

# Promoting Learning About Local Food Security by Applying Environmental Education Processes to People in Central Part of Thailand

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## Abstract

The objective of this research is twofold: firstly, to examine the level of local food security and the community members' understanding of environmental education; and secondly, to develop a model that enhances local food security by implementing the environmental education practices of the community residents. Utilized mixed-methods research. Data were gathered via a questionnaire, a group discussion, and a workshop. A total of 378 respondents were chosen for the questionnaire using multi-stage selection, while 45 respondents were chosen using purposive sampling. Furthermore, a total of 32 community volunteers were extended an invitation to participate in the workshop. This study included descriptive statistics and content analysis. The findings indicate that the target communities have an average perception level of 3.19 regarding local food security, while their knowledge about the environment is at a high level of 4.01. The study identifies five key components for establishing local food security, namely: (1) learning local food identity; (2) inheriting local wisdom; (3) transmitting local food knowledge; (4) managing sources of local food; and (5) building local networks.

**Keywords:** local food security, environmental education, community of central part of Thailand

## 1. Introduction

### 1.1 Introduce the Problem

The United Nations has established 17 objectives, referred to as the Sustainable Development Goals (SDGs). In addition, the goals have incorporated food as well. Goal number 2 specifically addresses the issue of “zero hunger.” The goal is to eradicate all types of hunger, enhance food sustainability, improve nutrition, and advance sustainable agriculture (United Nations, 2018). The rise in food production is being witnessed, yet a significant number of individuals, particularly those in developing nations who are susceptible, are experiencing malnutrition (Prusakova & Ivanova, 2018). In 2019, during the proliferation of COVID-19, Thailand encountered detrimental consequences not just on everyday routines and work but also on the ability to support domestic food production. This phenomenon was prominently witnessed during the period of lockdown, as urban residents faced constraints in their ability to generate an adequate supply of food, primarily attributable to a scarcity of essential components. Consequently, this led to a surge in the cost of food. The availability of food for individuals with minimal bargaining power was restricted. Individuals with substantial earnings stockpiled food, whereas others with limited incomes lacked the ability to adequately nourish themselves. This is indicative of Thailand's food crisis amidst the COVID-19 pandemic.

Furthermore, the country has witnessed its populace lining up for state subsidies, despite the fact that a significant number of individuals did not meet the eligibility criteria. According to the World Bank, the projected increase in the Thai population living below the poverty line is expected to reach 13–14 million by 2025, up from 6.7 million in 2018 (World Food Program, 2020). Hence, it is imperative for the government to offer reassurance to individuals who are unemployed or have low incomes, along with facilitating convenient access to sufficient food resources during times of crisis. In order to accomplish this, the government should advocate for food sustainability at the family and community levels by emphasizing the significance of expertise and indigenous knowledge in regards to food cultivation, food preparation in accordance with traditional practices, and locally sourced food (Thailand Environment Institute, 2008).

The implementation of the lockdown necessitated the populace to relocate to their respective hometowns, hence

requiring various villages in central Thailand to provide accommodation for them. The circumstances also compelled them to modify their dietary practices; they must rely on their own resources. Indeed, numerous localities managed to maintain sufficient food production for their residents, thereby guaranteeing convenient food availability despite declining incomes and purchasing power. The adaptation arose organically as they utilized resources within their communities to create indigenous cuisine that has been inherited from their forebears, with the aim of enduring the COVID-19 pandemic. To enhance local food security in central Thailand, it is imperative to promote environmental education and leverage the local wisdom of the communities. This prompts us to propose a study on a model that fosters local food security in central Thailand through the implementation of environmental education processes. The aim is to examine the extent of local food security and the understanding of environmental education, and to develop a model that bolsters local food security. This model will further advance the promotion of local food security through environmental education within the communities.

### *1.2 Literature Review*

The Food and Agriculture Organization, also known as FAO (2008), delineates the concept of food security into four distinct aspects. The first component pertains to the availability of food, with a focus on ensuring an adequate and appropriate supply of food through either self-production or assistance. The second factor pertains to the availability of food, encompassing suitable resources, nourishing diets that align with traditional and social contexts, and communal resources for sharing within the community. The third component is the effective utilization of food-related infrastructure, including provisions for clean water, sanitation, and a robust healthcare system. The fourth factor pertains to stability, guaranteeing continuous access to food for both households and individuals. This study will concentrate on knowledge management within communities to establish local food security, specifically focusing on food resource management and food preparation knowledge.

Environmental education is an interdisciplinary field of study that examines the relationship between humans and the environment with the aim of addressing intricate issues. This study utilizes the concept to establish a long-lasting and environmentally-friendly atmosphere throughout communities. The process comprises six facets, namely awareness, knowledge, attitude, skills, involvement, and ability of community members. Environmental education for lifetime learning is the term used to describe the learning that takes place inside a community, involving adults and youth, or among community members themselves. Ultimately, this leads to the creation of travel hubs, educational centers, and local databases that serve as the community's repositories of knowledge (Intem et al., 2021).

Additional research has demonstrated that the environment has a crucial impact on everyday living, particularly for individuals within a community who rely on locally sourced components for their food, such as those obtained from gardens, livestock, or greenhouses (Bvenura & Afolayan, 2015). Individuals residing in Southeast Asia possess knowledge on utilizing indigenous root and tuber vegetables as a substitute for rice-based carbs in their culinary practices. This endeavor enhances the cohesion of communities, safeguards the environment, and encourages the active involvement of community members in the process of environmental education (Qaralleh, 2021).

## **2. Method**

### *2.1 Study Areas*

The study was conducted in the central part of Thailand. The study regions were categorized into three groups based on the research purpose. The initial group encompassed the territories located in the elevated regions (referred to as the upland research area), specifically in the northern section of the region. The second group comprised the regions located in both the upland and the lowland, forming a mixed research area that corresponds to the center portion of the region. The third group consisted of the lowland research area, which is prone to flooding at the conclusion of the rainy season. This area specifically encompasses the southern portion of the region. Cluster sampling was utilized to determine the specific villages that were chosen for the study. A total of 6,947 households were included in the study, distributed across three different areas. The first area, known as study area 1, was Huai Krot subdistrict in Sankhaburi district, Chai Nat province, which represented the upland study area. The second area, referred to as study area 2, was Pho Thale subdistrict in Khai Bang Rachan, Sing Buri province, representing the mix study area. Lastly, the third area, known as study area 3, was Bueng Bon community in Bueng Bon subdistrict, Nong Suea district, Pathum Thani province, representing the lowland study area (Figure 1).

## 2.2 Population and Sample

There were three sample groups in this study.

Group 1: Housewife. The sample group consisted of individuals responsible for food preparation within their households, residing in the three designated study regions. The sample size of 6,497 households was determined using Yamane's formula. The calculation is presented in equation 1.

$$n = \frac{N}{1 + Ne^2} = \frac{6,947}{1 + (6,947 \times 0.0025)} = 378 \quad (1)$$

The sample population must be proportionate throughout all three research areas. We collected a total of 378 samples, with 147 samples from study area 1 (which had 2,710 homes), 79 samples from study area 2 (which had 1,430 households), and 152 samples from study area 3 (which had 2,807 households).

Group 2: Primary sources of information. The study involved a cohort of 45 key informants, consisting of 15 local scholars, 15 local food experts, 6 village health volunteers, 3 presidents of occupational groups, and 6 community leaders.

Group 3: The selections from this group were chosen for the focus group discussion in order to construct a model of local food security that is grounded in environmental education. The group consists of a total of 32 individuals, comprising 2 community leaders and 30 locals.

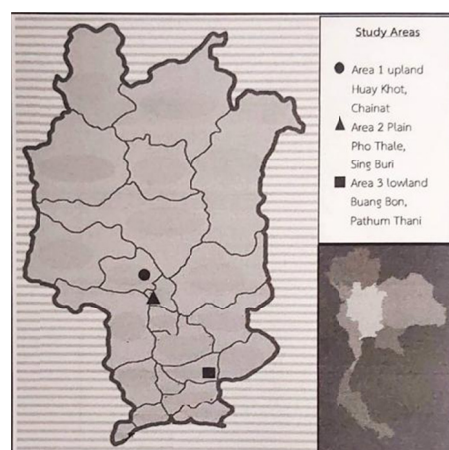


Figure 1. Study areas

## 2.3 Research Tools and Data Collection

The study was segmented into three distinct phases, each employing a variety of research instruments to gather data, as outlined below:

Phase 1 involved the collecting of data using questionnaires that were rated on a five-point Likert scale. The questionnaires consisted of two sections. The initial segment focused on individuals' overall understanding and perspectives regarding the state of local food security. The questions encompassed all the aforementioned aspects of food security, including food availability, food access, food use, and food stability. The second component pertains to the fundamental tenets of environmental education, centering on consciousness, erudition, disposition, proficiency, engagement, and the capacity to assess. A total of 378 questionnaires were sent to gather data on the local community members' understanding of food security and their environment.

Phase 2 focused on the examination of local food management. A total of three small group discussion sessions were conducted to collect the viewpoints of 45 key informants from each of the three study areas. Subsequently, the data underwent content analysis and were subsequently classified.

Phase 3 focused on conducting action research. An organized focus group discussion was conducted to gather data from a total of 32 community leaders and villagers. The data gathered during stages 1 and 2 served as the foundation for constructing a model of local food security that relies on environmental education (or LFS).

### 2.4 Data Analysis

The data gathered in phase 1 regarding the understanding and awareness of local food security and environment was utilized for descriptive statistical analysis, which involved calculating the mean and percentage values. Content analysis was utilized to examine and classify the data gathered in phase 2. Phase 3 of the study utilized action research and involved a discussion group consisting of 32 participants. The data collected in phases 1 and 2 were combined with content analysis to develop a model of local food security. The aim of this model was to promote local food security within the communities through environmental education.

## 3. Results

Phase 1 entails a quantitative investigation wherein data from 378 respondents was collected through questionnaires. The study aimed to assess the respondents' assessment of local food security and their knowledge of the environment. Phase 2 comprises a qualitative investigation, wherein data was gathered from 45 key informants who actively engaged in small group discussions. Phase 3 involves doing action research, where data was gathered from 32 community volunteers to develop a model of local food security through environmental education.

### 3.1 Local Food Security Perception

Upon analyzing the responses from the questionnaires about the perception of local food security based on the four dimensions identified by the FAO, we have determined that the average perception level is 3.19. This indicates an average level of perception. The specifics of the outcome are as outlined below:

- 1) *Food access*. The outcome indicates a significant level, specifically 3.55, with regards to the availability of food. Indeed, the outcome suggests that merchants from outside the villages can supply raw food ingredients and seasoning. Furthermore, vegetables can be sourced from natural reservoirs such as marshes and canals.
- 2) *Food availability*. The average score for food availability and sufficiency is 3.87, indicating a high level. Each household possesses an ample supply of food to sustain three meals daily, consisting of two primary dishes per meal. There is a constant and abundant supply of food throughout the entire year.
- 3) *Utilization*. The mean level of perception about use is 2.89 (average level). Analysis indicates that public vegetable resources are tainted with chemical residues, rendering them unsuitable for food preparation. Moreover, the communities have a deficiency in knowledge and expertise about the preparation of local food, as well as a dearth of public areas dedicated to cultivating fruits and vegetables.
- 4) *Stability*. The mean level of stability perception is 2.45, indicating a poor level. The findings suggest that the communities lack norms or restrictions pertaining to the utilization of plantation space. The farming techniques employed are not advantageous for the utilization of local food resources. Furthermore, the communities lack the backing of agricultural organizations to cultivate indigenous food crops.

Table 1. Local food security perception

Food security dimensions	Mean	S.D.	Perception level
1. Food access	3.55	0.60	high
2. Food availability	3.87	0.64	high
3. Utilization	2.89	0.68	average
4. Stability	2.45	0.62	low
Overall average	3.19	0.63	average

### 3.2 Environmental Literacy

This study utilized an environmental framework to assess the environmental awareness of community members. The framework assesses six dimensions of environmental research, encompassing awareness, attitude, knowledge, skills, involvement, and evaluative capabilities.

The findings indicate that the respondents possess a high level of knowledge on their environment. The top three scores are in the areas of awareness (Mean = 4.64, highest level), attitude (Mean = 4.49, high level), and capacity to evaluate (Mean = 4.28, high) correspondingly. The following information is shown in Table 2.

Table 2. Environmental knowledge of communities

Environmental education dimensions	Mean	S.D.	Perception level
1. Awareness	4.64	0.63	highest
2. Attitude	4.49	0.68	high
3. Ability to Evaluate	4.28	0.70	high
4. Knowledge	4.05	0.74	high
5. Skills	3.47	0.73	average
6. Participation	3.13	0.61	average

### 3.3 Community Perspectives

In phase two, the community representatives' perspectives were gathered through small group discussions. The sample of 45 key informants consisted of community members, such as local scholars, local food experts, village health volunteers, presidents of occupational groups, and six community leaders from three communities in Central Thailand. The results obtained from the discussion sessions demonstrate that the populace possesses an understanding of the influence of a favorable environment on the quality of food within their communities. Acquiring knowledge about the environment is crucial for the conservation of food plants, and it is important to improve skills in order to effectively address the associated challenges. Furthermore, the key informants concur that community members must engage actively in the conservation of food resources and possess the ability to assess situations where local resources are unsuitable for food preparation, hence resulting in food insecurity.

Regarding the food security situation, the study reveals that the communities in the studied areas possess sufficient food to sustain themselves during the entire year. Local food supplies are readily accessible to community members. The raw materials, seasonings, and vegetables are procured from merchants located outside the research areas. The probability of community members cultivating food crops independently is low. The absence of accessible food sources is owing to the presence of hazardous chemical residues, rendering them unsafe and detrimental to health. In addition, the communities lack suitable agricultural practices that contribute to local food security, and there is a lack of agricultural institutions that facilitate the promotion of local food production.

### 3.4 Components of the Model of Local Food Security Based Environmental Education

The third phase of this study aims to develop a comprehensive model of local food security by integrating environmental education through the use of action research. A symposium was arranged including 32 community volunteers to formulate the model. The outcome discloses five components that will be incorporated into the model: acquiring knowledge of local food identity, passing down traditional wisdom, conveying local food expertise, overseeing local food sources, and establishing a local network.

*Component 1: Learning local food identity (LLFI)* entails coordinating activities that encourage community member to gain knowledge about their own cultural and ecological surroundings, so enhancing their understanding of themselves and the significance of local food. This, in turn, contributes to the achievement of environmental objectives.

*Component 2: Inheriting local wisdom (ILW)* is the process by which community members gain knowledge of the natural and cultural wisdom that has been passed down through generations in the form of lifestyle, culture, and belief.

*Component 3: Transmitting local food knowledge (TLFK)* entails coordinating educational initiatives to empower the community, establishing platforms where housewives, community leaders, local scholars and experts, and young individuals can disseminate and exchange information regarding local food, culinary practices, and the conservation of indigenous cuisine.

*Component 4: Managing sources of local food (MSLF)* refers to the principles that enable the participation of all community members in the management of local food sources and knowledge. They have the chance to collaboratively establish the rules regarding the use and entitlements of food resources.

*Component 5: Building local networks (BLN)* pertains to the establishment of connections among various groups of individuals, both within and beyond the communities. It encompasses not only individuals, but also various organizations and networks that employ different communication channels to foster involvement, mutual assistance, and sharing.

### 3.5 The Implementation of These Five Components Occurred in Three Distinct Phases

Phase 1 was associated with the acquisition of knowledge among the communities. The initial step involved the implementation of two components: component 1 focused on learning about local food identity, while component 2 focused on inheriting local wisdom. The aim was to examine the gathered data and establish distinct local culinary identities. In addition, the communities gained knowledge about the local food’s origin, beliefs, values, and its connection to the environment. This promotes the development of cognitive skills and enhances understanding of the significance of regional cuisine by hosting a community forum that engages community leaders, academics, senior citizens, local experts, professionals, and youth.

Phase 2 entailed expanding the scope of education inside the communities. Component 3, which involves the transmission of local food knowledge, was implemented during this period. The results achieved in phase 1 were disseminated and shared with the rest of the community through a workshop, exhibitions, and demonstrations of local food preparation by members of occupational groups and individuals with an interest in local cuisine. Subsequently, component 4 was executed by means of a brainstorming session aimed at achieving consensus and establishing guidelines for the sustainable exploitation, preservation, and management of local food resources. The responsibility for managing the activity was entrusted to community leaders and representatives.

Phase 3 entailed the expansion of the learning beyond the communities. In this phase, Component 5, which involves the construction of a local network, was executed. The results of stages 1 and 2 were conveyed through a conference. The study areas provided the communities with the chance to exhibit their discoveries and expertise to other communities. It served as a venue for sharing information and collecting comments to improve the standards for promoting and managing local food. This work was overseen by community leaders, scholars, and representatives from local administrative bodies.

Enhancing local food security through environmental education requires the execution of three stages: community-based learning, expansion of community-based learning, and expansion of learning beyond the communities. This enhances consciousness about the significance of regional sustenance, engagement in regional sustenance conservation, and the safeguarding of the environment (Figure 2).

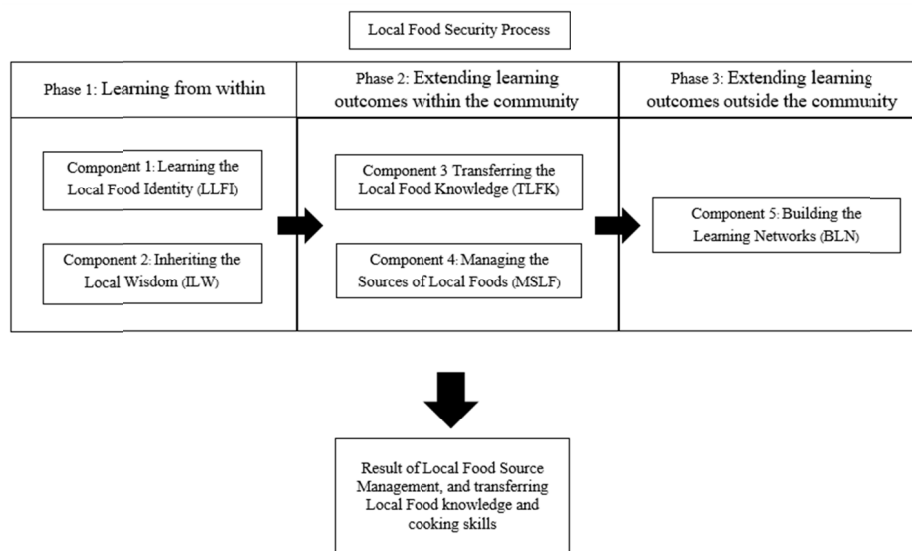


Figure 2. A model of local food security based environmental education: LFS

## 4. Discussion

### 4.1 Local Food Security

#### 1) Local food plant security

The study affirms the extensive range of natural food plants that serve as fundamental components in local culinary preparations. Typically, families and communities commonly utilize indigenous vegetables, particularly tubers, shoots, and leaves, for cooking purposes (Harmayani et al., 2019). A variety of indigenous vegetables are

utilized in the research regions for preparing native cuisine. Public woods have a diverse range of approximately 150 varieties of vegetables, which can be utilized for food preparation in times of disaster. Beans available in communities are consumed as alternative protein sources in times of meat scarcity (Burlingame, 2000).

### *2) Local Food Culture Security*

Furthermore, the communities also contain insects and small fish, in addition to natural food plants. Undeniably, the community members possess knowledge of utilizing indigenous food plants, insects, and fish to provide meals for their families. This is an integral aspect of the local culinary traditions and expertise that has been passed down through successive generations. They can economize by preparing their own meals rather than purchasing them. This can also promote the utilization of local ingredients in culinary practices (Minha et al., 2023). They are also aware of how to utilize public food resources, such as the vegetation found in forests (Hove & Gweme, 2018).

### *3) Household food security*

Domestically cultivated vegetables enhance household food security by augmenting food output (Muraoka et al., 2018). Furthermore, households purchase a less quantity of food, hence decreasing their overall household expenditures. Locally cultivated vegetables play a crucial role in the regional environment and exhibit resilience to climate change.

## *4.2 Local Food Security Perception*

### *1) Role of housewives*

The study demonstrates that housewives play a crucial role in ensuring the provision of food to families, particularly those with young children who require specific attention. They are the ones who comprehend the significance of consuming locally sourced food and the importance of its preparation. Nevertheless, in the absence of assistance for regional food production and consumption, individuals are only able to prepare local cuisine on an infrequent basis (Sirisai et al., 2013). The housewives' responsibilities of providing sustenance to their children and other family members hinder their ability to seek employment beyond their communities. Consequently, it is imperative for them to ascertain the means of acquiring all the necessary components for culinary preparation. They possess the knowledge and awareness of the methods and locations for procuring those materials (Habtezion, 2012). Their substantial contribution to local production has a favorable effect on food security in Asia (Makherjee, 2012). Moreover, they are inclined to experiment with novel agricultural technology or techniques for cooking, so enhancing local food security (Murray et al., 2016).

### *2) Embracing novel knowledge to enhance local food security*

The role of housewives is unquestionably crucial for ensuring local food security. The study also reveals that providing support for training and adopting participatory learning to transmit innovation can effectively decrease the knowledge gap among community members (Bala et al., 2014). Promoting conservation agriculture with appropriate techniques that engage community members at every stage of the process is crucial for achieving local food security in dry regions (Hove & Gweme, 2018). Approaches to the promotion of sustainable local food security requires the use of ecosystem conservation and protection principles (Phungpracha et al., 2016). Therefore, the incorporation of measures to enhance local food security should be an integral part of the policy framework of every nation. Comprehensive understanding of environmental change is necessary for effective management, as it can impact local food production (Ericksen et al., 2009). Furthermore, gaining an understanding of the community's perception aids in the sustainable promotion of environmental innovation (Bonatti et al., 2018). Furthermore, adult learners should prioritize their individual requirements and the practical application of information in their everyday lives. Furthermore, the utilization of communication technologies is crucial in establishing an educational setting that enhances adult learning (Chanpradit, 2022).

### *3) Community management*

Acquiring knowledge is of utmost importance. Furthermore, the efficacy of community management greatly enhances its benefits. Indigenous vegetables, typically cultivated in close proximity to the residence, within the garden or adjacent to the house enclosure, exhibit a wide range of varieties and serve as significant reservoirs of essential components. Cultivating vegetables at home can effectively save costs associated with food. Therefore, it is beneficial to endorse and foster the agricultural practices that align with the way of life in these communities (Visser & Wangu, 2021). Acquiring knowledge about environmental education enables societies to adjust and coexist harmoniously with the natural environment surrounding them (Veerawattananon, 2003). The aforementioned knowledge should be incorporated into the local learning process and development as well (Rawang, 2020). Developing networks that involve all stakeholders in the advancement of food, agriculture, and

communities is also financially advantageous. The aim is to diminish inequality, empower community members, and equip them to handle potential future circumstances (Bourgeoisa & Setted, 2017). The efficacy of experiential learning will stimulate cooperation in order to formulate strategies, analyze and derive lessons from emergencies, coordinate initiatives, and appraise and scrutinize community events (Bedri et al., 2017). The implemented local food security model, which incorporates environmental education, will enhance community members' understanding of the significance of local food by emphasizing the correlation between local food and the environment. Furthermore, the model establishes a framework for cooperation between communities and external organizations to encourage the use of locally sourced food and to develop legislation for the management of public spaces that serve as food resources. The network is designed to acquire knowledge about regional culinary practices and the cultivation of local food crops through the integration of environmental education.

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### **Authors' contributions**

The study design and revision were undertaken by Seree Woraphong and Wee Rawang. The responsibility for data gathering was assigned to Jidapa Koomklang. The manuscript was drafted and subsequently corrected by Khomkrit Bunkhiao. The final manuscript was read and approved by all writers. The primary responsibility for coordinating the publishing of the research has been assigned to Khomkrit Bunkhiao by the research team.

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### **Informed consent**

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### **Data availability statement**

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

### **Data sharing statement**

No additional data are available.

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