PREVALENCE AND ASSOCIATED FACTORS OF FOOD INSECURITY DURING COVID-19 PANDEMIC IN BANGKOK, THAILAND: A CROSS-SECTIONAL STUDY

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ความชุกและปัจจัยที่เกี่ยวข้องกับความไม่มั่นคงทางอาหารในช่วงการระบาดของไวรัสโควิด-19 ในเขตกรุงเทพมหานคร ประเทศไทย: การศึกษาภาคตัดขวาง

น.ส.วิมลมณี เมฆขำ

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรมหาบัณฑิต
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Thesis Title	PREVALENCE AND ASSOCIATED FACTORS OF FOOD INSECURITY DURING COVID-19 PANDEMIC IN BANGKOK, THAILAND: A CROSS-SECTIONAL STUDY
By	Miss Wimonmanee Mekkhum
Field of Study	Public Health
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วิมลมณี เมฆขำ : ความชุกและปัจจัยที่เกี่ยวข้องกับความไม่มั่นคงทางอาหารในช่วงการระบาดของไวรัสโควิด-19 ในเขตกรุงเทพมหานคร ประเทศไทย: การศึกษาภาคตัดขวาง. (PREVALENCE AND ASSOCIATED FACTORS OF FOOD INSECURITY DURING COVID-19 PANDEMIC IN BANGKOK, THAILAND: A CROSS-SECTIONAL STUDY) อ.ที่ปรึกษาหลัก : อ. ดร.วันดี ศิริโชคชัชวาล

ความชุกของความไม่มั่นคงด้านอาหารในประเทศไทยมีความผันผวนตลอดเวลา การระบาดใหญ่ของโควิด-19 มีผลกระทบอย่างมากต่อความไม่มั่นคงด้านอาหารที่รุนแรงในระหว่างการระบาดใหญ่และปัจจัยที่ส่งผลต่อความไม่มั่นคงด้านอาหารนั้นแตกต่างกันอย่างมากในประเทศที่พัฒนาแล้วและกำลังพัฒนา ดังนั้นการศึกษานี้อาจมีส่วนช่วยในการบรรลุ SDGs ภายในปี 2030 มีวัตถุประสงค์เพื่อประเมินความชุกและปัจจัยที่เกี่ยวข้องของความไม่มั่นคงด้านอาหารในช่วงการระบาดของโควิด-19 ของชาวกรุงเทพมหานคร กลุ่มตัวอย่างทั้งหมด 440คน การเก็บรวมรวมข้อมูลโดยให้กลุ่มตัวอย่างกรอกข้อมูลด้วยตัวเองเครื่องมือที่ใช้คือแบบสอบถามทั่วไปและมาตราส่วนประสบการณ์ความไม่มั่นคงด้านอาหาร (FIES) รวมทั้งสิ้นแปดคำถาม การวิเคราะห์ถดถอยโลจิสติกส์พหุกลุ่มจะนามาวิเคราะห์เพื่อหาความสัมพันธ์ระหว่างปัจจัยที่เกี่ยวข้องกับความไม่มั่นคงด้านอาหาร การวิจัยนี้พบว่าผู้เข้าร่วมส่วนใหญ่เป็นเพศหญิง อายุ46-55 ปี โสด อาศัยอยู่กับครอบครัว ไม่มีบุตร สำเร็จการศึกษาระดับปริญญาตรี มีงานทำ มีรายได้มากกว่า 20,000 บาทต่อเดือน และไม่ใช่หัวหน้าครอบครัว พบว่าผู้เข้าร่วมทั้งหมด 39.4% ประสบกับความไม่มั่นคงด้านอาหารอันเนื่องมาจากผลกระทบของการระบาดใหญ่ของโควิด-19 (ไม่รุนแรง 25.5% ปานกลาง 8% และรุนแรง 5.9%) ความไม่มั่นคงด้านอาหารมีความเกี่ยวข้องอย่างมากกับอายุ การอาศัยอยู่กับคนพิการ สถานะการเป็นเจ้าของบ้าน และใช้การสนับสนุนเพิ่มเติม ผู้ที่มีอายุ 36-45 และ 46-55 ปีมีโอกาสเกิดความไม่มั่นคงทางอาหารน้อยกว่า 0.29 และ 0.14 เท่าเมื่อเทียบกับผู้ที่มีอายุน้อยกว่า อย่างไรก็ตาม ความไม่มั่นคงด้านอาหารเพิ่มขึ้น 3.4 เท่า เมื่อครัวเรือนเป็นคนพิการ (OR=3.369; P=0.003) ผู้เช่าบ้านเพิ่มขึ้น 2.7 เท่า (OR=2.738, P=0.005) เพิ่มขึ้น 2 เท่าเมื่อใช้ความช่วยเหลือด้านอาหารเพิ่มเติม (OR=2.055, P=0.001) บทสรุปคือเกือบครึ่งหนึ่งของผู้เข้าร่วมประสบกับความไม่มั่นคงด้านอาหาร ซึ่งหมายความว่าการระบาดใหญ่เป็นภัยคุกคามต่อความมั่นคงด้านอาหาร ดังนั้นการวิจัยเพิ่มเติมและผู้มีส่วนได้ส่วนเสียที่เกี่ยวข้องควรมุ่งเน้นไปที่การแทรกแซงความช่วยเหลือด้านอาหารและนโยบายในการปกป้องคนหนุ่มสาวและครัวเรือนที่พิการจากความไม่มั่นคงด้านอาหาร

สาขาวิชา	สาธารณสุขศาสตร์	ลายมือชื่อนิสิต .....
ปีการศึกษา	2564	ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

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Wimonmanee Mekkhum : PREVALENCE AND ASSOCIATED FACTORS OF FOOD INSECURITY DURING COVID-19 PANDEMIC IN BANGKOK, THAILAND: A CROSS-SECTIONAL STUDY. Advisor: Ph.D Wandee Sirichokchatchawan

The prevalence of food insecurity (FI) in Thailand has fluctuated throughout time. The COVID-19 pandemic had a substantial impact on Thailand's food system and the factors that contribute to food insecurity differ greatly across developed and developing countries. Consequently, this study may contribute as a step in achieving the SDGs by 2030. The aim was to estimate the prevalence and associated factors of food insecurity during COVID-19 pandemic among Bangkokian. A cross-sectional study was conducted over 440 Bangkokians and data were collected through self-administrated. The questionnaire included the general characteristics, associated factors and the Food Insecurity Experience Scale (FIES) in the total of eight questions. Data were analyzed using univariate, bivariate (chi-square), and multivariate (logistic regression). The majority of the participants were females, aged between 46-55 years old, single, living with family, has no child, graduated with bachelor’s degree, employed, earning more than 20,000 Baht per month, and not the head of the family. The study revealed that as much as 39.4% of all participants experienced food insecurity due to the impact of COVID-19 pandemic (mild 25.5%, moderate 8%, and severe 5.9%). Food insecurity was significantly associated with age, living with a disabled person, house ownership status and used additional supports. Those aged 36-45 and 46-55 are 0.29 and 0.14 times less likely to experience food insecurity than those younger in age. However, food insecurity increased 3.4 times when households comprised a disabled person (OR=3.369; P=0.003), increased 2.7 times as a house renter (OR=2.738, P=0.005), increased 2 times when used additional food aids support (OR=2.055, P=0.001). The results indicated that almost half of the participants had been experiencing food insecurity, meaning that the pandemic threatens food security. Therefore, additional research and the relevant stakeholders should focus on food assistance intervention and policy to protect young adults and disabled households from food insecurity.

Field of Study:	Public Health	Student's Signature .....
Academic Year:	2021	Advisor's Signature .....

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Wimonmanee Mekkhum

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BMR	Bangkok Metropolitan Region
BMA	Bangkok Metropolitan Administration
COVID-19	Coronavirus Disease 2019 (SARS-CoV-2)
DDC	Department of Disease Control
FAO	Food and Agriculture Organization of the United Nations
FIES	Food Insecurity Experience Scale
FIVIMS	Food Insecurity and Vulnerability Information and Mapping System
FSIN	Food Security Information Network
IFAD	International Fund for Agricultural Development
SDG	Sustainable Development Goals
SNAP	Supplemental Nutrition Assistance Program
WFP	World Food Program
WFS	World Food Summit
WHO	World Health Organization
UHC	Universal Health Coverage

Chapter I: Introduction

1 Introduction

Background and Rational

Food security is an umbrella term that encompasses a variety of elements, including environmental, agricultural, social, and economic sustainability, which is seen as one of the generation's most pressing issues (Guiné et al., 2021; Vågsholm et al., 2020). It is considered as a multilayered concept and has been identified different levels; 1) Availability — National. 2) Accessibility — Household. 3) Utilization — Individual. 4) Stability— time should always be factored in to these three levels. The significant time dimension that pervades all of the three levels (Food Systems Handbook, 2022). However, the importance of these four pillars vary depending on context and country's circumstances as suggested by Peng and Berry (2019). For example, in global north/ developed countries, economic accessibility is the primary obstacle to food security. On the other hand, in global south, in other words in developing countries in which previously called as "Third World") and country like Thailand, access to food may be limited by the transportation infrastructure, which may make it physically and socially difficult to get to food. Following a natural disaster, such as an earthquake, flooding or drought will have substantial issues such as availability, accessibility, utilization, and stability arise that will differ from country to country. In Thailand for example, floods and droughts occur nearly every year even prior to the pandemic, resulting in increased death and slower the GDP rates (Center For Hazards and Risk Research at Columbia University, 2005). In 2011, Thailand was hit by the worst floods in its history, which caused at least US$20 billion to US$40 billion in economic damage.

Food insecurity can be interpreted in different ways. However, it is most commonly defined as a situation when a person does not have regular access to safe, nutritious food that can fulfil a healthy diet, growth, and wellbeing. These experiences might be due to food shortage, financial hardship, or a lack of food supplies. This was reported in the 1996 World Food Summit report (FAO, 1996), which noted that people could experience food insecurity, although there is food availability and accessible but unable to be utilized due to physical, social or other limitations.

Food insecurity has a direct effect to SDG 2 which highlight the need to "End hunger, achieve food security and improved nutrition, and promote sustainable agriculture" as confirmed by numerous findings (Althumiri et al., 2021; Elsahoryi et al., 2020); SDG 1 of “End poverty in all its forms everywhere”, specifically, SDG Target 2.2, “*End all forms of malnutrition, including achieving, by 2025, the internationally agreed-upon targets on stunting and wasting in children under five”.* Yet, the world has not made significant progress in ensuring that all people have access to secure, nutritious, and adequate food throughout the year, in which worsen by the impact of COVID-19. In turn, meeting a population's food, energy, and nutritional needs, as well as developments in sustainable agriculture, create favorable conditions for improving health, mental and labor capability (SDG 8), as well as urban sustainability and urbanization (SDG11). This will strengthen efforts to develop industries with nutrition innovation (SDG9), increase competition for impoverished areas, increase women's involvement in work and society (SDG5), and minimize conflict (SDG16) as war and conflict are major underlying causes of nutrition insecurity. Additionally, Arlin Wasserman (2021) agreed that food insecurity also play a critical role in Climate Change (SDG 13), Responsible Consumption and Production (SDG 12), Life on Land (SDG 15), which includes sustainable agriculture; Life Below the Water (SDG 14) where the focus on seafood is clustered.

Although, food insecurity may appear to be an irreverent or an untouchable concern, since it does not directly affect the majority of the public, it does directly affect vulnerable populations including children, women, elderly, disable, ethnic minority and essential workers (Himmelgreen & Stern, 2021). However, it is critical to consider that, while it has a direct influence on vulnerable groups, its effects are wider and have a downstream effect to the entire global population. This matter

should be empathized with among low-income countries including Thailand, where a number of citizens are already suffering from hunger and socioeconomic issues. But in high-income countries with robust and sustainable food systems, comparable crises may be quickly recovered from (Jafri et al., 2021; Pool & Dooris, 2021). Food insecurity has a profound influence on all humans and future generations, since it has long-term consequences on not just food supply, but also on the other three major drivers of sustainability, including the environment, economics, and culture. Nevertheless, the underlying cause is commonly associated with poverty, which has an adverse effect on the following health outcomes: diet-related chronic diseases such as type 2 diabetes, cardiovascular disease, obesity, and hypertension. However, studies discovered an association between chronic food insecurity and infectious diseases including viral infections such as HIV/AIDS as a result of impaired immune function, gender inequity, and risky behaviours such as transactional sex (Himmelgreen & Stern, 2021). In which, also in line with (Baker et al., 2021), stating that noncommunicable and zoonosis disease rate is higher among low-and middle income countries such as dengue fever, Zika virus disease, and chikungunya.

Prior to the COVID-19 pandemic (2019), the prevalence of food insecurity worldwide is approximately 690 million people which impacts 9.9 percent of the world's population, however, this number has increased by and estimated 83 million to 132 million since the beginning of the pandemic. By the end of 2020, 811 million people were malnourished, or were suffering from food insecurity (FAO, 2021a). In terms of global trends, most regions around the world showed a decrease of food insecurity prior the pandemic including Central and Southern Asia, Eastern and Southern- East Asia, Latin America and the Caribbean, Northern Africa, Oceania, and Sub-Saharan Africa. Once COVID-19 was introduced, the rate of food insecurity in all regions have increased, particularly in Sub-Sahara Africa region (FAO, 2021b). However, these statistics do not imply that developing countries were not affected, for example, in a US. report, over 50 million Americans were food insecure by the end of 2020, up sharply from 35 million a year earlier. It is predicted that 42 million Americans will face food insecurity in 2021, including 13 million children (Himmelgreen & Stern, 2021). Presently, the global food insecurity scale is estimated to be 27%, with the greatest burden falling on low-income countries, followed by

lower-middle-income, upper-middle-income, and high-income economies, respectively (Pereira et al., 2021).

In terms of economic impact as the result of COVID-19, Thailand's GDP declined by 6.7 percent in 2020, the greatest recession rate among Asian countries including Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Vietnam, China, and India, and the largest shrinkage rate since the Asian financial crisis (Bangkok Post, 2020). According to the Bank of Thailand statistics revealed that the prevalence of unemployment in Bangkok has skyrocketed from 0.87 in 2019 to 1.76 in 2020. Besides, the total unemployment in Thailand is at 1.69, which is slightly lower than the unemployment rate in Bangkok alone (Bank of Thailand, 2022). In general, average working hours decreased year over year in the first trimester of 2020, and over 170,000 workers in the formal sector filed for unemployment benefits. On the other hand, low-skilled workers, informal and migrant workers have been particularly hit hard, particularly women and youths (World Bank Group, 2020). As a consequence, a sizable proportion of the population must follow stay-at-home, at-home isolation and quarantine regulations. Some people have suffered financial losses as a result of downsizing their firms by laying off employees and workers. Moreover, numerous businesses and restaurants have closed or extended according to the safety guideline (Dou et al., 2021). Once a business closes, it has a domino effect on society. For instance, one of the noticeable aspects that was effected by COVID-19 is "Food insecurity" which made safe, nutritious food less affordable for millions. Combined with upcoming climate change issues, a rising global population, food prices and other environmental stressors which jeopardizes food security and postpones the achievement of Sustainable Development Goals (SDG).

Furthermore, existing studies on COVID-19 and food security has been conducted in 35 poor nations in Africa and literature review from the United States, the United Kingdom, Canada, Jordan, Saudi Arabia, Indonesia, and Thailand, all agreed upon the fact that food insecurity has been a rising concern for public health issues and is expected to continue to rise dramatically in the event of pandemics both individual and household levels (Coulthard et al., 2021; Elsahoryi et al., 2020; Morales et al., 2021; Nagata et al., 2021; Pereira et al., 2021; Pool & Dooris, 2021; Sereenonchai & Arunrat, 2021). Research have discovered that the factors that

contribute to food insecurity vary significantly across developed and developing countries. For example, in the US. and Canada studies revealed that elderly were the most vulnerable group while, others argued that youths age 25-34 years old are the most affected during this pandemic by almost triple-folded (Elsahoryi et al., 2020; Grimaccia & Naccarato, 2019; Lauren et al., 2021; Nagata et al., 2021; Pool & Dooris, 2021). One explanation by Tarasuk et al. (2019) suggested prior and during the pandemic situation, most senior rely on public pension or the government financial assistance which it a main protective measure against food insecurity, while many young adults experienced unexpected unemployment for their first time causing burdensome and anxiety. This is also in line with those who have education factor, where a higher degree of education attainment is significant to a higher likelihood of food insecurity in some studies. As many individuals encountered the new financial hardship for the first time (40 percent of American citizens) and with no backup plans or coping mechanisms. When compared those with a postgraduate degree or higher with primary school graduates, were less likely to seek finance and additional supports from the public nor private sectors or friends and family (Dian Luthfiana Sufyan, 2021; Reimold et al., 2021). However, when access from the global perspective, those with a lower level of education accompanied with high number of children in the family that residing in the urban area are most vulnerable to food insecurity. The type of occupation also plays a critical role in influencing food insecurity. In Turkey, the prevalence is 2.5 times higher among labour-workers and self-employed, which might be explained by the lack of employee wages insurance and workers protection law from the government (Bulucu Büyüksoy et al., 2021; Giacoman et al., 2021). In addition, findings from two developed nations the UK. (Pool & Dooris, 2021) and Canada (Tarasuk et al., 2019) stated that whose total monthly income lower than their nation's poverty line were more prone to food insecurity, as also seen in Jordan where the rate is five times higher to have a moderate food insecurity and seven times more likely to suffer from severer food insecurity (Elsahoryi et al., 2020). Household composition, number of economically dependents persons such as children, adolescent, elderly and disability also put the family at risk for experiencing food insecurity. The reason that household with children are prone to food insecurity is that, normally the children would attend

school and receive the school lunch programs which is sufficient for their needs. In developed countries studies suggested that minimum age of children at risk is 18 years old, compared to global prevalence at 15 years of age. Within these age range and children who face food insecurity are more likely to have low academic performances due to social discrimination and hunger shame, and more sensitive to develop adverse physical and mental health effects later on in life. Besides, children's experiences within the same household are vary and could be influenced by the following factors; age, orphan status, and caregiver gender especially among women (Giacoman et al., 2021; Lauren et al., 2021; Morales et al., 2021; Sandesh Adhikari, 2018). In low- and middle-income countries, such as Thailand, women are more vulnerable to food insecurity as a result of their employment, job availability, migration status, and assets, all of which frequently influence their wages being lower than males' (Grimaccia & Naccarato, 2019), On the other hand, current evidence suggests that men tend to be more vulnerable to food insecurity in relatively wealthy and developed countries. Overall, gender and food insecurity have a significant relationship in developing countries but not in rich countries. Having said that, policymakers in developing countries should place a higher emphasis on gender equality. Some evidences claimed that living in the central city increases the risk of food insecurity owing to population density, living conditions, and bad environment; on the other hand, some evidences claimed that living further away from urbanization increases the risk of food insecurity due to lack of access, availability, education, and living conditions (Dian Luthfiana Sufyan, 2021; Pereira et al., 2021; Tarasuk et al., 2019) Finally, substantial data revealed that in least developed countries, residing in the capital city, economically wealthy areas, or highly remote locations is associated with a higher risk of food insecurity (Grimaccia & Naccarato, 2019).

Bangkok is the capital city with the highest rate of COVID-19 infections from the outbreak's commencement in 2020 to the present. As a result, Bangkok will be chosen as the research location. Additionally, there is limited studies on food insecurity in Thailand to the best of my knowledge, as well as the association between food insecurity during pandemic. Thereby, to address this gap, a cross-sectional study will be conducted to determine food insecurity’s prevalence during the COVID-19

pandemic in Bangkok and to examine associated factors of food insecurity during the COVID-19 pandemic in Bangkok using the Food Insecurity Experience Scale (FIES) with online questionnaire method, while also providing Thailand's capital monitoring of food insecurity with a more comprehensive understanding of the prevalence and associated factors of food insecurity during the COVID-19 pandemic in Bangkok, Thailand. Therefore, this pandemic presents a "perfect storm" for evaluating countries' food systems' resilience and functional stability.

Research Questions

1. What is the prevalence of food insecurity during COVID-19 pandemic in Bangkok?
2. What are the associated factors of food insecurity during COVID-19 pandemic in Bangkok?
3. What are the general characteristics of participants during COVID-19 pandemic in Bangkok?
4. What are the household characteristics of participants during COVID-19 pandemic in Bangkok?
5. What are the statuses of COVID-19 related factors of participants during COVID-19 pandemic in Bangkok?
6. What are the additional supports (financial supports, food assistance, and health insurance) of participants during COVID-19 pandemic in Bangkok?

Research Objectives

1.3.1 General Objective

1. To determine the prevalence and associated factors of food insecurity during COVID-19 pandemic in Bangkok.

1.3.2 Specific Objective

1. To examine general characteristics of participants during COVID-19 pandemic in Bangkok.
2. To examine the household characteristics of participants during COVID-19 pandemic in Bangkok.

3. To examine the statuses of COVID-19 related factors of participants during COVID-19 pandemic in Bangkok.
4. To examine additional supports (financial supports, food assistance, and health insurance) of participants during COVID-19 pandemic in Bangkok.

Research Hypothesis

Null hypothesis

There is no association between general characteristics and food insecurity during COVID-19 pandemic in Bangkok.

Alternative hypothesis

There is an association between general characteristics and food insecurity during COVID-19 pandemic in Bangkok.

Null hypothesis

There is no association between household characteristics and food insecurity during COVID-19 pandemic in Bangkok.

Alternative hypothesis

There is an association between general characteristics and food insecurity during COVID-19 pandemic in Bangkok.

Null hypothesis

There is no association between the COVID-19 related factors and food insecurity during COVID-19 pandemic in Bangkok.

Alternative hypothesis

There is an association between the COVID-19 related factors and food insecurity during COVID-19 pandemic in Bangkok.

Null hypothesis

There is no association between additional supports and food insecurity during COVID-19 pandemic in Bangkok.

Alternative hypothesis

There is an association between additional supports (financial supports, food assistance, and health insurance) and food insecurity during COVID-19 pandemic in Bangkok.

Conceptual Framework

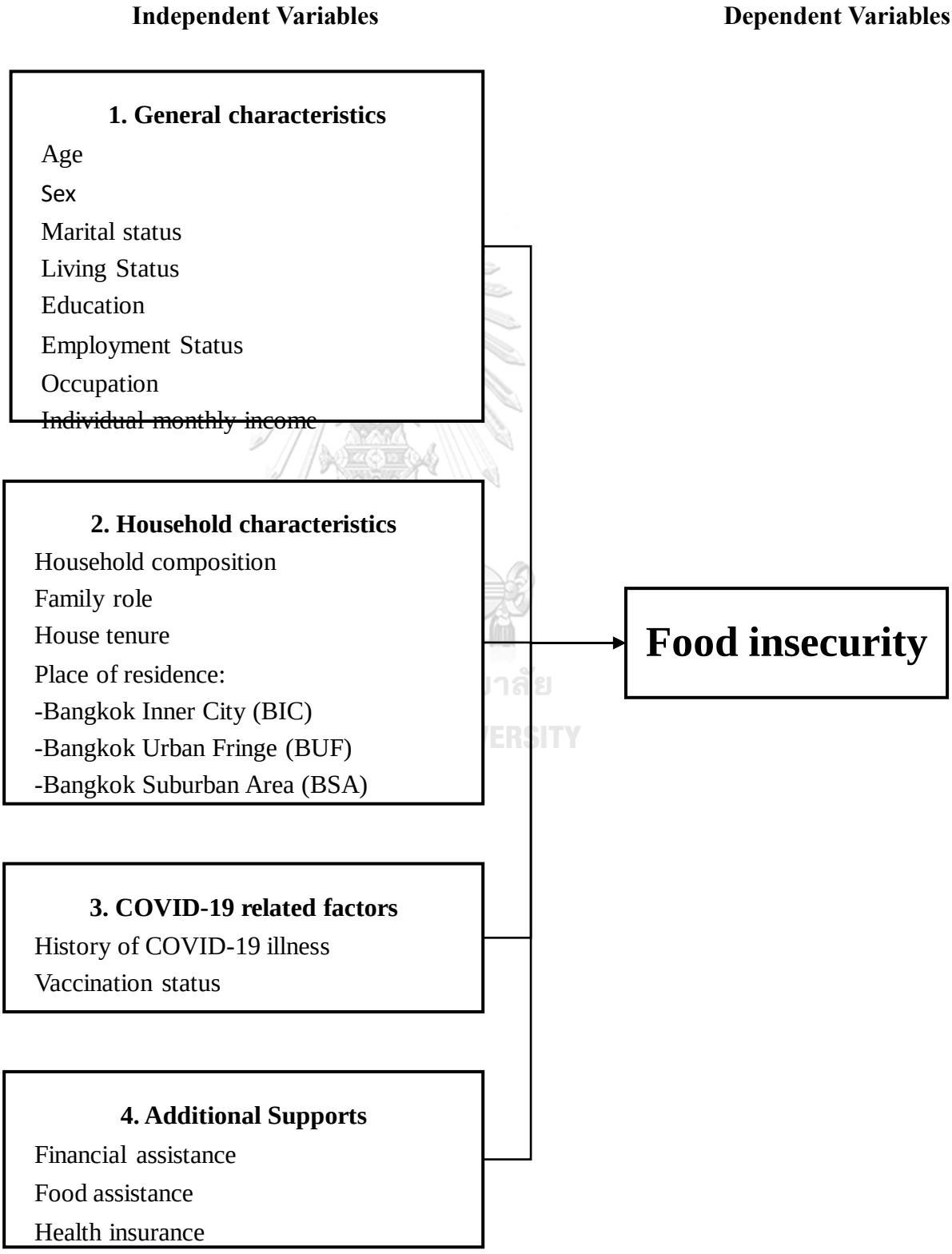

Figure 1. Conceptual Framework

Operational Definitions

Age: refers to the current age of participants at the time of the interview, and categorized into four age groups included less than or equal to 25 years old, 26-35 years old, 36-45 years old, and 46-55 years old.

Sex: refers to the sex of participants at the time of the interview, categorized into three categories as male, female, and LGBTQ+.

Marital status: refers to the marital status of participants at the time of the interview. This variable was measured in legal categories as follows; Single, Married, Divorced or Widowed.

Number of Children: refer to the number of children who aged 18 years or younger in the participant family, including the stepdaughter and son, at the time of interview. This variable was categorized into none and one or more than one child.

Living status: refers to the person that participant live with at the time of the interview during past 30 days. This variable was categorized into “Living alone”, and “Living with family or with others”.

Education: refers to the highest level of education of participants at the time of the interview, which categorized into 2 subgroups as follow: Bachelor’s degree or lower, and Higher than Bachelor’s degree.

Employment Status: refers to the current employment of participants as; Unemployed, Employed, Student, and Others.

Occupation: refers to both pre (2019) and current pandemic (2022) occupation of the participants and categorized into 5 subgroups as follow: Government sector, Private sector, Own business/ self-entrepreneur, Retried, and other.

Monthly income: refers to individual monthly income without deducting any expenses of the participants or the recent monthly income pre and current COVID-19 pandemic in Thai Baht (THB) as follow: Below or equal to 20,000 Baht, and More than 20,000 Baht.

Household composition: refers to family status of the participants as follow: Living alone, Living with friends or relatives, Married couple, Nuclear family, Extended family, Skipped- Generation family.

Family member: refers to number of family members of the participants as follow: Less than 3 members, or More than 3 members.

Number of seniors in your household: refers to number of elderlies who aged more than 60 years old and lived in the same house with the participants as follow: None, and One senior or more

Number of disabilities in your household: refers to number of disabled person who lived in the same house with the participants as follow: None, and One disability or more.

Family role: refers to the role in family of the participant or the household that you are resided at the current time of the study which can be categorized into head of the family and not the head of the family, and others.

Family role: refers to the role in family of the participant or the household that you are resided at the current time of the study which can be categorized into head of the family and not the head of the family, and others

House ownership status: refers to individual housing status of participants at the time of the interview, which categorized into three groups: House owner, Renter, and Living with family (at no cost).

Place of residence: refer to the current district where the participants have been resided in Bangkok more than 6 months or permanent resident. It will be divided into three main areas abide by the Department of Deputy BMA in 2001 as follows (BMA Information Center, 2021):

1) **Bangkok Inner City (BIC)**, the old city center dominated by the historical conservation area, government offices, schools, and central business district (CBD). It consists of 21 administrative districts: Phra Nakhon, Pom Prap Sattru Phai, Samphanthawong, Pathumwan, Bang Rak, Yannawa, Sathorn, Bang Kho Laem,

Dusit, Bang Sue, Phayathai, Ratchathewi, Huai Khwang, Khlong Toei, Chatuchak, Thonburi, Khlong San, Bangkok Noi, Bangkok Yai.

2) **Bangkok Urban Fringe (BUF**), where it located within 10–20 km radius of the city center and be the linkage between the BIC and the suburban region. The economic growth in this area is gradually increased as well as the population density and considered as subdivision development. It consists of 18 administrative districts: Phra Khanong, Prawet, Bang Khen, Bang Kapi, Ladprao, Bueng Kum, Bang Phlat, Phasi Charoen, Chomthong, Rat Burana, Suan Luang, Bang Na, Thung Khru, Bang Khae, Wang Thonglang, Khan Na Yao, Saphan Sung, Sai Mai.

3) **Bangkok Suburban Areas (BSA**) dominated by empty spaces, farming areas and enormous number of natural resources. This zone is a mixture of urban and rural and located more than 20 km radius from the BIC. It consists of 11 administrative districts: Min Buri, Don Mueang, Nong Chok, Lat Krabang, Taling Chan, Nong Khaem, Bang Khun Thian, Lak Si, Khlong Sam Wa, Bang Bon, Thawi Watthana.

History of COVID-19 illness: refer to the individual participant whose has a history of tested positive to COVID-19 (ATK and/or PCR positive) or in close contact and needed to self-quarantine in the past 12 months, and categorized into Never detect, and Detected

Vaccine status: refer to the number of COVID-19 vaccination doses of the participants as follows: Less than or equal to 2 doses, or Three doses or more

Financial assistance: refer to Thai's government financial support from Government support (50-50 co-payment scheme "Khon La Khrueng", Cashback measure "Ying Chai Ying Dai scheme", "Rao Chana scheme" etc.), Private sectors and Neighbors and local people in the community. The variable was categorized into "Not seek for additional support", and "Supported by Government, Private sector, Community"

Food assistance: refer to free food or relief packages via donation that participant have been received during the COVID-19 pandemic from Government support (50-50 co-payment scheme "Khon La Khrueng", Cashback measure "Ying Chai Ying Dai scheme", "Rao Chana scheme" etc.), Private sectors and Neighbors and local people in the community. The variable was categorized into "Not seek for additional support", and "Supported by Government, Private sector, Community"

COVID-19 insurance: refer to any additional private insurance such as COVID-19 insurance that the participant purchased/own, categorized as Yes and No

House ownership status: refers to individual housing status of participants at the time of the interview, which categorized into three groups: House owner, Renter, and Living with family (at no cost).

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COVID-19 insurance: refer to any additional private insurance such as COVID-19 insurance that the participant purchased/own, categorized as Yes and No

Bangkok: Include all 50 districts (khet) in Bangkok province, as follow:

1. Bang Bon
2. Bang Kapi
3. Bang Khae
4. Bang Khen
5. Bang Kho Laem
6. Bang Khun Thian
7. Bang Na
8. Bang Phlat
9. Bang Rak
10. Bang Sue
11. Bangkok Noi
12. Bangkok Yai
13. Bueng Kum
14. Chatuchak

15. Chom Thong
16. Din Daeng
17. Don Mueang
18. Dusit
19. Huai Khwang
20. Khan Na Yao
21. Khlong San
22. Khlong Toei
23. Khong Sam Wa
24. Lak Si
25. Lat Krabang
26. Lat Phrao
27. Min Buri
28. Nong Chok
29. Nong Khaem
30. Pathum Wan
31. Phasi Charoen
32. Phaya Thai
33. Phra Khanong
34. Phra Nakhon
35. Pom Prap Sattru Phai
36. Prawet
37. Rat Burana
38. Ratchathewi
39. Sai Mai
40. Samphanthawong
41. Saphan Sung
42. Sathon
43. Suan Luang
44. Taling Chan
45. Thawi Wathana
46. Thon Buri

47. Thung Khru
48. Wang Thonglang
49. Watthana
50. Yan Nawa

FIES: refer to the Food Insecurity Experience Scale developed by FAO. It consists of main 8 questions regarding food behaviour and an experience-based assessment of an individual which was asked to recall occurrences of food insecurity in the past 12 months. Additionally, every item questions

Food insecurity: Food insecurity status of the individual participant where they experienced a lack of regular access to adequate food sources, inefficient use of food resources, and instability over an extended period of time, in this case, 12 months period in accordance to SDG and FAO. The variable was categorized into "Yes" - experienced food insecurity from COVID-19 impact, and "No" – not experienced food insecurity from COVID-19 impact.

During COVID-19: refer to the past 12 months period up to the time of data collection, in which the COVID-19 virus still has been spreading globally. Also, refer to the past 12 months where the participants' food insecurity status may be impacted from COVID-19 pandemic, which measured by "Using the Food Insecurity Experience Scale to monitor the impact of COVID-19

Chapter II: Literature review

2 Literature reviews

This chapter contains theorical aspects and understanding related to food insecurity prior and current situation of COVID-19 pandemic in Thailand and globally as follows:

Food security

History of food security

Food security concept was first noticeable back in mid-1970s, during a period of global food crisis. In that era, people were struggling with food supply, ensuring

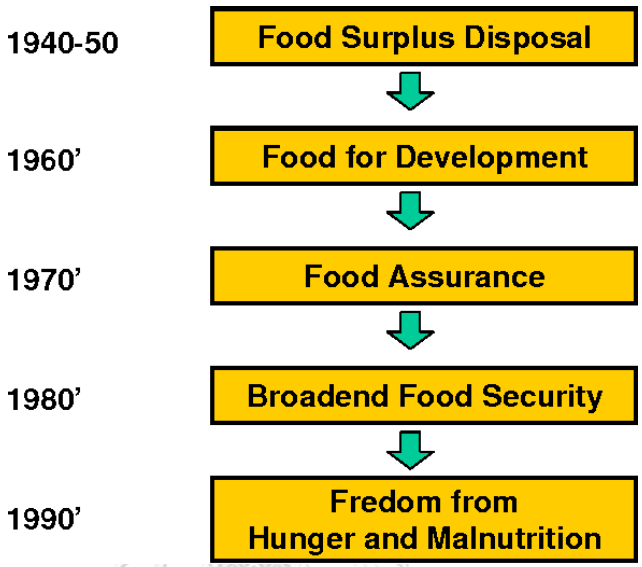
availability, and price stability of fundamental commodities on a worldwide and national scale. This led to international concerns in the global food economy, provoking multisectoral to acted up and enhanced coordination among officials and donor organizations (Napoli et al., 2011). After the culminating of diligent discussion resulting the first World Food Conference was announced which was held in Rome in 1974 responsible by the United Nations under the auspices of the UN Food and Agriculture Organization (FAO). The purpose of this conference was to ameliorate food insecurity among vulnerable population in several countries of Asia and Africa, likewise, purposively to repel devastating famine in Bangladesh, and platforms for policy dialogue (FAO, 2003b; Gerlach, 2015). Following the events of the mid-1970s, a great deal of attention was paid to the problems of famine, starvation, and food shortages. Food security's continued growth as an operational term in public policy reflects a growing awareness of the intricacies of the technological and policy concerns involved. Through comprehensive international consultation process accumulating to the World Food Summit (WFS) in 1996, later the conflicting definitions of food security were approved in 1974 and 1996, as well as those found in official FAO and World Bank publications. As a result, food security was redefined as recognizing that the behavior of potentially susceptible and impacted individuals was a significant component (FAO, 2003b).

Food security definition

To begin with, the term food security does not have a precise definition as each organization interpretate differently. In this paper, the author will gather a list of reliable sources of definition and commonly use definitions among nutritionist, policy makers and other public health sectors (*Figure 2*.). Interestingly, over 200 definitions and 450 indicators were included in published writing in the past generation. As a result, multiple indices of food insecurity have been evaluated and undergone various redefinition (FAO, 2003b; Napoli et al., 2011).

Figure 2. The Evolution of Food Security Concerns (Gross et al., 2000)

Firstly, the World Food Summit in 1974 primary focused was to increase the



quantity and stability of food supplies, as well as the global food economy which can be defined as: *"availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices"* (United Nations, 1975).

Secondly, in the 1983, FAO broadened its notion of food security to ensuring vulnerable people's access to adequate supplies and heavily emphasis on demand and supply: *"ensuring that all people at all times have both physical and economic access to the basic food that they need*" (FAO, 1983).

Thirdly, by 1986 the World Bank's report "Poverty and Hunger" essentially emphasis on chronic or transitory food insecurity, which associated with structural poverty, low incomes, natural disaster, economic collapse or conflict. Moreover, it appears that chronic food insecurity threatens the famine at high: *"access of all people at all times to enough food for an active, healthy life"* (World Bank, 1986).

Fourthly, in 1990s food security gain a significant recognition and transcending the focus from individualism to globalization, together with food safety

concept and nutrition balanced diet for active and healthy lifestyle. Both social and cultural food preferences were taken into account during this century. During the mid-1990s, the term “food security” and “nutrition security” emerged, thus, food security is a subgroup of “food security and nutrition”(Peng & Berry, 2019). In addition, human security and human rights became a consideration in accordance with 1994 UNDP Human Development Report (FAO, 2003b).

Lastly, the World Food Summit’s 1996 adopted a more comprehensive definition and this widely recognized concept highlights the Four Pillars of Food Security: accessibility, availability, utilization and stability:*“at the individual, household, national, regional and global levels when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life”* (FAO, 1996). This term is expanded further in 2001's The State of Food Insecurity: *“Food security [is] a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”(FAO, 2002).*

At present time, relying on the recent definition by FAO is most suitable and it can be defined as:*“A situation when exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life. Household food security is the application of this concept to the family level, with individuals within households as the focus of concern.”*

In summary, food security is concerned with the availability, access, and utilization of food. When an individual has regular access to sufficient safe and nutritious food to support an active and healthy lifestyle, they are termed food secure. Lastly, It is critical to note that that food security and famine and hunger are not synonymous: food security relates to the availability of food, but famine and hunger are the outcome of food insecurity (Napoli et al., 2011). Therefore, observation of these definitions over time demonstrates the significant shifts in government and stakeholders’ perception on food security and to some extended of how much attention they were paid on this issue. On this point, these assertions could be act as a

guideline for the policy analyses that potentially reshaped our view of food security as a global and national concern.

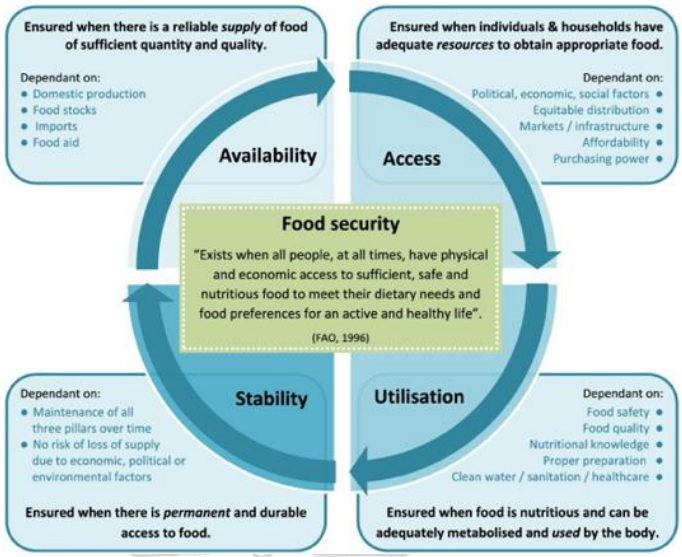
Household food security

Household food security exists when members of the household have access to a sufficient quantity and variety of safe foods necessary for an active and healthy lives (FAO, 2010). To put it simply, it is the extension of food security to the family level, centering exclusively on individuals within families; those food availability may be gathered from local production, commercial imports, or agency donations (Castell et al., 2015). It is important to determine vulnerable households in order to provide appropriate food security. Hence, an effective measure for identifying vulnerable families is the household's poverty level as assessed against a defined criterion or 'poverty-line' (FAO, 2003a). A large number of international survey and researches include poverty line as a measurement tool amongst household population including the U.S. Census Household Pulse Survey 2021, the IRIS Composite Survey Household Questionnaire (2004) in Bangladesh and Uganda, and The Household Food Insecurity Access Scale (HFIAS)(Alcaraz V & Zeller, 2007; Bulucu Büyüksoy et al., 2021; Nagata et al., 2021). According to FAO (2003a) these are the thee characteristics of ‘poor or vulnerable’ household:

- Location: rural/urban; small village/large village; remote province/near to capital city etc.;
- Composition: size, age and dependency ratios; male/female head;
- Sources of income: production, employment, trade, remittances and other transfers.

Four Pillars of Food Security

Food security is an umbrella term that encompasses a variety of elements, including environmental, agricultural, social, and economic sustainability, which is seen as one of the generation's most pressing issues (Guiné et al., 2021; Vågsholm et



al., 2020). It is considered as a multidimensional concept and have been identified in line with different levels. 1) Availability — National. 2) Accessibility — Household. 3) Utilization — Individual. 4) Stability – the significant time dimension that pervade all of the three levels (*See Figure 3*.). These four pillars will be explained in more details as follows (Food Systems Handbook, 2022):

Figure 3. FAO Four Pillars of Food Security (Sandesh Adhikari, 2018).

1) Physical AVAILABILITY of food

Food availability is determined the availability of sufficient amounts of food of acceptable quality, whether the source could be produced from domestically or imported goods at the nation scale. It also involves with the level of food stocking, panic buying, food aid and net trade.

2) Economic, physical and social ACCESS to food

Accessibility is referred to physical, economic and social access to food, which underly with the adequate resources, in other words, entitlements or money. It also varies based on the people's circumstances, which might influence their

accessibility, such as the community in which they reside, the government and political structure, and the economic arrangements that they have committed into.

3) Food UTILIZATION

Utilization is frequently used to refer to the process by which the individuals make the best use of the various nutrients found in food. Individuals who consume an adequate amount of energy and nutrients do so as a consequence of effective care and feeding practices, food preparation, food safety, diet diversity, and intra-household food distribution. When combined with proper biological use of food ingested, this defines an individual's nutritional state.

4) STABILITY of the other three dimensions over time

Food security means that a population, household, or individual has access to adequate food at all times, regardless of their circumstances. Each of these three pillars: Availability, Accessibility, and Utilization must be maintained over time, despite any unexpected threats such as extreme weather, disaster, economic collapse and conflicts. In order for there to be full food security, all four of these dimensions must be in place. In the last few years, more attention has been paid to the importance of sustainability, which can be thought of as the long-term time dimension to food security (Peng & Berry, 2019).

On the other hand, Peng and Berry (2019) the public health nutrition experts from China and Israel raised several intriguing points, firstly, this type of diagram is commonly use to illustrate the concept into simply form, however, this visualization is prone to mislead the audiences since the four dimensions are interconnected and interdependent. Secondly, this is a sophisticated system that cannot be presented solely through these four squares; rather, each pillar should be connected in some way. Often heard as complex problems require complex solutions. Lastly, not all aspects of food security pillar are equally important as suggested by the diagram. In fact, the distributions and percentages should be vary depending on context and country circumstances. For example, in global north (developed countries), economically accessible is the primary obstacle to food security, likewise, in global south (developing countries, previously called “Third World”) and country like

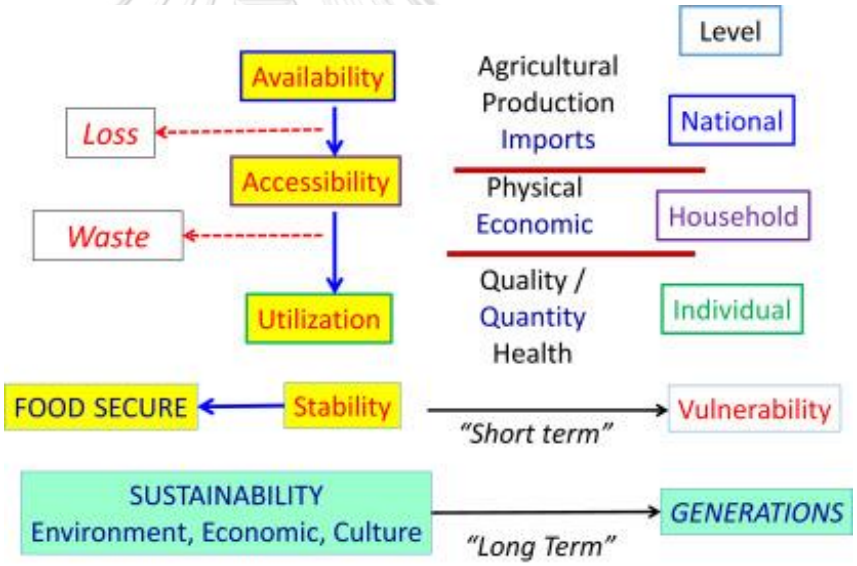
Thailand, access to food may be limited by the transportation infrastructure, which may make it physically and socially difficult to get to food. Following a natural disaster, such as an earthquake, substantial issues such as availability, accessibility, utilization, and stability arise that are completely differ by each country. By contrasting the circumstances in the global north and south, this argument becomes more understandable and paints a clearer picture of the need for each country to conduct a critical analysis of the value of each pillar in light of their inputs.

Although this graphic form is frequently used to illustrate the four pillars of food insecurity. Instead of pillars, Food and Agriculture Organization of the United Nations (FAO), International Fund for Agricultural Development (IFAD), and World Food Programme (WFP) suggested an alternative that is more appropriate analogy for describing the relationships between the four components of food security, which is a pathway and it was first mentioned in The State of Food Insecurity in the World 2013 report (Peng & Berry, 2019). This pathway illustrates a direct linkage from food production (availability) to household (accessibility) to individual (utilization), See Figure, 4.

Pay close attention to the last two dimensions, stability and sustainability, as well as their outcomes. While it is true that food security is a concern for vulnerable, also known as disadvantaged and underprivileged populations, this is just a temporary effect. A brief aside is that while analysing a notion, we should include time as a significant variable. In any case, based on the evidence, food insecurity appears to be a common issue for vulnerable minorities. However, if we examine closely food ‘in-sustainability’, it has a profound influence on all humans on this planet and future generations, since it has long-term consequences on not just food supply, but also on the other three major drivers of sustainability, including the environment, economics, and culture.

Figure 4. The pathway of the dimension of Food Security

This pathway adopted the concept of General Systems Theory (GST) by Karl Ludwig von Bertalannfy (See Figure 4.), an Austrian biologist whose also is the father of general systems theory. GST is famously proven and continuously use in health systems. In 2020, a systematic review over 47 studies conducted by Greece professionals, concluded that a substantial number of GST concepts had been implemented in the healthcare industry during the previous decade. Not mentioning the GST-related frameworks that have been utilized both theoretically and practically, and it has played a significant role in the healthcare. One of the reasons this system



has such recognition is that the system algorithm necessitates critical and systems thinking in order to generate a GST and to resolve real-world issues into a framework (Katrakazas et al., 2020). In addition, Gibson (2012) reformed a four-tiered of pyramid evaluates on the philosophies of the Committee on Food Security and the Food Insecurity and Vulnerability Information and Mapping System (FIVIMS) is being developed by FAO, while maintaining a connection to the four pillars of food security. Figure 5., Gibson conducted extensive research to properly comprehend this phenomenon, and he came to the conclusion that the phenomenon is frequently

researched from a certain professional perspective. Whilst, The More We Look, the Deeper It Gets, which follows the “Cultural Iceberg Theory”, also called as the “Theory of Omission” by Edward T. Hall’s in 1970s, the main concept is about system thinking and transformation (Oscar Berg, 2012).

In figure 5., starting from the tip of the model which is from the individual’s viewpoint meaning that they mostly care about the health status among of themselves, follow by the household which concerning more about the health of family members, sanitation and feeding practice. Agriculturalists and farmers, for example, may prioritize boosting output through better land management, crop yield potential maximization, disease avoidance, and pest control strategies. Conversely, from the perspective of a sociologist, whose primary concentration on food security issues is likely to be on cultural and sociological implications on insecurity, population growth, and how poverty affects malnutrition. Additionally, the government, politicians, and economists are the ones that have the most manpower and money, and they are the ones who are most focused on policy that is driven by domestic or international necessity, trade-offs, and financial commitments (Gibson, 2012).

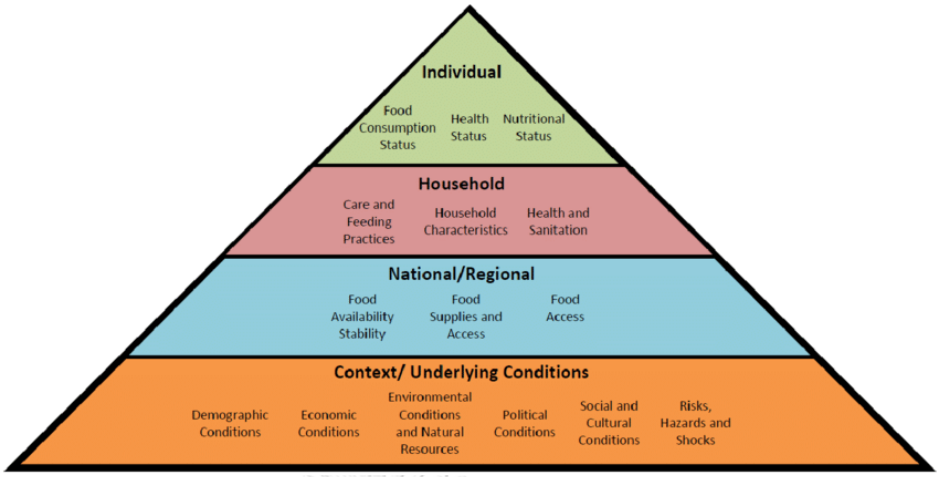


Figure 5. Four-tiered of food security(Gibson, 2012).

Over time the measurement of food insecurity has changed, as suggested from Pereira et al. (2021) findings that food insufficiency, nutrient inadequacy, cultural unacceptability, unsafety, and instability of foods are also acted as significant barriers apart from the four pillars described beforehand.

Food Insecurity

Definition of food insecurity

Below is the most recognized definition of food insecurity states as:

> "A person is food insecure when they lack regular access to enough safe and nutritious food for normal growth and development and an active and healthy life. This may be due to unavailability of food, financial hardship, and/or lack of resources to obtain food. Food insecurity can be experienced at different levels of severity" (FAO, 2022a)

Similarly, the U.S. Department of Agriculture (USDA) defines food insecurity as:

> "A lack of consistent access to enough food for an active, healthy life" which is a brief and simpler definition (US Department of Agriculture, 2021).

Among the many factors that might contribute to a state of food insecurity simply means the shortage of food, a lack of access to adequate food sources, inefficient use of food resources, and instability over an extended period of time. Food insecurity is a multifaceted issue, as much study has revealed. Gibson (2012) provided a sarcastic interpretation of food insecurity as "Opening Pandora's Box" illustrates the lesson of the story: we do something that creates hundreds of new issues that did not exist or were unknown previously. In this case, not taking any actions or considerations are already doing harm to future generations. This interpretation was once brought up in research in 2008, when there were private investments in biotechnology in such a way that patents were taken out on indigenous plants that had been utilized for centuries by the local people, without their knowledge or consent. From this event, intellectual property and food security are intertwined, and this has sparked a debate (Mitra, 2008).

Having state that, those factors are connected with the Four Pillars of Food Security that previously stated. Noting the fact that people could experience food insecurity, although there is food availability and accessible but unable to utilized due to physical, social or other limitations, namely the elderly, disabled, migrants or even children and women (Peng & Berry, 2019). Therefore, when public health, policy makers and other related agencies tackling this issue, health equity between age, gender, ethnicity, and health condition should be taking into the account. These vulnerable groups are more likely to exposed and threatened by a variety of stressors, ranging from internal conflict within family due to financial hardship to external conflict effecting from political decisions that potentially escalating to civil war. Conflict, in particular, is a significant contributor of severe food crises, including famine and this was revealed by the UN Security Council in May 2018. Moreover, in 2020, a total of 99.1 million people in 23 countries were affected by hunger as a result of conflict. Natural catastrophes, extreme weather and climate change exacerbate problems at all times, which are wreaking havoc on agricultural lands through deforestation, landslides, and decreased soil fertility, along with several other factors (Action Against Hunger, 2022; FSIN, 2021; Guiné et al., 2021). In Thailand for example, floods and droughts occur nearly every year even prior to the pandemic,

resulting in increased death and slower the GDP rates (Center For Hazards and Risk Research at Columbia University, 2005). In 2011, Thailand was hit by the worst floods in its history, which caused at least US$20 billion to US$40 billion in economic damage, according to the Bank of Thailand and other top research institutions in the country. Otherwise, Thailand's northeast region has been experiencing severe drought for decades, destroying the second largest rice cultivation after India (Daniel Workman, 2021) and agricultural regions that are critical to the country's food security, while also disrupting the global food supply chain. Most of these environmental hazards are a result of climate change; numerous studies suggest that rising sea levels are a result of increased air and water temperatures, supercharged storms and increased wind speeds, more intense and prolonged droughts and wildfire seasons, and increased precipitation and flooding (Ghazali et al., 2018; Makoto Ikeda, 2020).

Hunger

Prior exploring in-dept regarding to this concept, once again it is crucial to understand that hunger and food insecurity are inextricably connected, they are separate concepts. According to the US Department of Agriculture (2021) defined hunger as: **"**Hunger is a physiological condition for an individual that may result from food insecurity. It is a potential consequence of food insecurity that, because of prolonged, involuntary lack of food, results in discomfort, illness, weakness or pain that goes beyond the usual uneasy sensation".

In other words, it is the feeling of discomfortable or painful sensation from the shortage of food intake, it also called as food deprivation. Hunger is an individual-level physiological condition that is require an extensive tools such as Current Population Survey (CPS) to measure which may result from food insecurity, whereas food insecurity is a household-level economic and social condition, or the lack financial to purchase food (Action Against Hunger, 2022; Hunger and Health, 2022; US Department of Agriculture, 2021). Once again, food insecurity can be viewed differently by different institutions. Likewise, in this research the author will define hungry in abide by the UN's Hunger Report as it can be defined as: "…periods when populations are experiencing severe food insecurity—meaning that they go for entire

days without eating due to lack of money, lack of access to food, or other resources". In summary, FAO report states that hunger is the synonym word for 'chronic undernourishment' and this condition becomes chronic when the person consuming less than 1,800 calories per day on regular basis. If so, that person can be defined as undernourishment.

Malnutrition

According to the Max Roser and Hannah Ritchie (2019) under the Our World in Data, Malnutrition is a broad term that encompasses both under- and over-nutrition, along with micronutrient deficiencies, in which effect physiological abnormality occurred when individual struggle to meet the standard requirements, as well as imbalanced and excessive macronutrient and/or micronutrient intake. While, over-nourishment and undernourishment are the subgroup of this umbrella term. Besides, the FAO has used the Prevalence of Undernourishment (PoU) indicator to measure the degree of hunger across the globe based on FIES and a tool to monitor progress toward achieving SDG Target 2.1 (FAO, 2022a).

The Food Insecurity Experience Scale

The Food Insecurity Experience Scale (FIES) is regarded as one of the most trustworthy tools for assessing food insecurity and is getting increasing attention, particularly during current times of food crises. It is the only scale used to assess the degree of food insecurity throughout the globe and to track progress toward SDG 2. Additionally, this instrument gives accurate information at a minimal cost and has been demonstrated to be useful in over 150 nations, covering 90 percent of the world population. FIES is one of four experience-based indicators of food insecurity featured in the Data4Diets platform, along with the Household Hunger Scale (HHS), the Household Food Insecurity Access Scale (HFIAS), and the Latin American and Caribbean Food Security Scale (ELCSA). The Food and Agriculture Organization (FAO) established the FIES as part of the Voices of the Hungry (VoH) initiative, building on the extensive and critically research of the HFIAS and ELCSA. It was developed using the ELCSA's adult-referenced questions in order to generate a

concise, standardized experience-based assessment that could be used in a variety of

sociocultural situations (FAO, 2021a).

FIES generates comparable population-level estimates of food insecurity across nations, cultures, and subpopulations at low cost, yet efficient and reliable. Evidence proven that the individual questionnaire-based survey module provides the benefit of gender disaggregation, similarly, the household based module offer the benefits of the food security status (International Dietary Data Expansion, 2022). The measure can be divided into three categories based on the severity as follows in figure 6: Food security to mild food insecurity (Green zone), Moderate food insecurity (Amber zone), and Severe food insecurity (Red zone) (FAO, 2022a); consequently, a high prevalence of moderate food insecurity is a significant predictor of poor dietary quality and micronutrient deficiencies. While, a high prevalence of severe food insecurity is more likely associated with insufficient quantity of food and is hence highly associated with undernourishment or hunger.

Figure 6. Level of food insecurity (FIES).

The data for this indicator are gathered using the eight-item FIES survey questions which primary focus on food-related behaviors and experiences connected with challenges in obtaining food owing to resource limitations (individual or household), which may easily be included into a larger survey of individuals (e.g., a health and nutrition survey) or households (e.g. Household Consumption and Expenditure Survey [HCES]). The FIES survey modules, as well as individual version translations into 170 languages and dialects, are available on the VoH website. Additionally, the portal includes the FIES Statistical Software Package, which is used to do data analysis and estimate the incidence of food insecurity.

Advantage

The FIES may be used to assess food security for a variety of purposes, including the following (International Dietary Data Expansion, 2022):

- To determine the frequency of food insecurity in the population (for both SDG monitoring and national use)
- To identify groups at risk, vulnerable populations such as children, women, elderly, migrants etc. However, in this study, the focus is among adults, adults with children, women, men and others, and the elderly population.
- To direct and monitor the effects of policies and initiatives relating to food security
- To identify food insecurity's risk factors and effects

To gain a picture of the "adequacy" aspect of diet quality, other methods and indicators are needed, such as a quantitative 24-hour dietary recall to quantify food consumption and calculate the Mean Adequacy Ratio (MAR) or a diet diversity index to calculate the Minimum Dietary Diversity Score for Women (MDD-W).

Disadvantage

FIES uses a sophisticated probabilistic strategy to categorize families according to their food security status. While the results are statistically robust and similar across nations and subpopulations, doing the study and producing the estimates may be tough for non-specialists. However, this analytic technique allows for the accounting of variances in food insecurity experiences across distinct cultural

or personal conceptions. FAO supplies users with resources, such as software and educational materials, as well as technical assistance.

The Food Insecurity Experience Scale Rational

As this research aim is to measure the severity of Bangkokians at individual scale, thus, by applying this is the best option. As it is the scale that was developed exclusively to determine people's ability to access food (See, figure 7). Since 2014, the Gallup World Poll (GWP) has used the eight-question FIES survey module in nationally representative samples of the adult population aged 15 and over 140 countries included Thailand. While doing face-to-face interviews in the year 2020 during the COVID-19 pandemic may be challenging, telephone interviews were undertaken to limit the likelihood of community transmission (Ballard, 2013).

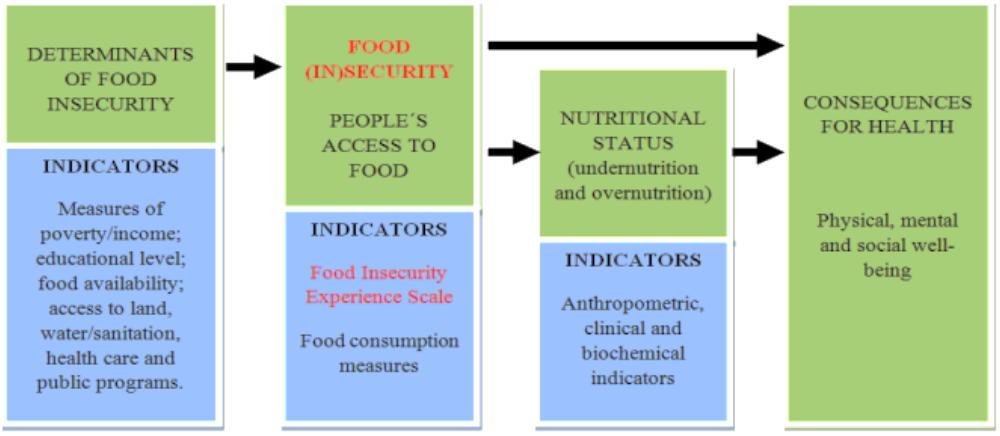


Figure 7. Determinants and consequences of food insecurity at the individual level

Globally, numerous research publications have used FIES to quantify the degree of food insecurity at the individual, household, and national level; however, there is a limited studies on the Thai population and FIES in the international database. FIES is frequently chosen to assess the prevalence and associated factors for food insecurity prior to and during the COVID-19 era, as demonstrated (Dian Luthfiana Sufyan, 2021), Jordan (Elsahoryi et al., 2020), Saudi Arabia (Althumiri et al., 2021), Chile (Giacoman et al., 2021), League of Arab States (Sheikomar et al., 2021), Zanzibari (Nyangasa et al., 2019), and The United Kingdom (Pool & Dooris, 2021). Additionally, FIES is helpful for identifying connections between eating behavior and BMI, eating style, coping, and health anxiety, as demonstrated in a cross-sectional study conducted in the United Kingdom (Coulthard et al., 2021). As previously stated, FIES is capable of accessing not only the individual level of food insecurity, but also the communal level, as illustrated by Onori et al. (2021); who evaluated the experiences of 8,755 mothers from three states in India. Occasionally, FIES is administered simultaneously with mental health evaluation, as was the case with 2,402 women in Bangladesh.

Sustainable Development Goals (SDGs)

It is built on the Millennium Development Goals (MDGs) for the period 2000–2015 and is measured against a set of 17 Sustainable Development Goals (SDGs). One of the SDGs' most distinguishing characteristics is the interconnected nature which align in a similar fashion with food insecurity. Food insecurity has a direct effect to SDG 2 which highlight the need to "End hunger, achieve food security and improved nutrition, and promote sustainable agriculture" as confirmed by numerous findings (Althumiri et al., 2021; Elsahoryi et al., 2020); SDG 1 of “End poverty in all its forms everywhere”, specifically, SDG Target 2.2, “End all forms of malnutrition, including achieving, by 2025, the internationally agreed-upon targets on stunting and wasting in children under five.” The goal was to reduce the prevalence to 15% internationally by 2030, however according to the Goal Keepers Report, 24 percent of children under the age of five were stunted worldwide in 2020, whereas by the end of 2030, it is predicted that approximately 22 percent of children under the age of five will be stunted (The Goalkeepers, 2021). and SDG 3 “Ensure healthy lives and promote well-being for all at all ages”. Yet, the world has not made significant progress in ensuring that all people have access to secure, nutritious, and adequate food throughout the year, in which worsen by the impact of COVID-19. In turn, meeting a population's food, energy, and nutritional needs, as well as developments in sustainable agriculture, create favorable conditions for improving health, mental and labor capability (SDG 8) as it potentially lower economic productivity and unnecessarily increases healthcare costs, as well as urban sustainability and urbanization (SDG11) because it requires integrated urban and rural food systems. This will strengthen efforts to develop industries with nutrition innovation (SDG9), increase competition for impoverished areas, increase women's involvement in work and society (SDG5), and minimize conflict (SDG16) as war and conflict are major underlying causes of nutrition insecurity. Additionally, Arlin Wasserman (2021) agreed that food insecurity also play a critical role in Climate Change (SDG 13) as a sustainable food systems reduce greenhouse gas emission, Responsible Consumption and Production (SDG 12) reduces food waste and loss at the retail and consumer levels; Life on Land (SDG 15) including soil degradation and reduced biodiversity

threaten the ability to grow food, which includes sustainable agriculture; Life Below the Water (SDG 14) where the focus on seafood is clustered. Therefore, FIES-based indicators will be used to monitor global, regional, and national trends in food insecurity, hence providing data for international and national policymaking (FAO, 2022a, 2022c).

Magnitude of food insecurity prior to and during COVID-19 pandemic worldwide

In terms of global trend, most regions around the world showed a continuously downward trend prior the pandemic including Central and Southern Asia, Eastern and Southern- East Asia, Latin America and the Caribbean, Northern Africa, Oceania and Sub-Saharan Africa, except in Western Asia region that showed a sky-rocking trend in 2010 (See Figure 8). All in all, the above regions shows a dramatically rose in the Prevalence of Undernourishment (PoU) in 2019, especially in Sub-Sahara Africa and least developed countries (FAO, 2021b; Our World Data, 2019).

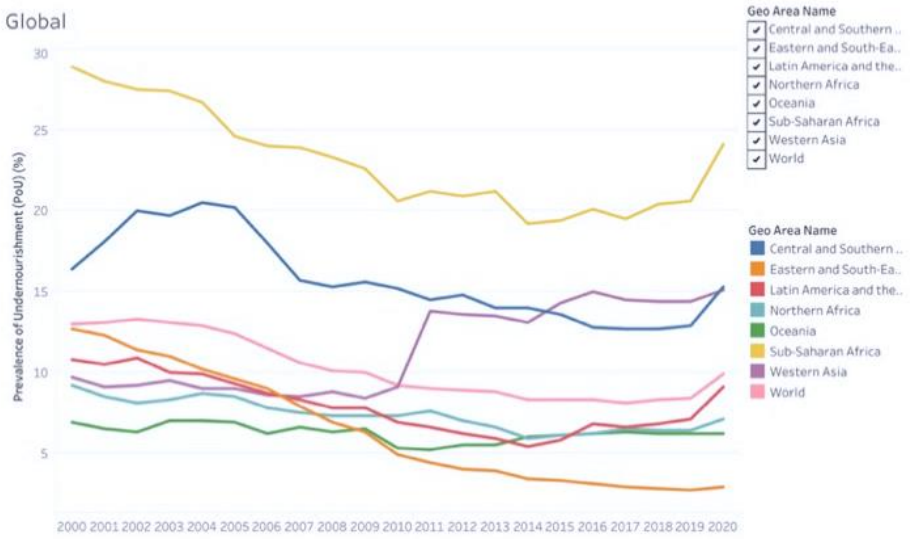
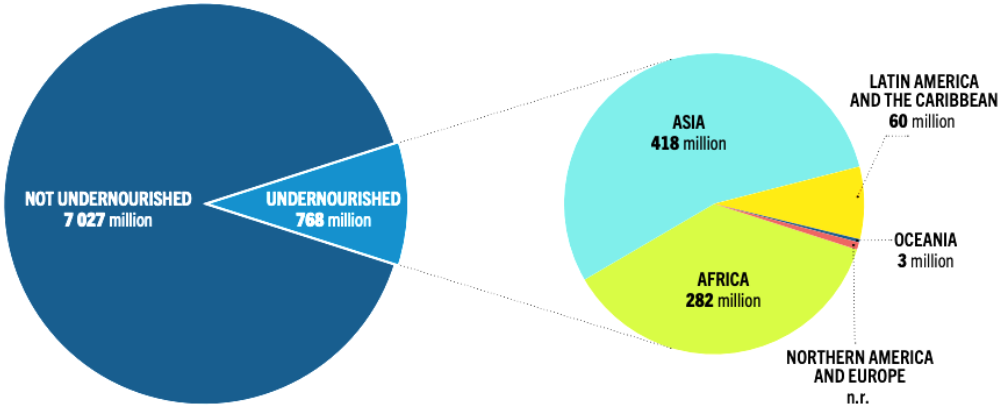


Figure 8. Percentage of undernourished people by region in 2000 and 2020

By 2020 (, The State of Food Security and Nutrition in the World 2021 report asserted that more than half (418 million) of the world's undernourished people (768 million) reside in Asia, more than a third (282 million) in Africa, and roughly 8% in Latin America and the Caribbean (60 million) (FAO, 2021a). This can be further stated that approximately 57 million additional people in Asia, 46 million additional people in Africa, and approximately 14 million additional people in Latin America and the Caribbean were significantly affected by hunger. However, these statistics do

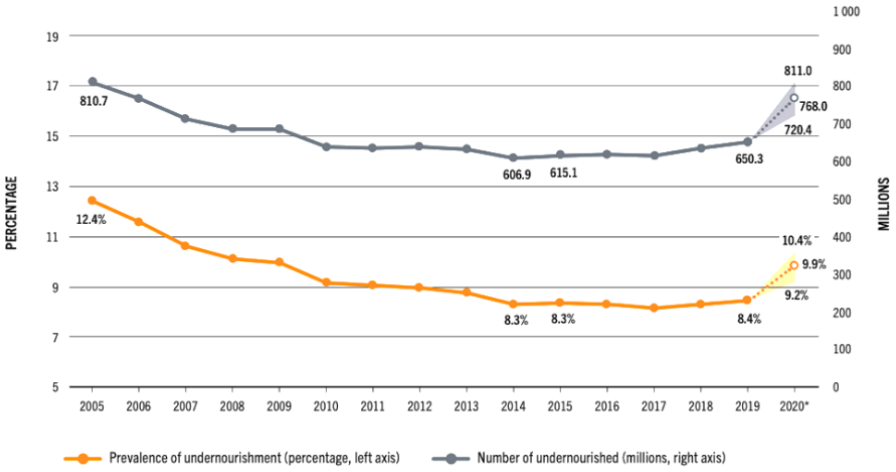
not imply that developed countries do not have any impacts, for example, in the US. reported that over 50 million Americans were food insecure by the end of 2020, up sharply from 35 million a year earlier. It is predicted that 42 million Americans will face food insecurity in 2021, including 13 million children (Himmelgreen & Stern, 2021). It is also projected that 720 and 811 million people were undernourished or food insecure, in other word nearly one in every three people in the world would lack



access to enough food. The prevalence of undernourishment (PoU) was had climbed from 8.4 in 2019 to 9.9 percent in 2020 (FAO, 2021a). In the report also suggested that while the global prevalence of moderate or severe food insecurity, as evaluated by the Food Insecurity Experience Scale (FIES) has been gradually increasing since 2014, the predicted increase in 2020 was equivalent to the cumulative increase over the previous five years (See Figure 8).

Figure 9. Regional prevalence estimates reveal

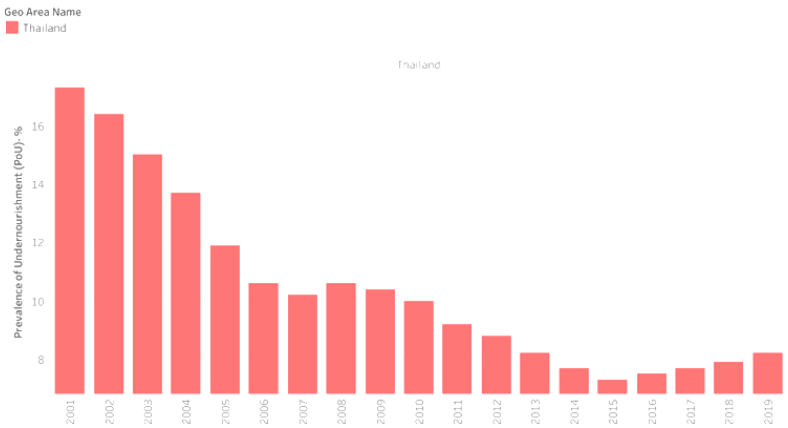
Figure 10. The number of undernourished people in the world continued to rise in 2020.



At the worldwide level, the gender disparity in the prevalence of moderate or severe food insecurity has expanded even more in the year of the COVID-19 pandemic, with women experiencing 10% more moderate or severe food insecurity than males in 2020, up from 6% in 2019 (FAO, 2021a). Another negative consequence claimed that the high expenditure of healthy foods, along with continuing high levels of wealth inequality, making it challenging to consume nutritious diet approximately for 3 billion people worldwide in 2019, considerably less than in 2017. Primarily in Africa and Latin America region which experienced a rise in the unaffordability of healthy diets in 2017-2019, and predicted by FAO that it will be the most severely impacted due to COVID-19 pandemic.

Magnitude of food insecurity prior to and during COVID-19 pandemic in Thailand

In Thailand, the proportion of undernourished persons decreased steadily from 2001 (17.3%) to 2015 (7.3%), implying the lowest rate in the country's 14-year history; however, the trend began to progressively grow in 2016 (7.5%), 2017 (7.7%), 2018 (7.9%), and 2019 (8.2%), correspondingly (See Figure 11.) (FAO, 2021b). As predicted, due to the pandemic's widespread and deterioration, Thailand's prevalence of undernourishment has decreased to as low as it was in 2013, about a decade ago.



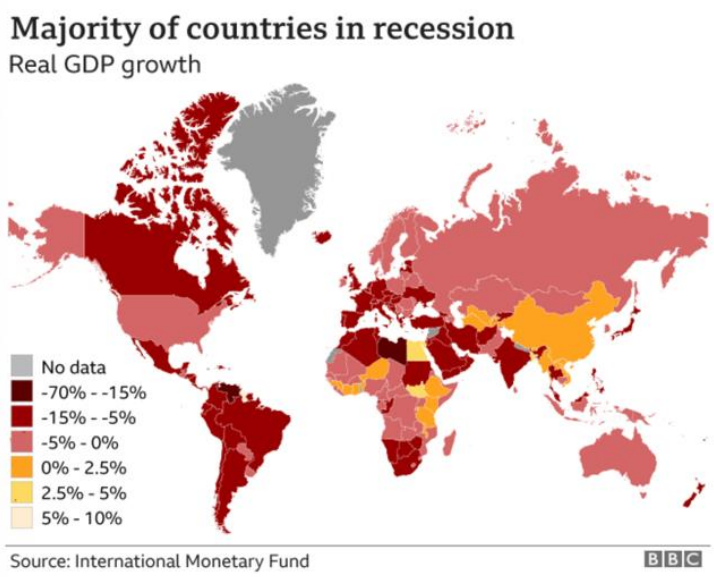
As time passes, the trend's name should not be the same as it was 10 years ago. As a result of progress and different hunger-prevention efforts, Thailand remains at a disadvantage.

Figure 11. Prevalence of Undernourishment (PoU) in Thailand (FAO, 2021b)

In 2014-2016, the prevalence of moderately or severely food insecurity in the total population was 15.1 percent, or 10.4 million people and it was almost doubled to 29.8 percent in 2018-2020 which accounted for 20.8 million people measured by FIES (FAO, 2021a).

Economic impact of COVID-19 worldwide and Thailand.

Since the outbreak of the COVID-19 pandemic, the global economy is now on pace to undergo the strongest post-recession recovery in 80 years in 2021 (Lora Jones, 2022). Nevertheless, the recovery is likely to be varied across countries, with industrialized countries expected to expand rapidly while many emerging economies languish. As seen in figure 12, China was the only major economy to expand up to 2.3 percent in 2020. According to the International Monetary Fund (IMF), the world



economy would contract by 4.4 percent in 2020. According to the organization, the decrease is the greatest since the 1930 Great Depression (Lora Jones, 2022; Tandon, 2020).

Figure 12. World map of GDP growth in 2020

Gallup polls conducted in 117 countries, including Thailand, in 2020 revealed that those who lost their jobs or businesses worldwide ranged from 64% in the

Philippines and Kenya to 3% in Switzerland (Ray, 2021). While Thailand's unemployment rate was 56 percent, it was the fifth highest in the world, overtaking Peru and India. Additionally, over 1.7 billion people experienced unexpected job loss and almost 2 billion worked fewer hours, with Thailand and Bolivia having the greatest percentage of employees working less hours at 76 percent and Sweden having the lowest at 17 percent. Additionally, Thailand was found to have the biggest percentage of workers earning less than average, ranging from 76 percent in Thailand to 10% in Switzerland (See Figure 13).

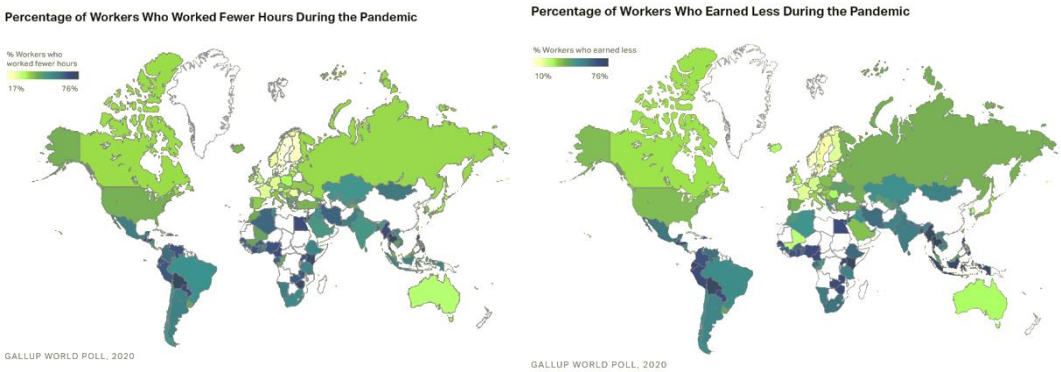


Figure 13. Percentage of workers situation during the COVID-19 pandemic

Thailand's economy, like that of many other countries, was impacted by the COVID-19 epidemic, which resulted in the unemployment of thousands of individuals. To begin, Thailand's GDP declined by 6.7 percent in 2020, the greatest recession rate among Asian countries including Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Vietnam, China, and India, and the largest shrinkage rate since the Asian financial crisis (Bangkok Post, 2020). Additionally, GDP expanded at its slowest pace in five years in the first quarter of 2020 (See Figure 14.). Additionally, decreased global demand has resulted in a slowdown in worldwide commerce, affecting Thailand's exports and disrupting global value chains such as vehicles, in which Thailand plays a significant role (International Monetary Fund, 2021). According to Tourism Receipts from International Tourist Arrivals report by the Digital Government Development Agency (DGA), when

comparing international tourist arrivals in 2019 and 2020, there was a significant drop from 39,916,251 to 6,702,396, accounting for approximately 80 percent decrease within a one-year gap, which means that Thailand lost over 33,213,855 tourists in 2020 (DGA, 2021).

Figure 14. Thailand's GDP recorded its lowest year-on-year growth rate in five years Office of the National Economic and Social Development Council (NESDC), (World Bank Group, 2020)

Secondly, Thailand is renowned as the "World's Kitchen" because of the large number of people laboring in the agriculture industry. There were over 7 million employees in tourism industry, which contributes for around a fifth of GDP and 20% of employment, has been severely impacted by the near-complete shutdown of foreign visitor arrivals since March 2020. Not only the tourist industry, but also retail, hotels, food, and manufacture of export-oriented industries are at risk. Similarly, workers in these sectors, such as shopkeepers, taxi drivers, sales assistants, and food service attendants, were Thailand's most prevalent jobs in 2017 (Narasri et al., 2020; Sereenonchai & Arunrat, 2021). At the same time, these occupations are considered as "front line employees" since they are more likely to come into contact with people and incomers (International Monetary Fund, 2021). As postulated, tourism is a substantial source of employment, with Thailand ranking ninth in the world in terms of tourist industry employment in 2019. Due to the unpreventable situation, Thailand has lost more than 100,000 people in the tourism business, with another 300,000 employees being forced to accept reduced working hours (Surawattananon, 2021). In

general, average working hours decreased year over year in the first trimester of 2020, and over 170,000 workers in the formal sector filed for unemployment benefits. On the other hand, low-skilled workers and informal and migrant workers have been particularly hard hit, particularly women and youths (World Bank Group, 2020).

According to the Bank of Thailand statistics revealed that the prevalence of unemployment in Bangkok is skyrocketed from 0.87 in 2019 to 1.76 in 2020 (See Figure 15.). Besides, the total unemployment in Thailand is at 1.69, which is slightly lower than the unemployment rate in Bangkok alone (See Figure 16.). However, this finding is excluded from Southern regions, where the unemployment rate is constantly at high and the highest of 2.38 in 2020 (See Figure 17.). One simple explanation is that Southern region of Thailand is mainly rely on the tourism industry from domestic and international (Bank of Thailand, 2022).

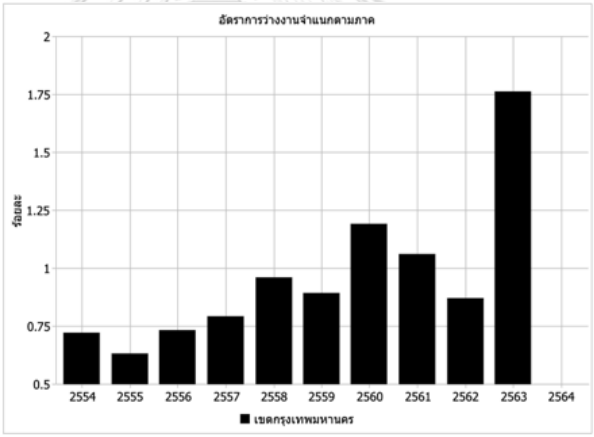


Figure 15. Unemployment rate in Bangkok

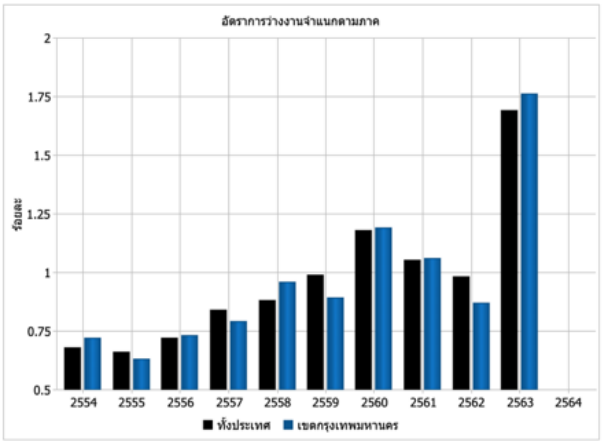


Figure 16. Comparison between Bangkok and total Thailand's unemployment rate

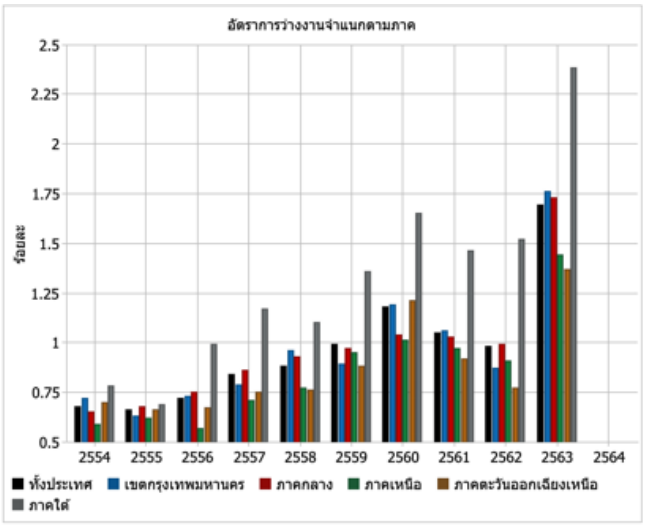


Figure 17. Overall Thailand's unemployment rate by year

Health impact of COVID-19 worldwide

The novel infectious COVID-19 is most frequently linked with respiratory symptoms such as cough, fever, and respiratory difficulties, as well as atypical pneumonia in certain cases. It is not only having an impact on respiratory system, but it is also having an effect on cardiovascular, gastrointestinal and urinary systems, in the worst-case situation, leading to death particularly among elderly and underlying medical conditions. Moreover, scientific research around the world all agree that COVID-19 is potentially increase the rate of infectious diseases such as malaria, HIV and tuberculosis particularly among vulnerable population and low-income countries, despite having the social distancing and lockdown regulation globally (Benedette Cuffari, 2021). Another significant impact is on mental health, with the WHO reporting that the global prevalence of anxiety and depression increased by 25% between 2020 and 2022. The evidences imply that one probable reason is the social isolation caused by the pandemic, which limits people's capacity to work, socialize, or seek help from loved ones, and results in less community engagement (WHO, 2022a). Loneliness, fear of infection, pain and death for oneself and loved ones, grieving following a loss, and financial concerns have all been identified as stresses that contribute to anxiety and depression. Exhaustion has been a significant cause for suicidal ideation among health care employees. According to the current Global

Burden of Disease report, young people and women are also at a greater risk of developing suicidal and self-harming behaviors (WHO, 2022a). This is in relation to DMH's recent mental health assessment of 183,974 teenagers in Thailand between 1 January 2020 and 30 September 2021, which discovered that 28% of adolescents suffer excessive stress, 32% are at risk of depression, and 22% are at risk of suicide (UNICEF, 2021). DMH's data also revealed that the fact that suicide is the leading cause of death among teenagers in Thailand, even prior to the COVID-19 pandemic. In 2019, over 800 teenagers and young adults aged 10-29 years old committed suicide.

As of 19 March 2022, COVID-19 had killed more than 6 million worldwide, however, based on reports and estimate of excess deaths, this number is considered as an underestimate of the total impact of the COVID-19 pandemic on mortality globally (Our World Data, 2020). By definition excess mortality is a term used in epidemiology and public health to describe the number of deaths from all causes during a crisis that exceeds the number predicted under 'normal' conditions. Evidence also asserted that the mortality rate inconsistency is due to several factors such as limited testing and unable to adequately determine or record the cause of death due to insufficient or underfunded health information systems. For instance, some nations record only COVID-19 deaths that occur in hospitals or among individuals who have tested positive for COVID-19 (WHO, 2022b). Another challenge is determining attribution of the cause of death. Health problems are frequently interconnected and multifactorial, which means that an underlying condition such as pneumonia and acute respiratory distress syndrome (ARDS) can easily result in complications that lead to mortality (Our World Data, 2020). Besides, it disrupts health service delivery and routine immunizations, fewer individuals seeking medical treatment and in many cases, cancer had to be postponed due to the immediate threat of COVID-19, and financial constraints for non-COVID-19 services, the pandemic is likely to have increased fatalities from other causes (WHO, 2022b).

Prevalence of COVID-19 in Thailand

It is undeniable that Coronavirus disease 2019, commonly known as COVID-19 caused by SARS-CoV-2, is one of the deadliest respiratory infections in humans

over the last century (Haider et al., 2020). As of 16th February 2022, the cumulative confirmed COVID-19 cases in Thailand were approximately 2.66 million cases since the beginning of the pandemic, with cumulative number of confirmed deaths of 22,538 people, which indicate a decent number when compared to other developed countries such as the US. (78.17 million) and the UK. (18.50 million) (Our World Data, 2022a).

It all began in December 2019, this virus has rapidly spread across the globe causing tremendous impacts to every corner of the world and all aspects of society, economy and world-health. Thailand was the first country in Southeast Asian countries reported COVID-19 case detected from a Chinese traveller to Bangkok, then it was confirmed by the authorities on the 17th January 2020 (DDC, 2021a). Numerous activities were associated with superspreading, including an indoor Thai boxing match and social gatherings in downtown pubs. By the end of March 2020, in all, 60 of Thailand's 77 provinces reported cases, indicating that the pandemic had spread widely throughout the country (See Figure 18). As of early May, there were 2732 recovered cases and 54 fatalities from COVID-19 in 68 of 77 provinces, and Bangkok was reported as the largest number of cases (at that time of 1538 cases), followed by Phuket (220 cases), and Nonthaburi (157 cases), respectively (Dechsupa et al., 2020). In relation to the Department of Disease Control, Bangkok are categorized as “Dark Red” or maximum and strict control zones. Entertainment venues, pubs, bars, karaoke bars, boxing stadiums, fitness facilities, cockfighting rings, and so on are not permitted in high-risk zones. Other locations, such as markets, restaurants, and shopping malls, may be opened, but they must rigorously adhere to public health regulations and close no later than 21.00 (DDC, 2021a).

As seen on the 18th of December 2020 to 8th of January 2021, Thailand faced the first outbreak which was initiated in Mahachai sub-district’s Shrimp Market, Samut Sakhon province and since then the virus has been replicated rapidly in BMR. When compared the COVID-19 cases between 2021 (397, 792 cases) and 2022 (489,478), it can be concluded that the number of cases increased by nearly 100,000 in a single year. This might be the Omicron variant, which has been discovered in over 141 countries, including Thailand and its neighbors. Aside from that, epidemiologists in Washington DC claim that the Omicron variant is still a strain of

concern since the rate of transmission is 4-6 times higher than that of the Delta variant (DDC, 2021b). Despite the fact that the virulence is lower, it has the potential to be a public health hazard. According to the World Health Organization, there have been 2,361,702 confirmed cases of COVID-19 in Thailand from the 3rd January 2020 to the 21st January 2022, with 22,000 fatalities. At this point in time, 99,389,056 vaccine doses have been provided as of the 15th of January 2022 (WHO, 2022c). In summary, Bangkok is the number one province reported with highest rate of COVID-19 cases in Thailand since 2019 to the beginning of 2022 (See Figure 18 and 19), despite having several outbreaks in different regions.

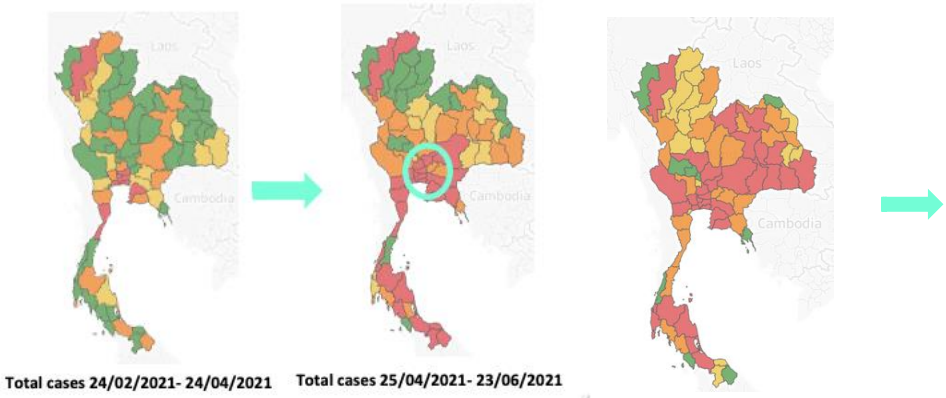


Figure 18. COVID-19 outbreaks in BMR

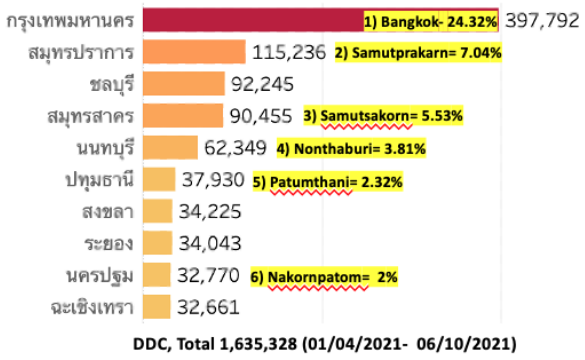


Figure 19. COVID-19 Situation in Thailand in 2021

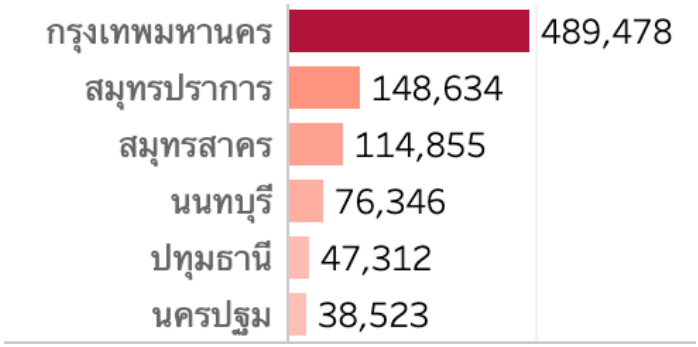


Figure 20. COVID-19 Situation in Thailand in 2022

Note: Red > 500, Orange (201-500), Yellow (101-200), Green (1-100); 1-100-200-500

Red (tightest control); Orange (control); Yellow (high surveillance); and Green (surveillance) (DDC, 2021c)

Bangkok

Bangkok is located in the central part of Thailand, with 50 districts and together with other five adjacent provinces: Nonthaburi, Pathum Thani, Samut Prakan , Nakhon Pathom, and Samut Sakhon (Rinchumphu et al., 2013). This combination also called as Bangkok Metropolitan Area (BMA), since the geographical of these provinces are closely interfaces thus, the virus is quickly spread (See Figure 21.).

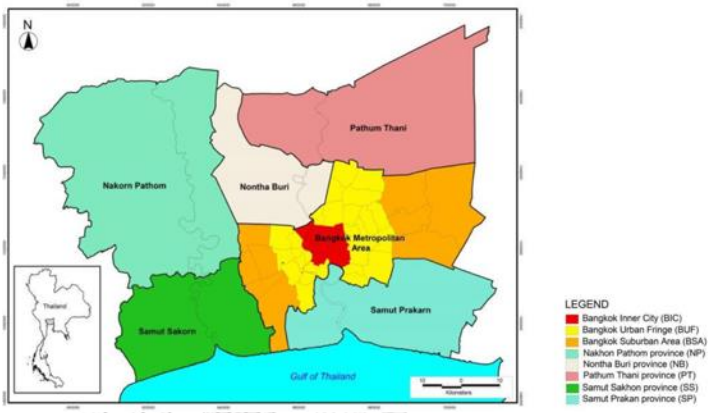


Figure 21. Map of the Bangkok Metropolitan Region (BMR) (Rinchumphu et al., 2013)

Bangkok total population in 2020 was 5,588,222 citizens which can be divided into three main areas abide by the Department of Deputy BMA since 2001. Below are the lists of district, number of population and ranked out of 50 districts which recorded in 2020 (See Figure 22) (Data Studio, 2020; Thailand Board of Investment, 2021) as follows;

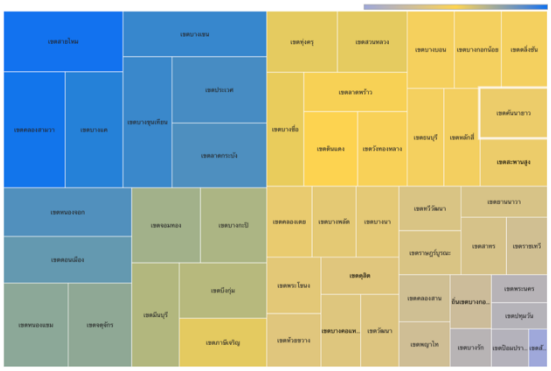


Figure 22. Bangkokian population by districts

1) Bangkok Inner City (BIC) consists of 19 administrative districts, this zone is considered as the old city center dominated by the historical conservation area, government offices, schools, and central business district (CBD).

1. Phra Nakhon, 44923 people (47th)
2. Pom Prap Sattru Phai, 41524 people (49th)
3. Samphanthawong, 21324 people (50th)
4. Pathumwan, 43338 people (48th)
5. Bang Rak, 45757 people (46th)
6. Yannawa, 76564 people (40th)
7. Sathorn, 75735 people (41st)
8. Bang Kho Laem, 82733 people (36th)
9. Dusit, 83897 people (35th)
10. Bang Sue, 122410 people (19th)
11. Phayathai, 67388 people (44th)
12. Ratchathewi, 69264 people (42nd)
13. Huai Khwang, 84233 people (34th)
14. Khlong Toei, 93193 people (30th)
15. Chatuchak, 155297 people (11th)
16. Thonburi, 103377 people (26th)
17. Khlong San, 69139 people (43rd)
18. Bangkok Noi, 103791 people (24th)
19. Bangkok Yai, 63861 people (45th)
20. Din Dang, 115508 people (21st)
21. Watthana, 81623 people (37th)

2) Bangkok Urban Fringe (BUF) comprises of 18 districts, the economic growth in this area is gradually increased as well as the population density and considered as subdivision development including:

22. Phra Khanong, 87856 people (33rd)
23. Prawet, 181821 people (6th)
24. Bang Khen, 187377 people (4th)
25. Bang Kapi, 144732 people (13th)
26. Ladprao, 117108 people (20th)
27. Bueng Kum, 140817 people (15th)
28. Bang Phlat, 89417 people (31st)

29. Phasi Charoen, 124318 people (16th)
30. Chomthong, 148290 people (12th)
31. Rat Burana, 78687 people (39th)
32. Suan Luang, 123609 people (18th)
33. Bang Na, 88535 people (32nd)
34. Thung Khru, 123700 people (17th)
35. Bang Khae, 193303 people (3rd)
36. Wang Thonglang, 107458 people (22nd)
37. Khan Na Yao, 96330 people (28th)
38. Saphan Sung, 96092 people (29th)
39. Sai Mai, 207272 people (1st)

3) Bangkok Suburban Areas (BSA) consists of 11 districts where dominated by abundant spaces, farming areas and enormous number of natural resources consists of: (BMA Information Center, 2021).

40. Min Buri, 142197 people (14th)
41. Don Mueang, 170791 people (9th)
42. Nong Chok, 177979 people (8th)
43. Lat Krabang, 178971 people (7th)
44. Taling Chan, 103617 people (25th)
45. Nong Khaem, 156203 people (10th)
46. Bang Khun Thian, 186144 people (5th)
47. Lak Si, 102704 people (27th)
48. Khlong Sam Wa, 204900 (2nd)
49. Bang Bon, 104366 people (23rd)
50. Thawi Watthana. 78749 people (38th)

Factors contributing to food insecurity

Age

Age is considered to be an important variable that contributed to food insecurity, the prevalent of food insecurity in each age groups are vary throughout the world. For instance, the data from the United State of America revealed that 5.2 million seniors or approximately 1 in 14 were food insecure prior the pandemic outbreak in 2019 and even prior to the Great Recession in 2007 (Feeding America, 2022). Therefore,

elderly who are aged 60-69 years old are considered to be the most vulnerable group for food insecurity in the USA. This can be explained by the National council on aging (NCOA) that despite all seniors aged 60 and over are eligible for the Supplemental Nutrition Assistance Program (SNAP) almost half of the them insisted to utilize the benefits (NCOA, 2021). It is also confirmed with Canadian study over 120, 909 households that those elderly whose rely on public pension or the government are protective against food insecurity since they have sufficient money and the sense of security to protect themselves from hunger (Tarasuk et al., 2019). Thus, it can be stated that elderly is one of the minority groups when it comes to the food crisis.

On the other hands, numerous studies disagreed on the age group, for example, recent cross-sectional online surveys accessing during COVID-19 pandemic argued that the highest incident risk for food insecurity is among aged 25-34 years old (Lauren et al., 2021; Nagata et al., 2021). Comparable research in Jordan during quarantine period found that the younger age group (18-30 years) was the most affected during the pandemic crisis, with nearly twice as many people suffering from severe food insecurity (Elsahoryi et al., 2020). In the United Kingdom finding emphasized that younger age group particularly those aged 18-24 (27.6%) , reported the greatest rates of food insecurity followed by the elder age group whose over 65-year-old (8.2%) (Pool & Dooris, 2021).

In summary, according to a systematic review over 150 thousand individuals from 147 countries around the world in abide by the FIES module of Gallup World Poll further concluded that younger people whose 35 years old and under are the most vulnerable group with approximately 40 percent, followed by 30% of the elderly aged 65 years and over (Grimaccia & Naccarato, 2019).

Gender

Despite critically analyse of the research articles all over from developed countries such as the USA, UK, and Canada as well as developing countries like Thailand, Indonesia, Jordan, and Saudi Arabia. The authors found that there is not a

significant association between food insecurity and gender. In addition, according to Smith and Floro (2020) analysed the GWP which interviewed over 337, 580 individuals living in 153 countries found that the relationship between these two variables are significant depending on the GNI (Gross National Income) per capita country ranking which can be categorized into three groups; low income countries ($1045 or less), lower-middle income countries (more than $1045 but less than $4125, and upper-middle income countries (more than $4125 but less than $12,736).

Nevertheless, international studies in several regions revealed that women are slightly at a higher risk of food insecurity (45.3 percent) than men (43.3 percent); additionally, when both genders are compared at the population level, four in ten women report experiencing food insecurity, compared to three in ten males (Elsahoryi et al., 2020; Grimaccia & Naccarato, 2019). This statement is also consistent with data from the National Health and Nutrition Examination Survey (NHANES), which revealed that despite similar levels of income, American women are more likely to experience household food insecurity than American men. The above assumption, however, is inapplicable to low- and middle-income countries, as Smith and Floro (2020) claimed that women are more vulnerable to food insecurity as a result of their employment, job availability, migration status, and assets, all of which frequently influence their wages being lower than males'. Additionally, when women have a low level of education, live in severely impoverished homes, or have a large number of children, they face significant food insecurity (Grimaccia & Naccarato, 2019).

Another interesting point to consider is the traditional gender roles that existed centuries ago and continue to exist today, for example in South Africa, Thailand and many other countries in which women frequently played a significant role as food providers, managing the vast majority of food consumption in the household, including raising small livestock, gathering fuelwood, and fetching water for cooking and consumption, as well as meal preparation. At comparison to males, who mostly shop for food in supermarkets (Grimaccia & Naccarato, 2019; Narasri et al., 2020; Smith & Floro, 2020). With that being stated, families led by women suffered a greater rate of food insecurity than those headed by males (Morales et al., 2021).

On the other hand, current evidence suggests that men tend to be more vulnerable to food insecurity in relatively wealthy and developed countries, mostly outside Europe. Conversely, in many European nations, gender is seen as irrelevant (Grimaccia & Naccarato, 2019). As a result, it is unnecessary to focus on women in policies to combat food insecurity in high-income countries. In conclusion, gender and food insecurity have a significant relationship in developing countries but not in rich countries. Having said that, policymakers in developing countries should place a higher emphasis on gender equality.

Marital Status

International studies suggested that in the wealthiest and most developed countries, marital status is not a major driver in food insecurity. Notwithstanding, living alone, as well as being a single, widowed, or divorced people, appears to be a risk factor for food insecurity.While married individuals are less likely to encounter food insecurity, widowed, divorced, or separated individuals are more sensitive to food insecurity (Grimaccia & Naccarato, 2019). A secondary data from the 2011-12 Canadian Community Health Survey also confirmed that people who are unmarried or have only female lone-parent households had a much higher chance of severe food insecurity when compared to couples without children (Tarasuk et al., 2019).

But even so, when considered at the household level, the finding appears to be different. According to a cross-sectional online survey of 1965 American adults conducted during the COVID-19 pandemic, married or cohabiting individuals are significantly more likely to experience household food insecurity than singles or unmarried couples. (Lauren et al., 2021).

Education

Individual and household food insecurity are regarded to be influenced by a number of factors, notably education. Global researches stated that more than two-thirds of those with less education show at least one sign of food insecurity, compared to just 37 percent of those with a college degree or higher (Grimaccia & Naccarato, 2019). Morales et al. (2021), cross-sectional research conducted across 50 states in the

United States of America during the COVID-19 crisis found that households with a head of household who did not have a college education generally faced increased food insecurity. Otherwise, individuals with less education and those living in low-income or underprivileged communities, particularly those headed by women, experienced more food insecurity. Thus, it is critical to emphasize that no single factor, such as education, can be blamed for food insecurity. Meanwhile, Tarasuk et al. (2019) observed a similar concept among Canadian households, stating that household food insecurity is highly connected with a variety of other risk factors, namely education level, residence, family income and sources, housing tenure, and household structure.

Everyone would have assumed that a higher level of education would reduce the incidence of food insecurity. However, a cross sectional research over 2,000 American people revealed a shocking finding that more education was associated with a higher likelihood of food insecurity as a result of the COVID-19 epidemic. A possible explanation suggested by the researchers is that individuals with higher education level may have encountered new financial hardships and pressure related to food availability and access for the first time. As the COVID-19 epidemic spread rapidly, there was little time to prepare for and establish coping mechanisms for this sort of new pressures. Approximately 40% of Americans encountered food insecurity for the first time in their lives during this epidemic. Additionally, those with a post-graduate degree were shown to be more likely to be newly food insecure than those with a college education, owing to their lower likelihood of receiving food or money from friends and family, utilizing a food pantry, or receiving government benefits (Reimold et al., 2021). Furthermore, this argument is supported by research from a developing nation, such as Indonesia, which found that households with female graduates with a higher level of education, such as a graduate degree, had a 0.23-fold greater likelihood of experiencing food insecurity than households with female graduates with only a primary or high school education (Dian Luthfiana Sufyan, 2021).

At the global level, education and the number of children in a household have a strong causal relationship. As a result, regardless of a country's degree of

development, these variables impact food insecurity. Regardless of the richest countries, the researchers discovered the demographic categories most at risk of food insecurity: those with a low level of education, families with many children, and those who live in major city suburbs (Grimaccia & Naccarato, 2019).

Employment Status

Grimaccia and Naccarato (2019) revealed that most food insecurity is seasonal or aperiodic with often related to “temporary unemployment” which disrupted the individual’s ability to afford purchasing food to meet their preferred intakes. Correspondingly, unemployment is closely linked with psychological distress, with 93.8 percent reporting at least one mental health symptom, such as anxiety, concern, boredom, or depression. As shown in a cross-sectional study conducted in the United States of America with 63, 674 participants from the U.S. Census Household Pulse Survey, employment loss in the preceding seven days, reporting income below the federal poverty line, and low education were all associated with food insufficiency (Nagata et al., 2021).

According to a longitudinal study based on two population-based surveys in Chile, the food insecurity was reported in more than two-thirds in the nation and it was noticeable despite having only one member in the household lost their job during the pandemic. Besides, the researchers concluded that food insecurity significantly rises during pandemics in contrast to the pre-pandemic era. The data indicated that while unemployment continues to rise despite the pandemic, job suspension had no noticeable effect on food insecurity, which might be explained by the government's special employment protection law. In which, the employers might pay their wages via the use of employee contributions in private employment insurance. In the event that these were insufficient, a state fund may be used (Giacoman et al., 2021). Conversely, this conclusion can only be generalized in the developing nations. Likewise, a US survey of 2714 low-income respondents countrywide found that the proportional risk of mental illness associated with food insecurity is nearly three times that associated with job loss during the pandemic (Fang et al., 2021). Fang et al. further suggested that this finding could be generalized to developing countries

context. Additionally, Lauren et al. (2021) discovered that individuals who tested positive for depression had a twofold increase in their risk of food insecurity, as well as the geographical regions.

Occupation and Income

Economic shocks accounted for a greater proportion of food crises in 2020, as the indirect impact of COVID-19 enhanced fragility. In 2020, they became the leading cause of acute food insecurity for over 40 million people in 17 countries who were in crisis or worse, up from roughly 24 million people in eight countries in 2019 (FSIN, 2021). Overall, the lack of economic and social resources which is worsen by COVID-19 situation, have a direct impact on food insecurity.

In terms of income, multiple studies are on the same page that very low- and low- income is closely related to the individuals and household food insecurity as it impacts on the ability to purchase food and meet with the standard nutrients (Dian Luthfiana Sufyan, 2021; Pereira et al., 2021). Nearly half of the American population of 63,674 was below the federal poverty line (Nagata et al., 2021). In this, also in accordance with cross-sectional research among family with children during pandemic that those children living in families at or below the poverty line are more prone to food insecurity (Morales et al., 2021). In addition, being economically stable was not dramatically linked with anxiety but rather is associated with decreased risk of depression for persons on SNAP, younger people, people with no children, and ethical or minority groups (Fang et al., 2021). As expected, severely impoverished persons have a larger risk of suffering food insecurity, but this link is not considerable in developed regions (Grimaccia & Naccarato, 2019).

The type of occupation is strongly associated with the amount of income, as well as unemployed. In Turkey, eighty-six percent of families had monthly incomes below the poverty level which revealed that the pandemic resulted in the loss of at least one employment in one out of every six families, and that more than half of households saw a decrease in monthly income. The studies also suggested that food insecurity increased 2.5 times when the occupation of the household employees was

worker or self-employed (Bulucu Büyüksoy et al., 2021). It surged 3.1 times in response to a fall in the household's monthly income. Additionally, those with a total monthly income below the poverty line experienced food inflation twice throughout the epidemic. For instance, In Jordan, researchers found that people with a monthly income less than the poverty level were five times more likely to have moderate food insecurity and seven times more likely to have severe food insecurity (Elsahoryi et al., 2020). In United Kingdom, increased income was shown to be associated with a lower frequency of food insecurity. Lower earnings, particularly those with yearly incomes of less than 5,000 pounds, reported 29.5% food insecurity, compared to the 40 000–£49 999 income category, which reported only 2.6 percent (Pool & Dooris, 2021). This finding in inconsistent with (Tarasuk et al., 2019) that persons whose rely on employment insurance or workers compensation are likely suffering food insecurity.

Household composition

Household composition is involved with the number of family members and economically dependents persons including children, adolescent, elderly and a disability (Giacoman et al., 2021). As suggested by (Elsahoryi et al., 2020) results from a cross-sectional study conducted in a developing country, the number of family members is significantly associated with moderate food insecurity, particularly for households with 1-4 and 5-7 members; likewise, households with 8 or more members do not appear to have a significant effect. Large number of studies have shown that having children is associated with an increased risk of food insecurity, which would be amplified if the number of children increased. (Althumiri et al., 2021; Dian Luthfiana Sufyan, 2021; Fang et al., 2021; Giacoman et al., 2021; Lauren et al., 2021; Morales et al., 2021; Pereira et al., 2021; Tarasuk et al., 2019). At the present pandemic, for instance, in a cross-sectional study of an American sample, individuals living with children or others constituted the biggest percentage of the population at risk of food insecurity, at 35% and 51%, respectively. Besides that, those who shared a home with children or others were substantially more likely to be suddenly at risk of food poverty than those who lived alone (Lauren et al., 2021). Even prior to the

COVID-19 epidemic, over 2.7 million US families with children aged younger than 18 years old, or around 7.1 percent, reported food poverty. Since the beginning of March, the virus's prevalence has increased significantly, resulting in school closures, a lack of school lunch programs, and mass unemployment for many families. As the studies asserted, about half of the respondents stated that they were unable to provide adequate meals for their children in the past (Morales et al., 2021). Within the same study, the researchers provided such a clear picture of the situation among the 20,543 families with children, 27 percent (4932) were food insecure prior to March 13, 2020, and the number grew to 38 percent (6860) in October 2020.

Another international research with a similar fashion among 147 countries from 12 regions throughout the world concluded that approximately 41% of households with children under the age of 15 experienced moderate or severe food insecurity, 19% experienced severe food insecurity, and 40% reported not having enough money to purchase food in the preceding 12 months, Thailand reported with 18.53% according to GWP (Pereira et al., 2021). While, orphans, children in households with more than eight people or children from wealthier families were not protected over food security. Therefore, children's experiences within the same household are vary and could be influenced by the following factors; age, orphan status, and caregiver gender especially among women (Giacoman et al., 2021; Morales et al., 2021). The above evidence implies that the minimum age of children at risk in developed countries is typically 18 years, compared to the global prevalence of 15 years. Lastly, it is worth emphasizing in this article that families with children have structural traits that increase their risk of food insecurity, such as lower per capita family income, heads with a poor level of education, and greater household size, and as previously indicated, one single component is insufficient to reach a conclusion.

Children and food insecurity have received a lot of attention recently as a result of more studies being done on the effects of malnutrition on children, which is one of the end issues of food insecurity. According to studies, children who experience food insecurity at a young age, that is, between the ages of 18 and 15, are more likely to have negative physical and mental health like depression and anxiety consequences and wellness at times of hardship, as well as develop future health

conditions (Fang et al., 2021; Lauren et al., 2021; Pereira et al., 2021). Additionally, data suggests that children and adolescents who face food insecurity are likely to have low academic performance as a result of social discrimination and shame associated with hunger (Sandesh Adhikari, 2018).

Home tenure

Home ownership is regarded as a strong correlation with income. As low-income households are more likely to rent or have a mortgage on their houses, they are more prone to experience food insecurity, particularly during current COVID-19 crisis. It is reasonable because they are constantly worry and stress about earning money to pay their monthly rents (Morales et al., 2021). For instance, a cross-sectional survey of over 3,000 participants found that those who rented houses had a 1.30-fold increased risk of severe food insecurity compared to those who owned housing property during the 2020 pandemic. Even so, the evidence also indicated that this discovery is not surprising, as in 2012, home ownership status accompanied with low education and income among women were more likely to suffer food insecurity (Elsahoryi et al., 2020). In 2021 UK study reported that merely 7.9 per cent of homeowners experienced food insecurity, compared to 28 percent of renters, according to the results of this study (Pool & Dooris, 2021), meanwhile the result is comparable to the Canadian's national survey in 2019 prior the COVID-19 pandemic (Tarasuk et al., 2019).

Place of residence

In this study will investigate whether location or geographical residence play a role in influencing food insecurity in Thailand during the pandemic. This is because, the data addressing residency around the world are contradictory and inconsistent depending on the regions, much like the findings involving gender and education. Some evidences asserted that living the central city is prone to food insecurity due to the population density, living condition and poor environment; on the other hand, some argued that living further away from the civilization increase the risk of food

insecurity due to the lack of accessibility, availability, education as well as living condition.

Giving a study in Canada around a decade ago as example, the prevalence of food insecurity during the 2011-12 among Canadians was 12.4 percent nationwide; however, when the statistics are broken down by area, they reveal a fourfold disparity in frequency between the country's provinces and territories. For a better illustration, in Ontario, household food insecurity rates ranged from 11.8 percent to 41.0 percent in Nunavut; Nunavut is located in the rural area and renowned for its visible minorities and Aboriginals. It is no surprise that household food insecurity is highly related to the province or territory in which a person resides, as well as family income, principal source of income, housing tenure, education, Aboriginal status, and household structure (Tarasuk et al., 2019). It is also consistent with the findings of the Gallup World Poll (GWP), which gathered data from over 160 nations, suggesting that children under the age of 15 are more likely to live in rural areas, whereas adults' results are inconsequential (Pereira et al., 2021). Grimaccia and Naccarato (2019) provided compelling evidence that living in the capital city, economically prosperous regions, or extremely remote places is related with a larger chance of food insecurity in least developed nations. On the other hand, a finding from developing country like Indonesia, reported that the likelihood of experiencing food insecurity is approximately 5.59 times greater for urban residents than for rural residents (Dian Luthfiana Sufyan, 2021). All in all, Pool and Dooris (2021) also concluded that no geographic features were found to be positively associated with food insecurity prevalence. This notion is shown through urbanization;

Urbanization is the process through which people move from rural to urban regions, hence expanding cities and towns. It is also referred to as the steady population increase of towns and cities (Sandesh Adhikari, 2018). By 2050, urban populations are expected to account for 68% of the global total and 55 percent are already living in the urban areas (WHO, 2021). Additionally, about half of urban people lack access to clean sanitation facilities, and many lack adequate drinking water. This is because poorly built urban transportation networks contribute to a variety of risks, including road traffic accidents, air and noise pollution, and

impediments to safe physical exercise - all of which contribute to an increase in injury and noncommunicable disease rates. Recent global research study concluded that rapid urbanization has facilitated the growth and spread of zoonotic diseases particularly among low-and middle income countries such as dengue fever, Zika virus disease, and chikungunya (Baker et al., 2021). Interestingly, Galea and Vlahov (2005) suggested that urban dwellers often have a limited access to the basic institutional resources such as nutritious food resources, healthcare, mental health counselling, and/or social support networks necessary for successfully negotiating the stresses of living in urban areas. Simultaneously, the living environment is frequently deteriorating and abandoned, with increasing access to liquor shops and unsanitary convenience stores that frequently sell fast food that are high in fat along with heavily advertisement. In addition, with excessive consumption of foods high in fat, processed, and with limited availability of fresh fruits and vegetables; these goods are frequently offered at a greater price than comparable things in sub-urban grocery shops; all of these factors lead to childhood and adolescent obesity, which is exacerbated by the sedentary urban lifestyle. Galea and Vlahov further underlined that few inner-city people have access to adequate garden area to grow a significant number of edible vegetables. Additionally, the types of retailers and their contents are a concern. In metropolitan areas, healthy eating options are frequently limited. Not to mention modernity and globalization, which have resulted in a more recognized Western fast-food diet in cities than in rural regions. It is critical to note that in Thailand, fast food does not necessarily refer to mass-produced food for commercial resale brands such as KFC, McDonald's, or Pizza Company, but may also refer to foods heavy in trans fats, salt, and sugar, or animal fats such as lard, pork skin, and so on.

The geographical region could also determine the level of weather extremes which is still remained the key cause of acute food insecurity in 15 countries in 2020, with about 16 million people in crisis or worse (IPC/CH Phase 3 or higher) or comparable. This is partly explained by the fact that economic shocks (particularly COVID-19) became the dominant cause of the food crisis in ten countries, including Ethiopia, rather than meteorological extremes, which remained important in 2020.

While ample rainfall increased agricultural production in certain regions, excessive rains caused floods, demolishing houses and shelters, ruining crops, killing cattle, and damaging key infrastructure throughout the majority of Africa, the Middle East, and South Asia's food-crisis countries/territories (FSIN, 2021; Guiné et al., 2021).

Vaccination status

Vaccination is the key to end this pandemic as it is the safest and most effective way to slowdown and reduce the mortality rates. Therefore, it is critical to have COVID-19 vaccine universally available for all countries, not just in rich countries, as well as all subgroups. According to Our World Data (2022b) COVID-19 vaccination status revealed that there were over half (61.9%) of the world population has received at least one dose of the vaccine, which is slightly lower than Thailand vaccination status of 75.5 percent (over 52.99 million people). Yet, Thailand is running a little behind the upper-middle income countries rate at 79.9 percent. Meanwhile, only 10.6% of people in low-income countries have received at least one dose. (See Figure 23.). While, there was not much significant rate of the share of people who completed the initial COVID-19 vaccination protocol (See Figure 24.).

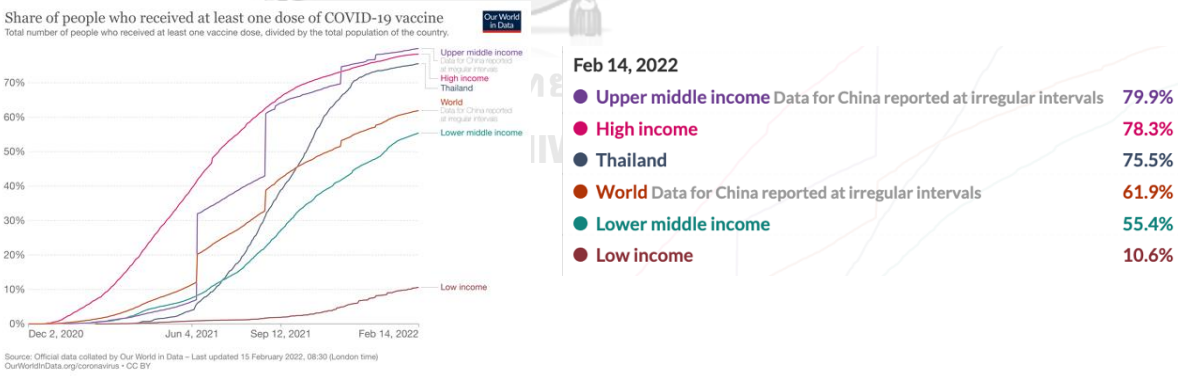


Figure 23. Share of people who received at least one dose of COVID-19 vaccine

Figure 24. Share of people who completed the initial COVID-19 vaccination protocol

Recent study in the US. supported that there is a significant association between unvaccinated and social vulnerabilities, including those who are suffering from economic hardship, lack of additional health insurance, low education and food insecurity (Ku, 2022). Although, it is free to receive COVID-19 vaccination without the health insurance in the US., similarly with Thailand where Thai government provides COVID-19 vaccination at no cost for the citizens. The uninsured were still less likely to be vaccinated compared to those who have private insurance, may due to disparities. For example, uninsured people are less likely to consult with primary care partitioners about immunization vaccine, unaware that the vaccines are free due to the lack of communication and poor education, unable to take time off for work, lack of internet access to schedule appointment or receiving news, lack of adequate transportation especially among hard-to reach who living in a very rural area, and inconvenience vaccination locations (Ku, 2022). Other social factors including having insufficient amount of food to consume, high number of children or being divorced due to the life obstacle and difficulties involving caring for the children particularly the single mothers, were also associated with lower vaccination rates.

Moreover, many countries around the world, like Thailand have adopted the “COVID-FREE Setting” to high-risk settings, like restaurants, clothing stores and hair salon, or the city that announced as the “dark red” zone by the BMA- currently there are 29 provinces. All businesses in these regions must follow the guideline by the Thai public health by ensuring all the employees to be fully vaccinated and must undergo an antigen COVID-test every week, however, this rule is also applied for the customers in some places to be fully vaccinated before entering the store or public

places (Nation Thailand, 2021). This regulation may seem to be effective in many countries, yet some still argue that it is causing more burdens than good. Therefore, if the assumption is correct, those who are unvaccinated should report as experiencing a degree of food insecurity as they might be excluded or dismiss from work which challenge them to seek and afford food.

Financial assistance

Since the outbreak, Thailand's government has spent an enormous amount of money responding to COVID-19. Between February and May 2020, the Bank of Thailand cut the policy rate from 1.25 to 0.5 percent, extending the monetary easing cycle that began in August 2019 in the hope of sustaining economic growth and assisting in the rise of headline inflation toward target. The government authorized a three-phase COVID-19 relief and rehabilitation program totalling 2.2 trillion baht (12.9 percent of GDP). The measures are primarily aimed at assisting disadvantaged households and businesses, notably informal sector workers and SMEs, in cushioning income losses and avoiding widespread unemployment and bankruptcy (World Bank Group, 2020). On March 10, Thai government announced a fiscal package, in other word, the economic stimulus package worth approximately 400 billion baht was revealed. The package aims to assist people by decreasing and deferring utility costs and soothing Thai's population financial hardship due to the lockdown, under- and unemployment. Consisting of soft loans totalling 150-billion-baht, debt payment extensions, and tax incentives, including withholding tax reductions as follows (KPMG, 2022); Employment-related measure such as state compensation schemes which available for those who registered under the Social Security System (SSS) would be able to receive half of the previous salary but not exceeding 15,000 baht for 3 months. Likewise, those who are not belong to the SSS such as labour, farmers, temporary workers, and freelance are capable to receive the cash support of 5,000 bath for 3 months as well.

During the first trimester in 2020, average working hours decreased year over year and over 170,000 Thai workers in the formal sector sought for unemployment benefits. Employers are obliged to verify that the business gone out of business as a result of COVID-19, which has apparently resulted in some benefit delays. As of May

29, 1.4 million paid employees have filed unemployment insurance claims, representing nearly 8% of the 15.9 million people enrolled in Thailand's Social Security Fund. 1,287,960 applications had been approved (World Bank Group, 2020). Contributions by employees to the Social Security Fund have also been reduced. Similar measures have been implemented in other countries, including Malaysia, where employee contributions to the Employees' Provident Fund have been reduced from 11% to 7% of salary from April 2020 to the end of the year; Vietnam, where social insurance contributions for COVID-19-affected firms have been suspended until June 30, 2020; and Singapore (World Bank Group, 2020). In fact, by providing unemployment insurance could reduce the prevalence of food insecurity by 35 percent during the COVID-19 pandemic and a declined up to 50 percent in consuming less food due to financial constraints as seen in various studies (Giacoman et al., 2021; Raifman et al., 2021; Tarasuk et al., 2019). Another interesting point is that providing cash assistance is more effective and useful than providing food or housing because food banks sometimes are not accessible in some regions and unsustainably financed as well as time consuming on the waiting line, limited selection on their preference and causing the embarrassment (Raifman et al., 2021; Reimold et al., 2021).

Financial hardship as a result of the COVID-19 pandemic was a significant predictor of food insecurity. In the United States, the Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamp Program, on the other hand, acted as a protection against the negative association between financial difficulties and food insecurity, particularly among those with the severe financial difficulties (Reimold et al., 2021). Reimold et al. further proposed that the government may participate in an aid program designed to support the poor in their war against hunger, in addition to social assistance. While the CARES Act and the FFCA's emergency measures may also help to ease economic burdens for Americans (Fang et al., 2021).

Food assistance

Apart from government sectors, additional support could be also come from the communities themselves, for example, in Non-koon village in Non Sa-ard sub-

district in Khon Kaen province which is located on the Eastern Region overcame by depending on local food systems rather than food from elsewhere. The village leader encouraged community members to grow fruit and vegetables for household consumption, which sparked the idea for them to establish a village-wide food bank (Sereenonchai & Arunrat, 2021).

In the United Kingdom, findings suggest that food insecurity was rising in the UK prior to the COVID-19 pandemic, as seen by an increase in the demand for emergency food assistance (Pool & Dooris, 2021). A study conducted over 4542 American household with children found that approximately 20% reported receiving food assistance from school programs during autumn 2020; Only 10% of food-insecure households with children in our research reported obtaining free meals from charitable food programs, 3% reported receiving assistance from religious groups, and 5% reported receiving assistance from family, friends, or neighbors (Morales et al., 2021). This finding is also consistent with Nagata et al. (2021) reporting that Americans household is most likely receiving food aids from school programs (4.1%), followed by food pantry or food bank (2.9%) and family, friends, or neighbors (2.5%) as the last resource. It is worth noting that only 22% of food insecure households with children got benefits from SNAP or the Food Stamp Program during COVID-19, compared to 16% of developing food insecure households.

Prior to the crisis, food-insecure households frequently sought assistance from charitable food organizations, such as food pantries or soup kitchens, or relied on social networks. The problem was exacerbated for newly food insecure households. Not only social distancing made it more difficult to have meals with neighbors or family members or to provide food at locations like soup kitchens, but it is also often involved with the stigmatization of receiving food assistance which may have exacerbated anxiety and depression in people who were not previously food insecure (Fang et al., 2021). Fang et al. finding further explain why food insecurity is more closely connected with anxiety and depression than job loss during the pandemic. As a result, initiatives should be done to alleviate the stigma and shame connected with charitable food acceptance. Moreover, just under half of Americans experienced food insecurity for the first time during this outbreak. Over one-third of individuals said

that they had used the charitable food system in the preceding two months. Additionally, participants with a post-graduate degree were found to be more likely to be newly food insecure than those with a college education, because they are less likely to seek food or money from friends and family, or using a food pantry, or receiving government benefits (Reimold et al., 2021).

Health insurance

Thai health system is well-known by one of the most excellent healthcare in a developing country, which primarily run by the Ministry of Public Health under the supervision of the government. Treatment is free at no cost for every Thai citizen holding universal health coverage (UHC) card, in other words, the “gold-card” scheme, allowing at least 50 million citizens to get treated despite having little to no money. While the 30-Baht Scheme which was first introduced in 2001, addresses the notion of "universal coverage," it has also promoted itself as a "pro-poor initiative" intended at alleviating financial strains associated with health care expenditures, which may be particularly deleterious for the poor (Viroj NaRanong and Anchana NaRanong, 2006). However, there is a downside for this system, which is the services and waiting time due to the inconsistency of high number of patients and low number of medical staffs and physicians. On the other hand, there are also other forms of health insurance for cover various occupations including the Civil Servant Medical Benefit Scheme (CSMBS) for government employees and retirees as well as their dependents, and the Social Security Scheme (SSS) for private-sector employees. Private health insurance otherwise, allow you to have a quick access to private hospitals, facilities and international treatment. In addition, Cambridge university suggested that by having an additional or private insurance would increase the patients sense of security and peace of mind. (North J, 2020). However, a systematic review on food insecurity during the COVID-19 pandemic in Jordan argued that there is no association between the risk of food insecurity and health insurance (Elsahoryi et al., 2020).

Thailand is frequently recognized as a beneficial strategy for reducing infection rates at an early stage. While over 80% of COVID-19 patients recover on

their own, others suffer severe symptoms and may require hospitalization or even critical care. Hospitals in Thailand are divided into three categories, namely public hospitals which is the majority of hospitals operated by the Ministry of Public Health; public hospitals operated by other entities (e.g., Medical Service Department of Bangkok Metropolitan Administration, Ministry of Education, Royal Thai Army, Thai Red Cross); and private hospitals (Marome & Shaw, 2021). Since 21 March 2020 up to now, citizens who fall under COVID-19 like symptoms and criteria can get tested for free and if they have been tested positive then they will also receive free treatments by the government which is under the UHC. This might explain why the COVID-19 mortality rate in Thailand is considerably low when compare to other countries.

Chapter III

3 Research Methodology

Research Design

This study was a cross-sectional study, which conducted in Bangkok, Thailand. This study aimed to determine the prevalence and associated factors of food insecurity during COVID-19 pandemic in Bangkok, Thailand.

Study Area

The research conducted in Bangkok, which is the capital city of Thailand due to the highest rate of COVID-19 cases since the beginning of the pandemic. Bangkok has a total of 50 districts, covers area of 1,568 sq km. All districts will be divided into three zones to explore association among the geographical, economical settings and food insecurity which adopted from the Department of Deputy BMA in 2001 as follows (BMA Information Center, 2021):

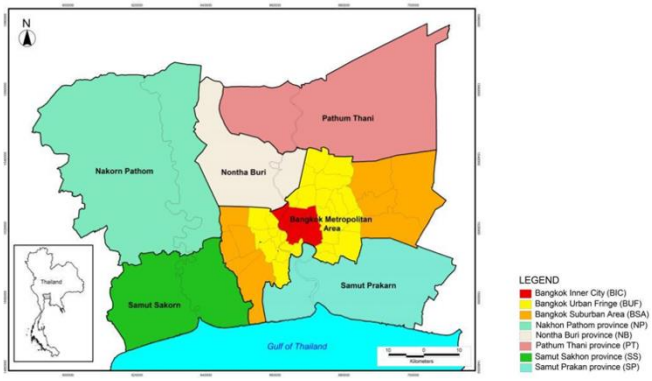


Figure 25. Map of BMR, Thailand

1) **Bangkok inner city (BIC)**, the old city center dominated by the historical conservation area, government offices, schools, and central business district (CBD). It consists of 21 administrative districts: Phra Nakhon, Pom Prap Sattru Phai, Samphanthawong, Pathumwan, Bang Rak, Yannawa, Sathorn, Bang Kho Laem, Dusit, Bang Sue, Phayathai, Ratchathewi, Huai Khwang, Khlong Toei, Chatuchak, Thonburi, Khlong San, Bangkok Noi, Bangkok Yai.

2) **Bangkok urban fringe (BUF**), where it located within 10–20 km radius of the city center and be the linkage between the BIC and the suburban region. The economic growth in this area is gradually increased as well as the population density and considered as subdivision development. It consists of 18 administrative districts: Phra Khanong, Prawet, Bang Khen, Bang Kapi, Ladprao, Bueng Kum, Bang Phlat, Phasi Charoen, Chomthong, Rat Burana, Suan Luang, Bang Na, Thung Khru, Bang Khae, Wang Thonglang, Khan Na Yao, Saphan Sung, Sai Mai.

3) **Bangkok suburban areas (BSA**) dominated by empty spaces, farming areas and enormous number of natural resources. This zone is a mixture of urban and rural and located more than 20 km radius from the BIC. It consists of 11 administrative districts: Min Buri, Don Mueang, Nong Chok, Lat Krabang, Taling Chan, Nong Khaem, Bang Khun Thian, Lak Si, Khlong Sam Wa, Bang Bon, Thawi Watthana.

Study Period

Study period was from February 2022 to May 2022. Data was collected on June 2022.

Study Population

This study will be using the primary data from collecting Thai citizens who resides in Bangkok province more than six months or permanent resident. According to Thailand Board of Investment (2021), total Thailand population is 66.19 million in 2020, and 5.59 million people reside in Bangkok. The majority of Thai people are in the age group of 25-54 years (44.64%), followed by 0-14 years (16.2%), 15-24 years (12.82%), 55064 years (12.63%) and 65 years and over (11.93%), respectively. This is explained why the authors decided to choose the age of 18 and over for the study

population. Additionally, the number between male and female population were approximately comparable throughout every age groups.

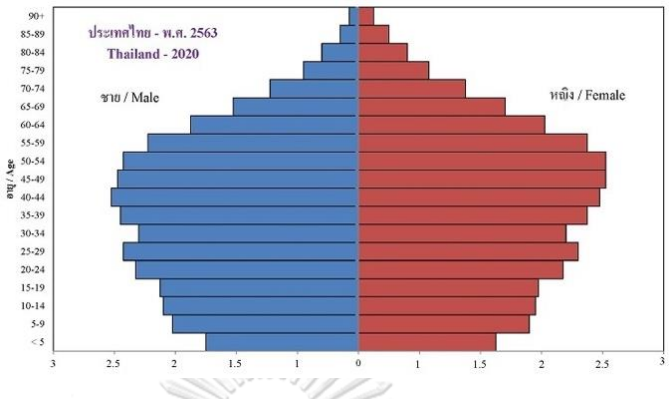


Figure 26. Thai population by sex in 2020

Below is the total population in each district in Bangkok, Thailand, ranking from the highest number of populations in Sai Mai district (207,272) to the lowest number of populations in Samphanthawong district (21,324), (Data Studio, 2020).

District	Total Population
1. Sai Mai	207272
2. Khong Sam Wa	204900
3. Bang Khae	193303
4. Bang Khen	187377
5. Bang Khun Thian	186144
6. Prawet	181821
7. Lat Krabang	178971
8. Nonh Chok	177979
9. Don Mueang	170791
10. Nonh Khaem	156203
11. Chatuchak	155297
12. Chom Thong	148290
13. Bang Kapi	144732
14. Min Buri	142197
15. Bueng Kum	140817
16. Phasi Charoen	124318
17. Thung Khru	123700
18. Suan Luang	123609
19. Bang Sue	122410
20. Lat Phrao	117108
21. Din Daeng	115508
22. Wang Thonglang	107458
23. Bang Bon	104366
24. Bangkok Noi	103791
25. Taling Chuan	103617
26. Thon Buri	103377
27. Lank Si	102704
28. Khan Na Yao	96330
29. Saphan Sung	96092
30. Khong Toei	93193
31. Bang Phlat	89417
32. Bang Na	88535
33. Phra Khanong	87856
34. Huai Khwang	84233
35. Dusit	83897
36.	
37. Bang Kho Laem	82733
38. Watthana	81623
39. Thawi Watthana	78749
40. Rat Burana	78687
41. Yan Nawa	76564
42. Sathon	75735
43. Ratchathewi	69264
44. Khlong San	69139
45. Phaya Thai	67388
46. Bangkok Yai	63861
47. Bang Rak	45757
48. Phra Nakorn	44923
49. Pathum Wan	43338
50. Pom Prap Sattru Phai	41524
51. Samphanthawong	21324

Table 1 Total population in each district in Bangkok, Thailand in 2020

Inclusion criteria:

a. Individuals who are Thai citizen,
b. Individuals who live in Bangkok more than 6 months or permanent resident,
c. Individuals who are 18 years old and above,
d. Individuals who are literate in Thai language; capable of read and write Thai language,
e. Individuals who have internet availability and electronic devices such as smartphones or laptops to fill online surveys,
f. Include all individuals despite occupations including those who are selling food goods and produce their own source of food.

Exclusion criteria

a. Individuals who are involuntary participated.

Sampling Technique

This study was using the convenience sampling on Bangkokian through a) Direct message through existing contacts due to the widespread prevalence of COVID-19 situation; existing contacts refer to the all kind of relationship that the author has connection which included family member's, colleague, friends, and neighbors, b) gather the participants through social media platforms such as Facebook and LINE along with the Google Form survey, initiated via close contacts, as well as contacting pages such as Bangkok Community Help Foundation and Duang Prateep Foundation in order to cover a variety of occupations. As a consequence, only the Bangkok Community Help Foundation responded via email and cooperated in distributing the questionnaire to the community. Questionnaire responding was monitored real-time every day on google form. Line groups, Facebook page and direct contacts are the main channel of distribution, in total of approximately 4,000 persons and there was approximately 30 people respond in one day in the total of 14 days (1/10 respond rate).

A screening questionnaire was provided in this study to meet the inclusion criteria which consists of three yes/no questions: 1) Are you reside in Bangkok, 2)

Have you resided in Bangkok for the last six months or permanently, and 3) Are you 18 years old or older? If the respondent answers yes to all 3 questions, they would be taken to the home page to initiate the online survey. Those who answered “no”, even one of three screen questions would be forwarded to the home page with "Thank you" message and notify that they did not meet the criteria for this research. In order to cover all three zones in Bangkok, there will be a real-time review on the Google Forms website during the questionnaire response period.

Sample Size

The sample of this research was calculated by using Taro Yamane (Yamane, 1973) formula with 95% confidence level, the latest Bangkokian population according from Thai government database in 2020 is 5.59 (Department of Provincial Administration (2021). The calculation formula of Taro Yamane with 0.05 degrees of error expected as follows:

Where:

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

n= sample size required

N = number of people in the population

e = allowable error (%)

Calculation:

$$n= \frac{5.59}{1+5.59(0.05)^2}$$

n= 399.97

After calculation the sample size was 399.97 persons. The sample size then rounded up to 400 persons. Considering drop-out during the interview or missing data, additional 10% will be added to the sample size. Therefore, the total sample size will be 440 participants.

Measurement Tools

This study used a web-based self-administered questionnaire as the research instrument on Google Form. To gather truthful information as well as time-efficient. Additionally, this study used individual self-administrated since individual perception on hunger can be vary based on their nutrition history, besides numerous scientific literatures and food severity instruments gather data entirely using this type of technique (Grimaccia & Naccarato, 2019). All questions were considerably brief, concise and simple to understand, in order to prevent any misunderstanding or misinterpretation. The questionnaires consist of 6 parts, in total of 31 questions including the screening questionnaire; which are in multiple-choice check-list question as follows:

Part 1: Screening questionnaire (3 questions); to determine whether the participants are suitable with your research objectives and inclusion criteria. In which, consists of 3 Yes or No questions, 1) You are currently residing in Bangkok, 2) You have been residing in Bangkok for six months or permanent, and 3) You are 18 years of age or older.

Part 2: General characteristics (12 questions); regarding personal information of the sample including age, gender, marital status, living status, education, employment status, and occupation pre and post COVID-19, and monthly income.

Part 3: Household characteristics (8 questions); including household composition, number of family members, number of children, youth, adults, senior or physical disability in the household, family role, house tenure status and place of the residence.

Part 4: COVID-19 situation (3 questions); regarding the history of COVID-19 infection of the participant, the history of close contact to COVID-19 patients and vaccination status.

Part 5: Additional supports (4 questions); related to the source of additional supports for both financially and food supply whether it's from utilizing government assistance benefits, private assistance sector, or none. Kinds of health insurance and COVID-19 insurance will also be assessed.

Part 6: The Food Insecurity Experience Scale (FIES) (8 main questions and 11 sub-questions); which was recommended by FAO and specifically modified for accessing the prevalence of food insecurity during COVID-19; as seen in figure 27, (FAO, 2022b).

Part 7: End of questionnaire. Once completing the questionnaire, all the participants were welcomed to enter the lucky draw for receiving a token appreciation, in total of 40 lucky winners by letting the Google pick 40 random numbers out of 440 participants. Winners would be notified either through their phone number or email that they had left on the last page. Those participants would be asked to give their address in order to deliver a100 baht note deliver by post-mail.

"Now I would like to ask you some questions about your food consumption in the last 12 months. During the last 12 MONTHS, was there a time when:	
Q1. You were worried you would run out of food because of a lack of money or other resources?	The question refers to a state of being **worried, anxious, apprehensive, afraid or concerned** that there might not be enough food or that the respondent would run out of food (because there was not enough money or other resources to get food.) The worry or anxiety is due to circumstances affecting their ability to procure food, such as: loss of employment or other source of income, or other reasons for not having enough money; insufficient food production for own consumption; disrupted social relationships; loss of customary benefits or food assistance; environmental or political crises. It is not necessary for the respondent or the household to have actually run out of food in order to answer affirmatively to this question, the rationale being that even just the concern and the consequent possible coping strategies are manifestations of food insecurity, even in cases when the actual food consumption is not compromised
Q2. You were unable to eat healthy and nutritious food because of a lack of money or other resources?	This question asks the respondent whether s/he was not able to get foods they considered **healthy** or those that make a **nutritious or balanced diet** (because there was not enough money or other resources to get food.) The answer depends on the respondent's own opinion of what *they* consider to be healthy and nutritious foods. This question refers to the quality of the diet and not the quantity of foods eaten.
Q3. You ate only a few kinds of foods because of a lack of money or other resources?	The question asks if the respondent or any other adult in the household had to eat a diet with a limited variety of foods or whether they had to eat the same foods or just a few kinds of foods every day because there was not enough money or other resources to get food. The implication is that the diversity of foods consumed would likely increase if the household had better access to food. This question refers to quality of the diet and not the quantity of foods eaten. It is important to stress the link to lack of money, to identify conditions of food insecurity, rather than customary habits to limit the variety of food for other circumstances (i.e., health or religion)
Q4. You had to skip a meal because there was not enough money or other resources to get food?	This question inquires about the experience of having to **miss** or **skip** a major meal (for example, breakfast, lunch or dinner depending on the norm for number and times of meals in the culture) that would normally have been eaten (because there was not enough money or other resources to get food.) This question refers to insufficient quantity of food.
Q5. You ate less than you thought you should because of a lack of money or other resources?	This question enquires about eating less than what the respondent considered they should, **even if they did not skip a meal** (because the household did not have money or other resources to get food). The answer depends on the respondent's own opinion or perception of how much *they* think they should be eating. This question refers to quantity of foods eaten and not the quality of the diet. This question does *not* refer to special diets to lose weight or for health or religious reasons.
Q6 Your household ran out of food because of a lack of money or other resources?	Referring to any experiences when there was actually no food in the household because they did not have money or other resources (for example, the household's own production or bartering) to get food.
Q7 You were hungry but did not eat because there was not enough money or other resources for food?	This question asks about the **physical experience of feeling hungry**, and specifically, feeling hungry and not being able to eat enough (because of a lack of money or resources to get enough food). It does not refer to dieting to lose weight or fasting for health or religious reasons
Q8. You went without eating for a whole day because of a lack of money or other resources?	This question asks about a specific behaviour—not eating anything all day (because of a lack of money and other resources to get food). It does not mean dieting to lose weight or fasting for health or religious reasons.

Figure 27. Questions that compose FIES and explanations of the intended meanings

Validity

Internal Validity

Construct validity was ensured by critically review on food insecurity, COVID-19 impacts, as well as similar research. In addition, conceptual framework and operational definition were clearly presented. In terms of FIES, which is considered as a standard tool recommended by FAO was used to measure the prevalence of food insecurity during COVID-19. To ensure the content validity of the questionnaire in this study, Item-Objective Congruence (IOC) Index was conducted by three experts to evaluate the content of the questionnaire as follows;

1) Prof. Ratana Somrongthong, Ph.D. : College of Public health Sciences. Chulalongkorn University.

2) Asst. Prof. Montakarn Chuemchit, Ph.D. : College of Public health Sciences. Chulalongkorn University.

3) Assoc. Prof. Nutta Taneepanichskul, Ph.D. : College of Public health Sciences. Chulalongkorn University.

A content expert was evaluated each item by gave the item a rate of 1 (for clearly measuring), -1 (clearly not measuring), or 0 (degree to which it measured the content area is unclear). The average IOC score for each item must be over 0.5 as

recommended (Rovinelli & Hambleton, 1977). All items in this study had IOC above 0.5 (see in Appendix A).

The IOC calculation is as follows:

IOC = Sum (R)/n

Where, R = total score of the item,

n = number of experts

Note: IOC of at least 0.5 is considered acceptable.

Reliability

The reliability of the questionnaire was ensured by performing of pre-test of the questionnaire among 20 participants living in a nearby province with the similar characteristics with the study population. The internal consistency was tested by using Cronbach's Alpha coefficient, calculated by SPSS version 22.0. The alpha value of 0.7-0.9 is considered as an indication of good internal consistency (Tavakol & Dennick, 2011). The alpha value of this study was more than 0.7.

Data Collection

1. All data distribution in this study was carried out through social media platform such as LINE and Facebook. The name and purpose of the research, organization that were responsible, ethical approval, consents, and participation benefits was also be attached to the beginning of the questionnaire. In addition, to secure all the information and answer confidential.

2. Data collection was taken by self-administered and self-report on Google Form by the participants who agreed, and voluntary participated in this study.

3. The authors had screened all participants based on the screening questionnaires, to make sure that the participants are meeting with the inclusion criteria.

Data Analysis

All statistical analyses performed using Statistical Package for the Social Sciences (SPSS) Version 28 licensed by Chulalongkorn University.

Descriptive Analysis

Independent variables including general characteristics (age, sex, marital status, living status, education, employment status, occupation, and individual monthly income); household characteristics (household composition, family role, house tenure, place of residence); COVID-19 related factors (history of COVID-19 illness, vaccination status), and additional supports (financial assistance, food assistance and health insurance); and Dependent variable (Food insecurity – Yes or No) were presented using frequency and percentages. In detail, for every main question in FIES questionnaire, there would be a sub-question and if the participant answered yes to the main question, then the system would automatically lead to the next sub-question. From this data, it was categorized into three levels; 1-3 scores referred to mild food insecurity, 4-6 scores referred to moderate food insecurity and 7-8 scores referred to severe food insecurity, in which all presented in frequency and percentages. Then, data was converted to "0" as food secure and from "1-8 scores" as having food insecurity, as showed in figure 28 (FAO, 2022c).

Inferential analysis

Chi-square test was performed to examine the association between all independent variables including general characteristics (age, sex, marital status, living status, education, employment status, occupation, and individual monthly income); household characteristics (household composition, family role, house tenure, place of residence); COVID-19 related factors (history of COVID-19 illness, vaccination status), and additional supports (financial assistance, food assistance and health insurance) with the dependent variable, which was "Food insecurity" (Yes or No). After the Chi-square test, the independent variables which show the p-value less than 0.05 were chosen for multiple logistic regression analysis. Adjusted odd ratio (AOR) and 95% confidence intervals (95% CI) were shown, along with the p-value.

FIES order of items	Scale items	Domains of the food insecurity construct	Assumed severity of food insecurity
1	Felt anxiety about having enough food at any time during the previous 12 months (this time period applies to all 8 scale items)	uncertainty and worry about food	**Mild**
2	Not able to eat healthy and nutritious food because of lack of money or other resources to get food	inadequate food quality	**Mild**
3	Consumed a diet based on only few kinds of foods because of lack of money or other resources to get food	inadequate food quality	**Mild**
4	Did not eat breakfast, lunch or dinner [or skipped a meal] because there was not enough money or other resources to get food	insufficient food quantity	**Moderate**
5	Ate less than they thought they should because of lack of money or other resources to get food	insufficient food quantity	**Moderate**
6	Household ran out of food because of lack of money or other resources to get food	insufficient food quantity	**Moderate**
7	Felt hungry but didn't eat because there was not enough money or other resources for food	insufficient food quantity	**Severe** (hunger)
8	Went without eating for a whole day	insufficient food quantity	**Severe** (hunger)

Figure 28. The 8 FIES items by domain of the theoretical construct of food insecurity and assumed (FAO, 2022c).

Ethical Consideration

This study abided by the concept of "Do No Harm" with minimal to no risk to participants, nonetheless, the research was commenced unless The Research Ethics Review Committee for Research Involving Human Subjects, Chulalongkorn University approved it.

Prior to data collection, ethical approval was taken from the Ethics Review Committee of Chulalongkorn University for the research involving human. Before conducting the interview, the purpose and information of the study were posted for the participant to read and check consent before initiating the self-administered questionnaire. Participants had the rights of withdrawal at any point, and the data

were strictly used for the purpose of the study only. Following the thesis, all pertinent information were destroyed.

The Ethical was approved from The Research Ethics Review Committee for Research Involving Human Research Participants, Group I, Chulalongkorn University (COA No.126/65).

Chapter IV: RESULTS

This study employed a cross-sectional study to estimate the prevalence and examine the associated factors of food insecurity among 440 Bangkokian during the COVID-19 pandemic in Thailand. The chapter was separated into 4 parts including:

- **Part 1:** Descriptive statistics of the study participants
- **Part 2:** Prevalence of food insecurity among Bangkokian during the COVID-19 pandemic
- **Part 3:** Associated factors between the studied independent variables and food insecurity
- **Part 4:** Risk factors of food insecurity among Bangkokian during the COVID-19 pandemic

Descriptive statistics of the study participants

This study includes four main groups of independent variables including 1) general characteristics (age, sex, marital status, living status, education, employment status, occupation, and individual monthly income); 2) household characteristics (household composition, family role, house tenure, place of residence); 3) COVID-19 related factors (history of COVID-19 illness, vaccination status), and 4) additional supports (financial assistance, food assistance and health insurance). The dependent variable in this study is “Food insecurity” – Yes or No.

The categorical data were presented using frequency and percentages. Additional remark for independent variable – place of residence- sample will be categorized into 3 parts inner city, the urban fringe and suburban areas according to previous research (Nakhapakorn et al., 2020).

A total of 440 participants were assessed and there was no missing data or irrelevant responses as illustrated in table 2. After collected all the responses, some of the variables will regroup and recode in order to simplify the data so that it will be easier for data analysis and interpretation. Overall, the majority of the 440 participants were females, 46 years old or older, single, living with family, has no child, graduated with bachelor’s degree, employed and worked with government, earning more than 20,000 Baht per month, and not the head of the family.

General characteristics

Table 2 showed the general characteristics of participants in Bangkok, Thailand. Most of the participants (31.1%) were age more than 46 years old, followed by age group of 36-45 (27.5%), less than 25 years old (27.3%) and 26-35 years old (14.1%). Mostly females (67.3%), males (31.1%) and LGBTQ+ (1.6%). In terms of marital status, most of the participants were single (58.2%), followed by married (34.1%) and divorced or widowed (7.7%). Mostly live with family or with others (84.3%), while the rest live alone (15.7%). In terms of number of children, almost more than half of the participants were childless (59.1%), whereas the rest have at least one or more than one child (40.9%). Regarding to education, most of the participants graduated with a bachelor degree or lower (72%) while 28% of them completed degree that are higher than bachelor degree. In terms of occupation status, most of the participants were employed with either full-time job, part-time or casual (71.8%) and the least of the participants were being unemployed (2.3%). Whereas, in terms of occupation indicated that most of the participants worked within the government sector (55.9%), followed by owning a business or self-entrepreneur (18.9%), retried (13.6%), worked with private sector (8.4%), and others (3.2%). In 2020, prior to COVID-19 pandemic, 52.5% of the participants earned monthly income below or equal to 20,000 Baht and 47.5% of them earned more than 20,000 Baht; (Average monthly income in 2020 is 18,700 Baht). Whereas, in the year of 2022, during the COVID-19 pandemic, 48.2% of the participants earned monthly income below or equal to 20,000 Baht, while 51.8% of them earned more than 20,000 Baht (Average monthly income in 2022 is 20,403 Baht).

Table 2 General characteristics of study participants (n=440)

General characteristics	Frequency (Percentage)
Age	
- Less than or equal to 25 years old	120 (27.3)
- 26-35 years old	62 (14.1)
- 36-45 years old	121 (27.5)
- More than 46 years old	137 (31.1)
Gender	
- Female	296 (67.3)
- Male	137 (31.1)
- LGBTQ+	7 (1.6)
Marital status	
- Single	256 (58.2)
- Married	150 (34.1)
- Divorced/ Widowed	34 (7.7)
Living status	
- Living with family or with others	371 (84.3)
- Alone	69 (15.7)
Number of your Children	
- None	260 (59.1)
- One or more than one child	180 (40.9)
Education	
- Bachelor degree or lower	317 (72.0)
- Higher than Bachelor degree	123 (28.0)
Occupation Status	
- Unemployed	10 (2.3)
- Employed (Full-time, Part-time or Casual)	316 (71.9)
- Student	80 (18.2)
- Others	34 (7.7)
Occupation	
- Government sector	246 (55.9)
- Private sector	37 (8.4)
- Own business/ self-entrepreneur	83 (18.9)
- Retried	60 (13.6)
- Others	14 (3.2)
Monthly income prior to COVID-19 (2020)*	
- Below or equal to 20,000 Baht	231 (52.5)
- More than 20,000 Baht	209 (47.5)
Monthly income during COVID-19 (2022)**	
- Below or equal to 20,000 Baht	212 (48.2)
- More than 20,000 Baht	228 (51.8)

*Average monthly income in 2020 is 18,700 Baht (Thansettakij, 2021)

**Average monthly income in 2022 is 20,403 Baht

Household characteristics

Table 3 showed the household characteristics of the study participants, most of them lived with nuclear family (39.5%), in other words, a family that consists of only parents and children, and the least were those who live with the skipped-generation (9.8%), in other words, a family that consists of grandparent and grandchild but no parent. Most of household had family less than three (59.8%), with no children aged less than 18 years old (57.7%), no senior aged 60 years or over (53.6%) and no disabled person (91.1%). For family role, most of the participants (58.9%) were not the head of the family; head of the family and others 36.4% and 4.8%, respectively. In terms of living arrangement, 42.7% of the participants resided in the BIC (Bangkok Inner City), 38.6% resided in the BUF (Bangkok Urban Fridge) and 18.6% resided in the BSA (Bangkok Suburban Areas).

Table 3 Household characteristics of study participants (n=440)

Household characteristics	Frequency (Percentage)
Family arrangement	
- Living alone	68 (15.5)
- Living with friends or relatives	44 (10)
- Married couple	56 (12.7)
- Nuclear family	174 (39.5)
- Extended family	55 (12.5)
- Skipped-Generation	43 (9.8)
Family member	
- Less than 3	263 (59.8)
- More than 3	177 (40.2)
Number of children in your household	
- None	254 (57.7)
- One child or more	186 (42.3)
Number of seniors in your household	
- None	236 (53.6)
- One senior or more	204 (46.4)
Number of disabilities in your household	
- None	401 (91.1)
- One disability or more	39 (8.9)
Family role	
- Head of the family	160 (36.4)
- Not the head of the family	259 (58.9)
- Others	21 (4.7)
House ownership status	
- House owner	192 (43.6)
- Renter	79 (18)
- Live with family	169 (38.4)

Bangkok arrangement	
- BIC	188 (42.8)
- BUF	170 (38.6)
- BSA	82 (18.6)

COVID-19 related factors

Table 4 showed the COVID-19 related factors characteristics of the study participants, indicated that 73.4% of the participants were never detected with COVID-19. Whereas, the majority of the participants (86.6%) had at least three doses of COVID-19 vaccination.

Table 4 COVID-19 related factors characteristics of study participants (n=440)

Variables	**Frequency (Percentage)**
COVID-19 related factors characteristics	
-COVID-19 illness	
- Never detect	323 (73.4)
- Detected	117 (26.6)
-Vaccination status	
- Less than or equal to two doses	59 (13.4)
- Three doses or more	381 (86.6)

Table 5 showed the additional supports characteristics which categorized into two parts, the financial support and the food support. In terms of financial support, over 67.7% of them used at least one kind of support, in which either from the government, private sector or the community. At the same time, those who used the financial aids support tended to use the food aids support also at 67.7%. Whereas, 54.8% of the participants did not have any COVID-19 insurance.

Table 5Additional supports characteristics of study participants (n=440)

Additional supports	**Frequency (Percentage)**
Financial support	
- Not seek for additional support	142 (32.3)
- Government, Private sector, C	298 (67.7)
Food support	
- Not seek for additional support	142 (32.3)
- Government, Private sector, Community, etc.	298 (67.7)
COVID-19 insurance	

- Yes	199 (45.2)
- No	241 (54.8)

Prevalence of food insecurity among Bangkokian during the COVID-19 pandemic

Table 6 showed the prevalence of food insecurity among Bangkokian during the COVID-19 pandemic. In this study revealed that only 267 (60.7%) of the participants have physical, social and economic access to sufficient, safe and nutritious food to meets their needs and sustain healthy life. On the other hand, as much as 39.4% of all participants experienced food insecurity at least one degree due to the impact of COVID-19 pandemic. In which, can be categorized into three levels, mild, moderate and severe food insecurity. In the total of 440 Bangkokians, 112 (25.5%) people experienced mild food insecurity meaning that they felt anxiety, uncertainty about food, consumed inadequate healthy and balanced diet or had consumed a limited variety of food. In addition, 35 (8%) people missed or skipped major meal, eating less than they thought should or ran out of food in the house. Lastly, 26 (5.8%) people felt hungry but unable to eat or went without eating for a whole day due to limited resources. It is beneficial to determine the level of food insecurity because it can use as an indicator, for example, a high prevalence of food insecurity means that a large population are suffering from poor dietary quality, and micronutrient deficiencies. While, a high prevalence of food insecurity implies that the population suffer from insufficient quantity of food and suffer from undernourishment or hunger. (FAO, 2016, 2022b, 2022c)

Table 6 Prevalence of food insecurity due to the impact of COVID-19 pandemic among Bangkokian (n=440) [Yes/No]

Variables	Frequency (Percentage)
Food insecurity by level of severity	
- No food insecurity (0)	267 (60.7)
- Mild food insecurity (1-3)	112 (25.5)
- Moderate food insecurity (4-6)	35 (8)
- Severe food insecurity (7-8)	26 (5.8)

Associated factors between the studied independent variables and food insecurity

Bivariate Analysis

For bivariate analysis, Chi-square test will be performed to examine the association between all independent variables including general characteristics (age, sex, marital status, living status, education, employment status, occupation, and individual monthly income); household characteristics (household composition, family role, house tenure, place of residence); COVID-19 related factors (history of COVID-19 illness, vaccination status), and additional supports (financial assistance, food assistance and health insurance) with the dependent variable, which is "Food insecurity" (Yes or No). Fisher's exact test will be reported the assumption is not met for the Chi- square test. The statistical significance is set at p-value less than 0.05.

After the Chi-square test, the independent variables which show the p-value less than 0.05 will be chosen for multiple logistic regression analysis. Literature review will be done to further select independent variables (depend on the results from bivariate analysis) to perform adjusted odd ratio (AOR), and subsequent 95% confidence intervals will also be calculated and reported. In the model, "Food insecurity" (Yes or No) is also a dependent variable. The statistical significance is set at p-value less than 0.05.

Table 7 showed association between general characteristics and food insecurity due to the impact of COVID-19 pandemic among Bangkokian, including age, marital status, number of children, education level, occupation status, occupation, monthly income prior and during COVID-19 pandemic (p-value <0.001). No significant association was found between gender and living status with food insecurity (p=0.86 and p=0.065, respectively). The variables that were significantly associated with food insecurity would be chosen to conduct the bivariate (logistic regression) and threated as covariates.

Table 7 Association between general characteristics and food insecurity due to the impact of COVID-19 pandemic among Bangkokian (n=440)

General Characteristics	Total n (%)	Food insecurity		p-value
		No n (%)	Yes n (%)	
Age (years)				**<0.001***
- <= 25	120 (27.3)	45 (16.9)	75 (43.4)	
- 26-35	62 (14.1)	32 (12)	30 (17.3)	
- 36-45	121 (27.5)	86 (32.2)	35 (20.2)	
- 46-55	137 (31.1)	104 (39)	33 (19.1)	
Gender				.086
- Female	296 (67.3)	169 (63.3)	127 (73.4)	
- Male	137 (31.1)	93 (34.8)	44 (25.4)	
- LGBTQ+	7 (1.6)	5 (1.9)	2 (1.2)	
Marital status				**<.001***
- Single	256 (58.2)	136 (50.9)	120 (69.4)	
- Married	150 (34.1)	110 (41.2)	40 (23.1)	
- Divorced/ Widowed	34 (7.7)	21 (7.9)	13 (7.5)	
Living status				.065
- Living with family or with others	371 (84.3)	232 (86.9)	139 (80.3)	
- Alone	69 (15.7)	35 (13.1)	34 (19.7)	
Number of your children				**<.001***
- None	260 (59.1)	139 (52.1)	121 (69.9)	
- One or more than one child	180 (40.9)	128 (47.9)	52 (30.1)	
Educational level				**<.001***
- Bachelor degree or lower	317 (72.0)	176 (65.9)	141 (81.5)	
- Higher than Bachelor degree	123 (28.0)	91 (34.1)	32 (18.5)	
Occupation status				**<.001***
- Unemployed	10 (2.3)	2 (0.7)	8 (4.6)	
- Employed (Full-time, Part-time or Casual)	316 (71.8)	210 (78.7)	106 (61.3)	
- Student	80 (18.2)	33 (12.4)	47 (27.2)	
- Others	34 (7.7)	22 (8.2)	12 (6.9)	
Occupation				**<.001***
- Government sector	246 (55.9)	167 (62.5)	79 (45.7)	
- Private sector	37 (8.4)	29 (10.9)	8 (4.6)	
- Own business/ self-entrepreneur	83 (18.9)	33 (12.4)	50 (28.9)	
- Retried	60 (13.6)	25 (9.4)	35 (20.2)	
- Others	14 (3.2)	13 (4.9)	1 (0.6)	
Monthly income prior to COVID-19 (2020)	231 (52.5)	110 (41.2)	121 (69.9)	**<.001***
- Below or equal to 20,000 Baht	209 (47.5)	157 (58.8)	52 (30.1)	
- More than 20,000 Baht				
Monthly income during COVID-19 (2022)	212 (48.2)	96 (36.0)	116 (67.1)	**<.001***
- Below or equal to 20,000 Baht	228 (51.8)	171 (64.0)	57 (32.9)	
- More than 20,000 Baht				

Note: *($p \leq 0.05$), **($p \leq 0.001$)

Table 8 showed association between household characteristics and food insecurity due to the impact of COVID-19 pandemic among Bangkokian, including number of disabilities in the household, family role and house ownership status (p-value <0.001). No significant association was found between family arrangement, family member, number of children and senior in the household, and Bangkok arrangement. The variables that were significantly associated with food insecurity would be chosen to conduct the bivariate (logistic regression) and threated as covariates.

Table 8 Association between household characteristics and food insecurity due to the impact of COVID-19 pandemic among Bangkokian (n=440)

Household Characteristics	**Total n (%)**	**Food insecurity**		**p-value**
		No n (%)	**Yes n (%)**	
Family arrangement				.098
- Living alone	68 (15.5)	42 (15.7)	26 (15.0)	
- Living with friends or relatives	44 (10.0)	18 (6.7)	26 (15.0)	
- Married couple	56 (12.7)	33 (12.4)	23 (13.3)	
- Nuclear family	174 (39.5)	113 (42.3)	61 (35.3)	
- Extended family	55 (12.5)	36 (13.5)	19 (11.0)	
- Skipped- Generation	43 (9.8)	25 (9.4)	18 (10.4)	
Family member				.766
- Less than 3	263 (59.8)	158 (59.2)	105	
- More than 3	177 (40.2)	109 (40.8)	(60.7)	
			68 (39.3)	
Number of children in your household				.536
- None	254 (57.7)	151 (56.6)	103	
- One child or more	186 (42.3)	116 (43.4)	(59.5)	
			70 (40.5)	
Number of seniors in your household				.410
- None	236 (53.6)	139 (52.1)	97 (56.1)	
- One senior or more	204 (46.4)	128 (47.9)	76 (43.9)	
Number of disabilities				**<.001***
- None	401 (91.1)	254 (95.1)	147	
- One disability or more	39 (8.9)	13 (4.9)	(85.0)	
			26 (15.0)	
Family role				**<.001***
- Head of the family	160 (36.4)	111 (41.6)	49 (28.3)	
- Not the head of the family	259 (58.9)	148 (55.4)	111	
- Others	21 (4.7)	8 (3.0)	(64.2)	
			13 (7.5)	
House ownership status				**<.001***
- House owner	192 (43.6)	142 (53.2)	50 (28.9)	
- Renter	79 (18)	28 (10.5)	51 (29.5)	

- Live with family	169 (38.4)	97 (36.3)	72 (41.6)	
Bangkok arrangement				.070
- BIC	188 (42.7)	105 (39.3)	83 (48.0)	
- BUF	170 (38.6)	104 (39.0)	66 (38.2)	
- BSA	82 (18.6)	58 (21.7)	24 (13.9)	

Note: *($p \leq 0.05$), **($p \leq 0.001$)

Table 9 showed association between COVID-19 related factors and food insecurity due to the impact of COVID-19 pandemic among Bangkokian, including COVID-19 illness (p-value <0.001). No significant association was found between vaccination status (p-value= 0.051). The variables that were significantly associated with food insecurity would be chosen to conduct the bivariate (logistic regression) and threated as covariates.

Table 9 Association between COVID-19 related factors and food insecurity due to the impact of COVID-19 pandemic among Bangkokian (n=440)

COVID-19 related factors	**Total n (%)**	**Food insecurity**		**p-value**
		No n (%)	**Yes n (%)**	
COVID-19 illness				**<.001***
- Never detect	323 (73.4)	218 (81.6)	105 (60.7)	
- Detected	117 (26.6)	49 (18.4)	68 (39.3)	
Vaccination status				.051
- Less than or equal to two doses	59 (13.4)	29 (10.9)	30 (17.3)	
- Three doses or more	381 (86.6)	238 (89.1)	143 (82.7)	

Note: *(p ≤0.05), **(p ≤0.001)

Table 10 showed association between additional supports and food insecurity due to the impact of COVID-19 pandemic among Bangkokian, including financial and food supports (p-value <0.001). No significant association was found between COVID-19 insurance purchase (p-value= 0.070). The variables that were significantly associated with food insecurity would be chosen to conduct the bivariate (logistic regression) and threated as covariates.

Table 10 Association between additional supports and food insecurity due to the impact of COVID-19 pandemic among Bangkokian (n=440)

Additional supports	Total n (%)	Food insecurity		p-value
		No n (%)	Yes n (%)	
Financial support				**<.001**
- Not seek for additional support	142 (32.3)	102 (38.2)	40 (23.1)	
- Government, Private sector, Community, etc.	298 (67.7)	165 (61.8)	133 (76.9)	
Food support				**<.001**
- Not seek for additional support	142 (32.3)	102 (38.2)	40 (23.1)	
- Government, Private sector, Community, etc.	298 (67.7)	165 (61.8)	133 (76.9)	
COVID-19 insurance				.070
- Yes	199 (45.2)	130 (48.7)	69 (39.9)	
- No	241 (54.8)	137 (51.3)	104 (60.1)	

Note: *($p \leq 0.05$), **($p \leq 0.001$)

Risk factors of food insecurity among Bangkokian during the COVID-19 pandemic

In table 11, age, occupation, number of disabilities, house ownership status, COVID-19 illness, financial and food support were significantly associated with food insecurity.

The results for age group shows a significant overall effect (Wald=14.412, df=3, p 0.002). The odds ratio for age group indicates that participants aged between 36-45 years, and 46-55 years are statistically significant associated with 71% (AOR 0.29; 95% CI 0.114-0.723; p 0.008) and 86.4% (AOR 0.14; 95% CI 0.046-0.398; p <0.001) decrease in the odds of having food insecurity compared to participants who aged 25 years old or due to the impact of COVID-19 pandemic, respectively.

The results for occupation also show a significant overall effect (Wald=18.139, df=4, p=0.001). The odds ratio for occupation indicates that retired participants is associated with 2.9 times (AOR 2.864; 95% CI 1.374-5.972; p 0.005) higher in the odds of having food insecurity due to the impact of COVID-19 pandemic.

The results for number of disabilities group shows that a highly significant overall effect (Wald=8.840, df=1, p<.003). The odds ratio for number of disabilities group indicates that living with one or more disable persons is associated with 3.4 times (AOR 3.369; 95% CI 1.513-7.505; p 0.003) higher in the odds of having food insecurity due to the impact of COVID-19 pandemic.

The results for house ownership group shows that a highly significant overall effect (Wald=9.052, df=2, p 0.011). The odds ratio for house ownership group indicates that being a renter is associated with 2.73 times (AOR 2.738; 95% CI 1.366-5.490; p 0.005) higher in the odds of having food insecurity due to the impact of COVID-19 pandemic.

The results for COVID-19 illness group shows that a highly significant overall effect (Wald=11.947, df=1, p<.001). The odds ratio for COVID-19 illness group indicates that those who had detected with COVID-19 is associated with 2.42 times

(AOR 2.425; 95% CI 1.467-4.007; p <0.001) higher of having food insecurity due to the impact of COVID-19 pandemic.

The results for financial supports group shows that a highly significant overall effect (Wald=5.700, df=1, p<.017). The odds ratio for financial supports group indicates that those who used additional financial supports including government, private sector, or community is associated with 1.85 times (AOR 1.853; 95% CI 1.117-3.075; p 0.017) higher in the odds of having food insecurity due to the impact of COVID-19 pandemic.

The results for food support group shows that a highly significant overall effect (Wald=10.729, df=1, p 0.001). The odds ratio for food support group indicates that those who used additional food supports including government, private sector, or community is associated with 2 times (AOR 2.055; 95% CI 1.336-3.163) higher in the odds of having food insecurity due to the impact of COVID-19 pandemic.

Table 11 Risk factors of food insecurity among Bangkokian during the COVID-19 pandemic (n=440)

Variable	Adjusted Odd Ratio (95% CI)	P-value	R^2 0.445
Age (years)			
- <= 25	Ref.		
- 26-35	0.502 (0.201-1.255)	0.141	
- 36-45	0.287 (0.114-0.723)	**0.008***	
- 46-55	0.136 (0.046-0.398)	**<0.001****	
Marital status			
- Single	Ref.		
- Married	1.042 (0.519-2.091)	0.908	
- Divorced/ Widowed	1.548 (0.564-4.246)	0.396	
Number of your children			
- None	Ref.		
- One child or more	0.917 (0.484-1.737)	0.789	
Education			
- Bachelor degree or lower	Ref.		
- Higher than Bachelor degree	1.242 (0.630-2.449)	0.531	
Occupation status			
- Unemployed	Ref.		
- Employed (Full-time, Part-time or Casual)	0.290 (0.052-1.614)	0.158	
- Student	0.105 (0.007-1.608)	0.106	
- Others	0.227 (0.037-1.397)	0.110	
Occupation	Ref.		
- Government sector	0.561 (0.244-1.294)	0.175	
- Private sector	8.4 (0.863-81.873)	0.067	

- Own business/ self-entrepreneur	2.864 (1.374-5.972)	**0.005***
- Retried	0.196 (0.022- 1.754)	0.145
- Others		
Monthly income prior to COVID-19 (2020)	Ref.	
- Below or equal to 20,000 Baht	1.336 (0.490-3.643)	0.572
- More than 20,000 Baht.		
Monthly income during COVID-19 (2022)		
- Below or equal to 20,000 Baht	Ref.	
- More than 20,000 Baht	0.444 (0.165-1.198)	0.109
Number of disabilities		
- None	Ref.	
- One disability or more	3.369 (1.513-7.505)	**0.003***

Note(s): *($p \leq 0.05$), **($p \leq 0.001$)

Table 11 Risk factors of food insecurity among Bangkokian during the COVID-19 pandemic (n=440) (cont.)

Variable	Adjusted Odd Ratio (95% CI)	P-value
Family role		
- Head of the family	Ref.	
- Not the head of the family	0.663 (0.366-1.200)	0.175
- Others	2.141 (0.684-6.705)	0.191
House ownership status		
- House owner	Ref.	
- Renter	2.738 (1.366-5.490)	**0.005***
- Live with family	1.188 (0.647-2.179)	0.578
COVID-19 illness		
- Never detect	Ref.	
- Detected	2.425 (1.467-4.007)	**<.001****
Financial support		
- Not seek for additional support	Ref.	**0.017***
- Government, Private sector, Community, etc.	1.853 (1.117-3.075)	
Food support		
- Not seek for additional support	Ref.	**0.001***
- Government, Private sector, Community, etc.	2.055 (1.336-3.163)	

Note(s): *($p \leq 0.05$), **($p \leq 0.001$)

CHAPTER V:

DISCUSSION, CONCLUSION AND RECOMMENDATION

Discussion

A cross sectional study was carried out to 440 Bangkokians during the COVID-19 pandemic period; in the year of 2022. In which, aim to explore the prevalence and associated factors (general characteristics, household characteristics, COVID-19 related characteristics and additional supports) of food insecurity. There is very little is known about food insecurity and people living in the urban city. To the best of our knowledge, this present study is one of the few studies in Thailand to examine the prevalence and associated factors of food insecurity among Bangkokians during the COVID-19 pandemic. Other studies have focused food security prior to the COVID-19 pandemic in the general population.

In this study, the prevalence of moderate and severe food insecurity among the 440 Bangkokians was 13.9%, or 61 people. However, this finding is only represented one province (50 subdistricts), there the future study should investigate on all 77 provinces in order to conclude the findings accurately. On the other hand, when compare the findings with the previous prevalence that were mentioned in the FIES report (FAO, 2021a), stating that in the year of 2018-2020, there was at least 29.8%, or 20.8 million Thai citizens suffered from moderate and severe food insecurity measured by FIES. One explanation that the prevalence of this study was solely among Bangkokians, this could imply that people who live in other provinces in Thailand, may suffer from food insecurity than those in who live in Bangkok. This statement is also supported by many studies claiming that living far away from the urbanization is more likely to have low accessibility, availability, education and living condition (Dian Luthfiana Sufyan, 2021; Pereira et al., 2021; Tarasuk et al., 2019).

This study was also assessing food insecurity using the FIES questionnaire to ensure the validity of the responses (FAO, 2022c), as the results there were no missing data from the participants which can be concluded that this questionnaire is suitable in Thai's context, as it claims that FIES is a time and cost efficient as well as high respondent rates, as seen in the previous research articles (Dian Luthfiana Sufyan, 2021), Jordan (Elsahoryi et al., 2020), Saudi Arabia (Althumiri et al., 2021), Chile (Giacoman et al., 2021), League of Arab States (Sheikomar et al., 2021), Zanzibari (Nyangasa et al., 2019), and The United Kingdom (Pool & Dooris, 2021). Severe food insecurity is commonly associated with the feeling hunger, in which strongly associated with undernourishment (Our World Data, 2019). When compared to the prevalence of undernourishment in Thailand, it showed an increased trend during the COVID-19 initiated, which is in line with our research findings (FAO, 2021a). Food insecurity is rising due to the underlying conditions such as a novel disease that led to a pandemic, climate change, flooding, war and conflicts (Action Against Hunger, 2022; Benites-Zapata et al., 2021; Center For Hazards and Risk Research at Columbia University, 2005; FSIN, 2021; Ghazali et al., 2018; Guiné et al., 2021; Makoto Ikeda, 2020; Pereira et al., 2021).

In addition, the results of this study also found that general characteristic (age and occupation); Household characteristic (number of disabilities in the household and house ownership status), COVID-10 related factors (COVID-19 illness); and Additional supports (financial and food assistance) were significantly associated with food insecurity as the result of COVID-19 pandemic.

The results showed those who age at the age of 25 and younger are at risk of suffering from food insecurity, in which in line with several studies either developed or developing studies concluded that people during this age group is typically a university students and the results showed that being a student is often associated with anxiety and depression due to various reasons such as excessive working hours or experience unemployment for the first time, surrounded by competitive academic environment, financial problem (Elsahoryi et al., 2020; Grimaccia & Naccarato, 2019; Lauren et al., 2021; Nagata et al., 2021; Pool & Dooris, 2021; Silva et al., 2021; Simegn et al., 2021).

In addition, this study also supports that those who at the aged between 36-45 years and 46-55 years would more likely to have 71% and 86.4% lower chance in developing or having to experience one degree of food insecurity. However, those who are retried are at risk higher risk of experience food insecurity than those who work in a government sector. In this study, the questionnaire did not specify the type of retirement which could be self-employed retirement or being a housewives/husband retirement or the previous employment. However, in general those who are employed in the government sector would have a much higher benefits than other occupation, including life-death coverage, disability benefits, medical treatment coverage, maternity benefits, child allowance, life insurance and pensions benefits (Office of the Civil Service Commission (OCSC), 2022).

In this study, the results showed that a household that consists at least one disable persons are three times (3.37) more likely to experience food insecurity than the household with no disable persons during the COVID-19 pandemic. There is no argue that having a disability is often associated with numbers of disadvantages as such food insecurity (Elsahoryi et al., 2020; FAO, 2000; Himmelgreen & Stern, 2021). Evidence have showed that people with disabilities tend to exacerbate food insecurity and suffer from malnutrition during the pandemic, conflicts and climate-change related disasters. In addition, these events often left this vulnerable group behind and accelerates the gap of inequality and many social gradients (FAO, 2021a). In addition, the University of Toronto Mississauga's literature review over 106 articles also supported this fact that population with disabilities experience greater risk of food insecurity due to economic, physical and social access to food especially in developing countries like Thailand, in which in line with the Four Pillars of Food Security; Availability, Accessibility, Utilization and Stability (Food Systems Handbook, 2022; Schwartz et al., 2019). As the majority of the people with disabilities are unemployed or earn less than the average salary, in which pushing them into poverty (Jankhotkaew et al., 2022). Although the Thai government may provide the additional financial assistance during the COVID-19 situation by reimbursement those who hold handicapped card for 1,000 baht per person for the first time (Prime Minister's Delivery Unit, 2020), however, this is insufficient for

sustaining healthy diet due to the inability to prepare the meals or leave the house to access food and the food delivery is considered expensive and not available in some regions (Bualar, 2016; Goering S, 2015).

This study claims that those living in a rented house are more approximately three times at risk for having food insecurity than homeowners. In which, in line with numbers of previous studies in developing and developed countries (Elsahoryi et al., 2020; Fafard St-Germain & Tarasuk, 2020; Pool & Dooris, 2021). Another evidence supports this statement is that most young adults are renters, in which in line with the finding of this study. In addition, many evidence claims that those who are a house renter are most likely to be in a low-income group and prone to experience food insecurity as they are constantly worry about earning money to pay for the rents (Elsahoryi et al., 2020; Morales et al., 2021; Pool & Dooris, 2021; Tarasuk et al., 2019).

Those who had detected with COVID-19 in the past were more likely to experience food insecurity than those who never detected with food insecurity, which is in line with the previous evidence. Food insecurity is a correlate of COVID-19 and health generally among disable or chronic conditions and there is no doubt that people who are less healthy have a higher risk of contracting COVID-19 and showing signs of the disease (Choi & Men, 2021). One explanation is that those who contracting COVID-19 are the ones with greatest socioeconomic disadvantages and the least to cope with its consequences, meaning they are more likely to live in overcrowded housing with very minimal social distancing, working as public facing front line jobs that do not have the opportunity to work from home and mostly shopping in the fresh market; in which it was the first outbreak in Thailand due to highly unhygienic and poor air-ventilated space (Ariya et al., 2021; Choi & Men, 2021; DDC, 2021a).

In terms of additional supports, it can be stated that those who seek for either financial nor food assistance are twice as much as suffering from food insecurity than those who did not use any additional supports. One explanation is that during the COVID-19 pandemic, Thailand lost over thirty-three million tourists in the year of 2020 causing over half of the total population to lose their jobs and businesses (Bangkok Post, 2020; DGA, 2021). There is no doubt that every individual especially

the low-income groups faced financial hardship. Moreover, previous studies found that people receiving financial and food assistance are at an increased risk of food insecurity and by providing financial assistance would reduce the prevalence of food insecurity (Fang et al., 2021; Giacoman et al., 2021; Reimold et al., 2021; Sereenonchai & Arunrat, 2021; Tarasuk et al., 2019). Besides, providing the financial support is a more effective way compared to the food assistance like food bank due to various reasons such as the quality of the food, not meet the diet preference, causing shame and discrimination while waiting in line receiving food (Farrington et al., 2006; Health Care Without Harm, 2018; Raifman et al., 2021).

Conclusion

This study provides a broad overview of food insecurity of the individuals who reside in the urban city during the COVID-19 pandemic. This study is contributed in one of a few research regarding to this topic, although food insecurity may seem as an irreverent issue in Thailand at this present time due to a very limited study. This study represented that prevalence of food insecurity during the COVID-19 pandemic in Bangkok was at high and approximately every two-fifth of the Bangkokians suffers from at least one degree of food insecurity. The associated risk factors are those who are 25 years and younger, being a retiree, living with a disability, being a renter, had detected with a COVID-19 and used at least one or more additional supports on financial and food assistance. However, this study surprisingly found that gender and monthly income were not significantly associated with food insecurity during COVID-19. The results of this study may be beneficial for domestic and international use as a benchmark for accessing the impact on food insecurity.

Limitation

The limitation of this research was subjective measure as this research only represents those whose have the access to electronic devices and internet availability. Therefore, this study may underreport the vulnerable population or marginalized population such as people who live in slum area, very low-income household, homeless people, refugees or those who are unable to read and write Thai as the

questionnaires are written in Thai. Self- administrated questionnaire regarding to the Food Insecurity Experience Scale (FIES) may associated with recall bias of the participants as well as some of the questions may be misunderstood.

The lack of the interaction and inability to rely only visual and verbal interaction with the participants. In addition, due to the restrictions and the spread of virus, it is a challenge for researcher to conduct a face-to-face interview to capture the gist of their matters and the perception towards food insecurity. Another limitation is that this study is cross-sectional study which limited certain areas and only focus on Bangkok province, as well as the convenience sampling technique which unable to generalize the results of the participants characteristics as a whole. Therefore, this study may not be the representative of the wide range of Bangkok population's characteristics in Thailand.

As a result of being regrouped and categorized into age range, the age variable could not be reported in mean form. This was not the author's intention; nonetheless, the foundation that delivered the questionnaire categorized the age into age ranges, requiring us to modify all our data to match theirs. Another limitation is the limited occupation, as this study distributed the data via online social media platform through close contact of the author. The majority of the participants in this study are those who work in the government sector such as university lecturer, staffs and students, therefore, for further study the data sampling should be reconsidered.

Recommendation

During the pandemic, the COVID-19 pandemic significantly impacted Thailand's food systems, including food production, trade, commerce, and the supply chain, resulting in severe implications for food security. Future research should focus on the impact of a pandemic on population health and other policy interventions associated with food and financial assistance to protect young adults and the disabled population from food insecurity, as well as the likelihood of reaching the SDGs by 2030. From a medical standpoint, having a disability is recognized as an individual problem that has to be treated or cured. Nevertheless, from a public health and social perspective, disability is the interaction between persons with impairments and an

environment abounding with physical, attitudinal, communication, and social obstacles. Research suggested the government should input better policy, not simply giving a 1,000 baht living allowance, there should be a more sustain way to protect this vulnerable population (disabilities). They require universal design of inclusive infrastructure and steady employment. In addition, local intervention among the urban citizens should be implement such as encouraging primary healthcare centre to monitor citizens health and to be aware of food insecurity. Lastly, health is the individual responsibility with the collaborative of the community, therefore, the community itself should be accessible, available and welcoming to individuals who need assistance.

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Appendix A

Internal Validity

To ensure the content validity of the questionnaire in this study, Item-Objective Congruence (IOC) Index was conducted by three experts to evaluate the content of the questionnaire as follows;

1) Prof. Ratana Somrongthong, Ph.D. : College of Public health Sciences. Chulalongkorn University.

2) Asst. Prof. Montakarn Chuemchit, Ph.D. : College of Public health Sciences. Chulalongkorn University.

3) Assoc. Prof. Nutta Taneepanichskul, Ph.D. : College of Public health Sciences. Chulalongkorn University.

A content expert was evaluated each item by gave the item a rate of 1 (for clearly measuring), -1 (clearly not measuring), or 0 (degree to which it measured the content area is unclear). The average IOC score for each item must be over 0.5 as recommended (Rovinelli & Hambleton, 1977). The IOC calculation is as follows: (see in Appendix A)

IOC = Sum (R)/n

Where, R = total score of the item,

n = number of experts

Note: IOC of at least 0.5 is considered acceptable

No.	1st expert	2nd expert	3rd expert	IOC	Result
Part 1					
1	+1	+1	+1	1	Agree
2	0	+1	+1	0.66	Agree

3	+1	+1	+1	1	Agree
Part 2					
1	+1	+1	+1	1	Agree
2	-1	0	+1	0	Disagree
3	+1	+1	+1	1	Agree
4	+1	+1	+1	1	Agree
5	+1	+1	+1	1	Agree
6	+1	-1	+1	0.33	Disagree
7	+1	+1	+1	1	Agree
8	-1	+1	+1	0.33	Disagree
9	+1	+1	+1	1	Agree
10	+1	+1	+1	1	Agree
11	+1	+1	+1	1	Agree
12	+1	0	+1	0.66	Agree
Part 3					
1	+1	+1	+1	1	Agree
2	+1	+1	+1	1	Agree
3	+1	+1	+1	1	Agree
4	+1	+1	+1	1	Agree
Part 4					
1	+1	+1	+1	1	Agree
2	+1	+1	+1	1	Agree
3	+1	+1	+1	1	Agree
Part 5					
1	+1	+1	+1	1	Agree
2	+1	0	+1	0.66	Agree
3	+1	+1	+1	1	Agree
4	+1	+1	+1	1	Agree
Part 6					
1	+1	+1	+1	1	Agree
1a	+1	+1	+1	1	Agree
2	+1	+1	+1	1	Agree
2a	+1	+1	+1	1	Agree
3	+1	+1	+1	1	Agree
3a	+1	+1	+1	1	Agree
4	+1	+1	+1	1	Agree
4a	+1	+1	+1	1	Agree
5	+1	+1	+1	1	Agree
5a	+1	+1	+1	1	Agree
6	+1	+1	+1	1	Agree
6a	0	+1	+1	0.66	Agree
6b	+1	+1	+1	1	Agree
7	+1	+1	+1	1	Agree

7a	0	+1	+1	0.66	Agree
7b	+1	+1	+1	1	Agree
8	+1	+1	+1	1	Agree
8a	0	+1	+1	0.66	Agree
8b	+1	+1	+1	1	Agree

Appendix B
Ethical approval and Questionnaire in Thai

Ethical approval

The Research Ethics Review Committee for Reseach Involving Human Research Participants, Group I, Chulalongkorn University
Chamchuri 1 Building, 2nd Floor, 254 Phayathai Road, Pathumwan, Bangkok 10330 Thailand
Telephone: 02-218-3202, 02-218-3049 Email: eccu@chula.ac.th

COA No. 126/65

Certificate of Approval

Study Title No. 650067 : PREVALENCE AND ASSOCIATED FACTORS OF FOOD INSECURITY DURING COVID-19 PANDEMIC IN BANGKOK, THAILAND: A CROSS-SECTIONAL STUDY

Principal Investigator : Ms. Wimonmanee Mekkhum

Place of Proposed Study/institution : College of Public Health Sciences, Chulalongkorn University

The Research Ethics Review Committee for Research Involving Human Research Participants, Group I, Chulalongkorn University, Thailand, has approved constituted in accordance with Belmont Report 1979, Declaration of Helsinki 2013, Council for International Organizations of Medical Sciences (CIOM) 2016, Standards of Research Ethics Committee (SREC) 2017, and National Policy and guidelines for Human Research 2015.

Signature Prida Tasanapradit
(Associate Prof. Prida Tasanapradit)
Chairman

Signature Raveenan Mingpalearn.
(Assistant Prof. Dr. Raveenan Mingpakanee)
Secretary

Date of Approval : 15 June 2022 **Approval Expire date :** 14 June 2023

The approval documents including:

1. Participant Information Sheet and Consent Form
2. Research proposal
3. Researcher
4. Research instruments/tools

Conditions

The approved investigator must comply with the following conditions:

1. It's unethical to collect data of research participants before the project has been approved by the committee.

2. The research/project activities must end on the approval expired date. To renew the approval, it can be applied one month prior to the expired date with submission of progress report.

3. Strictly conduct the research/project activities as written in the proposal.

4. Using only the documents that bearing the RECCU's seal of approval: research tools, information sheet, consent form, invitation letter for research participation (if applicable).

5. Report to the RECCU for any serious adverse events within 5 working days.

6. Report to the RECCU for any amendment of the research project prior to conduct the research activities.

7. Report to the RECCU for termination of the research project within 2 weeks with reasons.

8. Final report (AF 01-15) and abstract is required for a one year (or less) research/project and report within 30 days after the completion of the research/project.

9. Research project with several phases; approval will be approved phase by phase, progress report and relevant documents for the next phase must be submitted for review.

10. The committee reserves the right to site visit to follow up how the research project being conducted.

11. For external research proposal the dean or head of department oversees how the research being conducted

The Research Ethics Review Committee for Research Involving Human Research Participants Group I

Digital Certificate

Study Title No. 650067
Date of Approval 15 Jun 2022
Approval Expire date 14 Jun 2023

Questionnaire in Thai

แบบสอบถามงานวิจัย เรื่องความชุกและปัจจัยที่เกี่ยวข้องกับความไม่มั่นคงทางอาหารในช่วงการระบาดของไวรัสโควิด-19 ในเขตกรุงเทพมหานคร ประเทศไทย: การศึกษาภาคตัดขวาง

แบบสอบถามฉบับนี้ เป็นแบบสอบถามเกี่ยวกับปัจจัยที่เกี่ยวข้องกับความไม่มั่นคงทางอาหารในช่วงการระบาดของไวรัส โควิด-19 ทั้ง 50 เขตในกรุงเทพมหานครประเทศไทยมีประสงค์เพื่อศึกษาปัจจัยที่เกี่ยวข้องต่อการรับประทานอาหารที่ไม่เพียงพอและความไม่มั่นคงทางอาหาร สอบถามชุดนี้ประกอบด้วย 5 ส่วนรวมทั้งสิ้น 38 ข้อ โดยใช้เวลาประมาณ 20 ถึง 30 นาที

1) แบบสอบถามก่อนเริ่มและข้อมูล	จำนวน 15 ข้อ
2) แบบสอบถามเกี่ยวกับองค์ประกอบของครัวเรือน	จำนวน 8 ข้อ
3) แบบสอบถามเกี่ยวกับ โควิด-19	จำนวน 3 ข้อ
4) แบบสอบถามเกี่ยวกับการช่วยเหลือเพิ่มเติม	จำนวน 4 ข้อ
5) ทั่วไป แบบสอบถามเกี่ยวกับมาตราส่วนประสบการณ์ความมั่นคงด้านอาหาร (FIES)	จำนวน 8 ข้อ

ข้อมูลจากแบบสอบถามจะถูกนำไปวิเคราะห์ในลักษณะภาพรวมและข้อมูลที่ได้นี้จะเป็นประโยชน์อย่างยิ่งในการศึกษาความมั่นคงทางอาหารและปัจจัยที่เกี่ยวข้องในกรุงเทพมหานครประเทศไทย หากท่านมีข้อสงสัยประการใดเกี่ยวข้องกับปัญหาด้านจริยธรรมสามารถติดต่อสอบถามได้ที่คณะกรรมการจริยธรรมการวิจัย จุฬาลงกรณ์มหาวิทยาลัย ทั้งท่านมีข้อสงสัยใดใดเกี่ยวกับแบบสอบถาม โปรดติดต่อ นางสาววิมลมณี เมฆขำ ได้ที่วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย
หมายเลขโทรศัพท์ 093-498-2593

ขอขอบพระคุณที่ให้ความร่วมมือมา ณ โอกาสนี้

ท่านเข้าใจและยินยอมที่จะเริ่มการแบบสอบถาม

- ใช่ (*ระบบจะนำท่านไปสู่แบบสอบถาม)
- ไม่ใช่ (*ระบบจะนำท่านไปสู่หน้าหลัก)

<u>ก่อนเริ่มแบบสอบถามกรุณาตอบคำถามดังต่อไปนี้ตามความเป็นจริง</u>

1. คุณอาศัยอยู่ในกรุงเทพมหานครใช่หรือไม่
   - ใช่ **(*ระบบจะนำท่านไปสู่ข้อต่อไป)**
   - ไม่ใช่ **(*ระบบจะนำท่านไปสู่** “ขออภัยคุณไม่ตรงตามเกณฑ์งานวิจัยของเรา ขอบพระคุณมากที่ท่านให้ความสนใจและกรุณาเผยแพร่แบบสอบถามนี้ให้แก่บุคคลคาดว่าจะสนใจในงานวิจัยนี้”)
2. ท่านนั้นได้อาศัยอยู่ในกรุงเทพมหานครมาอย่างน้อย 6 เดือนหรือมากกว่า โดยไม่จำเป็นต้องมีชื่ออยู่ในทะเบียนบ้าน
   - ใช่ **(*ระบบจะนำท่านไปสู่ข้อต่อไป)**
   - ไม่ใช่ **(*ระบบจะนำท่านไปสู่** “ขออภัยคุณไม่ตรงตามเกณฑ์งานวิจัยของเรา ขอบพระคุณมากที่ท่านให้ความสนใจและกรุณาเผยแพร่แบบสอบถามนี้ให้แก่บุคคลคาดว่าจะสนใจในงานวิจัยนี้”)
3. ท่านมีอายุ 18 ปีหรือมากกว่า
   - ใช่ (*ระบบจะนำท่านไปสู่ ส่วนที่ 1 แบบสอบถามข้อมูลทั่วไป)
   - ไม่ใช่ (*ระบบจะนำท่านไปสู่ “ขออภัยคุณไม่ตรงตามเกณฑ์งานวิจัยของเรา ขอบพระคุณมากที่ท่านให้ความสนใจและกรุณาเผยแพร่แบบสอบถามนี้ให้แก่บุคคลคาดว่าจะสนใจในงานวิจัยนี้”)

→ขออภัยคุณไม่ตรงตามเกณฑ์งานวิจัยของเรา ขอบพระคุณที่ท่านให้ความสนใจ และขอความกรุณาเผยแพร่แบบสอบถามนี้ให้แก่บุคคลที่คาดว่าสนใจงานวิจัยนี้

ส่วนที่ 1 แบบสอบถามข้อมูลทั่วไป

คำชี้แจง กรุณาเลือกคำตอบที่ตรงกับข้อเท็จจริงเกี่ยวกับตัวท่านมากที่สุด

1. ปัจจุบันท่านมีอายุ ___ปี

(*ระบบจะบังคับให้ใส่ตัวเลขเท่านั้นที่เท่ากับ 18 หรือมากกว่า)

2. เพศ (*เลือกหนึ่งข้อเท่านั้น)

- ○ ชาย
- ○ หญิง
- ○ อื่น ๆ

3. ศาสนา (*เลือกหนึ่งข้อเท่านั้น)

- ○ พุทธ
- ○ คริสต์
- ○ อิสลาม
- ○ อื่น ๆ

4. สถานภาพสมรส (*เลือกหนึ่งข้อเท่านั้น)

- ○ โสด
- ○ แต่งงาน/สมรส
- ○ หย่า
- ○ หม้าย
- ○ แยกกันอยู่

5. สถานะความเป็นอยู่ (*เลือกข้อใดข้อหนึ่ง)

- ○ อาศัยอยู่คนเดียว
- ○ อาศัยอยู่กับครอบครัว
- ○ อาศัยอยู่กับคนอื่น เช่นเพื่อนร่วมห้อง

6. จำนวนบุตร (รวมถึงบุตรเลี้ยง) โปรดระบุจำนวน (*เลือกหนึ่งข้อเท่านั้น)

- ○ ไม่มี
- ○ 1 คน
- ○ 2 คน
- ○ 3 คน
- ○ 4 คน
- ○ 5 คนขึ้นไป

7. การศึกษาขั้นสูงสุดของท่านคือ

- ○ ไม่ได้รับการศึกษา
- ○ ประถม
- ○ มัธยมตอนต้น
- ○ มัธยมตอนปลาย
- ○ อาชีวศึกษา
- ○ อนุปริญญา
- ○ ปริญญาตรี
- ○ ปริญญาโท

- ปริญญาเอก
- ปริญญาเอก หรือสูงกว่า

8. สถานะทำงานในปัจจุบัน (*เลือกหนึ่งข้อเท่านั้น)

- ทำงานเต็มเวลา
- ทำงานบางเวลา หรืองานชั่วคราว
- นักเรียน/นักศึกษา
- ว่างงาน
- เกษียณ
- แม่บ้าน หรือพ่อบ้าน
- อื่นๆ โปรดระบุ_____

9. อาชีพหลักของท่านปัจจุบัน ณ เวลาที่ตอบคำถาม หรือขณะช่วงการระบาดของโรคโควิด-19 ของปี 2565 *(*อาชีพหลัก หมายถึงอาชีพที่ใช้เวลามากที่สุด)* (*เลือกหนึ่งข้อเท่านั้น)

- ข้าราชการ/พนักงานภาครัฐ
- พนักงานรัฐวิสาหกิจ
- พนักงานบริษัทเอกชน
- เจ้าของธุรกิจส่วนตัว
- นักเรียน/นักศึกษา
- เกษียณ
- แม่บ้าน/พ่อบ้าน
- รับจ้างทั่วไป

- ○ เกษตรกร
- ○ อื่นๆ โปรดระบุ_____

10. อาชีพหลักของท่านก่อนเกิดการระบาดของโรคโควิด-19 (ในปี 2563) (*เลือกหนึ่งข้อเท่านั้น)

- ○ ข้าราชการ/พนักงานภาครัฐ
- ○ พนักงานรัฐวิสาหกิจ
- ○ พนักงานบริษัทเอกชน
- ○ เจ้าของธุรกิจส่วนตัว
- ○ นักเรียน/นักศึกษา
- ○ เกษียณ
- ○ แม่บ้าน/พ่อบ้าน
- ○ รับจ้างทั่วไป
- ○ เกษตรกร
- ○ อื่นๆ โปรดระบุ_____

11. รายได้เฉลี่ยของท่าน (ต่อเดือน) ในปัจจุบัน

- ○ น้อยกว่า 5,000 บาท
- ○ 5,000-10,000 บาท
- ○ 10,001-15,000 บาท
- ○ 15,001-20,000 บาท
- ○ 20,001-25,000 บาท
- ○ 25,001-30,000 บาท

- มากกว่า 30,000 บาท

12. รายได้เฉลี่ยของท่าน (ต่อเดือน) ก่อนเกิดการระบาดของโรคโควิด-19 (ในปี 2563)

- น้อยกว่า 5,000 บาท
- 5,000-10,000 บาท
- 10,001-15,000 บาท
- 15,001-20,000 บาท
- 20,001-25,000 บาท
- 25,001-30,000 บาท
- มากกว่า 30,000 บาท

ส่วนที่ 2 องค์ประกอบของครัวเรือน

1. ข้อใดอธิบายสถานการณ์ครอบครัวของคุณได้ดีที่สุด

- ครัวเรือนคนเดียว หมายถึง ผู้อาศัยอยู่ลำพังเพียงคนเดียว
- ครัวเรือนอยู่กับเพื่อน-ญาติ
- ครัวเรือน 1 รุ่น หมายถึง สามี และภรรยา
- ครัวเรือน 2 รุ่น หมายถึง พ่อแม่ลูก
- ครัวเรือน 3 รุ่น หมายถึง พ่อแม่ลูกหลาน
- ครัวเรือนแหว่งกลาง หมายถึง ปู่-ย่า-ตา-ยาย และหลาน

2. โปรดระบุจำนวนสมาชิกในครัวเรือน (รวมถึงตัวท่านเอง) โปรดระบุเป็นตัวเลข

_____

3. ท่านอาศัยอยู่กับ เด็กที่ทีอายุ 0-18 ปี จำนวนกี่คน [โปรดเลือกตัวเลข] (*หมายถึงจำนวนบุคคลที่อาศัยอยู่ในบ้านเดียวกันซึ่งอาจไม่มีความสัมพันธ์ทางสายเลือด *สามารถตอบได้มากกว่าหนึ่งข้อ)

- O 0 คน
- O 1 คน
- O 2 คน
- O 3 คน
- O 4 คน
- O 5 คน
- O 6 คน
- O 7 คน
- O 8 คน
- O 9 คน
- O 10 คน

4. ท่านอาศัยอยู่กับ ผู้สูงอายุ (60 ปี ขึ้นไป) จำนวนกี่คน [โปรดเลือกตัวเลข] (*หมายถึงจำนวนบุคคลที่อาศัยอยู่ในบ้านเดียวกันซึ่งอาจไม่มีความสัมพันธ์ทางสายเลือด *สามารถตอบได้มากกว่าหนึ่งข้อ)

- O 0 คน
- O 1 คน
- O 2 คน
- O 3 คน
- O 4 คน

- ○ 5 คน
- ○ 6 คน
- ○ 7 คน
- ○ 8 คน
- ○ 9 คน
- ○ 10 คน

5. ท่านอาศัยอยู่กับ ผู้ทุพพลภาพ หรือมีความบกพร่องในร่างกาย จำนวนกี่คน [โปรดเลือกตัวเลข] (*หมายถึง จำนวนบุคคลที่อาศัยอยู่ในบ้านเดียวกันซึ่งอาจไม่มีความสัมพันธ์ทางสายเลือด *สามารถตอบได้มากกว่าหนึ่งข้อ)

- ○ 0 คน
- ○ 1 คน
- ○ 2 คน
- ○ 3 คน
- ○ 4 คน
- ○ 5 คน
- ○ 6 คน
- ○ 7 คน
- ○ 8 คน
- ○ 9 คน
- ○ 10 คน

6. บทบาทในครอบครัวของท่าน (*เลือกหนึ่งข้อเท่านั้น)

- ○ เป็นหัวหน้าครอบครัว
- ○ ไม่ได้เป็นหัวหน้าครอบครัว

7. การเป็นเจ้าของบ้าน (*เลือกหนึ่งข้อเท่านั้น)

- ○ เป็นเจ้าของบ้าน
- ○ เช่าอยู่อาศัย
- ○ อาศัยอยู่กับครอบครัว เพื่อน หรือคนรู้จัก โดยไม่เสียค่าใช้จ่าย

8. ปัจจุบันท่านอาศัยอยู่ในเขตใด ในกรุงเทพมหานคร (*เลือกหนึ่งข้อเท่านั้น)

- ○ คลองเตย
- ○ คลองสาน
- ○ คลองสามวา
- ○ คันนายาว
- ○ จตุจักร
- ○ จอมทอง
- ○ ดอนเมือง
- ○ ดินแดง
- ○ ดุสิต
- ○ ตลิ่งชัน
- ○ ทวีวัฒนา
- ○ ทุ่งครุ
- ○ ธนบุรี
- ○ บางกอกน้อย
- ○ บางกอกใหญ่
- ○ บางกะปิ
- ○ บางขุนเทียน
- ○ บางเขน

- บางคอแหลม
- บางแค
- บางซื่อ
- บางนา
- บางบอน
- บางพลัด
- บางรัก
- บึงกุ่ม
- ปทุมวัน
- ประเวศ
- ป้อมปราบศัตรูพ่าย
- พญาไท
- พระขโนง
- พระนคร
- ภาษีเจริญ
- มีนบุรี
- ยานนาวา
- ราชเทวี
- ราษฎร์บูรณะ
- ลาดกระบัง
- ลาดพร้าว
- วังทองหลาง
- วัฒนา
- สวนหลวง
- สะพานสูง
- สัมพันธวงศ์
- สาทร
- สายไหม
- หนองแขม
- หนองจอก

- หลักสี่
- ห้วยขวาง

ส่วนที่ 3 ข้อมูลเกี่ยวกับ COVID-19

1. ในช่วง 12 เดือนที่ผ่านมา ท่านเคยตรวจพบเชื้อโควิด 19 หรือไม่ (ATK และ/หรือ PCR เป็นผลบวก)

(เลือกหนึ่งข้อเท่านั้น)

- เคย
- ไม่เคย

2. ในช่วง 12 เดือน ที่ผ่านมา ท่านเคยต้องกักตัวเนื่องจากใกล้ชิดกับผู้ป่วยหรืออยู่ในกลุ่มเสี่ยงสูง

(เลือกหนึ่งข้อเท่านั้น)

- ใช่
- ไม่ใช่

3. ปัจจุบันนี้ท่านรับวัคซีนแล้วกี่เข็ม

- ยังไม่ได้รับวัคซีน
- รับวัคซีนแล้ว 1 เข็ม
- รับวัคซีนแล้ว 2 เข็ม
- รับวัคซีนแล้ว 3 เข็ม
- รับวัคซีนแล้ว 4 เข็ม
- รับวัคซีนแล้วมากกว่า 4 เข็ม

ส่วนที่ 4 การช่วยเหลือเพิ่มเติม

1. ในช่วง 12 เดือนที่ผ่านมา ท่านได้ใช้หรือได้รับสวัสดิการช่วยเหลือทางด้านการเงินหรือไม่

(สามารถตอบได้มากกว่าหนึ่งข้อ)

- ไม่ได้ใช้

- ใช้ หรือได้รับจากภาครัฐ เช่น คนละครึ่ง ยิ่งใช้ยิ่งได้ เราชนะ และอื่นๆ
- ใช้ หรือได้รับจากองค์กรเอกชน
- ได้รับการช่วยเหลือทางด้านการเงินจากเพื่อนบ้าน และคนในชุมชน
- อื่นๆ โปรดระบุ_____

2. ในช่วง 12 เดือนที่ผ่านมา ท่านได้ใช้หรือได้รับสวัสดิการช่วยเหลือทางด้านอาหารหรือไม่ (สามารถตอบได้มากกว่าหนึ่งข้อ)

- ไม่ได้ใช้
- ใช้ หรือได้รับจากภาครัฐ เช่น คนละครึ่ง ยิ่งใช้ยิ่งได้ เราชนะ และอื่นๆ
- ใช้ หรือได้รับจากองค์กรเอกชน
- ได้รับการช่วยเหลือทางด้านการเงินจากเพื่อนบ้าน และคนในชุมชน
- อื่นๆ โปรดระบุ_____

3. ปัจจุบัน ท่านมีประกันสุขภาพชนิดใด (สามารถตอบได้มากกว่าหนึ่งข้อ)

- 30 บาท รักษาทุกโรค (สิทธิ์ของคนไทยทุกคน)
- สิทธิสวัสดิการรักษาพยาบาลข้าราชการ
- สิทธิประกันสังคม
- กองทุนทดแทนจากนายจ้าง
- ประกันสุขภาพที่ท่านซื้อเอง

4. ท่านได้ซื้อ หรือมีประกัน COVID-19

- ใช่
- ไม่ใช่

ส่วนที่ 5 ประสบการณ์ความไม่มั่นคงด้านอาหาร อ้างอิงเป็นรายบุคคล

ความไม่แน่นอน และความกังวล

1. ใน 12 เดือนที่ผ่านมา คุณกังวลว่าจะมีอาหารไม่เพียงพอ เนื่องจากขาดแคลนเงินหรือทรัพยากรในการซื้ออาหารหรือไม่?

- ○ ใช่ (ระบบจะพาท่านข้ามไปข้อ 33)
- ○ ไม่ใช่ (ระบบจะพาท่านข้ามไปข้อ 34)

1a. ความกังวลของท่าน สืบเนื่องจากวิกฤต การระบาดของโรค COVID-19 ใช่หรือไม่?

คำอธิบาย: ความกังวลว่าจะมีอาหารไม่เพียงพอ ซึ่งเป็นผลสืบเนื่องจากการระบาดของโรค COVID-19

- ○ ใช่
- ○ ไม่ใช่

คุณภาพของอาหาร

2. ใน 12 เดือนที่ผ่านมา ท่านเคยไม่สามารถรับประทานอาหารที่มีประโยชน์ เนื่องจากขาดแคลนเงิน หรือทรัพยากรในการซื้ออาหาร

คำอธิบาย: อาหารที่มีประโยชน์ คือ อาหารที่ครบ 5 หมู่ หรือมีคุณค่าทางโภชนาการ

- ○ ใช่
- ○ ไม่ใช่

2a. ท่านไม่สามารถรับประทานอาหารที่มีประโยชน์ เนื่องจากวิกฤตการระบาดของโรค COVID-19 ใช่หรือไม่?

คำอธิบาย: ไม่สามารถรับประทานอาหารที่มีประโยชน์ เนื่องจากไม่มีเงินเพียงพอในการซื้ออาหารนั้นๆ ซึ่งเป็นผลสืบเนื่อง หรือผลกระทบจากการระบาดของโรค COVID-19

- ○ ใช่
- ○ ไม่ใช่

คุณภาพของอาหาร

3. ใน 12 เดือนที่ผ่านมา ท่านได้รับประทานอาหารเพียงไม่กี่ชนิด (รับประทานอาหารซ้ำๆ) เนื่องจากขาดแคลนเงินหรือทรัพยากร ในการซื้ออาหารที่หลากหลาย

- ○ ใช่
- ○ ไม่ใช่

3a. ท่านรับประทานอาหารเพียงไม่กี่ชนิด (หรือต้องรับประทานอาหารซ้ำๆ) เนื่องจากวิกฤตการระบาดของโรค COVID-19 ใช่หรือไม่?

คำอธิบาย: ต้องรับประทานอาหารเพียงไม่กี่ชนิด (หรือต้องรับประทานอาหารซ้ำๆ) เพราะไม่มีเงินซื้ออาหารอย่างอื่น ซึ่งเป็นผลสืบเนื่อง หรือผลกระทบจากการระบาดของโรค COVID-19

- ○ ใช่
- ○ ไม่ใช่

ปริมาณอาหาร

4. ใน 12 เดือนที่ผ่านมา คุณต้องอดอาหาร เพราะไม่มีเงิน หรือทรัพยากรอื่นเพียงพอที่จะซื้ออาหาร?

คำอธิบาย: เช่น ต้องอด หรืองดอาหารบางมื้อ เนื่องจากไม่มีเงินพอที่จะซื้ออาหาร

- ○ ใช่
- ○ ไม่ใช่

4a. ท่านต้องอดอาหาร เนื่องจากวิกฤตการระบาดของโรค COVID-19 ใช่หรือไม่?

คำอธิบาย: ท่านต้องอดอาหารบางมื้อ เนื่องจากไม่มีเงินพอที่จะซื้ออาหาร (ที่ท่านไม่มีเงินพอที่จะซื้ออาหาร เป็นผลกระทบจากการระบาดของโรค COVID-19)

- ○ ใช่
- ○ ไม่ใช่

ปริมาณอาหาร

5. ใน 12 เดือนที่ผ่านมา ท่านเคยมีช่วงเวลาที่ต้องรับประทานน้อยกว่าที่ควร เพราะขาดแคลนเงิน หรือทรัพยากรในการซื้ออาหาร?

คำอธิบาย: เช่น ท่านรับประทานอาหารไม่พอที่ร่างกายต้องการ เพราะไม่มีเงินซื้ออาหารให้เพียงพอ

- ใช่
- ไม่ใช่

5a. ท่านเคยต้องรับประทานน้อยกว่าที่ควร เนื่องจากวิกฤตการระบาดของโรค COVID-19 ใช่หรือไม่?

คำอธิบาย: ที่ท่านรับประทานอาหารไม่พอที่ร่างกายต้องการ เพราะไม่มีเงินซื้ออาหารให้เพียงพอ เนื่องจากผลกระทบจากการระบาดของโรค COVID-19?

- ใช่
- ไม่ใช่

ครัวเรือน

6. ใน 12 เดือนที่ผ่านมา บ้านของท่านมีการขาดแคลนอาหาร เพราะขาดเงิน หรือทรัพยากรอื่นในการทำอาหาร?

คำอธิบาย: บ้านของท่าน (คนที่อาศัยอยู่ในบ้านเดียวกัน)

- ใช่
- ไม่ใช่

ความถี่

6a. บ้านของท่านมีการขาดแคลนอาหาร เนื่องจากขาดแคลนเงิน หรือทรัพยากรอื่น บ่อยแค่ไหน?

- แทบจะไม่เคย (1 หรือ 2 ครั้ง)
- บางครั้ง (3-10 ครั้ง)
- บ่อยครั้ง (มากกว่า 10 ครั้ง)

6b. ที่บ้านของท่านขาดแคลนเงิน และทรัพยากรในการซื้อ และปรุงอาหาร เนื่องจากวิกฤตการระบาดของโรค COVID-19 ใช่หรือไม่?

- ใช่
- ไม่ใช่

รู้สึกหิว

7. ใน 12 เดือนที่ผ่านมา ท่านเคยรู้สึกหิว แต่ไม่สามารถรับประทานอาหารได้ เนื่องจากไม่มีเงิน หรือมีเงินไม่เพียงพอในการซื้ออาหารรับประทาน?

- ○ ใช่
- ○ ไม่ใช่

ความถี่

7a. ท่านเคยรู้สึกหิว แต่ไม่สามารถรับประทานอาหารได้ เนื่องจากไม่มีเงิน หรือมีเงินไม่เพียงพอในการซื้ออาหารรับประทาน บ่อยเพียงใด?

- ○ แทบจะไม่เคย (1 หรือ 2 ครั้ง)
- ○ บางครั้ง (3-10 ครั้ง)
- ○ บ่อยครั้ง (มากกว่า 10 ครั้ง)

7b. ที่ท่านต้องรู้สึกหิว แต่ไม่สามารถรับประทานอาหารได้ เนื่องจากไม่มีเงินสืบเนื่องมาจากวิกฤตการระบาดของโรค COVID-19 ใช่หรือไม่?

- ○ ใช่
- ○ ไม่ใช่

ความหิว

8. ใน 12 เดือนที่ผ่านมา ท่านเคยอยู่โดยไม่ได้รับประทานอะไรเลยทั้งวัน เพราะไม่มีเงินหรือทรัพยากรอื่นในการซื้อ หรือประกอบอาหาร?

- ○ ใช่ (ระบบจะพาท่านข้ามไปข้อ 49)
- ○ ไม่ใช่ (ระบบจะพาท่านข้ามไปข้อ 51)

ความถี่

8a. ท่านเคยอยู่โดยไม่ได้รับประทานอะไรเลยทั้งวัน เพราะไม่มีเงินบ่อยเพียงใด?

- แทบจะไม่เคย (1 หรือ 2 ครั้ง)
- บางครั้ง (3-10 ครั้ง)
- บ่อยครั้ง (มากกว่า 10 ครั้ง)

8b. ท่านเคยอยู่โดยไม่ได้รับประทานอะไรเลยทั้งวันเพราะไม่มีเงิน เนื่องจากวิกฤตการระบาดของโรค COVID-19 ใช่หรือไม่?

- ใช่
- ไม่ใช่

สิ้นสุดแบบสอบถาม

กรุณากรอกอีเมล์ หรือเบอร์โทรศัพท์ของท่านลงไว้ด้านล่าง หากท่านมีความประสงค์รับของกำนัลตอบแทนการกรอกข้อมูลในครั้งนี้ _____

เงื่อนไขในการลุ้นรับของรางวัล

เมื่อตอบแบบสอบถามเสร็จแล้ว ผู้เข้าร่วมทุกคนสามารถเข้าร่วมการจับฉลากเพื่อรับของรางวัล ซึ่งรวมเป็นผู้โชคดีทั้งหมด 40 คน โดยให้ Google สุ่มเลือกหมายเลข 40 หมายเลขจากผู้เข้าร่วม 440 คน ผู้ชนะจะได้รับแจ้งผ่านหมายเลขโทรศัพท์หรืออีเมล ผู้เข้าร่วมจะต้องให้ที่อยู่เพื่อจัดส่งธนบัตร 100 บาท เป็นซองพัสดุทางไปรษณีย์

Appendix C

Questionnaire in English

QUESTIONNAIRE ON "PREVALENCE AND ASSOCIATED FACTORS OF FOOD INSECURITY DURING COVID-19 PANDEMIC IN BANGKOK, THAILAND: A CROSS-SECTIONAL STUDY"

Part 1: Screening questionnaire

1. Are you currently residing in Bangkok, Thailand?

1.[ ] Yes, I am. *If yes, go to question 2

2.[ ] No, I am not. *If no, the Google Form will lead the participant to "Apologize, you do not meet with our research requirements. Thank you so much for interested and please share this survey to anyone who might be willing and interested."

2. Have you been residing in Bangkok more at least 6 months or more?

1.[ ] Yes, I have been living in Bangkok more than 6 months.*If yes, go to question 3

2.[ ] No, I have **not** been living in Bangkok more than 6 months. *If no, the Google Form will lead the participant to "Apologize, you do not meet with our research requirements. Thank you so much for interested and please share this survey to anyone who might be willing and interested."

3. Are you 18 years old or older?

1.[ ] Yes, I am. *If yes, go the next part of questionnaire.

2.[ ] No, I am not. *If no, the Google Form will lead the participant to "Apologize, you do not meet with our research requirements. Thank you so much for interested and please share this survey to anyone who might be willing and interested."

Part 2: General characteristics

Please select the answer that most match to your information

1. What is your age (at the time of interview) ……...[*Fill numbers*]…… **years old**

2. What is your gender? **Check one only*

1. [ ] Male
2. [ ] Female
3. [ ] Others

3. What is your religion? **Check one only*

1. [ ] Buddhism
2. [ ] Christianity
3. [ ] Islam
4. [ ] Others

4. What is your marital status? **Check one only*

1. [ ] Single
2. [ ] Married
3. [ ] Divorced
4. [ ] Widowed
5. [ ] Separated

5. What is your current living status? **Check one only*

1. [ ] Living alone
2. [ ] Living with family
3. [ ] Living with others such as roommate

6. How many children do you have? (including stepchildren) **Check one only*

1. [ ] None
2. [ ] 1 child
3. [ ] 2 children
4. [ ] 3 children
5. [ ] 4 children
6. [ ] 5 children and above

7. What is your highest education attainment? **Check one only*

1. [ ] No formal education
2. [ ] Up to primary school
3. [ ] Up to middle school
4. [ ] Up to high school
5. [ ] Up to vocational/ technical school
6. [ ] Up to Diploma or Assoc. degree
7. [ ] Bachelor's degree
8. [ ] Master's degree
9. [ ] Doctoral degree or higher

8. What is your current employment status **Check one only*

1. [ ] Employed (Full-time)
2. [ ] Employed (Part-time or Casual)
3. [ ] Student
4. [ ] Unemployed
5. [ ] Retired
6. [ ] Housewives/husbands
7. [ ] Other, please specify……

9. What is your current occupation during COVID-19 (in the year of 2022) **Check one only*

1. [ ] Civil servant
2. [ ] Government employee
3. [ ] Private staff in a private company
4. [ ] Business owner
5. [ ] Student (Full-time)
6. [ ] Retired

7. [ ] Housewives/husbands
8. [ ] Daily hire employee
9. [ ] Agriculturist
10. [ ]Other, please specify……

10. What was your occupation before COVID-19 (in the year of 2020)*Check one only*

1. [ ] Civil servant
2. [ ] Government employee
3. [ ] Private staff in a private company
4. [ ] Business owner
5. [ ] Student (Full-time)
6. [ ] Retired
7. [ ] Housewives/husbands
8. [ ] Daily hire employee
9. [ ] Agriculturist
10. [ ] Other, please specify……

11. What is your current average income monthly?

1. [ ] Less than 5,000 baht
2. [ ] 5,000-10,0000 baht
3. [ ] 10,001-15,000 baht
4. [ ] 15,001- 20,000 baht
5. [ ] 20, 001- 25,000 baht
6. [ ] 25,001-30,000 baht
7. [ ] More than 30,000 baht

12. What was your average income monthly? (Prior COVID-19 situation, in 2020)

1. [ ] Less than 5,000 baht
2. [ ] 5,000-10,0000 baht
3. [ ] 10,001-15,000 baht
4. [ ] 15,001- 20,000 baht
5. [ ] 20, 001- 25,000 baht
6. [ ] 25,001-30,000 baht
7. [ ] More than 30,000 baht

Part 3: Household characteristics

Please check and specify the number that represent your answer

1) Which of the following choice described your family situation best?

1. [ ] Living alone
2. [ ] Living with friends or relatives
3. [ ] Married couple
4. [ ] Nuclear family
5. [ ] Extended family
6. [ ] Skipped- Generation family

2) Please specify the number of your family member (including yourself) ..[*Fill numbers*].....

3) Please check the number of children (age 0-18 years old) *that you live with in which could be with or without blood related.

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

4) Please check the number of senior (65 years old and above) *that you live with in which could be with or without blood related

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

5) Please check the number of people with disability *that you live with in which could be with or without blood related

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

6. Family role (Refers to your position in the family) **Check one only*

1. [ ] Head of the family
2. [ ] Not the head of the family

7. House tenure **Check one only*

1. [ ] House owner 2. [ ] Renter
3. [ ] Living with family without paying

8. Please select the district that you live for during the past 6 months or more)

**Check one only*

1. Bang Bon
2. Bang Kapi
3. Bang Khae
4. Bang Khen
5. Bang Kho Laem
6. Bang Khun Thian
7. Bang Na
8. Bang Phlat
9. Bang Rak
10. Bang Sue
11. Bangkok Noi
12. Bangkok Yai
13. Bueng Kum
14. Chatuchak
15. Chom Thong
16. Din Daeng
17. Don Mueang
18. Dusit
19. Huai Khwang
20. Khan Na Yao
21. Khlong San
22. Khlong Toei
23. Khong Sam Wa

24. Lak Si
25. Lat Krabang
26. Lat Phrao
27. Min Buri
28. Nong Chok
29. Nong Khaem
30. Pathum Wan
31. Phasi Charoen
32. Phaya Thai
33. Phra Khanong
34. Phra Nakhon
35. Pom Prap Sattru Phai
36. Prawet
37. Rat Burana
38. Ratchathewi
39. Sai Mai
40. Samphanthawong
41. Saphan Sung
42. Sathon
43. Suan Luang
44. Taling Chan
45. Thawi Wathana
46. Thon Buri
47. Thung Khru
48. Wang Thonglang
49. Watthana
50. Yan Nawa

Part 4: COVID-19 related factors

1. In the past 12 months, have you got diagnosed with COVID-19 (positive with ATK or PCR)?

Check one only

1. [ ] Yes 2. [ ] No

2. In the past 12 months, have you ever had to self-quarantine or self0isolation due to close contact or categorized as a high-risk group?

Check one only

1. [ ] Yes 2. [ ] No

3. Currently, how many COVID-19 vaccines you have received? For example, Sinovac, Sinopharm, AstraZeneca, Moderna, Pfizer etc.

Check one only

1. [ ] No History of getting COVID-19 vaccination
2. [ ] Vaccinated: 1 dose
3. [ ] Vaccinated: 2 doses
4. [ ] Vaccinated: 3 doses
5. [ ] Vaccinated: 4 doses
6. [ ] Vaccinated: more than 4 doses

Part 5: Additional support

1. In the past 12 months, have you ever relied on any of these financial assistances?

**Multiple answer, more than one*

1. [ ] Not received
2. [ ] Received from government (Refers to 50-50 co-payment scheme, "Khon La Khrueng", Cashback measure "Ying Chai Ying Dai scheme", "Rao Chana scheme", "Rao Rak Kan scheme" etc.)
3. [ ] Received from NGOs
4. [ ] Received from community or neighbor
5. [ ] Others, please specify.....

2. In the past 12 months, have you ever relied on any of these food assistances?

**Multiple answer, more than one*

1. [ ] Not received
2. [ ] Received from government
3. [ ] Received from NGOs

4. [ ] Received from community or neighbor
5. [ ] Others, please specify.....

3. Currently, do you have any health insurance?

**Multiple answer, more than one*

1. [ ] None and rely only on 30- Baht Scheme
2. [ ] Civil Servant Medical Benefit Scheme (CHMES)
3. [ ] Social Security Scheme (SSS)
4. [ ] Worker Compensation Scheme (WCS)
5 [ ] Private insurance (purchased by the yourself)

4. Currently, do you have any COVID-19 insurances?

1. [ ] Yes
2. [ ] No

Part 6: Food insecurity experience scale (FIES)

FOOD INSECURITY EXPERIENCE SCALE Individually Referenced		
Now I would like to ask you some questions about food.		
Q1. During the last 12 months, was there a time when you were worried you would not have enough food to eat because of a lack of money or other resources? *If "Yes", go to question Q1a *If "No," "Don't Know," or "Refused, go to question Q2	0 No	1 Yes
Q1a. Was this specifically due to the COVID-19 crisis? *Go to question Q2	0 No	1 Yes
Q2. During the last 12 months, was there a time when you were unable to eat healthy and nutritious food because of a lack of money or other resources? *If "Yes", go to question Q2a *If "No," "Don't Know," or "Refused, go to question Q3	0 No	1 Yes
Q2a. Was this specifically due to the COVID-19 crisis? * Go to question Q3	0 No	1 Yes

Q3. During the last 12 months, was there a time when you ate only a few kinds of foods because of a lack of money or other resources? * If "Yes", go to question Q3a If "No," "Don't Know," or "Refused, go to question Q4	0 No 1 Yes
Q3a. Was this specifically due to the COVID-19 crisis? * Go to question Q4	0 No 1 Yes
Q4. During the last 12 months, did you ever had to skip a meal because there was not enough money or other resources to get food? *If "Yes", go to question Q4a *If "No," "Don't Know," or "Refused, go to question Q5	0 No 1 Yes
Q4a. Was this specifically due to the COVID-19 crisis? * Go to question Q5	0 No 1 Yes
Q5. During the last 12 months, was there a time when you ate less than you thought you should because of a lack of money or other resources? * If "Yes", go to question Q5a If "No," "Don't Know," or "Refused, go to question Q6	0 No 1 Yes
Q5a. Was this specifically due to the COVID-19 crisis? * Go to question Q6	0 No 1 Yes
Q6. During the last 12 months, did your household ran out of food because of a lack of money or other resources to get food? * If "Yes", go to question Q6a *If "No," "Don't Know," or "Refused, go to question Q7	0 No 1 Yes
Q6a. How often did this happen? Was it only once or twice? Did it happen 3 to 10 times, or it was more than 10 times? *Go to question Q6b	2 Rarely (1 or 2 times) 3 Sometimes (3-10 times) 4 Often (more than 10 times) 98 Don't Know 99 Refused
Q6b. Was this specifically due to the COVID-19 crisis?	0 No 1 Yes

* Go to question Q7	
Q7. During the last 12 months, was there a time when you were hungry but did not eat because there was not enough money or other resources for food? * If "Yes", go to question Q7a *If "No," "Don't Know," or "Refused, go to question Q8	0 No 1 Yes
Q7a. How often did this happen? Was it only once or twice? Did it happen 3 to 10 times, or it was more than 10 times? * Go to question Q7b	2 Rarely (1 or 2 times) 3 Sometimes (3-10 times) 4 Often (more than 10 times) 98 Don't Know 99 Refused
Q7b. Was this specifically due to the COVID-19 crisis? * Go to question Q8	0 No 1 Yes
Q8. Finally, during the last 12 months, , was there a time when you went without eating for a whole day because of a lack of money or other resources? * If "Yes", go to question Q8a *If "No," "Don't Know," or "Refused, module is finished	0 No 1 Yes
Q8a. How often did this happen? Was it only once or twice? Did it happen 3 to 10 times, or it was more than 10 times? *Go to question Q8b	2 Rarely (1 or 2 times) 3 Sometimes (3-10 times) 4 Often (more than 10 times) 98 Don't Know 99 Refused
Q8b. Was this specifically due to the COVID-19 crisis?	0 No 1 Yes

-END OF QUESTIONNAIRE-

Participant contact information

Thank you for taking your time to complete the questionnaire for "PREVALENCE AND ASSOCIATED FACTORS OF FOOD INSECURITY DURING COVID-19 PANDEMIC IN BANGKOK, THAILAND: A CROSS-SECTIONAL STUDY".

Your responses will be highly beneficial for this research. Once again, all your responses and personal information will be kept confidentially for educational purposes only. If you are interested in winning a lucky draw and receiving a token of appreciation, please fill out your name and phone number for the contact.

VITA

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