

Security in
food,
renewable
resources,
and
natural
medicines



SFRN 2019

PROCEEDING

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**3rd INTERNATIONAL CONFER-
ENCE ON SECURITY IN FOOD,
RENEWABLE RESOURCES, AND
NATURAL MEDICINES 2019
(SFRN 2019)**

Convention Hall Politeknik Pertanian Negeri Payakumbuh
INDONESIA



hosted by,
Politeknik Pertanian
Negeri Payakumbuh



co-Hosted by,
Universitas Andalas
(UNAND)

QUANTUM-LEAP OF AGRI-FOOD SYSTEM 4.0 AND DELIVERY OF SUSTAINABLE DE- VELOPMENTS GOALS (SDGS)

September 25-26, 2019



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SUSTAINABLE DEVELOPMENTS GOALS (SDGS)”

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Welcome Message
**Executive Chairman of The 3rd International Conference on Security in Food,
Renewable resources, and Natural Medicines (SFRN) 2019**



Dear Honorable ladies and gentlemen,

Good Morning and Assalamu'alaikum wr.wb

On behalf of the SFRN 2019 organizing committee, I am really honoured and delighted to welcome all of you to the 3rd International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019 at the State Polytechnic of Agriculture Payakumbuh, West Sumatra Indonesia

Our technical program is rich and varied with 8 keynote speeches and 4 invited talks and more than 170 technical papers split between 8 parallel oral sessions and 1 poster sessions. The speakers and participants came from 8 different countries, consist of Academicians, Scientists, Researchers, Practitioners, Professionals, and Government Officials in multidiscipline branch of knowledge, who gathered here today to share and discuss new findings and applications of innovations for promoting Food Security, Renewable Energy, Sustainable Resources and HealthCare Free for All, in particular for those who in needs. As the chairman of conference 2019 SFRN, I know that the success of the conference depends ultimately on the how many people who have worked in planning and organizing both the technical program and supporting social arrangements. This year, the conference is jointly organized by the Payakumbuh State Agricultural Polytechnic and Andalas University. We also thank to the steering committee for their wise and brilliant advice on organizing the technical program; and also to the the Program Committee, both from the Payakumbuh State Agricultural Polytechnic and Andalas University , for their thorough and timely reviewing of the papers and to the Director of Payakumbuh State Agricultural Polytechnic and the rector of Andalas University, and the Head of the Institute for Research and Community Service of Andalas University, and Payakumbuh State Agricultural Polytechnic. Our recognition should go to the Organizing Committee members who have all worked really hard for the details of the important aspects of the conference programs and social activities, and then we extend our gratitude to our students who bore the arduous burden for preparing this event.

We hope this event is also a good step in gaining strengthenn cooperation between our universities as we know that the State Agricultural Polytechnicof Payakumbuh is part of the Andalas University previously, of course the psychological relationship between the State Agricultural Polytechnicand the Andalas University is really close.

Finally on behalf of the committee, we apologize profusely for all the shortcomings and everything that is not properly in organizing this event and hopefully AES-Network contributes significantly to the research and technology for the good of humanity.

Thank you

Fithra Herdian, S.TP, MP

**Message from Afro-Eurasia Scientific (AES) Network
3rd International Conference on Security in Food, Renewable resources, and
Natural Medicines (SFRN) 2019**



Dear Honorable and Distinguished guests,
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

On behalf of the AES Network, I am honored and delighted to welcome you to the 3rd International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019 at the Agricultural State Poly Technique of Payakumbuh, Indonesia. I believe we have chosen a venue that guarantees a successful technical conference amid the culture, delicacy and scenery of Payakumbuh, the city of “Rendang”.

The AES-Network aims to Promote Livelihood Through Food Security, Promote Future Smart and Green Mobility by Using Renewable Energy, Promote Prosperity by Equally Managing and Distributing the Sustainable Resources and Promoting Enjoyable Long-Life by using Natural Medicines With Free Health Care For All. The AES-Network was established in 2018 and already have memberships from 12 countries. Our members consist of Academicians, Scientists, Researchers, practitioners, professionals, and government officials from multidiscipline branch of knowledge, who gathered and contributed their expertise to share and discuss new findings and applications of innovations for promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care for All. In particular, the network aims to alleviate the condition of those who in dire needs. In the future, we also expect to provide technical demonstrations, and numerous opportunities for informal networking for Promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care for All. In this opportunity, we invited you to become our members and join our efforts for a better life to all of mankind.

As a team, we acknowledge the existence of mutual interest among university and college educators, researchers, activists, business sector, entrepreneurs, policy

makers, and all society members. We must promote the need to strengthen cooperation for establishing Security in Food, Renewable Resources, and Natural Medicines in Africa, Europe, and Asia.

The AES-Network believe, a firm foundation for mutual collaboration with the spirit of equality and partnership and thereby contribute towards sustainable development in these three regions.

Therefore, through networking, friendships, and joint efforts, the capacity of our network can be enhanced to address major challenges in securing the Food, Renewable Resources, and Natural Medicines in Africa, Europa, and Asia. Our Network goals are to increase the awareness of educators, researchers, scientific community, business sector, entrepreneurs, and policy makers in Africa, Europa, and Asia, that the future of a better world, lies within their responsibilities, and to improve the networking, mobility and mutual collaboration of scientific community, business sector, entrepreneurs, and policy makers in Africa, Europe, and Asia to energize the delivery of Sustainable Development Goals.

Finally, I hope that, by registering our network, you will be provided a common platform and support the exchange of knowledge, while at the same time, we offer constructive dialogue across and within the various interest and stakeholder groups, including the intended beneficiaries, and arrived at the best solutions to our terminal goal, Promoting Food Security, Renewable Energy, Sustainable Resources and Free Health Care based on scientific evidence in Africa, Europa, and Asian region.

Thank You for Joining us!

President

Assoc. Prof. Dr. Eng. Muhammad Makky

Welcome Message
Head of Institute for Research and Community Service
Universitas Andalas



Dear Honorable and Distinguished guests,
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

It is with great pleasure that I welcome the participants of the SFRN 2019 in Payakumbuh, the city of “Rendang”, the prime of Indonesian delicacy.

In this esteem event, we share the knowledges, and imparted it to the people. The quest for knowledge has been from the beginning of time but knowledge only becomes valuable when it is disseminated and applied to benefit humankind. It is hoped that this conference will become a platform to gather and disseminate the latest knowledge which can be adopted for securing the food, resources, and health for mankind, in Asian, European and African region.

Academics, Scientists, Researchers and practitioners from multidisciplinary branches of knowledge who gathered here today will be able to share and discuss new findings and applications of innovations for ensuring food security, in particular for those who reside in developing countries. It is envisaged that the intellectual discourse will result in future collaborations between universities, research institutions and industry both locally and internationally. In particular it is expected that focus will be given to issues on environmental and sustainability. Therefore, we urge to all participants, to establish a scientific network that will voice the needs

Researchers in the multi sectoral aspects related to the benefit of mankind have been progressing worldwide. Food is a basic right, while energy drive the world. Human need a lot of resources so the civilization can be flourished. But human is not immune, and thus, ones need to take care of their health regularly. Modern Agri-food systems is the foundations of a decent life, a sound education and the achievement of

the Sustainable Development Goals. Over the past decade, we have witnessed a chain reaction that threatens the very foundations of life for millions of the world's people. Rising energy prices drove up the cost of food and ate away the savings that people otherwise would have spent on health care or education. Unsustainable plantation management induced forest fire and posed haze hazard to the whole Sumatra island and our neighboring countries.

The human cost of the food and energy crisis has been enormous. Millions of families have been pushed into poverty and hunger. Thousands more suffering from the collateral effects. Over the past year, food insecurity led to political unrest in some 30 countries. Yet because the underlying problems persist, we will continue to experience such crises, again and again -- unless we act now. That is why we are here today.

We must make significant changes to feed ourselves, and most especially, to safeguard the poorest and most vulnerable. We must ensure safety nets for those who cannot afford food, or energy, nor even a health service. We must transform agricultural development, markets and how resources is distributed. We must do so based on a thorough understanding of the issues. That is the only possible way we can meet the Goals of Sustainable Development.

Thank You,

Assoc. Prof. Dr.-Ing. Uyung Gatot S. Dinata,MT.

**Opening Ceremony
Rector of Andalas University**



Dear Honorable and Distinguished guests,
Ladies and gentlemen,

Assalamu'alaikum Warahmatullahi Wabarakatuh and Good Morning

I welcome the opportunity to address you at this important event.

It gives me great pleasure in welcoming you to this 3rd Conference on "Security in Food, Renewable resources, and Natural Medicines (SFRN)" 2019. I am delighted that so many have accepted our invitation. I am particularly happy that we have in this room, dedicated individuals from so many stakeholder groups — including our most respected and distinguished guest “The ministry of Agriculture of the Republic of Indonesia”. We also welcome the mayor of Payakumbuh and the Regent of Lima Puluh Kota. We extend our welcome to the civil society, the private sector, international organizations; the science community; and others dedicated to help create an environment in which people can escape food insecurity. Imagine what we can do together if we make the security for all as an our top priority, and pull in the same direction. We can make a difference in the lives of millions.

Food is a basic right. Food security are the foundations of a decent life, a sound education and the achievement of the Sustainable Development Goals Access to medicines - a fundamental element of the right to health. Health is a fundamental human right, indispensable for the exercise of many other rights in particular the right to development, and necessary for living a life in dignity. Moreover, human rights principles and language are being used to support resource access claims as rights-based approaches empower individuals and groups to gain or maintain access to natural resources

Much progress has been made during the last decades but much more needs to be done. Millions of people are Insecure worldwide, meaning that they either starve or they do not know from where their next meal, health care or resources will come.

Much of the progress on security has occurred at the expense of our environment. With business as usual, we foresee that the production improvements during the next decade will be less than the last one, while the environmental degradation will continue, and health will deteriorate significantly. Without available resources to seek, mankind will become endanger species in a very short time.

Solutions to the security problems need to be designed and implemented within a new and rapidly changing environment. Globalization and sweeping technological changes offer new opportunities for solving these problems. A number driving forces or trends must be taken into account in developing appropriate action. Some of the action needed, such as appropriate technology for small farms, is not new but it must be cast in the new and changing global and national environment, taking into account new opportunities and risks. I hope that by providing a forum for knowledge exchange, this conference will help identify the action to be taken. Furthermore, this conference will help to provide constructive dialogue across and within the various interest and stakeholder groups, including the intended beneficiaries, and arrive at the best solutions.

In conclusion, even if those responsible give high priority to achieving sustainable security for all and back it up with action, the world may not achieve the goal by 2030. But we will be much closer than with business as usual. I urge all of us to provide the strongest support for this event, to enable securing the food for all in the closest time possible. It is my sincere optimism that through the accomplishment of the objectives of this event, we will come to an important step nearer to secure the food for all.

Finally, I would like to thank the organizing committee who have spent their utmost efforts to prepare and manage this event successfully. Let me conclude my remarks by wishing our guests happiness, good luck and great success in the conference.

May I announce now the opening of the “3rd International Conference on Security in Food, Renewable resources, and Natural Medicines (SFRN) 2019” in Payakumbuh.

Thank you.

Rector,
Prof. Tafdil Husni, SE, MBA, PhD

Welcome Message
Director of Politeknik Pertanian Negeri Payakumbuh



Dear Honorable ladies and gentlemen,

Good Morning and Assalamu'alaikumwr.wb

I congratulate to all participants on the invitation and participate at our beloved campus Payakumbuh StateAgricultural Polytechnic. I feel really honoured to welcome all of you at our event, the 3rd International Conference on Security in Food, Renewable Resources, and Natural Medicines (SFRN) 2019 at thePayakumbuh State Agricultural Polytechnic, Indonesia.

Food security is a very important aspect in a country's sovereignty. Food also determines the future direction of a nation. Many social and political fluctuation can also occur if food security is disrupted. Food availability that is smaller than its needs can create economic instability. This critical food condition can even endanger economic and national stability. In the current situation, there are many challenges in exteriorize food security, such as climate change, population, limited natural resources and other challenges both locally, regionally and globally.

Renewable resources are also our starting point to start sustainable development. Research on renewable resources is also very important as the solution in meeting the principles of sustainable development. As we know that Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainability is the foundation for today's leading global framework for international cooperation - the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs)

The discovery of treatment based on local culture also contributes greatly to the good of humanity. Unfortunately, there are still many treatments that have not been carried out by scientific research. So, through this conferencewe hope it can be a trigger to increase in traditional plant-based treatments that not go through complex

chemical processes, so that the effectiveness of the pillars can be further suppressed and also contribute to the community's economy.

Finally, I would like to express my gratitude to all people who involved in organizing this event and to all of stakeholders who have helped to make this event go on successfully. Please accept my apologize for any shortage, Assalamu'alaikumwr.wb.

Thank you

Ir. Elvin Hasman, MP

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Relationship Analysis of the Proportion of Food Expenditures with Food Security in Farmer Households in North Aceh Regency

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Abstract. The share of food expenditure is inversely related to food security, the greater the share of food expenditure, the lower the resilience of the household concerned. Income is one of the factors that determine household consumption patterns. Higher incomes indicate increased purchasing goods and increased accessibility to better quality food. North Aceh Regency is a potential district for food insecurity. Most of the sub-districts in the North Aceh Regency depend on the agriculture sector as a source of livelihood. This research was conducted in 3 districts, namely Baktiya, Sawang, and Lhoksukon with a sample of 60 rice farmers. This study aims to find out: (1) knowing the proportion of food expenditure to the total expenditure of farm households by income group, (2) knowing the level of food consumption (energy and protein) of North farmer households based on income strata and (3) analyzing the conditions of household food security farmers according to income groups. The results show from the share of expenditure equations obtained the percentage of food security of farm households in North Aceh District describes those farmer households that secure food are 25 farmers (41.67%) of the total sample. Furthermore, there were one farmer households with lack of food category of 1 farmer (1.67%), two farmer households with a food vulnerable category of 2 farmers (3.33%), and a farmer with a food insecurity category of 32 farmers (53.33%) of the total study sample. It is indicated that farmers who have low incomes are in the food insecurity category.

Keywords: Food Security, Farmers, Food Expenditures.

INTRODUCTION

Food security is a national program that becomes the government's priority in fulfilling food. According to the Food Law Number 18 of 2012 states that food security is a condition of fulfilling food needs for households as reflected by the availability of sufficient food, both in quantity and quality, safe, equitable, and affordable (Law of the Republic of Indonesia, 2012). Based on this law, a region has to be successful in terms of food security if there is an increase in the production of safe and nutritious food in all levels of society (Arida, A. et al. 2015). Household food security is related to the ability of households to access food sufficiently to meet the needs of all family members. Household food security is reflected by several indicators, including: (1) the level of damage to crops, livestock and fisheries, (2) a decrease in food production, (3) the level of food availability in the household, (4) the proportion of food expenditure to total expenditure, (5) fluctuations in the prices of major foods that are commonly consumed by households, (6) changes in social

life, such as migration, selling / mortgaging assets, (7) food consumption conditions in the form of eating habits, quantity and quality of food, and (8) nutritional status (Saliem & Ariani, 2016).

Furthermore, according to Pakpahan, et al. (1993), there is a relationship between the portion share of food expenditure with household food security. The share of food expenditure is inversely related to food security, the higher the share of food expenditure, the lower the resilience of the household concerned. Income is one of the factors that determine household consumption patterns. Higher incomes indicate increased purchasing power and increased accessibility to better quality food. Other factors that also play a role in the formation of consumption patterns are habits (socio-cultural) and tastes. All these factors will determine the quality of food consumed by households, which in turn will determine the nutritional and health quality of household members (Ariningsih, 2016).

Central Statistics Agency (BPS) of Aceh Province states that the average expenditure per capita per month, according to the group of goods in 2014, shows that expenditure does not only consist of grains, but also from non-food groups such as housing goods and services. Data from the Central Statistics Agency (BPS) in 2014, on community food needs in Aceh province, showed that 59.84% was spent on food needs, while 40.16% was issued for non-food needs (Indonesian Central Statistics Agency, 2018).

Table 1. Average Per capita Expenditure per Month by Non-Food Group in North Aceh District

No.	Non-Food Group	Average/ Capita Expenditure/ Month (IDR)
1.	Housing, fuel, lighting, water	97.320
2.	Various goods and services	48.922
3.	Clothing, footwear, and hijab	22.659
4.	Durable goods	7.319
5.	Tax and insurance	8.238
6.	Party and ceremony	4.027
7.	Education	-
Total		188.485

Source: North Aceh Central Statistics Agency, 2018

Based on the table above, the average expenditure per capita in one month, non-food group expenditure table has a total expenditure of 188,485.00 IDR/capita/month. It is shown that the value of income received by farmers is higher than the value issued per month by the community in North Aceh District. Meanwhile, the value of expenditure for the food group for the people of North Aceh Regency can be seen in the following table 2.

Table 2. Average Per capita Expenditure per Month by Food Group in North Aceh District

No	Food Group	Average/ Capita Expenditure/ Month (IDR)
1.	Grains	65.537
2.	Bulbs	1.806

No	Food Group	Average/ Capita Expenditure/ Month (IDR)
3.	Fish	58.202
4.	Meat	5.919
5.	Egg dan milk	11.869
6.	Vegetables	28.513
7.	Nuts	4.813
8.	Fruits	16.435
9.	Oil and fat	12.323
10.	Drink ingredients	12.191
11.	Spices	6.702
12.	Other consumption	5.592
13.	Food and beverage	99.728
14.	Cigarette	61.381
Total		391.011

Source: North Aceh Central Statistics Agency, 2018

Based on table 2, the average expenditure per capita per month, according to the food group, the community in North Aceh Regency was able to spend a budget of 391,011.00 IDR with 14 criteria for food, which is the source of daily nutritional intake. Table 2 above provides an explanation related to the accumulation of community household expenditure cost in the North Aceh Regency of 579,496.00 IDR/ month. The real expenditure value is obtained from the accumulation of non-food consumption expenditure and food consumption expenditure within one month.

Aceh Utara is one of the potential districts for food insecurity (Aceh Central Statistics Agency in figures, 2018). In the North Aceh region, there are 27 districts, which have different natural potential characteristics. The majority of sub-districts in the North Aceh Regency make the agriculture sector a source of livelihood. Agricultural activities carried out, namely the activities of cultivating paddy rice farming, both in the planting of irrigated rice and rain-fed rice. The aims of the study are: (1) to identify the proportion of food expenditure to the total expenditure of farm households by income group, (2) determine the level of food consumption (energy and protein) of North farmer households based on income strata, and (3) analyze the conditions of household food security farmers according to income groups.

MATERIALS AND METHODS

This research was conducted in North Aceh District, precisely in Sawang, Baktiya, and Lhoksukon Sub-Districts, the number of samples taken was 60 people with proportional random sampling method based on the largest number of farmers.

Table 3. Research Samples

No	Sub-District	The Number of Samples (People)	Proportion (%)
1.	Baktiya	36	60
2.	Sawang	17	20
3.	Lhoksukhon	17	20
Total		60	100

Source: Primary Data (Processed), 2019

Analysis of Farmer Household Income Using the Farmer Household Spending Approach formula:

$$TP = P_p + P_n$$

Where:

TP : Total farmer household expenditure (IDR/month)

P_p : Food Expenditure (IDR/ month)

P_n : Non-Food Expenditure (IDR/ month)

The proportion of food expenditure to total farmer household expenditure can be calculated using the following formula (Ilham & Bonar, 2008):

$$PF = \frac{P_p}{TP} \times 100\%$$

Where:

PF : Proportion of Food Expenditure (%)

P_p : Food Expenditure (IDR/year)

TP : Total Expenditure (IDR/year)

Food consumption data can be obtained using the food record method. In general, the assessment of the number of nutrients consumed is calculated as follows:

$$G_{ij} = \frac{BP_j}{100} \times \frac{Bdd_j}{100} \times KG_{ij}$$

Where:

KG_{ij} : The content of certain nutrients (i) from food (j) or food eaten according to the unit.

BP_j : Weight of food consumed (gram)

Bdd_j : Edible portion (in percent or gram of 100% food j)

G_{ij} : Nutrients consumed from food j

According to the formula above, then the following formula can be used to measure the amount of energy consumption:

$$Ge_j = \frac{BP_j}{100} \times \frac{Bdd_j}{100} \times KGe_j$$

Where Ge_j is the energy consumed from food j. While protein consumption is calculated by the formula below:

$$Gp_j = \frac{BP_j}{100} \times \frac{Bdd_j}{100} \times KGp_j$$

Quantity of food consumption in terms of the volume of food consumed and consumption of nutrients contained in food using the formula:

$$TKE = \frac{\Sigma \text{energy consumption}}{AKE \text{ recommended}} \times 100\%$$

$$TKP = \frac{\Sigma \text{protein consumption}}{AKP \text{ recommended}} \times 100\%$$

Where:

TKE : The level of energy consumption (%)

TKP : The level of protein consumption (%)
 Σ energy consumption: Total energy consumption (kcal/capita/day)
 Σ protein consumption: Total protein consumption (kcal/capita/day)

The grouping of households using these two indicators can be seen in Table 4 as follows.

Table 4. Measurement of Degree of Food Security at Household Level

No	The Level of Energy Consumption	The Proportion of Food Expenditure	
		Low (<60% of total expenditure)	High (<60% of total expenditure)
1	Sufficient (> 80% sufficient energy)	Food Secure	Food Vulnerable
2	Less (<80% sufficient energy)	Deficient Food	Food Insecure

Source: Rachman, et.al., 2003

RESULTS AND DISCUSSION

Characteristics of Farmer Households in North Aceh District

The relationship of the proportion of food expenditure to food security is influenced by the characteristics of farmers. Characteristics of respondents include the following.

Table 5. Distribution of Characteristics of Research Respondents

No	Characteristic	Unit	Range		Average
			Low	High	
1	Age of Head of Family	Year	23	82	44,75
2	Head of Family Education	Year	0	16	8,42
3	Age of Housewife	Year	22	65	38,67
4	Education of Housewife	Year	0	16	8,42
5	Number of Family	People	2	4	3,15
6	Farming Business Experience	Year	4	57	20,05
7	Land Area	Hectare	0,08	15	2,45

Source: Primary Data (Processed), 2019

The productive working age in developing countries is 18 to 54 years, and the unproductive age is above 54 years. At the productive age, farmers are still easy to absorb information quickly and have a strong physique to do farming. Whereas at the age of unproductive farmers no longer optimal in doing farming. In table 5, it can be seen that farmers in North Aceh District are on average of productive age. Education is the level of formal education achieved by respondents. Education determines the level of competence of farmers in conducting agricultural activities (Manyamsari & Mujiburrahmad, 2014). So that farmers who have a relatively high education will be able to adopt innovation and technology quickly and be able to carry out farming activities efficiently and effectively. From table 5, it can be seen that the length of education of farmers in North Aceh Regency is at the Senior High School level. The Number of family is the number of family members borne by the farmer. The Central Statistics Agency classifies the number of dependents into three

groups, namely the number of dependents 1 to 3 classified as small family dependents, the number of dependents 4 to 6 are classified as medium family dependents, and the number of dependents of more than 6 is classified as large family dependents. The number of dependents significantly affects the respondent in the business. From table 5, it can be seen that the average dependents of farmers amount to more than three, which means they are classified in small families.

Based on Table 5 above, it shows the characteristics of respondents based on the most extended experience of farming, that is, over 20 years. Farmers in North Aceh Regency have started planting and farming as wet-rice farmers from adolescence and made the profession to date. Land area is the area of agricultural land owned by farmers. From table 5, it can be seen that the average area of farmers' land in the North Aceh Regency is 2.45 hectares. The land is mostly paddy fields. Other lands in the form of yards and plantation land.

Farmer Household Food Expenditure

Food expenditure is the value of money spent by farmers in the North Aceh Regency to buy household food needs of farmers.

Table 6. Average Household Household Food Expenditure in North Aceh District Based on Strata of Revenue (IDR/month)

Food Group	Level of Income (IDR)		
	Low	Medium	High
Grains	86.917	115.792	124.250
Bulbs	1.198	3.958	9.375
Fish	90.000	181.586	188.455
Meat	6.250	19.188	12.500
Egg and milk	9.438	20.667	22.583
Vegetables	53.654	60.748	80.250
Nuts	5.719	9.917	10.250
Fruits	17.667	18.292	37.250
Oil and fat	22.625	32.167	21.208
Drink ingredients	61.125	40.125	31.750
Spices	14.925	14.413	31.625
Other consumption (incl. Food and Beverage)	20.125	18.417	13.583
Cigarette	16.875	27.417	3.667
Total	478.392	666.271	804.997

Source: Primary Data (Processed), 2019

Based on Table 6 above, it can be seen the differences in expenditure allocations and food consumption patterns of farmer households in the three food groups, namely grains, vegetables, and beverage ingredients for food needs based on income level. It can be seen that the fulfillment of the need for staple food for each income level increases with the increase in the level of income of farmer households. However, more attention is the beverage ingredients in the lower income strata group are higher, and the allocation of these amounts decreases with increasing income. Related to food access, the low income level has a small expenditure allocation for each food group such as meat, vegetables, fruits, and others. In the expenditure

allocation to the fish food group, it is seen that the people prioritize fish consumption compared to other food groups, even being the largest expenditure allocation over rice. When there is a disturbance of fish that can slightly affect the food security of communities around the coast. Based on the responses of some people around the coast, they will complain when fish are expensive, but they will not complain when chicken or meat is expensive. It has not any impact on them except during Meugang and feast days. Habit is a regular behavior of a person in his life. A person's habits can influence other people's habits to the extent that they are acceptable to others. Even habits can be a general benchmark of behavior in society (Soekanto & Budi, 2015). Habits of people consuming fish have become a common benchmark in their daily food consumption so it is difficult to eliminate (Shamadiyah & Nasution, 2018).

Non-Food Expenditure

Non-food expenditure is a number of costs incurred by the population/person in order to meet their daily needs. Non-food expenditure was calculated during the past month. The following is the amount of non-food expenditure of the respondent's household as follows.

Table 7. Average Non-Food Expenditure of Farmers Households in North Aceh District Based on Income Structure (IDR/month)

Non-Food Group	Level of Income (IDR)		
	Low	Medium	High
Electricity	58.250	52.833	40.833
Gases	24.875	36.458	41.667
Kerosene	0	20.000	16.667
Generator	147.600	180.500	175.000
Others	4.000	6.000	10.000
Cellphone credit, starter pack	34.792	30.000	48.000
Others	0	39.500	53.333
Bath soap, toothpaste, toothbrush and shampoo	21.583	28.875	36.250
Beauty goods	27.500	35.600	49.900
Skincare, face, nails, hair	16.438	17.167	35.667
Laundry detergent	10.333	12.043	13.750
Other goods	0	80.000	0
Medical service costs	32.500	63.333	35.000
Drug costs	40.000	30.000	20.000
Education costs	75.000	227.000	407.000
Fuel, repairs, and maintenance	172.083	271.667	291.250
Cost of purchasing clothes	0	10.461	100.000
Saving per month	0	0	100.000
Total	437.375	564.583	948.500

Source: Primary Data (Processed), 2019

Proportion of Food Consumption Expenditure to Total Farmer Household Expenditure

The proportion of food consumption expenditure is a percentage of the amount of food expenditure compared to the amount of total expenditure. The following can be seen in Table 8 the proportion of farm household expenditure.

Table 8. The Proportion of Farmer Household Expenditure in North Aceh District by Income Level (%)

Farmer Household Expenditure	Level of Income (IDR)					
	Low	%	Medium	%	High	%
Food	478.392	52	666.271	54	804.997	46
Non-Food	437.375	48	564.583	46	948.500	54
Total	915.767	100	1.230.854	100	1.753.497	100

Source: Primary Data (Processed), 2019

Based on the data above, it can be concluded that food expenditure still takes more than a large portion of household expenditure. It means that the level of welfare of the farmer household is still low. The higher the proportion of food expenditure means the lower level of household welfare. The reduced level of household welfare means that more and more poor households are increasing. In this situation, households prioritize the fulfillment of their food needs and only focus on cheap and useful food to overcome hunger, so that food quality is less considered. Households with a high level of welfare will be able to meet their needs not only for food but also for non-food. It is like what applies to Engel's Law, that the proportion of the total expenditure allocated to food will decrease with increasing income. In addition, with increased income, households can buy good food in terms of nutrition, so that not only serves to overcome hunger but also to meet the nutritional needs of household members.

Energy and Protein Consumption

Food consumption is a number of foods and drinks that are consumed/drunk by the population/someone in order to meet their physical needs. Energy and protein consumption can be used to measure food quantity. In the following Table 9 is the average household energy and protein consumption of the respondent and the level of nutrient adequacy.

Table 9. Average Energy and Protein Consumption and Nutrition Consumption Level (TKG) for Farmer Households in North Aceh District Based on Income Level (Capita/Day)

Information	Level of Income					
	Low		Medium		High	
	Energy (kcal)	Protein (gram)	Energy (kcal)	Protein (gram)	Energy (kcal)	Protein (gram)
Consumption	1.119	42	1.773	55	2.168	54
Nutrition Consumption Level Recommended	2.100	57	2.100	57	2.100	57
% TKG	57	42	84	54	103	55

Source: Primary Data (Processed), 2019

The level of energy and protein sufficiency is obtained from the ratio between household consumption and recommended consumption based on nutrient sufficient level. In Table 10 below, it will explain the distribution of respondents' household energy and protein adequacy levels.

Table 10. Distribution of TKE and TKP Categories of Farmer Households in North Aceh District by Income Level (%)

Information	Level of Income											
	Low				Medium				High			
	TKE	%	TKP	%	TKE	%	TKP	%	TKE	%	TKP	%
Good	0	0	0		5	20.83	4	16.66	6	50	0	0
Medium	0	0	3	12.50	9	37.50	7	29.16	5	41.66	4	33.34
Less	6	25	8	33.34	4	16.64	8	33.34	1	0.84	5	41.66
Deficit	18	75	13	54.16	6	25	5	20.83	0	0	3	25
Total	24	100	24	100	24	100	24	100	12	100	12	100

Source: Primary Data (Processed), 2019

According to Table 10, the average amount of household energy and protein consumption is obtained from the amount of energy and protein contained in food/drinks consumed by each household member, then divided by the number of household members. Nutrition Adequacy Level is a comparison between the nutrients consumed with the recommended nutritional adequacy rates, which can later be seen whether the household consumes enough nutrients in accordance with the proper needs for a healthy life. The level of household energy sufficiency of farmers is classified in the less-category, while the level of protein adequacy in the medium category.

Food Security of Farmer Households

The proportion of food expenditure and energy consumption is a component to determine household food security. According to Rachman, et al. (2003), household food security can be classified as follows:

1. Food secure: Proportion of food expenditure ($\leq 60\%$), Energy consumption level is sufficient ($> 80\%$ energy sufficiency).
2. Food Vulnerability: The proportion of food expenditure ($> 60\%$), the level of energy consumption is sufficient ($> 80\%$ of energy sufficiency).
3. Less Food: The proportion of food expenditure ($\leq 60\%$), the level of energy consumption is lacking ($\leq 80\%$ of energy sufficiency).
4. Food Insecure: The proportion of food expenditure ($> 60\%$), the level of energy consumption is lacking ($\leq 80\%$ of energy sufficiency).

The distribution of farm household food security can be seen in Table 11 below.

Table 11. Distribution of Farmers Household Food Security in North Aceh District by Income Level (%)

Information	Level of Income						Total House hold	%
	Low		Medium		High			
	House hold	%	Hous ehold	%	House hold	%		
Food secure	0	0.00	15	62.50	10	83.33	25	41.67
Less Food	0	0.00	0	0.00	1	8.33	1	1.67
Food Vulnerability	1	4.17	1	4.17	0	0.00	2	3.33

Information	Level of Income						Total House hold	%
	Low		Medium		High			
	House hold	%	Hous ehold	%	House hold	%		
Food Insecure	23	95.83	8	33.33	1	8.33	32	53.33
Total	24	100	24	100	12	100	60	100

Source: Primary Data (Processed), 2019

Based on the calculation of the expenditure share equation, the percentage of food security of peasant households in North Aceh District shows that peasant households with food security are 25 farmers (41.67%) of the total study sample. Furthermore, there were one farmer households with a food shortage category of 1 farmer (1.67%), two farmer households with a food vulnerable category of 2 farmers (3.33%), and a farmer with a food insecurity category of 32 farmers (53.33%) of the total study sample. According to Mun'im (2012) indicate food insecurity, namely high poverty rates, limited access to clean water, high gaps between food needs and production. In addition to this, food insecurity villages are determined by the priority of livelihoods in one sector (agriculture sector), an insignificant increase in production (yields) or a decrease in production, a drought (damage), and identified data on pre-prosperous people (poor people). The results showed that farmers who have low incomes are in the food insecurity category. The food insecure households are households that are affected by a high number of dependents and low income. Low household income will make a high proportion of their food expenditure. It makes their food security low. To reduce the proportion of household expenditure is to increase household income.

CONCLUSION

Based on the above research results from the share of expenditure equations obtained, the percentage of food security of farm households in North Aceh District shows that farmer households that food secure is 25 farmers (41.67%) of the total sample. Furthermore, there were one farmer households with a food less category of 1 farmer (1.67%), two farmer households with a food vulnerable category of 2 farmers (3.33%), and a farmer with a food insecure category of 32 farmers (53 , 33%) of the total sample. The results showed that farmers who have low incomes are in the food insecure category.

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