Establishing Geospatial Database for Assessing Food Security Status in the Communities of Eastern Economic Corridor (EEC), Thailand

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Abstract: - Food security is an important indicator of the people's well-being and the national security. This research focuses on the investigation of food security in the communities of eastern special development zone, Saensuk municipality, Chonburi Province, Thailand. By random sampling of 397 participants, the data are analyzed using IBM SPSS and service area analysis using ArcGIS program to evaluate food security status in the areas. The results show the communities investigated have access to food service areas at 4 levels: 1) the nearest distance, 6,812 households; 2) medium distance, 3,241 households; 3) quite far, 2,202 households; and 4) the farthest distance, 3,088 households. In terms of the assessment of food security status, it reveals that they gain a high average score (2.48). Although the food accessibility of the communities has been at a good level, Saensuk municipality should have a plan to prevent risks that may arise from unforeseen events, both from natural disasters and economic conditions that may affect their food security in the future, as well as establishing a learning center, providing knowledge of fisheries to the community members in order to strengthen the community's sustainable economy.

Key-Words: -Geospatial database, Food security, Service area analysis

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1 Introduction

Food security is a fundamental factor in human life. If households, communities and countries lack food security, people will live their life with difficulty. As the world experienced a shortage of grains for consumption, the food price crisis was rising. In 1974, the first world food conference was held in Rome, Italy emphasizing food security which was viewed as a problem caused by insufficiency in food production to meet consumer demand. The World Food Organization, therefore, decreed the term "Food Security" since then [1]. The problem of food insecurity arises from a number of reasons, such as an increase in the cultivation of alternative energy crops and economic adaptation, etc. The growing of renewable energy crops has reduced the area for growing food crops. The yield of food crops may not be sufficient to meet the demand for consumption and may affect economic adjustment causing food prices to rise. These causes are parts of the growing food insecurity that can affect households, communities and nations. However, food security in the community sector in Thailand has a different food source depending on the context of each community [2]. When looking at the world's food stability today, there is still enough food for consumption, but there is a problem of uneven distribution of food at certain times. Trade is, therefore, a solution to this problem by reducing fluctuations in food supply and prices in certain countries and seasons as well as it enables to help consumers to consume a variety of foods. In addition, advances in technology have enabled food distributors to efficiently diversify food into the market, and they can access food demand information through it which can reduce transportation costs, financial fees and the amount of spoiled food or leftover food from the production process.[3]

However, the current problem that arises and affects food security is the epidemic of COVID-19 because the amount of food produced around the world is sufficient to meet the needs of the world's population, but those foods cannot be distributed to

people around the world thoroughly and sufficiently. While the crisis from the epidemic is severe, climate change, natural disasters and economic crises, this makes the problem of food access more serious. It affects the world's food stability.[4]

In addition, if considering the United Nations Sustainable Development Goals Framework (UN Sustainable Development Goals (SDGs) that define 17 Sustainable Development Goals, it is also found that goals related to food security, Hunger, Good health and Well-Being, Clean Water and Sanitation, Responsible Consumption and Production are also set. Especially, the goal of ending hunger, achieving food security, improving nutrition and promoting sustainable agriculture which is considered the United Nations Sustainable Development Goals, it covers food security within the meaning of FAO, which reflects the interrelationship between food and the goals of the SDGs. [5]

However, constitution of the Kingdom of Thailand determines a 20-year long-term national development strategy with the aim of raising the quality of the country in all sectors and develops Thailand into a high-income country in developed countries. The Eastern Economic Corridor (EEC) project is an area development project with the main objective of extending the development of the Eastern Seaboard area which is known for more than 30 years, focusing on the development of 3 provinces in the eastern region, namely Rayong, Chonburi and Chachoengsao. Thus, EEC development plan recognizes the importance of area development both physically and socially in order to raise the level competitiveness of the country. Saensuk is a community in Chonburi Province, which is a community in the country's economic special development zone. The living conditions of the people in the community can reflect the country's economic security to a certain extent. In the past, people in the community lived a lifestyle that relied on food from the coastal areas. Most of the population is engaged in fishing, such as shellfish and crabs etc. by using fishing tools that are custom made to suit each species of aquatic life. It is a wisdom passed on from generation to generation. Food obtained from fishing is often consumed in the household. If it is obtained in large quantities, it will be sold or preserved to make the food last longer for consumption in their families. But nowadays, the lifestyle of fishing which is the main occupation of the people in the community has changed. By turning to other occupations more, causing the fishing wisdom to begin to disappear that they used to rely on tools that had been invented themselves replacing with tools that enabled them to catch more fish like trawlers. It is a tool that catches both small and large fish. However, the area of Saensuk municipality is dependent on marine natural resources which is part of the natural food source for life and bring some food resources to sell to markets both in the community and outside the community.

Therefore, this research aims to investigate the food security status of Saensuk municipality community in order to contribute to awareness and promotion of food security management guidelines by collecting data from surveys, questionnaires and assessment forms. The data were analyzed by using preliminary statistics and the geographic information system to obtain results of food security status of Saensuk municipality Community, Saensuk Sub-district, Mueang Chon Buri District, Chon Buri province, Thailand.

2 Literature Review

The history of food security began with food shortages in various regions around the world, especially in developing countries. This has made food security an issue that has gained a lot of attention. In 1974, the World Food Summit was held in Rome, Italy, where regional food crises were discussed e.g., the adequate quantity of food, food price stability as well as maintaining the ecosystem which as a result of food production [6].

[7] has classified the history of food security in each period as follows:

The first period, 1974-1980, focuses on global food security because of the food crisis in Africa, including rising food prices, World Food Summit and Food and Agriculture Organization of the United Nations (FAO) established a committee on World Food Security and World Food Council to monitor global food demand and supply.

The second period, 1981-1985, began to implement a restructuring policy to address poverty problems that may affect food security.

The third period, 1986-1990, when there was a famine in Africa and parts of the developing world and the concept of food security was taken seriously.

In the fourth period, 1990-1996, the concept of poverty reduction was introduced to solve the problem of food security.

The fifth period, 1996 onwards, was the period when food prices in the world market rose making food stability is back in the spotlight again. Rather it emphasizes the ability to be self-reliant.

[8] affirmed a number of studies in Thailand addressing the situation of food security in developing countries caused by the impact of climate change, such as drought, floods, etc. Some of the population has a shortage of food for consumption. This situation has affected their health and quality of life, which linked to other problems such as poverty, problems of resource degradation, social problems, etc. In addition, [9] indicated the additional causes that people in the developing countries have a changing consumption culture by turning to the Western diet, commonly referred to as junk food. The new generation neglects local food and tends to rely on food in the market causing the wisdom to prepare local food menus disappeared. In addition, the diversity of plants was reduced due to the agricultural system that focuses on producing monocultures in order to gain larger quantity. As a result, subsistence farming has changed to commercial farming.

Food security according to the concept of Food and Agriculture Organization of the United Nations [10]

It consists of 4 dimensions as follows:

1. Food availability means having enough food in general domestic consumption which may be acquired by domestic production or imported from abroad as well. But if it is imported in large quantities, there is a risk of food insecurity.

2. Food accessibility refers to the ability of people to access food by producing it at home or buying it for consumption. Therefore, having enough food in a country as a whole is not a guarantee that all people will have enough food to eat, especially if people do not have enough income. While food is expensive or the government has no system and well-managed welfare, some people may have a shortage of edible food.

3. Food utilization means the consumption of food that is nutritious, safe, diverse (complete food groups) providing enough energy (calories) for the growth of the body and good health.

4. Food stability means that all of the above dimensions must be stable. For example, there is no shortage of food in some years, some seasons or people sometimes do not have access to food, including unhealthy consumption for some cases, etc.

The United Nations has therefore divided three approaches to addressing food instability risks:

1. Mobilizing help to the point who most are at risk for food stability first

2. Strengthening the social protection system in food

3. Investing in food for sustainability in the future

But with travel restrictions including measures of social distancing that still exist makes every sector requires new technologies used to benefit the world's food stability.

Food security does not only include an aspect of producing more food, but it also links to access to food consistently, food production, food safety, food security of community, including other contexts, such as poverty reduction development, reducing risk situation and vulnerability of society. In addition, there is also a shift in understanding the new role of farmers who are not just crop growers but key players in the manufacturing sector that help increase agricultural productivity and create food stability. The role of farmers should be maintained and is extremely protective. Food security and developing the agricultural sector in various fields is, therefore, an important issue that must be carried out in parallel.

[11] studied food security in Africa. It was found that food insecurity occurs in low-income families. Meanwhile, the government pays less attention to the problem as they focused on solving the problems of non-agricultural workers instead. This indicates that the role of farmers is not fully supported, making it less possible to increase agricultural production and the sufficient amount of food for the consumption. The agricultural crops and food are expensive, but farmers are still in poverty. This research also suggests ways to increase productivity for farmers, expansion of production in the agricultural sector, reducing food insecurity problems.

[12] examined solutions to improve food security of farmers during drought in Kenya to alleviate problems among food disadvantaged groups. During the drought, the area of the country is not suitable for commercial crops such as corn, cassava, beans, etc. As a result, farmers can produce crops in small quantities and are cheap. The results suggest that farmers switch to subsistence farming. Vegetables are grown for domestic consumption

rather than commercial crops during drought. This is to alleviate drought problems for farmers, enabling them to have food produced by themselves for consumption within the household as well.

[13] investigated poverty issues affecting household food security and nutrition in South Africa. Research has focused on households at risk of developing food insecurity, including information about nutritional values which affects malnutrition in children. The study shows that the nutritional status of malnourished children in South Africa remains a concern as most households do not have permanent housing.

3 Findings

The population living in Saensuk municipality, Saensuk subdistrict, Mueang District, Chonburi Province, Thailand, a total of 46,126 people was applied in the present study [14]. The sample group of 46,126 people were determined and calculated using the Yamane formula at a 95% confidence level with a 5% error using the following formula [15].

Using the formula to calculate the sample size

When

n = sample size
N = number of population units
e = acceptable group tolerance

$$n = \frac{N}{1+Ne^2} \quad (1)$$

by

n = number of samples
N = the total number of the population used in the study
e = acceptable error (in this study it was given = 0.05), which makes e^2 the number 0.0025.

substitute

$$n = \frac{46{,}126}{1 + 46{,}126(0.05)^2}$$
$$= 397 \text{ sets}$$

Sampling method

The randomized method for this study was Accidental Sampling according to the proportion of samples in each village calculated. The calculated sample size is 397 sets.

Table 1. Proportion of sample sizes classified by population size in each community

Community	Population (people)	Sample group (people)
Community 1, Maneekao	4,002	34
Community 2, Don Bon	2,633	23
Community 3, Bangsaen Tower	903	8
Community 4, Tan Lom 1	2,422	21
Community 5, Tan Lom 2	2,373	20
Community 6, Ban Muang	2,213	19
Community 7, Pattana 2	1,367	12
Community 8, Donnara	1,042	9
Community 9, Wat Klang Don	3,945	12
Community 10, Saensuk	1,546	34
Community 11, Map Mayom	1,338	13
Community12, Tai Talad	1,309	11
Community 13, Ruam Jai Pattana	825	11
Community 14, Bangsaen Bon	758	7
Community 15, Hard Wonnapha	2,789	24
Community 16, Bang Peng	3,959	34
Community 17, Na Mor	833	7
Community 18, Chok Dee	1,019	9
Community19, SomjaiNuek	2,068	18
Community 20, Na Tessaban	1,453	18
Community 21, Wat Saen Suk	3,077	26
Community 22, Muk Saen Charoen 1	1,643	14
Community 23, Muk Saen Charoen 2	459	4
Community 24, Khao Sam Muk	797	7
Community 25, Ban Laem Taen	1,353	12

Community	Population (people)	Sample group (people)
Total	**46,126**	**397**

The results of collecting geospatial database

1. Database of households and communities in the area of Saensuk municipality, as shown in Table 2 and Figure 1

Table 2. The number of households in each community of Saensuk municipality

Community	Number of households
Community 1, Maneekao	987
Community 2, Don Bon	782
Community 3, Bangsaen Tower	90
Community 4, Tan Lom 1	533
Community 5, Tan Lom 2	521
Community 6, Ban Muang	575
Community 7, Pattana 2	489
Community 8, Donnara	173
Community 9, Wat Klang Don	314
Community 10, Saensuk	450
Community 11, Map Mayom	346
Community 12, Tai Talad	429
Community 13,Ruam Jai Pattana	793
Community 14, Bangsaen Bon	869
Community 15, Hard Wonnapha	2,123
Community 16, Bang Peng	1,958
Community 17,NaMor	246
Community 18,Chok Dee	121
Community19, SomjaiNuek	670
Community 20,NaTessaban	482
Community 21, Wat Saen Suk	1,303
Community 22, Muk Saen Charoen 1	399
Community 23, Muk Saen Charoen 2	217
Community 24, Khao Sam Muk	241
Community 25, Ban Laem Taen	232
Total	**15,343**

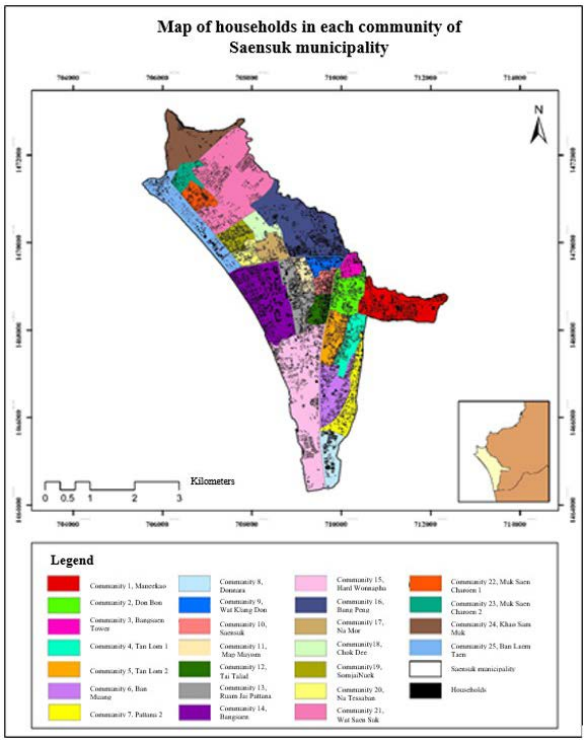

Fig. 1: Map of households in each community of Saensuk municipality

2. Table 3 and Figure 2 indicate the database of food sources of each community in the area of Saensuk municipality. There are 4 types of access to food sources in the communities of Saensuk municipality, namely convenience stores, flea markets, fresh markets and department stores.

Table 3. Types of food sources in each community of Saensuk municipality

Community	Type of food sources			
	Convenience stores	Fresh markets	Flea markets	Department stores
Community 1, Maneekao	5	-	1	-
Community 2, Don Bon	-	-	-	-
Community 3, Bangsaen Tower	1	-	-	-
Community 4, Tan Lom 1	-	-	-	-
Community 5, Tan Lom 2	3	-	-	-
Community 6, Ban Muang	5	-	-	-
Community 7, Pattana 2	2	-	-	-
Community 8, Donnara	2	-	-	-
Community 9, Wat Klang Don	3	-	-	-
Community 10, Saensuk	6	2	-	-
Community 11,	1	-	-	-

Community	Type of food sources			
	Convenience stores	Fresh markets	Flea markets	Department stores
Map Mayom				
Community 12, Tai Talad	5	1	-	-
Community 13, RuamJaiPattana	11	-	1	-
Community 14, Bangsaen Bon	11	1	-	-
Community 15, Hard Wonnapha	1	2	-	-
Community 16, Bang Peng	9	1	3	-
Community 17, Na Mor	3	-	1	1
Community 18, Chok Dee	-	-	-	-
Community19, SomjaiNuek	-	-	-	-
Community 20, Na Tessaban	1	-	-	-
Community 21, Wat Saen Suk	4	-	-	-
Community 22, Muk Saen Charoen 1	2	-	-	-
Community 23, Muk Saen Charoen 2	2	-	-	-
Community 24, Khao Sam Muk	-	-	-	-
Community 25, Ban Laem Taen	11	-	-	-
Total	**91**			

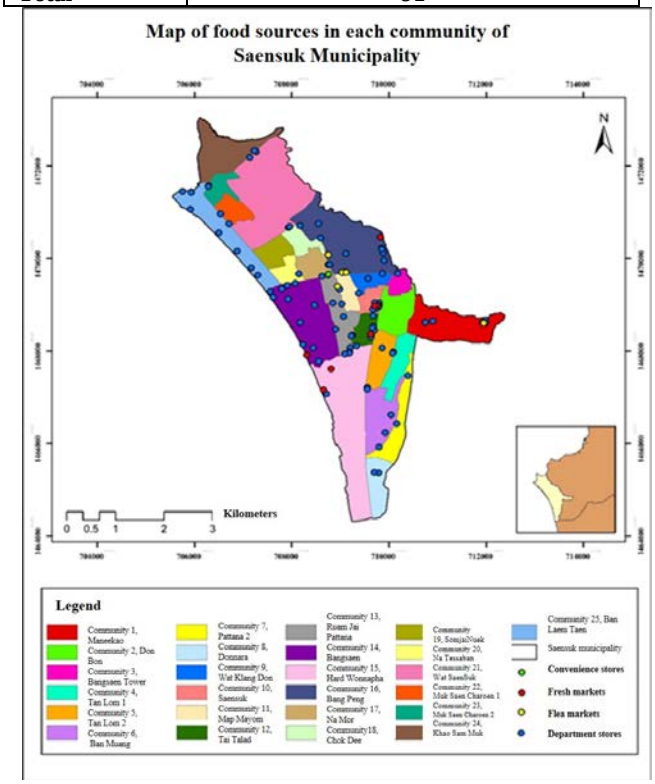

Fig. 2: Map of food sources in each community of Saensuk municipality

3. Figure 3 Database of transportation routes in each community of Saensuk municipality

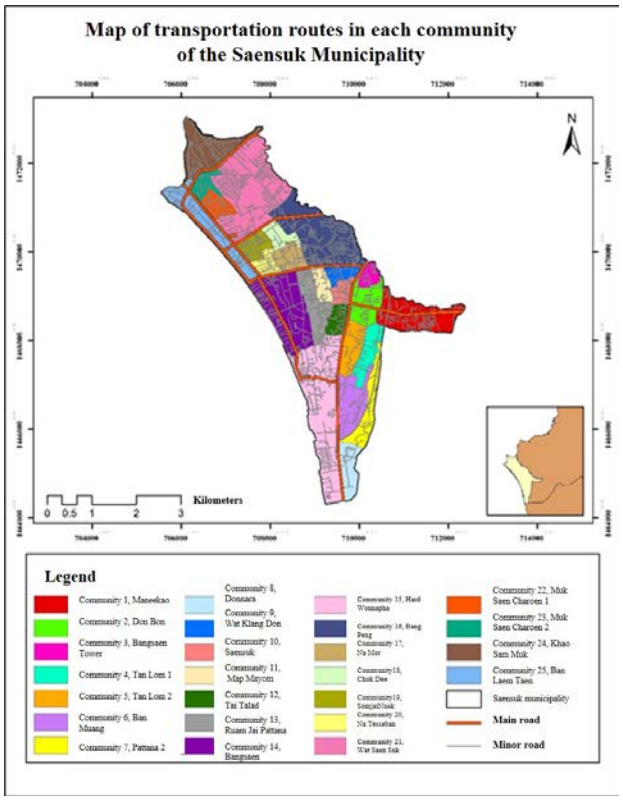

Fig. 3: Map of transportation routes in each community of the Saensuk municipality

Results of data analysis

Based on the analysis of areas in Saensuk municipality, the distribution of food source areas can be illustrated in a map below:

1. The result of food security status of each community in Saensuk municipality is shown in Figure 4.

Figure 4 shows the food security status of each community in Saensuk municipality. There are 4 levels of access to food service areas: green is the closest (0-500 meters); yellow is medium (distance 501- 1000 meters); orange is quite far (distance 1,001 – 1,500 meters); and red is the furthest (distance 1500 – 2000 meters). It is evident that there is access to food sources in each community at different levels. When considered food stability based on [16] criteria, for which the calculated result has a mean score of 2.48 and the results in the mean score range of 2.00 – 3.00, it means the food security of Saensuk municipality is at a high level.

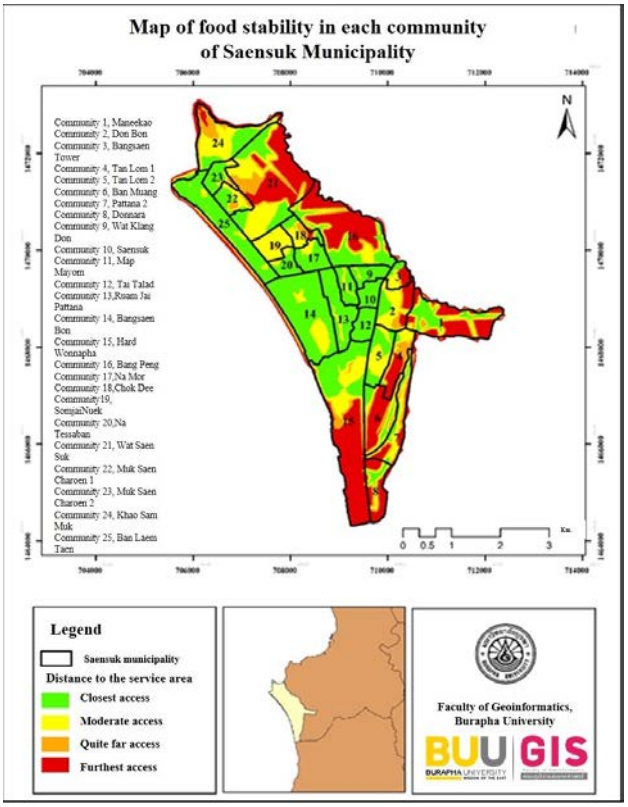

Fig. 4: Map of food stability in each community of Saensuk municipality

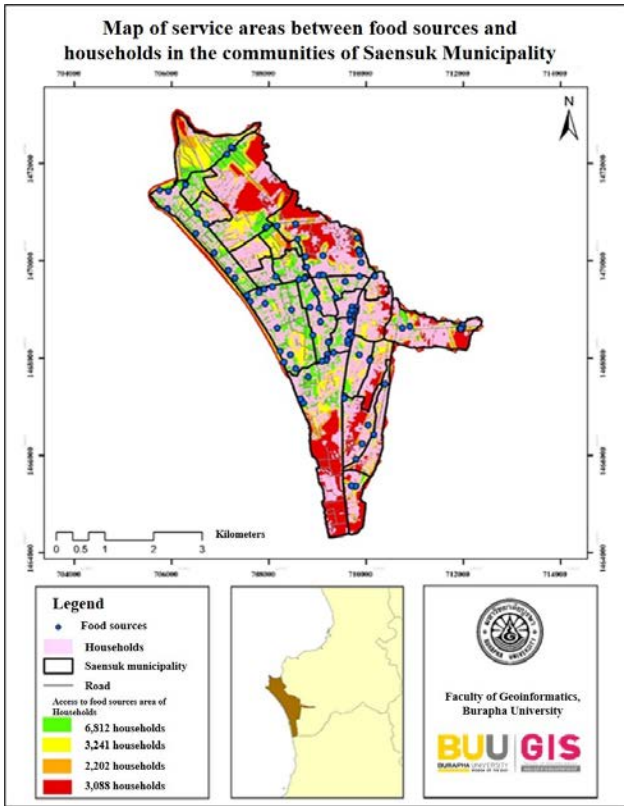

Fig. 5: Map of service areas between food sources and households in the communities of Saensuk municipality

2. The result of the service areas between food sources and households in the community of Saensuk municipality is shown in Table 4, Figure 5.

From figure 4, the map showing the service area between food sources and households in accessing food sources at distances of 500, 1,000, 1,500 and 2,000 meters, it is the distance used to measure the suitability of accessing the service areas with the criteria ranging from highest to lowest. The distance of 0-500 meters is the distance with the closest access to food sources with a total of 6,812 households. The distance of 501-1,000 meters is a distance with moderate access to food sources, containing 3,241 households. The distance of 1,001-1,500 meters is the distance that access to food sources is quite far, consisting of 2,202 households. The distance of 1,501-2,000 meters is the distance with the furthest access to food sources, totalling 3,088 households.

Table 4. Service areas between food sources and households in the communities of Saensuk municipality

Community	Range of access to food source areas (Households)			
	Green	Yellow	Orange	Red
Community 1, Maneekao	137	123	127	600
Community 2, Don Bon	210	212	123	237
Community 3, Bangsaen Tower	13	20	5	52
Community 4, Tan Lom 1	76	116	163	178
Community 5, Tan Lom 2	236	285	0	0
Community 6, Ban Muang	93	129	152	201
Community 7, Pattana 2	108	168	107	106
Community 8, Donnara	40	51	24	58
Community 9, Wat Klang Don	307	7	0	0
Community 10, Saensuk	450	0	0	0
Community 11, Map Mayom	309	37	0	0

Community	Range of access to food source areas (Households)			
	Green	Yellow	Orange	Red
Community 12, Tai Talad	429	0	0	0
Community 13,Ruam Jai Pattana	764	29	0	0
Community 14, Bangsaen Bon	843	26	0	0
Community 15, Hard Wonnapha	713	420	122	818
Community 16, Bang Peng	779	310	305	480
Community 17,NaMor	222	24	0	0
Community 18,Chok Dee	18	78	25	0
Community19, SomjaiNuek	11	654	5	0
Community 20,NaTessaban	394	103	15	0
Community 21, Wat Saen Suk	138	502	312	321
Community 22, Muk Saen Charoen 1	223	107	62	7
Community 23, Muk Saen Charoen 2	182	35	0	0
Community 24, Khao Sam Muk	28	61	144	8
Community 25, Ban Laem Taen	225	7	0	0
Total	**15,343**			

Results of statistical analysis based on the questionnaires data

To analyze the data from the questionnaire, the steps are as follows:

1. In relation to food security data analysis using descriptive statistical processing methods, the researcher used the data obtained to analyze the statistical values consisting of mean and standard deviation. Then, the researcher presented the data in a tabular form along with a description and a summary of the results of the study. The score on the questionnaire responses ranges from the level of indicative behavior that is most consistent with the household's opinion, assigned 3 points, to the level of the indicator of behavior that is the least consistent with the opinion of the household, assigned a score of 0. The last step is to find the average score of the questionnaire answers. The interpretation criteria are as follows:

Average score 0.00 – 0.99 means food security is at a low level.

A mean score of 1.00 – 1.99 means food security is at a moderate level.

Average score of 2.00 – 3.00 means food security is at a high level.

Part 1: Data of Personal information, family and environment

The sample group of the study consists of 63.2% females and 36.8% males, representing the number of respondents who are 251 females and 146 males. Their education is at the bachelor's degree or equivalent at most, 33.2%, and most are single 55.2%. Their income 10,001 baht or more is found at the highest level, 61%. They cook their own food at home, 63.7%.

Part 2: Social Support

In terms of social support in the communities of Saensuk municipality, there are 5 aspects found at a moderate level. This includes the ability of family members to buy food on demand from shops, flea markets, or community centers (0.967%), support of family members when having anxiety about managing food for their family (0.914%), assistance of family members in providing food and cooking fuel (0.798%), neighbor's help or close friends in food upon request (0.715%), and assistance from government agencies or non-governmental organizations in selling low price food (e.g. blue flags) or food donation (0.272%).

Part 3: Results of food security status assessment from questionnaire in the communities of Saensuk municipality

Based on the assessment of food security status in terms of food availability, it shows that 64.7% of the sample group were able to practice regularly having enough food to meet their needs at every meal, ability to eat foods that contain nutrients from all 5 food groups, 48.9% which can be practiced often, and traveling outside the community due to inadequate food sources, 59.2% with occasional practice. In terms of food access, it reveals that 94.2% of the samples have the ability to regularly store fresh food in the refrigerator for ready-to-use cooking, ability to practice frequently on consumption of community-produced foods in their daily life (51.1%), and ability to practice

occasionally to buy vegetables, fruit, and meat to cook (28.7%). In terms of food utilization, it is evident that 52.1% of the respondents are able to practice regularly avoiding unclean food from food sources in the community, ability to frequently consume food from community healthy sources such as seafood and local delicacies, and ability to practice from time to time to process community food for food preservation (22.4%). In terms of food stability, it shows that 21.4% of the respondents are able to practice their daily spending on food, and11.6% of them frequently do not eat all three meals a day. They are able to practice from time to time to deal with feelings of inadequate income to buy food, and the sample group has never experienced the condition of not eating day and night due to the inability to find food (95%). In the majority, the people in the Saensuk community have access to food sources, but there is no shortage of food. As the research cited the cases for Africa and Kenya, there might be different in terms of insufficient food sources for local consumption. Therefore, food security is not only a dimension of greater food production, but it is also linked to other issues such as food access, consistent food production, food safety, community food security, and other related contexts of food security which need to be addressed for sustainable improvement. Regardless of the nature of the food security problem, it is necessary for the government or relevant agencies to urgently address the issue upstream.

As it can be seen, the results analyzed as percentages in each section are obtained from a survey with a questionnaire of people in the community. The researchers then calculated and analyzed them by multiplying the number of respondents in that question by 100 divided by the total number of respondents, and the obtained values are processed in the SPSS program.

Table 5. Illustration of the mean and level of food security in Saensuk municipality

Assessment of food security status	Level of practice			
	Always	Often	Sometimes	Never
Food Availability 1. You are able to eat all three food groups.	0.99	1.44	0.56	0.01
2. You have enough food for every meal.	1.94	0.98	0.08	-
3. You eat food that contains nutrients from all 5 food groups.	0.90	1.47	0.63	0.01
4. You must fast one meal due to insufficient food.	0.01	0.05	0.23	2.71
5.You must reduce the amount of food you consume so that all family members can eat.	0.02	0.06	0.50	2.43
6.You must travel outside your community due to insufficient food sources.	0.08	0.37	1.78	0.78
Food Access 7. You can find vegetables, fruits, and meat to cook.	0.79	1.27	0.86	0.08
8. You can buy food from the shop or vendors that are conveniently located in the community.	1.28	1.48	0.23	0.01
9. Your family has a refrigerator/equipment to keep food fresh and ready to use for cooking.	2.83	0.12	0.04	0.02
10.There is an adequate food source in your community for consumption.	1.32	1.44	0.24	-
11.You can consume food that produces within the community to eat on a daily basis.	1.13	1.53	0.32	0.02
12.You can go to buy food from the market or distribution source to eat.	1.53	1.34	0.14	-
Food	1.56	1.16	0.28	-

Assessment of food security status	Level of practice			
	Always	Often	Sometimes	Never
Utilization 13. You can choose to eat food from your community valuable for the price.				
14. You can eat food from your community which is good for health such as seafood, community delicacies etc.	0.58	1.54	0.87	0.01
15. You can avoid food which is not fresh and clean from the food source in your community.	1.69	0.85	0.45	0.02
16. You eat expired food.	0.01	0.03	0.10	2.86
17.You took the food from the community to process and preserve food.	0.11	0.26	0.67	1.96
Food Stability 18.Each day you spend more on food than other expenses.	0.64	1.44	0.90	0.02
19. Each day you do not eat all three meals.	0.08	0.35	1.59	0.98
20. You are worried that your income would not be enough to buy food.	0.03	0.20	1.65	1.12
21. You have to borrow money from your neighbours to buy food.	0.01	0.08	0.26	2.65
22. You have not eaten day and night due to the inability to find food.	0.01	0.06	0.08	2.85

In Table 5, the mean and level of food security in Saensuk community, Chonburi Province are illustrated, wherein a total of 397 questionnaires are analyzed (as calculated in Equation 1) and the results of each analysis are averaged for further analysis of the level of food security.

Table 6. Assesses of food security status

Food security	$\bar{x}$	S.D.	Level
1. Food availability	2.35	0.59	High
2. Food accessibility	3.38	0.61	High
3. Food stability	2.46	0.58	High
4. Food utilization	1.73	0.64	Moderate
Overall	**2.48**	**0.61**	**High**

In relation to food security status in Saensuk municipality community in Table 6, it is divided into 3 levels. It shows that the people in the community have food security status at a high level.

A study result on solutions to problems of Saensuk municipality community

1. Due to the relatively moderate food security status found, government or public and private agencies should focus on spatial policies in various aspects to enhance food security status in Saensuk municipality community.

1.1 There should be prevention of risks and crises that may occur suddenly to the people in the community such as the economic crisis or climate.

1.2 Local authorities should come to an agreement with their community members to use natural resources in the community to suit the recovery of natural resources.

1.3 Government agencies in fisheries should promote and focus on fishermen to have a comprehensive system. There is a strong and continuous integration, creating a power to bargain for production and income and establishing a learning center in the area to provide information on fisheries.

2. The learning potential of the household is very important as it is the internal factor of the people in the community. Infrastructure factors are also external factors that play an important role in food security. Therefore, the government and those involved should accelerate in educating the people in the community at the right point and bring knowledge of management to people in the community in order to gain ability to manage various aspects, including the preparation of household accounts, production and marketing arrangements, financial management and risk management. Especially in the municipality of Saensuk, it is an educational city with an educational council that will be an important force in bringing knowledge for people in the community

to have higher food security. When people in the community have knowledge about living and earning money for food consumption and know the community environment well, academicians from educational institutions and knowledgeable people are important factors that can drive academic service approaches to the community. This principle is to strengthen the community, building good relationships with people in the community and people who come to develop the community. When there is a problem, it can help plan to solve it in a timely manner which is appropriate for the conditions of the area.

4 Conclusion and Discussion

This research aims to assess food security status and seek solutions to promote food security in the communities of Saensuk municipality, Chonburi Province, Thailand. The data of population, the number of households, food sources and transport routes were analyzed. In addition, the researcher visited the site and collected data from questionnaires and analyzed the data using IBM SPSS program and created a database of population numbers, households, food sources and transport routes in each community in Saensuk municipality. The findings are presented, discussed and summarized in the following order.

1. Based on the study of food security status in each community of Saensuk municipality, there are 4 levels of access to food service areas. Green is the nearest (0-500 m distance), with an access of 6,812 households. Yellow is moderate (distance 501- 1000 m) with 3,241 households. Orange is quite far (distance 1,001 – 1,500 meters) with 2,202 households. Red is the furthest (1,501 – 2000 meters) with 3,088 households. The study reveals that there are different levels of access to food sources of each community in the same community. This indicates the stability status based on the criteria of [17], which the calculated result has an average score of 2.48, with the result being in the mean score range of 2.00 – 3.00, referring to the food security of Saensuk municipality which is at a high level.

2. To assess the food security status in the community area of Saensuk municipality, the people in the community have food security status at a high level. It indicates that there are 3 aspects of food security status found at a high level : food accessibility ($\bar{x}$ = 3.38), food stability ($\bar{x}$ = 2.46), food sufficiency ($\bar{x}$ = 2.35) and food utilization ($\bar{x}$ = 1.73).

The findings of the present study are consistent with the definitions and theories of food security which consists of 4 dimensions: food availability, food accessibility, food utilization and food stability [18]. The previous study by [19] convinces the important of 4-dimesion food assessment is the most reliable measure of food security, calculated by descriptive statistical processing by using the collected data for statistical analysis. It consists of mean (Mean) and standard deviation (Standard Deviation) and presents the data in a tabular form.

Food stability is a factor that influences the level of food security of people in Saensuk municipality. This includes a plan to control people's access to all food groups, promoting a variety of food groups and status of being good health. This is consistent with Maslow's theory of hierarchy of needs [19], as the results of research reflected the access of food to fulfill their basic needs for people in Saensuk community, which is in the Eastern Economic Corridor. Such facts can reflect the model communities of the country's strategic economic zones that lessons can be drawn for the development of other communities in the special economic zone or other provinces of the country, as well as in areas with close contexts around the world. Food stabilization has important implications for people's well-being, physical and mental integrity of the people in the community. Therefore, food stability is linked to food availability, food accessibility and food utilization.

Finally, it can be concluded that food security is an important issue that many countries have raised and discussed in both national and international forums. For challenges to working on food security in the National Security Policy and Plan Framework 2019-2022 [20], there should be the implementation plan of 5 strategies involved. First, promote sustainable food and water security enabling mechanisms, laws and an integrated food and water security management plan that covers emergency food and water reserves. Second, develop and link defense systems, surveillance, and warning, suspend, deter, rectify threats caused by water hazards such as flash floods and what is hidden in food and water by integration between agencies concerned. Third, promote sustainable agriculture for farmers and agricultural entrepreneurs to see practical results, covering the production, product standard marketing and funding sources including supply chains to increase food production areas that are safe and immune to food crises. Fourth, promote research Development of

agricultural production technology and food industry to build confidence and food safety, while maintaining or enhancing nutritional value and increasing productivity, as well as promoting international cooperation to develop relevant technologies and innovations. Fifth, allocate land to support food security and protect agricultural areas to enhance food security so that problems can be solved and can reduce loss of ownership, as well as a fair distribution of farmer's land holdings.

The above five food security plans It can reflect the importance of food in the framework of the United Nations Food and Agriculture Organization (FAO) and its goals to end hunger, achieve food security and enhance nutrition and promote sustainable agriculture in accordance with the UN Sustainable Development Goals (SDGs), which cover what government agencies and relevant sectors should focus on having stock of food and water to be used in case of anticipated emergencies. This includes giving importance to people's access to food and water sources for basic living needs that are linked from individual immunity, community, village, the right to live in the land; Preserving community forest areas, planting fruits and vegetables for subsistence. More importantly, the effective land and water management can support food security and protect farmland which can be a guideline for improving food security for other countries, bringing such guideline and body of knowledge to prioritize projects on food security management. Solving problems should start from a small point that arises from the economic conditions of the community and community access to food sources spanning all four dimensions: food availability, food accessibility, food utilization and food stability for sustainable solutions by strengthening the economic resources of the community as well as applying the principles of mobilization to the point at risk of most food stability first, strengthening the system of Social protection for food and food investment for sustainable in the future according to the recommendations by the United Nations. The results of this research will be a case study that can be applied in similar contexts of the world where food management principles are applied with recommendations to relevant departments at the policy management level to provide accurate information for decision-making and to help the global food shortage crisis more effectively.

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