

## Level of Understanding and Attitude of Primary School Pupils' towards Food Security Through Sustainable Garden Implementation

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### Abstract

In recent years, many countries have faced challenges balancing food production and the increasing needs of the rapidly growing population and large-scale urban development. This situation reflects the importance of food security in overcoming food shortages. Food security allows every citizen to acquire the same amount of nutritious food to survive and lead a healthy life. The concept of sustainable gardens is the best way to improve food access and increase food resources to ensure food security. This study examines primary school pupils' level of understanding and attitude towards food security through the implementation of sustainable gardens. In this study, pupils' understanding of food security means they understand that it entails access to the same physical, social, and economic resources and adopting a healthy and active lifestyle. In terms of attitude, sustainable gardening activities can help pupils provide feedback openly and influence them to adapt these practices to their social environment. This study aims to measure pupils' level of understanding and attitude. The quantitative component of this study was conducted in nine selected national schools and involved three hundred and thirty-five respondents. The findings of this study demonstrate the pupils' level of understanding and attitude towards food security through the implementation of sustainable gardens. It was found that the primary school pupils showed a high level of understanding and positive attitude. This study's findings can guide education stakeholders toward the next step in sustainable practices. The study results suggest the need to conduct further studies to examine the development of pupils' understanding and attitude towards implementing sustainable gardens to address food security issues. This study allows all parties to curb food security threats by implementing sustainable gardens.

**Keywords:** Food Security, Sustainable Gardens, Level of Understanding, Attitude, Nutritious Food

**Introduction**

Food is a very important source of energy and nutrient for humans; hence, the lack of access to healthy food will disrupt our daily lives (Sabi et al., 2019). Abdul Rahman (2018) explained that rapid urbanisation has diminished farmlands to develop the industrial sector. This scenario contributes to deterioration of crop and livestock supplies, which subsequently, and reduces the population's access to adequate, quality and safe-to-eat food sources.

Urbanisation and migration from rural to urban have increased the need for food resources. This situation threatens the stability of the food supply, especially among the low-income group (Stewart et al., 2013). The literature review shows that the limited access to nutritious foods is closely linked to health problems such as nutritional deficiency, which causes concerns especially among children (Hisham & Yahaya, 2020). A 2015 report by Food and Agriculture Organization (FAO, 2015) showed that about 795 million people worldwide are living in hunger, with 780 million of them live in poor and developing countries. This suggests that one in nine of the world's population has difficulty getting nutrient food. According to *Fitch Solutions Macro Research's* report in 2019—ASEAN countries -Vietnam, Thailand, Singapore, the Philippines, Malaysia and Indonesia have shown rapid rates in adult obesity. Malaysia showed an increase of 33% and 27% in its obesity rate between 2010 and 2014. The study conducted by the United International Children's Emergency Fund (UNICEF) reported that Malaysia has the second-highest rate of obesity among children aged between 5 and 19 in Southeast Asia, behind Brunei (14.1%), with 12.7%.

Goodland and Ledoc (1987) linked sustainable development with social and economic and social sustainability and efforts to balance development and protect the needs and welfare of the population. The concept of sustainable development refers to a balanced, environmentally friendly and productive development process to meet the needs of the present without sacrificing the balance and supply for the future. In 1996, the concept of sustainable development was adopted in the 7th Malaysia Plan, which emphasises balanced and sustainable development. Among the initiatives to address the problem of food security under this plan are urban community gardens under the urban agriculture programme. This project was undertaken by the local community through a combination of crops and preservation in the derelict area or space around the residential area using good farming methods and easy to find, easy to use and cost saving (Islam & Chamhuri, 2012; Jennings et al., 2016; Zaidi, 2013). Recently, urban community gardens have been recognised as an initiative to address community concerns over the safety of staple foods and environmental issues due to the increase in population and changes in dietary patterns in cities and suburbs, especially in developing countries.

To overcome the problem of access to nutritious, safe-to-eat and affordable food sources, the Malaysian government has encouraged the urban dwellers to be involved in sustainable gardening. This initiative has also been implemented at all school levels to create awareness on food security among students for universal well-being. The issue of food security is a global issue nowadays due to the increase in the urban population and the imbalance between demands for food and food production. This situation has threatened food security, especially in developing countries. In response, the Malaysian government established the National Agricultural Policy (DPN) to increase food security and production. The NDP has been carried out through several phases, starting from the First National Agricultural Policy (DPN1)

between 1984 and 1999. It continued to the third phase known as Third National Agricultural Policy (DPN3) from 1998 to 2010 (Zakaria et al., 2017).

Mohamad & Abdul Razak (2018) study showed that aside from poverty, today's inactive lifestyle, increased calorie intake and lack of physical activities have led to health problems such as obesity. In this light, obesity is linked to various factors, including social and environmental factors, and it has become a concerning health issue, especially in urban areas. A report for the Primary School Assessment Reporting (PPSR) (2017) has shown that a total of 58,294 year 6 pupils in primary school recorded a Body Mass Index (BMI) above the normal index. This report generated concerns about the risk of childhood obesity in the country. Wardahcom (2017) stated that the Director of Education Malaysia stated that the high obesity rate is attributed to the food intake trend of Malaysians, whom diet is largely made of rice and protein dishes such as fish or meat, and the lack fibre intake from vegetables and fruits. This condition has led to an alarming increase in health problems, especially among schoolchildren. While studies have linked individual nutritional intake and health factors and there is a consensus that a balanced diet reduces disease risk, the literature review show that studies on food security understanding and the implementation of sustainable gardens are still limited, especially involving primary school pupils in Malaysia. This gap has attracted the interest of researchers to conduct this study.

This study explores the level of understanding and attitude of upper primary school pupils towards food security by implementing sustainable gardens to raise awareness among obese pupils on the importance of nutritious food intake. This study was conducted to:

- measure primary school pupils' level of understanding towards food security through the implementation of sustainable garden projects.
- measure primary school pupils' attitude towards food security through the implementation of sustainable garden projects.

### **Literature Review**

The quality of people's diet is affected by the lack of food security. Individuals with lack of access to nutritious food will be more likely to consume a less varied diet and develop unhealthy eating habits. Communities with low food security often adopt diets low in macronutrients, micronutrients (vitamins and minerals), fibre, vegetables and fruits. This practice adversely affects the health and threaten the survival of individuals (Awang, 2015). A study by Eche & Herrera (2018) involved 730 students from a private university, the University of The Americas and a public university, University of Ecuador (public), Quito, Ecuador. The findings of this study show wide socioeconomic differences between households among students in both institutions; nearly 50% of respondents faced the threat of food security due to factors such as economic restrictions, limited household food spending and high food prices. They tend to adopt a less healthy diet or limit food intake so that some eat only once a week. This situation has to some extent, affected the performance of these students. The Malaysian government has sought to implement sustainable development in development planning by reviewing the 6th Malaysia Plan (1991-1995) to recognise the importance of food security. It was used as a platform for implementing the 7th Malaysia Plan in 1996, which emphasised balanced and sustainable development.

A study by Diekmann et al (2018), states that urban gardening leads to healthy eating practices that generate results accepted by culture and can provide food security. The study is qualitative and quantitative. Based on interviews with respondents, the implementation of sustainable gardens has created awareness of the importance of healthy food, combating barriers in terms of acceptable outcomes by the culture itself and realising their food aspirations. Respondents also stated that they are able to diversify their food intake as they can get a wide variety of seasonal vegetables throughout the day. Chalmin-Pui et al (2021) studied attitude and health benefits of home gardening activities. The study involved a sample population in the UK selected via a target website. Target respondents are individuals who are interested in gardening, along with other activities. The study showed that individuals who frequently engaged in gardening activities showed lower perceived stress, higher subjective well-being and increased frequency of self-reported physical activity. This study presented new findings on the health benefits of gardening activities, and has proven the relationship between health and frequency of gardening activities. Another study by Rademacher et al (2019), examined the gardening activities in schools and found that gardening influences students' attitude and nutritional behaviour. The quantitative study also found that most pupils have a positive view of the school gardening programme. They believe that school garden produce is healthier and can provide a more sustainable food source than those available in the market. Moreover, the respondents showed a higher knowledge of gardening and sustainability knowledge than those not involved in the study. This suggests that pupils' knowledge of sustainability can positively influence their behaviour on the intake of nutrition. The study also explained how *school gardening* programmes help raise awareness on sustainability and nutritious food among students.

### Conceptual Framework

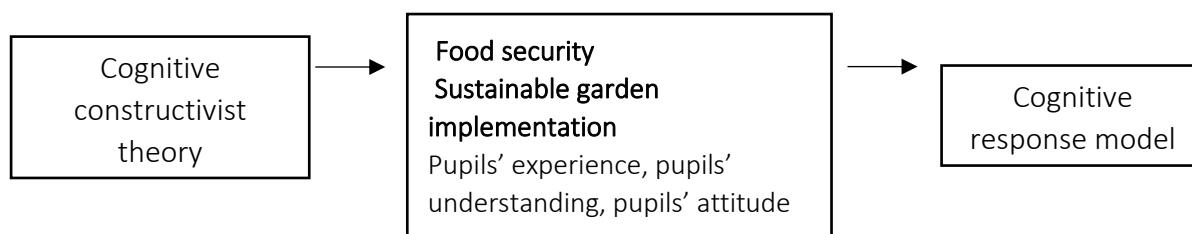


Figure 1: The conceptual framework on the level of primary school pupils' understanding and attitude towards food security through the implementation of sustainable garden programme.

The conceptual framework of this study is illustrated in Figure 1.1. It comprises three main aspects, the theory used and the model to assess the level of understanding and attitude of pupils towards food security through the implementation of sustainable gardens in schools. The Cognitive Constructivist theory was used to assess pupils' level of understanding and attitude of the sustainable gardens programme.

Dewey (1966) introduced "progressivism" in education. It stipulates that the student's thinking and understanding can be improved through practical lessons or 'learning by doing'. Another widely used theory of learning is the Piaget Cognitive Learning Theory, which was introduced in 1970. This theory has been widely used in the study of cognitive learning among children. There are five basic concepts of learning are closely related to the cognitive learning

of the individual, namely, schemes, adaptation, balance, assimilation, and accommodation. It emphasises individuals' adaptation to an environment.

Constructivism refers to the development of knowledge. According to this theory of learning, a student is not only a recipient of knowledge but also responsible for building his knowledge. According to this theory, students learn not by receiving the knowledge presented by the teacher but by linking new knowledge with the existing knowledge or experience. In this study, the theory of constructivism was applied through sustainable garden projects which actively involves pupils in vegetable and fruit planting activities to ensure supplies of nutritious food.

The cognitive response model (Waugh & Norman, 1965) explains how humans shape and change their thinking based on persuasive communication. This model explains that the recipient of information responds to the information received and will also have different impressions of the information. In this light, the development of understanding and change in pupils' attitude towards implementing sustainable gardens can increase their awareness of the importance of food security in their lives. This can offer a continuous solution to address the impending food security issues in this country.

### **Methodology**

The study adopted a quantitative design and data were collected using questionnaire survey methods to obtain data. The study population consisted of level 2 students in the National Primary school around Seremban 1 District, Negeri Sembilan. There are 61 national schools located in Seremban town, Negeri Sembilan, divided into 2 districts, namely Seremban 1 and 2 districts. This study involved 9 primary schools in Seremban District 1. Researchers choose Seremban District 1 because it facilitates the movement of researchers to conduct surveys. The location of this study is also limited to the district of Seremban 1 due to the covid-19 pandemic that has hit the world. Samples from each school are selected at random. The researchers selected 342 pupils as a sample of the study based on the determination of the sample size of Krejcie and Morgan, which listed the sample size corresponding to the study population size (Krejcie & Morgan 1970, p.s.607-610).

Questionnaires were used as instruments to obtain information related to the research questions. The questionnaire consists of 3 sections; Section A contains items on the respondents' demographics, Section B contains 10 items which probe on primary school pupils' understanding of food security through the implementation of sustainable gardens while Section C contains 9 items covering primary school pupils' attitude towards food security through the implementation of the sustainable gardens programme.

Before distributing the questionnaire copies for the pilot study, the instrument was verified by two field experts. Then, a pilot study was carried out to obtain the reliability and validity index of the questionnaire items. Reliability reflects internal stability and consistency (Creswell & Creswell, 2017) while an instrument's validity refers to how an instrument measures what should be measured (Creswell, 2010). The Cronbach Alpha obtained reflects the internal consistency, which is an indication of reliability (Cronbach, 1946; Norusis, 1977). Table 1 lists the indicator for each Cronbach Alpha reliability value category, as outlined in the study of (Babbie, 1992).

Table 1

Cronbach Alpha (1946) Reliability value

Cronbach Alpha Value	Reliability Level Indicator
0.90 – 1.00	Very High
0.70 – 0.89	High
0.30 – 0.69	Intermediate
0.00 – 0.30	Low

The pilot study examined the functional aspect of the questionnaire. The findings showed that the reliability value represents the instrument reliability and isolation value of each item. The reliability value derived from the Alpha Cronbach value is 0.958. In all, 9 questions were accepted and 1 question from part B were dropped due to a low Cronbach Alpha. The items in the final questionnaire were modified based on the experts' advice.

Before the data collection, the researcher referred to the Education Planning Policy and Research Division (ePRD) and applied for a permission from the State Education Department (JPN). A pilot study was then conducted to test the validity and reliability of the questionnaire, which copies were distributed online using the Google Form application to 342 primary school students as respondents. The data analysis was implemented after the data were obtained using the Statistical Package for Social Science (SPSS) version 23 software. The researcher conducted a descriptive analysis, which involved the calculation of mean, percentage, and standard deviation values.

A detailed description of the study's methodology can ensure accurate collection of data and information as well as data analysis. In this regard, the study's methodology is detailed to ensure respondents' input can be used to answer the research questions. These findings help identified the extent of the pupils' understanding and attitude towards food security through the implementation of sustainable gardens.

### Research Findings

Descriptive analysis, comprising the calculation of mean value, frequency, percentage, and standard deviation, was conducted to determine pupils' level of understanding and attitude towards food security through the implementation of sustainable gardens. A questionnaire was used as instruments to obtain information related to the research questions. The researchers used the Likert Scale to rate their agreement of each statement. The Likert scale is a simple and accurate way of collecting data. It allows respondents to freely express their opinion on the statement in each item and provide input for the researchers (Creswell, 2014). For this study, the researchers used a 5-point Likert Scale 5 (Likert,1932), with a scale of 1-strongly disagree (SDA); 2 disagree (DA); 3 Somewhat agree (SWA); 4 agree (A); 5 strongly agree (SA)



**Primary School Pupils' Understanding Food Security Through Sustainable Garden Implementation**

Table 2

*Primary School Pupils Understanding Food Security Through Sustainable Garden Implementation*

No	Statement	VDA	DA	SWA	A	SA	Mean	SD
B1	I know that the information on the implementation of sustainable gardens in the city is easily accessible through mass media and the internet	26 (7.6)	39 (11.4)	76 (22.2)	165 (48.2)	165 (48.2)	3.43	1.069
B2	I know nutritious food is essential to my body	1 (0.3)	11 (3.2)	42 (12.3)	129 (37.7)	159 (46.5)	4.27	.820
B3	I know that there are programmes related to urban community gardens organised by the government and certain parties.	25 (7.3)	38 (11.1)	129 (37.7)	129 (37.7)	21 (6.1)	3.24	.985
B4	I understand that food intake will affect my health.	6 (1.8)	17 (5.0)	70 (20.5)	143 (41.8)	106 (31.0)	3.95	.934
B5	I know how to plant food plants such as fruits.	3 (0.9)	22 (6.4)	107 (31.3)	123 (36.0)	87 (25.4)	3.79	.928
B6	I know how to use waste materials related to sustainable garden for school activities in the city	24 (7.0)	35 (10.2)	122 (35.7)	130 (38.0)	31 (9.1)	3.32	1.013
B7	I know that urban vegetable cultivation comprises a community of large gardens, backyards, and small farms, including agricultural farming in school areas	11 (3.2)	32 (9.4)	124 (36.3)	123 (36.0)	52 (15.2)	3.51	.968
B8	I know how to grow vegetables.	11 (3.2)	21 (6.1)	88 (25.7)	151 (44.2)	71 (20.8)	3.73	.965

B9	I know sustainable gardens produce fresh food	4 (1.2)	19 (5.6)	73 (21.3)	146 (42.7)	100 (29.2)	3.93	.912
B10	I know that the findings from sustainable gardens can improve the needs of consumers in a city.	9 (2.6)	16 (4.7)	71 (20.8)	162 (47.4)	84 (24.6)	3.87	.928
<b>Overall</b>							<b>3.70</b>	<b>.571</b>

(Level: Very low= 1.00 – 1.89, Low = 1.90 – 2.69, Intermediate = 2.70 – 3.49, High = 3.50 – 4.29, very high = 4.30 - 5.00)

Table 2 shows the frequency score, percentage, the mean and standard deviation for each item according to the level of primary school pupils' understanding of food security through sustainable gardens. The results showed that seven items had a high score, while the other three had a modest score. In all, the year 4 and 5 pupils in National Primary schools around Seremban District 1, Negeri Sembilan, who participated in this study showed a high level of understanding on food security through the implementation of sustainable gardens (mean = 3.70, SD = 0.571)

### Attitude of Primary School Pupils Towards Food Security Through Implementation Sustainable Garden

Table 3

*Attitude of Primary School Pupils Towards Food Security Through Sustainable Garden Implementation*

No	Statement	SDA	DA	SWA	A	SA	Mean	SD
C1	I like to eat fresh food like organic vegetables and fruits	4 (1.2)	14 (4.1)	40 (11.7)	146 (42.7)	138 (40.4)	4.17	.873
C2	I like growing different types of fruits and vegetables for my family's needs.	3 (0.9)	13 (3.8)	87 (25.4)	142 (41.5)	97 (28.4)	3.93	.875
C3	I like to grow fast-growing vegetables to cook at home	8 (2.3)	23 (6.7)	115 (33.6)	135 (39.5)	61 (17.8)	3.64	.930
C4	I like to save time by growing my vegetables than buying fresh food from the market	10 (2.9)	27 (7.9)	107 (31.3)	119 (34.8)	79 (23.1)	3.67	1.009



C5	I like to grow vegetables and fruits at school to fill my free time	27 (7.9)	50 (14.6)	98 (28.7)	130 (38.0)	37 (10.8)	3.29	1.092
C6	I exercise by watering the plants in the garden.	10 (2.9)	25 (7.3)	92 (26.9)	151 (44.2)	64 (18.7)	3.68	.956
C7	The gardening activities help me establish good relationship with teachers and other pupils.	11 (3.2)	16 (4.7)	74 (21.6)	160 (46.8)	81 (23.7)	3.83	.951
C8	I love gardening because it gives me the opportunity to learn how to grow plants easily	1 (0.3)	15 (4.4)	89 (26.0)	154 (45.0)	83 (24.3)	3.89	.833
C9	I love gardening because it reduces the cost of food and travel	4 (1.2)	10 (2.9)	74 (21.6)	167 (48.8)	87 (25.4)	3.94	.832
<b>Overall</b>							<b>3.78</b>	<b>.573</b>

Table 3 shows the frequency score, percentage, mean and standard deviation for each item on primary school pupils' attitude on food security through the implementation of the sustainable gardens programme. This study's findings indicate that the general attitude of primary school pupils towards food security through the implementation of sustainable gardens (mean = 3.78, SD = 0.573) is at a high level.

## Discussion

### Pupils' Level of Understanding of Food Security through the Sustainable Gardens Programme

The findings showed that primary school pupils have high understanding of the importance of nutritious food and a balanced menu in maintaining their health. These findings contradict the findings presented in Eche & Herrera (2018) which showed that private university students have lower knowledge of food safety than public university students despite having better food access. In addition, the interview results presented in Law et al (2015) study showed that students have known understanding and could not explain the term food security accurately. This suggests that their understanding of food safety is still lacking.

This study's findings are similar to a study by Diekmann et al (2018). The study found that urban gardening activities can improve healthy eating practices, increase social acceptance and provide food security. Another study with a similar finding is Schreinemachers et al (2020) which found home gardening projects increase knowledge of food and agriculture and type of vegetables harvested from home gardens.

This study has also confirmed the theory of Constructivism, stating that students learn when they receive the knowledge presented by the teacher. Learning also occurs when they link new knowledge with their knowledge or experience.

### **The Attitude of the Students of the Lower Sect towards Food Security through the Implementation of Sustainable Gardens**

This study's finding showed that in general, primary school pupils have a positive attitude towards food security through the implementation of sustainable gardens. The results of this study are in line with a cross-sectional study conducted by (Rademacher et al., 2019). The study found that students' knowledge of sustainability positively affects their behaviour towards nutritious food consumption. This finding is also supported by a study conducted by De Young et al (2016) involving University undergraduates. The study showed that students' positive attitude reflects their interests, willingness to do gardening and learning opportunities to address food security issues.

These findings can be attributed to Piaget's Cognitive Learning Theory, which states that learning occurs when students interact with other people, objects or events around them as they try to adapt to the surrounding conditions. This suggests that the pupils have the attitude to adapt and change according to the changes in the environment. The findings of this study support the cognitive response model which stipulates that changes in a person's attitude are closely related to learning, perception, function and consistency.

#### **Study Implications**

These findings can be used as a reference for improvement, especially for primary schools involved in this study. They can use the inputs to improve pupils' attitude toward gardening and increase their awareness of the importance of sustainable gardening and address the problem of access to nutritious food at critical times, such as during the Covid-19 pandemic. The study also found pupils were not exposed to community garden programmes around housing and in schools. Therefore, responsible parties such as agencies need to intensify the activities of the urban community garden programme involving families so that the students are aware of the importance of the garden in overcoming the problem of food security.

This study's findings can lead to improvements in schools with existing food gardens. The school management could invite the environment department to give a talk and organise a green school project to expose students to sustainable gardens and address food security issues. This study can also guide education stakeholders in taking the next step to address food security issues, especially the consumption of nutritious and healthy food to curb obesity among students, starting at the primary level.

#### **Recommendation for Future Studies**

This study has put forward several recommendations for future studies to address its limitations. The study was conducted in primary schools and involved only nine schools around Seremban 1, Negeri Sembilan. Hence, it is proposed that a further study involve a more extensive student population be carried out. Future researchers can conduct an interventional study to conduct a more thorough examination into pupils' awareness of the importance on food security through the implementation of sustainable gardens. For instance, studies could involve form three to five secondary school students to understand their awareness and attitude on food security. The results could be used to compare the understanding and the attitude of primary and secondary school students towards food security through the implementation of sustainable gardens. In addition, further studies

should be carried out to see the development of the students' attitude towards implementing sustainable gardens. Researcher can take a quasi-experimental approach to obtain more detailed data and help raise pupils' awareness of the importance of sustainable gardens. The study could also be extended to green schools.

### Conclusion

Overall, this study could be further extended to other target respondents in Malaysia. Further studies could be conducted quantitatively and qualitatively where structured interviews could be used to measure primary school pupils' level of understanding and attitude towards food security through sustainable garden projects. In the context of this study, while both variables showed high scores, in-depth studies are needed to expand knowledge on food security and sustainable gardens among primary school pupils across the country. This implementation of sustainable gardens can help curb food security issues in Malaysia and provide opportunities for the government to address this issue. Such programme can be the first step for all parties to take responsibility in dealing with this issue.

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