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4 DETERMINANT OF HOUSEHOLD FOOD CONSUMPTION DIVERSITY IN LAMPUNG PROVINCE USING THE 2019 NATIONAL SOCIAL ECONOMIC SURVEY DATA

Abstract:

Diversifying food consumption was intended to reduce rice consumption while modifying food consumption patterns to become more diversified and healthier to gain excellent human resources. The goal of this study was to discover (1) household expenditure patterns and welfare levels, (2) household food consumption diversity, and (3) factors influencing household food consumption diversity. This analysis drew on secondary data from the 2019 National Social Economic Survey (NSES). The size of household samples utilized in this study was 9,046. Quantitative descriptive analysis was used to examine the household expenditure pattern and the welfare level. Desirable Dietary Pattern (DDP) approach was utilized to examine food consumption diversity. The multiple regression method was employed to determine the factors influencing food consumption diversity. The results indicated that the level of household welfare in Lampung Province is categorized as pre-prosperous household because the food share is 57.15%. The DDP score of the Lampung Province household was 75.44. This means that the diversity of household food consumption in Lampung Province was not ideal. Household income, age of the head of the household, mother's education, and gender of the head of the household had a positive effect to household food consumption diversity, while the number of household members and the level of welfare harmed the household food consumption diversity.

Keywords: Consumption, Diversification, Desirable Dietary Pattern

Introduction

Lampung Province is one of the provinces with an abundance of food, producing rice, corn, cassava, and other forms of food. According to The Food Security Agency, food availability index in Lampung Province in 2019 was 99.89 (Badan Ketahanan Pangan, 2020). This index's rating scale ranges from 0 to 100. So, that high score indicates that food availability in Lampung Province is excellent. However, this does not eliminate food issues in Lampung Province. Lampung Province's dietary problem is that its energy consumption in 2018-2019, namely 2,082 kcal and 2,051 kcal, is still below the national average (2,112 kcal) and does not comply with recommendation of Minister of Health Regulation No. 28 of 2019, namely 2,100 kcal (Badan Ketahanan Pangan, 2020). In addition, the regional medium-term development plan's target for the diversity of food consumption has not yet been met (Sayekti *et al.*, 2020a). This certainly feared will disrupt the stability of food security.

According to Badan Ketahanan Pangan (2020), the food consumption utilization index in Lampung Province is still inadequate (52.67). This is evident from the index value, which is still lower than that of the Riau Islands Province (78.17) and the Bangka Belitung Islands (70.56). This value is also the lowest among the other food security indices, namely the food availability index and the affordability index. Low food utilization rates can result in poor health. There has been an increase in cases of malnutrition in the region (Dito & Prayitno, 2019) as a result of the poor condition of health, which makes people susceptible to disease. To combat the low food utilization, therefore, intervention is required. Diversifying food consumption is one strategy for resolving this issue.

Food consumption diversity plays a crucial role in efforts to enhance nutrition and produce healthy individuals. In addition, the implementation of food consumption diversity aims to decrease rice consumption and alter food consumption patterns so that they are more diverse and nutritious. This is because no single diet type contains all nutrients. According to

Labadarios *et al.* (2011) the greater the number of food groups ingested, the greater the likelihood that the nutrients consumed will be met. Moreover, according to Parappurathu *et al.* (2015) and Taruvinga *et al.* (2013), the consumption of diverse and nutritionally balanced cuisine has a positive effect on the quality of life of human resources (HR) and improves the standard of living.

The Desirable Dietary Pattern (DDP)⁴⁷ is a measure of the variety of foods consumed. A diverse dietary pattern will affect the community's health and food security. According to Jones *et al.*, (2014) and Kumar *et al.* (2016), the greater the variety of foods ingested, the greater the improvement in nutrient intake. In addition, the diversity of people's dietary habits will reduce their reliance on particular commodities.

The diversity of food consumption which is a manifestation of food patterns is influenced by various factors. From various studies, it can be identified various variables that influence food consumption and food consumption diversity. These variables are household income variables (Alexandri & Kevorchian, 2015; Argandi *et al.*, 2019; Iftikhar *et al.*, 2020; Firdaus & Cahyono, 2017; Sayekti *et al.*, 2020a; Taruvinga *et al.*, 2013; Rinaldi *et al.*, 2017), number of household members (Argandi *et al.*, 2019; Miranti, 2017; Miranti & Syaukat, 2016; Firdaus & Cahyono, 2017; Sayekti *et al.*, 2020b; Workicho *et al.*, 2016), housewife's education (Alexandri *et al.*, 2015; Argandi *et al.*, 2019; Firdaus & Cahyono, 2017; Iftikhar *et al.*, 2020; Singh *et al.*, 2020; Taruvinga *et al.*, 2013; Workicho *et al.*, 2016), education of the household's head (Alexandri *et al.*, 2015; Firdaus & Cahyono, 2017; Iftikhar *et al.*, 2020; Miranti, 2017; Miranti & Syaukat, 2016) and age of the household's head (Iftikhar *et al.*, 2020; Firdaus & Cahyono, 2017).

In addition, food expenditure affects the diversity and or pattern of food consumption (Firdaus & Cahyono, 2017; Rinaldi *et al.*, 2017). Other studies have also found that there is a significant effect of non-food expenditure on consumption patterns and/or food diversity (Liu

et al., 2014; Mahmudiono *et al.*, 2017). Food expenditure/food share can be used as an indicator of household welfare (Sintha, 2019). According to Li (2009), diverse diets also increase consumer welfare because greater variety increases the likelihood of matching consumer preferences. The next variable that influences consumption and/or food consumption diversity is the sex of the head of the household (Codjoe *et al.*, 2016; Cordero-ahiman *et al.*, 2021; Misker *et al.*, 2016; Workicho *et al.*, 2016) and type of residential area (Alexandri & Kevorchian, 2015; Miranti, 2017; Qineti *et al.*, 2017).

According to research conducted in Germany by Thiele and Weiss (2003), the diversity of food consumption is influenced by household size, age, gender of the head of the household, employment status of the head of the household, and level of education of the head of the household. In addition, research conducted in Romania by Alexandri *et al.*, (2015) found that household income, the level of education of the head of household, the number of household members, and the location of domicile had a significant impact on the diversity of food consumption. According to research conducted by Zhang *et al.* (2017) in Southwest China, the diversity of household consumption is influenced by the gender, age, education, and income of the household's head. In addition, research by Ochieng *et al.* (2017) in Tanzania indicates that the education of the household head, food and nutrition training, and the size of the agricultural land are significant determinants of the diversity of food consumption.

Based on the findings of these studies, it appears that the factors that influence the diversity of food consumption vary. This is likely that regional behaviour differs. According to Sayekti *et al.*, (2020c) and Seda *et al.*, (2021), consumption patterns and food preferences are influenced by behaviour. Consequently, it is necessary to identify more closely related food consumption patterns in a region, either at the regional or provincial level. In Lampung

Province, research on household consumption diversity and consumption patterns has never been conducted.

This study's objectives are to analyse the pattern of household expenditures, the household welfare, the household food consumption diversity, and to determinant factors of household food consumption diversity in Lampung Province. It is anticipated that the identification of determinants of food consumption diversification can be used as a basis for formulating policies that will increase the quality of human resources.

Materials and Methods

Data, Sample, and Model Research

This research was a study that used secondary data in the form of cross-section data. Secondary data was raw data obtained from the Central Bureau of Statistics Republic of Lampung Province based on the results of the 2019 National Social Economic Survey (NSES). Initially, the raw data for this study were 9,653 households. After the outlier test was carried out (Ghozali, 2016), there were 607 data outliers, so the data analysed were 9,046 households.

This investigation utilized descriptive quantitative and verification data analysis. In this study, quantitative descriptive analysis employed a tabular summary of numbers to characterize the condition of household expenditure patterns, welfare level, and household food consumption diversity in Lampung Province.

Household expenditures were the costs that households incur to satisfy their consumption needs. There were two categories of household expenditures: food expenditures and non-food expenditures. The pattern of household food expenditures could characterize the behavior of household groups as a whole. From the description of this behavior, the type and quantity of food ingested could be determined. The percentage of household food expenditures/food share was used to determine the pattern of food consumption expenditures.

Total food expenditures were divided by total household expenditures multiplied by 100% yielding the food share.

Using the DDP score, food consumption diversity was measured. Law no. 18 of 2012 defines DDP as the composition of the amount of food according to nine food groups based on the contribution of energy that meets nutritional requirements in terms of quantity, quality, and diversity while considering social, economic, cultural, religious, and gastronomic considerations. Table 1 demonstrated that the DDP score was determined by multiplying the energy contribution of the nine food categories by their respective weights.

Table 1. DDP composition as a reference instrument for planning and evaluation

No	Food Group	Gram	Recommended Energy Distribution Value (kcal/day)	% Energy Adequacy Rate (EAR) Normative	Weight	Max DDP score
1	Grains	289	1,050	50	0.5	25.0
2	Tubers	105	126	6	0.5	2.5
3	Animal-derived food	157	252	12	2.0	24.0
4	Oil and Fat	21	210	10	0.5	5.0
5	Oily fruit and seeds	11	63	3	0.5	1.0
6	Nuts	35	105	5	2.0	10.0
7	Sugar	37	105	5	0.5	2.5
8	Vegetable and fruit	262	126	6	5.0	30.0
9	Others	0	63	3	0.0	0.0
Total			2,100	100		100.0

Source: (Badan Ketahanan Pangan, 2021)

Verification analysis was used to identify the determinants of food consumption diversity using the multiple regression model using the Ordinary Least Square (OLS) method. In this analysis model, classical assumption tests were carried out including multicollinearity tests, heteroscedasticity tests, and statistical criteria tests (Coefficient of Determination (R^2), F- statistics, and t- statistics).

Research variables included household income, number of household members, age of

head of household, level of education of head of household and housewife, type of area, gender of head of household, and level of household welfare. Household income was the quantity of money received by the household in question after total monthly expenditures (IDR/month) were deducted. The area type was a dummy variable (1 for urban and 0 for rural). Also used as a dummy variable was the gender of the head of the household (1 = male; 0 = female).

The pattern of household expenditures may also serve as an indicator of household well-being. The more prosperous the household, according to Engel's Law, the smaller the proportion of spending on food consumption. Based on the percentage of food expenditure, the level of household welfare in this study was divided into three categories: prosperous, pre-prosperous, and not yet prosperous. Pre-prosperous households have food expenditure percentages in the range of 50-60%, while not-yet-prosperous households have food expenditure percentages greater than 60%. The classification of welfare level was then utilized as a dummy variable for welfare level 1 (1 = pre-prosperous households; 0 = others) and welfare level 2 (1 = prosperous households; 0 = others). This investigation makes use of the following model:

$$DDP = \alpha + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + d_1 DA + d_2 DG + d_3 DW1 + d_4 DW2$$

DDP	: Desirable Dietary Pattern score of household
X_1	: Household income (IDR/month)
X_2	: Number of household members (person)
X_3	: Education level of the household's head (year)
X_4	: Education level of housewife (year)
X_5	: Age of the household's head (year)
DA	: Dummy variable for area type ($DA=1$ for Urban, and $DA=0$ for Rural)
DG	: Dummy variable for the gender of the household's head ($DG = 1$ for female, and $DG = 0$ for male)
$DW1$	: Dummy variable for welfare level 1 ($DW1=1$ for pre-prosperous households, and $DW1=0$ for others)
$DW2$	: dummy variable for welfare level 2 ($DW2=1$ for prosperous households, and $DW2=0$ for others)

Results and Discussion

Household Characteristics in Lampung Province

This study's sample of 9,046 households included 6,950 households from rural areas and 2,096 from urban areas. According to the 2019 NSES, the majority of household heads in Lampung Province were men (89.51%). Moreover, according to Table 2, the plurality of household heads was between the ages of 35 and 46 (27.81%). The majority of Lampung Province's household heads were of productive age (89.91%). The productive age is between the ages of 15 and 65, when a person is still able to work (BPS, 2020). In rural areas, the average age of the head of household was 49 years old, whereas in urban areas, the average age of the head of household was 46 years old.

The majority of households in Lampung Province have 3-4 members (27.81%). In terms of area type, the majority of households in rural and urban areas are the same, namely 4 people. According to BPS, (2020), households in Bandar Lampung City are households with the most number of household members, namely 4.21 when compared to other areas in Lampung Province. According to Wuryandari, (2015), the increasing number of household members can increase food expenditure.

The majority of the education level of household heads in Lampung Province are elementary school graduates (31.65%). Households that have attained 9 years of education are 44.80%. This was also found in the study of Amin *et al.* (2019) which states that the average length of schooling in Lampung Province is still below 9 years and is also still below the average length of schooling in Indonesia. Judging from the type of region, the education level of the head of the household in rural areas is elementary school, while in urban areas the education level of the head of household is senior high school (Table 2). In addition, the education level of household heads in urban areas is more in line with the 9-year compulsory education program (60.59%) compared to household heads in rural areas, which is only

around 40.04%. Based on this statement, there is a gap in household education between rural and urban areas. The gap in education levels between regions of residence can be caused by several factors, namely school facilities and the quality of teaching staff (BPS, 2020).

In contrast to the education level of the head of the household, the education level of housewives in Lampung Province is that the majority did not graduate from elementary school or did not attend school (33.45%). Overall, housewives who have reached an average length of schooling of 9 years are 39.94 %. When viewed based on the type of region, there is no difference in the level of education of housewives in rural and urban. The majority of the education level of housewives in the rural (34.35%) and in the urban (30.49%) did not graduate from elementary school or did not attend school. In addition, housewives whose average length of schooling has reached 9 years in urban and rural areas are 50.81% and 36.61%. Based on this description, it is necessary to increase the government's role in increasing the education or knowledge of housewives, considering that education is still low, and the important role of education. Education is a basic need for society. According to Article 31 paragraph 1 of the 1945 Constitution, every citizen has the right to education. It is hoped that the higher the level of education, the more advanced people will have insight and thinking patterns. According to Jacobus *et al.* (2019) and Aini *et al.* (2018) the higher the education, the more people can live a decent life and can reduce the increase in household poverty rates.

Household income is the total household expenditure per month (household food and non-food expenditure). The results of this study indicate that the average household income in Lampung Province is IDR 3,067,112.82/month. Based on the type of area, the average household income in urban areas is greater than in rural areas. The average household income in urban areas is IDR 3,848,623.19/month while in rural areas is IDR 2,831,422.79/month.

Table 2. Distribution of household characteristics in Lampung Province, 2019

Variable	Area Type					
	Frequency Rural	Percentage (%)	Frequency Urban	Percentage (%)	Frequency Rural & Urban	Percentage (%)
Area type	6,950	76.83	2,096	23.17	9,046	100
Gender of the household's head						
Male	6,283	90.40	1,814	86.55	8,097	89.51
Female	667	9.60	282	13.45	949	10.49
Total	6,950	100	2,096	100	9,046	100
Number of the household's members (person)						
1 – 2	1,422	20.46	391	18.65	1,813	20.04
3 – 4	4,036	58.07	1,125	53.67	5,161	57.05
>5	1,492	21.47	580	27.67	2,072	22.91
Total	6,950	100	2,096	100	9,046	100
Age of the household's head (year)						
16 – 25	132	1.90	43	2.05	175	1.93
26 – 35	1,089	15.67	308	14.69	1,397	15.44
36 – 45	1,955	28.13	561	26.77	2,516	27.81
46 – 55	1,784	25.67	561	26.77	2,345	25.92
56 – 66	1,290	18.56	410	19.56	1,700	18.79
> 66	700	10.07	213	10.16	913	10.09
Total	6,950	100	2,096	100	9,046	100
Education of the household's head (year)						
NS	1,771	25.48	359	17.13	2,130	23.55
Elementary school	2,396	34.47	467	22.28	2,863	31.65
Junior high school	1,411	20.30	360	17.18	1,771	19.58
Senior high school	1,186	17.06	683	32.59	1,869	20.66
Associate & Bachelor Degree	186	2.68	227	10.83	413	4.57
Total	6,950	100	2,096	100	9,046	100
Education of housewife (year)						
TS	2,387	34.35	637	30.39	3,024	33.43
Elementary school	2,015	28.99	394	18.80	2,409	26.63
Junior high school	1,454	20.92	356	16.98	1,810	20.01
Senior high school	869	12.50	505	24.09	1,374	15.19
Associate & Bachelor Degree	225	3.24	204	9.73	429	4.74
Total	6,950	100	2,096	100	9,046	100
Income of Household (IDR/Month)						
< 1,5 million	1,034	14.88	140	6.68	1,174	12.98
1,5 – 2,5 million	2,464	35.45	478	22.81	2,942	32.52
2,5 – 3,5 million	1,710	24.60	511	24.38	2,221	24.55
> 3,5 million	1,742	25.06	967	46.14	2,709	29.95
Total	6,950	100	2,096	100	9,046	100

Source: NSES Data, 2019 (processed data)

1 NS = Not graduating from elementary school or not attending school

This research also classifies household income per month into 4, namely household income < IDR. 1,500,000, household income of IDR 1,500,000 - 2,500,000, household income of 2,500,000 - 3,500,000 and household income stairs > IDR 3,500,000. Based on Table 3, households in Lampung Province are classified as income group 2 (IDR 1,500,000 – 2,500,000) with an average income of IDR 2,003,094.04/month. Judging from the type of area, it turns out that there are differences between households in urban and rural areas. In urban areas, the majority of household income is group 4 (household income > IDR 3,500,000) while in rural areas is class 2 (household income of IDR 1,500,000 – 2,500,000).

Household income and income per capita in Lampung Province are already above the poverty line (Table 3). According to BPS (2020), the household poverty line and per capita poverty line in Lampung Province in 2019 are IDR 1,966,052.00/month and IDR 418,309.00/month. Based on Table 3, there are 2,540 poor households (27.10%). The results of this study also show that there are more poor households in rural areas than in urban areas (Table 3).

Table 3. Summary of household income in Lampung Province according to the 2019 Poverty Line category (IDR/month)

Category	Average (IDR/month)	Standard deviation	Percentage (%)
Urban			
Poor	1,478,887.23	348.657,83	15,08
Not Poor	4,269.317,89	1.991.598,06	84,92
Total	3,848.623,19	2.093.769,14	100,00
Rural			
Poor	1,457.985,04	364.959,55	32,00
Not Poor	3,477.746,44	1.396.268,27	68,00
Total	2,831.422,79	1.502.011,00	100,00
Urban and Rural			
Poor	1,460.585,47	362.970,19	27,10
Not Poor	3,694.315,33	1.620.307,78	72,90
Total	3,067.112,82	1.712.556,57	100,00

Source: NSES Data, 2019 (processed data)

1. Household Expenditure Patterns

Household expenditure is spending on goods and services by households to meet the necessities of life. Household expenditure in Lampung Province consists of food and non-

food expenditure. The results of this study show that the average total household expenditure per month in Lampung Province in 2019 was IDR 3,067,112.82/month and the total per capita expenditure was IDR 911,356.50/ month (Table 4). The results of this study also show that the average household food and non-food expenditure per month in Lampung Province in 2019 was IDR 1,672,553.66 and IDR 1,394,559.17/month respectively.

It can also be seen that the average household expenditure in rural areas is lower than that in urban areas (Table 4). This is presumably because income in urban areas is greater than in rural areas. According to Abdillah *et al.*, (2019), the average per capita income significantly influences food and non-food expenditure in each type of region. Likewise, according to research by Wuryandari (2015) which states that socio-demographic, socio-economic, and residential conditions have a significant effect on the proportion of household expenditure on food, total household expenditure on education, and health.

Table 4. Household Expenditure in Lampung Province 2019

Area type	The household expenditure (IDR Million/month)			Expenditure per capita (IDR Million/month)		
	Food	Non- Food	Total	Food	Non-Food	Total
Rural	1,58	1,24	2,83	0,47	0,38	0,85
Urban	1,95	1,89	3,84	0,55	0,55	1,10
Province	1,67	1,39	3,06	0,49	0,42	0,91

Source: NSES Data, 2019 (processed data)

The average household food share in Lampung Province is 57.15%. In addition, based on the type of region, households in urban areas in Lampung Province have a smaller percentage of food shares compared to rural areas (Table 5). According to Engel's Law, the lower the percentage of food expenditure (food share) indicates the better the household economy. In addition, BPS, (2020) states that if the percentage of household food expenditure is below 60%, it indicates that Lampung Province households are not food-vulnerable.

Food expenditure consists of 14 groups, namely grains, tubers, marine animals (fish, squid, shrimp, shellfish), meat, eggs and milk, vegetables, nuts, fruits, oil and coconut, ingredients for beverages, spices, other foodstuffs, ready-to-drink foods, and cigarettes and

tobacco. Based on Table 5, the highest average household food expenditures per month are expenditures for the processed food and beverage group (IDR 421,860.14), cigarettes and tobacco expenditure (IDR 257,462.64) and grain expenditure (IDR 239,376.07). Based on the type of area, the average expenditure for processed food households in urban areas is IDR 197,954.50 more than households in rural areas. The same is also seen in the average expenditure on cigarettes and tobacco in urban households which is greater than in rural areas. There is a difference in the average spending on grain commodities in urban areas which is lower than households in rural areas (Table 5).

The highest average household food budget share in Lampung Province in Table 5 is processed food and beverage commodities at 13.44%, followed by grain commodities (9.26%) and cigarette and tobacco commodities (8.25%). The budget share of food groups in households can be used as an illustration of how these households allocate their budget for consuming more specific foods in food commodity groups. The percentage of food expenditure for the processed food group in Lampung Province is still low when compared to the average in Indonesia (17.29%). However, the percentage of grain expenditure in Lampung Province is greater than the average in Indonesia (5.57%). The government needs to pay attention to the high consumption of grains in Lampung Province.

The same thing is also found in Table 5 which shows that the percentage of cigarette/tobacco expenditure in Lampung Province is 2.20%, greater than the average percentage of expenditure in Indonesia. According to Purwaningsih *et al.* (2015), the high percentage of expenditure in the cigarette and tobacco group needs to be watched out for considering the health risks of smoking. Not only it is detrimental to health, but smoking habits also have an impact on reducing household expenses in meeting food and education needs (Ginting & Maulana, 2020). In addition, according to BPS Provinsi Lampung (2019), cigarette/tobacco commodity expenditure is the 2nd largest contributor to the poverty line

(9.45%). According to Wandita (2020), the factors that influence cigarette consumption in households in Lampung Province are the price of cigarettes, household income category, and the education level of the head of the household.

Households in urban areas have a larger budget share of processed food and beverage expenditure per month (1.81%) compared to rural areas (Table 5). This is in line with the research of Miranti *et al.* (2016) in West Java and Mayasari *et al.* (2018) in East Java which shows that households in urban areas consume more prepared food and beverages compared to households in rural areas. The high budget share of the prepared food group in urban areas is suspected of a change in the lifestyle/habits of the community and the busyness of the urban community. Currently, people prefer to gather to eat out and spend a lot of activities or activities outside the home. In addition, many activities outside the home require them to consume prepared food and drinks because they are more practical. An increase in spending on food allocation for processed food commodities can have a positive impact on the processed food and beverage industry.

It can be seen in Table 5, that the next highest expenditure is the expenditure of the grains group. The high average share of the grain group's budget indicates that grain consumption is one of the main priorities in spending on household needs in Lampung Province. In addition, the percentage of grain expenditure in rural areas is higher than in urban areas. This is in line with research by Purwaningsih (2015) and Miranti *et al.* (2016) which shows that the proportion of expenditure on grain in rural is higher than in urban areas.

The results of this research also show the percentage of cigarette/tobacco spending in urban areas is 1.03% lower than in rural areas. This was also reported by Miranti *et al.* (2016) which states that the percentage of cigarette/tobacco expenditure in villages is 1.41% greater than in cities.

Non-food expenditure consists of 6 groups, namely housing and household facilities, various goods and services, clothing, footwear and headgear, durable goods, taxes, insurance, and parties and ceremonial needs. Based on the results in Table 5, the largest household non-food expenditure is housing and household facilities expenditure, which is IDR 736,416.38/month and non-food expenditure per capita in Lampung Province is IDR 227,479.86/month. In addition, non-food expenditure, namely the housing group and household facilities in urban areas is greater than in rural areas. Expenditures for housing and household facilities consist of housing costs, home maintenance, and repairs, electricity costs, municipal waterworks costs, and fuel costs and include telephone, credit, internet, and so on costs.

Table 5. Household Food and Non-food Expenditure in Lampung Province 2019

The household expenditure	IDR/month			Budget Share (%)		
	Rural	Urban	Rural + Urban	Rural	Urban	Rural + Urban
Cereals	245,073.27	220,485.07	239,376.07	10.00	6.81	9,26
Tubers	11,475.48	12,051.44	11,608.94	0.43	0.35	0,41
Fish/shrimp/common squid/shells	122,570.14	175,906.59	134,928.44	4.34	4.57	4,40
Meat	53,390.90	69,686.21	57,166.60	1.70	1.58	1,67
Egg and Milk	86,853.44	123,869.47	95,430.22	3.10	3.26	3,14
Vegetables	152,911.72	164,279.59	155,545.71	6.08	5,02	5,83
Legumes	43,106.37	53,169.15	45,437.96	1.73	1.60	1,70
Fruits	59,891.71	90,395.31	66,959.54	2.00	2.33	2,08
Oil and Coconut	53,725.99	56,743.71	54,425.21	2.18	1.76	2,08
Beverages stuffs	61,635.19	59,050.50	61,036.31	2.49	1.82	2,33
Spices	40,089.58	41,545.55	40,426.93	1.56	1.26	1,49
Miscellaneous Type of Food Commodity	29,234.31	36,375.51	30,888.96	1.09	1.03	1,07
Prepared Food and Beverages	375,993.17	573,947.67	421,860.14	13.02	14.83	13,44
Cigarettes	251,527.03	277,144.17	257,462.64	8.49	7.46	8,25
Total Food Expenditure	1,587,478.30	1,954,649.92	1,672,553.66	58.20	53.68	57,15
Housing and Household Facilities	649,127.92	1,025,850.92	736,416.38	23.20	26.39	23.94
Goods and Services	270,731.98	465,717.10	315,910.93	8.92	10.79	9.35
Clothing, footwear, and headgear	100,942.88	128,327.51	107,290.61	3.34	3.15	3.29
Durable goods	114,523.61	116,768.36	115,039.63	2.82	2.21	2.68
Taxes and insurance	76,131.51	126,686.08	87,835.82	2.58	2.99	2.67
Parties and ceremonies	236,816.46	313,396.58	250,905.99	0.96	0.80	0.92
Total Non-food Expenditure	1,243,944.50	1,893,973.27	1,394,559.17	41.80	46.32	42.85
Total Expenditure	2,831,422.79	3,848,623.19	3,067,112.83	100.00	100.00	100.00

Source: NSES Data, 2019 (processed data)

2. Household Welfare Level

One of the main indicators in describing the level of household welfare is household food consumption expenditure (Puspita & Agustina, 2020). Households with a small proportion of food expenditure (food share) compared to non-food expenditure, it can be assumed that these households are prosperous (Wuryandari, 2015). This is based on Engel's Law which states that the lower the proportion of food expenditure, the more prosperous the household will be (Kumar *et al.*, 2016). The level of household welfare in this study is classified into prosperous, pre-prosperous, and not yet prosperous households. Based on the results of this study, the level of household welfare in Lampung Province is categorized as pre-prosperous household because the average percentage of food expenditure is 57.15%. The results also showed that 2,263 households (44.12%) in Lampung Province were classified as not prosperous households, 2,792 households (30.86%) were pre-prosperous and 2,263 households (25.02%) were prosperous households. In this study, welfare level was used as a dummy variable for welfare level 1 (1 = pre-prosperous households; 0 = others) and welfare level dummy 2 (1 = prosperous households; 0 = others).

Based on Figure 1, the highest percentage of food consumption expenditure allocation (budget food share) in households that are prosperous, pre-prosperous, and not yet prosperous is the processed food and beverage group and the lowest is the tubers group. The results of this study also show that the pattern of food consumption in prosperous households is better than that of pre-prosperous and less-prosperous households. As seen in Figure 1, after fulfilling the consumption of the grain group, wealthy households allocate food needs to the protein group (fish, shrimp, squid, shellfish) and fibre (vegetables) group, in contrast to poor and less prosperous households which allocate expenditure in the cigarette and tobacco group.

This is following Bennett's law which states that the more prosperous and household income increases there will be a change in consumption patterns which were initially only dominated by staple foods such as grains to become more varied such as consuming foods rich in fibre and vitamins (fruits and vegetables), as well as protein, namely milk, and meat (Gevisioner, 2015). Hamid *et al.* (2013) also stated that households at certain income levels would prioritize food at lower prices, such as energy food. Then if the level of income increases, a consumption preference will change from previously cheap food to high-priced food such as protein food.

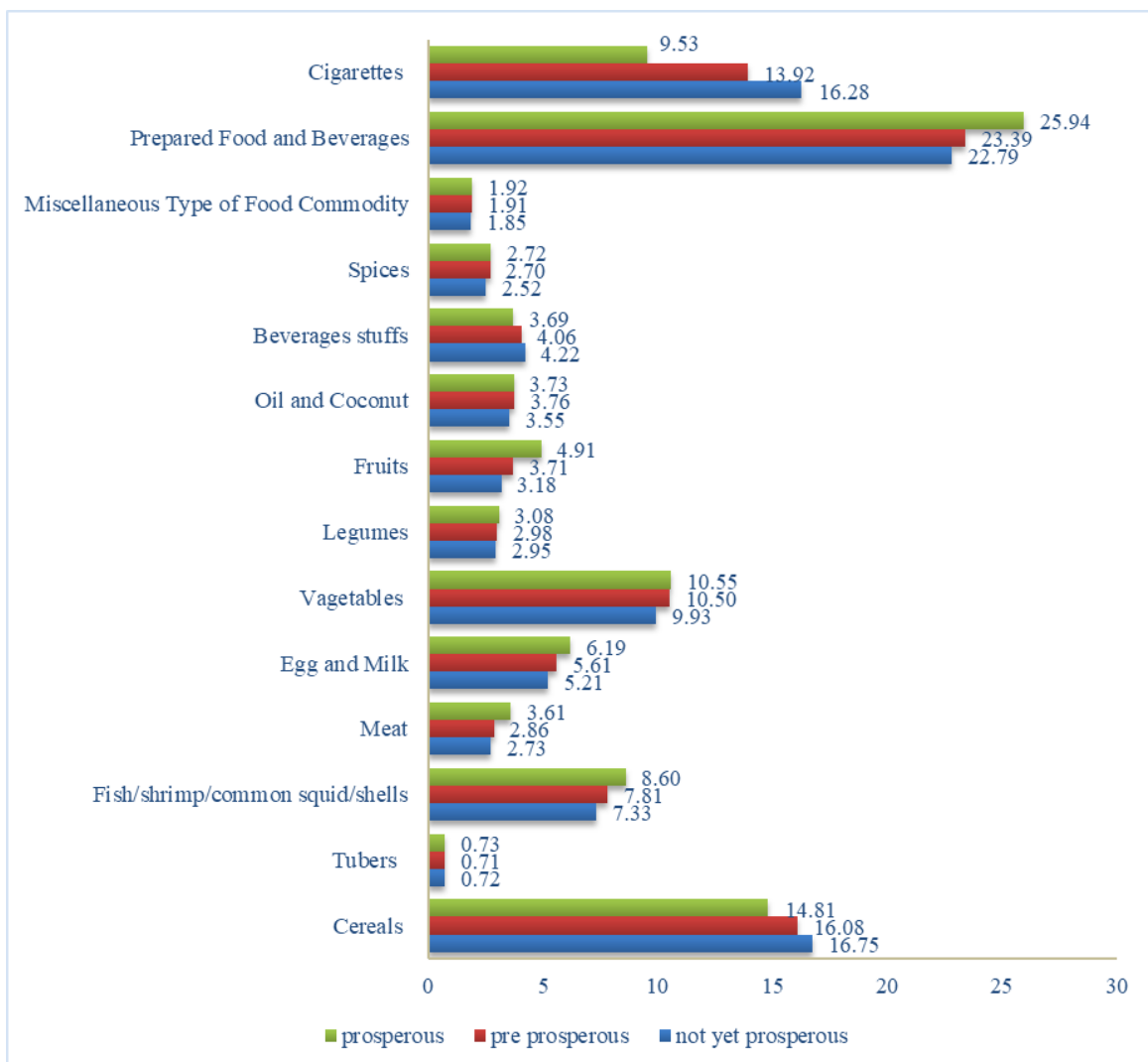


Figure 1. Budget food share according to welfare level

3. Desirable Dietary Pattern Score (Food Consumption Diversity)

The Desirable Dietary Pattern (DDP) score in this study was obtained from the research results of Sayekti, *et al.* 2022. The results of this study show that the DDP score in Lampung Province is 75.44 (Figure 2). This score is still quite far from the ideal DDP score of 100. The DDP score in Lampung Province is lower when compared to research by Dewanti *et al.*, (2020) in Central Java and Musta'in & Saputro (2021) in the Special Region of Yogyakarta. Based on this research, the PPH score in Central Java Province was 89.07 and in Yogyakarta Province, the DDP score was 89.92.

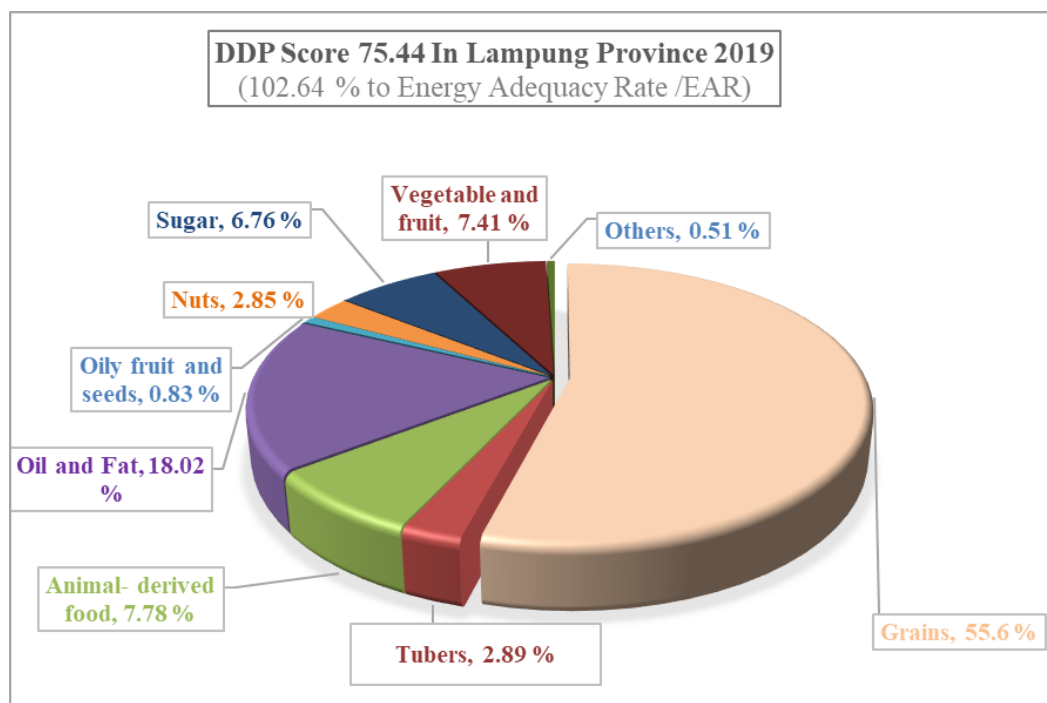


Figure 2. DDP score in Lampung Province in 2019 (Source: Sayekti *et al.*, 2022)

Table 6 shows the food groups with the largest to the smallest energy grains, oils and fats, animal-derived foods, vegetables, fruit, sugar, tubers, nuts, and others. It can be seen that the food consumption for the grain, oil, fat, and sugar group exceeds the recommendations, while the consumption of tubers, animal-derived foods, vegetables, fruit, nuts, oily fruit and seeds is still not in accordance with the recommendations. In addition, Table 6 also shows that all food groups in Lampung Province are still below the ideal rate.

Table 6. DDP score calculation in Lampung Province 2019

No.	Food Group	Average Consumption							DDP Score
		Energy	Ideal Energy*	%EAR	Ideal % EAR*	Weight	% EAR x Weight	Ideal Standard DDP	
1	Grains	1.195,45	1.050	55,60	50	0,50	27,80	25,00	23,29
2	Tubers	62,17	126	2,89	6	0,50	1,45	2,50	0,95
3	Animal-derived food	167,17	252	7,78	12	2,00	15,55	24,00	13,73
4	Oil and fats	387,40	210	18,02	10	0,50	9,01	5,00	4,82
5	Oily Fruit and Seed	17,82	63	0,83	3	0,50	0,41	1,00	0,34
6	Nuts	61,28	105	2,85	5	2,00	5,70	10,00	5,07
7	Sugar	145,26	105	6,76	5	0,50	3,38	2,50	2,23
8	Vegetables and Fruits	159,28	126	7,41	6	5,00	37,04	30,00	25,02
9	Others	11,00	63	0,51	3	0,00	0,00	0,00	0,00
Total		2.206,84	2.100	102,64	100	-	100,34	100,00	75,45

Source: Sayekti *et al.* (2022)

4. Determinants of Household's Desirable Dietary Pattern (Food Consumption Diversity)

The results of the DDP score determinant analysis are described in detail as follows.

First, a test for violating the classical assumption of multicollinearity was carried out, the results of which can be seen in Table 7.

Table 7. Multicollinearity test results

Variable	Coefficient Variance	Uncentered VIF	Centred VIF
C	0.492390	39.55919	NA
X1	6.84E-15	6.776805	1.610505
X2	0.008832	10.65610	1.308365
X3	9.75E-05	19.76160	1.366462
X4	0.001231	6.800197	1.814917
X5	0.001262	6.043866	2.023284
DA	0.077394	1.440718	1.106897
DG	0.169422	1.427967	1.278161
DW1	0.071102	1.763112	1.218937
DW2	0.103905	2.088341	1.565909

Source: NSES Data, 2019 (processed data)

Table 7 shows that there is no multicollinearity problem in the model because the VIF obtained for all variables is less than 10. Second, a heteroscedasticity test was carried out whose results can be seen in Table 8.

Table 8. Heteroscedasticity test results

F-statistic	13.61070	Prob. F(9,9036)	0.0000
Obs*R-squared	120.9917	Prob. Chi-Square(9)	0.0000
Scaled explained SS	118.2562	Prob. Chi-Square(9)	0.0000

Source: NSES Data, 2019 (processed data)

From Table 8 it can be seen that Prob. Chi-Square obtained is less than 0.05. So, in this model, there is a problem of heteroscedasticity. Therefore, it is necessary to improve the model. The results are presented in Table 9.

Table 9. The results of the regression analysis determine the DDP score

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	80,38420***	0,716093	112,2538	0,0000
X ₁ (Household income)	4,89E-06***	1,07E-07	45,63023	0,0000
X ₂ (Number of household members)	-5,649353***	0,100073	-56,45228	0,0000
X ₃ (Age of the head's household)	0,051761***	0,010007	5,172563	0,0000
X ₄ (Education of the head's household)	0,035311 ^{ns}	0,037609	0,938880	0,3478
X ₅ (Education of the housewife)	0,102437***	0,035396	2,894022	0,0038
D _A	0,321476 ^{ns}	0,274756	1,170040	0,2420
D _G	2,395239***	0,417431	5,738054	0,0000
D _{W1}	-2,988287***	0,263996	-11,31944	0,0000
D _{W2}	-8,955807***	0,319880	-27,99743	0,0000
R-squared	0,386712			
Adjusted R-squared	0,386101			
S.E. of Regresion	10,61107			
F-statistic	633,0763			
Prob(F-statistic)	0,000000			

Source: NSES Data, 2019 (processed data)

*** = significant $\alpha = 0,01$; ** = significant $\alpha = 0,05$; * = significant $\alpha = 0,1$; and ns = not significant.

Table 9 is the result of the best DDP score determinant analysis because it is free from multicollinearity and heteroscedasticity problem. From the table, it can be seen that the adjusted R^2 obtained is 0.3861. This means that 38.61% of the DDP score variation can be explained by household income, number of household members, age of head of household, education of the household's head, education of housewife, area, gender of the household head, and level of welfare. Other variables that were not analysed contributed 61.39% to the DDP score variation. The use of secondary data with a broad scope in this study causes limited data availability. Therefore, another study is needed that uses models with more complete variables.

From the F-stat obtained, it can be concluded that household income, number of household members, age of the household head, education of the household head, education of housewife, area, gender of the household head, and level of welfare have a significant effect on the DDP score with a confidence level of 99%. However, the results of the partial test show that household income, number of household members, age of the household head, education of the housewife, gender of the household head, and level of welfare have a significant effect on the DDP score, while the education of the household head and area has no significant effect on DDP score.

Household income has a significant effect on the DDP score with a 99% confidence level. The regression coefficient of 4.89E-6 indicates that if household income increases by IDR.1,000,000.00 per month, the DDP score will increase by 4.89. This is in line with research by Alfiati, (2018), Aneftasari *et al.* (2016), Rinaldi *et al.* (2017), Taruvinga *et al.* (2013), and research by Hutagaol and Sinaga (2022) which states that an increase in income will further increase the variety of food consumed so that it can influence food consumption patterns. In addition, according to Gevisioner *et al.* (2015) and Handayani *et al.* (2019) an

increase in income has a great opportunity to choose and buy various types of food products with better quality and quantity under balanced nutrition provisions.

¹⁴ The number of household members has a significant effect on the DDP score with a ¹99% confidence level. The regression coefficient obtained is -5.6494 which means that if the member in the household increases by one person, the DDP score will decrease by 5.65. The results of this research follow research by [Alfiati \(2018\)](#), [Ismiasih et al. \(2013\)](#) and [Qinetti et al. \(2017\)](#) which shows the number of household members has a negative effect on the diversity of food consumption. In addition, according to [Dewanti et al. \(2020\)](#), households with more than 4 members tend to have less chance of achieving a high diversity of food consumption. ¹ An increase in the number of household members can contribute to an increased expenditure burden borne by the head of the household which is getting bigger. Thus, an increasing number of household members without an increase in income can make these households prioritize allocating their income to meet the quantity of food rather than diversifying the food they consume. In addition, households with a larger number of household members tend to consume only one type of staple food which is cheap ([Hutagaol and Sinaga, 2022](#)).

¹ The age of the head's household has a significant effect on the DDP score with a 99% confidence level. With a regression coefficient of 0.0518, if the ⁴² age of the household head increases by one year, the DDP score will increase by 0.05. This following the research of [Firdaus and Cahyano \(2017\)](#) in Yogyakarta Province and East Nusa Tenggara Province and research by [Dewanti et al. \(2020\)](#) in Central Java Province which concluded that the age of the head of the family had a significant effect on the diversification of household food consumption. ¹⁹ As the age of the household's head increases, experience also increases, including experience in choosing good food for consumption.

The education of the housewife has a significant effect on the DDP score with a 99% confidence level. The regression coefficient of 0.1024 indicates that if a housewife's education increases by one year, the expected food pattern score will increase by 0.10. This is following the research of [Rahma et al. \(2020\)](#) and [Alfiati \(2018\)](#) which show that the level of a housewife's education has a significant effect on the diversity of food consumption. Furthermore, according to [Amugsi et al. \(2016\)](#) housewives with a higher level of education than basic education are more likely to achieve a more varied diet when compared to housewives who are not educated. Similarly, the research's [Hamid et al. \(2013\)](#) stated that the more educated the housewife is, the more knowledge and insight the housewife has about nutrition so that when the mother cooks food every day, it is not only based on habits and the concept of being full. The housewife will consider or choose a quality type of food and also pay attention to the nutritional elements contained in the food.

The gender of the head's household has a significant effect on the DDP score with a 99% confidence level. The regression coefficient obtained is 2.3952. This means that the DDP score of households with female heads of households is 2.39 higher than the DDP scores of households with male heads of households. The results of this research are in line with the research of [Taruvunga et al. \(2013\)](#) and [Dewanti et al. \(2020\)](#) who concluded that female heads of household tend to have a higher diversity of food compared to households with male heads of household.

The welfare level has a significant effect on the DDP score with a 99% confidence level. The regression coefficients obtained are -2.9883 and -8.9558. This shows that the DDP score for less prosperous households is the highest (80.38). The PPH score for pre-prosperous households is 77.39. The DDP score for prosperous households is the lowest at 71.42. The results of this study are not in line with the research by [Mayasari et al. \(2018\)](#) which states that households with better welfare will tend to pay attention to the quality and quantity of

food consumed by their households compared to households with a low level of welfare. With this difference in results, it is suspected that prosperous households will try to allocate their income for secondary and even tertiary needs which can increase the percentage of non-food expenditures such as education, health, and other expenses.

¹ The education of the head's household has no significant effect on the DDP score because the confidence level is less than 90%. Nearly 90% of household heads are male. The head of this household is in charge of earning a living, so the task of organizing and providing food for household members is in the hands of the mother. In addition, according to Dewanti *et al.* (2020), education can cause a person to have a wider choice in determining the food he consumes. This results in a person's level of education not always being aligned with consumption patterns. So, the higher the ³ education level of the head of the household does not determine the higher the DDP score achieved.

The area has no significant effect on the DDP score because the level of confidence obtained is also less than 90%. This shows that DDP scores in rural areas are the same as DDP scores in urban areas.

Conclusion

The findings of ³⁸ this study suggest that the level of diversity in food consumption among households in Lampung Province was suboptimal, as reflected by the DDP score of 75.44 for the region. The aforementioned score exhibits considerable deviation from the optimal DDP score of 100. The present study indicates that certain factors positively contribute to the household food consumption diversity, including the income level ³ of the household, the age of the household head, the educational attainment of the housewife, and the gender of the household head. Conversely, the number of household members and welfare level negatively impact ¹⁵ the household food consumption diversity.

The findings of this study demonstrate that household characteristics are a key factor in determining food consumption diversification. As such, there is a pressing need to engage in socialization, promotion, and counselling interventions aimed at fostering the consumption of diverse, nutritious, balanced, and safe food to enhance overall food quality. Moreover, a deficient background in education can lead to a deficiency in comprehension and understanding regarding the consumption of high-quality food, thus necessitating the enhancement of both formal and informal educational efforts. This is attributable to the fact that superior education has the potential to augment both the financial resources and overall well-being of households.

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