

**TRANSLATION AND VALIDATION ON
HOUSEHOLD COVID-19 FOOD
INSECURITY EXPERIENCE SCALE
(COVID-19 FIES) AND ITS ASSOCIATION
WITH PSYCHOLOGICAL WELL BEING
AMONG LOW INCOME WOMEN IN
KELANTAN DURING THE COVID-19
PANDEMIC**

MUHAMMAD ZULFAHMI BIN HARON

UNIVERSITI SAINS MALAYSIA

2023

**TRANSLATION AND VALIDATION ON
HOUSEHOLD COVID-19 FOOD
INSECURITY EXPERIENCE SCALE
(COVID-19 FIES) AND ITS ASSOCIATION
WITH PSYCHOLOGICAL WELL BEING
AMONG LOW INCOME WOMEN IN
KELANTAN DURING THE COVID-19
PANDEMIC**

By

MUHAMMAD ZULFAHMI BIN HARON

**Thesis submitted in fulfilment of the
requirements for the degree of
Doctor of Public Health (Family Health)**

AUGUST 2023

ACKNOWLEDGEMENT

All praise and gratitude are due to Allah, the Lord of the Worlds, who has bestowed His blessings upon me throughout my academic journey and has guided me in completing my Doctor of Public Health (DrPH) dissertation.

I would like to express my sincere appreciation and thanks to my honourable main supervisor, Assoc. Prof. Dr. Rohana Jalil, for her invaluable guidance, encouragement, and expertise in the field of public health nutrition. I am also grateful to my co-supervisor, Assoc. Prof. Dr. Nor Azwany Yaacob, for her insightful comments and constructive criticism. My heartfelt thanks also go to my co-researcher, Puan Norhasliza Ariffin, for her collaboration and assistance especially in the data collection phase of my research.

To my dear parents, Haji Haron Abdul Rahman and Hajjah Saodah Saibon, I offer my heartfelt thanks for their unwavering support, encouragement, and sacrifice. Their love, guidance, and prayers have been the cornerstone of my success.

I also extend my gratitude to my father and mother-in-law, and my siblings and in-law siblings, for their love, support, and encouragement throughout my academic journey.

To my lovely and supporting wife, Dr Nawal Nabilah and our two heroes, Rizqi and Rayyan, thank you for your patience, understanding, and unwavering love throughout my journey. Your support and encouragement have been my driving force, and I could not have achieved this without you.

I extend my appreciation to the clinic staffs and respondents who participated in my study. Their time, effort, and willingness to participate have been invaluable in contributing to the success of my research.

Lastly, I would like to express my gratitude to lecturers, colleagues, and all those who have contributed to my academic and personal growth, whether through their kind words, deeds, or prayers. I am deeply humbled and honored by your support, and I pray that Allah blesses you all with success and happiness. Jazakumullahu khayran

TABLE OF CONTENTS

ACKNOWLEDGEMENT	ii
TABLE OF CONTENTS.....	iv
LIST OF TABLES	xiv
LIST OF FIGURES.....	xvi
LIST OF APPENDICES	xvii
LIST OF SYMBOLS	xviii
LIST OF ABBREVIATIONS	xix
ABSTRAK	xx
ABSTRACT.....	xxiii
CHAPTER 1.....	1
INTRODUCTION.....	1
1.1 COVID-19 and Food Insecurity	1
1.2 Psychological Well-Being.....	4
1.3 Problem Statement.....	6
1.4 Rationale of the Study	8
1.5 Research Questions	10
1.5 Objectives	10
1.5.1 General.....	10
1.5.2 Specific	11
1.6 Research Hypotheses.....	11

CHAPTER 2.....	13
LITERATURE REVIEW.....	13
2.1 Food insecurity during COVID-19.....	13
2.2 Impact of COVID-19 pandemic on food related events.....	15
2.2.1 Food chain disruption	16
2.2.2 Rising food prices	17
2.2.3 Widening social inequities.....	19
2.2.4 Economic impacts.....	20
2.3 Food insecurity, malnutrition and impact on of household members	22
2.3.1 Food insecurity and malnutrition.....	22
2.3.2 Food insecurity and children.....	23
2.3.3 Food insecurity and women.....	24
2.3.4 Food insecurity and elderly.....	25
2.3.5 Food insecurity and people with disability (PWD)	26
2.3.6 Food insecurity and low-income group	27
2.4 Food insecurity, mental health and psychological well-being	28
2.4.1 Well-being and psychological well-being	31
2.4.2 Psychological well-being and its relation to food insecurity, low socioeconomic status and COVID-19.....	34
2.5 Food insecurity measurement tools	36
2.5.1 Household Food Security Survey Module (HFSSM).....	36
2.5.2 Household Food Insecurity Access Scale (HFIAS).....	37

2.5.2 Radimer-Cornell Hunger Scale.....	38
2.5.3 COVID-19 Food Insecurity Experience Scale (COVID-19 FIES) as a measurement tool	39
2.5.3.1 Cross cultural translation of COVID-19 FIES.....	40
2.6 Psychological well-being measurement tools	42
2.6.1 Positive and Negative Affect Schedule	42
2.6.2 Warwick-Edinburgh Mental Well-being Scale (WEMWBS)	42
2.6.3 Mental Health Continuum-Short Form (MHC-SF)	43
2.6.4 Ryff's Psychological Well-Being Scale as measurement tool.....	43
2.7 Existing policies and programs Malaysia to address food insecurity among low-income group during COVID-19 pandemic.....	44
2.9 Conceptual framework	45
CHAPTER 3.....	48
METHODOLOGY.....	48
3.1 Introduction	48
3.2 Background of study area.....	48
3.3 Phase 1: Translation and validation of the COVID-19 Food Insecurity Experience Scale (COVID-19 FIES).....	49
3.3.1 COVID-19 Food Insecurity Experience Scale (COVID-19 FIES) questionnaire	49
3.3.2 Translation of COVID-19 FIES.....	54
3.3.2.1 Forward Translation.....	55

3.3.2.2 Backward Translation	56
3.3.2.3 Translation review	56
3.3.3 Validation and reliability assessment of Malay version COVID-19 FIES	57
3.3.3.1 Face validity.....	57
3.3.3.1.1 Preparing response process validation form	58
3.3.3.1.2 Selecting a panel of raters	58
3.3.3.1.3 Conducting response process validation.....	59
3.3.3.1.4 Reviewing items for clarity and comprehension	59
3.3.3.1.5 Providing score for each item based on the clarity and comprehensibility rating scale	59
3.3.3.1.6 Calculating the Face Validity Index	60
3.3.3.2 Construct validity.....	60
3.3.3.2.1 Study duration.....	60
3.3.3.2.2 Study location	61
3.3.3.2.3 Reference population	61
3.3.3.2.4 Source population	61
3.3.3.2.5 Sampling frame.....	61
3.3.3.2.6 Inclusion criteria	62
3.3.3.2.7 Exclusion criteria	62
3.3.3.2.8 Sample size determination for Phase 1	62
3.3.3.2.9 Sampling method	63

3.3.3.2.10 Data collection method	64
3.3.3.2.11 Statistical analysis	65
3.3.3.2.12 Proportion of individual and household food insecurity experience among low-income women in Kota Bharu during COVID-19 pandemic	65
3.3.3.2.13 Descriptive statistic	66
3.4 Phase 2 – Association between household and individual food insecurity experience and psychological well-being.....	68
3.4.1 Study design.....	68
3.4.2 Study duration.....	69
3.4.3 Study location	69
3.4.4 Reference population	69
3.4.5 Source of population	69
3.4.6 Sampling Frame	69
3.4.7 Inclusion criteria	69
3.4.8 Exclusion criteria	70
3.4.9 Sample size determination	70
3.4.10 Sampling Method.....	73
3.4.11 Research tools for Phase Two study	76
3.4.12 Data collection method	78
3.4.13 Definition of Operational Terms.....	79
3.4.13.1 Food Basket Program.....	79
3.4.13.2 Low-income women	79

3.4.13.3 Malnourished child	79
3.4.13.4 Comorbidities.....	80
3.4.13.5 COVID-19 status (past 12 months)	80
3.4.13.6 Household	80
3.4.13.7 Head of household	80
3.4.13.8 Relationship	80
3.4.13.9 Employment status of the respondents	81
3.4.13.10 Employment status of the respondents during COVID-19.....	81
3.4.3.11 Employment status of the head of household	81
3.4.13.12 Employment status of the head of household during COVID-19.....	81
3.4.13.13 Types of occupation of the head of household	81
3.4.13.14 Types of occupation of the head of household during COVID-19....	81
3.4.13.15 Main income of the head of household.....	82
3.4.13.16 Total household income	82
3.4.13.17 Self employed	82
3.4.13.18 Number of household members	82
3.4.13.19 COVID19 social protection	82
3.4.13.20 House ownership.....	83
3.4.13.21 Individual food insecurity experience.....	83
3.4.13.22 Household food insecurity experience.....	83
3.4.13.23 Study outcome	83

3.4.13.24 Floor effect.....	83
3.4.14 Statistical analysis.....	84
3.4.14.1 Proportion of individual and household food insecurity experience among low-income women in Kelantan during COVID-19 pandemic	85
3.4.14.2 Association between household and individual food insecurity experience and psychological well-being	85
3.5 Ethical consideration	89
3.5.1 Subject vulnerability	89
3.5.2 Declaration of conflict of interest	90
3.5.3 Handling privacy and confidentiality issue.	90
3.5.4 Community sensitivity and benefits	91
3.5.5 Incentives/honorarium/compensation	91
3.5.6 Ethical clearance approval	91
3.5.7 Publication policy	92
CHAPTER 4.....	93
RESULTS	93
4.1 Phase 1 – Translation and validation of COVID-19 Food Insecurity Experience Scale (FIES).....	93
4.1.1 Translation of COVID-19 Food Insecurity Experience Scale (FIES)	93
4.1.2 Face validity.....	95
4.1.2.1 Sociodemographic characteristics of the respondents	95
4.1.2.2 Face Validation Index	95

4.1.3 Construct validity.....	98
4.1.3.1 Sociodemographic characteristics of the respondents	98
4.1.3.2 Proportion of individual and household food insecurity	99
4.1.3.2 Item level descriptive statistic.....	100
4.1.3.3 Factor analysis	107
4.1.4 Reliability.....	110
4.2 Phase 2 – Association between household and individual food insecurity experience and psychological well-being.....	111
4.2.1 Sociodemographic characteristics of the respondents	111
4.2.2 Proportion of individual and household food insecurity	116
4.2.3 Item level descriptive statistic of individual and household Malay version of COVID19 FIES	117
4.2.4 Association between individual and household food insecurity experience with psychological well-being	130
CHAPTER 5.....	133
DISCUSSION	133
5.1 Translation of COVID-19 Food Insecurity Experience Scale.....	133
5.2 Face validity	134
5.3 Sociodemographic characteristics	135
5.4 Factor Analysis.....	136
5.5 Reliability	136

5.6 Other approach of translation and validation of Food Insecurity Experience Scale	137
5.7 Proportion of individual and household food insecurity	139
5.8 Association between food insecurity with psychological well-being among low-income group.....	140
5.9 Complex pathways between food insecurity and mental health	143
5.10 Strength and limitation	145
CHAPTER 6.....	147
CONCLUSION AND RECOMMENDATIONS.....	147
REFERENCES.....	149
APPENDICES.....	
APPENDIX A	
APPENDIX B.....	
APPENDIX C.....	
APPENDIX D	
APPENDIX E.....	
APPENDIX F.....	
APPENDIX G	
APPENDIX H	
APPENDIX I.....	
APPENDIX J.....	
APPENDIX K	

APPENDIX L.....

APPENDIX M.....

APPENDIX N

APPENDIX O

APPENDIX P

LIST OF TABLES

	Page	
Table 3.1	English version of the Food Insecurity Experience Scale Survey Module	50
Table 3.2	Internal consistency based on Cronbach's alpha value	68
Table 3.3	Calculation of sample size to determine the proportion of food insecurity	70
Table 3.4	Distribution of respondents from health clinics in all districts in Kelantan	75
Table 4.1	Sociodemographic characteristics of raters (n=10)	96
Table 4.2	Face Validation Index based on rating of the clarity and comprehensibility on Malay version of COVID-19 FIES questionnaire	97
Table 4.3	Sociodemographic characteristics of respondents (n=68)	99
Table 4.4	Item level descriptive statistics of household reference Malay version of COVID-19 FIES items	102
Table 4.5	Communalities of Malay version of COVID-19 FIES items	108
Table 4.6	Correlation matrix of Malay version of COVID-19 FIES items	109
Table 4.7	Factor loading of Malay version of COVID-19 FIES items	110
Table 4.8	Reliability of Malay version COVID-19 FIES	111
Table 4.9	Final construct validity and reliability of Malay version COVID-19 FIES	111
Table 4.10	Sociodemographic characteristics of the respondents	113

Table 4.11	Employment status, occupation, and income of head of households	114
Table 4.12	Food and Milk Assistance Program received by the respondents	115
Table 4.13	Social protection during COVID-19	116
Table 4.14	Item level descriptive statistics of Malay version of COVID-19 FIES individual reference	118
Table 4.15	Item level descriptive statistics of Malay version of COVID-19 FIES household reference	124
Table 4.16	Univariable analysis on comparison of mean PWB score	131
Table 4.17	Association of individual and household food insecurity with psychological well-being	132

LIST OF FIGURES

	Page
Figure 1.1: The impact of COVID-19 food system dynamics on the six dimensions of food security	2
Figure 2.1 Conceptual framework of the study	47
Figure 3.1 Map of Kelantan	49
Figure 3.2 Food insecurity severity along a continuous scale of severity	51
Figure 3.3 Flowchart of translation process	57
Figure 3.4 Sampling method for Phase 1 study	64
Figure 3.5 Sample size calculation to determine the association between individual and household food insecurity experience with psychological well-being	72
Figure 3.6 Sampling method of phase 2	74
Figure 3.7 Independent and Dependent Variables	84
Figure 3.8 Steps in ANCOVA	89
Figure 4.1 Proportion of Individual and Household Food Insecurity Validation Study	100
Figure 4.2 Scree plot of Malay version of COVID-19 FIES	108
Figure 4.3 Proportion of Individual and Household Food Insecurity Experience Cross-Sectional Study	117

LIST OF APPENDICES

Appendix A	COVID-19 Food Insecurity Experience Scale (COVID-19 FIES) Questionnaire (English) Household and Individually Referenced
Appendix B	Food and Agriculture Organization (FAO) Approval
Appendix C	FAO Digital Badge
Appendix D	Rating Form
Appendix E	Inform Consent Form Phase 1
Appendix F	Data Collection Form Phase 1
Appendix G	Data Collection Form Phase 2
Appendix H	Validated Malay Version of COVID-19 FIES
Appendix I	Malay Version of Ryff's Psychological Well-Being (PWB) Scale
Appendix J	Malay Version of Ryff's Psychological Well-Being Scale Author's Approval
Appendix K	Ryff's Psychological Well-Being Original Author's Approval
Appendix L	Inform Consent Form Phase 2
Appendix M	Kelantan State Health Department Approval
Appendix N	<i>Jawatankuasa Etika Penyelidikan Manusia</i> of Universiti Sains Malaysia (JEPeM) Approval
Appendix O	Medical Research & Ethics Committee (MREC) Approval
Appendix P	Translation Table

LIST OF SYMBOLS

$\%$	Percent
$=$	Equal to
\geq	More than and equal to
\leq	Less than and equal to
$>$	More than
$<$	Less than

LIST OF ABBREVIATIONS

AdjOR	Adjusted Odds Ratio
ADL	Activities of Daily Living
CI	confidence interval
COVID-19	Coronavirus Disease 2019
FIES	Food Insecurity Experience Scale
FAO	Food and Agriculture Organization
HFIAS	Household Food Insecurity Access Scale
HFSSM	Household Food Security Survey Module
HLPE	High Level Panel of Experts
IQR	interquartile range
kg	kilogram
MOH	Ministry of Health
OR	odds ratio
PWB	Psychological Well Being
QoL	Quality of Life
SD	standard deviation
WHO	World Health Organization

ABSTRAK

TERJEMAHAN DAN PENGESAHAN SKALA PENGALAMAN KETIDAKJAMINAN MAKANAN ISI RUMAH COVID-19 (COVID-19 FIES) DAN PERKAITANNYA DENGAN KESEJAHTERAAN PSIKOLOGI DALAM KALANGAN WANITA BERPENDAPATAN RENDAH DI KELANTAN SEWAKTU PANDEMIK COVID-19

Pengenalan: Pandemik COVID-19 merupakan krisis kesihatan awam dan kemanusiaan yang mengancam keterjaminan makanan dan pemakanan berjuta-juta orang di seluruh dunia. Tahap ketidakjaminan makanan yang semakin teruk semasa pandemik mungkin mempunyai implikasi jangka panjang dan menurunkan tahap kesejahteraan psikologi kumpulan yang terancam terutamanya wanita berpendapatan rendah. Pada masa ini, tiada instrumen dalam Bahasa Melayu yang telah disahkan untuk mengukur skala pengalaman ketidakjaminan makanan akibat krisis COVID-19 dan perkaitannya dengan kesejahteraan psikologi di negara ini. **Objektif:** Oleh itu, objektif fasa pertama kajian ini adalah untuk menterjemah Skala Pengalaman Ketidakjaminan Makanan COVID-19 (COVID-19 FIES) ke dalam bahasa Melayu dan untuk menentukan kesahihan dan konstruk kebolehpercayaan. Fasa kedua adalah untuk mengenalpasti peratusan pengalaman ketidakjaminan makanan individu dan isi rumah serta kaitannya dengan kesejahteraan psikologi dalam kalangan wanita berpendapatan rendah di Kelantan semasa pandemik COVID-19. **Metodologi:** Fasa satu melibatkan 10 dan 68 orang ibu atau penjaga wanita dari daerah Kota Bharu, masing-masing untuk mengenalpasti kesahihan muka dan konstruk. Fasa kedua ialah kajian keratan rentas yang melibatkan 252 ibu atau penjaga wanita kanak-kanak kekurangan zat makanan yang merupakan penerima Program Bakul Makanan dan

yang dijalankan di 24 buah klinik kesihatan di Kelantan dari November 2022 sehingga Mac 2023. Kesemua responden dipilih secara rawak melalui persampelan proporsi berstrata. Kesahihan muka telah diuji oleh Indeks Kesahan Muka (FVI) dan kesahihan serta kebolehpercayaan konstruk telah diuji, masing-masing dengan menggunakan analisis faktor penerokaan dan pekali alfa Cronbach. Perkaitan antara pengalaman ketidakjaminan makanan individu dan isi rumah dengan kesejahteraan psikologi telah dinilai melalui Analisis Kovarian (ANCOVA). **Keputusan:** Julat Indeks Kesahan Muka Peringkat Item (I-FVI) ialah 0.9 hingga 1.0 dan Skala Indeks Kesahan Muka (S-FVI) ialah 0.73. Tiga komponen utama telah dikenal pasti daripada faktor analisis penerokaan iaitu komponen ketidakpastian, komponen kualiti, dan komponen kuantiti dengan julat pemuatan faktor dari 0.428 hingga 0.866 dan indeks kebolehpercayaan yang boleh diterima (Cronbach's $\alpha = 0.710$). Sebanyak 26 (10.3%) isi rumah telah dikenal pasti mempunyai keterjaminan makanan, manakala bagi ketidakjaminan makanan pula, 122 (48.4%) adalah ringan, 85 (33.8%) sederhana dan 19 (7.5%) mempunyai ketidakjaminan makanan yang teruk. Tiada perkaitan yang signifikan antara kumpulan keterjaminan makanan dan kumpulan ketidakjaminan makanan untuk tahap pengalaman individu dan isi rumah dengan purata skor kesejahteraan psikologi [-0.37 (-4.38, 5.11), $p=0.880$] dalam kalangan wanita berpendapatan rendah di Kelantan semasa COVID- 19 walaupun selepas mengawal kemungkinan pengganggu sosiodemografi (etnik, tahap pendidikan dan penerima bantuan makanan tambahan) dan kovariat (umur, bilangan anak, bilangan ahli isi rumah dan jumlah pendapatan isi rumah). **Kesimpulan:** Skala Pengalaman Ketidakjaminan Makanan COVID-19 versi Bahasa Melayu (COVID-19 FIES) adalah sah dan instrumen yang boleh dipercayai untuk mengukur ketidakjaminan makanan isi rumah dalam kalangan wanita berpendapatan rendah di Kelantan. Walaupun tidak terdapat perkaitan yang

signifikan antara ketidakjaminan makanan dan kesejahteraan psikologi, namun kajian lain mengenai hubungan struktur antara sosiodemografi dengan ketidakjaminan makanan sebagai kesan pengantara, terhadap kesejahteraan psikologi perlu dijalankan.

Kata kunci: ketidakjaminan makanan, kesejahteraan psikologi, wanita berpendapatan rendah, COVID-19

ABSTRACT

TRANSLATION AND VALIDATION ON HOUSEHOLD COVID-19 FOOD INSECURITY EXPERIENCE SCALE (COVID-19 FIES) AND ITS ASSOCIATION WITH PSYCHOLOGICAL WELL BEING AMONG LOW INCOME WOMEN IN KELANTAN DURING THE COVID-19 PANDEMIC

Introduction: The COVID-19 pandemic is a public health and humanitarian crisis that threatens the food security and nutrition of millions of people around the globe. Worsening food insecurity level during pandemic may have long-term implications and lower the psychological well-being level of the vulnerable group particularly low-income women. Currently, there is no validated Malay instrument available to measure the food insecurity experience scale due to COVID-19 crisis and its association with psychological well-being in the country. **Objectives** Thus, the objective of first phase of this study was to translate the COVID-19 Food Insecurity Experience Scale (COVID-19 FIES) into Malay and to determine its construct validity and reliability. The second phase was to describe the proportion of individual and household food insecurity experience and its association with psychological well-being among low-income women in Kelantan during the COVID-19 pandemic.

Methodology: Phase one involved ten and 68 mothers or women caretakers from Kota Bharu district were invited for face and construct validity, respectively. The second phase was a cross sectional study involving 252 mothers or women caretakers of malnourished children who were the recipients of Food Basket Program conducted at 24 health clinics in Kelantan from November 2022 to March 2023. All respondents were randomly selected by proportionate stratified sampling. The face validity has been tested by Face Validity Index (FVI) and the construct validity and reliability has

been tested using exploratory factor analysis and Cronbach's alpha coefficient, respectively. The association between individual and household food insecurity experience with psychological well-being has been identified through Analysis of Covariance (ANCOVA) analysis. **Results:** The Item-Level Face Validity Index (I-FVI) range was 0.9 to 1.0 and the Scale-Level Face Validity Index (S-FVI) was 0.73. Three major components have been identified from exploratory analysis factors which are uncertainty component, quality component, and quantity component with factor loading range from 0.428 to 0.866 and acceptable reliability index (Cronbach's $\alpha = 0.710$). A total of 26 (10.3%) households were identified as food security, 122 (48.4%) mild, 85 (33.8%) moderate and 19 (7.5%) severe food insecurity. There was no significant association between food security and food insecurity group for both individual and household experience level with mean psychological well-being score [-0.37 (-4.38, 5.11), $p=0.880$] among low-income women in Kelantan during COVID-19 even after controlling for possible sociodemographic confounders (ethnic, educational level and receiving supplementary food assistance) and covariates (age, number of children, number of household members and total household income). **Conclusion:** Malay version of COVID-19 Food Insecurity Experience Scale (COVID-19 FIES) is valid and a reliable tool to measure household food insecurity among low-income women in Kelantan. Although there was no significant association between food insecurity and psychological well-being, however, other study on structural relationship between sociodemographic with food insecurity as mediating effect, toward psychological well-being need to be carried out.

Keywords: food insecurity, psychological well-being, low-income women, COVID-19

CHAPTER 1

INTRODUCTION

1.1 COVID-19 and Food Insecurity

The COVID-19 pandemic creates a significant public health and humanitarian challenge, with serious impacts for the food security and nutritional status of millions of individuals worldwide (United Nations, 2020). Furthermore, due to COVID-19 crisis, The High-Level Panel of Experts Global Narrative study identifies six elements of food security (Figure 1.1), suggesting that agency and sustainability should be considered as important aspects of food systems, alongside the four traditional pillars of food availability, access, stability, and utilization. The Experts believes that food systems should not only be concerned with providing people with enough food to eat, but also with ensuring that people have the ability to make choices about their food, and that food production is done in a sustainable way (HLPE, 2020).

Food security is a public health issue worldwide (FAO *et al.*, 2021). Consistently, research has revealed that food insecurity is detrimental to health. Elderly individuals who experience food insecurity exhibit similar limitations in their daily activities as elderly individuals who are food-secure, despite being fourteen years younger in age (Gundersen and Ziliak, 2015). In general, food security is achieved when people have reliable access to safe, nutritious food that meets their dietary needs and food preferences for an active and healthy life. There are four dimensions of food security: availability, access, utilization, and stability (World Food Summit, 1996).

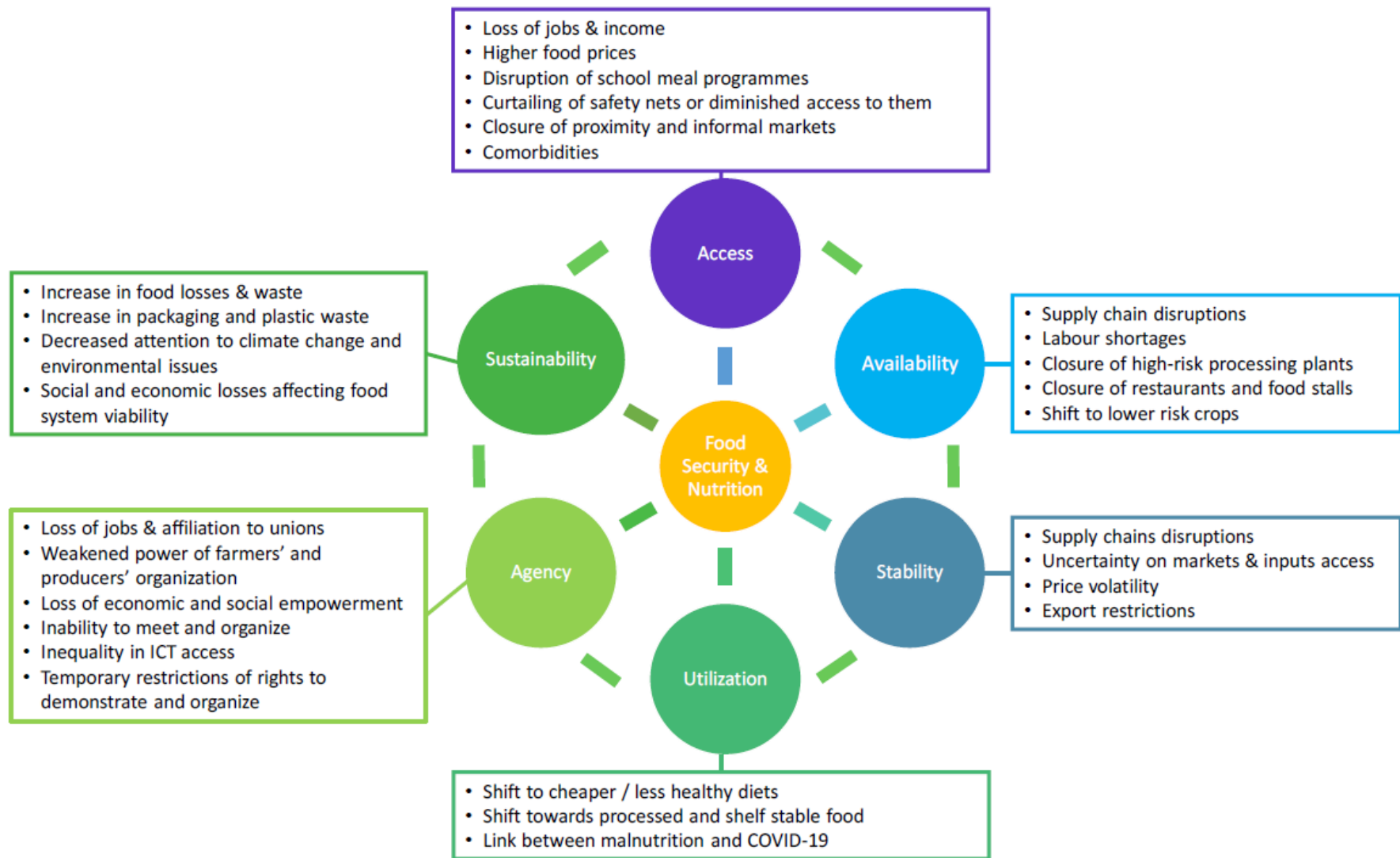


Figure 1.1: The impact of COVID-19 food system dynamics on the six dimensions of food security (HLPE, 2020)

The percentage of people globally who experienced moderate or severe food insecurity increased from 22.6% in 2014 to 26.6% in 2019. This number increased to 30.4% in 2020, the year the COVID-19 pandemic spread around the world (FAO, 2021b).

Before the COVID-19 pandemic, the State of Food Security and Nutrition report found that nearly two billion people experienced some level of food insecurity (FAO *et al.*, 2021). However, current estimates suggest that the COVID-19 pandemic will directly lead to an additional 83 to 132 million people experiencing food insecurity, including 38 to 80 million in low-income countries that rely on food imports. (FAO *et al.*, 2020; Torero, 2020). Moreover, as a result of the pandemic's secondary socioeconomic repercussions, at least 25 nations, including Lebanon, South Sudan and, Yemen, are facing a serious food insecurity crisis. (FAO and WFP, 2020).

Prior to COVID-19, food insecurity and hunger were already on the rise. The number of people who were undernourished increased by 64 million between 2014 and 2019. COVID-19 have raised the number of individuals suffer from severe food insecurity dramatically between 2020 and 2021. The World Food Programme reported an increase of 111 million to 296 million people have lack access to adequate food from April 2020 to April 2021 in the 35 countries where it operates (World Bank, 2021).

Sustainable Development Goal 2 aims to end hunger by 2030 and ensure that everyone, especially the poor and vulnerable, including infants, has access to safe, nutritious, and sufficient food all year round. Regrettably, the global target of eliminating hunger by 2030 is not on track to be achieved. If present trends continue,

by 2030 there will be more than 840 million people suffering from hunger. (United Nations, 2021). Many studies have shown that food insecurity is associated with poor psychological well-being. (Heylen *et al.*, 2015; Myers, 2020; Pourmotabbed *et al.*, 2020).

1.2 Psychological Well-Being

Most definitions of health focused on the absence of disease and disability before the Era of World War II. In 1948, the World Health Organization (WHO) expanded the definition of health to include physical, mental, and social well-being. Despite this, most health-care research and practise remained based on the conventional medical paradigm, which prioritised illness and disability reduction while paying less focus to the nature of health and well-being (Cooke *et al.*, 2016). There is no consensus around a single definition of well-being, but there is general agreement that at minimum, well-being includes the presence of positive emotions and moods such as contentment and happiness, the absence of negative emotions such as depression and anxiety, satisfaction with life, fulfilment, and positive functioning. In simple terms, well-being can be described as judging life positively and feeling good (CDC, 2018). The concept of well-being may be divided into four broad approaches. The first one is *hedonic* approach. This approach put an emphasis on happiness and pleasure (Ryan and Deci, 2001). Subjective well-being is a hedonic model that is commonly used to measure happiness that is comprised of three distinct components: life satisfaction, positive affect, and negative affect. Life satisfaction is a person's overall evaluation of their life. Positive affect is the experience of positive emotions, such as joy, happiness, and love. Negative affect is the experience of

negative emotions, such as sadness, anger, and fear (Diener *et al.*, 1985). The second approach is *eudaimonic* approach. According to this approach, psychological health is obtained through reaching one's potential, functioning optimally, or recognising one's actual nature (Lent, 2004). The psychological well-being model is a multidimensional approach to understanding well-being that was first proposed by Carol Ryff in 1989. The model proposes that well-being is comprised of six components: autonomy, self-acceptance, environmental mastery, life purpose, positive interpersonal relationships, and personal growth (Ryff, 1989). Quality of life (QoL) is a third approach to conceptualizing well-being that encompasses physical, mental, social, and emotional well-being. In the literature, the terms QoL and well-being are often used interchangeably (Cooke *et al.*, 2016). This approach draws on knowledge from a variety of disciplines, such as sociology and psychology, and is often used in medical settings (Lent, 2004). According to the WHO, QoL is a “broad range concept affected in a complex way by the persons’ physical health, psychological state, level of independence, social relationships and their relationship to salient features of their environment”. A fourth approach to conceptualizing well-being is wellness. Wellness approaches are grounded in counselling literature and are often broader and less specific than previous approaches.(Roscoe, 2009). As with QoL, some authors use the terms well-being and wellness interchangeably (Harari *et al.*, 2005; Hattie *et al.*, 2004). Similar to *eudaimonic* approaches, an early definition of wellness, emphasised optimal functioning. Dr. Halbert Dunn believes that wellness is more than just the absence of illness. It is a state of being that is characterized by physical, mental, and social well-being. Wellness is about living a life that is full of purpose and meaning. (Palombi, 1992). In fact, these many theory groups may be getting into the same or a similar part of human experience. This could lead to a lot

of different models that may make more sophisticated rather than clear scientific understanding. The different approaches to well-being may be partly due to the different perspectives of the various fields that study them. Hedonic and *eudaimonic* well-being are often studied by psychologists and sociologists, while wellness is often studied by counsellors, and QoL is often studied by medical professionals. (Cooke *et al.*, 2016).

1.3 Problem Statement

The United Nations Sustainable Development Goals include a commitment to eradicate global hunger and malnutrition by 2030. This goal was already challenging before the COVID-19 pandemic, but the pandemic has made it even more difficult. (FAO *et al.*, 2021). Low-income households are more likely to experience food insecurity than higher-income households, and the COVID-19 pandemic has made this issue worse. We need to do more to support low-income groups during the pandemic to help them avoid food insecurity (Kent *et al.*, 2020; Wolfson and Leung, 2020). The Government of Malaysia has implemented various initiatives to provide COVID-19 assistance during the pandemic, especially to the low-income group. One of the significant measures taken was the provision of financial assistance to the B40 group through the *Bantuan Prihatin Nasional* (BPN) program (Chek *et al.*, 2022). Additionally, the government has provided food aid and essential items to the low-income group through various programs such as the National Food Basket Program (Ministry of Finance, 2021).

Providing good support to low-income groups during the COVID-19 pandemic can lead to improved psychological well-being and health outcomes.

Studies have shown that low-income families and disadvantaged communities are more likely to experience food insecurity and psychological stress during the pandemic. Study by Villani *et al.* (2021) showed that COVID-19 pandemic had a significant influence on the psychological well-being of individuals in many countries throughout the world. However, providing social support can help mitigate the negative impacts of the pandemic on mental health (Ju *et al.*, 2023). Kelantan has been selected as study location due to its highest incidence of poverty in Peninsular Malaysia (Department of Statistics Malaysia, 2020b).

During pandemic, studies conducted during the early surge of COVID-19 in Malaysia are very scarce, particularly due to Movement Control Order (MCO). A study was conducted from April to June 2020 in four states of Peninsular Malaysia namely Kelantan, Perak, Johor, and Selangor involving 535 middles to older aged individuals via telephone interviews showed that the prevalence of food insecurity was 14.8% (Rivan *et al.*, 2021). A higher prevalence of overall food insecurity was obtained in an online survey conducted from May 1st to 14th 2020 during home confinement involving 136 respondents where it shows that 43.2% of the respondents was food insecure. The majority (19.8%) are classified as mildly food insecure, while the remainder are classified as moderately food insecure (14.8 %) (Tan *et al.*, 2022). The difference in prevalence obtained in these two studies may be attributed by difference sampling method and study instrument used where Rivan *et al.* (2021) used purposive sampling method and United States Department of Agriculture (USDA) Household Food Security Survey as study instrument while Tan *et al.* (2022) used snowball sampling and Food Insecurity Experience Scale (FIES) as study instrument. To date, there is no questionnaire that specifically measure food insecurity post COVID-19 pandemic in Malaysia.

Worsening food insecurity level during pandemic may have long-term implications and lower the psychological well-being level of the affected population. The current pandemic has given rise to a dual crisis, including a food crisis and a mental health crisis, which are related with the issue of food insecurity (Fang *et al.*, 2021). The impact of food insecurity on nutritional status, growth, and development has been extensively studied in the literature. However, there exists a lack of knowledge regarding the non-nutritional implications of food insecurity, including its effects on mental health (Pourmotabbed *et al.*, 2020).

1.4 Rationale of the Study

The COVID-19 Food Insecurity Experience Scale (COVID-19 FIES) questionnaire is an expanded version of the original FIES produced by the Food and Agriculture Organisation (FAO) as part of the Voice of the Hungry (VOH) project (Ballard *et al.*, 2013). Over the years, several tools have been suggested and employed to evaluate household food security. The COVID-19 FIES is particularly well-suited to address the urgent problem of assessing and monitoring food insecurity during the COVID-19 pandemic, while also conducting an in-depth evaluation of its effects (FAO, 2020d). As its original version is in English language, there is a need to translate and validate the questionnaire to Malay language to measure the food insecurity among local population during the pandemic.

Often, in high-income countries, food insecurity surveys are conducted in conjunction with national nutrition censuses. Another method of analysing food security is to concentrate on vulnerable groups, such as women especially those with poor socioeconomic status (Sulaiman *et al.*, 2021). Study has shown that food

insecurity is prevalent among female headed households (Habyarimana, 2015). In Malaysia, women are often the final decision-makers on everyday household expenditures (Yusof and Duasa, 2010). Traditionally, in Kelantan women become more active participants than her husband in several aspects including social life and in the economic spheres. They manage the household finances and monitor the family budget. Although the patriarchal system is well established in Malaysia, however, Kelantanese women dominate the economic contribution to the households including marketing and tend to control the distribution of many forms to produce (Rekarti *et al.*, 2019). Hence, women had been chosen as a proxy of the household members in this study as target respondents.

In term of psychological well-being, women are more impacted than men, with a 1.48 greater risk of psychological distress during COVID-19 owing to a variety of variables (Wang *et al.*, 2020; World Health, 2022), including food insecurity within the household (Fang *et al.*, 2021). Considering that women in Kelantan made equal financial contributions to their families, research should be performed to determine the psychological effect of food insecurity on women's well-being and other household members. Currently, there is no validated Malay instrument available to measure the food experience scale due to COVID-19 crisis and its association with psychological well-being in the country. By knowing the prevalence of food insecurity related to pandemic using validated questionnaire and its relation to psychological well-being among low-income women will provide evidence that more action should be taken to ensure that no one is left behind.

1.5 Research Questions

1. Is Malay version of COVID-19 Food Insecurity Experience Scale (COVID-19 FIES) valid and a reliable tool to measure household food insecurity among low-income women in Kelantan?
2. What is the proportion of individual and household food insecurity experience among low-income women in Kelantan during COVID-19 pandemic?
3. Is there any association between both individual and household food insecurity experience and psychological well-being among low-income women in Kelantan during COVID-19 pandemic?

1.5 Objectives

1.5.1 General

To translate and validate Malay version of COVID-19 Food Insecurity Experience Scale (COVID-19 FIES), and to study the association between household food insecurity experience with psychological well-being among low-income women in Kelantan during COVID-19 pandemic.

1.5.2 Specific

Phase 1

1. To translate the COVID-19 Food Insecurity Experience Scale (COVID-19 FIES) into Malay language among low-income women in Kelantan during COVID-19 pandemic
2. To determine the construct validity and reliability of the Malay version of COVID-19 Food Insecurity Experience Scale (COVID-19 FIES)

Phase 2

1. To determine the proportion of individual and household food insecurity experience among low-income women in Kelantan during COVID-19 pandemic using validated Malay version of COVID-19 FIES
2. To determine the association between individual and household food insecurity experience (Malay-COVID-19 FIES) with psychological well-being (Malay-Ryff's Psychological Well-Being Scale) among low-income women in Kelantan during COVID-19 pandemic.

1.6 Research Hypotheses

1. Malay version of COVID-19 Food Insecurity Experience Scale (COVID-19 FIES) is a valid tool to measure the food insecurity among low-income women in Kelantan during COVID-19 pandemic.

2. There is significant association between individual and household food insecurity experience with psychological well-being among low-income women in Kelantan during COVID-19

CHAPTER 2

LITERATURE REVIEW

2.1 Food insecurity during COVID-19

Food security is a multidimensional concept based on four 'pillars': physical availability of food, economic and physical access to food, food utilisation, and long-term stability of the previous three dimensions (World Food Summit, 1996). There were roughly 200 definitions of food security (Smith *et al.*, 1993), with the following definition being the most often used:

'Food security 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' (World Food Summit, 1996)

This definition emphasises that just acquiring adequate food does not equal to food security, as a diversity of culturally appropriate food is required to preserve health and food quality is a vital component of food security (Sinclair *et al.*, 2019).

Recent COVID-19 pandemic has created an unprecedented problem to public health and the economy, resulting in significant impact to both. As a result of measures used to stop the spread, such as isolation, quarantine, and the closure of public areas and schools, many individuals have been affected by mental health issues (Tan *et al.*, 2022). It is not uncommon for individuals to experience a mental health crisis during a public health emergency (Fang *et al.*, 2021). Any health-care interventions that reduce food insecurity would also benefit people's overall well-being in addition to their physical health (Pourmotabbed *et al.*, 2020).

An online population-level survey reported a one-third increase (32.3%) in household food insecurity in the United States during pandemic. Furthermore, 59.1% of persistently food-insecure families had very low food security (defined by altered eating habits and decreased consumption), while 40.9 % had poor food security. In addition, 32.3 % of newly food-insecure families had very low food security, while 67.7 % had poor food security (Niles *et al.*, 2020). Another study reported that 36.1% of respondents were classified as food insecure (Litton and Beavers, 2021). Another study in the United States found that the prevalence of food insecurity was 44%, with 17% low food security and 27% very low food security. This study was conducted using a web-based survey involving 1478 respondents (Wolfson and Leung, 2020).

In Australia, cross-sectional survey data of 1170 were analyzed and revealed that the prevalence of food insecurity was 26%. The adjusted odds of food insecurity were significantly higher for those with disabilities, those who lived in rural areas, and those with dependents (Kent *et al.*, 2020). Moving to Middle East countries, a web-based validation questionnaire among 3129 Jordanian households reported that 23.1 % of respondents were classified as severely food insecure, 36.1 % as moderate food insecure, and 40.7 % as food secure. Based on current data, it is projected that approximately 9.76 million individuals in Malaysia, which accounts for 30% of the population, will experience food insecurity due to the impact of the COVID-19 pandemic (UNICEF, 2020a).

In Africa, smaller size respondents of 442 in Kenya and Uganda revealed that food insecurity rose by 38% and 44% in Kenya and Uganda (Kansiime *et al.*, 2021). Even worse, in East Africa, residents face a "triple menace" of mutually intensifying crises, as persistent heavy rain complicates efforts to prevent locust swarms during the COVID-19 epidemic (IFRC, 2020). Meanwhile, the worst locust epidemic in

decades is threatening crops as they approach harvest time (FAO, 2021a). However, a higher prevalence was reported in India, where household food insecurity surged dramatically from 21% in December 2019 to 80% in August 2020, with 62% of families shifting from food secure to food insecure during this period (Nguyen *et al.*, 2021).

In Malaysia, studies conducted during the early surge of COVID-19 are very scarce, particularly due to lockdown order. A study was conducted from April to June 2020 in four states of Peninsular Malaysia namely Perak, Selangor, Johor, and Kelantan, involving 535 middle to older aged individuals via telephone interviews showed that the prevalence of food insecurity was 14.8% (Rivan *et al.*, 2021). A higher prevalence of overall food insecurity was obtained in an online survey conducted from May 1st to 14th 2020 during home confinement involving 136 respondents where it shows that 43.2% of the respondents were food insecure. The majority (19.8%) are classified as mildly food insecure, while the remainder are classified as moderately food insecure (14.8 %) (Tan *et al.*, 2022). However, both studies utilized phone and online survey, which may lead to the sampling bias where the questionnaire could reach the respondents who were downwind and completed only those who are only interested to the topic and weak respond to the questionnaire distributed or phone calls (Andrade, 2020).

2.2 Impact of COVID-19 pandemic on food related events

It is noteworthy to highlight that the COVID-19 pandemic, which has rapid spread and extensive transmission across the globe since the latter part of 2019, has resulted in consequential implications for both food security and nutrition. The

growing crisis has had serious consequences for food systems, thereby jeopardising people's ability to obtain food through various mechanisms. The global health crisis has caused considerable disruptions to food supply chains, alongside a notable deceleration in the global economy. The current crises have resulted in a situation where individuals with lower incomes are facing difficulties in accessing food due to the increased prices of certain food items. This has led to a violation of the right to food and has impeded the progress towards the attainment of Sustainable Development Goal (SDG) 2, which aims to achieve "Zero Hunger." (HLPE, 2020; United Nations, 2021).

2.2.1 Food chain disruption

Control and mitigation measures for COVID-19 outbreaks are already disrupting global food supply networks. For example, border restrictions and lockdowns delay harvests in various regions globally, displacing millions of seasonal workers and restricting food distribution to markets (Pérez-Escamilla *et al.*, 2020). Besides, the implementation of physical distancing rules also affecting laborers (Huszainey, 2020). Moreover, in several areas, meat processing industries and food markets have been forced to close owing to severe COVID-19 outbreaks among employees (United Nations, 2020).

Because of supply chain disruptions and declining customer demand, farmers have begun burying perishable vegetables and dumping milk (Pérez-Escamilla *et al.*, 2020). Consequently, many urban residents now have difficulty accessing fresh fruits and vegetables, dairy, meat, and seafood (United Nations, 2020). COVID-19 has imposed shocks on all parts of the global food supply chain, affecting agricultural

productivity, food processing, transportation and linear, and final demand for all food items (Huszainey, 2020). In Afghanistan, COVID-19 preventive measures have hampered planting, leaving Afghan farmers unable to sow their crops on time. At the same time, food prices in urban areas continue to rise as food shortages become more critical (World Bank, 2021).

2.2.2 Rising food prices

In many countries, food prices increase in cities with the highest density of consumers. In contrast, lower density in rural regions produces, aggregate, sort, distribute, and transport food to urban and semi-urban markets. This discrepancy exists because rural food production is inadequate to meet urban and food-importing region demand. Moreover, when these processes are labor demanding, there are often issues relating to fear of excessive contact and a lack of protection for farm and food workers (United Nations, 2020).

Since January 2020, global food prices have increased by 40%. Prices of maize are 66% higher, wheat prices are 23% higher, and cereal prices are 45% more in January 2021 than they were in January 2020. Initially, meat, dairy, sugar, and vegetable oil prices dropped drastically, but cereal grain prices stayed stable. As the pandemic progressed, pricing patterns shifted, with meat prices increasing due to high infection rates among meatpacking employees in certain nations and temporary closures of meat-processing industries to limit disease transmission among worker populations (EFFAT, 2020; Waltenburg *et al.*, 2021).

In India, a longitudinal community-based study reported that rising food prices were among the challenges during this pandemic (Nguyen *et al.*, 2021).

Venezuela and Guyana, for example, had approximately 50% increases in food prices as of late July 2020, while Kenya had just a 2.6 percent increase in food prices (FAO, 2020a). This uneven impact on food prices results from several complex factors, including early export limitations on cereal crops such as rice and wheat imposed by numerous exporting nations (Laborde *et al.*, 2020). For example, between February and mid-April 2020, rice prices jumped by 32, 25, and 10% in Thailand, Vietnam, and the United States, respectively (Katsoras, 2020). Food prices have also increased due to interrupted supply chains, which have increased the cost of transport (FAO, 2020a).

Food inflation significantly affects people in low- and middle-income countries since they spend a more significant proportion of their income on food than individuals in high-income countries (World Bank, 2021). For example, in Malaysia, among the B40 group, the pandemic's effects have a devastating impact on their capacity to purchase nutritious and inexpensive food, especially for families who spend up to 70% of their income on food (Shamsudin, 2021). Another recent research of low-income urban households in Malaysia discovered that the COVID-19 situation had impacted their food expenditures due to lower-income. The majority of them (53%) have reduced their food consumption owing to economic concerns. For instance, many people have switched from animal-based protein to egg-based protein as a cost-effective alternative (UNICEF, 2020b). Thus, these localized price rises directly impact food security and nutrition by increasing the cost of food, making it more difficult to access, particularly for low-income groups.

2.2.3 Widening social inequities

The worldwide economic slowdown precipitated by the epidemic and the disease's spread has worsened already-existing social inequities in most countries (Ashford *et al.*, 2020). These inequities influence rights and access to basic requirements such as food, water, healthcare, employment, and livelihoods, all of which affect food security and nutrition. Food insecurity already disproportionately impacts those living in poverty and facing societal discrimination. It is precisely these individuals who are more likely to develop COVID-19 and have less access to health care services (Klassen and Murphy, 2020).

Agriculture is dependent on migrant laborers in many countries, the majority of whom work under informal employment contracts with little rights and are vulnerable to exploitation. (FAO, 2020c). As a result, migrant workers commonly endure poverty and food insecurity, and limited access to healthcare and social safety. In addition, COVID-19 infection is more prevalent among migrant food system employees than in other groups because they are more susceptible to disease due to confined workplaces, transportation, and housing environments. (Guadagno, 2020; Klassen and Murphy, 2020).

Women represent 43% of the agricultural labor force in developing countries and are believed to account for two-thirds of the world's 600 million poor livestock keepers. In addition, 79% of economically active women in the least developed countries (48 percent of economically active women globally) claim agriculture as their principal source of income (United Nations, 2020). Women are also at risk of an increase in domestic violence as a result of the recession and lockdown measures (FAO, 2020b; WHO, 2020). These inequities disproportionately impact women and

their significant roles in food systems, including as prominent players in ensuring family food security and nutrition, as well as food producers, farm managers, food dealers, and wagedworkers. According to the FAO, rural women's agricultural activities have been impacted more than men's (FAO, 2020b).

Social protection programs have contributed to ensure food security, but the solutions are only short-term. Children often miss out on numerous social safety programs. Additionally, the COVID-19 pandemic has made food and nutrition shortages worse, leading to an increase in malnutrition, especially in children. Therefore, child-sensitive social protection programs are essential for filling up systemic gaps, supporting all families in reducing vulnerabilities, boosting resilience, and reducing the COVID-19 crisis's impacts. (UNICEF, 2020a).

2.2.4 Economic impacts

The COVID-19 pandemic triggered a global economic recession, resulting in widespread loss of livelihoods and income (World Bank, 2021). The consequent decline in buying power among those who lost income significantly affected food security and nutrition, particularly for already vulnerable communities (HLPE, 2020). In the second quarter of 2020, more than 400 million full-time jobs were lost due to many governments adopting lockdown measures (ILO, 2020).

Farmers, pastoralist households, fisherfolk, and traders all experience significant economic losses when milk and dairy products, fruits and vegetables, meat, and fish do not reach wholesale and retail markets. This results in fewer resources available to prepare for the next season's planting, fishing, livestock raising, and slaughter. Additionally, large volumes of food are wasted before it reaches

retailers and consumers due to restaurant closures and hoarding by people fearful of losing access to retail stores (United Nations, 2020). As food demand declines due to decreased incomes, the lives of food producers and food system laborers are affected further: It is anticipated that food systems will lose 451 million jobs, or 35% of their formal employment (Torero, 2020).

In Malaysia, according to the Department of Statistics, the unemployment rate increased drastically to 3.9 percent in March 2020, affecting a total of 546.6 thousand employees. Additionally, 2.7 million self-employed individuals face job loss (Department of Statistics Malaysia, 2020c). Other than that, in a study conducted in the United States, respondents who lost their jobs had a threefold increased likelihood of living in a family facing food insecurity (Niles *et al.*, 2020).

In addition to the direct effects experienced by individuals and households, food and nutrition insecurity has been associated with enduring economic effects, including raised healthcare expenditures, lowered academic achievement, reduced productivity, decreased earnings in adulthood, and higher susceptibility to poverty in later years. (UNICEF, 2020a). It is projected that by 2030, an additional 130 million people will be considered as living in extreme poverty. Many of these disadvantaged individuals engage in food production or employment connected to food systems to ensure their food availability (United Nations, 2020).

2.3 Food insecurity, malnutrition and impact on of household members

2.3.1 Food insecurity and malnutrition

In 2020, the pandemic might push around 49 million people into severe poverty. Based on a recent study, the COVID-19 pandemic has resulted in a direct impact on impoverished households, leading them to divert their expenses from fresh fruits and vegetables that are rich in micronutrients towards staple foods that are less nutrient-dense (Laborde *et al.*, 2020). Many other studies revealed a trend toward the increased intake of processed meals (Bracale and Vaccaro, 2020). It is projected that for every percentage point decrease in the worldwide gross domestic product, an additional 0.7 million children will experience stunted growth (United Nations, 2020). These figures might rapidly increase.

Cognitive development of young children is largely affected by poor calorie intake and impaired nutrition that subsequently will jeopardize poverty reduction and health benefits (World Bank, 2021). In addition, food insecurity is related to a variety of adverse health outcomes throughout the lifetime, including poor nutrition quality, rising prevalence of chronic diseases like diabetes and obesity, and declining general health status, as well as negative mental health consequences like depression, anxiety and stress (Wolfson and Leung, 2020). Due to school closures, some parents have been forced to choose between jobs and childcare. In several countries, such as the United States, losing access to school meals during the epidemic worsened the family's financial vulnerability. According to a recent study, individuals with children showed lower mental health outcomes compared to those without children. Furthermore, the research found that respondents with children who experienced food insecurity were at the highest risk of developing anxiety and depression (Fang *et al.*,

2021). Food insecurity is also connected with increased healthcare expenses, in part because food-insecure patients face a more significant burden of chronic health disorders and the well-known trade-offs between food and medication (Wolfson and Leung, 2020).

2.3.2 Food insecurity and children

Food and nutrition insecurity is associated with malnutrition, with children living in food-insecure households being more likely to be malnourished (UNICEF, 2020a). The number of children below five years old who are affected by stunting has increased to 144 million. This represents a prevalence of over 20% of children worldwide. Currently, 47 million children are categorised as experiencing wasting. (UNICEF *et al.*, 2020). As of late May 2020, 368 million school children missed essential nutritional school meals due to school closure (WFP, 2020). Each school-provided meal may account for about one-third of their daily calorie intake, and for families with multiple school-aged children in school may save a lot of money by adhering to school meals program (UNICEF, 2020a).

In Malaysia, stunting was three times more prevalent in children under five than in other upper-middle-income nations. Moreover, the prevalence grew even before the COVID-19 disaster (from 17.7 % in 2015 to 21.8 % in 2019) (Institute for Public Health, 2020). Apart from stunting, food insecurity has been linked to various kinds of malnutrition, including wasting, obesity, and anemia. The prevalence of malnutrition in Malaysian children is expected to rise as a result of increasing poverty and food insecurity, aggravated by the discontinuation of school feeding programs in the midst of the COVID-19 pandemic (UNICEF, 2020a).

2.3.3 Food insecurity and women

At the global level, women are more likely than males to experience moderate or severe food insecurity, with substantial inequalities reported in almost every year for Africa and Latin America. Women are also more likely to experience severe food insecurity than males. In 2019, the disparities are statistically significant on a global level (FAO *et al.*, 2020). A detailed analysis of the FIES dataset compiled by the Food and Agriculture Organization (FAO) during the period of 2014 to 2018 has yielded new knowledge into the socio-economic attributes of individuals who experience insufficient access to food. Upon controlling for socioeconomic variables, it was observed that females exhibited a 13% higher probability of experiencing moderate to severe food insecurity in comparison to males. Furthermore, globally, women had an almost 27% greater chance of being severely food insecure (FAO *et al.*, 2020).

In Nepal, out of the 12 862 of nationally representative sample women of reproductive age, 56% of them experienced food insecurity (Sinclair *et al.*, 2019). Another larger study involving 75,851 adults in 76 lower-middle income countries in Latin America, Asia, the Middle East, and North Africa, and Sub-Saharan Africa using data from the 2014 Gallup World Poll (GWP) has shown that women in all localities had a higher prevalence of food insecurity, with rural women having the highest prevalence of 71.8 %. In the same study, analyses of adjusted logistic regression revealed a similar pattern at the global level, with women living in rural regions having the greatest odds of experiencing food insecurity (OR = 1.44, $P < 0.0001$) This research indicated that, women had a disproportionately higher risk of poor health than males (Sinclair *et al.*, 2019).