



**FOOD SAFETY KNOWLEDGE, ATTITUDE, AND PRACTICES OF STREET
FOOD VENDORS IN THE KLANG VALLEY, MALAYSIA**

By

NUR AMELIA SYAKIRA BINTI ABDUL AZIZ

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in
Fulfilment of the Requirements for the Degree of Master of Science**

January 2023

FP 2023 25



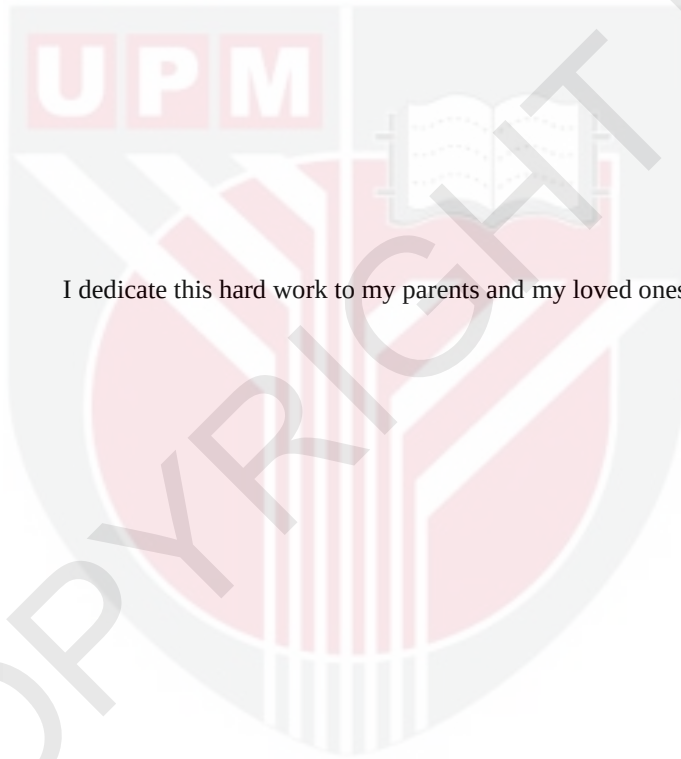
All material contained within the thesis, including without limitation text, logos, icons, photographs and all other artwork, is copyright material of Universiti Putra Malaysia unless otherwise stated. Use may be made of any material contained within the thesis for non-commercial purposes from the copyright holder. Commercial use of material may only be made with the express, prior, written permission of Universiti Putra Malaysia.

Copyright © Universiti Putra Malaysia



DEDICATION

I dedicate this hard work to my parents and my loved ones.



Abstract of thesis presented to the Senate of Universiti Putra Malaysia
in fulfilment of the requirements degree of Master of Science

FOOD SAFETY KNOWLEDGE, ATTITUDE, AND PRACTICES OF STREET FOOD VENDORS IN THE KLANG VALLEY, MALAYSIA

By

NUR AMELIA SYAKIRA BINTI ABDUL AZIZ

January 2023

Chairman : Associate Professor Nitty Hirawaty binti Kamarulzaman, PhD
Faculty : Agriculture

The term street food is synonyms with other words such as hawker food or ready-to-eat (RTE) foods that are prepared by vendors from their stalls for customers' on-site consumption or takeaways. Street food vendors in Malaysia are proliferating in the local market because the foods available are reasonably priced and easily accessible to consumers. However, the presence of street food vendors has been argued to be the cause of foodborne disease due to unsanitary practices and sanitation procedures. As a result, street food vendors have become a major source of food safety concerns in Malaysia. Street foods are viewed as a serious public health concern due to a lack of basic infrastructure and services, poor food handling and storage procedures, and the difficulties associated with supervising numerous street food vending businesses attributable to their variety, flexibility, and impermanent nature. Furthermore, street food vendors are largely untrained and lack an understanding of the proper food handling process. Since dining at street food vendors has become a norm among Malaysians, customers are exposed to the danger of foodborne illnesses. Despite health concerns, the need for street food in Malaysia is growing. Therefore, the main objective of the study is to determine the knowledge, attitude, and practices (KAP) of street food vendors towards food safety.

Four (4) specific objectives of the study were established; 1) to determine the food safety knowledge, attitude, and practices (KAP) levels of street food vendors; 2) to examine the relationships between food safety knowledge, attitude, and practices (KAP) levels among street food vendors; 3) to determine the associations between demographic characteristics and food safety practices among street food vendors; and 4) to investigate the most influential factor that influences food safety practices among street food vendors.

Using the purposive sampling method, a total of 268 respondents were chosen for this study. The location of study was conducted in the Klang Valley area. A structured

questionnaire consisted of four (4) main sections namely Section A, which consisted of questions on respondents' demographic characteristics, Section B comprised of questions regarding knowledge of food safety, Section C consisted of questions on attitude towards food safety, and section D comprised of questions on practices towards food safety. The respondents' responses were obtained using a structured questionnaire via face-to-face interviews. Descriptive analysis, Chi-square analysis, Pearson correlation analysis, and logistics regression analysis were used to analyze the data.

Most street food vendors have adequate knowledge (81.7%), favorable attitude (89.2%), and good practices (91.4%) towards food safety. There were statistically significant positive correlations between knowledge and attitude ($r = 0.301$, $p = 0.000$), attitude and practices ($r = 0.279$, $p = 0.000$), and knowledge and practices ($r = 0.269$, $p = 0.000$) of street food vendors on food safety. Education level ($\chi^2 = 10.213$, $p = 0.069$), type of stalls ($\chi^2 = 4.693$, $p = 0.030$), monthly revenue ($\chi^2 = 10.233$, $p = 0.006$), license ($\chi^2 = 4.871$, $p = 0.027$), food safety training ($\chi^2 = 11.963$, $p = 0.001$), and typhoid injection ($\chi^2 = 7.963$, $p = 0.005$) were significantly associated with food safety practices among street food vendors. Logistic regression analysis showed seven (7) variables namely knowledge, attitude, education level, type of stalls, monthly revenue, food safety training, and typhoid injection were the influential factors influencing food safety practices among street food vendors. The results emphasized that monthly revenue was an important variable in providing good food safety practices upon handling the foods.

This study indicated that the knowledge, attitude, and practices levels of street food vendors were relatively good. In-house food safety training should be implemented, and educational food safety programs, seminars, and workshops are necessary to educate and raise awareness of street food vendors. Providing incentives like equipment purchasing subsidies, and microcredit programs by authorities will help to improve the revenue of street food vendors hence improving the food safety practices in their workplace.

Keywords: Street food vendors, Food safety, Knowledge, Attitude, Practices, Klang Valley

SDG: GOAL 3: Good Health and Well Being

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk Ijazah Master Sains

**PENGETAHUAN, SIKAP, DAN AMALAN KESELAMATAN MAKANAN
PENJAJA JALANAN DI KLANG VALLEY, MALAYSIA**

Oleh

NUR AMELIA SYAKIRA BINTI ABDUL AZIZ

January 2023

Pengerusi : Profesor Madya Nitty Hirawaty binti Kamarulzaman, PhD
Fakulti : Pertanian

Istilah makanan jalanan adalah sinonim kepada perkataan lain seperti makanan penjaja atau makanan sedia untuk dimakan (*RTE*) yang disediakan oleh vendor dari gerai mereka untuk kegunaan pelanggan di tapak atau dibawa pulang. Penjual makanan jalanan di Malaysia semakin berkembang pesat di pasaran tempatan kerana ketersediaan makanan adalah pada harga berpatutan dan mudah diakses oleh pengguna. Bagaimanapun, kehadiran peniaga makanan jalanan telah dihubungkan sebagai punca penyakit bawaan makanan kerana amalan dan prosedur sanitasi yang tidak bersih. Akibatnya, penjual makanan jalanan telah menjadi sumber utama kebimbangan keselamatan makanan di Malaysia. Makanan jalanan dilihat sebagai kebimbangan kesihatan awam yang serius disebabkan oleh kekurangan infrastruktur dan perkhidmatan asas, prosedur pengendalian dan penyimpanan makanan yang lemah, dan kesukaran dalam mengawasi perniagaan penjual makanan jalanan yang banyak dikaitkan dengan kepelbagaian, fleksibiliti dan sifatnya yang tidak kekal. Tambahan pula, sebahagian besar penjual makanan jalanan tidak terlatih dan kurang memahami proses pengendalian makanan yang betul. Memandangkan makan di vendor jalanan telah menjadi kebiasaan dalam kalangan rakyat Malaysia, pelanggan terdedah kepada bahaya penyakit bawaan makanan. Di sebalik kebimbangan kesihatan, keperluan untuk makanan jalanan di Malaysia semakin meningkat. Oleh itu, objektif utama kajian adalah untuk menentukan pengetahuan, sikap, dan amalan peniaga makanan jalanan terhadap keselamatan makanan.

Empat (4) objektif khusus kajian telah diwujudkan; 1) untuk menentukan tahap pengetahuan, sikap, dan amalan keselamatan makanan (*KAP*) peniaga makanan jalanan; 2) untuk mengkaji hubungan antara tahap pengetahuan, sikap, dan amalan (*KAP*) keselamatan makanan di kalangan peniaga makanan jalanan; 3) untuk menentukan perkaitan antara ciri demografi dan amalan keselamatan makanan dalam kalangan peniaga makanan jalanan; dan 4) untuk menyiasat faktor paling mempengaruhi yang amalan keselamatan makanan dalam kalangan penjual makanan jalanan.

Menggunakan kaedah persampelan bertujuan, seramai 268 orang responden telah dipilih untuk kajian ini. Lokasi kajian dijalankan di kawasan Lembah Klang. Soal selidik berstruktur mengandungi empat (4) bahagian utama iaitu Bahagian A, terdiri daripada soalan tentang ciri demografi responden, Bahagian B mengandungi soalan mengenai pengetahuan tentang keselamatan makanan, Bahagian C terdiri daripada soalan tentang sikap terhadap keselamatan makanan, dan bahagian D terdiri daripada soalan mengenai amalan ke arah keselamatan makanan. Maklum balas responden diperoleh menggunakan soal selidik berstruktur melalui temu bual bersemuka. Analisis deskriptif, analisis Khi kuasa dua, analisis korelasi Pearson, dan analisis regresi logistik digunakan untuk menganalisis data.

Majoriti peniaga makanan jalanan mempunyai pengetahuan yang mencukupi (81.7%), sikap yang menggalakkan (89.2%), dan amalan yang baik (91.4%) terhadap keselamatan makanan. Terdapat korelasi positif yang signifikan secara statistik antara pengetahuan dan sikap ($r = 0.301$, $p = 0.000$), sikap dan amalan ($r = 0.279$, $p = 0.000$), dan pengetahuan dan amalan ($r = 0.269$, $p = 0.000$) penjual makanan jalanan tentang keselamatan makanan. Tahap pendidikan ($\chi^2 = 10.213$, $p = 0.069$), jenis gerai ($\chi^2 = 4.693$, $p = 0.030$), pendapatan bulanan ($\chi^2 = 10.233$, $p = 0.006$), lesen ($\chi^2 = 4.871$, $p = 0.027$), latihan keselamatan makanan ($\chi^2 = 11.963$, $p = 0.001$), dan suntikan tifoid ($\chi^2 = 7.963$, $p = 0.005$) adalah signifikan dikaitkan dengan amalan keselamatan makanan dalam kalangan penjual makanan jalanan. Analisis regresi logistik menunjukkan tujuh (7) pembolehubah iaitu pengetahuan, sikap, tahap pendidikan, jenis gerai, hasil bulanan, latihan keselamatan makanan, dan suntikan tifoid merupakan faktor berpengaruh yang mempengaruhi amalan keselamatan makanan dalam kalangan peniaga makanan jalanan. Keputusan menekankan bahawa pendapatan bulanan merupakan pembolehubah penting dalam menyediakan amalan keselamatan makanan yang baik semasa mengendalikan makanan.

Kajian ini menunjukkan tahap pengetahuan, sikap dan amalan peniaga makanan jalanan adalah agak baik. Latihan keselamatan makanan dalaman harus dilaksanakan, dan program pendidikan keselamatan makanan, seminar, dan bengkel adalah perlu untuk mendidik dan meningkatkan kesedaran penjual makanan jalanan. Penyediaan insentif seperti subsidi pembelian peralatan, dan program kredit mikro oleh pihak berkuasa akan membantu meningkatkan hasil penjual makanan jalanan seterusnya meningkatkan amalan keselamatan makanan di tempat kerja mereka.

Kata kunci: Penjaja jalanan, Keselamatan makanan, Pengetahuan, Sikap, Amalan, Klang Valley

SDG: MATLAMAT 3: Kesihatan dan Kesejahteraan Baik

ACKNOWLEDGEMENTS

Alhamdulillah gives thanks to Allah s.w.t, The Lord of Majesty and Generosity for blessing me with patience, strong will, and good health during the preparation of this study. The study is successfully completed with the support, guidance, and contributions of many individuals. Firstly, deepest appreciation and thank you to my supervisor, Assoc. Prof. Dr. Nitty Hirawaty Kamarulzaman for her continuous support, motivation, and immense knowledge. It is a wonderful journey of study under her supervision, who patiently guides me to perfection. My sincere thanks go to my supervisory committee member, Dr. Ahmad Hanis Izani Abdul Hadi, for his assistance and support during the study.

A heartfelt thanks to my beloved parents, Abdul Aziz Mat Noor and Ros Anita Abraham, and my siblings for their encouragement and support to complete this study. A big thanks to my husband, Ahmad Nasuha Abd Rahim, without his support and understanding it would have been impossible to finish the study. Thank you for always being there for me and encouraging me to always give my best and achieve what I wanted.

My acknowledgment also goes to my colleagues Nur Syamimi Yaakub, Ainatul Husna Ahmad Azuddin, Amira Hanani Azali@Sazali, and Nurul Athirah Rosli for their moral support, help, and encouragement in making this study a success. Thank you for all the memorable moments throughout this journey. We did it, guys! Appreciation goes to my friends who always give me strength and always there for me when I am in need. You guys are always in my prayer.

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

Nitty Hirawaty binti Kamarulzaman, PhD

Associate Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Chairman)

Ahmad Hanis Izani Abdul Hadi, PhD

Senior Lecturer
Faculty of Agriculture
Universiti Putra Malaysia
(Member)

ZALILAH MOHD SHARIFF, PhD

Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 18 April 2024

TABLE OF CONTENTS

ABSTRACT		Page
ABSTRAK		i
ACKNOWLEDGEMENTS		iii
APPROVAL		v
DECLARATION		vi
LIST OF TABLES		viii
LIST OF FIGURES		xii
LIST OF ABBREVIATIONS		xiv
		xv
CHAPTER		
1	INTRODUCTION	
	1.1 Overview of the Food and Beverage Sector	1
	1.2 Street Food	6
	1.3 Food Safety Practices among Street Food Vendors	9
	1.4 Foodborne Diseases	12
	1.5 Contaminated Street Foods Cases	15
	1.6 Regulation on Street Food Vendors	21
	1.7 Problem Statement	23
	1.8 Research Questions	25
	1.9 Objectives of the Study	25
	1.10 Significance of the Study	25
	1.11 Operational Definition of Key Terms	26
	1.12 Scope of Study	26
	1.13 Organization of the Thesis	27
2	LITERATURE REVIEW	
	2.1 Knowledge, Attitude, and Practices Model (KAP)	28
	2.2 Knowledge	30
	2.3 Attitude	31
	2.4 Practices	32
	2.5 Association between Demographic Characteristics and Food Safety Practices	34
	2.6 Summary	37
3	METHODOLOGY	
	3.1 Conceptual Framework	38
	3.1.1 Hypothesis Development	39
	3.2 Sources of Data	41
	3.2.1 Primary Data	41
	3.2.2 Secondary Data	41
	3.3 Data Collection	42
	3.3.1 Location of the Study	42
	3.3.2 Sampling Design	42
	3.3.3 Questionnaire Design	44

3.4	Pilot Study	46
3.5	Data Analysis Techniques	48
3.5.1	Descriptive Analysis	48
3.5.2	Food Safety Knowledge Level Analysis	49
3.5.3	Food Safety Attitude Level Analysis	49
3.5.4	Food Safety Practices Level Analysis	50
3.5.5	Pearson Correlation Analysis	50
3.5.6	Chi-square Analysis	51
3.5.6.1	Crosstab	52
3.5.7	Logistic Regression Analysis	53
3.6	Summary	55
4	RESULTS AND DISCUSSIONS	
4.1	Respondents' Demographic Characteristics	56
4.2	Food Safety Knowledge, Attitude, and Practices (KAP) Levels	58
4.2.1	Food Safety Knowledge Level	58
4.2.2	Food Safety Attitude Level	63
4.2.3	Food Safety Practices Level	69
4.2.4	Summary of Food Safety Knowledge, Attitude and Practices Level	74
4.3	Relationships between Food Safety Knowledge, Attitude, and Practices Level of Street Food Vendors	75
4.4	Associations between Food Safety Practices and Street Food Vendors' Demographic Characteristics	76
4.5	Factors Influencing Food Safety Practices among Street Food Vendors	79
4.6	Summary	83
5	SUMMARY, RECOMMENDATIONS, AND CONCLUSION	
5.1	Summary of Findings	84
5.2	Recommendations	85
5.3	Limitations of the Study	86
5.4	Suggestions for Future Research	87
5.5	Conclusion	87
	REFERENCES	89
	APPENDICES	129
	BIODATA OF STUDENT	144
	LIST OF PUBLICATIONS	145

LIST OF TABLES

Table		Page
1.1	Food Away from Home Expenditure by Strata and Main Ethnic of Head of Household, Malaysia, 2019	4
1.2	Examples of Good and Poor Food Safety Practices	10
1.3	Incidence Rate of Communicable Diseases in Malaysia from the Year 2011 to 2020	14
1.4	Mortality Rate of Communicable Diseases in Malaysia from the Year 2011 to 2020	14
1.5	Food Poisoning Incidents and Deaths Caused From 2011 to 2022	17
1.6	Total Microbial Load of Total Viable Count (TVC), Total Coliform, <i>Escherichia Coli</i> , And <i>Staphylococcus Aureus</i> in Street-Vended Beverages from Chow Kit	19
1.7	Total Microorganism of a Total Viable Count, Total Coliform, <i>E. Coli</i> , <i>S. Aureus</i> , and <i>Salmonella spp.</i> in Street Vended Food in Chow Kit	20
1.8	Number of Sample Taken, Detection and Bacterial Load of <i>S. Aureus</i>	20
1.9	Aerobic Colony Count (ACC), Total Coliform, and <i>E. coli</i> Count in Ready-To-Eat Foods Sampled from Night Market and Street Stalls in Nilai, Negeri Sembilan	21
3.1	Hypotheses for the Study	40
3.2	Questionnaire Development for Food Safety Knowledge	45
3.3	Questionnaire Development for Food Safety Attitude	45
3.4	Questionnaire Development for Food Safety Practices	46
3.5	Amendments to the Questionnaires	47
3.6	Reliability Analysis Results of KAP Variables	48
3.7	Food Safety Knowledge Level Score	49
3.8	Food Safety Attitude Level Score	49
3.9	Food Safety Practices Level Score	50

3.10	Pearson Correlation Coefficient Interpretation	51
3.11	Hypotheses of Pearson Correlation Analysis	51
3.12	Hypotheses for Chi-square Analysis	52
3.13	Coded of Dependent and Independents Variables in Logistic Regression Analysis	54
4.1	Respondents' Demographic Characteristics	56
4.2	Street Food Vendors' Knowledge towards Food Safety	59
4.3	Street Food Vendors' Food Safety Knowledge Level	63
4.4	Street Food Vendors' Attitude towards Food Safety	65
4.5	Street Food Vendors' Food Safety Attitude Level	69
4.6	Street Food Vendors' Practices towards Food Safety	70
4.7	Street Food Vendor's Food Safety Practice Level	74
4.8	Summary of Street Food Vendors' Food Safety KAP Levels	74
4.9	Correlations between Food Safety Knowledge, Attitude, and Practices Level of Street Food Vendors	75
4.10	Crosstab Table	77
4.11	Associations between Food Safety Practices and Demographic Characteristics of Street Food Vendors	78
4.12	Factors Influencing Food Safety Practices among Street Food Vendors	79

LIST OF FIGURES

Figure		Page
1.1	Food and Beverage Services Gross Output Value in 2017	2
1.2	Composition of Mean Monthly Household Consumption Expenditure by Main Group, 2019	3
1.3	Percentage of Households' Food Expenditure in Malaysia, 2004 – 2019	3
1.4	Percentage of Food Away from Home Expenditure by Age Group of Head of Household, Malaysia, 2019	5
1.5	Percentage of Food Away from Home Expenditure by Activity Status of Head of Household, Malaysia, 2019	6
1.6	Number of Food Premises Inspection and Percentage of Food Premises Closure by State for 2020	23
2.1	KAP Model	28
3.1	Conceptual Framework of Food Safety Practices of Street Food Vendors	39

LIST OF ABBREVIATIONS

ACC	Aerobic Colony Count
AIM	Amanah Ikthiar Malaysia
CAC	Codex Alimentarius Commission
CFU	Colony Forming Unit
DBKL	Kuala Lumpur City Hall
DOI	Diffusion of Innovation
DOSM	Department of Statistics, Malaysia
EFSA	European Food Safety Authority
FAFH	Food Away from Home
FAH	Food at Home
FAO	Food and Agriculture Organization
FSQD	Food Safety and Quality Division
FSANZ	Food Standards Australia New Zealand
F&B	Food and Beverage Sector
H ₀	Null Hypothesis
H ₁ H ₂ H ₃ H ₄	Alternative Hypothesis
ICMSF	International Microbiological Specifications on Foods
IPH	Institute for Public Health
KAP	Knowledge, Attitude, and Practices
MBPJ	Petaling Jaya City Council
MBSA	Shah Alam Council
MPAJ	Ampang Jaya Municipal Council
MOH	Ministry of Health
MPK	Klang Municipal Council

MPKJ	Kajang Municipal Council
MPN	Most Probable Number
MPS	Selayang Municipal Council
MPSJ	Subang Jaya City Council
NGO	Non-Governmental Organization
ND	Not Detected
PCR	Polymerase Chain Reaction
RTE	Ready-to-Eat
SD	Standard Variation
SMEs	Small and Medium Enterprises
SLT	Social Learning Theory
SPSS	Statistical Package for Social Science
TEKUN	Economic Fund for National Entrepreneurs Group
TVC	Total Viable Count
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

The discussions in this chapter start with an overview of the food and beverage sector followed by a problem statement, research questions, objectives of the study, and the organization of the thesis. An introduction to the street food vendors industry in Malaysia, foodborne disease issues, contaminated street foods cases, and regulations on street food vendors are discussed in this section. The problem that occurs in the street food industry is explained in the problem statement. The research questions become the parameter for creating the objectives of this study. The significance of the study is also presented to highlight the impacts of the study on relevant parties.

1.1 Overview of the Food and Beverage Sector

The food and beverage (F&B) sector in Malaysia is recognized as a fast-expanding market and one of the leading contributors to the domestic economy. Malaysia's F&B sector was estimated at RM100,867,200,000 (€22.12 billion) in 2018, growing at a 7.6% annual rate (Flanders Investment & Trade, 2020). The F&B sector is incredibly varied, with a variety of processed food for Asian tastes and dietary preferences, in addition to numerous western recipes. Examples of F&B outlets include restaurants, street stalls/kiosks, fast food, cafes, bars, and self-service cafeterias (Md Husin et al., 2021). Small and medium enterprises (SMEs) are primarily the dominant force in this sector (Flanders Investment & Trade, 2020; Azmi et al., 2018; Italian Trade Agency, 2017, Abdul Talib & Mohd Ali, 2009).

The F&B services had a gross output value of RM82.8 billion in 2017, up from RM66.4 billion in 2015, according to the Department of Statistics, Malaysia (DOSM), with an annual growth rate of 11.7%. (DOSM, 2019). Food services made up the largest portion of the gross output value in 2017 with RM67.1 billion (81.1%). With RM8.8 billion (10.7%), beverage services came in second, followed by RM6.8 billion (8.2%) for event catering. Food services had the most employees (758,992 people, or 79.2%) in 2017 (Figure 1.1). Event catering services came in second with 106,701 people or 11.1%, a decrease of 1% in 2015, followed by beverage services with 93,110 people or 9.7% (DOSM, 2019).

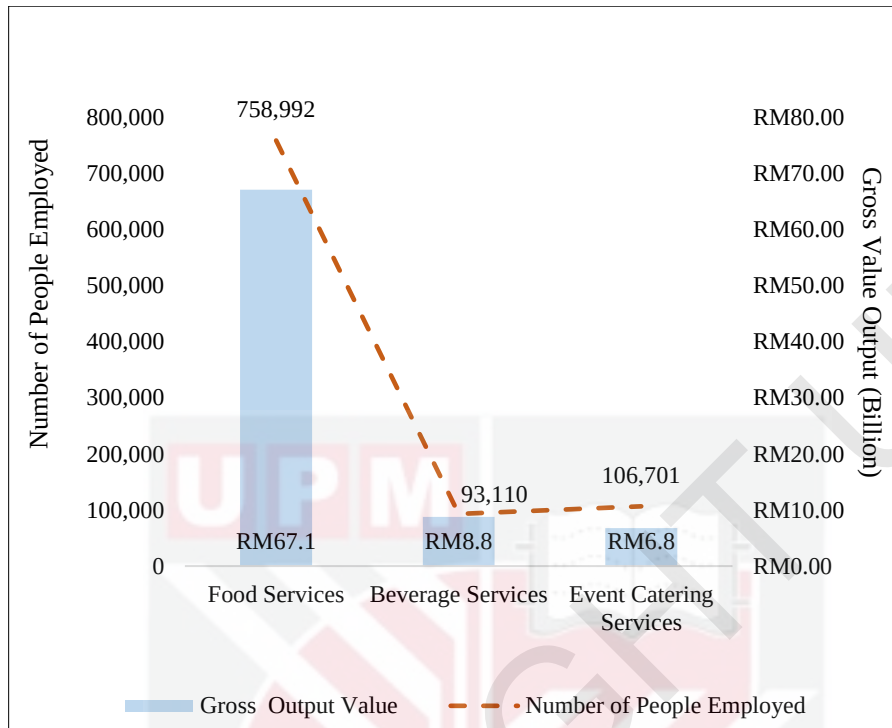


Figure 1.1: Food and Beverage Services Gross Output Value in 2017
(Source: DOSM, 2019)

The first quarter of 2022 saw RM378.7 billion in total revenue across the wholesale and retail trade, food and beverages, and accommodation segment (DOSM, 2022a). According to DOSM (2020a), food and non-alcoholic beverages accounted for about 17.3% of the total household consumption expenditure (Figure 1.2). Commonly, the spending on food can be distributed into two, namely food at home (FAH) and food away from home (FAFH). FAH explains food that is made and consumed at home while FAFH is classified as food eaten at restaurants, food courts, roadside stalls, fast food restaurants, and street food vendors (DOSM, 2020b; Murad et al., 2011; Guthrie et al., 2002). In 2019, FAFH spending made up 11.2% of all household spending in Malaysia (Figure 1.3) (DOSM, 2020b). Although the growth rate of FAFH spending was less than that of FAH spending, FAFH spending still increased by a lower percentage and it can be observed that the expenditure on FAFH is on an increasing trend over time (DOSM, 2020b; Lin et al., 2013; You et al., 2009).

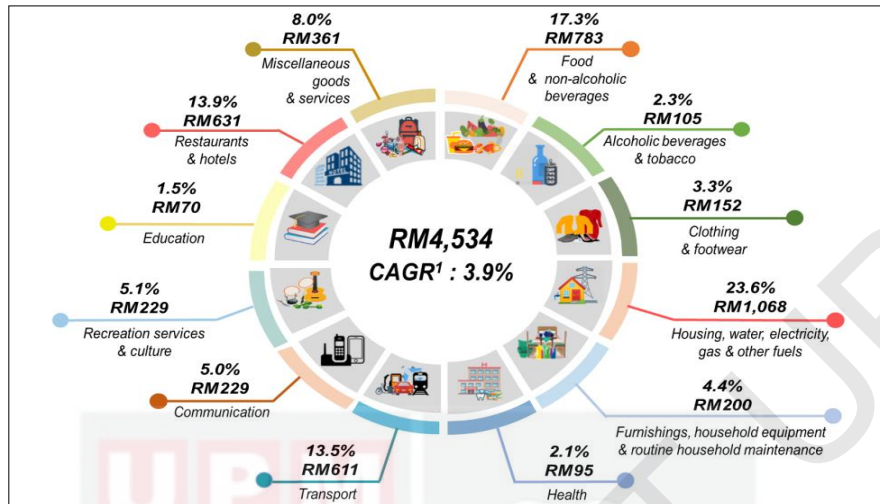


Figure 1.2: Composition of Mean Monthly Household Consumption Expenditure by Main Group, 2019
(Source: DOSM, 2020a)

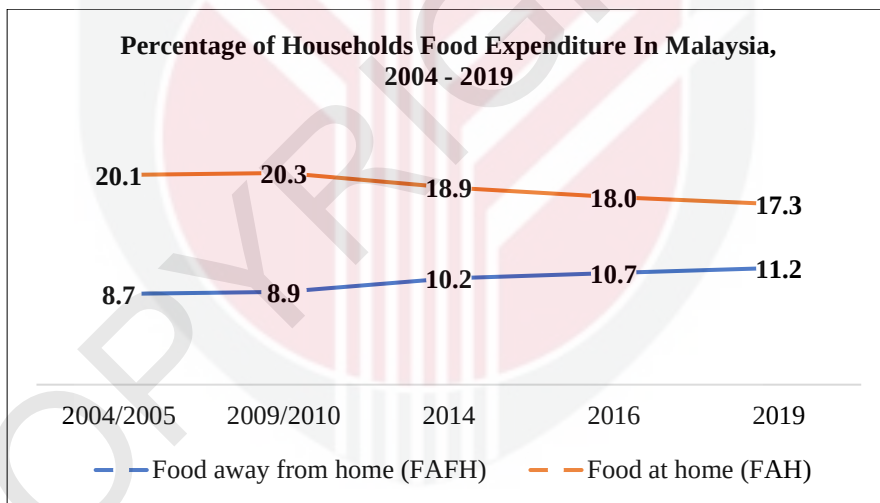


Figure 1.3: Percentage of Households' Food Expenditure in Malaysia, 2004 - 2019
(Source: DOSM, 2020b)

Eating at home after working all day and on weekends is normal for women who traditionally prepare meals for the household, but dietary habits have changed because of social transformation and urbanization (Ali & Abdullah, 2012; Islam et al., 2010). Despite the shift in profile, consumption of FAFH has remained high, with rising trends associated with urbanization (DOSM, 2020b; da Cunha, 2021; Institute for Public Health (IPH), 2014) and raised income (Islam et al., 2010; Radam, 2006). In Household Expenditure Survey 2019 by the Department of Statistics, Malaysia (2020b), indicated

that urban households pay more money than rural households on FAFH is, due to employment reasons. Urban households spent 11.4% of their total spending on FAFH, while rural households spent only 9.8% (Table 1.1). This is due to urban economic growth and increase in income, which are among the crucial factor that allows urban households to spend more money on eating out, probably because they have less time to make food at home and must spend more time at work (Sezgin & Şanlıer, 2016; Ali & Abdullah, 2012; Islam et al., 2010; Radam et al., 2006). According to Lee and Tan (2006), the most significant variables affecting Malaysian household spending on FAFH are household income, location, and ethnic group.

Table 1.1: Food Away from Home Expenditure by Strata and Main Ethnic of Head of Household, Malaysia, 2019

Year	Strata		Main Ethnic		
	Urban	Rural	Bumiputera	Chinese	Indian
2019	RM561 (11.4%)	RM299 (9.8%)	RM477 (11.3%)	RM615 (10.8%)	RM538 (11.3%)
2016	RM481 (10.9%)	RM252 (9.2%)	RM397 (10.7%)	RM552 (10.7%)	RM446 (10.4%)

(Source: DOSM, 2020b)

Expenditure patterns in 2019 by major ethnic groups revealed that Bumiputera and Indian households paid 11.3% of their overall spending on FAFH, while Chinese households spent only 10.8%. (Table 1.1) (DOSM, 2020b). The recent findings are notably slightly different from a prior finding by Islam et. Al. (2010), whereby Chinese and Indian households spent more on FAFH than Malay and East Malaysian Bumiputera did. However, DOSM's (2020b) findings were found to be consistent with Latimaha et al. (2018) observation, where Chinese communities tend to spend more on FAFH. There are a few reasons to support the findings such as Chinese communities generally have more purchasing power and have a different lifestyle as compared to other races.

On the other note, FAFH expenditure can also be discussed by the age group of the head of the household. In 2019, about 13.2% of total FAFH spending was made by households headed by people under 30 (DOSM, 2020b). This aligned with various studies that young adults spend more of their total daily energy consumption away from home (Adams et al., 2015; Larson et al., 2011). Besides, the Household Expenditure Survey 2019 by DOSM (2020b) also revealed that the expenditure on FAFH reduces as the household gets older. Elderly households spent only 9.5% of their total income on FAFH (Figure 1.4). This is in line with previous findings by Codjia and Saghaian (2022), where the amount spent on FAFH was consistently lower in households headed by a person over 40 compared to households with a person under 40. This might be attributed to quality family time and economies of scale (Zan & Fan, 2010).

According to Radam et al. (2006), age has an impact on the income elasticity of FAFH, where income elasticity rose for the younger to middle-aged age group and declined in the older age group (50 years old and above). This is consistent with the decline in income

and activities since Malaysians' retirement age is 55 years old. Due to their rapid income growth, middle-aged consumers are the consumer group who are most likely to eat out.

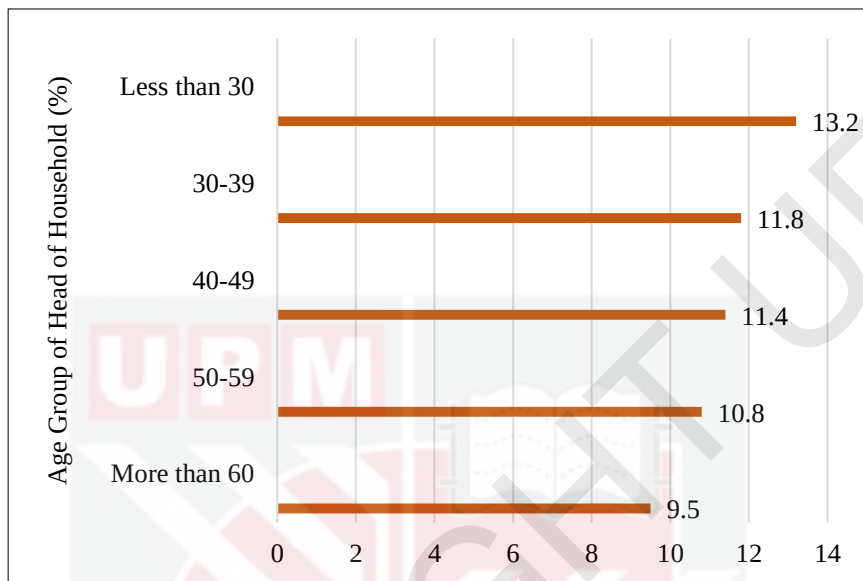


Figure 1.4: Percentage of Food Away from Home Expenditure by Age Group of Head of Household, Malaysia, 2019
(Source: DOSM, 2020b)

Households led by a working female spent 11.7% of their total food expenditure away from home, while households led by a male spent 11.3% (Figure 1.5). This is because working women and a decline in the frequency of homemade cooking have increased eating FAFH (Kim & Ahn, 2020; Hersch et al., 2014; Nicklas et al., 2013). The recent eating-out trend in Malaysia has been fueled by working mothers who do not have time to prepare meals at home as well as the growth of food businesses that served a variety of foods (Poulain et al., 2020; Ali & Abdullah, 2012). Hence, the role of women in food provision has changed as a result of the rise in the number of women in the labor force (Ashari et al., 2022). Furthermore, more people are eating out as hawkers become more prevalent (Ashari et al., 2022; Vijayakumaran & Nur Amalina, 2018; Ali & Abdullah, 2012), who normally started operating from morning to midnight and served a variety of meals.

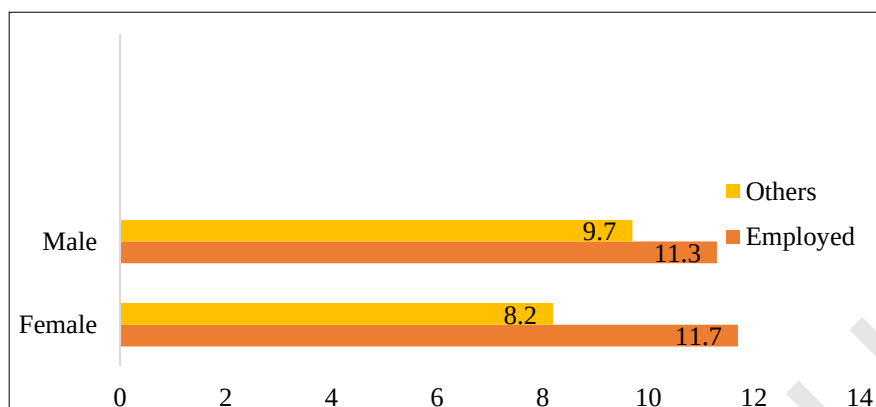


Figure 1.5: Percentage of Food Away from Home Expenditure by Activity Status of Head of Household, Malaysia, 2019
(Source: DOSM, 2020b)

1.2 Street Food

Street food can be described as ready-to-eat foods and beverages prepared and/or sold by vendors or hawkers, mostly on streets and other related locations (WHO; 1996; FAO, 1989). Hawking's activities in Malaysia can be traced back to before the country's independence (Stapa, 2002). In Malaysia's context, hawker food, synonymous with street foods, is RTE or prepared-on-demand foods for consumption on-site, or takeaways, made by the omnipresent small business owner (Toh & Birchenough, 1999). Hassan (2003) discussed the word "hawker" from the perspective of Malaysia's Local Government Act 1976, which indicates a person who moves around the street asking people to buy their goods. He then suggested that "hawker" can be categorized into three namely "temporary hawker", "static hawker" or a "nomad".

Additionally, according to Toh and Birchenough's (2000) classification, "hawker food" is synonymous with a few other commonly used, for example, "street food", "ready-to-eat (RTE) food", or else "prepared-on-demand food" prepared by low-income small business owners from the stalls they had erect for their customers' on-site consumption or takeaways. On the other hand, Kuala Lumpur City Hall (DBKL) has categorized hawkers' businesses into five (5) categories based on the buildings they operate and the location of their operations: "stalls", "hawker centers", "kiosks", "night markets", and "food courts" (Hassan, 2003). Hawkers, also known as street vendors, bring their equipment and operate from mobile platforms such as carts and stalls (Johan & Adnan, 2021; Chong & Stephenson, 2020). Night markets and street stalls in Malaysia have popularized street food vending concepts by selling household goods, clothing, and a variety of authentic Malaysian foods (Latchumaya et al., 2021; Ishak et al., 2012).

A street vendor sells food from a temporary stall, structure, or cart in a street, lane, sidewalk, footpath, public park, market or fair, workplaces, schools, colleges, railway

stations, hospitals, bus terminals, and industrial sites (Panwar & Garg, 2015; Muyanja, 2011). Informally, street food is produced in a variety of settings, including small-scale food factories, traditional workshops, homes, markets, and the street itself (WHO, 2010). There are two types of street vendors: 1) those who squat in public places like parks or sidewalks, as well as 2) those who are mobile and move from one location to another looking for customers (Bhowmik, 2012) or can be classified as stationary and mobile vendors (Soon, 2019; Bhowmik, 2012; Fellows & Hilmi, 2011). Mobile stalls were open at odd and irregular hours ranging from early dawn to late at night (Mohd Johan et al., 2021). Working hours were set according to the schedules of the hawkers rather than the demands and needs of the clients (Omar & Ishak, 2016). Street food vendors, on the other hand, are not subject to strict regulation in low- and middle-income countries, even though they can significantly boost the local economy (Al Banna et al., 2022; Al Mamun et al., 2013).

Street food vending is rapidly gaining popularity across all socioeconomic backgrounds because the foods sold are far less expensive, and a wide variety of options are available (Ferrari et al., 2021; Alimi, 2016; Samapundo et al., 2015; Aluko et al., 2014; Omemu & Aderoju, 2008). Every day, around the world, there are reportedly 2.5 billion consumers who eat street food, making it the most common form of public dining (Morano et al., 2018; Fellows & Hilmi, 2011; FAO, 2011), reflecting the recent surge in popularity (WHO, 2022a; Abrahale et al., 2019; Al Mamun et al., 2013). According to studies conducted in developed nations, 20% to 25% of household food expenses are spent outside the home, and some communities solely depend on street food. (Lamuka, 2014) and account for up to 40% of urban consumers' daily diets in low- and middle-income countries (Emmanuel et al., 2015). People are eating out more often because there are more hawkers, who are normally open from morning to midnight and serve a selection of meals, according to a study done by Ashari et al. (2022). Street food is even considered a tourist resource in countries such as Singapore, Thailand, and Malaysia, and authorities encourage the variety of offerings because it brings color and life to the destination landscape (Jalis et al., 2014; Henderson et al., 2012). Malaysian household spending patterns have changed over the previous ten years, and from 2009 to 2019, the growth rate of food expenditures outside the home increased by 9.6% (DOSM, 2020b).

The street food industry is growing for urban development because it meets food dwellers' needs while contributing to the country's economy. In urban areas, there is growing demand for RTE foods among working individuals, especially women who had no time to cook meals at home (Allen & Sachs, 2012; Fellows & Hilmi, 2011). With a change in lifestyle and more responsibilities from society, job, and family, Malaysians frequently seek out different meal alternatives to home-cooked cuisine (Chang et al., 2020). This helps the already popular street food to be even more popular. These significant demographic and economic changes have resulted in significant lifestyle changes, such as increased female labor-force participation at the expense of housework and increased time spent working or commuting (Sousa et al., 2022; Vorster et al., 2011). This has hampered household food preparation and consumption, leading urban dwellers to regard away-from-home food sources, such as street vendors, as excellent substitutes for their daily meals (Janssen et al., 2018; Steyn et al., 2011). In addition, street food is a major source of daily nutrition for a large number of single workers without families and the migrant population who move about in searching for jobs (FAO, 2003).

The street food trade has facilitated to create of self-employment opportunities and the expansion of individual business skills, become a significant source of earning, mainly for women, and has provided inexpensive, diverse, and healthy indigenous meals to city dwellers (WHO, 2022a; Njaya, 2014; WHO, 2010). For low-income urban communities, street meals also provide food security, as well as an important source of money and employment in many developing nations (Khairuzzaman et al., 2014; Yotsumoto, 2011; Chukuezi, 2010). Aside from that, street food is regarded as a cultural, social, and economic phenomenon common in most urbanized areas (Gelormini et al., 2015; Fellows & Hilmi, 2011; Rane, 2011).

Street selling is a typical informal industry in many nations, including Malaysia owing to the lack of certain requirements such as business licenses and tax reports, and frequent noncompliance with labor regulations governing employment contracts and working conditions (Rahman et al., 2013; Franck, 2011; Lee, 2008; Hassan, 2003; Cross, 2000). Informal Sector Workforce Survey in 2019, indicated that about 19.4% of activity in the informal sector operated at the market or street stalls (DOSM, 2020d). According to Handoyo and Wijayanti (2021), the informal economic sector, which includes small and retail trades such as food and beverage, has gotten little attention from central and regional governments. Due to a lack of collateral and insufficient documentation to support loan applications, Malaysian SMEs typically struggle to obtain financing because they fall short of the requirements to access normal banking (Nawai & Shariff, 2013). Microfinance organizations were created to close a funding gap in the financial services industry by giving money to lower-income individuals who are typically engaged in small- and micro-business activities. Microfinance organizations offer to fund new businesses or for working capital needs like purchasing raw materials, machinery, and office supplies (Nawai & Shariff, 2012). Amanah Ikhtiar Malaysia (AIM) was established in 1986 and has since become one of the key players in Malaysia's effort to eradicate poverty using microcredit financing (Terano et al., 2015; Mokhtar et al., 2012), and regardless of the business revenue cycle, all sizes of businesses, including agricultural businesses, are subject to weekly loan payments under AIM. The Economic Fund for National Entrepreneurs Group (TEKUN) is the largest microfinance institution in Malaysia established in 1998 that offered microcredit services throughout Malaysia based on an individual lending approach (Mokhtar et al., 2012; Nawai & Shariff, 2012). In addition, a large percentage of microfinance organizations are informal or semi-formal organizations that are not focused on making a profit, and Government funding was typically used by these microfinance organizations to support their operations (Shu-Teng et al., 2015).

Street hawking is thought to have existed in Malaysia since the British colonial era (Sulaiman et al., 2020; Azis & Tek, 2018). Its existence is recognized and regulated by the government as an economic component of Malaysia (Bhowmik, 2005), as evidenced by the licensing and taxation regulations in place in Malaysia. Street retailing in Malaysia, according to Omar and Ishak (2016), consists of selling legal goods and services on the street without a fixed location. Although the seller may register and operate with a valid business license, some unregistered ventures do not have a business license. Due to lower start-up and infrastructure costs (Njaya, 2014; Newman & Burnett, 2013), street stalls, according to Shafiee et al. (2018), offer the potential for entrepreneurs looking to start a business and introduce their locals alike. In 2012, Malaysia had over 11,000 street stalls and kiosks with sales of more than RM490 million (Shafiee et al.,

2018). Between 2008 and 2012, the total of outlets and transactions grew at yearly rates of 6.2% and 5.9%, respectively (Abd Hanan et al., 2021; Shafiee et al., 2018). The median income for a street stall or kiosk in 2012 was RM588,86.37 (\$179,939) or RM13.42 (\$4.10) for each transaction, the smallest of any subsector (Shafiee et al., 2018; Agriculture and AgriFood Canada, 2014).

Street markets in Malaysia adopt the idea of outdoor shopping, with street hawkers or petty traders setting up their stalls in a designated part of a street (Rahman, 2013) to attract consumers (Kariuki et al., 2017). According to Huang et al. (2009), a street market is a nighttime marketplace where small businesses sold a variety of inexpensive goods and cooked food. Street markets usually operate on the street, primarily in metropolitan or residential areas that have more leisure, shopping, and dining spaces (Lee et al., 2008). Furthermore, the local authority plans the night market location, which must not interfere with traffic or public roadways (Ramli & Jamri, 2021). Local governments had also begun to recognize the night market's importance in fostering youth participation in business (Mohd Johan et al., 2021).

1.3 Food Safety Practices among Street Food Vendors

Despite their popularity, street food vending in developing countries is usually unregulated and unprotected by governments (Majing & Regina, 2021; Imathiu, 2017; Alimi, 2016), and the official data on the street food industry involved is largely lacking (Alimi & Workneh, 2016; Steyn et al., 2014). Food sanitation regulations, licensing, training, and vendor monitoring are not properly established and monitored by local or national organizations (Khairuzzaman et al., 2014; Liu et al., 2014; Xue & Zang, 2013). Street food is becoming increasingly popular, with a high consumption rate, particularly in urban areas (Alimi et al., 2014; Hiamey et al., 2013; Das et al., 2012; Steyn et al., 2011; Chukuezi, 2010). Urbanization, along with industrial development, has resulted in more employment opportunities in cities and no time to cook (Kariuki et al., 2017; Bellia et al., 2016; Popkin et al., 2012; Vorster et al., 2011), increasing the need for convenient and readily available food sources like street food (Bellia et al., 2016; Moussavi et al., 2016; Liu & Zhang, 2014; Newman & Burnett, 2013; Winarno & Allain, 1991).

Street food safety is a serious concern. Street food vendors are a crucial link in the food supply chain in many developing nations (Lamuka, 2014; FAO, 2003). Street food offers a convenient diet for many people in developing countries, including Malaysia (Anandhi et al., 2015; König et al., 2010) and about 2.5 billion people throughout the world consume street food every day, sustaining millions of low-income individuals' livelihoods and making a substantial economic contribution (WHO, 2022a; Abrahale et al., 2019; Al Mamun et al., 2013). In addition to being cherished for their distinctive flavors and convenience, street foods have a significant socioeconomic role in supplying the food and nutritional demands of urban consumers at low- and middle-income levels (Alimi et al., 2014; Aluko et al., 2014; Ackah et al., 2011; Chukuezi, 2010; Muzaffar et al., 2009; Cross & Morales, 2007).

The Codex Alimentarius Commission (CAC) describes food safety as the assurance that food will not cause harm to the customer when prepared and/or consumed as intended. The definition incorporated three important concepts: 1) harm, in which the food is unfit for human consumption without necessarily posing a health risk; 2) assurance, as in the concept of food safety and management of the place to produce safe food; and 3) intended use, in which the manufacturer to the consumer and at the consumer phase to ensure safe food (New et al., 2017a). Food safety ensures that food is chemically, physically, and microbiologically safe for consumption. Food safety encompasses all actions taken to ensure that all food is as safe as possible (WHO, 2016). Acute or chronic that could harm consumers' health are all included in the concept of food safety (FAO, 2003). Food that is free of contamination (FAO, 2003), safe to eat when consumed within its shelf life, and has been stored and distributed under proper temperature control (Food Safety and Standards Act, 2006) is described as safe food. In other words, food safety is the scientific field that specifies how to handle, prepare, and store food to prevent foodborne diseases (Australian Institute of Food Safety, 2019; Mohd Nawi & Mohd Nasir, 2014). The preparation of food that will not cause harm to the consumer when consumed as intended is known as food safety (Uçar et al., 2016; WHO, 2015b).

In developing countries, such as Malaysia, one of the biggest issues is ensuring food safety for consumption (Fung et al., 2018; Paudyal et al., 2017). Recently, food safety continued to be a major concern in the food supply chain globally since foodborne illnesses outbreaks are on the rise and have the potential to attack patrons in a variety of ways (Mangla et al., 2021; Cushman et al., 2001). According to the EFSA (2010), catering and food service facilities were responsible for 48.7% of foodborne illnesses reports in 2010, indicating the importance of following basic food safety procedures in the food industry. Table 1.2 shows some examples of good and poor food safety practices among food handlers.

Table 1.2: Examples of Good and Poor Food Safety Practices

No.	Food Safety Practices	
	Good	Poor
1.	Wash hands with soap after using the toilet.	Did not wash hands after using the toilet.
2.	Cook food using the right temperature.	Use inappropriate temperature to cook.
3.	Never thaw food at room temperature.	Thaw food on the countertop.
4.	Separate raw meat, poultry, seafood, and eggs from other foods in your grocery shopping cart, grocery bags, and refrigerator.	Did not separate different raw materials in the shopping cart, grocery bags, and refrigerator.
5.	Use one cutting board for fresh produce and a separate one for raw meat, poultry, and seafood.	Use the same cutting board for fresh produce and other raw materials.

(Source: CDC, 2022; FDA, 2017)

Nevertheless, food safety and health experts have determined that millions of foodborne illnesses cases are recorded annually, but the precise statistics are clouded by uncertainty because most cases are not reported (Uçar et al., 2016; Soon et al., 2011). In vulnerable populations like the elderly, pregnant women, children, and immunocompromised

people, it is estimated that more than 200 different diseases can occasionally spread among the population through food and lead to long-term health issues in the world, including Malaysia (WHO, 2022b; Loukieh et al., 2018).

Food safety is important not only to protect consumers directly from foodborne illnesses, but it is also important because having a balanced diet that is safe to eat promotes overall wellness. However, most Malaysians prioritize food taste over food safety (Mohd Noor et al., 2021; New et al., 2017b), so they often overlook its safety, quality, and hygiene (Barro et al., 2006; Muinde & Kuria, 2005; Mensah et al, 2002). This indicated that Malaysians are generally unaware of food safety issues (Salleh et al., 2017). Past studies indicated that a high proportion of reported foodborne illnesses were caused by unsafe food handling practices (Akabanda et al., 2017; Soon et al., 2011; Ansari-Lari et al., 2010) therefore, ensuring food safety is essential as a public health measure to lower the fatality rate (Paudyal et al., 2017).

Despite having the abilities and knowledge to carry out food safety, most cases of food poisoning have been linked to human handling errors (Sanlier, 2009; Greig et al., 2007; Ehiri & Morris, 1996). Unsanitary food handling practices caused half of all foodborne illnesses from reported food poisoning cases (Soon et al., 2011; MOH, 2007). Analyses of reported outbreaks have confirmed that poor food handling practices among food handlers are the root cause of most foodborne illnesses (Nik Husain et al., 2016).

Street foods are consequently considered to be a significant public health concern (WHO, 2022a; Loukieh et al., 2018; Bhowmik, 2012) due to fundamental factors that may have an impact on different points along their supply chain, beginning with the procurement of raw materials and extending to handling and service (Nurudeen et al., 2014). Even though street food is popular, it is regularly found to be contaminated with microorganisms and associated with foodborne illnesses (Loukieh et al., 2018; Muyanja et al., 2011; Das et al., 2010; Tambekar et al., 2008; Ghosh et al., 2007). This is because most of the food that street food vendors sell is already cooked and considered RTE food that can be eaten immediately (Oje et al., 2018; Imathiu, 2017; Khater et al., 2013; Oranusi & Olorunfemi, 2011) and due to the limited accessibility of street food operations, consumers perceive that street food poses a high food safety risk (Chang et al., 2020). Toxic substances and harmful organisms can contaminate food during manufacture, transit, preparation, storage, and service and foodborne illnesses occur when pathogenic organisms and toxic chemicals are present in significant amounts in contaminated food (Legesse et al., 2017). Foodborne illnesses are caused by a lack of knowledge on the part of food handlers and negligence of proper food handling (Legesse et al., 2017; Abdul-Mutalib et al., 2015).

Inadequate food storage, poor personal hygiene, cross-contamination of raw and processed food, improper heating and reheating procedures, cooking food incorrectly, exposed food without covering it, using food additives, and banned hazardous chemicals, and selling expired products are just a few of the major perceived street food safety risks among consumers (Rahman et al., 2016; Monney et al., 2013). Street foods are typically prepared and sold in unacceptable areas (Aluko et al., 2014; da Silva et al., 2014; Muyanja et al., 2011), with restricted access to clean water, sanitary services, or rubbish

disposal facilities (Lamuka, 2014; FAO, 2011; WHO, 2010) and as a result, eating street foods comes with a significant risk of getting sick due to microbial contamination (Liu et al., 2014; Hanashiro et al., 2005), along with inappropriate usage of food flavorings, contamination, and environmental contamination (Lamuka, 2014; FAO, 2003).

In street vending, incorrect holding temperatures and extended holding times have also led to serious food poisoning episodes and foodborne outbreaks (Birgen et al., 2020; Gitahi et al., 2012; Muyanja et al., 2011). Lack of environmental regulation surrounding the vending sites, unacceptable facilities, and poor street foods' food safety practices can raise the risk of foodborne illnesses for consumers (Johnson et al., 2020; Isoni Aua et al., 2019; Alimi, 2016). In addition, the consumption of street food and beverage may increase the probability of foodborne illnesses brought on by a range of microorganisms (Das et al., 2010; Barro et al., 2006) due to unhygienic food handling by street food vendors (Lues et al., 2006; Mensah et al., 2002). In conclusion, foodborne illness outbreaks have been linked to street food in several countries (Shehasen & Mohammed, 2020; Cortese et al., 2016; Aluko et al., 2014; Bryan et al., 1992) due to improper food handling practices.

1.4 Foodborne Diseases

Street foods are perceived to be a major public health risk (WHO, 2022a; Bhowmik, 2012) due to improper food handling. Although street food is popular, it is frequently reported to be contaminated with pathogens and linked to foodborne diseases (Muyanja et al., 2011; Das et al., 2010). The safety and quality of the food are the responsibility of everyone along the food supply chain, from the farm to the consumer. To keep food safe throughout the entire food chain, from production to harvest, processing, storage, distribution, and finally final preparation and consumption, food safety is essential. (United Nations, 2022).

Nevertheless, foodborne diseases, which occur because of consuming food contaminated with viruses, bacteria, parasites, chemicals, and allergens, have been a never-ending threat to public health and a significant impediment to global socioeconomic development (Yu et al., 2021; Havelaar, 2015; Linscott, 2011). Foodborne diseases have become more serious in Southeast Asian countries, with these countries having the highest incidence rate in 2015 (WHO, 2015a). The occurrence of two or more cases of similar diseases caused by food consumption is referred to as an outbreak of foodborne diseases (Wu et al., 2014; Soon et al., 2011). In addition to hot and humid weather conducive to microbial growth, insanitary food handling practices by food handlers and poor environmental sanitation have been identified as major contributors to foodborne diseases in this region (Samapundo et al., 2016; Siow & Abdullah Sani, 2011; Soon et al., 2011). Previous studies by Ruby et al. (2019a) and Salleh et al. (2017) discovered that eating out has contributed to an increase in food poisoning in Malaysia. Foodborne outbreaks were frequently reported at food facilities rather than at home (Nguyen et al., 2018; Centers for Disease Control and Prevention, 2017). Prior studies indicate that the cleanliness of food premises and the hygiene of food handlers are Malaysia's most pressing concerns regarding foodborne diseases (Siau et al., 2015; Ungku Zainal Abidin et al., 2011).

Most of the foods sold by street food vendors are pre-cooked and RTE (Raza et al., 2021; Khater et al., 2013). These foods are prepared ahead of time (4-8 hours) and are simple to prepare because some RTE street foods only need minimal cooking (heating), but others do not. Hence, RTE street foods have cast significant doubt regarding bacteriological quality due to such preparation procedures and lack of essential sanitation at the premises (Latchumaya et al., 2021), which allows bacterial growth (Rosset et al., 2004). When meals are prepared hours before selling and presented in an open setting without appropriate incubation, there is a huge risk of bacterial pollution (Latchumaya et al., 2021), which can stimulate foodborne diseases (Sharifa Ezat et al., 2013). Incorrect holding temperature and increased holding duration in street vending have also resulted in severe food poisoning incidents and foodborne outbreaks (Birgen et al., 2020; Gitahi et al., 2012). Roadside food and drink consumption may increase the risk of foodborne diseases brought on by a selection of pathogens (Das et al., 2010; Barro et al., 2006).

In addition, inadequate facilities, lacking environmental control surrounding the vending locations, and the deficiency of food safety behavior among the street food handlers increase the risk of foodborne diseases to consumers (Isoni Auad et al., 2019; Alimi, 2016). Food handlers with inadequate knowledge of food safety may raise the danger of food contamination and contribute to foodborne diseases (Abd Rahim et al., 2019). According to Abdullah Sani and Siow (2014), most of the food handlers in Malaysia have never received any food safety training. This implies that the majority have poor knowledge of pathogens correlated with infection-causing agents and the ideal storage temperatures for RTE foods, which will lead to poor food handling practices among food handlers. The majority of foodborne diseases include food poisoning, hepatitis A, typhoid, hepatitis B, and cholera (Abdul-Mutalib et al., 2015; Meftahuddin, 2002). Bacteria, viruses, and parasites are the agents (Abdul-Mutalib et al., 2015) that enter the human body through the consumption of microorganisms or toxins created by microorganisms (Campos et al., 2009). Nausea, diarrhea, vomiting, stomachache, sweating/fever, headache, and lethargy are common food poisoning symptoms (MOH, 2012a; Linscott, 2011). Foodborne diseases are more likely to occur when proper sanitation and food premise hygiene are neglected (Abdul-Mutalib et al., 2015; Abdalla et al., 2009).

Foodborne diseases in Malaysia are seeming to fluctuate as observed in Table 1.3 based on the incidence rate reported by the Ministry of Health, Malaysia (MOH). In 2014, 58.65 cases per 100,000 population were recorded for food poisoning within 10 years. The number keeps on fluctuating throughout the years. The rising trend in food poisoning cases may imply that food handlers do not consider the significance of safe food handling in the pantry (Abdul-Mutalib et al., 2015). Although the incidence rates were high for food poisoning, the mortality rates were substantially low as indicated in Table 1.4. With 12 deaths, 2013 documented the highest mortality rate (0.4) and reduced in the following years. However, this should not be put to relief as the mortality rate increased back to 0.3 in 2019, indicating more cases continued to occur affecting many victims.

Table 1.3: Incidence Rate of Communicable Disease in Malaysia from the Year 2011 to 2020

Disease	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cholera	2.02	0.96	0.58	0.45	0.80	0.54	0.01	0.50	0.25	0.35
Dysentery	0.15	0.26	0.28	0.27	0.41	0.40	0.37	0.50	0.67	0.48
Food poisoning	56.25	44.93	47.79	58.65	47.34	55.21	42.25	45.71	50.90	28.93
Hepatitis A	1.71	1.58	0.41	0.21	0.36	0.27	0.47	0.30	0.29	0.14
Typhoid	0.84	0.75	0.73	0.7	1.42	0.57	0.59	0.53	0.55	0.20

(Source: MOH, 2012b-2021)

Cholera was reported to cause an outbreak in Limbang, Sarawak in 2011, with approximately 111 cases reported which causes a high incidence rate (2.02) in the year 2011 (Table 1.3) (New et al., 2017a). Typhoid cases also reported a higher incidence rate (1.42) in 2015 compared to other years. Kuala Lumpur, Selangor, and Kelantan were involved in Typhoid cases and Kelantan recorded the highest number of cases with 151 Typhoid cases (Mohd Shahar, 2015). Approximately 304 food premises were inspected, 31 of which were closed due to cleanliness issues, and sixteen notices were issued to eatery owners under the Food Health Regulations 2009 (Mohd Shahar, 2015). The cholera outbreak and typhoid outbreak recorded a mortality rate of 0.04 (per 100,000 population) and 0.03 (per 100,000 people), respectively as tabulated in Table 1.4 (New et al., 2017a).

Table 1.4: Mortality Rate of Communicable Diseases in Malaysia from the Year 2011 to 2020

Diseases	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cholera	0.04	0.00	0.00	0.00	0.01	ND	ND	0.00	0.01	0.00
Dysentery	0	0	0	0.00	ND	0.00	0.00	0	0	0
Food poisoning	0.03	0.00	0.04	0.01	0.01	0.02	0.01	0.02	0.03	0.02
Hepatitis A	0	0	0	ND	ND	ND	0.00	0	0.00	0
Typhoid	0.00	0.00	0.01	0.00	0.03	0.01	0.02	0.02	0.02	0

ND: Not detected

(Source: MOH, 2012b-2021)

The rise in reported food poisoning cases over the years reflects Malaysia's true food safety situation while also raising the burden of foodborne diseases (Ruby et al., 2019a; New et al., 2017a). In 2019, there were 16,583 cases of food poisoning, with Wilayah Persekutuan Labuan having the highest incidence rate per 100,000 people (165.2), followed by Sabah (71.2), and Terengganu (68.9) (DOSM, 2020c). More emphasis has been placed on food quality and safety because of the significant outbreaks and unacceptable chemical hazards in foods that have been the main causes of foodborne diseases in recent years (Kılıçhan et al., 2020). Food handlers play a key role in foodborne outbreaks because their attitudes and workplace cultures can affect their actions (Todd et al., 2007). Foodborne bacteria can be transmitted when raw foods are handled improperly in the kitchen while food is being prepared (Odeyemi, 2016; European Food Safety Authority (EFSA), 2014). Aside from that, a polluted water

source, an unsuitable environment, as well as unsanitary food handlers, have the potential to cause foodborne diseases (Ruby et al., 2019a; Cheng et al., 2017; Saad et al., 2013; Meftahuddin, 2002).

However, foodborne illness cases in Malaysia are often underestimated because most incidents are not reported, with many of the procedures that need to be completed before any cases can be reported to the authorities (Abdul-Mutalib et al., 2015; Soon et al., 2011). This is because only a fraction of the victims receives necessary treatment and are reported to public health authorities since not all victims undergo treatment at the appropriate hospital or clinic (New et al., 2017a; Salleh et al., 2017). Actual foodborne illness cases could not be detected, potentially delaying the investigation of outbreak cases, and limiting surveillance data. Hence, a lack of accurate data on foodborne diseases has made it difficult for policymakers to enhance the existing guidelines or policies for food safety (Salleh et al., 2017). The effectiveness of public health priorities and food safety measures may be improved with the knowledge of all the information available about outbreaks of foodborne diseases (WHO, 2015a). To better understand the various cases of foodborne diseases, developing countries must provide accurate and trustworthy data (Pires et al., 2015; Haagsma et al., 2013). Without good surveillance data, estimating the foodborne illness burden and implementing appropriate corrective actions will be difficult (New et al., 2017a).

An effective method of surveillance is required to assess the disease burden (Groseclose & Buckeridge, 2017; Dewaal et al., 2010). Changes in consumer purchasing patterns because of the occurrence of foodborne diseases may have an impact on the country's economic growth (Palma et al., 2010). The cost of foodborne illnesses as well as their economic impact in Malaysia have received little research (Sharifa-Ezat et al., 2013). To determine the economic value of foodborne diseases, the burden of the disease must be evaluated. Health treatment, lawful action, outbreak inspections, food product recalls, along with a loss of public trust are just a few of the costs that foodborne diseases can incur (Dewaal et al., 2010). Furthermore, the threat of food poisoning from street food persists in several parts of the world, especially in developing nations (Khairuzzaman et al., 2014; Mensah et al., 2002).

1.5 Contaminated Street Foods Cases

When eating out, one risks developing health problems such as overeating, irregular eating patterns, late eating, an unequal diet, and eating in unsanitary environments (Ali & Abdullah, 2012). The public is also at risk of food contamination if the premises are not kept clean. Disease Control Division under the Ministry of Health (MOH) Malaysia revealed some food poisoning incidents that occurred during the majority of Bazaar Ramadhan from 2011 to 2015 (Table 1.5) (MOH, 2016a). Every Ramadan, people go to Bazaar Ramadhan to buy food for the iftar. Water and foodborne diseases can be caused by food and drink purchased at the Ramadhan Bazaar. The First Edition of Bazaar Ramadhan Management Guidelines (2013) has been distributed and adopted since 2013 by the District Health Offices and some parties' Local Authorities. However, the application of the guidelines is not comprehensive in Local Authority across the country.

The Second Edition of Ramadhan Bazaar Management Guidelines (2016) has been updated to be implemented by all District Health Offices and Local Authorities. The incidence of food poisoning has been found to increase during the month of Ramadan and there are also involved death. Incidences of food poisoning that occur in Malaysia were concluded in Table 1.5. The majority of the food poisoning incidents were affected by the food prepared ahead. As stated by Samapundo et al. (2015) and Siau et al. (2015), the preparation of food in advance could lead to food poisoning.



Table 1.5: Food Poisoning Incidents and Deaths Caused from 2011 to 2022

No	Premise/ Year	No. of cases	No. of Exposure	Food/ drink contaminated	Risk factor
1.	Bazaar Ramadhan – Kampar, Perak (2011)	3	6	Soymilk	- Food has been prepared for more than 4 hours
2.	Bazaar Ramadhan – Klang, Selangor (2011)	17 (1)*	138	ABC	- Cross-contamination by operators who handle burgers
3.	Stall – Sabak Bernam, Selangor (2012)	10 (1)*	24	Roti john	- Food has been prepared for more than 4 hours
4.	Night market – Dengkil, Sepang (2012)	3	5	Yong taufu	- The food was not cooked perfectly
5.	Night market – Tangkak, Johor (2012)	25 (1)*	1500	Nasi lemak	- Food handlers and premises were not hygienic
6.	Bazaar Ramadhan – Kolej UNITI, Negeri Sembilan (2012)	36	75	Meatball soup	- Food has been prepared for more than 4 hours
7.	Bazaar Ramadhan – Taman Seri Muda, Shah Alam (2014)	38	516	Roti john	- Food handlers were not hygienic
8.	Bazaar Ramadhan – Tanjung Karang, Selangor (2014)	6	6	Bubur lambuk	- Food has been prepared for more than 4 hours
9.	Bazaar Ramadhan – MRSM Trolak dan Gerai Program Ushawan Muda (2014)	18	934	Roti john	- Cross-contamination
10.	Bazaar Ramadhan – Jerthi, Terengganu (2015)	7	10	Ayam golek	- Food handlers have no vaccination
11.	Bazaar Ramadhan – Kampung Baru Pendang, Kedah (2015)	5	8	Ayam percik	- Used unhygienic utensils
12.	Bazaar Ramadhan – Gaal Pasir Puteh, Kelantan (2015)	8	40	Soymilk	- Food has been prepared for more than 4 hours
13.	Bazaar Ramadhan dan Cafeteria – Kolej Matrikulasi Kok Lanas, Kota Bharu, Kelantan (2015)	39	1297	Nasi kerabu ayam Nasi ayam	- Food handlers were not hygienic - This operator does not undergo health checks and vaccinations typhoid vaccine
14.	Bazaar Ramadhan – Kolej Matrikulasi Johor, Ledang (2015)	64	1169	Nasi tomato	- 23% of food handlers do not attend food handling training and do not have typhoid injections. - Food handlers were not hygienic

Table 1.5: Continued

15.	Bazaar Ramadhan – Paka, Terengganu (2016)	19	-	Puding buih	- Contaminated <i>Puding buih</i> - Food handlers not vaccinated
16.	Stalls – Baling, Kedah (2018)	61 (2)*	-	Laksa	- <i>Salmonella enterica</i> serovar <i>weltevreden</i> was detected - Laksa noodle preparation and storage are not clean processes - The temperature of the reheated laksa noodles before consumption is insufficient to disinfect
17.	Street stall/ Bazaar Ramadhan – Titi Gantung, Ipoh (2018)	4 (1)*	-	-	-
18.	Home-based (Online) – Kuala Terengganu (2020)	99 (1)*	-	Pudding buih	- Expired egg used
19.	Canteen – Sekolah Menengah Sains Tuanku Aishah Rohani (2021)	152	-	-	-
20.	Street Stall/ Bazaar Ramadhan – Batu Burok, Terengganu (2022)	93	-	2-Pudding buih 91- no data	-

*Number of deaths

-No data reported

(Source: Bakar, 2022; Jalil, 2021; Yatim, 2020; Amarudin, 2018; Amran, 2018; Ilham, 2016; MOH, 2016a)

Besides, as indicated by some studies, food poisoning frequently occurred in Malaysia, and some of the food and beverages offered by the street food vendors were contaminated with bacteria that can lead to food poisoning the consumers. For instance, Mohd Nawawee et al. (2019) found that the bacteriological quality of drinks sold by street vendors in Kuala Lumpur was unsatisfactory, with 90.3% of overall samples tainted with viable bacteria and an average reading of 5.03 $\pm$ 0.23 log Colony Forming Unit (CFU)/mL (Table 1.6). Food Standards Australia New Zealand (FSANZ) Compendium of Microbiological Criteria for Food classified the level of bacterial contamination in drinks sold as marginal and unacceptable and it had surpassed the standard set by Malaysian specifications for ready-to-drink beverages (carbonated and non-carbonated) (MS601:1994), and WHO Guidelines for Drinking-Water Quality (Mohd Nawawee et al., 2019). Water used to produce beverages sold by street vendors can be a vital source of microbial contamination, including total coliforms, fecal coliforms, fungal contamination, streptococci contamination, and others as a result of the insufficiency of amenities around the selling site (Odeyemi & Abdullah Sani, 2016; Tasnim et al., 2010).

Table 1.6: Total Microbial Load of Total Viable Count (TVC), Total Coliform, *E. coli*, and *S. aureus* in Street-Vended Beverages from Chow Kit

Types of Beverages	Bacteria Loads in Beverages			
	TVC	Total coliform	<i>E. coli</i>	<i>S. aureus</i>
	No. (%)	No. (%)	No. (%)	No. (%)
Cordial-based drinks (<i>n</i> = 11)	9 (81.8)	5 (45.5)	0	5 (45.5)
Milk-based drinks (<i>n</i> = 9)	9 (100)	9 (100)	1 (11.1)	7 (77.8)
Fruit juices (<i>n</i> = 11)	10 (90.9)	8 (72.7)	0	6 (54.5)
Total (<i>n</i> = 31)	28 (90.3)	22 (71)	1 (3.2)	18 (58.1)

(Source: Mohd Nawawee et al., 2019)

According to Abd Rahim et al. (2019), high level of bacterial contamination such as total coliform, *E. coli*, and *S. aureus* was found in the overall foods sold by street vendors in the Chow Kit area that exceeding the permissible limit set by the International Microbiological Specifications on Foods (ICMSF) standard. Table 1.7 summarizes the presence of total viable count, total coliform, *E. coli*, *S. aureus*, and *Salmonella spp.* The highest contamination was seen with 87% of the total sample on the total viable count. Total coliforms were discovered in 43% of the total food samples. Meanwhile, *E. coli* was found in only 6% of the total samples. *S. aureus* contaminated 33% of the total samples, while *Salmonella spp.* was not found in any of them. Due to the contaminated street food found in previous research, street foods are perceived to be one of the contributors to public health risks.

Table 1.7: Total Microorganism of a Total Viable Count, Total Coliform, *E. Coli*, *S. Aureus* and *Salmonella spp.* in Street Vended Food in Chow Kit

Type of microorganisms (n=30)	No (%)
Total viable count	26 (87)
Total coliform	13 (43)
<i>E. coli</i>	2 (6)
<i>S. aureus</i>	20 (33)
<i>Salmonella spp.</i>	Not detected

(Source: Abd Rahim et al., 2019)

In addition, Shafizi et al. (2016) revealed that the significant existence of *S. aureus* was found in food samples bought from premises in Putrajaya. About 106 food samples in total were collected from 53 RTE food establishments, including 50 samples of raw RTE food and 56 (cooked RTE food). By using the most probable number (MPN)-polymerase chain reaction (PCR) method, 31 of the 50 samples of raw RTE food, whereas 25 of the total samples (56) of cooked RTE food from food premises in Putrajaya were found to be infected with *S. aureus* (Table 1.8). In general, a total of 36 out of 53 food premises (68%) provided consumers with food contaminated with *S. aureus*. Studies carried out in Southeast Asia similarly obtained and supported the findings demonstrating the presence of *S. aureus* in the food samples examined. For instance, the detection was discovered in 10.8% of the food samples gathered in Thailand (Chomvarin et al., 2006), and 21.2% of the 212 samples examined in Vietnam (Huong et al., 2010).

Table 1.8: Number of Sample Taken, Detection and Bacterial Load of *S. Aureus*

RTE Food	No. of sample taken		No. of <i>S. aureus</i> detected		No. of <i>S. aureus</i> non-detected		Bacterial load of <i>S.</i> <i>aureus</i> (MPN/g)
	n	%	n	%	n	%	
Raw	50	47	31	55	19	38	220.2
Cooked	56	53	25	45	31	62	484.9
Total	106	100	56	100	50	100	705.1

(Source: Shafizi et al., 2016)

Latchumaya et al. (2021) also found that all 50 random RTE street food samples that were procured from night markets and street vendors were all determined to be extremely infected with aerobic bacteria (Table 1.9). In addition, the majority of them had significant coliform and *E. coli* occurrences. The RTE street food samples gathered were classified into five categories, such as category 2 (e.g., cooked hot dogs and sausages), category 3 (e.g., fish and squid gravies), and category 4 (e.g., smoked pork and products). Since the researchers want to look at the bacteriological quality of street foods that were cooked and prepared in advance (4 to 8 hours) before the sale, category 1 (RTE street foods are fully cooked and must be instantly accessible for sale or consumption - beef

burgers & meat pies) and category 5 (the uncooked foods such as raw hams and salami and other fermented meat products) street foods were not tested in the study. This demonstrates that RTE's standard for street food is largely at an unacceptable level.

Table 1.9: Aerobic Colony Count (ACC), Total Coliform, and *E. coli* Count in Ready-to-Eat Foods Sampled from Night Market and Street Stalls in Nilai, Negeri Sembilan

Food Category	Aerobic colony count (ACC)		Total Coliform		<i>E. coli</i>	
	No	%	No	%	No	%
2 (n=18)	18	100	12	66.7	7	38.9
3 (n=22)	22	100	22	100	15	68.2
4 (n=10)	10	100	10	100	7	70
Total (n=50)	50	100	44	88	29	58

(Source: Latchumaya et al., 2021)

Haryani et al. (2007) also revealed that *Klebsiella pneumoniae* contamination was detected in 32% (25/78) of the street food assessed. *Klebsiella* is known as a source of public-acquired bacterial pneumonia and all the reports by other researchers and the discovery of this pathogen in Malaysia's street food pointed to potential fecal contamination, cross-contamination between food handlers, food preparation, surfaces, and the food itself (Haryani et al., 2007). In addition, juice samples collected from street vendors were found to have a higher microbial load compared to those prepared in the laboratory in a study by Suguna et al. (2011). *Klebsiella pneumoniae* was presented in all the juice samples but other foodborne pathogens such as *S. aureus*, *Salmonella sp.*, and generic *E. coli* were absent (Suguna et al., 2011). According to an earlier assessment by Lewis et al. (2006), the presence of elevated microbial loads in the street vendor samples may be directly related to insufficient fruit washing, the use of unrefined stands and carts, preservation without suitable refrigeration, and unsanitary surroundings.

1.6 Regulations on Street Food Vendors

The Food Act 1983 and the Food Regulations 1985 are the laws that govern food safety in Malaysia and are administered by the Food Safety and Quality Division (FSQD) of the Ministry of Health, Malaysia (MOH). In other words, the Food Act 1983, along with Food Regulations 1985, is the main piece of food safety legislation, and come into force on October 1, 1985 (Philip, 2015). The Food Hygiene Regulations 2009 were later established to provide a framework for policing the safety and hygienic standards of food sold to protect the public's health (Jores et al., 2018). The implementation of the most recent Food Hygiene Regulations 2009 is critical to ensuring that food premises are clean and that consumers can consume safe food at an acceptable price. Furthermore, Malaysia's food safety system stands out for its complexity and variety, with several authorities including Malaysia's FSQD tasked with ensuring food safety at numerous stages of the food chain (Mohamad, 2003). To protect the public, the division has played a significant part in guaranteeing that food is free of fraud and related hazards.

According to Section 2 of the Food Act of 1983, premises include any street, open area, or public resort, along with any bicycle or vehicle used in the preparation, preservation, packaging, storage conveyance, distribution, or sale of any food (Shafiee et al., 2018; Food Act 1983, 1983). While under Regulation 3 of Food Hygiene Regulations 2009 mandates registration for all food premises including street food vendors (Jores et al., 2018; Food Hygiene Regulations 2009, 2009). All food premises that manufacture, prepare, process, store, or serve for sale/mass catering, as well as all vehicles from which ready-to-eat foods are sold, must be registered (Shafiee et al., 2018). In Malaysia, local councils are responsible for granting licenses to street vendors. The regulation of street food vendors' food safety falls under the purview of the local councils. The regulation's scope is similar to that of Malaysia's FSQD, MOH, which includes training food vendors (Jores et al., 2018).

Training is essentially crucial to any food safety and hygiene system. Therefore, according to Regulation 30 of Food Hygiene Regulations 2009, all food handlers must be trained and acquire a certification in the Food Handlers Training program hosted by FSQD under MOH, Malaysia, including street food vendors (Jores et al., 2018; Food Hygiene Regulation 2009, 2009). MOH established the Food Handlers Training program in 1996 to improve food hygiene knowledge (Salleh et al., 2017). This knowledge is extremely useful in ensuring that food is handled, prepared, and sold in an appropriate manner (Selamat et al., 2003). This program is critical for raising awareness among food handlers about the importance of personal hygiene and sanitation in the workplace (MOH, 2012a). The effectiveness of the training can be increased by keeping track of the food handlers' contributions to reducing the frequency of foodborne outbreaks (Soon et al., 2011).

Apart from attending food safety training, all food handlers must be vaccinated against typhoid before applying for a license (Abd Rahim et al., 2019; Lee et al., 2017; Food Act 1983, 1983). Food premises owners must not hire or permit any food handlers to work on their premises except if they have been vaccinated with an anti-typhoid vaccine by a licensed medical practitioner, according to Regulation 11, Food Hygiene Regulations 2009. Furthermore, whether they are citizens or not, all food handlers are required by Regulation 31, Food Hygiene Regulations 2009, to obtain a vaccination from a registered medical practitioner (Food Hygiene Regulations 2009, 2009).

Food premise grades are conducted by local authorities and the MOH in some states, concerning grading premises with grades A, B, C, and D or "no grade" (Abdul-Mutalib et al., 2015; MOH, 2015b). In general, clean premises with 76% to 100% marks receives a grade of A. After a year, the next inspection will be conducted; if the grade declines, the inspection date will be adjusted. Food premises with marks between 50% and 75% are given a grade of B and are considered moderately clean. In six months, there will be another inspection. The unclean food premises is graded C overall. For two weeks, this place will have to close its doors. After that, a second inspection of the premises will be conducted to determine whether it is suitable for reopening for business (Abdul-Mutalib et al., 2015; Ali & Abdullah, 2012). Since eating at the premises will increase the risk of contracting a foodborne disease hence food premises grades will assist people in choosing food premises with better grades (Djekic et al., 2014; Lee et al., 2012).

Food premise hygiene inspections are performed regularly to ensure that the premises are clean and in compliance in conjunction with the Food Act 1983 and the Food Hygiene Regulations 2009. In 2020, 29,286 notices of violation under Section 32B of the Food Act 1983 were issued to owners of food premises and food handlers for violations of the Food Hygiene Regulation 2009, while 1,751 (2.58%) unsanitary food premises were closed under Section 11 of the Food Act 1983 (MOH, 2020b). The number of food facilities inspected and the percentage of food establishment closures by the state for 2020 are shown in Figure 1.6.

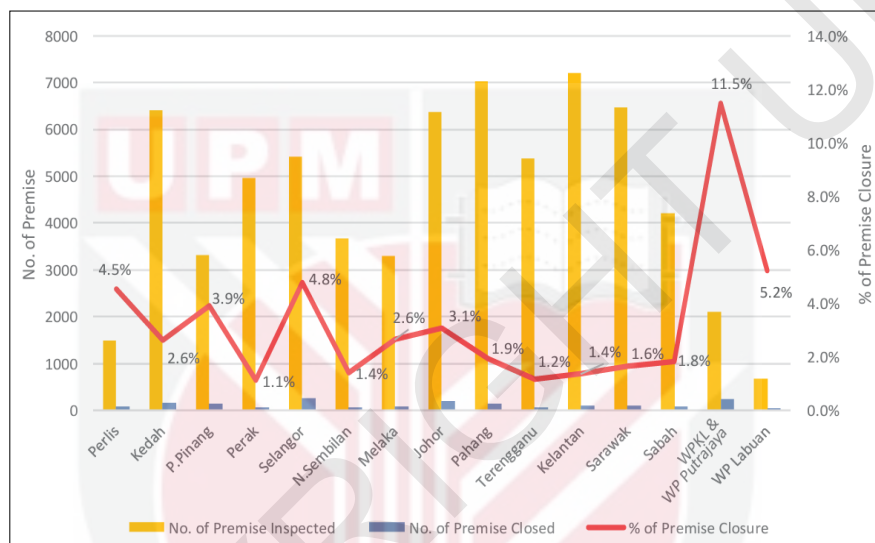


Figure 1.6: Number of Food Premises Inspection and Percentage of Food Premises Closure by State for 2020
(Source: MOH, 2020b)

1.7 Problem Statement

The trend of street food vending is escalating in Malaysia due to rapid urbanization, technological advancement, and an alarmingly increasing hasty lifestyle. The affordability, accessibility, and convenience of street foods are the main drivers of the rising popularity in Malaysia. The demand for street food is growing as people prefer RTE food due to the limited time to cook. People in urban areas tend to have street food because it is more reasonable during a tough economy hence making this sector bloom in Malaysia, especially in big cities with a high capacity of people. Despite its popularity, street food has been linked to foodborne illnesses and has been reported to be contaminated with pathogens due to the conditions under which it is sold. Street food vendors are typically found on the street and near public areas like bus stops, parks, and schools. Street food is also risky because it is frequently prepared and sold in filthy conditions with no sanitary supervision or legal control. Street foods are regarded as a major public health risk because of improper food handling.

The concept of street food vendors was open-air locations that exposed the food to the elements. RTE food purchases from street markets pose a serious threat to public health, especially because of the lack of proper sanitation. On the other hand, some vendors operate without a health certificate or license, putting the safety of the food produced at risk. Customers who could be exposed to foodborne illnesses are increasing along with the number of people eating street food. Therefore, it is critical to assess street food vendors' food safety practices to ensure that street food adheres to sanitary practices to protect public health.

Most foodborne outbreaks are caused by preventable food handler failures. Food handling malpractices, including temperature and exposure duration violations, as well as personal and environmental hygiene issues, have been identified as the most common FBI outbreak-contributing factors in several countries (Angelo et al., 2017; Hull-Jackson et al., 2019; Wu et al., 2018). Improper practices by street food vendors lead to food contamination, which causes food poisoning in those who consume it. Food handlers play a significant role in ensuring food safety because they serve the food directly to consumers. This is because many incidents have been reported in recent years because of eating street food. Street food vendors who had inadequate food safety knowledge tend to disregard safe practices during food handling because they are unaware of the consequences of their actions on consumers. Concerns have been raised as street food vendors have been linked to outbreaks of foodborne illnesses around the world.

The rising frequency of food poisoning has made food safety a top concern for consumers, particularly in Malaysia. People nowadays are concerned about the treatment of food from the time it is harvested until it is sold in markets. In Malaysia, the Food Act 1983, and the Food Hygiene Regulations 2009 have been enacted to improve food safety for consumers and aim to protect the public from risks to their health and fraud in the handling, distribution, and consumption of food, as well as other related issues. Foodborne diseases have also resulted in deaths in Malaysia, demonstrating that the authorities must enforce stricter enforcement to ensure that those involved in the street food industry adhere to all the standards and guidelines established by the authorities. Hence, to prevent serious cases of food poisoning in Malaysia, food safety must be addressed throughout the food supply chain.

Lacking food safety knowledge among street food vendors will pose improper food handling practices that could contribute to the occurrence of foodborne illnesses. Hence, food safety knowledge is considered an antecedent that will influence behavior by changing attitudes and later translate the food safety knowledge gained by implementing better food handling practices. Despite numerous studies on food safety have been conducted in Malaysia, most of the studies focus on the knowledge, attitude, and practices of food handlers in various settings such as canteens, residential colleges, and food service operations. However, studies on food safety practices among street food vendors are scarce. A few studies were conducted to investigate street food vendors. Therefore, understanding street food vendors' food safety knowledge, attitude, and practices is crucial to address the incidence of foodborne illnesses. Considering the above discussions, all issues raised are related to the external aspects that can influence foodborne diseases. Knowledge, attitude, and practices of street food vendors concerning food safety are driven by the fundamental practices of street food vendors to prevent food

contamination along with foodborne illnesses in Malaysia. Thus, it is necessary to understand the street food vendors' knowledge, attitude, and practices towards food safety that will inhibit food contamination and mishandling among street food vendors.

1.8 Research Questions

The research questions of the study were developed as follows:

- 1) What are the levels of food safety knowledge, attitude, and practices (KAP) among street food vendors?
- 2) What are the relationships between food safety knowledge, attitude, and practices (KAP) levels among street food vendors?
- 3) Are there any significant associations between demographic characteristics and food safety practices among street food vendors?
- 4) What is the most influential factor that influences food safety practices among street food vendors?

1.9 Objectives of the Study

The general objective of this study is to determine the knowledge, attitude, and practices (KAP) of street food vendors towards food safety.

The specific objectives of this study are as follows:

- 1) To determine the food safety knowledge, attitude, and practices (KAP) levels of street food vendors;
- 2) To examine the relationships between food safety knowledge, attitude, and practices (KAP) levels among street food vendors;
- 3) To determine the associations between demographic characteristics and food safety practices among street food vendors; and
- 4) To investigate the most influential factor that influences food safety practices among street food vendors.

1.10 Significance of the Study

This research will increase knowledge and information about improper food handling practices in the street food industry. The study will also help policymakers to gain a better understanding of good food safety practices that can prevent improper food handling among food handlers, and it will indirectly provide policymakers with early information to enhance and strengthen existing policies regarding the development of the street food industry. The findings of this study will assist local authorities, especially in Klang Valley area such as Kuala Lumpur City Hall (DBKL), Petaling Jaya City Council (MBPJ), and Subang Jaya City Council (MPSJ) in revising and tightening street vendor standards and guidelines in the future.

The study will also assist street food vendors in improving their food safety knowledge and indirectly implementing good food safety handling practices to prevent cross-contamination of the food that they serve. Street food vendors can also identify the best ways to manage food from raw materials to the end consumer. Furthermore, new street food vendors will obtain necessary information on regulations regarding street food vendors before beginning their business, as well as adhere to all the regulations established by the authorities for a better future for consumer health.

1.11 Operational Definition of Key Terms

Food handlers- As individuals who are actively involved in food preparation, come into contact with food or food contact surfaces, and handle packaged or unpackaged food, or appliances, in any food premises (Food Act 1983, 1983).

Food safety- Food safety encompasses all actions taken to ensure that all food is as safe as possible (WHO, 2016).

Foodborne diseases- Illness occurred due to consuming food contaminated with viruses, bacteria, parasites, chemicals, and allergens (Yu et al., 2021; Havelaar, 2015; Linscott, 2011).

KAP model- The KAP theory separates the process of changing a person's behavior into three phases: knowledge, developing attitudes and beliefs, and creating practices and behaviors (Xie et al., 2017).

Street food- Described as ready-to-eat foods and beverages prepared and/or sold by vendors or hawkers, mostly on streets and other related locations (WHO; 1996; FAO, 1989).

Street food vendors- A person that sells food from a temporary stall, structure, or cart in a street, lane, sidewalk, footpath, public park, market or fair, workplace, school, college, railway station, hospital, bus terminal, and industrial sites (Panwar & Garg, 2015; Muyanja, 2011).

1.12 Scope of Study

This study focused on street vendors that offer food or ready-to-eat (RTE) foods. The selection criteria for the respondents were narrowed to street food vendors in the Klang Valley area. The scope of the study covered the factors that influenced the food safety practices of street food vendors. The study also determined the associations between demographic characteristics and food safety practices of street food vendors. The street food vendors' food safety knowledge level, attitude level, and practices level were calculated based on the data collected from street food vendors in the Klang Valley areas. Face-to-face interviews were conducted with street food vendors using a structured questionnaire adapted from previous studies.

1.13 Organization of the Thesis

The thesis is organized into five chapters. The first chapter starts with Chapter 1, which discusses an overview of the food and beverage sector in Malaysia, issues with street food vendors, regulations on street food vendors, problem statements, research questions, and objectives of the study. Chapter 2 reviews the literature on past studies and information that are pertinent to the KAP study. The third chapter explains the research methodology used in conducting the study. These include the sampling techniques, data collection method, description area of study, and statistical analysis of the data. Chapter 4 will discuss the findings of the study to achieve the stated objectives. Finally, Chapter 5 addressed a summary of the findings, recommendations, limitations of the study, suggestions for future study as well as the conclusion of the study.



CHAPTER 2

LITERATURE REVIEW

The literature review provides reviews of relevant past studies to justify both the study's conceptual and theoretical frameworks. The review will be initiated by the theoretical framework used for the study. In this subsection knowledge, attitudes, and practices (KAP) of street food vendors are discussed. The following subsection provides an overview of food safety and street food vendors are reviewed in this chapter. The last subsection of the chapter presents a review of factors affecting food safety practices among street food vendors.

2.1 Knowledge, Attitude, and Practices (KAP) Model

After its origins in the fields of family planning and population studies in the 1950s, the Knowledge, Attitude, and Practices (KAP) model (figure 2.1) was established and acknowledged as a frequently used survey instrument in the field of social research (Andrade et al., 2020; Launiala, 2009). This model can be used to analyze the relationship between knowledge, attitude, and practices (Vandamme, 2009). KAP surveys were first used to understand African family planning attitudes in the 1960s and 1970s (Sarmiento et al., 2021; Launiala, 2009; Schopper et al., 1993). In response to the demands of the primary healthcare approach used by international aid organizations, the number of studies on community perspectives and human behavior rapidly increased at the same time (Launiala, 2009). Thus, KAP surveys gained a reputation as one of the techniques for examining health behavior, and they are still widely used to gather data on health-seeking behaviors today (Andrade et al., 2020; Hausmann-Muela et al. 2003; Manderson & Aaby 1992).

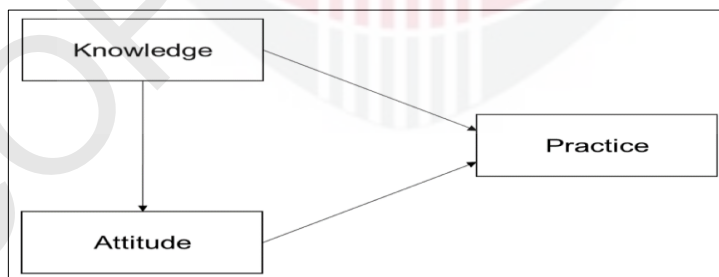


Figure 2.1: KAP Model
(Source: Zeng et al., 2019)

The KAP survey remains in use today for a variety of purposes: assessing public knowledge, attitude, and practices regarding social epidemics/disease (Sujarwoto et al., 2022; Ferreira Júnior et al., 2013; Turhan et al., 2010), vocational training (Chien-Yun et al., 2012; Wang et al., 2010), health and safety education (van Dijk et al., 2015;

Marzuillo et al., 2013; Nunes, 2009), and in livestock management (Grace et al., 2009). Indeed, the KAP model is one of the models that are most frequently utilized in the medical industry (Luo et al., 2022; Alzghoul & Abdullah, 2015). The Social Learning Theory (SLT) (Bandura & Walters, 1977) and the Diffusion of Innovation (DOI) were the inspirations for the KAP model method (Roger, 1995). According to Roger (1995), a social system's members accept innovation over time in four stages. Among the stages are knowledge gathering, persuasion, decision-making, and confirmation. Furthermore, Adimora and Schoenbach (2005) and Bandura and Walters (1977) proposed that social context influences individual behaviors.

The KAP survey is a representative study of a particular population to find out what people are aware of, believe, and act upon about a specific topic (AshaRani et al., 2020; Zahedi et al., 2014; WHO, 2008). It reveals what people believe (knowledge), feel (attitude), and do (practices). The KAP model, which has come to be associated with health education, assumes that a person's behavior is based on their knowledge and that just providing information will result in a change in attitude and therefore practices (Baş et al., 2006). The understanding (knowledge), beliefs (attitudes), as well as practiced (practices) of a target group are measured and evaluated using the KAP model, which is a structured, standardized questionnaire (Andrade et al., 2020; Nguyen et al., 2019). The KAP model data can therefore help in identifying knowledge gaps, attitude barriers, and practice patterns that may help people understand and act on a certain issue (Chang et al., 2021; WHO, 2008). Furthermore, one of the most influential theories for examining and explaining food safety practices is the KAP model (Zanin et al., 2017).

Furthermore, KAP is an essential component of behavioral change models (Liao et al., 2022; Singh et al., 2022; Wang et al., 2020). A positive or negative evaluation of an objective is referred to as an attitude (Ajzen & Fishbein, 2000). Regular acts that are impacted by widely held social norms and beliefs are referred to as practice (Bourdieu, 1990). Ahmed et al. (2021), Hashanuzzaman et al. (2020), and Rennie (1995) demonstrated that the KAP model assumes that a person's knowledge determines their practice, which immediately results in a change in attitude, and consequently, a change in practices. Hence, food safety studies commonly used the KAP approach. Numerous studies over the years used this model to investigate relationships between KAP (Letuka et al., 2021; Kwol et al., 2020; Isoni Auad et al., 2019; Asmawi et al., 2018; Bou-Mitri et al., 2018; Al-Shabib et al., 2016; Ismail et al., 2016; Kunadu et al., 2016; Abdullah Sani & Siow, 2014; Abdul-Mutalib et al., 2012). For instance, Asmawi et al. (2018) found that food handlers' handling behavior was significantly impacted by their lack of knowledge. Kwol et al. (2020) discovered that the KAP model functions well in the Nigerian context and validates its applicability globally in preventing the spread of epidemic foodborne diseases.

According to the KAP model, a person's attitude, and knowledge toward a practice (behavior) will determine that behavior hence people with a high level of knowledge and a positive attitude toward behavior will have an effective practice (Kwol et al., 2020; Ruby et al., 2019b; Kunadu et al., 2016; Alzghoul & Abdullah, 2015; Abdullah Sani & Siow, 2014).

2.2 Knowledge

Knowledge is gained from both education and experience. Knowledge is the conscious and non-symbolic sense of meaning derived from information (Wessman, 2007). There are four types of knowledge, according to Hulme (2018) and Nguyen et al., 2014: (i) scientific and social scientific knowledge; (ii) local knowledge; (iii) tacit knowledge; and (iv) self-reflective knowledge. Indeed, many initiatives to prevent foodborne diseases have centered on education (Soon et al., 2011; Milton & Mullan, 2010), believing that an absence of food safety knowledge is the reason for poor food hygiene behavior (Lestantyo et al., 2017; Siau et al., 2015; Griffith et al., 1998). According to research, operational infractions, which raise the likelihood of foodborne disease outbreaks, are linked to a lack of food safety knowledge (Al-Shabib et al., 2016; Woh et al., 2016). Lack of knowledge is also seen as a major barrier to implementing food safety initiatives as well as a significant driver of the growth in foodborne diseases (Walker et al., 2003). This interpretation received mixed support from relevant studies (Mullan et al., 2013). Abbot et al. (2009) highlighted knowledge as the most critical predictor of compliance with safe food handling and is limited, particularly among young food handlers (Giritlioglu et al., 2011; Osaili et al., 2011).

Diseased food handlers and their unhygienic food handling methods have been linked to numerous foodborne outbreaks (Akabanda et al., 2017; Soon et al., 2011; McCabe-Sellers et al., 2004). Thus, food handlers are essential in lowering the frequency of food poisoning, but this reduction will only be possible if they have a good knowledge of safety, a positive attitude, and hygienic practices for preparing and storing food (Yusof et al., 2018; Redmond & Griffith, 2003). As mentioned by Rane (2011) and Garin (2002), inadequate knowledge and awareness about food safety risks of street food vendors will have an impact on public health. Hence, knowledge, attitude, and behavior or practice all have crucial functions in preventing foodborne diseases. This is because changes in individuals' levels of knowledge lead to alterations in their attitudes, behaviors, and practices within their surroundings (McGlade & Pierscionek, 2013; Blackmore, 2007).

Numerous studies have been done in Malaysia on food safety knowledge among students (Norazmir et al., 2012; Abd Patah et al., 2009), abattoir workers (Abdullahi et al., 2016), canteen, food court, or restaurant food handlers (Asmawi et al., 2018; Bin, 2016; Siau et al., 2015; Abdullah Sani & Siow, 2014; Rosnani et al., 2014; Abdul-Mutallib et al., 2012) and food vendors (Wan Nawawi et al., 2022; Jores et al., 2018; Shafiee et al., 2018; Ismail et al., 2016; Rahman et al., 2016). Learning about food safety knowledge is one of the most crucial steps in trying to lower the incidence of foodborne diseases, but even more crucial is the translation of knowledge into practice. This is because street food handlers who had above-average food safety knowledge hardly applied it when handling food (Clayton et al., 2002). According to Abdullah Sani and Siow (2014), food vendors play a significant role in food contamination. The issue is that untrained street and workplace food vendors may have a low degree of food safety awareness regarding food quality control norms, such as sanitary and hygienic operational standards.

Knowledge influences behavior indirectly through its impact on attitude and beliefs (Nguyen et al., 2019) and may be an important factor in understanding the relationship

between attitude and practices (Zanin et al., 2017). Hence, the level of food safety knowledge of food handlers may have a favorable effect on their attitude, which is then transformed into practices regarding the safe handling of food. According to Kwol et al. (2020), food handlers' attitude and, eventually, their practices of personal hygiene, kitchen hygiene, and disease control measures are affected by their knowledge. While Angelillo et al. (2000) mentioned food handlers who are knowledgeable about safe food handling practices could be able to reduce the number of cases of food poisoning as they often have direct contact with food, especially RTE meals.

Asmawi et al. (2018) demonstrated that food handlers' poor safety knowledge negatively influenced their handling behavior, but both training and experience could mitigate this effect. Apart from adequate knowledge and strict enforcement, food handlers' right attitude can also help to reduce the outbreaks of foodborne diseases (Abdullah Sani & Siow, 2014). Furthermore, according to Mohd Azaman et al. (2016), knowledge and attitude are essential factors in ensuring proper action among consumers if it is related to health. With knowledge and a positive attitude, food handlers will foster the sustainability of food safety handling practices and ensure better quality and safe products for consumers (Campos et al., 2009). However, it has been argued that knowledge alone does not result in positive changes in food handling practices (Madaki & Miroslava, 2021; Abdullah Sani & Siow, 2014; Soares et al., 2012; Buccheri et al., 2010; Park et al., 2010). Numerous studies support this argument and decided that increased food safety knowledge does not always result in the implementation of good hygiene practices (Ansari-Lari et al., 2010; Buccheri et al., 2010; Park et al., 2010). Significant obstacles including time restraints, a lack of employees, the negative attitude of workers and supervisors, as well as structural issues like the availability of facilities and supplies, may be at fault (Läikkö-Roto & Nevas, 2014; Soares et al., 2012). However, it is considered that if food handlers were trained will provide them with greater information and, as a result, better practices (da Cunha, 2021). Moreover, food safety knowledge has a significant impact on food safety attitude and practices of food handlers (da Vitória et al., 2021). In conclusion, food safety knowledge is the foundation for improving the quality of food safety practices.

2.3 Attitude

Attitude could be expected to perform behavior indicates that this variable has a component, which is the belief in the consequences of the behavior (behavioral belief). For instance, an individual has a favorable and unfavorable attitude or appraisal of the behavior in question (Ajzen, 1991). Finlay et al. (1999) proposed that to measure attitude means to ask how much an individual likes or dislikes to perform a behavior. The attributes linked to the behavior are already valued both favorably and unfavorably, resulting in the simultaneous development of an attitude towards the behavior (Ajzen, 1991). Additionally, it has been suggested that attitude may affect a person's intention to engage in a particular behavior or practice (Quine et al., 2002; Fishbein & Ajzen, 1975). Furthermore, attitude reveals how much effort consumers make to adhere to safe food handling procedures (Howe & Krosnick, 2017; Bai et al., 2014). Therefore, an individual does have a favorable attitude, which he or she believes to have great desirable consequences while unfavorable attitudes toward behavior believe to have largely undesirable consequences (Ajzen, 1991).

The degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question is referred to as their attitude (Ajzen, 1991) and is used to measure an individual's specific behavior (Russell et al., 2017). For the objective of the study, attitudes refer to food handlers' habitual behaviors toward food safety practices as suggested by Kwol et al. (2020). A positive attitude implies a disposition to act on food safety knowledge to ensure food is safe for all (Akabanda et al., 2017). Attitude is another significant factor that can influence food safety behavior and practices, thereby reducing the incidence of foodborne diseases (Kwol et al., 2020; Al-Shabib et al., 2016; Abdullah Sani & Siow, 2014; Aziz & Dahan, 2013).

Additionally, it has been proposed that attitude can influence a person's intention to participate in a specific behavior or practice (Ukenna & Ayodele, 2019; Quine et al., 2002; Bagozzi, 1992). As a result, they are correlated to practices. For instance, someone is more likely to wash their hands if they have a positive attitude toward doing so (Simelane, 2005). According to Asmawi et al. (2018), individuals handling food would demonstrate positive and good food safety practices if they had a positive attitude and adequate safety knowledge. Lim et al. (2016) discovered Bum Bum Island community of Semporna, Sabah, Malaysia just used only one cutting board for all-purpose and just wash knives with water without disinfectant, indicating a poor attitude towards washing knives.

Furthermore, several studies have discovered a significant correlation between food safety knowledge and food safety attitude (Putri et al., 2021; Elobeid et al., 2019; Asmawi et al., 2018; Al-Shabib et al., 2016; Kunadu et al., 2016; Abdullah Sani & Siow, 2014; Cuprasitrit et al., 2011), others have found no correlation between the two (Soares et al., 2012; Omemu & Aderoju, 2008). It indicates that knowledgeable food personnel with adequate information on food safety will also be good food preparation and service practitioners. Because attitude encompasses beliefs, behaviors, values, and dispositions, food handlers' attitude is directly associated with their actual practices of hygienic practices (Kwol et al., 2020). In terms of the relationship between attitude and practices, Ajzen (1991) proposed that if a person has positive attitudes and behaviors, she or he will have a more motivating intention toward an issue.

A favorable attitude is crucial in making the transition from food safety knowledge to effective hygienic practices (Kwol et al., 2020) since attitude is an intermediary between knowledge and practices (Kwol et al., 2020; Zanin et al., 2017). Thus, the training should be focused on shaping handlers' attitude in ensuring the handlers understand how to apply knowledge for efficient practices (Zanin et al., 2017).

2.4 Practices

Personal hygiene is crucial to ensure safe food production for consumers (Abdullah Sani & Siow, 2014). Practice refers to everyday habitual activities that are regarded as societal norms and widely shared (Bourdieu, 1990; de Certeau, 1984). Rather than being founded on conscious choices and preferences, practice is frequently evident in tacit knowledge or articulate know-how (Turner, 1994). Practices are the recurring systematic activities

that people engage in to complete their tasks (Schatzki, 2005). Several studies have reported on the food safety knowledge, attitudes, and practices of food handlers, together with street food vendors in some countries, including Pakistan (Ahmed et al., 2021), Turkey (Kılıçhan et al., 2020; Giritlioglu et al., 2011; Baş et al., 2006), Vietnam (Nguyen et al., 2018; Vo et al., 2015), Canada (McIntyre et al., 2013), China (Zhang et al., 2015; Liu et al., 2014), Qatar (Elobeid et al., 2019), Ethiopia (Azanaw et al., 2021), Indonesia (Putri et al., 2021; Cempaka et al., 2019), Haiti (Samapundo et al., 2015), Saudi Arabia (Al-Shabib et al., 2016; Sharif et al., 2010), Kuwait (Al-Kandari et al., 2019), Iran (Ansari-Lari et al., 2010), Nigeria (Kwol et al., 20120; Aluko et al., 2014; Chukuezi, 2010), Italy (Buccheri et al., 2010), Ghana (Tuglo et al., 2021; Akabanda et al., 2017; Kunadu et al., 2016) and Brazil (Isoni Auad et al., 2019; Rebouças et al., 2017; da Cunha et al., 2014; Soares et al., 2012). The KAP scores of food handlers in Vietnam (Vo et al., 2015) were low when compared to similar studies conducted in Malaysia (Tan et al., 2013; Abdul-Mutalib et al., 2012; Siow & Abdullah Sani, 2011, as well as in Brazil (Soares et al., 2012), Saudi Arabia (Sharif et al., 2010), Kuwait (Al-Kandari et al., 2019) and Canada (McIntyre et al., 2013).

Studies in Kuwait, Qatar, Indonesia, Ghana, and Vietnam showed a positive relationship between KAP of food handlers (Al-Kandari et al., 2019; Elobeid et al., 2019; Cempaka et al., 2019; Kunadu et al., 2016; Vo et al., 2015). However, a study in Iran (Ansari-Lari et al., 2010) showed that knowledge and attitude have a positive relationship, nevertheless, there was a negative relationship between knowledge and practices, and attitude and practices. This indicates that improvements in food handling practices may not always result from increased food safety knowledge or even attitude. On the contrary, there was no relationship between KAP as observed in Brazil (Soares et al., 2012). Furthermore, Kunadu et al. (2016) emphasized the importance of hand washing as a vital food safety practice and Todd et al. (2009) deemed hand hygiene more important than cleaning and disinfecting environmental surfaces in controlling infections. Moreover, food handlers' hands have been implicated in several studies as an important method of disease transmission in food premises (Baş, 2006; Montville et al., 2001; Taylor, 2000). Hence, a lack of knowledge on this matter may result in poor hygiene practices among food handlers (Çakiroğlu & Uçar, 2008).

Given that numerous studies have demonstrated the prevalence of harmful microbes on food workers' hands and make these individuals a crucial vehicle for the spread of foodborne diseases (Githiri et al., 2013; Soares et al., 2012; Allwood et al., 2004). As a result, most cases of foodborne disease are caused by improper handling, which includes improper temperature control during food preparation and storage, insufficient equipment, cross-contamination, as well as poor personal hygiene (Rebouças et al., 2017; Sharifa Ezat et al., 2013; FAO, 2011). Improper food handling may be the root cause of illness transmission, putting the most vulnerable people in danger, including children, the elderly, and pregnant women (Ruby et al., 2019a; Jouve et al., 2010). Failure to treat such disorders may result in death (Cook et al., 2018; Cassini et al., 2016; Lund, 2015).

According to Abdullah Sani and Siow (2014), when food handlers have adequate knowledge of food safety, they become knowledgeable about its practices, and they turn such knowledge during food preparation and service in the food processing area. Furthermore, Zanin et al. (2015) and Abdullah Sani and Siow (2014) discovered that

nearly 87% of food handlers did not touch food while their hands were wounded, and approximately 82% stored cooked and raw food in the fridge to prevent spoilage. Al-Shabib et al. (2016) and Angelillo et al. (2000) found that the majority of food handlers were aware that if they had cuts on their hands or fingers, they should not handle food. According to Ahmed et al. (2021) and CAC (2003), food handlers who are ill should not be allowed to work or handle food because they are responsible for spreading the disease.

However, despite the positive relationship between the level of knowledge, attitude, and practices (Al-Kandari et al., 2019; Elobeid et al., 2019; Dudeja et al., 2017; Kunadu et al., 2016; Vo et al., 2015; Abdullah Sani & Siow, 2014), some studies argued that a value-action gap exists where many food handlers do not constantly apply the food safety knowledge they gained throughout the actual food handling (Pacholewicz et al., 2016; Abdullah Sani & Sani, 2014; Pilling et al., 2008; Clayton et al., 2002). In other words, food handlers frequently had adequate food safety knowledge principles, however, they decided not to apply them. It was also argued that although knowledge alone is insufficient to change practices, food handlers with adequate knowledge may find it easier to change their practices if they are closely supervised and supported by their on-site managers (Roberts et al., 2008; Green et al., 2007) could improve attitude (Tones & Tilford, 2001) and practices (Siow & Abdullah Sani, 2011; Egan et al., 2007). In conclusion, this is considered a matter of attitude instead of knowledge. Since attitude serves as a mediator between knowledge and practice (Kwol et al., 2020; Zanin et al., 2017) and hence, this highlights the importance of training that concentrates on attitude, theoretical and practical knowledge to ensure better implementation of the theoretical principles (Zanin et al., 2017).

2.5 Associations between Demographic Characteristics and Food Safety Practices

Previous studies have found associations between the demographic characteristics of street food vendors or food handlers with food safety and hygiene practices (Ahmed et al., 2021; Mohamad Fauzi & Abdul-Mutalib, 2021; Tuglo et al., 2021; Kwol et al., 2020; Woh et al., 2016; Lawan et al., 2015; Siau et al., 2015). Ahmed et al. (2021) and Mohamad Fauzi and Abdul-Mutalib (2021), concluded in their studies that age was associated with food safety practices among food handlers in Pakistan and Malaysia, respectively. Young food handlers (26-35 years) in Ireland were found to be more knowledgeable about standard food safety standards, which could be attributed to increased exposure and commitment to studying food practices (Moreb et al., 2017). This could be because as food handlers get older, they will get more experience in their field, which will reflect in their hygienic habits in the workplace (Mohamad Fauzi & Abdul-Mutalib, 2021).

Apart from that, studies in various countries including Malaysia (Ahmed et al., 2021; Mohamad Fauzi & Abdul-Mutalib, 2021; Hossen et al., 2021; Tuglo et al., 2021; Cempaka et al., 2019; Lawan et al., 2015; Siau et al., 2015) revealed that level of education was significantly correlated with practices. A study conducted in Vietnam by Vo et al. (2015) concluded that the level of education had a significant impact on food

handlers' food safety knowledge and food safety practices. Food handlers' education had a significantly favorable impact on food handlers' knowledge. Thus, food handlers with a high education background have more food safety knowledge and practices.

In addition, demographic characteristics such as the level of education and food safety training that food handlers have received, as well as adequate knowledge and positive attitudes regarding food safety, all play a crucial role in encouraging food handlers to adhere to proper food handling practices (Al-Shabib et al., 2016; Abdullah Sani & Siow, 2014). Jores et al. (2018) and Abdul-Mutalib et al. (2012) found that attitude had a significant association with food safety practices among food handlers. The study results conducted in Turkey by Kılıçhan et al. (2020) showed that practices for food safety can be explained by attitude towards food safety, where chefs who had better attitudes were 0.567 times more likely to practice good food safety practices.

Food safety knowledge was discovered to have an association with food safety practices (Jores et al., 2018; Abdul-Mutalib et al., 2012). Food handlers in Indonesia with a good level of food hygiene knowledge tend to be 3 times more likely to obtain good levels of practice compared to food handlers with a moderate level of food hygiene knowledge, and trained food handlers tend to be twice times as obtain good practice levels compared to food handlers who have not or have never attended training (Cempaka et al., 2019). This finding supports the evidence that receiving adequate knowledge can enhance food hygiene practices when producing food.

Tuglo et al. (2021) revealed that street-cooked food handlers in Ghana with greater average monthly income were 4.9 times more likely to practice good food safety and hygiene than those with fewer average monthly income and registered street-cooked food handlers were 7.5 times more likely than unregistered street-cooked food handlers to have good food safety and hygiene practices as well as, street-cooked food handlers who attend food safety training course were 6 times more likely to practice good food safety and hygiene compared to those who had no attend food safety training. Mohamad Fauzi and Abdul-Mutalib (2021) also found that monthly income was significantly correlated with food safety practices. It is argued that as income increases, better facilities, and equipment to aid in proper hygiene practice can be provided (Mohamad Fauzi & Abdul-Mutalib, 2021; Adane et al., 2018). Furthermore, another study conducted in Ethiopia revealed that food handlers with a greater monthly salary practiced excellent food handling practices (Tessema et al., 2014).

According to Rebouças et al. (2017) and Abdullah Sani and Siow (2014), most food handlers who had good food safety knowledge believed it was due to food safety training. Personal hygiene education alone will not ensure the correct application of food safety knowledge, food safety attitude, and food safety. Hence, hands-on training and regular training programs are crucial for improving overall food safety (Mallhi et al., 2019; Abdul-Mutalib et al., 2012). Employees' food safety practices can be improved through food safety training (Pilling et al., 2008). Findings from Al-Shabib et al. (2016) and Çakıroğlu and Uçar (2008) discovered about 80%-97% of food handlers regularly wore hand gloves, masks, and caps during handling food, this could be a consequence of employing food safety training programs for food handlers. According to previous

studies, food handler training is critical to producing safe food (McIntyre et al., 2013; Sharif & Al-Malki, 2010; Santana et al., 2009).

Studies from Tuglo et al. (2021), Addo-Tham et al. (2020), Al-Kandari et al. (2019), Suryani et al., (2019), and Woh et al. (2016) discovered that training had an association with food safety practices among food handlers. Food safety training can lead to enhanced attitude and improved food handling techniques that lead to consumer-safe food management (Putri et al., 2021). Training should encourage favorable attitude toward food safety and promote appropriate food safety practices, as well as theoretical and practical understanding (Al-Kandari et al., 2019).

However, several authors argued that training programs can improve food handlers' knowledge of food safety, encourage a positive food safety culture, and lower the risk of disease transmission (McIntyre et al., 2013; Soares et al., 2012; Sarter and Sarter, 2012). Adequate food safety training also would be beneficial to food handlers to reduce foodborne diseases and develop positive attitudes towards practices of food safety knowledge (Soon et al., 2011; Powell et al., 2011). The beneficial effects of training on food safety knowledge are well documented in the literature (Elobeid et al., 2019; da Cunha et al., 2014; McIntyre et al., 2013). A study by Samapundo et al. (2015) for example revealed that food handlers' knowledge scores and average attitude scores were significantly higher for those who attend training compared with untrained handlers. This is consistent with other studies that showed food handlers with training scored higher than food handlers without training (McIntyre et al., 2013; Park et al., 2010; DeBess et al., 2009; Hislop & Shaw, 2009; Naing et al., 2007). A study in Ghana discovered that street-cooked food handlers who joined food safety training courses were 6 times more likely to have excellent food safety and hygiene practices than those who had not (Tuglo et al., 2021). Contrary, da Cunha et al. (2014) found that theoretical training is unrelated to the attitude, self-reported practices, and observed practices of food handlers from various food services in Brazil. However, the authors agreed that training appears to be an effective program for knowledge expansion.

Nik Husain et al. (2016) investigated the impact of food safety training on the knowledge and practices of Malaysian food handlers. The findings revealed that food safety training improved food safety knowledge. Furthermore, it was discovered that food safety training resulted in better food safety practices among participants. According to Adesokan et al. (2015), respondents with more up-to-date food safety knowledge demonstrated significant improvement in food safety knowledge and practice when compared to those with less up-to-date training. This finding suggests that favorable attitude towards food safety led to better food safety practices and that this relationship improves as the number of people who receive food safety training grows (Aquino et al., 2021). These results contradict prior studies where food safety training was found to lead to better food safety knowledge and practices (Nik Husain et al., 2016; Adesokan et al., 2015). Based on the above discussions, it can be concluded that the demographic characteristics of street food vendors have an association with food safety practices.

2.6 Summary

This chapter discusses the theoretical framework used in this study. The KAP Model is discussed to understand the idea of knowledge, attitude, and practices of food safety among food handlers. The knowledge, attitude, and practices (KAP) are the significant model in understanding street food vendors to minimize foodborne disease occurrence. Literature reviews show other factors that have an association with food safety practices among street food vendors such as demographic characteristics variables. In the street food industry, street vendors' knowledge, attitude, and practices are crucial in controlling food contamination that causes the occurrence of foodborne diseases.



CHAPTER 3

METHODOLOGY

This chapter explains the methodology used in this study to fulfill the objectives of the study. The methodology consists of a conceptual framework, sources of data, data collection, and analysis of data used in this study. As for the questionnaire development process, a pilot study is also discussed as the process is vital to improve the questionnaire design. Several data analysis techniques used in the study including descriptive analysis, Pearson correlation analysis, Chi-square analysis, and logistic regression analysis will also be discussed in this chapter.

3.1 Conceptual Framework

To learn what people think, believe, and do about a given subject, the KAP survey is a representative study of a particular population (AshRani et al., 2020; Zahedi et al., 2014). Additionally, the KAP model assumes that an individual's knowledge determines their practices, which immediately results in a change in attitude and, as a result, a change in practices (Ahmed et al., 2021; Hashanuzzaman et al., 2020; Rennie, 1995). Past researchers have the same opinion that food handlers need to be knowledgeable about food safety and be able to apply that knowledge while handling food, even though researchers found a variety of factors influencing food handling behavior (Mortlock et al., 2000). The KAP model was commonly applied to explain and study food safety because KAP is a crucial element of behavioral change models (Liao et al., 2022; Singh et al., 2022; Wang et al., 2020; Zanin et al., 2017).

The conceptual framework in this study is established based on the Knowledge, Attitude, and Practices (KAP) Model, and it is based on the theoretical foundation offered by the TPB and earlier empirical research. The conceptual framework demonstrates the relationship among the examined variables wherein in this study it consisted of several independent variables such as knowledge, attitude, and demographic characteristics. These variables were employed to explain the dependent variable which is the street food vendors' practices towards food safety. Figure 3.1 presents the conceptual framework of the study that was adapted from Kwol et al. (2020) and Abdullah Sani and Siow (2014).

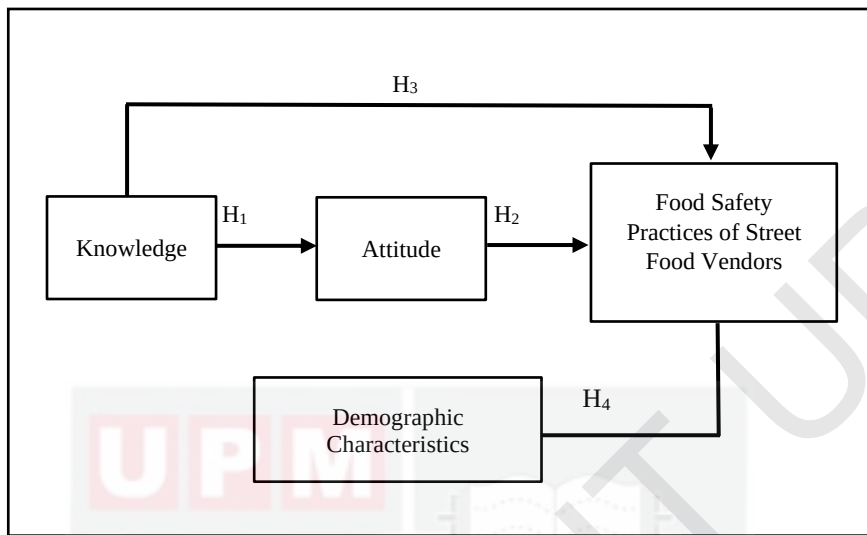


Figure 3.1: Conceptual Framework of Food Safety Practices of Street Food Vendors
(Source: Adapted from Kwol et al., 2020; Abdullah Sani and Siow, 2014)

The conceptual framework of the study consists of three independent variables, namely knowledge, attitude, and demographic characteristics, while food safety practices were treated as the dependent variable of the study. The conceptual framework demonstrates how the independent variables namely knowledge, attitude, and demographic characteristics affect the dependent variable, which is how street food vendors implement food safety practices. It also demonstrates how street food vendors' attitudes towards food safety practices will change as they gain knowledge (Kwol et al., 2020). Attitudes, in turn, will lead to food safety practices among street food vendors (Kwol et al., 2020; Akabanda et al., 2017; Bin, 2016; Abdullah Sani & Siow, 2014).

3.1.1 Hypothesis Development

The first hypothesis of the study was to determine the relationship between food safety knowledge and attitude level among street food vendors. Knowledge indirectly influences behavior through its impact on attitudes and beliefs and is a significant aspect of understanding the relationship between attitudes and behaviors (Nguyen et al., 2019; Zanin et al., 2017). According to Kwol et al. (2020), knowledge influenced food handlers' attitudes and subsequently, their practices of personal cleanliness, kitchen hygiene, and disease prevention measures. As a result, food handlers' level of food safety knowledge may have a positive effect on their attitude, which is subsequently translated into safe food handling behaviors. Because attitudes include beliefs, behaviors, values, and dispositions, the attitude of food handlers is directly associated with their actual sanitary practices (Kwol et al., 2020). Several researchers also found that food safety knowledge influenced attitudes and practices (Al-Kandari et al., 2019; Elobeid et al., 2019; Cempaka et al., 2019; Aswawi et al., 2018; Al-Shabib et al., 2016; Kunadu et al., 2016; Siau et al., 2015; Vo et al., 2015; Abdullah Sani and Siow, 2014; Abdul-Mutalib

et al., 2012; Soares et al., 2012; Ansari-Lari et al., 2010). Furthermore, relevant studies discovered an association between food safety knowledge and food safety attitude (Putri et al., 2021; Elobeid et al., 2019; Asmawi et al., 2018; Al-Shabib et al., 2016; Kunadu et al., 2016; Abdullah Sani & Siow, 2014; Cuprasitrit et al., 2011). Other studies also showed a positive relationship between knowledge, attitude, and practices of food handlers (Al-Kandari et al., 2019; Elobeid et al., 2019; Cempaka et al., 2019; Kunadu et al., 2016; Vo et al., 2015). When food handlers have adequate knowledge of food safety, they become knowledgeable about its practices, and they applied such knowledge during food preparation and service in the food processing area (Abdullah Sani & Siow, 2014). Hence, this study proposed there is a relationship between food safety knowledge, attitude, and practices.

Demographic characteristics namely gender, age, race, religion, marital status, education level, business ownership, operation hour, food handling experience, type of stalls, number of workers, monthly revenue, license, food safety training, and typhoid injection influenced the food safety practices of street food vendors. Based on previous studies, demographic characteristics associated with street food vendors' food safety practices (Tuglo et al., 2021; Addo-Tham et al., 2020; Mukherjee et al., 2018; Woh et al., 2016; Siau et al., 2015).

Thus, from the above discussions, four (4) hypotheses were developed in this study, and they are stated in Table 3.1.

Table 3.1: Hypotheses of the Study

Variables	Hypothesis	Hypotheses Explanation	Source
Knowledge (H ₁)	H ₀	There is no significant relationship between food safety knowledge and attitude level among street food vendors.	Putri et al. (2021); Elobeid et al. (2019); Asmawi et al. (2018); Al-Shabib et al. (2016);
	H ₁	There is a significant relationship between food safety knowledge and attitude level among street food vendors.	Kunadu et al. (2016); Abdullah Sani & Siow (2014); Cuprasitrit et al. (2011)
Attitude (H ₂)	H ₀	There is no significant relationship between food safety attitude and practices level among street food vendors.	Kwol et al. (2020); Ukenna & Ayodele (2019); Asmawi et al. (2018); Al-Shabib et al. (2016); Abdullah Sani & Siow (2014); Aziz & Dahan (2013)
	H ₂	There is a significant relationship between food safety attitude and practices level among street food vendors.	
Practices (H ₃)	H ₀	There is no significant relationship between food safety knowledge and practices level among street food vendors.	Al-Kandari et al. (2019); Elobeid et al. (2019); Dudeja et al. (2017); Kunadu et al. (2016); Vo et al. (2015); Abdullah Sani & Siow (2014)
	H ₃	There is a significant relationship between food safety knowledge and practices level among street food vendors.	

Table 3.1: Continued

Demographic Characteristics (H4)	H ₀	There are no significant associations between demographic characteristics and food safety practices among street food vendors.	Ahmed et al. (2021); Tuglo et al. (2021); Addo-Tham et al. (2020); Al-Kandari et al. (2019); Cempaka et al. (2019); Jores et al. (2018); Woh et al. (2016); Lawan et al. (2015); Siau et al. (2015)
	H ₄	There are significant associations between demographic characteristics and food safety practices among street food vendors.	

3.2 Sources of Data

There are two types of data sources used in this study namely primary and secondary data to gather all the information needed. However, the data used in the respective analyses were derived from primary data collection, collected from street food vendors via self-administered questionnaires.

3.2.1 Primary Data

Primary data are described as the original data obtained or recorded directly by the researcher for a specific purpose via surveys, interviews, and direct observations. Experiments, social surveys, qualitative research, and solicited and spontaneous data are a few examples of primary data collection methods (Hox & Boeije, 2005). The primary data for this study were collected using a social survey method, where the data were obtained through a survey based on face-to-face interviews using a structured questionnaire. Structured questionnaires were distributed to 268 street food vendors in the Klang Valley area. The data collection was conducted between September and December 2021.

3.2.2 Secondary Data

Secondary data is essential in many fields of study, including social sciences (Salkind, 2010). Secondary data, according to Hox and Boeije (2005), is material or information created by other researchers that is easily accessible for use as references by the general research community. Secondary data can be classified as information that has been collected and is readily available from other sources of data. Official data archives from government websites such as 1) Ministry of Health Malaysia (MOH) - data on foodborne diseases cases in Malaysia; 2) Department of Statistics Malaysia (DOSM) - data on the contribution of the food and beverage service Malaysia; and 3) World Health Organization (WHO) - data on foodborne outbreaks worldwide. Furthermore, data were gathered from a variety of sources, including previous journals and articles, to compare the data in this study to data from previous studies.

3.3 Data Collection

This section explains how data collection was conducted by identifying the location, targeted respondents, selection of sample size, and questionnaire design to gather all the information needed to achieve all the stated objectives.

3.3.1 Location of the Study

Klang Valley was chosen as a research area because it is located in the heart of Kuala Lumpur and consists of several large cities and towns known as Metropolitan cities. The regional planning study in 1973 led to the creation of Klang Valley (Shankland et al. 1973). According to Abdul Rashid (2017), Klang Valley is one of the most developed areas in Malaysia. Rapid net migration and rural-urban migration have both directly contributed to the region's ongoing and rapid population increase (Abdul Rashid et al., 2014). This area is made up of the Federal Territory of Kuala Lumpur, Gombak, Petaling, Klang, and Hulu Langat. Klang Valley is located in the central part of the West Coast of Peninsular Malaysia with an area of approximately 2,832 square kilometers (Abdul Rashid, 2017), and it has the highest population growth in Malaysia, with roughly 8 million people in 2020.

For administrative purposes, eight (8) local authorities administer the region:

- 1) Kuala Lumpur City Hall (DBKL)
- 2) Kajang Municipal Council (MPKJ),
- 3) Ampang Jaya Municipal Council (MPAJ),
- 4) Selayang Municipal Council (MPS),
- 5) Shah Alam City (MBSA),
- 6) Petaling Jaya City (MBPJ),
- 7) Subang Jaya Municipal Council (MPSJ),
- 8) Klang Municipal Council (MPK).

This area represents the overall development growth of Malaysia. Hence, Klang Valley was selected as a study area due to its concentrated population which may represent Malaysia. The number of street foods available became one of the reasons why Klang Valley was chosen for this study.

3.3.2 Sampling Design

Purposive sampling was used in this study to identify the target respondents. Purposive sampling is a method for gathering information from a particular group of people in which respondents are chosen based on the specifications and goals of the study (Saabar & Ibrahim, 2014). The samples are chosen based on the researcher's assumption that the

population possesses the necessary characteristics to provide the research with the necessary information (Kumar, 2011). Purposive sampling is also known as judgment, selective, or subjective sampling (Lavrakas, 2008; Palys, 2008; Tongco, 2007) and is one of the non-probability sampling methods that are commonly used in research (Tongco, 2007; Guarte & Barrios, 2006). The respondents in this study were selected based on the criteria of- 1) food handlers that are involved in the street food business; and 2) street food vendors that actively participate in food handling.

As for sampling technique, Uakarn et al. (2021) suggested that Cochran's (1977) formula is suitable to use if:

- i) the population size is unknown, but the number is large,
- ii) the population proportion is known, or the population size is unknown,
- iii) the population proportion is unknown, or the population size is unknown, and
- iv) the population mean is estimated, or the population size is known, and the population proportion is estimated.

Since there is no exact data on the amount of Malaysian street food vendors available, Cochran's formula was used to calculate the number of targeted respondents. Therefore, the sample size was determined using the following Cochran's formula:

$$n = \frac{z^2(pq)}{e^2} \quad \text{Equation 1}$$

$$n = \frac{1.96^2(0.5)(0.5)}{0.05^2}$$

$$n = 384.16$$

$$n = 385$$

n = sample size

p = the population proportions

q = 1-p

e = acceptable sampling error (e = 0.05)

z = z value at reliability level or significance level

Reliability level 95% or significance level 0.05; z = 1.96

The level of confidence indicates the likelihood that the sample portion accurately reflects the population. The margin of error for this study was 0.05, according to the 95% confidence level. Margin error can be described as the error in statistics calculation caused by uncertainty while collecting data, as well as the radius of the statistics' confidence interval. Margin error is synonymous with sampling error in general, such as biased sampling. Using the above formula, 385 respondents are required to achieve a 95% confidence level. However, if the population being studied is small, changes can be made by using a correction for a finite population (Addo-Tham et al., 2020). Using the new population size provided by DBKL, where the list of street food vendors in the

DBKL database was 876, the new sample size was determined in equation 2, resulting in a total of 268 street food vendor respondents needed for the study.

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}} \quad \text{Equation 2}$$

$$n = \frac{385}{1 + \frac{(385 - 1)}{876}} = 268$$

where:

n_0 = Cochran's sample size recommendation

N = population size

n = new, adjusted sample size

3.3.3 Questionnaire Design

For data collection, a structured questionnaire was designed based on the research objectives and the literature review. The actual questionnaire used in the study is appended in Appendix 1. To avoid misunderstanding and misinterpretation of the questions, the questionnaire was prepared in both Malay and English versions. Both open-ended and closed-ended formats were prepared in the questionnaire. The structured questionnaire was divided into four sections, Section A for demographic characteristics questions. As for Sections B, C, and D, the statements established were based on a 3-Point Likert Scale (Sections B and D) and a 5-Point Likert Scale (Section C).

i) Section A: Demographic Characteristics

Section A consisted of questions on the demographic characteristics of street food vendors. The questions in this section were created to describe the demographic characteristics of the respondents, such as gender, age, race, religion, marital status, educational level, business ownership, operation hour, experience in food handling, types of stalls, number of workers, monthly revenue, license, food safety training, and typhoid injection. The questions were both open-ended and closed-ended.

ii) Section B: Street Food Vendors' Knowledge towards Food Safety

Section B included questions about street food vendors' knowledge of food safety. The questions in this section were designed to assess the level of knowledge of street food vendors, and there were 18 statements presented to respondents as dichotomous statements, with respondents choosing either 1= No, 2= Do Not Know, or 3= Yes for each statement in this section (Jores et al., 2018; Rahman et al., 2016; Abdullah Sani & Siow, 2014; Woh et al., 2016). Do Not Know' option prevents the respondents from being forced into selecting an option that they may not truly endorse (Andrade et al., 2020) and decreases the probability of respondents selecting the responses by assumption (Al-Kandari et al., 2019; Elobeid et al., 2019; Al-Shabib et al., 2016). Questions for food

safety knowledge were adapted and modified from the previous study as shown in Table 3.2.

Table 3.2: Questionnaire Development for Food Safety Knowledge

No.	Knowledge	References
1.	Washing hands before handling food reduces the risk of food contamination.	Putri et al. (2021); Cempaka et al. (2019); Elobeid et al. (2019); Isoni Auad et al. (2019); Samapundo et al. (2015); Siau et al. (2015); Abdullah Sani & Siow (2014); Ansari-Lah et al. (2010)
2.	Proper cleaning and sanitation of utensils lower the risks of food contamination.	Cempaka et al. (2019); Elobeid et al. (2019); Samapundo et al. (2015); Siau et al. (2015); Abdul-Mutalib et al. (2012); Ansari-Lah et al. (2010)
3.	Preparing food in advance increases the risk of food contamination.	Samapundo et al. (2015); Siau et al. (2015); Abdul-Mutalib et al. (2012); Buccheri et al. (2010)
4.	Reheating cooked food can contribute to food contamination.	Cempaka et al. (2019); Samapundo et al. (2015); Siau et al. (2015); Abdul-Mutalib et al. (2012); Buccheri et al. (2010)
5.	<i>Salmonella</i> , <i>S. aureus</i> , and <i>E. coli</i> are among the foodborne pathogens.	Putri et al. (2021); Elobeid et al. (2019); Woh et al. (2016); Samapundo et al. (2015); Al-Shabib et al. (2016); Abdullah Sani & Siow (2014); Soares et al. (2012); Ansari-Lah et al. (2010)

iii) Section C: Street Food Vendors' Attitude towards Food Safety

The statements in Section C were created to assess street food vendors' attitude towards food safety. There were 18 statements established based on a 5-Point Likert Scale, with 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree (Jores et al., 2018; Mohd Azaman et al., 2016; Abdullah Sani & Siow, 2014). Questions for food safety attitude were adapted and modified from the previous study as shown in Table 3.3.

Table 3.3: Questionnaire Development for Food Safety Attitude

No.	Attitude	References
1.	I believe defrosted food should not be refrozen.	Ahmed et al. (2021); Al-Kanadari et al. (2019); Elobeid et al. (2019); Al-Shabib et al. (2016); Samapundo et al. (2015); Siau et al. (2015); Soares et al. (2012); Abdul-Mutalib et al. (2012); Buccheri et al. (2010)
2.	I believe it is necessary to check the temperature of the refrigerators and freezers to reduce the risk of food contamination.	Kılıçhan et al. (2020); Elobeid et al. (2019); Samapundo et al. (2015); Abdullah Sani & Siow (2014); Soares et al. (2012); Ansari-Lah et al. (2010)
3.	I believe improper food storage can contribute to food contamination.	Kılıçhan et al. (2020); Al-Kandari et al. (2019); Isoni Auad et al. (2019); Cempaka et al. (2019); Elobeid et al. (2019); Al-Shabib et al. (2016); Abdullah Sani & Siow (2014)

Table 3.3: Continued

4.	I believe raw materials and cooked food must be stored separately.	Ahmed et al. (2021); Azanaw et al. (2021); Kılıçhan et al. (2020); Cempaka et al. (2019); Elobeid et al. (2019); Isoni Auad et al. (2019); Al-Shabib et al. (2016); Samapundo et al. (2015); Abdullah Sani & Siow (2014); McIntyre et al. (2013); Soares et al. (2012); Ansari-Lah et al. (2010); Buccheri et al. (2010)
5.	I think that food handlers with abrasions or cuts on their hands should not touch unwrapped food.	Ahmed et al. (2021); Kılıçhan et al. (2020); Al-Kandari et al. (2019); Elobeid et al. (2019); Al-Shabib et al. (2016); Siau et al. (2015); Abdul-Mutalib et al. (2012); Soares et al. (2012); Ansari-Lah et al. (2010); Buccheri et al. (2010)

iv) Section D: Street Food Vendors' Practices towards Food Safety

The last section (Section D) consisted of 18 statements on food safety practices and this section was established to measure the practices of street food vendors based on three optional answers of 1=Never, 2=Seldom, and 3=Always (Jores et al., 2018; Rahman et al., 2016). Each statement was assigned a number ranging from 1 (Never) to 3 (3=Always). Questions for food safety knowledge were adapted and modified from the previous studies as shown in Table 3.4.

Table 3.4: Questionnaire Development for Food Safety Practices

No.	Practices	References
1.	Use separate utensils to preparing cooked and raw food	Ahmed et al. (2021); Al-Kandari et al. (2019); Siau et al. (2015); Abdul-Mutalib et al. (2012); Buccheri et al. (2010)
2.	Wash hands with soap and water before and after handling food.	Ahmed et al. (2021); Putri et al. (2021); Azanaw et al. (2021); Al-Shabib et al. (2016); Sharif & Al-Malki (2010)
3.	Refrain from handling food with wounded hands.	Asmawi et al. (2018); Rebouças et al. (2017); Al-Shabib et al. (2016); Abdul-Mutalib et al. (2012); Giritlioglu et al. (2011)
4.	Refrain from wearing accessories while handling food.	Putri et al. (2021); Al-Kandari et al. (2019); Asmawi et al. (2018); Rebouças et al. (2017); Al-Shabib et al. (2016); Samapundo et al. (2015)
5.	Check the expiration dates of ingredients before using them in food preparation	Ahmed at al. (2021); Tuglo et al. (2021); Isoni Auad et al. (2019); Jores et al. (2018); Soares et al. (2012); Buccheri et al. (2010)

3.4 Pilot Study

A pilot study is a “pre-study” of the research that indicates the first trial research designed to gather information and test the reliability of the variable before the actual study to improve the questionnaire quality is conducted (Golafshani, 2003; Ruxton & Colegrave,

2006; Johanson & Brooks, 2010). The pilot study was also used to estimate the sample study from the survey population who responded to the questionnaire. According to Maiyaki and Mokhtar (2010), the pilot study is used to understand the real scenario of the actual study. This is usually done earlier so that more significant changes can be made before the actual survey. A pilot study allows researchers to anticipate and overcome potential problems during the actual survey test, which is usually conducted with a small group of 15-30 respondents (Malhotra, 2008).

In this study, a pilot study was conducted with 15 street food vendors to assess the reliability and validity of the questionnaire. It is critical to ensure that all questions are clear and properly structured and that there are no differences in meaning between the Malay and English versions of the questionnaire. The street food vendors were asked to carefully read all the questions and make suggestions to improve the content of the questionnaire.

Based on responses and feedback from the street food vendors during the pilot study, the questionnaire was revised to reduce redundancy, increase reliability and validity, and make the questionnaire fully understandable for street food vendors. A few amendments have been made with some questions rephrased in response to feedback from street food vendors. The amendments to the questionnaire are shown in Table 3.5.

Table 3.5: Amendments to the Questionnaire

No.	Original Statements	Amendment Statements
1.	Foodborne diseases are caused by microbial and contaminated food.	Foodborne illnesses are caused by food contaminated with microbes (bacteria, pathogens, viruses, or parasites) that spoil food.
2.	I need to improve my knowledge so that I can be confident in handling food.	I believe that educating myself with food safety knowledge enhances my confidence in handling food.
3.	I understand that the temperature of refrigerators needs to be checked.	I believe it is necessary to check the temperature of the refrigerators and freezers to reduce the risk of food contamination.
4.	Food handlers with cut hands cannot touch the food.	Refrain from handling food with wounded hands.
5.	The expiration date should be checked.	Check the expiration dates of ingredients before using them in food preparation.

The reliability of the questionnaire was assessed using the reliability analysis and Cronbach's alpha score. Cronbach's alpha has a possible range value of 0.00 (if no variance is consistent) to 1.00 (if all variance is consistent), and a value less than 0.50 is considered a low correlation. If Cronbach's alpha is 0.60, this is considered the lower limit of acceptability. Tavakol and Dennick (2011) demonstrated that alpha values greater than 0.7 are acceptable (Panayides, 2013; Santos, 1990). Estimated reliability coefficients of 0.90 and higher are considered excellent, while 0.80 to 0.89 are considered very well (Panayides, 2013; Peter, 1979). After the statements were rephrased, the reliability analysis was conducted for all 54 questions and the Cronbach's alpha for the

questionnaires was 0.874, indicating that it is acceptable and could be used for future survey administration (Panayides, 2013; Schmitt, 1996; Peter, 1979; Nunnally, 1967). Cronbach's alpha for the study is stated in Table 3.6. Data collected during the pilot study was not included in Chapter Four (Results and Discussions).

Table 3.6: Reliability Analysis Results of KAP Variables

Variable	Cronbach's Alpha		N of items
	Pilot Test	Actual Study	
Knowledge	0.685	0.757	18
Attitude	0.769	0.883	18
Practices	0.784	0.810	18
Overall KAP	0.796	0.874	54

3.5 Data Analysis Techniques

In this study, statistical analysis was used as an analysis technique. Statistical analysis provides information to help solve study problems and converts raw data into usable information. For data analysis, the Statistical Package for Social Science (SPSS) version 22 was used as statistical software. To analyze all the data obtained in this study, descriptive analysis, Pearson correlation analysis, Chi-square analysis, and logistic regression analysis were used.

3.5.1 Descriptive Analysis

Descriptive analysis is a simple analysis that is used to meaningfully describe and summarize a large set of quantitative (numerical) data from a study. A basic descriptive analysis of data entails calculating simple measures of composition and variable distribution. It is also used to graphically represent the entire population or sample for easier understanding, such as sample size, mean, median, and standard deviation. According to Lankford et al. (2002), descriptive analysis is the discipline of quantitatively describing the main characteristics of data collection. Descriptive statistics are used to review data in an arranged manner by explaining the relationship between variables in a sample or population (Kaur et al., 2018). The descriptive analysis results are presented in the form of tables and describe the characteristics of the variables in terms of their frequency distribution and percentages. This analysis is used to discuss the demographic characteristics of the respondents in the study.

3.5.2 Food Safety Knowledge Level Analysis

The food safety knowledge level analysis was used to calculate the food safety knowledge score for each statement. A total of 18 statements about food safety knowledge were developed. Street food vendors had three (3) options to choose from (1=No, 2=Do Not Know, 3=Yes) (Jores et al., 2018; Woh et al., 2016; Samapundo et al., 2015; Abdullah Sani & Siow, 2014). Each correct answer received one (1) point, while incorrect answers and “Do Not Know” answers received zero points (0). Respondents’ scores would be calculated based on 18 statements. The score range for this section was 0 to 18, with scores below 8 categorized as inadequate knowledge and total scores above 8 categorized as adequate knowledge (Addo-Tham et al., 2020; Woh et al., 2016; Abdullah Sani & Siow, 2014; Baş et al., 2006). Table 3.7 shows the food safety knowledge level score used in this study.

Table 3.7: Food Safety Knowledge Level Score

Food Safety Knowledge Level	Score
Adequate Knowledge	9-18
Inadequate knowledge	0-8

(Source: Adapted from Addo-Tham et al., 2020; Woh et al., 2016; Vo et al., 2015; Abdullah Sani and Siow, 2014; Bas et al., 2006)

3.5.3 Food Safety Attitude Level Analysis

Food safety attitude level analysis was used based on calculating the score of attitude for each statement. Regarding attitude towards food safety, 18 statements were asked. All the statements were asked on a 5-point Likert Scale, with respondents choosing one of the options (1= Strongly Disagree, 2 = Disagree, or 3 = Neutral, 4 = Agree, 5 = Strongly Agree). The scales ranged from 1 (Strongly Disagree) to 5 (Strongly Agree). The scores ranged from 18 to 90, with scores below 53 considered unfavorable attitude and score 54 and above considered favorable attitude (Mohd Azaman et al., 2016; Abdullah Sani & Siow, 2014) as presented in Table 3.8.

Table 3.8: Food Safety Attitude Level Score

Food Safety Attitude Level	Score
Favorable attitude	54-90
Unfavorable attitude	18-53

(Source: Adapted from Al-Kandari et al., 2019; Mohd Azaman et al., 2016; Abdullah Sani and Siow, 2014)

3.5.4 Food Safety Practices Level Analysis

All the food safety practices level statements were developed based on the food safety practices in implementing good practices in the street food industry. Concerning food safety practices, 18 statements were asked. The total score for each question was used to calculate the level of practice. The statements were graded on a 3-point Likert Scale (1=Never, 2=Seldom, 3=Always). The score was assigned based on each score statement, which ranged from 1 (1=Never) to 3 (3=Always). A respondent will receive 3 marks for each statement. Practice level scores (Table 3.9) are as follows: Street food vendors with total scores ranging from 36 to 54 were considered to have good practices, while those with total scores ranging from 18 to 35 were considered to have poor practices. The scales for the level of food safety practices were adapted from Abdul Aziz and Mohd Sham (2021); Addo-Tham et al. (2020); and Abdullah Sani and Siow (2014).

Table 3.9: Food Safety Practices Level Score

Food Safety Practices Level	Score
Good practices	36-54
Poor practices	18-35

(Source: Abdul Aziz and Mohd Sham, 2021; Addo-Tham et al., 2020; Al-Kandari et al., 2019; Cempaka et al., 2019; Vo et al., 2015; Abdullah Sani and Siow, 2014)

3.5.5 Pearson Correlation Analysis

Pearson correlation analysis is used to statistically measure the strength and association of two variables, which is denoted by the correlation coefficient (r) (Sedgwick, 2012; Benesty et al., 2009). Pearson correlation is a statistical relationship measurement method that is used to determine the degree of statistical relationship between two continuous-level variables. Because it is based on the method of covariance, this analysis method is also known as the best method to test linear relationships between variables of interest.

The r significance test determines whether two variables in the population have a linear relationship. This explanation can be summarised as follows:

$$-1 \leq r \leq 1$$

Table 3.10 shows the correlation coefficient strength of the association range proposed by Abu Bakar et al. (2021) and Evans (1996). The association strength can be classified into five categories, ranging from very weak to very strong.

Table 3.10: Pearson Correlation Coefficient Interpretation

Strength of Association	Coefficient, <i>r</i>	
	Positive	Negative
Very weak	0.00 to 0.19	-0.00 to -0.19
Weak	0.20 to 0.39	-0.20 to -0.39
Moderate	0.40 to 0.59	-0.40 to -0.59
Strong	0.60 to 0.79	-0.60 to -0.79
Very strong	0.80 to 1.0	-0.80 to -1.0

(Source: Abu Bakar et al., 2021; Evans, 1996)

Pearson correlation analysis was used to examine the relationships between the level of knowledge and attitude, knowledge and practices, and attitude and practices related to food safety.

Table 3.11: Hypotheses of Pearson Correlation Analysis

Variables	Hypothesis	Hypotheses explanation
Knowledge (H ₁)	H ₀	There is no significant relationship between food safety knowledge and attitude level among street food vendors.
	H ₁	There is a significant relationship between food safety knowledge and attitude level among street food vendors.
Attitude (H ₂)	H ₀	There is no significant relationship between food safety attitude and practices level among street food vendors.
	H ₂	There is a significant relationship between food safety attitude and practices level among street food vendors.
Practices (H ₃)	H ₀	There is no significant relationship between food safety knowledge and practices level among street food vendors.
	H ₃	There is a significant relationship between food safety knowledge and practices level among street food vendors.

3.5.6 Chi-square Analysis

Chi-square analysis is used to find the association between two variables. According to Field (2009), Chi-square analysis is an inferential statistic used in evaluating the relationship between two variables. Chi-square analysis is a non-parametric method used to determine the likelihood of an association between observed and expected values occurring due to sampling variation. According to Jays et al. (2011), Chi-square statistics is the most used statistic for determining the statistical significance of a cross-tabulation table. The Chi-square test determines whether two variables are independent. If the variables are independent (have no relationship), the statistical test results will be “non-significant,” and will be “unable to reject the null hypothesis,” indicating that there is no relationship between the variables.

The null hypothesis is rejected if the p-value is less than or equal to the significance level ($p\text{-value} < \alpha$), and the test result is statistically significant. Alternatively, if the $p\text{-value} > \alpha$, can conclude that the test failed to reject the null hypothesis and that it is statistically

not significant (Momeni et al., 2018; Field, 2009). In this study, significance levels of 1%, 5%, and 10% were applied. There are no associations between the two variables if the p-value is greater than the level of significance. The Chi-square statistics can be used to determine whether the differences in the observed frequency distribution can be attributed to sampling variation (Zikmund, 2003). In this study, Chi-square analysis was used to determine the associations between the demographic characteristics of street food vendors and food safety practices. The following is the formula of Chi-square, as stated below.

$$X^2 = \frac{\sum(\text{Observed frequencies} - \text{Expected frequencies})^2}{\text{Expected frequencies}} \quad \text{Equation 3}$$

$$= \frac{\sum(F_o - F_e)^2}{F_e}$$

where:

X^2 = Chi-square statistics

F_o = Observed frequency in the i th cell

F_e = Expected frequency in the i th cell

The hypotheses for Chi-square analysis were employed to recognize the association between street food vendors' demographic characteristics with food safety practices, as shown in Table 3.12.

Table 3.12: Hypotheses for Chi-square Analysis

Variables	Hypothesis	Hypotheses explanation
Demographic Characteristics (H_a)	H_0	There are no significant associations between demographic characteristics and food safety practices among street food vendors.
	H_a	There are significant associations between demographic characteristics and food safety practices among street food vendors.

3.5.6.1 Crosstab

Chi-square, X^2 test is one of the most basic techniques for explaining a set of relationships using cross-tabulation. A cross-tabulation table (also known as a contingency or crosstab table) is generated for each distinct value of a layer variable (optional) and contains counts and percentages (Bishop et al., 2007). It is the first approach to consider when attempting to determine how two or more categorical variables are linked in a study (Dass, 2010). The cross-tabulation table contains the number of cases that fall into each combination of categories and is rather like the original contingency table (Field, 2009). In addition, a cross-tabulation is also described as the summary of categorical data into a table, with each cell carrying the frequency (raw or proportional) of the observations fitting the categories indicated by that cell which can be used for a variety of statistical tests, the majority of which follow a distribution known

as the chi-squared distribution (Momeni et al., 2018). In short, a cross-tabulation table is a method of showing the relationship between different variables of categorical data.

3.5.7 Logistic Regression Analysis

Logistic regression analysis is a statistical method for analyzing a data set that contains one or more independent variables that influence the outcome. Binary (or binomial) logistic regression, also known as the logit model, is a type of regression that is used to predict the likelihood of a binary response variable in logistic regression (Kiliç, 2015; Hosmer & Lemeshow, 2004). When the independent variables are continuous, categorical variables, or both, binary logistic regression is used (Bishop, 2006; Pallant, 2005). The dependent variable, on the other hand, is a dichotomous categorical variable (Kiliç, 2015; Bishop, 2006; Pallant, 2005) with two groups or two values, which are coded as zero (0) and one (1), such as adequate knowledge or inadequate knowledge level, favorable attitudes, or unfavorable attitudes, and good or poor practices.

To describe the relationship of several Xs to a dichotomous dependent variable, one of the mathematical modelling approaches such as logistic regression can be used (Kleinbaum and Klein, 2010). There are only two (2) values for the logistic variable, and the outcome is usually coded as “0” or “1”. As a result, the possible observed variable outcome of the dependent variable for a positive response would be coded as “1” (referred to as a “success”), while the possible observed variable outcome of the dependent variable for a negative response would be coded as “0” (referred to as a “failure”). The dependent variable in this study is food safety practices, which have two (2) categories, namely “good practices” that coded as (1) and “poor practices” that coded as (0). Meanwhile, there are eight (8) independent variables used namely knowledge, attitude, education level, type of stalls, license, monthly revenue, food safety training, and typhoid injection. Three (3) significance levels were used in this study namely 1%, 5%, and 10% (Vaiappuri, 2013). After transforming dependent variables into logit variables, which contain the natural log odds of the dependent occurring or not, logistic regression analysis employs maximum likelihood estimation.

The factors that most influenced food safety practices among street food vendors were identified using logistic regression analysis. The prediction of the outcome of the dependent variable is shown below:

$$\log \left(\frac{p(x)}{1-p(x)} \right) = \alpha + \beta_1 \chi_1 + \beta_2 \chi_2 + \beta_3 \chi_3 + \beta_4 \chi_4 + \beta_5 \chi_5 + \beta_6 \chi_6 + \beta_7 \chi_7 + \beta_8 \chi_8 + \varepsilon_i \quad \text{Equation 4}$$

where:

$\log \left(\frac{p(x)}{1-p(x)} \right)$ = the *odds ratio*, or “logit” that the dependent variable is 1,

$$Y = \alpha + \beta_1 \chi_1 + \beta_2 \chi_2 + \beta_3 \chi_3 + \beta_4 \chi_4 + \beta_5 \chi_5 + \beta_6 \chi_6 + \beta_7 \chi_7 + \beta_8 \chi_8 + \varepsilon_i \quad \text{Equation 5}$$

Y = Food safety practices (1= Good, 0= Poor)

α = Constant

$\beta_1 - \beta_8$ = Coefficient of $\chi_1 - \chi_8$

$\chi_1 - \chi_8$ = Independent variables

ε_i = Error term

All the coding variables used in the study are shown in Table 3.13.

Table 3.13: Coded of Dependent and Independents Variables in Logistic Regression Analysis

	Variables	Coding Systems
Dependent Variable (DV)	Food safety practices level of street food vendors	0 = Poor 1 = Good
	χ_1 = Knowledge	0 = Inadequate knowledge 1 = Adequate knowledge
Independent Variables (IV)	χ_2 = Attitude	0 = Unfavourable attitude 1 = Favourable attitude
	χ_3 = Education Level	0 = Low education 1 = High education
	χ_4 = Type of stalls	0 = Mobile 1 = Stationary
	χ_5 = License	0 = No 1 = Yes
	χ_6 = Monthly revenue	0 = Low revenue 1 = High revenue
	χ_7 = Food safety training	0 = Not attend 1 = Attend
	χ_8 = Typhoid injection	0 = No 1 = Yes

3.6 Summary

This chapter covers the important components of research methodology. It also describes how the study was conducted, as well as all the analyses used in this study. The study was done in Klang Valley area and involved 268 street food vendors that have been selected using the purposive sampling method. To achieve the objectives of the study, four main analyses were elaborated in this chapter namely 1) descriptive analysis; 2) Pearson correlation analysis; 3) Chi-square analysis; and 4) logistic regression analysis.



CHAPTER 4

RESULTS AND DISCUSSIONS

This chapter consists of discussions on the findings of the study. The first section comprises the street food vendors' demographic characteristics. This is followed by highlights on food safety knowledge, attitude, and practices (KAP) levels among street food vendors. The following section covers a Pearson correlation analysis discussion to examine the relationships between KAP levels of street food vendors. The study results obtained from Chi-square analysis are also presented in the chapter. The last section discusses the results of logistic regression analysis to investigate the factors that influence food safety practices among street food vendors.

4.1 Respondents' Demographic Characteristics

Descriptive analysis was carried out to analyze the demographic characteristics of the street food vendors. Demographic characteristics variables used in this study were gender, age (years), race, religion, marital status, education level, business ownership, operation hour, experience in food handling (years), type of stalls, number of workers, monthly revenue (RM), license, food safety training, and typhoid injection. A total of 268 respondents were involved in this study and the results of demographic characteristics as shown in Table 4.1.

Table 4.1: Respondents' Demographic Characteristics

Characteristics		Frequency (n)	Percentage (%)	Mean
Gender	Male	166	61.9	
	Female	102	38.1	
Age (years)	20 – 29	97	36.2	33.54
	30 – 39	103	38.4	
	40 – 49	52	19.4	
	50 – 59	16	6.0	
Race	Malay	242	90.3	
	Chinese	6	2.2	
	Indian	1	0.4	
	Others	19	7.1	
Religion	Islam	263	98.1	
	Buddha	5	1.9	
Marital status	Single	103	38.4	
	Married	165	61.6	

Table 4.1: Continued

Education level	Primary School	19	7.1	
	Secondary School	133	49.6	
	Certificate	30	11.2	
	Diploma	40	14.9	
	Bachelor's Degree	42	15.7	
	Master	4	1.5	
Business ownership	Sole Proprietorship	239	89.2	
	Partnership	23	8.6	
	Company	6	2.2	
Operation hour	Morning	66	24.6	
	Evening	79	29.5	
	Night	123	45.9	
Experience in food handling (years)	1 – 15	252	94.0	5.34
	16 – 30	16	6.0	
Type of stalls	Mobile	76	28.4	
	Stationary	192	71.6	
Number of workers	1 – 7	246	91.8	3.15
	8 – 15	22	8.2	
Monthly revenue (RM)	1,000 – 10,000	175	65.3	10,920.07
	10,001 – 50,000	91	34.0	
	50,001 – 100,000	2	0.7	
License	Yes	220	82.1	
	No	48	17.9	
Food safety training	Yes	150	56.0	
	No	118	44.0	
Typhoid injection	Yes	186	69.4	
	No	82	30.6	

A total of 268 street food vendors located in the Klang Valley participated in this study. Based on the descriptive analysis results, more than half, 61.9% (166) of the street food vendors were male and the remaining, 38.1% (102) were female. 36.2% (97) of street food vendors were between 20 to 29 years old, 38.4% (103) were between 30 to 39 years old, 19.4% (53) and 26.0% (16) were aged between 40 to 49 years old and 50 to 59 years old, respectively. The mean for street food vendors age was 33 years old. Many of the street food vendors were Malay which accounted for 90.3% (242), followed by 2.2% of Chinese (6), 0.4% (1) Indian, and others accounted for 7.1% (19), which were Indonesians. 98.1% of street food vendors were Muslim (263) and the rest (1.9%) are Buddhist (5).

The results showed that more than half of the street food vendors, 61.6% (165) were married and about 38.4% (103) were still single. In terms of education, 49.6% (133) of street food vendors attended secondary school, followed by 15.7% (42) of degree holders, 14.9% (40) of diploma holders, and 11.2% (30) of certificate holders.

Meanwhile, 7.1% (19) street food vendors attended the primary level only and 1.5% (4) were master holders. About 89.2% (239) of street food vendors were sole proprietors, followed by the partnership at 8.6% (23) and the company accounted for 2.2% (6). Besides, only 45.9% (123) of the street food vendors operate their business at night, while 29.5% (79) in the evening and 24.6% (66) in the morning hour.

Nearly all (252) of the street food vendors (94.0%) had 1 to 15 years of experience in food handling, followed by 6.0% (16) who had 16 to 30 years of experience. The mean for street food vendors' experience in food handling was five years of experience, indicating that most of the street food vendors were in a growth phase. The street food vendors who run their business in the stationary stall accounted for about 71.6% (192) while 28.4% (76) used mobile stalls, which they move from one place to another place or they conducted their business using transportation like motorcycles or food trucks, or pushcart.

Many of the street food vendors, accounting for 91.8% (246) had 1 to 7 workers and only 8.2% (22) had 8 to 15 workers that helped them to run their business. The mean of street food vendors' workers was 3 workers. Furthermore, the result indicated that 65.3% (175) of street food vendors gained RM1,000 to RM10,000 per month, followed by RM10,001 to RM50,000 and RM50,001 to RM100,000, which accounted for 34.0% (91) and 0.7% (2), respectively and the mean monthly revenue was RM10,920.07. Most of the street food vendors had a license in operating street food businesses. The results revealed that 82.1% (220) of the street food vendors operate their business with a license while 17.9% (48) still did not get a license before they started their business. Half of the street food vendors, 56.0% (150) had attended food safety training while 44.0% (118) did not attend. Lastly, about 69.4% (186) of the street food vendors had taken their typhoid injection and 30.6% (82) still have not taken typhoid injection yet.

4.2 Food Safety Knowledge, Attitude, and Practices (KAP) Levels

Descriptive analysis was used to analyze food safety knowledge, attitude, and practices (KAP) levels. This analysis was conducted to achieve specific objectives 1); to determine the food safety knowledge, attitude, and practices (KAP) levels of street food vendors.

4.2.1 Food Safety Knowledge Level

The knowledge of street food vendors regarding food safety practices was measured based on 18 statements. For each correct answer, a score of one (1) was given while for the incorrect answer, and "Do Not Know" answer was given a zero (0) score. The knowledge level was categorized into two (2) levels namely adequate level and inadequate level. Street food vendors' knowledge was calculated based on total scores. A street food vendor was categorized as having adequate knowledge if he or she achieved total scores between 9 to 18, while those with a total score below 9 were considered to have inadequate knowledge regarding food safety practices (Addo-Tham et al., 2020;

Woh et al., 2016; Vo et al., 2015; Abdullah Sani & Siow, 2014; Baş et al., 2006). The statements were ranked according to the mean score (Table 4.2).

Table 4.2: Street Food Vendors' Knowledge towards Food Safety

Statements	Responses n (%)			Mean	SD
	1	2	3		
1. Washing hands before handling food reduces the risk of food contamination.	3 (1.1)	17 (6.3)	248 (92.5)	2.91	0.318
2. Foods that are not safe to eat can be identified by changes in appearance, taste, colour, and smell.	4 (1.5)	18 (6.7)	246 (91.8)	2.90	0.343
3. It is important to know the temperature of the refrigerators and freezers to reduce the risk of food spoilage.	2 (0.7)	35 (13.1)	231 (86.2)	2.85	0.374
4. Eating and drinking in the workplace increases the risk of food contamination.	9 (3.4)	24 (9.0)	235 (87.7)	2.84	0.447
5. Wearing gloves is required for safe food handling.	8 (3.0)	27 (10.1)	233 (86.9)	2.84	0.442
6. Proper cleaning and sanitation of utensils lower the risks of food contamination.	9 (3.4)	32 (11.9)	227 (84.7)	2.81	0.469
7. Well-cooked foods are free from microbes that can otherwise cause foodborne illnesses.	9 (3.4)	46 (17.2)	213 (79.5)	2.76	0.500
8. Foodborne illnesses are caused by food contaminated with microbes (bacteria, pathogens, viruses, or parasites) that spoil food.	23 (8.6)	35 (13.1)	210 (78.4)	2.70	0.620
9. Foodborne illnesses are caused by unhygienic practices in the production, post-harvest, processing, and preparation of food.	15 (5.6)	56 (20.9)	197 (73.5)	2.68	0.575
10. I have heard about foodborne illnesses.	15 (5.6)	65 (24.3)	188 (70.1)	2.65	0.585
11. Preparing food in advance increases the risk of food contamination.	28 (10.4)	46 (17.2)	194 (72.4)	2.62	0.668
12. Reheating cooked food can contribute to food contamination.	29 (10.8)	55 (20.5)	184 (68.7)	2.58	0.680
13. Frozen foods can kill microbes that cause food spoilage and foodborne illnesses.	21 (7.8)	73 (27.2)	174 (64.9)	2.57	0.635

Table 4.2: Continued.

14.	Cross-contamination is a major contributing factor to food contamination.	25 (9.3)	96 (35.8)	147 (54.9)	2.46	0.660
15.	Foodborne illnesses are illnesses caused by consuming food contaminated with harmful bacteria, viruses, parasites, or toxins.	46 (17.2)	57 (21.3)	165 (61.6)	2.44	0.770
16.	Salmonella, S. aureus, and E. coli are among the foodborne pathogens.	41 (15.3)	133 (49.6)	94 (35.1)	2.20	0.683
17.	Food handlers with minor injuries should not be involved in food handling activities.	122 (45.5)	47 (17.5)	99 (36.9)	1.91	0.906
18.	Typhoid injection can prevent typhoid fever.	159 (59.3)	34 (12.7)	75 (28.0)	1.69	0.882

Note: 1= No, 2= Do not know, 3= Yes

The results in Table 4.2 showed that most of the street food vendors, 92.5% (248) knew that washing hands before handling food reduces the risk of food contamination. This knowledge is common knowledge practice in our daily life. This result is in accordance with other studies in which a majority had high knowledge of the importance of washing hands can reduce the risk of food contamination (Putri et al., 2021; Cempaka et al., 2019; Elobeid et al., 2019; Isoni Auad et al., 2019; Rebouças et al., 2017; Samapundo et al., 2015; Siau et al., 2015; Abdullah Sani & Siow, 2014; Abdul-Mutalib et al., 2012; Soares, 2012; Ansari-Lah, 2010; Sharif et al., 2010).

Approximately, 91.8% of street food vendors were aware foods that are not safe to eat can be identified by changes in appearance, taste, color, and smell. The result in the present study showed a lower percentage compared to a study by Cempaka et al. (2019) where almost all food handlers (98%) in Indonesia knew that contaminated food has some changes in color, smell, and taste. However, a lower rate was reported in a study by Isoni Auad et al. (2019), indicating that Brazilian food handlers still do not aware of recognized contaminated food.

About 86.2% (231) of the street food vendors agreed that it is important to know the temperature of the refrigerators and freezers to reduce the risk of food spoilage. The results were parallel to Siau et al. (2015) and Abdul-Mutalib et al. (2012). A study conducted in Indonesia (Putri et al., 2021) found that most food handlers knew the appropriate temperature used to store raw materials and for cooking. Findings from Al-Kandari et al. (2019) discovered that 62.7% of food handlers in Kuwait were not aware of the importance of the essential time and temperature control required for preventing microbial growth in foods however majority knew about safe operating temperatures for refrigerators and freezers. Similar findings by Buccheri et al. (2010) reported that 82.0%

and 24.2% of food service staff in Italy did not know the critical temperature for storing hot and cold RTE foods, respectively.

Approximately, 87.7% (235) of the street food vendors knew that eating and drinking in the workplace increases the risk of food contamination. Similar findings with Rebouças et al. (2017), however, contradict with Samapundo et al. (2015), where most food handlers in Haiti did not aware that eating and drinking will increase the risk of food contamination. Besides, the majority (86.9%, 233) of street food vendors realized that wearing gloves is required for safe food handling. This result is similar to studies by Azanaw et al. (2021), Cempaka et al. (2019), Elobeid et al. (2019), Rebouças et al. (2017), Samapundo et al. (2015), Siau et al. (2015), and Ansari-Lah et al. (2010). This showed that those food handlers had adequate knowledge regarding food hygiene. However, Liu et al. (2014), in a study in China revealed that more than half of food handlers were unaware that improper handling could lead to food contamination and cross-contamination.

Most street food vendors (84.7%) noticed that proper cleaning and sanitation of utensils will decrease the risks of food contamination. Similar results to other studies where many food handlers have excellent knowledge regarding proper cleaning equipment can reduce the risk of food contamination (Cempaka et al., 2019; Samapundo et al., 2015; Siau et al., 2015; Ansari-Lari et al., 2010; Abdul-Mutalib et al., 2012). Nevertheless, a different result was discovered by Elobeid et al. (2019) that revealed more than 75% did not respond correctly to the importance of cleaning equipment to reduce the risk of cross-contamination.

More than half of the street food vendors, which accounted for 79.5% (213) responded wrongly regarding well-cooked foods being free from the microbes that can cause foodborne illnesses. Freezing does not destroy bacteria, but only inhibits the microbes from multiplying. Food handlers in studies by Isoni Auad et al. (2019) and Sharif & Al-Malki (2010) correctly answered regarding freeze temperature. Next, 78.4% (210) of the street food vendors understood that foodborne illnesses are caused by food contaminated with microbes such as bacteria, pathogens, viruses, or parasites that spoil food. 66.45% of food handlers in Ghana knew that foodborne illnesses are caused by contamination with bacteria and parasites (Teferi et al., 2021). This presented that food handlers are aware of the causes of food contamination and this knowledge may be gained during food safety training that food handlers had attended.

About 73.5% (197) of the street food vendors were aware of the foodborne illnesses that are caused by unhygienic practices in the production, post-harvest, processing, and preparation of food. This observation is parallel with both Ahmed et al. (2021) and Sharif and Al-Malki (2010). The results revealed that 70.1% (188) of the street food vendors have heard about foodborne illnesses and this showed that they are already aware of the foodborne cases that happened in Malaysia. This result is also consistent with a study conducted in Ghana (Teferi et al., 2021), whereby the majority said that they got the information from mass media. Thus, relevant authorities can spread awareness regarding food safety via mass media so that it can reach consumers and improve their knowledge of food safety issues that happened in Malaysia.

Roughly three-quarters of street food vendors, 72.4% (194) acknowledged that preparing food in advance can increase the risk of food contamination. The result is consistent with other studies, for instance, Samapundo et al., 2015; Siau et al., 2015; Abdul-Mutalib et al., 2012; and Buccheri et al., 2010. Ahmed et al. (2021) found that most food handlers in Pakistan knew that food is more susceptible to the growth of microorganisms if it is prepared too much in advance. Food poisoning cases that occurred in Malaysia were reported due to food having been prepared more than 4 hours before consumption, and this usually happened in Bazaar Ramadhan (MOH, 2016a). Hence, it is crucial for food handlers to have adequate knowledge in preparing food that is safe to consume. Meanwhile, 68.7% (184) of the street food vendors were informed that reheating cooked food also can contribute to food contamination. This result aligned with studies in Haiti (Samapundo et al., 2015), Malaysia (Siau et al., 2015; Abdul-Mutalib et al., 2012), and Italy (Buccheri et al., 2010). A study conducted by Cempaka et al. (2019) showed a difference, where most food handlers in Indonesia had low knowledge regarding reheating cooked food can cause food contamination.

About 64.9% (174) of street food vendors correctly answered the question regarding frozen food can prevent spoilage and foodborne illnesses. This somehow contradicted the previous findings by Isoni Auad et al. (2019), where many food handlers wrongly answered the statement that freezing kills the microbes that may cause the deterioration of foods and foodborne illnesses. This showed that food handlers in Malaysia have better knowledge compared to Indonesian food handlers in terms of proper temperature for food storage.

More than half of the street food vendors (147), which accounted for about 54.9% knew that cross-contamination is a major contributing factor to food contamination. Most food handlers in Indonesia knew that cross-contamination is the major factor affecting food poisoning (Putri et al., 2019). Siau et al. (2015) indicated that cross-contamination and preparing foods in advance are the main contributing factors to food contamination. These findings align with Azanaw et al. (2021) and Haapala and Probart (2004) studies. The results demonstrated that the majority (61.6%, 165) of street food vendors are aware that foodborne diseases are diseases that are transmitted to people by food. The current study revealed the same result as Elobeid et al. (2019), Jores et al. (2018), and Abdullah Sani and Siow (2014).

However, only 35.1% (94) of street food vendors knew *Salmonella*, *S. aureus*, and *E. coli* are foodborne pathogens that can contaminate foods. Similar results were also described by Putri et al. (2021), Elobeid et al. (2019), Woh et al. (2016), Samapundo et al. (2015), Abdullah Sani and Siow (2014), Soares et al. (2012) and Ansari-Lari et al. (2010). However, a study by Al-Shabib et al. (2016) discovered that more than half of food handlers in Saudi Arabia knew that *S. aureus* is a pathogen of food. The study results are however contradicted by previous results by Abdul-Mutalib et al. (2012), where 73.4% of food handlers in Kuala Pilah (Malaysia) had good knowledge regarding foodborne pathogens. Therefore, the study suggested that most of the food handlers in this study are still lacking in terms of knowledge regarding pathogens. On the same note, it can be proposed that there is a need to improve food safety knowledge among street food vendors, even though half of them (56.0%) had attended food safety training.

About 45.5% (122) of the street food vendors wrongly answered the statement that “*Food handlers with minor injuries should continue food handling activities*”, which demonstrated that most of those street food vendors were not aware that they should not continue to prepare the food when they got minor injuries. Contrary to studies in Indonesia (Cempaka et al., 2019) and Brazil (Isoni Auad et al., 2019), where food handlers knew that when the hand is injured or the skin got irritated, they should stop the job immediately. Lastly, more than half of street food vendors, 59.3% (159) did not know that typhoid injection can prevent typhoid fever and proving that some of the street food vendors did not follow the guidelines and standards by the authorities before they started to operate their business. Siau et al. (2015) discovered that many food handlers in Putrajaya were aware that Typhoid injection can prevent form typhoid infection. Given its importance, which is the reason why typhoid injection is set mandatory for food handlers as it can prevent the occurrence of foodborne illnesses hence ensuring the food consumed is safe and properly handled.

All the statements related to food safety knowledge were able to determine the respondent’s knowledge level. Table 4.3 shows the results of street food vendors’ knowledge level of food safety. The knowledge level was categorized into two namely (1) adequate knowledge (total scores of 9-18); and (2) inadequate knowledge (total score of 0 to 8). The results revealed that 81.7% (219) of the street food vendors had an adequate level of knowledge while the remaining 18.3% (n=49) respondents had inadequate knowledge. In general, the study result is higher in terms of percentage than previous studies conducted in different locations such as Ethiopia (Azanaw et al., 2021), Ghana (Tuglo et al., 2021; Kunadu et al., 2016), Kuwait (Al-Kandari et al., 2019), Malaysia (Woh et al., 2016), Haiti (Samapundo et al., 2015), and Saudi Arabia (Sharif & Al-Malki, 2010). Many of the respondents have attended food safety training and that training has provided them with some relevant information and has improved their knowledge of food safety and food handling.

Table 4.3: Street Food Vendors’ Food Safety Knowledge Level

Level (score)	Frequency (n)	Percentage (%)
Adequate knowledge (9 – 18)	219	81.7
Inadequate knowledge (0 – 8)	49	18.3
Total	268	100.0

4.2.2 Food Safety Attitude Level

The statements measure street food vendors’ attitude level towards food safety. A total of 18 statements were used to calculate each street food vendor’s attitude level towards food safety. All the statements related to attitude were measured based on total scores. The statements then were arranged according to the mean, from the highest (4.21) to the lowest (3.46). The results for attitude statements are shown in Table 4.4.

The street food vendors showed a highly favorable attitude towards their responsibility to handle food properly and safely with a mean of 4.21. The result is similar to Ahmed

et al. (2021), Al-Kandari et al. (2019), Elobeid et al. (2019), Al-Shabib et al. (2016), and Abdullah Sani and Siow (2014). About 96% of trained food handlers in Canada obtained agreed that safe food handling is an important part of their job responsibilities as compared to untrained food handlers (91%) (McIntyre et al., 2013). Street food vendors agreed that good personal hygiene could prevent foodborne illnesses with a mean of 4.17. Many food handlers in Malaysia agreed with this statement (Jores et al., 2018; Abdullah Sani & Siow, 2014). Studies by Azanaw et al. (2021), Samapundo et al. (2015), and Soares et al. (2012) highlighted that many food handlers had positive attitudes on proper hygiene of the hand can prevent foodborne illnesses. Kunadu et al. (2016) also emphasized the importance of hand washing as a critical food safety practice among food handlers.

Only 38.8% (104) of the street food vendors were willing to take leave when sick or had a fever that prohibited them from handling any food preparations. Previous studies (Al-Shabib et al., 2016; Samapundo et al., 2015; Abdullah Sani and Siow, 2014; Giritlioglu et al., 2011, showed similar findings that most food handlers would take leave or did not participate in food production if they were unwell. Gyebi et al. (2021), on the other hand, revealed that some food service providers continued to work even though they had a skin infection. According to the CAC (2003), sick food handlers who are suspected of having any disease that could be transmitted by food are not permitted to work or deal with food.

More than half of the street food vendors, 51.1% (137) were willing to attend food safety training if needed (mean score of 4.03). A previous study by Jores et al., (2018) revealed that a high proportion (82.9%) of food handlers in Malaysia agree to join food safety training, while this result illustrated a lower percentage as a comparison. Abdullah Sani and Siow (2014) on the other hand found that more food handlers (76.8%) will attend the food safety training and the remaining (23.2%) did not want to join or were unsure because they said not have enough time and unable to understand the texts given during the training. A contrasting result was discovered in Indonesia where nearly half of the food handlers claimed that they were unable to participate in food safety training because they were required to cook and sell food all day long (Putri et al., 2021). Woh et al. (2016) reported that migrant workers in Malaysia had poor knowledge due to poor participation in food training, low educational level, and language barriers. Knowledge during training was not fully assimilated since lacked comprehension of language barriers. Hence, the contents of food safety training should be improved to ensure better understanding among food handlers.

Table 4.4: Street Food Vendors' Attitude towards Food Safety

Statements		Responses n (%)					Mean	SD
		1	2	3	4	5		
1.	I believe that handling food properly and safely is my responsibility.	0 (0.0)	6 (2.2)	40 (14.9)	113 (42.2)	109 (40.7)	4.21	0.776
2.	I know that good personal hygiene can prevent foodborne illnesses.	1 (0.4)	1 (0.4)	46 (17.2)	124 (46.3)	96 (35.8)	4.17	0.743
3.	I am willing to take leave when sick, with a fever or cold.	0 (0.0)	1 (0.4)	74 (27.6)	104 (38.8)	89 (33.2)	4.05	0.789
4.	I am willing to attend food safety training.	0 (0.0)	16 (6.0)	38 (14.2)	137 (51.1)	77 (28.7)	4.03	0.818
5.	I believe defrosted food should not be refrozen.	0 (0.0)	10 (3.7)	77 (28.7)	99 (36.9)	82 (30.6)	3.94	0.861
6.	I am willing to change my food handling habits if it is unsafe.	0 (0.0)	5 (1.9)	73 (27.2)	130 (48.5)	60 (22.4)	3.91	0.752
7.	I believe that wearing clean and appropriate attire will prevent food contamination.	0 (0.0)	9 (3.4)	85 (31.7)	107 (39.9)	67 (25.0)	3.87	0.828
8.	I think food premises should always be kept clean to prevent food contamination.	0 (0.0)	10 (3.7)	101 (37.7)	98 (36.6)	59 (22.0)	3.77	0.834
9.	I believe it is necessary to check the temperature of the refrigerators and freezers to reduce the risk of food contamination.	2 (0.7)	15 (5.6)	60 (22.4)	156 (58.2)	35 (13.1)	3.77	0.772
10.	I believe improper food storage can contribute to food contamination.	0 (0.0)	9 (3.4)	81 (30.2)	150 (56.0)	28 (10.4)	3.74	0.687
11.	I believe raw materials and cooked food must be stored separately.	0 (0.0)	29 (10.8)	73 (27.2)	111 (41.4)	55 (20.5)	3.72	0.913
12.	I believe that it is my responsibility to ensure that the food provided is safe.	0 (0.0)	30 (11.2)	62 (23.1)	133 (49.6)	43 (16.0)	3.71	0.869

Table 4.4: Continued

13.	I believe wearing caps, masks, and gloves is critical to avoid food contamination while handling food.	1 (0.4)	11 (4.1)	81 (30.2)	149 (55.6)	26 (9.7)	3.70	0.714
14.	I believe that educating myself with food safety knowledge enhances my confidence in handling food.	0 (0.0)	20 (7.5)	85 (31.7)	132 (49.3)	31 (11.6)	3.65	0.781
15.	I think that food handlers with abrasions or cuts on their hands should not touch unwrapped food.	0 (0.0)	7 (2.6)	112 (41.8)	121 (45.1)	28 (10.4)	3.63	0.704
16.	I believe that producing safe food is more important than tasty food.	2 (0.7)	26 (9.7)	104 (38.8)	101 (37.7)	35 (13.1)	3.53	0.867
17.	I think the health status of workers should be evaluated before employment.	1 (0.4)	50 (18.7)	55 (20.5)	138 (51.5)	24 (9.0)	3.50	0.910
18.	I believe that wearing accessories can lead to cross-contamination.	3 (1.1)	39 (14.6)	72 (26.9)	140 (52.2)	14 (5.2)	3.46	0.845

Note: 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly agree

About 36.9% (99) of the food vendors agreed that defrosted food should not be refrozen. The result was similar to Ahmed et al. (2021), Al-Kandari et al. (2019), Elobeid et al. (2019), Al-Shabib et al. (2016), Siau et al. (2015), Abdul-Mutalib et al. (2012), and Soares et al. (2012). Anyhow, food handlers in studies by Samapundo et al. (2015) and Buccheri et al. (2010) believed that defrosted food can be refrozen again. The results show that it is crucial to emphasize how important cold temperatures are in preventing the growth of microorganisms, especially during defrosting. It is common practice to thaw a whole piece of food but only use a portion of it before refreezing the rest to use later. The number of microorganisms in food increases when it is thawed and refrozen (Elobeid et al., 2019; Abdul-Mutalib et al., 2012), which in turn raises the incidence of foodborne illnesses (Elobeid et al. (2019).

Approximately, 48.5% (130) of street food vendors are willing to change their food handling habits if it is unsafe and does not follow the standard operation. This is in parallel with earlier findings conducted in Kuwait (Al-Kandari et al., 2019), Malaysia (Jores et al., 2018; Abdullah Sani & Siow, 2014), and Brazil (Rebouças et al., 2017) where most food handlers willing to change their improper food handling to produce safe food. Several studies reported that improper food handling practices by food handlers have been linked as a major contributor to the occurrence of a foodborne outbreak (Samapundo et al., 2016; Siow & Abdullah Sani, 2011; Soon et al., 2011).

Most street food vendors believe that wearing clean and appropriate attire and keeping clean food premises will prevent food contamination. Asmawi et al. (2018) reported that 81.5% of food handlers strongly agreed that they should wear suitable attire before they start working. Al-Shabib et al. (2016) found that most food handlers in Saudi Arabia keep the kitchen surfaces clean to reduce the risk of illness and clean surfaces and equipment used for food preparation before re-using it on other food. It shows that the street food vendors understand the consequences of food contamination if the operators mishandle the food. As addressed by Coleman and Roberts (2005) and Powell et al. (1997), attitude usually precedes practices.

More than half of the street food vendors, 58.2% (156) agreed that it is necessary to check the temperature of the refrigerators and freezers to reduce the risk of food contamination with a mean score of 3.77. Kılıçhan et al. (2020), Elobeid et al. (2019), Samapundo et al. (2015), Abdullah Sani & Siow (2014), Soares et al. (2012), and Ansari-Lah et al. (2010) showed a higher percentage compared to the current study. According to the WHO (2017), one of the causes of foodborne outbreaks is time-and-temperature control abuse during food handling. These findings support the importance of food safety training, in which education increases food handler knowledge, resulting in the effective performance of hygienic practices (Al Suwaidi et al., 2015). About 56.0% (150) of street food vendors believed that improper food storage can contribute to food contamination. Most food handlers in other studies such as Kılıçhan et al. (2020), Al-Kandari et al. (2019), Isoni Auad et al. (2019), Cempaka et al. (2019), Elobeid et al. (2019), Al-Shabib et al. (2016), and Abdullah Sani and Siow (2014) agreed that inappropriate food storage is dangerous to health.

Meanwhile, 41.1% (111) believed that raw materials and cooked food must be stored separately. The current study revealed a lower proportion compared to other studies done in Ethiopia (Azanaw et al., 2021); Turkey (Kılıçhan et al., 2020); Indonesia (Cempaka et al., 2019); Qatar (Elobeid et al., 2019); Saudi Arabia (Al-Shabib et al., 2016); Haiti (Samapundo et al., 2015); Malaysia (Abdullah Sani & Siow, 2014; Abdul-Mutalib et al., 2012), Brazil (Isoni Auad et al., 2019; Soares et al., 2012); Iran (Ansari-Lah et al., 2010); and Italy (Buccheri et al., 2010). Most trained and untrained food handlers in Canada (McIntyre et al., 2013) also agreed that raw foods should be kept separate from cooked foods. The results in Table 4.4 showed that 49.6% (133) of the street food vendors trust that it is their responsibility to ensure that the food provided is safe to be consumed. This result is lower compared with previous studies (Jores et al, 2018; Al-Shabib et al., 2016; Abdullah Sani & Siow, 2014), 82.1%, 95.4%, and 67.9%, respectively. This indicates that street food vendors who participated in this study were still not fully aware of their responsibility in producing and delivering safe food to the customer due to lack of food safety knowledge and did not attend food safety training.

Apart from that, half of the street food vendors accounting for 55.6% (149), accept that wearing caps, masks, and gloves is critical to avoid food contamination during food handling. This finding is consistent with the findings of Letuka and Nkhebenyane (2021), Elobeid et al. (2019), Akabanda et al. (2017), Samapundo et al.(2015), Abdullah Sani and Siow (2014), Soares et al. (2012), Giritlioglu et al. (2011), Ansari-Lah et al. (2010), Buccheri et al. (2010), and Çakiroğlu and Uçar (2008) who reported that majority of food handlers understood the importance of using caps, masks, protective gloves, and adequate clothing in reducing foodborne illnesses. Personal hygiene can have an immediate effect on street food safety. Food contamination, particularly microbial contamination, can be reduced if street food handlers practice good personal hygiene (Liu et al., 2014). As a result, food handlers should maintain a high level of personal hygiene and, where appropriate, wear appropriate overalls, hats, and gloves.

Up to 49.3% (132) of the street food vendors are optimistic that when they are educating themselves with food safety knowledge, will enhance their confidence in food handling. These are consistent with previous results observed in Pakistan (Ahmed et al., 2021), Malaysia (Jores et al., 2018; Abdullah Sani & Siow, 2014), and Saudi Arabia (Al-Shabib et al., 2016) where many food handlers willing to obtain more food safety knowledge. This implies that food handlers are aware of the benefits of food safety knowledge in implementing good food safety practices during food handling. Besides, less than 50% of the street food vendors (121) believed that food handlers with abrasions or cuts on their hands should not touch unwrapped food. The statement that personnel with abrasions or cuts on fingers or hands should not handle unwrapped food was approved by most of the food handlers in previous studies (Ahmed et al., 2021; Al-Kandari et al., 2019; Elobeid et al., 2019; Abdullah Sani & Siow, 2014; Abdul-Mutalib et al., 2012; Soares et al., 2012; Buccheri et al., 2010). Therefore, it is evident that the majority of the food handlers are aware that cross-contamination will occur if they touch food with cuts on their hands.

However, 38.8% (104) of the street food vendors are not sure about what is more important, either producing safe food or tasty food and only 37.7% (101) believe that producing safe food is more important compared to tasty food (mean score of 3.53). Al-

Kandari et al. (2019), Jores et al. (2018), and Abdullah Sani and Siow (2014) reported that many food handlers agreed that providing safe food takes precedence over preparing tasty food. Mohd Noor et al. (2021), Ruby et al. (2019a), and New et al. (2017b) revealed that most Malaysians prefer food taste to food safety, which is contradicting the study result. The study results portray a better scenario in terms of food safety awareness as compared to those findings obtained earlier by Salleh et al. (2017).

Half of the street food (51.5%) think that the health status of workers should be evaluated before employment. Ahmed et al. (2021), Samapundo et al. (2015), Soares et al. (2012), and Ansari-Lah et al. (2010) also revealed that almost all street food vendors in their study agreed that the health status of the workers should be evaluated before employment to avoid unvaccinated employers being hired. Lastly, about 52.2% (140) of the street food vendors believed that wearing accessories can lead to cross-contamination in food handling. The results are aligned with both studies by Isoni Auad et al. (2019) and Al-Shabib et al. (2016), where many food handlers (95% and 86.2%, respectively) agreed that wearing watches, earrings, and rings allows food to be contaminated.

To determine the level of attitude among street food vendors, the total scores were divided into 2 levels- favorable and unfavorable attitude. As for attitude level, street food vendors who obtained scores between 18 to 53 were considered as having an unfavorable attitude, while those who obtained scores between 54 to 90 were considered as having a favorable attitude. Approximately 89.7% (239) of the street food vendors had a favorable level of attitude toward food safety and the remaining, 10.8% (29) vendors had an unfavorable level of attitude (Table 4.5). The results found in the study is higher in percentage than previous findings in Ethiopia (Azanaw et al., 2021), Ghana (Tuglo et al., 2021; Kunadu et al., 2016), Saudia Arabia (Sharif et al., 2016), Malaysia (Abdullah Sani & Siow, 2014), and Haiti (Samapundo et al., 2015), indicated that majority street food vendors in this study had favorable attitudes compared with previous studies.

Table 4.5: Street Food Vendors' Food Safety Attitude Level

Level (score)	Frequency (n)	Percentage (%)
Favorable attitude (54 – 90)	239	89.7
Unfavorable attitude (18 – 53)	29	10.8
Total	268	100

4.2.3 Food Safety Practices Level

Street food vendors' food safety practices level was measured based on 18 statements (Table 4.6). The statements were developed to cover all aspects of food safety practices. The practice level was grouped into two categories namely good and poor levels of food safety practices. Each of the statements regarding food safety practices was evaluated based on a total score. The result indicates that street food vendors had implemented good food safety practices during the food handling process.

Table 4.6: Street Food Vendors' Practices towards Food Safety

Statements	Responses n (%)			Mean	SD
	1	2	3		
1. Inspect the quality of raw materials upon purchase/receipt from the supplier.	24 (9.0)	30 (11.2)	214 (79.9)	2.71	0.622
2. Thaw frozen food at room temperature.	26 (9.7)	35 (13.1)	207 (77.2)	2.68	0.644
3. Maintain a clean work area for safe food production.	23 (8.6)	58 (21.6)	187 (69.8)	2.61	0.641
4. Use separate utensils for preparing cooked and raw food.	14 (5.2)	76 (28.4)	178 (66.4)	2.61	0.586
5. Wash hands with soap and water before and after handling food.	39 (14.6)	30 (11.2)	199 (74.3)	2.60	0.730
6. Refrain from handling food with wounded hands.	27 (10.1)	54 (20.1)	187 (69.8)	2.60	0.666
7. Use appropriate and clean utensils when handling food.	29 (10.8)	62 (23.1)	177 (66.0)	2.55	0.682
8. Refrain from wearing accessories while handling food.	37 (13.8)	50 (18.7)	181 (67.5)	2.54	0.726
9. Wash the hands before and after the use of gloves.	50 (18.7)	30 (11.2)	188 (70.1)	2.51	0.791
10. Keep the nails short and clean when handling food.	49 (18.3)	37 (13.8)	182 (67.9)	2.50	0.786
11. Refrain from eating and drinking in food processing areas.	38 (14.2)	70 (26.1)	160 (59.7)	2.46	0.730
12. Wear a suitable apron and disposable head cover when handling food.	49 (18.3)	52 (19.4)	167 (62.3)	2.44	0.784
13. Ensure all raw materials are clean before use.	45 (16.8)	59 (22.0)	164 (61.2)	2.44	0.765
14. Wash the hands after using the toilet.	42 (15.7)	70 (26.1)	156 (58.2)	2.43	0.748
15. Check the expiration dates of ingredients before using them in food preparation.	43 (16.0)	68 (25.4)	157 (58.6)	2.43	0.753
16. Wear proper attire in the food premises.	64 (23.9)	41 (15.3)	163 (60.8)	2.37	0.845
17. Always disinfect the food-handling areas to maintain sanitary environment.	54 (20.1)	63 (23.5)	151 (56.3)	2.36	0.798
18. Wear disposable gloves when handling food.	68 (25.4)	35 (13.1)	165 (61.6)	2.36	0.861

Note: 1= Never, 2= Seldom, 3= Always

About 79.9% (214) of food vendors always made sure that they checked the quality of raw materials at purchase receipts from the supplier. This is a crucial practice because the quality of raw materials used to prepare food is critical for food safety because contaminants can persist or increase during preparation and cooking however, vendors typically keep input costs low by using low-quality, low-cost ingredients, doubtful sources (Rane, 2011) or even using banned or excessive chemicals and additives to conceal poor-quality materials (Khairuzzaman et al., 2014). A study in Nigeria, for example, discovered that when purchasing raw materials, more than 90% of vendors prioritized quantity and price over freshness and cleanliness (Omemu & Aderoju, 2008). Liu et al. (2014) suggested that to minimize food contamination and reduce the incidence

of foodborne illness as much as possible, street food vendors must purchase raw materials and ingredients from reputable suppliers and be familiar with some practical quality assessment methods to avoid purchasing unqualified or deteriorated raw materials.

More than half of the street food vendors, 77.2% (207), reported that they always ensure to thaw frozen food at room temperature. Similar results were found by Ahmed et al. (2021) and Buccheri et al. (2010) where food handlers (72.8% and 55.2%, respectively) always thaw frozen food at room temperature. However, Isoni Aua et al. (2019) and Soares et al. (2012) discovered that most food handlers in Brazil did not thaw food outside the refrigerators. The results showed that food handlers were still unaware of standard food thaw practices and training was needed to improve their knowledge of thawing frozen food in the right way. Besides, 69.8% (187) of the street food vendors maintain a clean work area for safe food production. Most food handlers in Malaysia reported that they always clean and sanitize work surfaces after each task (Jores et al., 2018) and before starting work (Abdul-Mutalib et al., 2012). Meanwhile, Giritlioglu et al. (2011) also reported the same result.

The results showed that 66.4% (178) of the vendors always used separate kitchen utensils to prepare cooked and raw food. This finding aligned with the studies by Ahmed et al. (2021), Al-Kandari et al. (2019), Siau et al. (2015), Abdul-Mutalib et al. (2012) and Buccheri et al. (2010). 74.3% of street food vendors (199) always washed their hands with soap and water before and after handling the food. Ahmed et al. (2021) and Sharif and Al-Malki (2010) found the same result as the current study. However, this present study contradicts with a study by Azanaw et al. (2021) which discovered only 32.6% of the respondents always wash their hands with soap and water before handling and preparing the food. Several studies have found pathogenic microorganisms in the hands of food handlers, making them an important vehicle for foodborne illnesses transmission (Zhang et al., 2015; Githiri et al., 2013; Soares et al., 2012; Allwood et al., 2004) hence, food handlers should thoroughly wash their hands with water and perfumed soap before, during, and after handling foods or raw materials, as well as after using the restroom, as suggested by Liu et al. (2014). Abdullah Sani and Siow (2014) have found that although 86.4% of their food handlers said that always wash their hands with soap and water, some of them were observed not doing so in actual food handling practice. These self-reported practices could not confirm the actual practices and behavior of food handlers in the food production area.

Besides, only 69.8% (187) of street food vendors refrained from handling food with wounded hands. Similar results were reported in previous studies (Rebouças et al., 2017; Al-Shabib et al., 2016; Abdul-Mutalib et al., 2012; Giritlioglu et al., 2011). This finding is consistent with the findings of a study by Tokuc et al. (2009) who discovered that almost all (93.2%) of hospital food staff were aware of the dangers of touching food with cut hands or fingers. Angelillo et al. (2001) discovered that 99% of food service employees did not touch food with cut hands or fingers. About 66.0% (177) of the vendors use appropriate and clean utensils when handling food. Samapundo et al. (2015) found that 50% of street vendors did not cover the utensils used and 95% cleaned the utensils every time after use but used soapy cold water. These practices will increase the risk of foodborne illnesses due to unsanitary utensils used to serve consumers. Hence,

training should be emphasized more regarding good practices among street food vendors to improve the quality of street food.

More than half of the street food vendors (67.5%) ensure that they do not wear any accessories while handling food. Food handlers (84.2%) in Turkey showed a high proportion regarding this practice and most of them indicated that they did not wear jewellery during food production (Giritlioglu et al., 2011). This aligned with Al-Kandari et al. (2019), Rebouças et al. (2017), Al Shabib et al. (2016), Samapundo et al. (2015), Çakiroglu and Uçar (2008), and Walker et al. (2003), where most of the food handlers took off their jewellery before engaging in food production. Approximately, 70.1% of street food vendors frequently washed their hands before and after wearing gloves. This result is consistent with past studies by Asmawi et al., 2018; Al-Shabib et al., 2016; and Soares et al., 2012. According to Abdul-Mutalib et al. (2012), gloves are important, but only a few food handlers use them during food preparation due to Malaysia's hot climate, which can cause discomfort if worn for an extended time. Gloves, on the other hand, can become a source of contamination through contact with raw materials and other kitchen surfaces (Liu et al., 2006). Every time want to handle the food, these street food vendors (67.5%) will make sure that their nails are short and clean. Similar results were reported in Indonesia (Putri et al., 2021), Kuwait (Al-Kandari et al., 2019), Brazil (Rebouças et al., 2017), and Haiti (Samapundo et al., 2015).

Street food vendors (59.7%) always refrain from eating and drinking in food processing areas. This was aligned with other studies (Asmawi et al., 2018; Jores et al., 2018; Rebouças et al., 2017; Al-Shabib et al., 2016) that reported most food handlers in their studies did not eat or drink at the workplace or during food processing. Eating and drinking during food handling are prohibited because can lead to cross-contamination with the food and utensils used. About 62.3% of the street food vendors always wear a suitable apron and disposable head cover every time handling the food. A study conducted in Indonesia revealed that 90.30% of food handlers did not wear aprons while processing food, and 80.60% did not wear head coverings, both of which could be sources of physical contamination in food (Putri et al., 2021). Asmawi et al. (2018) reported most of their food handlers wear aprons and caps before working. Samapundo et al. (2015) found that 60% of street food vendors did not wear an apron but 65% of street vendors' hair was covered during handling, preparing, and serving food.

A total of 164 of the street food vendors (61.2%) always ensure that the raw materials used are clean before cooking. Jores et al. (2018) found that 98.3% of street food vendors in Sarawak always wash raw foods before using them. This can guarantee raw materials to be used for cooking are free from pathogens and bacteria. More than half of the street food vendors, 58.2%, always wash their hands after using the toilet. A study conducted in Malaysia also revealed the same result (Asmawi et al., 2018). However, the results were parallel with studies in Ethiopia (Azanaw et al., 2021), Indonesia (Putri et al., 2022), and Saudi Arabia (Al-Shabib et al., 2016). Hand washing, on the other hand, has been identified as one of the most important methods of preventing the spread of foodborne illnesses (Abdul-Mutalib et al., 2012; Soares, 2012). A virus can be spread by the unwashed hands of food handlers who are themselves infected. As a result, good personal hygiene and sanitary handling practices at work are crucial parts of prevention programs for food safety (Ansari-Lari et al., 2010).

About 58.6% of street vendors in this study always check the expiration dates of ingredients before using them in food preparation. Street-cooked food handlers in Ghana were reported to check and dispose of food that was past its expiry date (Tuglo et al., 2021). Isoni Auad et al. (2019) discovered that 87.5% of food truck handlers always check the expiration dates of ingredients before using them in food preparation and 90% never use expired food even with no changes in the quality of food. Jores et al. (2018) in another study found that 86.3% of food handlers in Sarawak pay attention to the expiration dates of food and do not use expired food in preparing food. Meanwhile, Soares et al. (2012) and Buccheri et al. (2010) reported food handlers check the shelf life of foods at the time of delivery.

The results found that 60.8% (163) of street food vendors always wore proper attire in the food premises. Putri et al. (2021) also found similar results in their study that 91.7% of food handlers wear clean clothes when preparing food at their premises and 97.2% will change work clothes with clean garments. In addition, most food handlers in a study conducted by Asmawi et al. (2018) reported that they always wear a clean and suitable uniform before working. 99.1% of food handlers in Sarawak always wear clean uniforms when they are in food service (Jores et al., 2018). Approximately 56.3% of street vendors (151) disinfected food-handling areas to maintain sanitary environment. Isoni Auad et al. (2018) reported that all food truck handlers in Brazil sanitize the workplace after finishing the operation. This is maybe due to the food truck that usually took place in an open area tends to clean the area every time finished the operation, and they are obligated to the rules by relevant authorities. Giritlioglu et al. (2011) discovered that almost all respondents in Turkey kept their working areas clean and safe for food production. This is important to ensure there is no contamination in the food production area and thus reduce the cross-contamination in food produced.

Lastly, about 61.6% (165) of the street food vendors always wore disposable gloves when handling food. Similarly, studies by Abdullah Sani and Siow (2014) and Jores et al. (2018) also reported equivalent results on the importance of wearing gloves during food handling. However, Cempaka et al. (2019) reported that food handlers in Indonesia rarely use gloves, masks, and aprons because the weather in their place of sale was not conducive (hot) hence their hands and face are easily sweaty, and it makes the food handlers feel uncomfortable. Another study in Indonesia also revealed that most food handlers did not use gloves when processing food (Putri et al., 2019).

To determine the practice level of street food vendors, two (2) categories were used, namely good and poor practices. The result in Table 4.7 revealed that 91.4% (245) of the street food vendors had a good level of food safety practices, with a score between 36 to 54, while 8.6% (23) of the street food vendors were still at a poor level of food safety practices, with a score between 18 to 53. This percentage is higher than in other studies in Ethiopia (Azanaw et al., 2021; Teferi et al., 2021), Ghana (Tuglo et al., 2021; Addo-Tham et al., 2020; Kunadu et al., 2016), Kuwait (Al-Kandari et al., 2019), Brazil (Rebouças et al., 2017), Malaysia (Woh et al., 2016; Siau et al., 2015) and Saudi Arabia (Sharif & Al-Malki, 2010). The variation could be attributed to study settings, cutoff points, and demographic characteristics of street food vendors, as well as the food safety culture. In conclusion, this present study showed that many of the street food vendors

were able to practice a good level of practice because they had adequate knowledge and favorable attitude towards food safety.

Table 4.7: Street Food Vendor's Food Safety Practices Level

Level (score)	Frequency (n)	Percentage (%)
Good practices (36 – 54)	245	91.4
Poor practices (18 – 35)	23	8.6
Total	268	100.0

4.2.4 Summary of Food Safety Knowledge, Attitude and Practices Level

The summary of food safety knowledge, attitude, and practices (KAP) levels were summarized in Table 4.8. Most street food vendors in this possessed adequate food safety knowledge, favorable attitude towards food safety and obeyed to good food handling practices. Overall, the food safety KAP levels of street food vendors in Klang Valley are considered relatively good as indicated by many street food vendors. These findings were supported by Jores et al. (2018), Abdullah Sani and Siow (2014), and Rahman et al. (2016), who similarly reported that street food handlers in Malaysia have high knowledge, attitude, and practices (KAP) on food safety. However, according to Siau et al. (2015), some food handlers' knowledge and attitude were not translated into safe practices. In comparison, Asmawi et al. (2018) reported that food handlers who worked at food courts had poor knowledge but good attitudes and practices, indicating that working experience may have influenced vital food hygiene and safety practices. In conclusion, great knowledge, favorable attitude, and good food handling practices, on the other hand, could assist in the control of foodborne outbreaks in the food industry (Sharif and Al-Malki, 2010; Angelillo et al., 2000).

Table 4.8: Summary of Street Food Vendors' Food Safety KAP Levels

Level (score)	Frequency (n)	Percentage (%)
Food Safety Knowledge		
Adequate knowledge (9 – 18)	219	81.7
Inadequate knowledge (0 – 8)	49	18.3
Food Safety Attitude		
Favorable attitude (54 – 90)	239	89.2
Unfavorable attitude (18 – 53)	29	10.8
Food Safety Practices		
Good practice (36 – 54)	245	91.4
Poor practice (18 – 35)	23	8.6

4.3 Relationships between Food Safety Knowledge, Attitude, and Practices Level of Street Food Vendors

Pearson correlation analysis is used to test the linear relationship between two quantitative variables. In this study, Pearson correlation analysis was used to examine the relationships between food safety knowledge, attitude, and practices levels of the street food vendors. The correlation results are summarized in Table 4.9. The results revealed that there were statistically positive significant relationships at 1% level of significance between food safety knowledge and attitude of street food vendors ($r = 0.301$, $p < 0.000$), food safety knowledge and practices of street food vendors ($r = 0.269$, $p < 0.000$) and food safety attitude and practices of street food vendors ($r = 0.279$, $p < 0.000$). Nevertheless, even though these relationships were positive and significant, they were not particularly strong.

Table 4.9: Correlations between Food Safety Knowledge, Attitude, and Practices Level of Street Food Vendors

		Knowledge	Attitude	Practices
Knowledge	Pearson Correlation (r)	1	0.301***	0.269***
	Sig. (2-tailed)		0.000	0.000
Attitude	Pearson Correlation (r)	0.301***	1	0.279***
	Sig. (2-tailed)	0.000		0.000
Practices	Pearson Correlation (r)	0.269***	0.279***	1
	Sig. (2-tailed)	0.000	0.000	

Note: *** Correlation is significant at a 1% level of significance (2-tailed)

These findings revealed that the street food vendors' level of food safety knowledge influenced their attitude and practices on food safety. This relationship showed that street food vendors with adequate food safety knowledge have favorable food safety attitude and good food safety practices, a finding which was also supported by Al-Kandari et al. (2019), Elobeid et al. (2019), Cempaka et al. (2019), Aswawi et al. (2018), Al-Shabib et al. (2016), Kunadu et al. (2016), Siau et al. (2015), Vo et al. (2015), Abdullah Sani and Siow (2014), Abdul-Mutalib et al. (2012), Soares et al. (2012), and Ansari-Lari et al. (2010). Food handlers with adequate knowledge led to a good attitude towards food safety (Mendagudali et al., 2016; Abdul-Mutalib et al., 2012) and their practices on proper food safety (Abd Rahman et al., 2015). Abdullah Sani and Siow (2014) emphasized the importance of food safety attitude influencing food safety performance and practices, thereby reducing foodborne illnesses outbreaks.

According to Iwu et al. (2017), practice refers to how food handlers demonstrate their knowledge and attitude toward food hygiene through behavior or action. Aswawi et al. (2018) stated that positive attitudes could motivate and produce a greater impact on their practices in food safety attitudes. Nevertheless, Ansari-Lari et al. (2010) found contradictory results where there was a significant negative association between both

knowledge and attitude towards practices among food handlers in Iran. This means that while training may increase knowledge, it does not always result in changes to food handling practices and behaviors. However, in this study, it showed that street food handlers may gain food safety knowledge through food safety training which led to a favorable attitude. This was due to most of the street food vendors of the study had attended the food safety training and had more than 10 years' experience in food handling, resulting in a better food safety practice.

4.4 Associations between Food Safety Practices and Street Food Vendors' Demographic Characteristics

Chi-square analysis was used to determine the associations between the street food vendors' demographic characteristics and food safety practices. The hypotheses developed for this analysis are as follow:

- H₀: There are no significant associations between demographic characteristics and food safety practices among street food vendors.
- H₄: There are significant associations between demographic characteristics and food safety practices among street food vendors.

A cross-tabulation (crosstab) table was used to describe the relationship between two categorical variables. The result of the crosstab between street food vendors' demographic characteristics and food safety practices is shown in Table 4.10. The cross-tabulation was applied to all the demographic characteristics variables of street food vendors. However, according to the Chi-square analysis, only education level, type of stalls, monthly revenue, license, food safety training, and typhoid injection were found statistically significantly associated with food safety practices among street food vendors. Street food vendors with a secondary level of education (48.6%) were found to have good food safety practices compared to primary level (7.3%), certificate (9.8%), diploma (15.9%), bachelor's degree (16.7%), and master (1.6%). Besides, street food vendors with stationary stalls (73.5%) were likely to practice proper food safety practices as compared with mobile stalls (26.5%).

In terms of monthly revenue, 153 street food with the lowest revenue (RM1,000-RM10,000) seemed to have better food safety practices compared with others due to most street food handlers in this study earning RM1,000-RM10,000 per month. About 83.7% of the street food vendors who had licenses have good practices compared with unlicensed street food vendors (16.3%). Street food vendors who attend food safety training (59.2%) had good practices while 21.7% had poor food safety practices. Approximately, 71.8% of street food vendors took typhoid injections to implement good food safety practices while the remaining (28.2%) had poor practices.

In total, 245 street food vendors practiced good food safety practices (91% of the total) and of these 119 graduated from secondary school (48.6% of the total that has good practices), 180 street vendors had stationary stalls (73.5% of the total that has good practices), 153 street vendors with monthly revenue ranged RM1,000-RM10,000 (62.4% of the total that has good practices), 205 street vendor with licensed (83.7% of the total that has good practices), 145 street vendors who had attend food safety training (59.2% of the total that has good practices), and 176 street vendors who had injected with typhoid injection (71.8% of the total that has good practices). In summary, when street vendors graduated from secondary school, had stationary stalls, monthly revenue of about RM1,000-RM10,000, had a license, went to food safety training, and had taken typhoid injections most street food vendors would implement good food safety practices.

Table 4.10: Crosstab Table

Variables	Level of Food Safety Practices		
	Poor Practices (0)	Good practices (1)	Total
	Frequency (%)	Frequency (%)	Frequency (%)
Education level			
Primary school	1 (4.3%)	18 (7.3%)	19 (7.1%)
Secondary school	14 (60.9%)	119 (48.6%)	133 (49.6%)
Certificate	6 (26.1%)	24 (9.8%)	30 (11.2%)
Diploma	1 (4.3%)	39 (15.9%)	40 (14.9%)
Bachelor's Degree	1 (4.3%)	41 (16.7%)	42 (15.7%)
Master	0 (0.0%)	44 (1.6%)	4 (1.5%)
Type of Stalls			
Mobile	11 (47.8%)	65 (26.5%)	76 (28.4%)
Stationary	12 (52.2%)	180 (73.5%)	192 (71.6%)
Monthly Revenue			
RM1,000-RM10,000	22 (95.7%)	153 (62.4%)	175 (65.3%)
RM10,001-RM50,000	1 (4.3%)	90 (36.7%)	91 (34.0%)
RM50,001-RM100,000	0 (0.0%)	2 (0.8%)	2 (0.7%)
License			
Yes	15 (65.2%)	205 (83.7%)	220 (82.1%)
No	8 (34.8%)	40 (16.3%)	48 (17.9%)
Food Safety Training			
Yes	5 (21.7%)	145 (59.2%)	150 (56.0%)
No	18 (78.3%)	100 (40.8%)	118 (44.0%)
Typhoid Injection			
Yes	10 (43.5%)	176 (71.8%)	186 (69.4%)
No	13 (56.5%)	69 (28.2%)	82 (30.6%)
Total	23 (8.6%)	245 (91.4%)	268 (100%)

Table 4.11 shows the associations between street food vendors' demographic characteristics and food safety practices results. The Chi-square test indicated that there were statistically significant associations between food safety practices and demographic characteristics of street food vendors. The results revealed that variables such as education level ($\chi^2 = 10.213$, $p = 0.069$), type of stalls ($\chi^2 = 4.693$, $p = 0.030$), monthly revenue ($\chi^2 = 10.233$, $p = 0.006$), license ($\chi^2 = 4.871$, $p = 0.027$), food safety training ($\chi^2 = 11.963$, $p = 0.001$), and typhoid injection ($\chi^2 = 7.963$, $p = 0.005$) were found statistically significant associated with food safety practices among street food vendors. Only

variables with p-values of <0.10 in the Chi-square analysis were included in the logistic regression analysis.

Table 4.11: Associations between Food Safety Practices and Demographic Characteristics of Street Food Vendors

Variables	Chi-square (χ^2)	df	Sig.
Gender	1.018	1	0.313
Age	0.383	3	0.944
Race	4.588	3	0.205
Religion	0.478	1	0.489
Marital status	0.005	1	0.943
Education level	10.213	5	0.069*
Business ownership	1.207	2	0.547
Operation hour	0.399	2	0.819
Experience in food handling	1.597	1	0.206
Type of stalls	4.693	1	0.030**
Number of workers	2.250	1	0.134
Monthly revenue	10.233	2	0.006***
License	4.871	1	0.027**
Food safety training	11.963	1	0.001***
Typhoid injection	7.963	1	0.005***

Note: *** Significant at a 1% level of significance

** Significant at a 5% level of significance

* Significant at a 10% level of significance

These results align with a study by Tuglo et al. (2021), where educational level, average monthly income, registered street-cooked food handler, and food safety hygiene practices. Addo-Tham et al. (2020) highlighted the statistically significant association between food handling practices and license and training, thereby emphasizing the importance of food safety training in influencing the practices of street food vendors. Huynh-Van et al. (2022) revealed that fixed vendors practiced better than mobile vendors. This was due to the fixed vendors having sufficient access to clean water, proper waste bins, and proper plastic bags to pack food. Furthermore, Woh et al. (2016) indicated that those who had attended food safety training were more likely to have good practices than those who had not. According to Abdul-Mutalib et al. (2012), providing food handlers with specific training to improve food safety practices and meet acceptable standards is critical. Asmawi et al. (2018) demonstrated that food handlers' poor safety knowledge negatively impacted their handling behavior, but both training and experience could mitigate this effect. Nonetheless, the study did not find any significant association between street food vendors' practices between gender, age, race, religion, marital status, education level, and business ownership.

4.5 Factors Influencing Food Safety Practices among Street Food Vendors

Binary logistic regression analysis is used to perform logistic regression on a binary response variable (Agresti, 1990; Hosmer & Lemeshow, 1989). Binary logistic regression is a regression model in which the target variable has only two values: 0 or 1 (Artetxe et al., 2018). Also known as logistic regression analysis, it is in the form of probability statistical data that measures the relationship between a dependent variable and independent variables. In this study, logistic regression analysis was used to estimate the selected demographic characteristics (variables with p-values of <0.10 in the Chi-square analysis) and the factors that influenced food safety practices among street food vendors.

The variables used as the independent variables are knowledge, attitude, education level, type of stalls, monthly revenue, license, food safety training, and typhoid injection. The results revealed that seven (7) factors, namely knowledge, attitudes, education level, type of stalls, monthly revenue, food safety training, and typhoid injection, were statistically significant with food safety practices among the street food vendors. Based on Nagelkerke's result, the R^2 was 0.402, which revealed that the regression model explains 40.2% of the variability observed in the dependent variable. The Hosmer and Lemeshow test for this study was ($p = 0.839$), given that the P value of the Hosmer and Lemeshow Test was higher than 0.05, this model was thought to be a good predictor of street food vendors' level of knowledge regarding food safety (Pallant, 2007). Indicated the variables are not significantly different from those predicted by the model and that the overall model fit is good. Overall, 83.9% of the practicing level was explained by all the independent variables. Table 4.12 shows the results of the factors that influenced street food vendors' food safety practices.

Table 4.12: Factors Influencing Food Safety Practices among Street Food Vendors

Variables	Estimated coefficients (B)	SE	Wald	Sig.	Exponential (B)
Knowledge	1.296	0.563	5.308	0.021**	3.656
Attitude	1.086	0.630	2.972	0.085*	2.963
Education level	1.608	0.810	3.939	0.047**	4.993
Type of stalls	1.064	0.548	3.773	0.052*	2.899
Monthly revenue	1.766	1.071	2.718	0.099*	5.848
License	0.667	0.571	1.364	0.243	1.948
Food safety training	1.220	0.581	4.417	0.036**	3.387
Typhoid injection	1.194	0.541	4.861	0.027**	3.299
Constant	-2.329	0.887	6.898	0.009	0.097
-2 Log-Likelihood			104.304		
Cox and Snell R square			0.178		
Nagelkerke R Square			0.402		
Hosmer and Lemeshow Test			0.839		

Note: **Significant at a 5% level of significance

*Significant at a 10% level of significance

The estimated coefficient for knowledge showed a positive relationship ($\beta = 1.296$), indicating that street food vendors with adequate knowledge were 3.656 likely to practice good practice compared to those with inadequate knowledge and significant at a 5% level of significance. This finding aligns with Cempaka et al. (2019) and Mohd Azaman et al. (2016), who established a connection between improved knowledge will promote positive attitude and safe handling practices among food handlers. Rahman et al. (2016) also found a similar result, where knowledge significantly increased food safety practices and it was 1.732 times higher in practice good practice. Toh and Birchenough (2002) found there was a strong correlation between knowledge and food handling practices and most studies supported that knowledge as a prerequisite to safe food handling practices (Lin et al., 2004; Daniels et al, 2001). Knowledge level is possibly a crucial factor in understanding the relationship between attitude and practices because knowledgeable handlers often act and behave in ways that affirm their knowledge level and vice versa (Zanin et al., 2017). Several studies found that an increase in knowledge does not always result in implementing good practices (Ansari-Lari et al., 2010; Bucchieri et al., 2010; Park et al. 2010) due to time restraint, lacked employees, unavailability of facilities and supplies, and negative attitude of workers (Läikkö-Roto & Nevas, 2014; Soares et al., 2012).

The attitude also showed a positive relationship ($\beta = 1.086$) that indicated street food with favorable attitudes was 2.963 times more likely to display a good level of food safety practice ($p=0.085$), significant at a 10% level of significance. The finding is consistent with a previous study by Kılıçhan et al. (2020), who reported that 23.4% of chefs' practices for food safety can be explained by attitude toward food safety. According to the model, a one-unit increase in the attitude towards food safety results in an increase of 0.567 units in food safety practice. The result of the current study was parallel with a study done by Rahman et al. (2016) that reported attitudes significantly increased food safety practices, and it was 1.166 times higher in good practices. Abdullah Sani and Siow (2014) stated that attitude is the crucial factor that may influence food safety behavior and practices, thus decreasing the occurrence of foodborne illnesses. According to Siau et al. (2015), measuring food safety attitude is crucial because people act according to their intentions, which are influenced by their attitudes. This is in line with Ajzen's (2002) Theory of Planned Behavior. Previous studies unanimously concluded that safety knowledge and handlers' attitudes significantly correlate (Al-Shabib et al., 2016; Abdullah Sani & Siow, 2014).

Education level was found to be a positive relationship ($\beta = 1.608$) and had a significant effect on food safety practices among street food vendors. The result indicates that street food handlers with higher education tend to be practicing food safety 4.993 times better than those who have lower education levels. The current finding was aligned with a study done in Ghana by Odonkor et al. (2020) that reported food handlers with tertiary education qualifications were more likely to have proper food handling practices than those with primary education. Tuglo et al. (2021) argued for a minimum educational requirement for aspiring food handlers, noting that in their study, individuals with secondary education were more likely to have good hygiene practices compared to those with no formal education. Meanwhile, a study by Dagne et al. (2019) revealed that mothers in Ethiopia with secondary education were 3.09 times more, and mothers with a college or university education were 2.95 times more likely to have proper food safety practices. The thought of food handlers with lower education but practicing good food

safety practices is because they attend food safety training or because of their experience in food handling. Tuglo et al. (2021) discovered that food preparation skills, personal hygiene, and cleanliness are learned from friends, relatives, parents, and the media, but not necessarily from formal education. Therefore, it is crucial to establish a basic educational framework for food handlers before they enter the food industry.

The type of stalls showed a positive relationship ($\beta = 1.064$), indicating that the street food vendors with stationary stalls exhibit 2.899 times more likely to have good food safety practices. According to Isoni Auad et al. (2019), mobile stalls such as food trucks generally escape effective food safety regulations and inspections due to their itinerant and temporary nature and may also encourage the hiring of untrained employees, thus, increasing the risk of foodborne diseases. Because of the mobility and temporary nature of street vendors, it is very complex and difficult to control a large number of street vending operations while ensuring street food safety (Liu et al., 2014). As a result, necessary steps must be taken to improve street food hygiene and safety to facilitate long-term economic and tourism development in Malaysia. The mobility of street vendors could be a predictor of food safety compliance. According to Huynh-Van et al. (2022), mobile vendors had a lower chance of meeting the food hygiene and safety criteria than fixed vendors. Furthermore, fixed vendors were more likely to have a business license or permit. This legal status may provide access to social and legal protection, as well as necessary services and facilities, and assist them in better-adopting food safety practices (Khairuzzaman et al. (2014). As such, food vendors with fixed stalls are more likely to have good practices when handling food since they operate their business at a similar place and have already established an environment, water supply, and hygiene sanitation conditions.

Meanwhile, the monthly revenue variable showed a positive relationship with the high level of food safety practices with an estimated coefficient of $\beta = 1.766$. Street food vendors who gained a high monthly revenue were 5.848 times more likely to implement better food safety measures than those with low monthly revenue. Tuglo et al. (2021) discovered that street food vendors who earned high monthly incomes were more likely to have good hygiene practices compared to those who earned low monthly incomes. These results aligned with other studies by Lema et al. (2020) and Osaili et al. (2018). Food handlers with higher incomes are better able to afford the equipment necessary to create and maintain a hygienic environment. They also can afford to hire many workers to help them in maintaining cleanliness and manage proper waste management. Tuglo et al. (2021) agreed that food handlers with high income can determine their ways of hygiene practices, purchasing more cooking utensils for preparing different meals and managing their leftover food to prevent contamination. Working in a suitable environment also supports improved food safety procedures (da Cunha et al., 2014). Some essential requirements for food safety include equipment, utensils, products, and physical structures can be provided and a suitable facility also increases employee satisfaction and organizational cohesion (da Cunha, 2021). In this situation, food handlers are more likely to follow proper procedures because they work in a professional setting and are aware of strict food safety management standards.

Attending food safety training had a significant impact on the street food vendors' level of food safety practice in implementing good practices in their food handling. The results

revealed that positive relationship with an estimated coefficient of $\beta = 1.220$, indicating street food vendors who had attended food safety training practiced 3.387 times better level of food safety practices compared to those who did not attend the training with a p-value of 0.036 and significant at 5% level of significance. This finding is similar to Cempaka et al. (2019), where food handlers who have attended training in Indonesia tend to obtain good practices level 2.38 times more likely compared to food handlers who have not attended the training. This study also found street food vendors who have completed food safety training were associated with implementing good practices. Similar results to the previous study done in Ghana, Ethiopia, and Malaysia (Tuglo et al., 2021; Azanaw et al., 2019; Rahman et al., 2016). This finding also emphasized the importance of training on influencing food handling practices of street food vendors. Azanaw et al. (2019) mentioned that food safety training and knowledge are strongly related to food handling practices. Addo-Tham et al. (2020) and Woh et al. (2016) recommended that food safety training be improved and continuous training food handlers to ensure compliance with the regulations. Adequate food safety training also will be beneficial to food handlers in reducing the occurrence of foodborne diseases and improving positive attitudes towards practicing food safety knowledge (Soon, et al., 2011; Powell, et al., 2011). Additional, training should include procedures to prevent food contamination, risks of foodborne pathogens, perception of good handling practices and personal hygiene, proper sanitation of food, utensils, and the environment, and ensure that food handlers are kept updated about the required procedures in maintaining the quality and safety of the food produced (Campos et al., 2009). Studies have shown that knowledge alone is insufficient to improve the hygienic attitude and practices of food handlers (Madaki & Miroslava, 2021; Abdullah Sani & Siow, 2014; Soares et al., 2012; Bucchieri et al., 2010; Chang et al., 2003; Walker et al., 2003). As a result, hands-on training materials should be available, and training programs should be designed with a variety of activities aimed toward the viewer of handlers. Sanitation practices like health checks, adequate handwashing, observation of proper personal hygiene, prevention of cross-contamination, and proper sanitation procedures could be easily improved if food handlers receive ongoing, and goal-specific training (Park et al., 2010).

Typhoid injection is another critical factor that has influenced food safety practices among street food vendors. It had a positive relationship with an estimated coefficient of $\beta = 1.194$. Hence, street food vendors who had taken typhoid injection were 3.299 times higher level of food safety practices compared to those who did not have the injection. All food handlers must have a basic certificate of training on food handling processes and be vaccinated (Tan et al., 2013; Mohd Zain & Naing, 2002). Such precautionary measures are necessary to prevent food safety problems and protect customers' health (Sylvia et al., 2015; Agyei-Baffour et al., 2013), this is because food handlers are often identified as the most common cause of foodborne diseases, transmitting pathogens through feral-oral routes, skin lesions, as well as unclean kitchen utensils or counters (Linscott, 2011). Overall, the results revealed that food safety training was the most influential factor influencing food safety practices among street food vendors.

The overall results from Table 4.13 showed that the variable of monthly revenue was the most influential factor that influenced food safety practices among street food vendors. Highly earned revenue street food vendors could provide their businesses with proper equipment for ensuring hygiene practices at their stalls. They were also able to hire more workers to help them in maintaining a hygienic environment and implement good food

safety practices hence reducing the number of contaminated foods. The estimate equation model as given:

$$\text{Food Safety Practices} = -2.329 + 1.296 (\text{knowledge}) + 1.086 (\text{attitude}) + 1.608 (\text{education level}) + 1.064 (\text{type of stalls}) + 1.766 (\text{monthly revenue}) + 1.220 (\text{food safety training}) + 1.194 (\text{typhoid injection}) + \varepsilon_i \quad \text{Equation 6}$$

4.6 Summary

This chapter explains the results of the study based on four (4) analyses namely descriptive analysis, Pearson correlation analysis, Chi-square analysis, and logistic regression analysis. In the first part, the results of respondents' demographic characteristics are presented. Street food vendors' knowledge, attitude, and practice levels are also described. Pearson correlation analysis was conducted to measure the relationships between knowledge, attitude, and practices (KAP) levels among street food vendors. Results on the associations between demographic characteristics and independent variables namely practices level are also described. Finally, a logistic regression analysis was conducted to determine the influential factors in street food vendors' food safety practices. Out of eight (8) variables, seven (7) variables namely knowledge, attitude, education level, type of stalls, monthly revenue, food safety training, and typhoid injection, are revealed to be significant variables that influenced food safety practices among street food vendors.

CHAPTER 5

SUMMARY, RECOMMENDATIONS, AND CONCLUSION

The summary of findings, recommendations, limitations, and conclusion of the study are discussed in this chapter. The findings from this study contribute to the improvement of food safety practices among street food vendors and enhancing established regulations would undoubtedly ensure a significant reduction in the hazards of street food consumption. In addition, this chapter also discusses suggestions for future studies related to street food vendors' knowledge, attitudes, and practices towards food safety.

5.1 Summary of Findings

Street food vendors are proliferating in the food industry recently due to easy access to the market. However, there have consistently been cases that link Malaysian street food with foodborne illnesses, raising consumer concerns about their health. To reduce the risk of foodborne illnesses, street food vendors must be knowledgeable about food safety procedures. Since it has been established that street food is prepared in an unhygienic environment and is linked to food contamination, the main concern is the extent to which contaminated street food may have had adverse effects on Malaysian health.

The general objective of this study is to determine the knowledge, attitude, and practices (KAP) of street food vendors towards food safety. The specific objectives are 1) to determine food safety knowledge, attitude, and practices (KAP) levels of street food vendors; 2) to examine the relationships between food safety knowledge, attitude, and practices (KAP) levels among street food vendors; 3) to determine the associations between demographic characteristics and food safety practices among street food vendors, and 4) to investigate the most influential factor that influence food safety practices among street food vendors.

This study involved 268 street food vendors and descriptive analysis was used to gather information on street food vendors' demographic characteristics in terms of frequency and percentage. Most of the street food vendors were male and aged between 35 – 44 years old. The majority of the street food vendors who participated in the study were Malay, Muslim, and married. Many of them had secondary school and there are sole proprietorships in general. Half of the street food vendors operate their business at night with 1 – 15 years of experience in food handling, as well as operate with stationary stalls and have 1 – 7 workers. Most of the street food vendors earned monthly revenue between RM1,000 – RM10,000, had licenses, attended food safety training, and had taken typhoid injections.

To achieve the first specific objective which is to determine food safety knowledge, attitude, and practices (KAP) levels of street food vendors, a descriptive analysis was conducted. The knowledge level of the street food vendors was categorized into two groups namely adequate and inadequate knowledge. The results revealed that 81.7% of street food vendors showed an adequate knowledge level of food safety practices. Next, street food vendor's attitude was divided into two groups, namely favorable and unfavorable attitude. Most street food vendors (89.2%) had a favorable attitude level towards food safety practices. In terms of practices level, the result showed that 91.4% of the street food vendors were at a good food safety practices level to implement better hygiene practices in reducing foodborne diseases and the remaining street food vendors (8.6%) were at a poor level of food safety practices.

Pearson correlation analysis was conducted to accomplish the second specific objective which is to examine the relationships between food safety knowledge, attitude, and practices (KAP) levels among street food vendors. The results revealed that knowledge, attitude, and practices levels were statistically positively correlated among street food vendors. The strongest correlation was found between the knowledge and attitude level of street food vendors ($r=0.301$, $p < 0.000$). For the attitude and practices level, the correlation score was ($r= 0.279$, $p < 0.000$), while for the knowledge and practices level was ($r= 0.269$, $p < 0.000$).

Next, Chi-square analysis was employed to attain the third specific objective which is to determine the associations between demographic characteristics and food safety practices among street food vendors. The results indicated there were statistically significant associations between food safety practices and demographic characteristics of street food vendors. The results revealed that variables such as education level ($\chi^2 = 10.213$, $p = 0.069$), type of stalls ($\chi^2 = 4.693$, $p = 0.030$), monthly revenue ($\chi^2 = 10.233$, $p = 0.006$), license ($\chi^2 = 4.871$, $p = 0.027$), food safety training ($\chi^2 = 11.963$, $p = 0.001$), and typhoid injection ($\chi^2 = 7.963$, $p = 0.005$) were found statistically significant associated with food safety practices among street food vendors.

Lastly, a fourth specific objective which is to investigate the factors that influence food safety practices among street food vendors was achieved using logistic regression analysis. Out of eight (8) variables measured, the results revealed that seven (7) variables namely knowledge, attitude, education level, type of stalls, monthly revenue, food safety training, and typhoid injection were identified to be significant variables that influenced food safety practices among street food vendors. The regression model explains 36.5% of the variability observed in food safety practices. The results emphasized that monthly revenue was the most influential factor affecting street food vendors' food safety practices concerning minimizing foodborne disease occurrence.

5.2 Recommendations

Based on the findings of the study, street food vendors' knowledge, attitude, and practices (KAP) levels were correlated; as a result, the local authorities such as the

Ministry of Health, Malaysia (MOH), municipal council for each state in Malaysia, and non-governmental organization (NGO) should constantly hold more seminars, workshops, and campaigns to create awareness and improve food safety knowledge on good food handling practices to improve street food vendors' handling techniques. Improvement of food safety educational programs that cover all aspects and concerns about safety practices should be conducted to educate more street food vendors and raise their awareness regarding food safety. Food safety information, education, and communication materials should be freely available and easily accessible to food handlers. Besides, strengthening the importance of practicing food safety and conserving public health in the Malaysian community helps to reduce public health risks. Campaigns can now be run through social media, which appears to be one of the best ways to attract the interest of people of all ages.

Food safety policies and regulations were established to ensure the Malaysian community is protected. But then again, the one-sided effort is insufficient as issues on food safety remain unresolved. Even though by default, typhoid vaccination is mandatory for food vendors (employers and employees) however, there are still unvaccinated street food vendors. Therefore, there is a need for stricter enforcement to tackle unvaccinated food handler issues. This can be done through frequent inspections to verify the vaccination status of food vendors or establish a new regulation where food handlers must undergo a routine medical checkup to make sure food handlers are in a good condition to serve/prepare food. Employers have a big responsibility to play in making sure all their staff strictly adhere to the rules set by the authorities and monitor their staff's good and hygienic food handling practices. Current food safety regulations for street vendors can be further improved by providing incentives to street food vendors to aid them, such as equipment procurement subsidies and microcredit programs to help them in getting better and proper equipment for their businesses. With subsidies, street food vendors can buy equipment at a low price which then helps them to get more revenue when customers keep on buying their product.

However, to facilitate effective street vendors' safety inspection, proper training of food inspectors should also be strengthened. Food safety training should be done regularly and in-house to ensure that food handlers are equipped with the most updated food safety guidelines. Furthermore, food safety training programs should improve their contents, implementation, and effectiveness to ensure better understanding so that food handlers can translate their knowledge into safe food handling practices. Additionally, the local government needs to provide better infrastructure for street vendors such as designated sites for street food vendors with appropriate and reliable infrastructure, and proper access to clean water coupled with the sewage system, to accommodate food vendors to run their businesses in hygienic conditions and hence reduce foodborne disease risks.

5.3 Limitations of the Study

Throughout the study, several limitations were encountered. There are very limited studies that are relevant to street food vendors, particularly from a Malaysian perspective, and most of these studies only looked at canteen and food court workers. Data on food safety practices are primarily self-reported; as a result, bias may exist because it is

unknown whether the responses given by food handlers reflect their actual practices or not. Hence, the validity of street food handlers cannot be verified as street vendors were not observed during food handling. Additionally, it is challenging to collect data on street food vendors because there is no database and central agency that oversees them. The street food industry is regulated by various agencies, depending on the state. Furthermore, the study samples are only a fraction of the whole nation's food vendors as the study focused on Klang Valley areas. Therefore, these results should not be generalized to an entire country.

5.4 Suggestions for Future Research

Future research should focus more on street food vendors since the number of street vendors keeps increasing in the following years. Hence, a comparison can be made between street vendors and other food handler operators. To avoid invalidity in the results of self-report practices, observed practices should be done and to reduce observer bias, only one observer was assigned to observe the practices. The observation was based on the same observation checklist that was used for all food premises.

A dedicated agency needs to be assigned to observe the practice, and the checklist to follow must be consistent for all food premises. This will lead to encouraging more collaboration with local authorities. Hence, more samples of street vendors in Malaysia can be obtained thus, this will involve the expansion of data where the future research needs to cover the whole of Malaysia which will lead to more accurate findings and generalizability.

In addition, research on knowledge, attitudes, and concern about street food is essential in minimizing foodborne diseases, particularly due to dining out at street food vendors. The next studies should include more variables that affect food safety procedures so that more precise results can be anticipated. This will aid policymakers in creating effective strategies to develop Malaysia's street food industry.

5.5 Conclusion

The street food industry plays a crucial role in ensuring the availability of low-cost and convenient foods, ensuring food security, and alleviating hunger. However, contaminated street food is a global food safety concern because it has adverse health effects on humans. Despite being a severe issue, food handlers still do not adequately address the harmful effects of food product contamination due to consumers' lack of knowledge about the foods they eat, some of which may be contaminated as for street food vendors supplying or producing street foods that are free of any contamination must be given high priority. The results indicated that most of the street food vendors had adequate knowledge, favorable attitudes, and good practices towards implementing safe food handling. The food handling practices of these street food vendors can still be improved by planning suitable strategies to overcome the problems since some street

food vendors operated without licenses and are unvaccinated which can lead to the occurrence of food poisoning. Improvised food safety training programs will be able to help street food vendors to deliver better practices and gain more knowledge on food safety thus will help to reduce the incidence of foodborne diseases, which occurred particularly frequently in Malaysia. Incentives from the government such as a loan or capital support can help street food vendors to implement better practices since they can accommodate their business with sufficient appropriate utensils, sanitary stalls, proper water supply, and enough employees.

Based on the findings of the study, it is important for street food vendors to fulfill all the requirements on food safety which will improve the quality of the food industry in Malaysia since the contribution that street food vendors make to the national economy is one of the main forces behind efforts to improve the practices. Food control agencies and street food vendors need to collaborate to improve the street food industry and have a clear understanding of their respective roles and responsibilities to ensure the success of the industry in Malaysia. It is also crucial to ensure street food vendors apply for business licenses before operating their business, hence, improving the quality of food produced and the productivity of the business. In the major cities in Malaysia, there are numerous opportunities for local street vendors and the franchise sector to develop and grow their businesses. This is due to the fact that demand for FAFH is rapidly increasing among Malaysians regardless of ethnicity or income. Therefore, enhancing national surveillance and boosting food inspection in the food industry, particularly for street food vendors, should include long-term solutions for food contamination. Shifting in consumers' behavior and the increment of their income levels has improved the demand for safe foods, thus making Malaysia one of the countries that produce safe food in the world.

REFERENCES

- Abbot, J. M., Byrd-Bredbenner, C., Schaffner, D., Bruhn, C. M., & Blalock, L. (2009). Comparison of food safety cognitions and self-reported food-handling behaviors with observed food safety behaviors of young adults. *European Journal of Clinical Nutrition*, 63(4), 572-579. <https://doi.org/10.1038/sj.ejcn.1602961>
- Abd Hanan, F., Sadri, N., & Yusup, N. Q. B. (2021). Customers' perception on Malaysian street food quality. *International Journal of Academic Research in Business and Social Sciences*, 11(13), 7387. <http://dx.doi.org/10.6007/IJARBS/v11-i13/8503>
- Abd Patah, M. O. R., Mat Issa, Z., & Mohammad Nor, K. (2009). Food safety attitude of culinary arts based students in public and private higher learning institutions (IPT). *International Education Studies*, 2(4), 168-178.
- Abd Rahim, N. L., Bakar, N. F. A., & Zulfakar, S. S. (2019). Bacterial contamination in foods sold by street vendors around Chow Kit, Kuala Lumpur. *Asia Pacific Environmental and Occupational Health Journal*, 5(2), 23-29.
- Abd Rahman, A., Asrarhaghighi, E., & Ab Rahman, S. (2015). Consumers and halal cosmetic products: knowledge, religiosity, attitude, and intention. *Journal of Islamic Marketing*, 6(1), 148-163. <https://doi.org/10.1108/JIMA-09-2013-0068>
- Abdalla, M. A., Suliman, S. E., & Bakhiet, A. O. (2009). Food safety knowledge and practices of street foodvendors in Atbara City (Naher Elneel State Sudan). *African Journal of Biotechnology*, 8(24), 6967-6971.
- Abdul Aziz, N. A. A., & Mohd Sham, S. (2021). Knowledge, attitude and practice towards water, sanitation and hygiene among street food vendors in Serdang, Selangor. *Asia Pacific Environmental and Occupational Health Journal*, 7(2), 1-12.
- Abdul Rashid, M. F. (2017). Characteristics, trends and spatial distribution of urban migration in Malaysia: A case study of the Klang Valley region. *UPLanD- Journal of Urban Planning, Landscape & Environmental Design*, 2(2), 107-127. <https://doi.org/10.6092/2531-9906/5261>
- Abdul Rashid, M. F., Ab. Ghani, I., Ngah, I., & Mat Yasin, S. (2014). Evaluation of migration decision-selectivity factors in Metropolitan area: A case of Klang Valley region, Malaysia. *Journal of Social Sciences and Humanities (e-BANGI)*, 9(1), 34-44.
- Abdul Talib, H., & Mohd Ali, K. A. (2009). An overview of Malaysian food industry: The Opportunity and Quality Aspects. *Pakistan Journal of Nutrition*, 8, 507-517. <https://dx.doi.org/10.3923/pjn.2009.507.517>
- Abdullah Sani, N., & Siow, O. N. (2014). Knowledge, attitudes, and practices of food handlers on food safety in food service operations at the Universiti Kebangsaan Malaysia. *Food Control*, 37, 210-217.

- Abdullahi, A., Hassan, A., Kadarman, N., Saleh, A., Baraya, Y. S., & Pei, L. L. (2016). Food safety knowledge, attitude, and practice toward compliance with abattoir laws among the abattoir workers in Malaysia. *International Journal of General Medicine*, 6(9), 79-87. <https://doi.org/10.2147/IJGM.S98436>
- Abdul-Mutalib, N. A., Abdul-Rashid, M. F., Mustafa, S., Amin-Nordin, S., Hamat, R. A., & Osman, M. (2012). Knowledge, attitude and practices regarding food hygiene and sanitation of food handlers in Kuala Pilah, Malaysia. *Food Control*, 27(2), 289-293.
- Abdul-Mutalib, N.A., Syafinaz, A.N., Sakai, K., & Shirai, Y. (2015). An overview of foodborne illness and food safety in Malaysia. *International Food Research Journal*, 22(3), 896-90.
- Abrahale, K., Sousa, S., Albuquerque, G., Padrão, P., & Lunet, N. (2019). Street food research worldwide: a scoping review. *Journal of Human Nutrition and Dietetics*, 32(2), 152-174. <https://doi.org/10.1111/jhn.12604>
- Abu Bakar, N., Rosbi, S., Hashim, H., & Che Arshad, N. (2021). Factors influencing students intention to choose career of Halal Food Industry in Malaysia using Theory of Planned Behavior. *The International Journal of Management Science and Business Administration*, 8(1), 50-67.
- Ackah, M., Gyamfi, E. T., Anim, A. K., Osei, J., Hansen, J. K., & Agyemang, O. (2011). Socio-economic profile, knowledge of hygiene and food safety practices among street-food vendors in some parts of Accra-Ghana. *Internet Journal of Food Safety*, 13, 191-197.
- Adams, J., Goffe, L., Brown, T., Lake, A. A., Summerbell, C., White, M., ... & Adamson, A. J. (2015). Frequency and socio-demographic correlates of eating meals out and take-away meals at home: Cross-sectional analysis of the UK national diet and nutrition survey, waves 1–4 (2008–12). *International Journal of Behavioral Nutrition and Physical Activity*, 12(1), 1-9.
- Adane, M., Teka, B., Gismu, Y., Halefom, G., & Ademe, M. (2018). Food hygiene and safety measures among food handlers in street food shops and food establishments of Dessie town, Ethiopia: A community-based cross-sectional study. *PLOS ONE*, 13(5), e0196919. <https://doi.org/10.1371/journal.pone.0196919>
- Addo-Tham, R., Appiah-Brempong, E., Vampere, H., Acquah-Gyan, E., & Gyimah Akwasi, A. (2020). Knowledge of food safety and food-handling practices of street food vendors in Ejisu-Juaben Municipality of Ghana. *Advances in Public Health*, 2020, 1-7. <https://doi.org/10.1155/2020/4579573>
- Adesokan, H. K., Akinseye, V. O., & Adesokan, G. A. (2015). Food safety training is associated with improved knowledge and behaviours among foodservice establishments' workers. *International Journal of Food Science*, 2015, 1-8. <https://doi.org/10.1155/2015/328761>

- Adimora, A. A., & Schoenbach, V. J. (2005). Social context, sexual networks, and racial disparities in rates of sexually transmitted infections. *The Journal of Infectious Diseases*, 191(Supplement_1), S115-S122. <https://doi.org/10.1086/425280>
- Agriculture and Agri-Food Canada. (2014). *Global Analysis Report: Foodservice Profile Malaysia*. <https://docplayer.net/13913089-Foodservice-profile-malaysia.html>
- Agyei-Baffour, P., Sekyere, K. B., & Addy, E. A. (2013). Policy on Hazard Analysis and Critical Control Point (HACCP) and adherence to food preparation guidelines: a cross-sectional survey of stakeholders in food service in Kumasi, Ghana. *BMC Research Notes*, 6(1), 1-12. <https://doi.org/10.1186/1756-0500-6-442>
- Ahmed, M. H., Akbar, A., & Sadiq, M. B. (2021). Cross sectional study on food safety knowledge, attitudes, and practices of food handlers in Lahore district, Pakistan. *Heliyon*, 7(11), 1-7. <https://doi.org/10.1016/j.heliyon.2021.e08420>
- Ajzen, I. (1985). From intentions to actions: A Theory of Planned Behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control* (pp. 11-39). Springer.
- Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211.
- Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the Theory of Planned Behavior. *Journal of Applied Social Psychology*, 32(4), 665-683. <https://doi.org/10.1111/j.1559-1816.2002.tb00236.x>
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Prentice Hall.
- Ajzen, I., & Fishbein, M. (2000). Attitudes and the attitude-behavior relation: Reasoned and automatic processes. *European Review of Social Psychology*, 11(1), 1-33. <https://doi.org/10.1080/14792779943000116>
- Akabanda, F., Hlortsie, E. H., & Owusu-Kwarteng, J. (2017). Food safety knowledge, attitudes, and practices of institutional food handlers in Ghana. *BMC Public Health*, 17(1), 1-9. <https://doi.org/10.1186/s12889-016-3986-9>
- Al Banna, M. H., Kundu, S., Brazendale, K., Ahinkorah, B. O., Disu, T. R., Seidu, A. A., ... & Khan, M. S. I. (2022). Knowledge and awareness about food safety, foodborne diseases, and microbial hazards: A cross-sectional study among Bangladeshi consumers of street-vended foods. *Food Control*, 134, 1-10. <https://doi.org/10.1016/j.foodcont.2021.108718>
- Al Mamun, M., Rahman, S. M. M., & Turin, T. C. (2013). Knowledge and awareness of children's food safety among school-based street food vendors in Dhaka, Bangladesh. *Foodborne Pathogens and Disease*, 10(4), 323-330.
- Al Suwaidi, A., Hussein, H., Al Faisal, W., El Sawaf, E., & Wasfy, A. (2015). Hygienic practices among food handlers in Dubai. *International Journal of Preventive Medicine Research*, 1(3), 101-108.

- Ali, N. & Abdullah M. A. 2012. The food consumption and eating behaviour of Malaysian urbanites: Issues and concerns. *Geografia Malaysia Journal of Society and Space*, 8(6), 157-165.
- Alimi, B. A. (2016). Risk factors in street food practices in developing countries: A review. *Food Science and Human Wellness*, 5(3), 141-148. <https://doi.org/10.1016/j.fshw.2016.05.001>
- Alimi, B. A., & Workneh, T. S. (2016). Consumer awareness and willingness to pay for safety of street foods in developing countries: a review. *International Journal of Consumer Studies*, 40(2), 242-248. <https://doi.org/10.1111/ijcs.12248>
- Alimi, B. A., Shittu, T. A., & Sanni, L. O. (2014). Effect of hydrocolloids and egg content on sensory quality of coated fried yam chips. *Journal of Culinary Science & Technology*, 12(2), 168-180. <https://doi.org/10.1080/15428052.2014.880097>
- Al-Kandari, D., Al-abdeen, J., & Sidhu, J. (2019). Food safety knowledge, attitudes and practices of food handlers in restaurants in Kuwait. *Food Control*, 103, 103-110. <https://doi.org/10.1016/j.foodcont.2019.03.040>
- Allen, P., & Sachs, C. (2012). Women and food chains: The gendered politics of food. In P. W. Forson & C. Counihan (Eds.), *Taking food public: Redefining foodways in a changing world* (pp. 23-40). Routledge.
- Allwood, P. B., Jenkins, T., Paulus, C., Johnson, L., & Hedberg, C. W. (2004). Hand washing compliance among retail food establishment workers in Minnesota. *Journal of Food Protection*, 67(12), 2825-2828.
- Al-Shabib, N. A., Mosilhey, S. H., & Husain, F. M. (2016). Cross-sectional study on food safety knowledge, attitude and practices of male food handlers employed in restaurants of King Saud University, Saudi Arabia. *Food Control*, 59, 212-217. <https://doi.org/10.1016/j.foodcont.2015.05.002>
- Aluko, O. O., Ojeremi, T. T., Olaleke, D. A., & Ajidagba, E. B. (2014). Evaluation of food safety and sanitary practices among food vendors at car parks in Ile Ife, southwestern Nigeria. *Food Control*, 40, 165-171.
- Alzghoul, B. I., & Abdullah, N. A. (2015). Pain management practices by nurses: An application of the Knowledge, Attitude and Practices (KAP) Model. *Global Journal of Health Science*, 8(6), 154-160. <https://doi.org/10.5539/gjhs.v8n6p154>
- Amarudin, S. K. (2018). *Kanak-kanak maut, 3 ahli keluarga dirawat keracunan makanan*. Bharian. <https://www.bharian.com.my/berita/kes/2018/06/434964/kanak-kanak-maut-3-ahli-keluarga-dirawat-keracunan-makanan>
- Amran, S. N. M. E. (2018). [UPDATE] 42 lagi kes keracunan akibat laksa...?. Harian Metro. <https://www.hmetro.com.my/mutakhir/2018/10/385030/update-42-lagi-kes-keracunan-akibat-laksa>

- Anandhi, N., & Krishnaveni, N. (2015). Microbiological quality of selected street-vended foods in Coimbatore, India. *African Journal of Microbiology Research*, 9(11), 757-762. <https://doi.org/10.5897/AJMR2013.6421>
- Andrade, C., Menon, V., Ameen, S., & Kumar Praharaj, S. (2020). Designing and conducting knowledge, attitude, and practice surveys in psychiatry: practical guidance. *Indian Journal of Psychological Medicine*, 42(5), 478-481. <https://doi.org/10.1177%2F0253717620946111>
- Angelillo, I. F., Viggiani, N. M., Rizzo, L., & Bianco, A. (2000). Food handlers and foodborne diseases: knowledge, attitudes, and reported behavior in Italy. *Journal of Food Protection*, 63(3), 381-385. <https://doi.org/10.4315/0362-028X-63.3.381>
- Angelo, K. M., Nisler, A. L., Hall, A. J., Brown, L. G., & Gould, L. H. (2017). Epidemiology of restaurant-associated foodborne disease outbreaks, United States, 1998–2013. *Epidemiology & Infection*, 145(3), 523-534. <https://doi.org/10.1017/S0950268816002314>
- Ansari-Lari, M., Soodbakhsh, S., & Lakzadeh, L. (2010). Knowledge, attitudes and practices of workers on food hygienic practices in meat processing plants in Fars, Iran. *Food Control*, 21(3), 260-263. <https://doi.org/10.1016/j.foodcont.2009.06.003>
- Aquino, H. V. A., Yap, T., Lacap, J. P. G., Tuazon, G., & Flores, M. (2021). Food safety knowledge, attitudes, practices and training of fast-food restaurant food handlers: a moderation analysis. *British Food Journal*, 123(12), 3824-3840. <https://doi.org/10.1108/BFJ-01-2021-0026>
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, 40(4), 471-499. <https://doi.org/10.1348/014466601164939>
- Artetxe, A., Beristain, A., & Grana, M. (2018). Predictive models for hospital readmission risk: A systematic review of methods. *Computer Methods and Programs in Biomedicine*, 164, 49-64. <https://doi.org/10.1016/j.cmpb.2018.06.006>
- AshaRani, P. V., Abidin, E., Kumarasan, R., Kumar, F. D. S., Shafie, S., Jeyagurunathan, A., ... & Subramaniam, M. (2020). Study protocol for a nationwide Knowledge, Attitudes and Practices (KAP) survey on diabetes in Singapore's general population. *BMJ Open*, 10, 1-8. <https://doi.org/10.1136/bmjopen-2020-037125>
- Ashari, L. S., Abd Rashid, A. A., Shahril, M. R., Lee, Y. Y., Kueh, Y. C., Abdul Hakim, B. N., ... & Mohamed, H. J. J. (2022). Exploring the norms of eating-out practice among adults in Malaysia. *Malaysian Journal of Nutrition*, 28(1), 31-41. <http://dx.doi.org/10.31246/mjn-2021-0008>
- Asmawi, U. M. M., Norehan, A. A., Salikin, K., Rosdi, N. A. S., Munir, N. A. T. A., & Basri, N. B. M. (2018). An assessment of knowledge, attitudes, and practices in food safety among food handlers engaged in food courts. *Current Research in*

- Nutrition and Food Science Journal*, 6(2), 346-353.
<https://dx.doi.org/10.12944/CRNFSJ.6.2.09>
- Australian Institute of Food Safety. (2019). What is Food Safety?.
<https://www.foodsafety.com.au/blog/what-is-food-safety>
- Ayodele, A. A., & Panama, A. E. (2016). Predictors of consumer patronage of street food vendors in a typical developing economy context. *Developing Country Studies*, 6(11), 105-119.
- Azanaw, J., Dagne, H., Andualem, Z., & Adane, T. (2021). Food safety knowledge, attitude, and practice of college students, Ethiopia, 2019: A Cross-Sectional Study. *BioMed Research International*, 2021, 1-10.
<https://doi.org/10.1155/2021/6686392>
- Azis, A., & Tek, L. X. (2018). The community perceptions of street hawkers in Malaysia. *Sumatra Journal of Disaster, Geography and Geography Education*, 2(2), 35-38. <https://doi.org/10.24036/sjdgge.v2i2.154>
- Aziz, S. A. A., & Dahan, H. M. (2013). Food handlers' attitude towards safe food handling in school canteens. *Procedia-Social and Behavioral Sciences*, 105, 220-228. <https://doi.org/10.1016/j.sbspro.2013.11.023>
- Azmi, F., Abdullah, A., Bakri, M., Musa, H., & Jayakrishnan, M. (2018). The adoption of halal food supply chain towards the performance of food manufacturing in Malaysia. *Management Science Letters*, 8(7), 755-766.
- Bagozzi, R. P. (1992). The self-regulation of attitudes, intentions, and behavior. *Social Psychology Quarterly*, 178-204. <https://doi.org/10.2307/2786945>
- Bagozzi, R. P., Wong, N., Abe, S., & Bergami, M. (2000). Cultural and situational contingencies and the theory of reasoned action: Application to fast food restaurant consumption. *Journal of Consumer Psychology*, 9(2), 97-106.
- Bai, L., Tang, J., Yang, Y., & Gong, S. (2014). Hygienic food handling intention. An application of the Theory of Planned Behavior in the Chinese cultural context. *Food Control*, 42, 172-180.
- Bakar, B. (2022). 93 kes keracunan makanan sejak 1 Ramadan. Berita Harian Online. <https://origin.bharian.com.my/berita/nasional/2022/04/945787/93-kes-keracunan-makanan-sejak-1-ramadan>
- Bandura, A., & Walters, R. H. (1977). *Social learning theory* (Vol. 1). Prentice Hall.
- Barro, N., Bello, A. R., Savadogo, A., Ouattara, C. A. T., & Iiboudo, A. J. (2006). Hygienic status assessment of dish washing waters, utensils, hands and pieces of money from street food processing sites in Ouagadougou (Burkina Faso). *African Journal of Biotechnology*, 5(11), 1107-1112.
- Baş, M., Ersun, A. Ş., & Kivanç, G. (2006). The evaluation of food hygiene knowledge, attitudes, and practices of food handlers' in food businesses in Turkey. *Food Control*, 17(4), 317-322. <https://doi.org/10.1016/j.foodcont.2004.11.006>

- Bellia, C., Pilato, M., & Seraphin, H. (2016). Street food and food safety: a driver for tourism?. *Quality – Access to Success*, 17(1), 20-27.
- Benesty, J., Chen, J., Huang, Y., & Cohen, I. (2009). Pearson correlation coefficient. In *Noise Education in Speech Processing. Springer Topics in Signal Processing: Vol 2* (pp. 1-4). Springer.
- Bhowmik, S. (2012). *Street vendors in the global urban economy*. Routledge.
- Bhowmik, S. K. (2005). Street Vendors in Asia: A Review. *Economic and Political Weekly*, 40(22/23), 2256–2264. <http://www.jstor.org/stable/4416705>
- Bin, R. M. (2016). Knowledge, attitudes, and practices (KAP) on good manufacturing practices (GMP) among food handlers in Terengganu hospitals. *International Journal of Pharmacy and Pharmaceutical Sciences*, 8(11), 53-59. <https://doi.org/10.22159/ijpps.2016v8i11.13000>
- Birgen, B. J., Njue, L. G., Kaindi, D. M., Ogutu, F. O., & Owade, J. O. (2020). Determinants of microbial contamination of street-vended chicken products sold in Nairobi County, Kenya. *International Journal of Food Science*, 2020, 1-8. <https://doi.org/10.1155/2020/2746492>
- Bishop, C. M. (2006). *Pattern recognition and machine learning*. Springer. <https://link.springer.com/book/9780387310732>
- Bishop, Y. M. M., Fienberg, S. E., & Holland, P. W. (2007). *Discrete multivariate analysis: Theory and practice*. Springer-Verlag.
- Blackmore, C. (2007). What kinds of knowledge, knowing and learning are required for addressing resource dilemmas?: a theoretical overview. *Environmental Science & Policy*, 10(6), 512-525. <https://doi.org/10.1016/j.envsci.2007.02.007>
- Bou-Mitri, C., Mahmoud, D., El Gerges, N., & Abou Jaoude, M. (2018). Food safety knowledge, attitudes and practices of food handlers in Lebanese hospitals: A cross-sectional study. *Food Control*, 94, 78-84.
- Bourdieu, P. (1990). *The logic of practice*. Stanford University Press.
- Bryan, F. L., Teufel, P., Riaz, S., Roohi, S., Qadar, F., & Malik, Z. U. R. (1992). Hazards and critical control points of street-vending operations in a mountain resort town in Pakistan. *Journal of Food Protection*, 55(9), 701-707. <https://doi.org/10.4315/0362-028X-55.9.701>
- Buccheri, C., Mammina, C., Giammanco, S., Giammanco, M., La Guardia, M., & Casuccio, A. (2010). Knowledge, attitudes and self-reported practices of food service staff in nursing homes and long-term care facilities. *Food Control*, 21(10), 1367-1373. <https://doi.org/10.1016/j.foodcont.2010.04.010>
- CAC. (2003). Recommended International Code of Practice General Principles of Food Hygiene: CAC/RCP 1-1969, Rev. 4-2003.

- Çakıroğlu, F. P., & Uçar, A. (2008). Employees' perception of hygiene in the catering industry in Ankara (Turkey). *Food Control*, 19(1), 9-15. <https://doi.org/10.1016/j.foodcont.2007.01.001>
- Campos, A. K. C., Cardonha, Â. M. S., Pinheiro, L. B. G., Ferreira, N. R., Azevedo, P. R. M., & Stamford, T. L. M. (2009). Assessment of personal hygiene and practices of food handlers in municipal public schools of Natal, Brazil. *Food Control*, 20(9), 807-810. <https://doi.org/10.1016/j.foodcont.2008.10.010>
- Cassini, A., Colzani, E., Kramarz, P., Kretzschmar, M. E., & Takkinen, J. (2016). Impact of food and water-borne diseases on European population health. *Current Opinion in Food Science*, 12, 21-29. <https://doi.org/10.1016/j.cofs.2016.06.002>
- CDC. (2022). Four Steps to Food Safety: Clean, Separate, Cook, Chill <https://www.cdc.gov/foodsafety/keep-food-safe.html>
- Cempaka, L., Rizki, A. A., & Asiah, N. (2019). Knowledge, attitudes and practices regarding food hygiene and sanitation of food street handlers in the public elementary school at greater Jakarta, Indonesia. *Asia Pacific Journal of Sustainable Agriculture Food and Energy (APJSAFE)*, 7(2), 1-8. <http://jurnal.bakrie.ac.id/index.php/APJSAFE/article/view/1944>
- Chang, C. T., Lee, M., Lee, J. C. Y., Lee, N. C. T., Ng, T. Y., Shafie, A. A., & Thong, K. S. (2021). Public KAP towards COVID-19 and antibiotics resistance: A Malaysian survey of knowledge and awareness. *International Journal of Environmental Research and Public Health*, 18(8), 1-20. <https://doi.org/10.3390/ijerph18083964>
- Chang, F. S., Chu, C. H., & Mohd Shahril, A. (2020). Consumer's perception towards street food in Malaysia. *EPRA International Journal of Research and Development*, 5(2), 343-352. <https://doi.org/10.36713/epra2016>
- Chang, H. J., Lee, J. S., & Kwak, T. K. (2003). Effectiveness of HACCP-based training on the food safety knowledge and behavior of hospital foodservice employees. *Nutritional Sciences*, 6(2), 118-126.
- Cheng, Y., Zhang, Y., Ma, J., & Zhan, S. (2017). Food safety knowledge, attitude and self-reported practice of secondary school students in Beijing, China: a cross-sectional study. *PloS One*, 12(11), 1-13.
- Chien-Yun, D., Wan-Fei, C., Yu-Hsi, Y., & Chia-Hung, Y. (2012). A study on modification of knowledge, attitude and practice on vocational high school electronics courses integrated with nanotechnology concept. *International Journal of Thermal & Environmental Engineering*, 4(1), 73-9. <http://dx.doi.org/10.5383/ijtee.04.01.011>
- Chomvarin, C., Chantarasuk, Y., Srigulbutr, S., Chareonsudjai, S., & Chaicumpar, K. (2006). Enteropathogenic bacteria and enterotoxin producing *Staphylococcus aureus* isolated from ready-to-eat foods in Khon Kaen, Thailand. *Southeast Asian Journal of Tropical Medicine & Public Health*, 37(5), 983-990.

- Chong, K. L., & Stephenson, M. L. (2020). Deciphering Food Hawkerpreneurship: Challenges and success factors in franchising street food businesses in Malaysia. *Tourism and Hospitality Research*, 20(4), 493-509.
- Chukuezi, C. O. (2010). Food safety and hygienic practices of street food vendors in Owerri, Nigeria. *Studies in Sociology of Science*, 1(1), 50-57. <http://dx.doi.org/10.3968/j.sss.1923018420100101.005>
- Clayton, D. A., Griffith, C. J., Price, P., & Peters, A. C. (2002). Food handlers' beliefs and self-reported practices. *International Journal of Environmental Health Research*, 12(1), 25-39. <https://doi.org/10.1080/09603120120110031>
- Cochran, W. G. (1977). *Sampling techniques* (3rd ed.). John Wiley & Sons.
- Codjia, C. O., & Saghaian, S. H. (2022). Determinants of Food Expenditure Patterns: Evidence from US Consumers in the Context of the COVID-19 Price Shocks. *Sustainability*, 14(13), 1-17. <https://doi.org/10.3390/su14138156>
- Coleman, P., & Roberts, A. (2005). Food hygiene training in the UK: A time for change. *Food Service Technology*, 5(1), 17-22. <https://doi.org/10.1111/j.1471-5740.2005.00108.x>
- Cook, J. L., Graves, L., & Kirkham, C. (2018). Listeriosis in pregnancy: Practitioners' food safety counselling practices to pregnant women. *Journal of Obstetrics and Gynaecology Canada*, 40(9), 1139-1147.
- Cortese, R. D. M., Veiros, M. B., Feldman, C., & Cavalli, S. B. (2016). Food safety and hygiene practices of vendors during the chain of street food production in Florianopolis, Brazil: A cross-sectional study. *Food Control*, 62, 178 -186. <https://doi.org/10.1016/j.foodcont.2015.10.027>
- Cross, J. (2000). Street vendors, and postmodernity: conflict and compromise in the global economy. *International Journal of Sociology and Social Policy*, 20(1/2), 29-51. <https://doi.org/10.1108/01443330010789061>
- Cross, J., & Morales, A. (Eds.). (2007). *Street entrepreneurs: People, place, & politics in local and global perspective*. Routledge.
- Cuprasitrit, T., Srisorrachatr, S., & Malai, D. (2011). Food safety knowledge, attitude and practice of food handlers and microbiological and chemical food quality assessment of food for making merit for monks in Ratchathewi District, Bangkok. *Asia Journal of Public Health*, 2(1), 27-34.
- Cushman, J. W., Shanklin, C. W., & Niehoff, B. P. (2001). Hygiene practices of part-time student employees in a university foodservice operation. *The Journal of the National Association of College and University Food Service*, 23, 37-43.
- Da Cunha, D. T. (2021). Improving food safety practices in the foodservice industry. *Current Opinion in Food Science*, 42, 127-133. <https://doi.org/10.1016/j.cofs.2021.05.010>

- da Cunha, D. T., Stedefeldt, E., & De Rosso, V. V. (2014). The role of theoretical food safety training on Brazilian food handlers' knowledge, attitude and practice. *Food Control*, 43, 167-174. <https://doi.org/10.1016/j.foodcont.2014.03.012>
- da Silva, S. A., Cardoso, R. D. C. V., Góes, J. Â. W., Santos, J. N., Ramos, F. P., de Jesus, R. B., ... & da Silva, P. S. T. (2014). Street food on the coast of Salvador, Bahia, Brazil: A study from the socioeconomic and food safety perspectives. *Food Control*, 40, 78-84.
- da Vitória, A. G., de Souza Couto Oliveira, J., de Almeida Pereira, L. C., de Faria, C. P., & de São José, J. F. B. (2021). Food safety knowledge, attitudes and practices of food handlers: a cross-sectional study in school kitchens in Espírito Santo, Brazil. *BMC Public Health*, 21, 1-10. <https://doi.org/10.1186/s12889-021-10282-1>
- Dagne, H., Raju, R. P., Andualem, Z., Hagos, T., & Addis, K. (2019). Food safety practice and its associated factors among mothers in Debarq town, northwest Ethiopia: community-based cross-sectional study. *BioMed Research International*, 2019, 1-8. <https://doi.org/10.1155/2019/1549131>
- Daniels, R. W., Daniels, B. L., Gilmet, P., & Noonan, D. (2001). Audits international: 2000 home food safety study report. *Food Safety Magazine*, 7(2), 1-4.
- Das, A., Nagananda, G. S., Bhattacharya, S., & Bhardwaj, S. (2010). Microbiological quality of street-vended Indian chaats sold in Bangalore. *Journal of Biological Sciences*, 10(3), 255-260. <https://doi.org/10.3923/JBS.2010.255.260>
- Das, M., Rath, C. C., & Mohapatra, U. B. (2012). Bacteriology of a most popular street food (Panipuri) and inhibitory effect of essential oils on bacterial growth. *Journal of Food Science and Technology*, 49(5), 564-571. <https://doi.org/10.1007/s13197-010-0202-2>
- Dass, M. (2010). Cross-Tabulation. In J. N. Sheth & N. K. Malhotra (Eds.), *Wiley International Encyclopedia of Marketing*. John Wiley & Sons. <https://doi.org/10.1002/9781444316568.wiem02063>
- de Certeau, M. (1984). *The practice of everyday life*, trans. Steven Rendall. University of California Press.
- DeBess, E. E., Pippert, E., Angulo, F. J., & Cieslak, P. R. (2009). Food handler assessment in Oregon. *Foodborne Pathogens and Disease*, 6(3), 329-335. <https://doi.org/10.1089/fpd.2008.0102>
- Department of Standards Malaysia. (1994). *Specification for Ready-To-Drink Beverages (Carbonated and Non-Carbonated) (MS 601:1994)*.
- Dewaal, C. S., Robert, N., Witmer, J., & Tian, X. A. (2010). A comparison of the burden of foodborne and waterborne diseases in three world regions, 2008. *Food Protection Trends*, 30(8), 483-490.

- Djekic, I., Smigic, N., Kalogianni, E. P., Rocha, A., Zamioudi, L., & Pacheco, R. (2014). Food hygiene practices in different food establishments. *Food Control*, (39), 34-40. <https://doi.org/10.1016/j.foodcont.2013.10.035>
- DOSM. (2019). *Food and Beverage Services recorded gross output value of RM82.8 billion in 2017*. https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=456&bul_id=MWg5UHNIRXFnN2xlWVdDTmErUDV6QT09&menu_id=b0pIV1E3RW40VWRTUkZocEhyZ1pLUT09
- DOSM. (2020a). *Household Expenditure Survey Report 2019*. https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=323&bul_id=c3JpRzRqeTNPamMxL1FpTkNBNUVBQT09&menu_id=amVoWU54UTl0a21NWmdhMjFMMWcyZz09
- DOSM. (2020b). *The Key Findings: Income, Poverty, Inequality, Expenditure, Basic Amenities. Survey report 2019*. www.dosm.gov.my/v1/uploads/files/1_Articles_By_Themes/Prices/HIES/Penemuan_Utama.pdf
- DOSM. (2020c). *Compendium of Environment Statistics, Malaysia 2020*. https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=162&bul_id=TjM1ZlFxb3VOakdmMnozVms5dUlKZz09&menu_id=NWVEZGhEVlNMeitaMHNzK2htRU05dz09#:~:text=Meanwhile%2C%20for%20the%20Population%20Settlement,W.P.
- DOSM. (2020d). *Informal Sector Work Force Survey Report, Malaysia, 2019*. <https://www.dosm.gov.my/v1/index.php?r=column/pdfPrev&id=U0tMZmJudTkzNmhwjdjZFb2FmVWxOUT09>
- DOSM. (2022a). *Revenue for Services Sector First Quarter 2022*. https://www.dosm.gov.my/v1/index.php?r=column/cthemByCat&cat=398&bul_id=Zjh4SlluQ1EwTFFScHFJL2N1cXQ3dz09&menu_id=b0pIV1E3RW40VWRTUkZocEhyZ1pLUT09
- Dudeja, P., Singh, A., Sahni, N., Kaur, S., & Goel, S. (2017). Effectiveness of an intervention package on knowledge, attitude, and practices of food handlers in a tertiary care hospital of north India: A before and after comparison study. *Medical Journal Armed Forces India*, 73(1), 49-53.
- EFSA. (2010). The Community Summary Report on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks in the European Union in 2008. *EFSA Journal*, 8,(1), 1-368. <https://doi.org/10.2903/j.efsa.2010.1496>
- EFSA. (2014). Scientific opinion on the risk posed by pathogens in food of non-animal origin. Part 2 (*Salmonella* and Norovirus in leafy greens eaten raw as salad). *EFSA Journal*, 12(3): 1-118. <https://efsa.onlinelibrary.wiley.com/doi/pdf/10.2903/j.efsa.2014.3600>

- Egan, M. B., Raats, M. M., Grubb, S. M., Eves, A., Lumbers, M. L., Dean, M. S., & Adams, M. R. (2007). A review of food safety and food hygiene training studies in the commercial sector. *Food Control*, 18(10), 1180-1190.
- Ehiri, J. E., & Morris, G. P. (1996). Hygiene training and education of food handlers: does it work?. *Ecology of Food and Nutrition*, 35(4), 243-251. <https://doi.org/10.1080/03670244.1996.9991494>
- Elobeid, T., Savvaiddis, I., & Ganji, V. (2019). Impact of food safety training on the knowledge, practice, and attitudes of food handlers working in fast-food restaurants. *British Food Journal*, 121(4), 937-949. <https://doi.org/10.1108/BFJ-01-2019-0066>
- Emmanuel, A., Mangai, J. M., Kayong, E. A., Afoi, B. B., Goshit, J. D., Naman, K., & Innocent, O. (2015). Assessment of practice of food safety and hygiene among food vendors within Jos North Local Government Area of Plateau State, Nigeria. *International Journal of Medical and Health Research*, 1(2), 83-86.
- Evans, M. (1989). Consumer behaviour towards fashion. *European Journal of Marketing*, 23(7), 7-16. <https://doi.org/10.1108/EUM00000000000575>
- FAO. (2003). *Assuring food safety and quality: Guidelines for strengthening national food control systems*. Food and nutrition paper no. 76. FAO. <https://www.fao.org/publications/card/en/c/92f82d38-5557-4ca1-b361-be14cd129db6/>
- FAO. (2011). *The place of urban and peri-urban agriculture (UPA) in national food security programmes*. Integrated Food Security Support Service (Tcsf) Policy and Programme Development Support Division Technical Cooperation Department. FAO. <http://www.fao.org/3/i2177e/i2177e00.pdf>
- FAO. (1989). *Street Foods: Report of an FAO Expert Consultation, Jogjakarta, Indonesia*. 5–9 December 1988. Indonesia: Food and Agriculture Organization.
- FDA. (2017). *Safe Food Handling*. <https://www.fda.gov/food/buy-store-serve-safe-food/safe-food-handling>
- Fellows, P., & Hilmi, M. (2011). *Selling street and snack foods*. FAO diversification booklet 18. FAO.
- Ferrari, A. M., Oliveira, J. D. S. C., & São José, J. F. B. D. (2021). Street food in Espírito Santo, Brazil: a study about good handling practices and food microbial quality. *Food Science and Technology*, 41, 549-556.
- Ferreira Júnior, S., Oliveira, H. B. D., & Marin-Léon, L. (2013). Knowledge, attitudes and practices on tuberculosis in prisons and public health services. *Revista Brasileira de Epidemiologia*, 16(1), 100-113.
- Field, A. (2009). *Discovering Statistics Using SPSS* (3rd ed.). Sage.

- Finlay, K. A., Trafimow, D., & Moroi, E. (1999). The importance of subjective norms on intentions to perform health behaviors. *Journal of Applied Social Psychology*, 29(11), 2381-2393.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Flanders Investment & Trade. (2020). *F&B Report Malaysia 2020*. https://www.flandersinvestmentandtrade.com/export/sites/trade/files/market_studies/FB%20Industry%20Report.pdf
- Food Act 1983. (1983). https://www.moh.gov.my/index.php/database_stores/attach_download/317/16
- Food Hygiene Regulation 2009. (2009). <http://extwprlegs1.fao.org/docs/pdf/mal91581.pdf>
- Food Safety and Standards Act (2006). *Act no. 34 of 2006 with Comments. Short notes & important gazette Notifications*. 3rd edn: 9-10.
- Franck, A. K. (2011). "I am Too Old! Who is Going to Give Me a Job?" Women Hawkers in Teluk Bahang, Penang, Malaysia. *Journal of Workplace Rights*, 15(1), 111-132.
- Fung, F., Wang, H. S., & Menon, S. (2018). Food safety in the 21st century. *Biomedical Journal*, 41(2), 88-95. <https://doi.org/10.1016/j.bj.2018.03.003>
- Garin, B., Aidara, A., Spiegel, A., Arrive, P., Bastaraud, A., Cartel, J. L., ... & Rocourt, J. (2002). Multicenter study of street foods in 13 towns on four continents by the food and environmental hygiene study group of the international network of pasteur and associated institutes. *Journal of Food Protection*, 65(1), 146-152. <https://doi.org/10.4315/0362-028X-65.1.146>
- Gelormini, M., Damasceno, A., Lopes, S. A., Maló, S., Chongole, C., Muholove, P., ... & Lunet, N. (2015). Street food environment in Maputo (STOOD Map): a cross-sectional study in Mozambique. *JMIR Research Protocols*, 4(3), 1-7. <https://doi.org/10.2196/resprot.4096>
- Ghosh, M., Wahi, S., Kumar, M., & Ganguli, A. (2007). Prevalence of enterotoxigenic *Staphylococcus aureus* and *Shigella* spp. in some raw street vended Indian foods. *International Journal of Environmental Health Research*, 17(2), 151-156. <https://doi.org/10.1080/09603120701219204>
- Gianpietri, E., Verneau, F., Del Giudice, T., Carfora, V., & Finco, A. (2018). A Theory of Planned behaviour perspective for investigating the role of trust in consumer purchasing decision related to short food supply chains. *Food Quality and Preference*, 64, 160-166. <https://doi.org/10.1016/j.foodqual.2017.09.012>
- Giritlioglu, I., Batman, O., & Tetik, N. (2011). The knowledge and practice of food safety and hygiene of cookery students in Turkey. *Food Control*, 22(6), 838-842. <https://doi.org/10.1016/j.foodcont.2010.09.016>

- Gitahi, M. G., Wangoh, J., & Njage, P. M. K. (2012). Microbial safety of street foods in Industrial Area, Nairobi. *Research Journal of Microbiology*, 7(6), 297-308.
- Githiri, M., Kimiywe, J., & Okemo, P. (2013). Knowledge in food hygiene and hygienic practices differ-in food handlers at a hospital in Nairobi, Kenya. *African Journal of Food Science and Technology*, 4(1), 19-24.
- Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report*, 8(4), 597-606. <https://doi.org/10.46743/2160-3715/2003.1870>
- Grace, D., Randolph, T., Affognon, H., Dramane, D., Diall, O., & Clausen, P. H. (2009). Characterisation and validation of farmers' knowledge and practice of cattle trypanosomosis management in the cotton zone of West Africa. *Acta Tropica*, 111(2), 137-143. <https://doi.org/10.1016/j.actatropica.2009.03.009>
- Green, L. R., Radke, V., Mason, R., Bushnell, L., Reimann, D. W., Mack, J. C., ... & Selman, C. A. (2007). Factors related to food worker hand hygiene practices. *Journal of Food Protection*, 70(3), 661-666.
- Greig, J. D., Todd, E. C., Bartleson, C. A., & Michaels, B. S. (2007). Outbreaks where food workers have been implicated in the spread of foodborne disease. Part 1. Description of the problem, methods, and agents involved. *Journal of Food Protection*, 70(7), 1752-1761. <https://doi.org/10.4315/0362-028X-70.7.1752>
- Griffith, C., Worsfold, D., & Mitchell, R. (1998). Food preparation, risk communication and the consumer. *Food Control*, 9(4), 225-232. [https://doi.org/10.1016/S0956-7135\(98\)00003-6](https://doi.org/10.1016/S0956-7135(98)00003-6)
- Groseclose, S. L., & Buckeridge, D. L. (2017). Public health surveillance systems: recent advances in their use and evaluation. *Annual Review of Public Health*, 38, 57-79. <https://doi.org/10.1146/annurev-publhealth-031816-044348>
- Guarte, J. M., & Barrios, E. B. (2006). Estimation under purposive sampling. *Communications in Statistics-Simulation and Computation*, 35(2), 277-284. <https://doi.org/10.1080/03610910600591610>
- Gumucio, S., Luhmann, N., Fauvel, G., Zompi, S., Ronsse, A., Courcaud, A., ... & du Monde, M. (2011). The KAP survey model: knowledge, attitude, and practices. *Saint-Etienne, France: IGC Communigraphie*, 4(5).
- Guthrie, J. F., Lin, B. H., & Frazao, E. (2002). Role of food prepared away from home in the American diet, 1977-78 versus 1994-96: changes and consequences. *Journal of Nutrition Education and Behavior*, 34(3), 140-150.
- Gyebi, B. E. A., Annan, R. A., Apprey, C., Asamoah-Boakye, O., & Asare, C. Y. (2021). Knowledge, attitude, and practices (KAP) of foodservice providers, and microbial quality on food served in Kumasi. *Journal of Foodservice Business Research*, 24(4), 397-413. <https://doi.org/10.1080/15378020.2020.1859972>
- Haagsma, J. A., Polinder, S., Stein, C. E., & Havelaar, A. H. (2013). Systematic review of foodborne burden of disease studies: quality assessment of data and

- methodology. *International Journal of Food Microbiology*, 166(1), 34-47.
<https://doi.org/10.1016/j.ijfoodmicro.2013.05.029>
- Haapala, I., & Probart, C. (2004). Food safety knowledge, perceptions, and behaviors among middle school students. *Journal of Nutrition Education and Behavior*, 36(2), 71-76. [https://doi.org/10.1016/S1499-4046\(06\)60136-X](https://doi.org/10.1016/S1499-4046(06)60136-X)
- Hanashiro, A., Morita, M., Matté, G. R., Matté, M. H., & Torres, E. A. (2005). Microbiological quality of selected street foods from a restricted area of Sao Paulo city, Brazil. *Food Control*, 16(5), 439-444.
- Handoyo, E., & Wijayanti, T. (2021). The factors affecting the welfare of street vendors in Indonesia. *Planning Malaysia: Journal of the Malaysian Institute of Planners*, 19(4), 23-243.
- Haryani, Y., Noorzaleha, A. S., Fatimah, A. B., Noorjahan, B. A., Patrick, G. B., Shamsinar, A. T., ... & Son, R. (2007). Incidence of Klebsiella pneumonia in street foods sold in Malaysia and their characterization by antibiotic resistance, plasmid profiling, and RAPD-PCR analysis. *Food Control*, 18(7), 847-853.
<https://doi.org/10.1016/j.foodcont.2006.04.009>
- Hashanuzzaman, M., Bhowmik, S., Rahman, M. S., Zakaria, M. A., Voumik, L. C., & Mamun, A. A. (2020). Assessment of food safety knowledge, attitudes and practices of fish farmers and restaurants food handlers in Bangladesh. *Heliyon*, 6(11), 1-8.
- Hassan, N. (2003). *Accommodating the street Hawkers into Modern Urban Management in Kula Lumpur*. 39th ISOCARP Congress.
https://www.isocarp.net/Data/case_studies/293.pdf
- Hausmann-Muela, S., Ribera, J. M., & Nyamongo, I. (2003). Health-seeking behaviour and the health system response. *Disease Control Priority Project Working Paper No. 14*, 43-61.
- Havelaar, A. H., Kirk, M. D., Torgerson, P. R., Gibb, H. J., Hald, T., Lake, R. J., ... & World Health Organization Foodborne Disease Burden Epidemiology Reference Group. (2015). World Health Organization global estimates and regional comparisons of the burden of foodborne disease in 2010. *PLoS Medicine*, 12(12), 1-23. <https://doi.org/10.1371/journal.pmed.1001923>
- Henderson, J. C., Yun, O. S., Poon, P., & Biwei, X. (2012). Hawker centres as tourist attractions: The case of Singapore. *International Journal of Hospitality Management*, 31(3), 849-855. <https://doi.org/10.1016/j.ijhm.2011.10.002>
- Hersch, D., Perdue, L., Ambroz, T., & Boucher, J. L. (2014). Peer reviewed: the impact of cooking classes on food-related preferences, attitudes, and behaviors of school-aged children: a systematic review of the evidence, 2003–2014. *Preventing Chronic Disease*, 11, 1-10.
<https://doi.org/10.5888%2Fpcd11.140267>

- Hiamey, S. E., Amuquandoh, F. E., & Boison, G. A. (2013). Are we indeed what we eat? Street food consumption in the Market Circle area of Takoradi, Ghana. *Nutrition and Health*, 22(3-4), 215-235. <https://doi.org/10.1177%2F0260106015599482>
- Hislop, N., & Shaw, K. (2009). Food safety knowledge retention study. *Journal of Food Protection*, 72(2), 431-435. <https://doi.org/10.4315/0362-028X-72.2.431>
- Hosmer, D. W. & Lemeshow, S. (2004). Applied logistics regression (2nd ed.). Wiley - Interscience.
- Hossen, M., Ferdaus, M., Hasan, M., Lina, N. N., Das, A. K., Barman, S. K., ... & Roy, R. K. (2020). Food safety knowledge, attitudes and practices of street food vendors in Jashore region, Bangladesh. *Food Science and Technology*, 41, 226-239. <https://doi.org/10.1590/fst.13320>
- Howe, L. C., & Krosnick, J. A. (2017). Attitude strength. *Annual Review of Psychology*, 68(1), 327-351. <https://doi.org/10.1146/annurev-psych-122414-033600>
- Hox, J. J., & Boeije, H. R. (2005). Data collection, primary vs. secondary. *Encyclopedia of Social Measurement*, 1(1), 593-599.
- Huang, E., & Chuang, M. H. (2007). Extending the Theory of Planned Behaviour as a model to explain post-merger employee behaviour of IS use. *Computers in Human Behavior*, 23(1), 240-257. <https://doi.org/10.1016/j.chb.2004.10.010>
- Huang, S. O., Liou, Y. H., & Tzeng, G. H. (2009). Development strategies for improving the services of tourist night markets through hybrid MCDM technique. *International Journal of Information Systems for Logistics and Management*, 5(1), 53-68.
- Hull-Jackson, C., & Adesiyun, A. A. (2019). Foodborne disease outbreaks in Barbados (1998-2009): a 12-year review. *The Journal of Infection in Developing Countries*, 13(01), 1-10.
- Hulme, M. (2018). "Gaps" in climate change knowledge: Do they exist? Can they be filled?. *Environmental Humanities*, 10(1), 330-337. <https://doi.org/10.1215/22011919-4385599>
- Huong, B. T. M., Mahmud, Z. H., Neogi, S. B., Kassu, A., Van Nhien, N., Mohammad, A., ... & Khan, N. C. (2010). Toxigenicity and genetic diversity of *Staphylococcus aureus* isolated from Vietnamese ready-to-eat foods. *Food Control*, 21(2), 166-171. <https://doi.org/10.1016/j.foodcont.2009.05.001>
- Huynh-Van, B., Vuong-Thao, V., Huynh-Thi-Thanh, T., Dang-Xuan, S., Huynh-Van, T., Tran-To, L., ... & Nguyen-Viet, H. (2022). Factors associated with food safety compliance among street food vendors in Can Tho city, Vietnam: Implications for intervention activity design and implementation. *BMC Public Health*, 22(1), 1-11.
- Ilham, R. (2016). 19 keracunan makanan. *Berita Harian*.

<https://www.bharian.com.my/taxonomy/term/2645/2016/06/167574/19-keracunan-makanan>

- Imathiu, S. (2017). Street vended foods: potential for improving food and nutrition security or a risk factor for foodborne diseases in developing countries?. *Current Research in Nutrition and Food Science Journal*, 5(2), 55-65. <http://dx.doi.org/10.12944/CRNFSJ.5.2.02>
- Institute for Public Health (IPH). (2014). *National Health and Morbidity Survey 2014: Malaysian Adult Nutrition Survey (MANS) Vol II: Survey Findings*. Ministry of Health, Malaysia. <https://iku.moh.gov.my/images/IKU/Document/REPORT/NHMS2014-MANS-VOLUME-2-SurveyFindings.pdf>
- Ishak, N. K., Abdul Latif, R., & Abdul Aziz, K. (2012). Understanding the entrepreneurs in the night market business. *Journal of Business Cases and Applications*, 5, 1-15.
- Islam, G. N., Yew T. S., Abdullah, N. M. R., & Mohd Noh, K. (2010). Household expenditure on food away from home by type of meal in Malaysia. *Pertanika Journal of Social Science & Humanities*, 18(2), 285-294.
- Ismail, F. H., Chik, C. T., Muhammad, R., & Yusoff, N. M. (2016). Food safety knowledge and personal hygiene practices amongst mobile food handlers in Shah Alam, Selangor. *Procedia-Social and Behavioral Sciences*, 222, 290-298. <https://doi.org/10.1016/j.sbspro.2016.05.162>
- Isoni Auad, L., Cortez Ginani, V., Stedefeldt, E., Yoshio Nakano, E., Costa Santos Nunes, A., & Puppim Zandonadi, R. (2019). Food safety knowledge, attitudes, and practices of Brazilian food truck food handlers. *Nutrients*, 11(8), 1784, 1-19. <https://doi.org/10.3390/nu11081784>
- Italian Trade Agency. (2017). *Food and Beverages Market Report in Malaysia*. https://www.ice.it/it/sites/default/files/inlinefiles/Nota%20Mercato%20Agroalimentare%20-%20Malesia%20-%202018_0.pdf
- Iwu, A. C., Uwakwe, K. A., Duru, C. B., Diwe, K. C., Chineke, H. N., Merenu, I. A., ... & Ohale, I. (2017). Knowledge, attitude and practices of food hygiene among food vendors in Owerri, Imo State, Nigeria. *Occupational Diseases and Environmental Medicine*, 5(1), 11-25.
- Jalil, M. A. (2021). 152 pelajar keracunan makanan. *Berita Harian*. <https://www.bharian.com.my/berita/nasional/2021/11/891143/152-pelajar-keracunan-makanan>
- Jalis, M. H., Che, D., & Markwell, K. (2014). Utilising local cuisine to market Malaysia as a tourist destination. *Procedia-Social and Behavioral Sciences*, 144, 102-110. <https://doi.org/10.1016/j.sbspro.2014.07.278>

- Janssen, H. G., Davies, I. G., Richardson, L. D., & Stevenson, L. (2018). Determinants of takeaway and fast food consumption: a narrative review. *Nutrition Research Reviews*, 31(1), 16-34. <https://doi.org/10.1017/S0954422417000178>
- Jays, B., Socks, R., Do, I. W. C., & Reside, Y. (2011). *Cross Tabulation Analysis*. Qualtricks. https://ils.unc.edu/courses/2015_fall/inls151_002/CrossTabulationTheory.pdf
- Johan, M.R.M., Syed, M.A.M., & Adnan, H.M. (2021). Mobile eateries SMEs: Occidentals & Malaysia chronicles. *Journal of Tourism, Hospitality & Culinary Arts*, 13(2), 85-102.
- Johanson, G. A., & Brooks, G. P. (2010). Initial scale development: sample size for pilot studies. *Educational and Psychological Measurement*, 70(3), 394-400. <https://doi.org/10.1177%2F0013164409355692>
- Johnson, M., Samuel, I., Irene, O., & Paul, K. (2020). Food safety knowledge and practices of street food vendors in selected locations within Kiambu County, Kenya. *African Journal of Food Science*, 14(6), 174-185. <https://doi.org/10.5897/AJFS2020.1929>
- Jores, D., Arif, M. T., & Rahman, M. M. (2018). Factors associated with food hygiene practices among street food vendors in Padawan, Sarawak. *Borneo Journal of Resource Science and Technology*, 8(1), 56-65.
- Jouve, J. L., Aagaard-Hansen, J., & Aidara-Kane, A. (2010). Food safety: equity and social determinants. In E. Blas & A. S. Kurup (Eds.), *Equity, social determinants and public health programmes* (pp. 95–114). WHO.
- Kariuki, E. N., Waithera Ng'ang'a, Z., & Wanzala, P. (2017). Food-handling practices and environmental factors associated with food contamination among street food vendors in Nairobi County, Kenya: a cross-sectional study. *The East African Health Research Journal*, 1(1), 62-71. <https://doi.org/10.24248/EAHRJ-D-16-00382>
- Kaur, P., Stoltzfus, J., & Yellapu, V. (2018). Descriptive statistics. *International Journal of Academic Medicine*, 4(1), 60-63.
- Khairuzzaman, M. D., Chowdhury, F. M., Zaman, S., Al Mamun, A., & Bari, M. (2014). Food safety challenges towards safe, healthy, and nutritious street foods in Bangladesh. *International Journal of Food Science*, 2014, 1-9. <https://doi.org/10.1155/2014/483519>
- Khater, F.D., Heikal, E.G., Shehata, A.A., & El-Hofy, I.F. (2013). The microbiological assessment of ready-to-eat-food (liver and kofta sandwiches) in Tanta city, Egypt. *Benha Veterinary Medical Journal*, 25(2), 187-197.
- Kiliç, S. (2015). Binary logistic regression analysis. *Psychiatry and Behavioral Sciences*, 5(4), 191-194. <http://dx.doi.org/10.5455/jmood.20151202122141>

- Kılıçhan, R., Çalhan, H., & Umur, M. (2020). Food safety attitudes and practices of chefs in Cappadocia region, Turkey. *Journal of Foodservice Business Research*, 23(3), 193-215. <https://doi.org/10.1080/15378020.2020.1718401>
- Kim, D., & Ahn, B. I. (2020). Eating out and consumers' health: Evidence on obesity and balanced nutrition intakes. *International Journal of Environmental Research and Public Health*, 17(2), 586-603. <https://doi.org/10.3390/ijerph17020586>
- Kim, E., Ham, S., Yang, I. S., & Choi, J. G. (2013). The roles of attitude, subjective norm, and perceived behavioral control in the formation of consumers' behavioral intentions to read menu labels in the restaurant industry. *International Journal of Hospitality Management*, 35, 203-213. <https://doi.org/10.1016/j.ijhm.2013.06.008>
- Kleinbaum, D. G., & Klein, M. (2010). Analysis of matched data using logistic regression. *Logistic Regression* (pp. 389-428). Springer. https://doi.org/10.1007/978-1-4419-1742-3_11
- König, A., Kuiper, H. A., Marvin, H. J., Boon, P. E., Busk, L., Cnudde, F., ... & Wentholt, M. T. (2010). The SAFE FOODS framework for improved risk analysis of foods. *Food Control*, 21(12), 1566-1587.
- Kumar, R. (2011). *Research methodology: A step-by-step guide for beginners*. Sage.
- Kunadu, A. P. H., Ofori, D. B., Aboagye, E., & Tano-Debrah, K. (2016). Food safety knowledge, attitudes and self-reported practices of food handlers in institutional food service in Accra, Ghana. *Food Control*, 69, 324-330. <https://doi.org/10.1016/j.foodcont.2016.05.011>
- Kwol, V. S., Eluwole, K. K., Avci, T., & Lasisi, T. T. (2020). Another look into the Knowledge Attitude Practice (KAP) model for food control: An investigation of the mediating role of food handlers' attitudes. *Food Control*, 110, 1-8. <https://doi.org/10.1016/j.foodcont.2019.107025>
- Läikkö-Roto, T., & Nevas, M. (2014). Restaurant business operators' knowledge of food hygiene and their attitudes toward official food control affect the hygiene in their restaurants. *Food Control*, 43, 65-73.
- Lamuka, P. O. (2014). Public health measures: Challenges of developing countries in management of food safety. *Encyclopedia of Food Safety*, 4, 20-26. <https://doi.org/10.1016/B978-0-12-378612-8.00310-3>
- Lankford, H., Loeb, S., & Wyckoff, J. (2002). Teacher sorting and the plight of urban schools: A descriptive analysis. *Educational Evaluation and Policy Analysis*, 24(1), 37-62. <https://doi.org/10.3102%2F01623737024001037>
- Larson, N., Neumark-Sztainer, D., Laska, M. N., & Story, M. (2011). Young adults and eating away from home: associations with dietary intake patterns and weight status differ by choice of restaurant. *Journal of the American Dietetic Association*, 111(11), 1696-1703.

- Latchumaya, S.R., Hameed, M. N. S. S., Arkappan, P., Sreedharam, R. J., & Sandrasaigaran, P. (2021). Assessment of bacteriological quality and *Escherichia coli* O157:H7 in ready-to-eat street foods. *Food Research*, 5(2), 98-105. [https://doi.org/10.26656/fr.2017.5\(2\).480](https://doi.org/10.26656/fr.2017.5(2).480)
- Latimaha, R., Bahari, Z., & Ismail, N. A. (2018). Food away from home of middle-income earners: Empirical evidence from the three major cities in Malaysia. *Geografia Online Malaysian Journal of Society and Space*, 14(4), 274-286. <https://ejournal.ukm.my/gmjss/article/view/29097>
- Launiala, A. (2009). How much can a KAP survey tell us about people's knowledge, attitudes and practices? Some observations from medical anthropology research on malaria in pregnancy in Malawi. *Anthropology Matters*, 11(1), 1-13. <https://doi.org/10.22582/am.v11i1.31>
- Lavrakas, P. J. (2008). *Encyclopedia of survey research methods*. Sage.
- Lawan, U. M., Ilyasu, Z., Abubakar, S., Gajida, A. U., & Abdussalam, A. (2015). Personal and food hygiene practices of subsistence food vendors operating in Kano metropolis, northwestern Nigeria. *International Journal of Medical Science and Public Health*, 4(2), 214-221. <http://dx.doi.org/10.5455/ijmsph.2015.1509201441>
- Lee, H. K., Abdul Halim, H., Thong, K. L., & Chai, L. C. (2017). Assessment of food safety knowledge, attitude, self-reported practices, and microbiological hand hygiene of food handlers. *International Journal of Environmental Research and Public Health*, 14(1), 1-14. <https://doi.org/10.3390/ijerph14010055>
- Lee, H., & Tan, A. K. (2006, August 12-18). *Determinants of Malaysian Household Expenditures on Food-Away-From-Home* [Paper presentation]. International Association of Agricultural Economists Conference, Queensland, Australia. <http://dx.doi.org/10.22004/ag.econ.25430>
- Lee, L. E., Niode, O., Simonne, A. H., & Bruhn, C. M. (2012). Consumer perceptions on food safety in Asian and Mexican restaurants. *Food Control*, 26(2), 531-538. <https://doi.org/10.1016/j.foodcont.2012.02.010>
- Lee, M. H. (2008). Tourism and sustainable livelihoods: The case of Taiwan. *Third World Quarterly*, 29(5), 961-978. <https://doi.org/10.1080/01436590802106148>
- Legesse, D., Tilahun, M., Agedew, E., & Haftu, D. (2017). Food handling practices and associated factors among food handlers in Arba Minch Town Public food establishments in Gamo Gofa Zone, Southern Ethiopia. *Epidemiology (Sunnyvale)*, 7(302), 2161-1165. <https://doi.org/10.4172/2161-1165.1000302>
- Lema, K., Abuhay, N., Kindie, W., Dagne, H., & Guadu, T. (2020). Food hygiene practice and its determinants among food handlers at University of Gondar, Northwest Ethiopia, 2019. *International Journal of General Medicine*, 2020(13), 1129-1137. <https://doi.org/10.2147%2FIJGM.S262767>

- Lestantyo, D., Husodo, A. H., Iravati, S., & Shaluhayah, Z. (2017). Safe food handling knowledge, attitude and practice of food handlers in hospital kitchen. *International Journal of Public Health Science*, 6(4), 324-330. <https://doi.org/10.11591/ijphs.v6i4.10778>
- Letuka, P. & Nkhebenyane, J. (2021). Street food handlers' food safety knowledge, attitudes and self-reported practices and consumers' perceptions about street food vending in Maseru, Lesotho. *British Food Control*, 123(13), 302-316. <https://doi.org/10.1108/BFJ-07-2020-0595>
- Lewis, J. E., Thompson, P., Rao, B. V. V. B. N., Kalavati, C., & Rajanna, B. (2006). Human bacteria in street vended fruit juices: A case study of Visakhapatnam city, India. *Internet Journal of Food Safety*, 8(1), 35-38.
- Liao, X., Nguyen, T. P. L., & Sasaki, N. (2022). Use of the knowledge, attitude, and practice (KAP) model to examine sustainable agriculture in Thailand. *Regional Sustainability*, 3(1), 41-52. <https://doi.org/10.1016/j.regsus.2022.03.005>
- Lim, T., Chye, F.Y., Sulaiman, M.R., Suki, N.M., & Lee, J. (2016). A structural modeling of food safety knowledge, attitude and behaviour among Bum Bum Island community of Semporna, Sabah. *Food Control*, 60, 241-246. <https://doi.org/10.1016/j.foodcont.2015.07.042>
- Lin, B. H., Guthrie, J., & Frazão, E. (2013). Nutrient contribution of food away from home. In E. Frazão (Ed.), *America's Eating Habits: Changes & Consequences* (pp. 213-242). United States Department of Agriculture.
- Lin, J. R., & Chen, S. Y. (2004). Study of the knowledge, attitudes, and practices of food hygiene by cooks in daycare centers in the Tainan Area. *Nutritional Sciences Journal*, 29(2), 83-96.
- Linscott, A. J. (2011). Food-borne illnesses. *Clinical Microbiology Newsletter*, 33(6), 41-45. <https://doi.org/10.1016/j.clinmicnews.2011.02.004>
- Liu, C., Duan, J., & Su, Y. C. (2006). Effects of electrolyzed oxidizing water on reducing *Listeria monocytogenes* contamination on seafood processing surfaces. *International Journal of Food Microbiology*, 106(3), 248-253. <https://doi.org/10.1016/j.ijfoodmicro.2005.06.020>
- Liu, Z., Zhang, G., & Zhang, X. (2014). Urban street foods in Shijiazhuang city, China: Current status, safety practices and risk mitigating strategies. *Food Control*, 41, 212-218. <https://doi.org/10.1016/j.foodcont.2014.01.027>
- Loukieh, M., Mouannes, E., Abou Jaoudeh, C., Hanna Wakim, L., Fancello, F., & Bou Zeidan, M. (2018). Street foods in Beirut city: An assessment of the food safety practices and of the microbiological quality. *Journal of Food Safety*, 38(3), 1-11. <https://doi.org/10.1111/jfs.12455>
- Lues, J. F., Rasephei, M. R., Venter, P., & Theron, M. M. (2006). Assessing food safety and associated food handling practices in street food vending. *International*

- Journal of Environmental Health Research*, 16(5), 319-328.
<https://doi.org/10.1080/09603120600869141>
- Lund, B. M. (2015). Microbiological food safety for vulnerable people. *International Journal of Environmental Research and Public Health*, 12(8), 10117-10132.
<https://doi.org/10.3390/ijerph120810117>
- Luo, Y. F., Chen, L. C., Yang, S. C., & Hong, S. (2022). Knowledge, attitude, and practice (KAP) toward COVID-19 Pandemic among the Public in Taiwan: A Cross-Sectional Study. *International Journal of Environmental Research and Public Health*, 19(5), 1-14. <https://doi.org/10.3390%2Fijerph19052784>
- Madaki, M. Y., & Mirosława, B. (2021). Determinants of food safety behaviour among food vendors: The case of Nigeria. *British Food Journal*, 123(12), 3857-3875.
<https://doi.org/10.1108/BFJ-02-2020-0143>
- Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A comparison of the Theory of Planned Behavior and the Theory of Reasoned Action. *Personality and Social Psychology Bulletin*, 18(1), 3-9.
<https://doi.org/10.1177%2F0146167292181001>
- Maiyaki, A. A., & Mokhtar, S. S. M. (2010). Determinants of customer behavioural responses: a pilot study. *International Business Research*, 4(1), 193-197.
<https://doi.org/10.5539/ibr.v4n1p193>
- Majing, O., & Regina, E. (2021). Effects of the COVID-19 lockdown on the livelihood and food security of street food vendors and consumers in Nigeria. *Journal of African Studies and Development*, 13(4), 106-114. <https://doi.org/106-114.10.5897/JASD2021.0641>
- Malhotra, N. K. (2008). *Essentials of marketing: An applied orientation*. (2nd ed.). Pearson Education.
- Mallhi, I. Y., Sohaib, M., Khan, A. U., & Nawaz, M. (2019). Evaluating food safety knowledge, practices, and microbial profile of meat in abattoirs and butchery shops in Lahore, Pakistan. *Journal of Food Safety*, 39(2), 1-7.
<https://doi.org/10.1111/jfs.12612>
- Manderson, L., & Aaby, P. (1992). An epidemic in the field? Rapid assessment procedures and health research. *Social Science & Medicine*, 35(7), 839-850.
[https://doi.org/10.1016/0277-9536\(92\)90098-B](https://doi.org/10.1016/0277-9536(92)90098-B)
- Mangla, S. K., Bhattacharya, A., Yadav, A. K., Sharma, Y. K., Ishizaka, A., Luthra, S., & Chakraborty, R. (2021). A framework to assess the challenges to food safety initiatives in an emerging economy. *Journal of Cleaner Production*, 284, 1-12.
<https://doi.org/10.1016/j.jclepro.2020.124709>
- Marzuillo, C., De Vito, C., Boccia, S., D'Addario, M., D'Andrea, E., Santini, P., ... & Villari, P. (2013). Knowledge, attitudes and behavior of physicians regarding predictive genetic tests for breast and colorectal cancer. *Preventive Medicine*, 57(5), 477-482. <https://doi.org/10.1016/j.ypmed.2013.06.022>

- McCabe-Sellers, B. J., & Beattie, S. E. (2004). Food safety: emerging trends in foodborne illness surveillance and prevention. *Journal of the American Dietetic Association*, 104(11), 1708-1717. <https://doi.org/10.1016/j.jada.2004.08.028>
- McGlade, D., & Pierscione, B. (2013). Can education alter attitudes, behaviour and knowledge about organ donation? A pretest-post-test study. *BMJ Open*, 3(12), 1-7. <https://doi.org/10.1136/bmjopen-2013-003961>
- McIntyre, L., Vallaster, L., Wilcott, L., Henderson, S. B., & Kosatsky, T. (2013). Evaluation of food safety knowledge, attitudes and self-reported hand washing practices in FOODSAFE trained and untrained food handlers in British Columbia, Canada. *Food Control*, 30(1), 150-156.
- Md Husin, M., Kamarudin, S., & Mohd Rizal, A. (2021). Food and beverage industry competitiveness and halal logistics: Perspective from small and medium enterprises in Malaysia. *Asian Journal of Islamic Management*, 3 (1), 1-10. <https://doi.org/10.1108/AJIM.vol3.iss1.art1>
- Meftahuddin, T. (2002). Review of the trends and causes of food borne outbreaks in Malaysia from 1988 to 1997. *The Medical Journal of Malaysia*, 57(1), 70-79.
- Mendagudali, R. R., Akka, K. D., Swati, I. A., Shedole, D. T., & D Bendigeri, N. A. (2016). Knowledge, attitude, and practices of food safety among women of Khaza bazar, the urban field practice area of KBN Institute of Medical Sciences, Kalaburagi, Karnataka. *International Journal of Medical Science and Public Health*, 5(3), 516-520. <https://dx.doi.org/10.5455/ijmsph.2016.20102015146>
- Mensah, P., Yeboah-Manu, D., Owusu-Darko, K., & Ablordey, A. (2002). Street foods in Accra, Ghana: how safe are they?. *Bulletin of the World Health Organization*, 80(7), 546-554. <https://apps.who.int/iris/handle/10665/268542>
- Milton, A., & Mullan, B. (2010). Consumer food safety education for the domestic environment: a systematic review. *British Food Journal*, 112(9), 1003-1022. <https://doi.org/10.1108/00070701011074363>
- MOH. (2007). *Annual Report Ministry of Health Malaysia*. <https://www.moh.gov.my/moh/images/gallery/publications/md/ar/2007-2.pdf>
- MOH. (2012a). Food Poisoning. Nutrition. <http://www.myhealth.gov.my/en/food-poisoning/>
- MOH. (2012b). *Health facts 2012*. http://vlib.moh.gov.my/cms/documentstorage/com.tms.cms.document.Document_2e8d12efa0188549d5315d001c23c0ca/Health%20Facts%202012.pdf
- MOH. (2013). *Health facts 2013*. <https://www.moh.gov.my/moh/resources/Penerbitan/Penerbitan%20Utama/HEALTH%20FACTS/HEALTH%20FACTS%202013.pdf>
- MOH. (2014). *Health facts 2014*.

- http://vlib.moh.gov.my/cms/documentstorage/com.tms.cms.document.Document_2e8e997fa0188549d5315d002d9464b7/HEALTH%20FACTS%202014.pdf
- MOH. (2015a). *Health facts 2015*.
http://vlib.moh.gov.my/cms/documentstorage/com.tms.cms.document.Document_2e8efe25a0188549d5315d00e9ca9560/KKM_HEALTH_FACTS_2015.pdf
- MOH. (2015b). *Food Act 1983 Safety Regulation 2009*. MOH.
- MOH. (2016a). *Garis panduan pengurusan Bazar Ramadhan*. Edisi kedua.
https://jkt.kpkt.gov.my/jkt/resources/PDF/Pekeliling%20JKT/2017/GP_BAZAR_RAMADHAN_last_edited_19feb2016_at_423pm.pdf
- MOH. (2016b). *Health facts 2016*.
http://vlib.moh.gov.my/cms/documentstorage/com.tms.cms.document.Document_4ad54b25a0188549187fdf501006a4e5/Health%20Facts%202016.pdf
- MOH. (2017). *Health facts 2017*.
http://vlib.moh.gov.my/cms/documentstorage/com.tms.cms.document.Document_77d75374a018854916992bd076fb713b/HEALTH%20FACTS%202017.pdf
- MOH. (2018). *Health facts 2018*.
http://vlib.moh.gov.my/cms/documentstorage/com.tms.cms.document.Document_d07e478b-a0188549-ebcfa200-52570141/hfa-2018.pdf
- MOH. (2019). *Health facts 2019*.
http://vlib.moh.gov.my/cms/documentstorage/com.tms.cms.document.Document_ad745928-a0188549-1a5b5960-f293c229/hfa-2019.pdf
- MOH. (2020a). *Health facts 2020*.
<https://www.moh.gov.my/moh/resources/Penerbitan/Penerbitan%20Utama/HEALTH%20FACTS/Health%20Facts%202020.pdf>
- MOH. (2020b). *Annual Report Ministry of Health Malaysia 2020*.
https://www.moh.gov.my/moh/resources/Penerbitan/Penerbitan%20Utama/ANNUAL%20REPORT/Annual_Report_MOH_2020.pdf
- MOH. (2021). *Health facts 2021*.
https://www.moh.gov.my/moh/resources/Penerbitan/Penerbitan%20Utama/HEALTH%20FACTS/Health_Facts_2021.pdf
- Mohamad Fauzi, F. J., & Abdul-Mutalib, N. A. (2021). Knowledge, and practice of home-based food handlers in Hulu Selangor, Malaysia regarding Food Safety. *Biology and Life Sciences Forum*, 6(12), 1-6.
<https://doi.org/10.3390/Foods2021-10930>

- Mohamad, A. R. (2003). Food Safety in Malaysia – an overview. [Presentation Slide]. SlideShare. https://www.wur.nl/upload_mm/d/5/5/e/4ff76cd-f564-4ced8453ecdf368933c9_p8.pdf
- Mohd Azaman, N. N. M., Kamarulzaman, N. H., & Shamsudin, M. N. (2016). Stakeholders' knowledge, attitude, and practices (KAP) towards aflatoxins contamination in peanut-based products. *Food Control*, 70, 249-256. <https://doi.org/10.1016/j.foodcont.2016.05.058>
- Mohd Johan, M. R., Syed, M., Azalanshah, M., & Mohd Adnan, H. (2021). Mobile eateries SMEs: occidentals & Malaysia chronicles. *Journal of Tourism, Hospitality and Culinary Arts*, 13(2), 85-102.
- Mohd Nawawee, N. S., Abu Bakar, N. F., & Zulfakar, S. S. (2019). Microbiological safety of street-vended beverages in Chow Kit, Kuala Lumpur. *International Journal of Environmental Research and Public Health*, 16(22), 1-9.
- Mohd Nawi, N., & Mohd Nasir, N. I. (2014). Consumers' attitude toward the food safety certificate (FSC) in Malaysia. *Journal of Food Products Marketing*, 20(sup1), 140-150.
- Mohd Noor, N. R. A., Kamarul Zaman, L., Yaacob, N., & Hassan, M. S. (2021). A conceptual study on the awareness of food borne disease and food handling regulation among food handlers. *E-Proceeding 8th International Conference on Public Policy and Social Science (Icops) 2021*, 735-739.
- Mohd Shahar, F. (2015). 52 typhoid cases recorded. New Straits Times. <https://www.nst.com.my/news/2015/10/52-typhoid-cases-recorded>
- Mohd Zain, M., & Naing, N. N. (2002). Sociodemographic characteristics of food handlers and their knowledge, attitude and practice towards food sanitation: A preliminary report. *The Southeast Asian Journal of Tropical Medicine and Public Health*, 33(2), 410-417.
- Mokhtar, S. H., Nartea, G., & Gan, C. (2012). Determinants of microcredit loans repayment problem among microfinance borrowers in Malaysia. *International Journal of Business and Social Research (IJBSR)*, 2(7), 33-45.
- Momeni, A., Pincus, M., Libien, J. (2018). Cross Tabulation and Categorical Data Analysis. *Introduction to Statistical Methods in Pathology*. Springer, Cham. https://doi.org/10.1007/978-3-319-60543-2_5
- Monney, I., Agyei, D., & Owusu, W. (2013). Hygienic practices among food vendors in educational institutions in Ghana: the case of Konongo. *Foods*, 2(3), 282-294. <https://doi.org/10.3390/foods2030282>
- Montaño, D. E., & Kasprzyk, D. (2015). Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. In K. Glanz., B. K. Rimer & K. Viswanath (Eds.), *Health behavior: Theory, research and practice* (pp. 95-124). Wiley.

- Montville, R., Chen, Y., & Schaffner, D. W. (2001). Glove barriers to bacterial cross-contamination between hands to food. *Journal of Food Protection*, 64(6), 845-849. <https://doi.org/10.4315/0362-028X-64.6.845>
- Morano, R. S., Barrichello, A., Jacomossi, R. R., & D'Acosta-Rivera, J. R. (2018). Street food: factors influencing perception of product quality. *RAUSP Management Journal*, 53(4), 535-554. <https://doi.org/10.1108/RAUSP-06-2018-0032>
- Moreb, N. A., Priyadarshini, A., & Jaiswal, A. K. (2017). Knowledge of food safety and food handling practices amongst food handlers in the Republic of Ireland. *Food Control*, 80, 341-349. <https://doi.org/10.1016/j.foodcont.2017.05.020>
- Mortlock, M.P., Peter, A.C., & Griffith, C.J. (2000). A national survey of food hygiene training and qualification level in UK food industry. *International Journal Environmental Health Research*, 10, 111-123. <https://doi.org/10.1080/09603120050021119>
- Moussavi, P., Liguori, K., & Mehta, K. (2016). Street foods in Central Kenya: Actors, trends, and opportunities. *International Journal for Service Learning in Engineering, Humanitarian Engineering and Social Entrepreneurship*, 11(2), 87-100. <https://doi.org/10.24908/ijlse.v11i2.6411>
- Muinde, O. K., & Kuria, E. (2005). Hygienic and sanitary practices of vendors of street foods in Nairobi, Kenya. *African Journal of Food, Agriculture, Nutrition and Development*, 5(1), 1-5. <https://doi.org/10.18697/ajfand.8.1060>
- Mukherjee, S., Mondal, T. K., De, A., Misra, R., & Pal, A. (2018). Knowledge, attitude, and practice of food hygiene among street food vendors near a tertiary care hospital in Kolkata, India. *International Journal of Community Medicine and Public Health*, 5(3), 1206-1211. <http://dx.doi.org/10.18203/2394-6040.ijcmph20180786>
- Mullan, B. A., Wong, C., & Kothe, E. J. (2013). Predicting adolescents' safe food handling using an extended theory of planned behavior. *Food Control*, 31(2), 454-460. <https://doi.org/10.1016/j.foodcont.2012.10.027>
- Murad, M. H., Wan Omar, M., & Fadzil, M. I. (2011). Customer satisfaction towards service quality: A study on Islamic culture. *Global Journal of Human Social Science*, 11(7), 47-51.
- Muyanja, C., Nayiga, L., Brenda, N., & Nasinyama, G. (2011). Practices, knowledge and risk factors of street food vendors in Uganda. *Food Control*, 22(10), 1551-1558.
- Muzaffar, A. T., Huq, I., & Mallik, B. A. (2009). Entrepreneurs of the streets: An analytical work on the street food vendors of Dhaka City. *International Journal of Business and Management*, 4(2), 80-88.
- Naing, N. N., Zain, M. M., Hamzah, W. M., Mat, H. A., Abdullah, N., & Abu Bakar, M. H. (2007). A study of effectiveness of health education program on knowledge,

- attitude and practice (KAP) of food handlers toward foodborne diseases and food safety. *International Medical Journal*, 14(4), 253–260.
- Nawai, N. B., & Shariff, M. N. B. M. (2013). Determinants of repayment performance in microfinance programs in Malaysia. *Labuan Bulletin of International Business and Finance (LBIBF)*, 14-29.
- Nawai, N., & Shariff, M. N. M. (2012). Factors affecting repayment performance in microfinance programs in Malaysia. *Procedia-Social and Behavioral Sciences*, 62, 806-811.
- New, C. Y., Thung, T. Y., Premarathne, J. M. K. J. K., Russly, A. R., Abdulkarim, S. M., & Son, R. (2017b). Microwave oven safety: A food safety consumer survey in Malaysia. *Food Control*, 80, 420-427.
- New, C. Y., Ubong, A., Premarathne, J. M. K. J. K., Thung, T. Y., Lee, E., Chang, W. S., ... & Son, R. (2017a). Microbiological food safety in Malaysia from the academicians' perspective. *Food Research*, 1(6), 183-202. <http://doi.org/10.26656/fr.2017.6.013>
- Newman, L. L., & Burnett, K. (2013). Street food and vibrant urban spaces: lessons from Portland, Oregon. *Local Environment*, 18(2), 233-248. <https://doi.org/10.1080/13549839.2012.729572>
- Nguyen, A. T. L., Tran, B. X., Le, H. T., Le, X. T. T., Do, K. N., Do, H. T., ... & Ho, R. C. (2018). Customers' knowledge, attitude, and practices towards food hygiene and safety standards of handlers in food facilities in Hanoi, Vietnam. *International Journal of Environmental Research and Public Health*, 15(10), 2101. <https://doi.org/10.3390/ijerph15102101>
- Nguyen, T. P. L., Seddaiu, G., & Roggero, P. P. (2014). Hybrid knowledge for understanding complex agri-environmental issues: Nitrate pollution in Italy. *International Journal of Agricultural Sustainability*, 12(2), 164-182. <https://doi.org/10.1080/14735903.2013.825995>
- Nguyen, T. P. L., Seddaiu, G., & Roggero, P. P. (2019). Declarative or procedural knowledge? Knowledge for enhancing farmers' mitigation and adaptation behaviour to climate change. *Journal of Rural Studies*, 67, 46-56. <https://doi.org/10.1016/j.jrurstud.2019.02.005>
- Nicklas, T. A., Jahns, L., Bogle, M. L., Chester, D. N., Giovanni, M., Klurfeld, D. M., ... & Tucker, K. L. (2013). Barriers and facilitators for consumer adherence to the dietary guidelines for Americans: The health study. *Journal of the Academy of Nutrition and Dietetics*, 113(10), 1317-1331.
- Nik Husain. N. R., Wan Muda, W. M., Noor Jamil, N. I., Nik Hanafi, N. N., & Abdul Rahman, R. (2016). Effect of food safety training on food handlers' knowledge and practices: A randomized controlled trial. *British Food Journal*, 118(4), 795-808. <https://doi.org/10.1108/BFJ-08-2015-0294>

- Njaya, T. (2014). Operations of street food vendors and their impact on sustainable urban life in high density suburbs of Harare, in Zimbabwe. *Asian Journal of Economic Modelling*, 2(1), 18-31. <http://dx.doi.org/10.18488/journal.8.2014.21.18.31>
- Norazmir, M. N., Noor Hasyimah, M. A., Siti Shafurah, A., Siti Sabariah, B., Ajau, D., & Norazlanshah, H. (2012). Knowledge and practices on food safety among secondary school students in Johor Bahru, Johor, Malaysia. *Pakistan Journal of Nutrition*, 11(2), 110–115. <https://doi.org/10.3923/pjn.2012.110.115>
- Nunes, N. (2009). O690 Maternal obesity in pregnancy in the UK: A KAP (knowledge, attitudes and practices) study of trainees and midwives. *International Journal of Gynecology & Obstetrics*, 107, S291-S291. [https://doi.org/10.1016/S0020-7292\(09\)61063-8](https://doi.org/10.1016/S0020-7292(09)61063-8)
- Nunnally, J. C. (1967). *Psychometric theory*. McGraw-Hill.
- Nurudeen, A. A., Lawal, A. O., & Ajayi, S. A. (2014). A survey of hygiene and sanitary practices of street food vendors in the Central State of Northern Nigeria. *Journal of Public Health and Epidemiology*, 6(5), 174-181. <https://doi.org/10.5897/JPHE2013.0607>
- Odeyemi, O. A. (2016). Public health implications of microbial food safety and foodborne diseases in developing countries. *Food & Nutrition Research*, 60(1), 29819. <https://doi.org/10.3402/fnr.v60.29819>
- Odeyemi, O. A., & Abdullah Sani, N. (2016). Antibiotic resistance and burden of foodborne diseases in developing countries. *Future Science OA*, 2(4), 1-4. <https://doi.org/10.4155/fsoa-2016-0023>
- Odonkor, S. T., Kurantin, N., & Sallar, A. M. (2020). Food safety practices among postnatal mothers in Western Ghana. *International Journal of Food Science*, 2020, 1-10. <https://doi.org/10.1155/2020/8891605>
- Oje, O. J., Ajibade, V. A., Fajilade, O. T., & Ajenifuja, O. A. (2018). Microbiological analysis of ready-to-eat (rte) foods vended in mobile outlet catering units from Nigeria. *Journal of Advances Food Science & Technology*, 5(1), 15-19.
- Omar, A. R. C., & Ishak, S. (2016). The business behaviors of Malaysian food hawkers. *International Business and Management*, 12(1), 20-28.
- Omemu, A. M., & Aderoju, S. T. (2008). Food safety knowledge and practices of street food vendors in the city of Abeokuta, Nigeria. *Food Control*, 19(4), 396-402. <https://doi.org/10.1016/j.foodcont.2007.04.021>
- Oranusi, S., & Olorunfemi, O. J. (2011). Microbiological safety evaluation of street vended ready-to-eat fruits sold in Ota, Ogun state, Nigeria. *International Journal of Research in Biological Sciences*, 1(3), 27-32.
- Osaili, T. M., Al-Nabulsi, A. A., & Krasneh, H. D. A. (2018). Food safety knowledge among foodservice staff at the universities in Jordan. *Food Control*, 89, 167-176. <https://doi.org/10.1016/j.foodcont.2018.02.011>

- Osaili, T. M., Obeidat, B. A., Jamous, D. O. A., & Bawadi, H. A. (2011). Food safety knowledge and practices among college female students in north of Jordan. *Food Control*, 22(2), 269-276. <https://doi.org/10.1016/j.foodcont.2010.07.009>
- Pacholewicz, E., Barus, S. A. S., Swart, A., Havelaar, A. H., Lipman, L. J., & Luning, P. A. (2016). Influence of food handlers' compliance with procedures of poultry carcasses contamination: A case study concerning evisceration in broiler slaughterhouses. *Food Control*, 68, 367-378.
- Pallant, J. (2005). *SPSS survival manual: A step by step guide to using SPSS for windows* (version 12). Allen & Unwin.
- Palma, M. A., Ribera, L. A., Bessler, D., Paggi, M., & Knutson, R. D. (2010). Potential impacts of foodborne illness incidences on market movements and prices of fresh produce in the U.S. *Journal of Agricultural and Applied Economics*, 42(4), 731-741. <https://doi.org/10.1017/S1074070800003928>
- Palys, T. (2008). Purposive sampling. In L. M. Given (Ed.). *The Sage Encyclopedia of Qualitative Research Methods: Vol 2* (pp 697-698). Sage.
- Panayides, P. (2013). Coefficient alpha: interpret with caution. *Europe's Journal of Psychology*, 9(4), 687-696. <https://doi.org/10.23668/psycharchives.1414>
- Panwar, A. M., & Garg, V. (2015). Issues and challenges faced by vendors on urban streets: a case of Sonipat City, India. *International Journal of Engineering Technology, Management and Applied Sciences*, 3(2), 71-84.
- Park, H. S. (2000). Relationships among attitudes and subjective norms: Testing the theory of reasoned action across cultures. *Communication Studies*, 51(2), 162-175. <https://doi.org/10.1080/10510970009388516>
- Park, S. H., Kwak, T. K., & Chang, H. J. (2010). Evaluation of the food safety training for food handlers in restaurant operations. *Nutrition Research and Practice*, 4(1), 58-68. <https://doi.org/10.4162/nrp.2010.4.1.58>
- Paudyal, N., Anihouvi, V., Hounhouigan, J., Matsheka, M. I., Sekwati-Monang, B., Amoa-Awua, W., ... & Fang, W. (2017). Prevalence of foodborne pathogens in food from selected African countries—A meta-analysis. *International Journal of Food Microbiology*, 249, 35-43.
- Peter, J. P. (1979). Reliability: A review of psychometric basics and recent marketing practices. *Journal of Marketing Research*, 16(1), 6-17. <https://doi.org/10.1177/002224377901600102>
- Philip, A. (2015). [Malaysia] Food Safety in Malaysia. *Japan Medical Association Journal: JMAJ*, 58(4), 180-184.
- Pilling, V. K., Brannon, L. A., Shanklin, C. W., Howells, A. D. & Roberts, K. R. (2008). Identifying specific beliefs to target to improve restaurant employees' intentions

- for performing three important food safety behaviors. *Journal of the American Dietetic Association*, 108(6), 991-997.
- Pires, S. M., Fischer-Walker, C. L., Lanata, C. F., Devleeschauwer, B., Hall, A. J., Kirk, M. D., ... & Angulo, F. J. (2015). Aetiology-specific estimates of the global and regional incidence and mortality of diarrhoeal diseases commonly transmitted through food. *PloS One*, 10(12), 1-17.
- Popkin, B. M., Adair, L. S., & Ng, S. W. (2012). Global nutrition transition and the pandemic of obesity in developing countries. *Nutrition Reviews*, 70(1), 3-21. <https://doi.org/10.1111/j.1753-4887.2011.00456.x>
- Poulain, J. P., Laporte, C., Tibère, L., Mognard, E., Ragavan, N. A., Zadeh, A. A., & Mohd Noor, I. (2020). Malaysian Food Barometer (MFB): A study of the impact of compressed modernisation on food habits. *Malaysian Journal of Nutrition*, 26(1), 1-17.
- Powell, D. A., Jacob, C. J., & Chapman, B. J. (2011). Enhancing food safety culture to reduce rates of foodborne illness. *Food Control*, 22(6), 817-822. <https://doi.org/10.1016/j.foodcont.2010.12.009>
- Powell, S. C., Attwell, R. W., & Massey, S. J. (1997). The impact of training on knowledge and standards of food hygiene Eth a pilot study. *International Journal of Environmental Health Research*, 7(4), 329-334. <https://doi.org/10.1080/09603129773788>
- Putri, M. S., & Susanna, D. (2021). Food safety knowledge, attitudes, and practices of food handlers at kitchen premises in the Port 'X' area, North Jakarta, Indonesia 2018. *Italian Journal of Food Safety*, 10(4), 1-8.
- Quine, L., Rutter, D., & Arnold, L. (2002). Increasing cycle helmet's use in school-age cyclists: an intervention based on the Theory of Planned Behaviour. *Changing Health Behaviour: Intervention and Research with Social Cognition Models*, 172-192.
- Radam, A., Mansor, S. A., & Marikan, D. A. A. (2006). Demand analysis of FAFH homes' in Malaysia. *Staff Paper*, 6, 2006.
- Rahman, M. M., Arif, M. T., Bakar, K., & Talib, Z. (2016). Food safety knowledge, attitude and hygiene practices among the street food vendors in Northern Kuching City, Sarawak. *Borneo Science*, 31, 107-116.
- Rahman, M. S., Haque, M. M., Khan, A. H., & Murtaza, M. (2013). Ethics in Business: Practices by the Street Hawkers'. *Journal of Management Research*, 5(1), 80-91. <http://dx.doi.org/10.5296/jmr.v5i1.2785>
- Ramli, M. W., & Jamri, M. H. (2021). The Impact of COVID-19 Pandemic: A Closer Look at the Night Market Traders' Experience in Penang, Malaysia. *International Journal of Academic Research in Business and Social Sciences*, 11(1), 741-760. <http://dx.doi.org/10.6007/IJARBS/v11-i1/8408>

- Rane, S. (2011). Street vended food in developing world: hazard analyses. *Indian Journal of Microbiology*, 51(1), 100-106. <https://doi.org/10.1007/s12088-011-0154-x>
- Raza, J., Asmat, T. M., Mustafa, M. Z., Ishtiaq, H., Mumtaz, K., Jalees, M. M., ... & ur Rehman, H. (2021). Contamination of ready-to-eat street food in Pakistan with *Salmonella* spp.: implications for consumers and food safety. *International Journal of Infectious Diseases*, 106, 123-127.
- Rebouças, L. T., Santiago, L. B., Martins, L. S., Menezes, A. C. R., Araújo, M. D. P. N., & de Castro Almeida, R. C. (2017). Food safety knowledge and practices of food handlers, head chefs and managers in hotels' restaurants of Salvador, Brazil. *Food Control*, 73, 372-381. <https://doi.org/10.1016/j.foodcont.2016.08.026>
- Redmond, E. C., & Griffith, C. J. (2003). Consumer food handling in the home: a review of food safety studies. *Journal of Food Protection*, 66(1), 130-161. <https://doi.org/10.4315/0362-028X-66.1.130>
- Rennie, D. M. (1995). Health education models and food hygiene education. *Journal of the Royal Society of Health*, 115(2), 75-79.
- Roberts, K. R., Barrett, B. B., Howells, A. D., Shanklin, C. W., Pilling, V. K., & Brannon, L. A. (2008). Food safety training and foodservice employees' knowledge and behavior. *Food Protection Trends*, 28(4), 252-260. <http://hdl.handle.net/2097/806>
- Rogers, E. M. (1983). *Diffusion of innovations*. Free Press.
- Rosnani, A. H., Son, R., Mohhidin, O., Toh, P. S., & Chai, L. C. (2014). Assessment of knowledge, attitude and practices concerning food safety among restaurant workers in Putrajaya, Malaysia. *Food Science and Quality Management*, 32, 20-27.
- Rosset, P., Simon-Cornu, M., Noël, V., & Elisabeth, M. (2004). Time-temperature profiles of chilled ready-to-eat foods in school catering and probabilistic analysis of *Listeria monocytogenes* growth. *International Journal of Food Microbiology*, 96(1), 49-59.
- Ruby, G. E., Ungku Zainal Abidin, U. F., Lihan, S., Jambari, N. N., & Radu, S. (2019a). A cross sectional study on food safety knowledge among adult consumers. *Food Control*, 99, 98-105.
- Ruby, G. E., Ungku Zainal Abidin, U. F., Lihan, S., Jambari, N. N., & Radu, S. (2019b). Predicting intention on safe food handling among adult consumers: A cross sectional study in Sibul district, Malaysia. *Food Control*, 106, 1-8. <https://doi.org/10.1016/j.foodcont.2019.06.022>
- Russell, S. V., Young, C. W., Unsworth, K. L., & Robinson, C. (2017). Bringing habits and emotions into food waste behaviour. *Resources, Conservation and Recycling*, 125, 107-114. <https://doi.org/10.1016/j.resconrec.2017.06.007>

- Ruxton, G. D., & Colegrave, N. (2006). *Experimental design for the life sciences*. Oxford University Press.
- Saabar, S. S., & Ibrahim, S. B. (2014). The knowledge of halal and advertising influence on young Muslims awareness. *International Proceedings of Economics Development and Research*, 73, 36-39. http://www.ipedr.com/vol73/008-ICWIS2014_A00021.pdf
- Saad, M., See, T. P., & Mohamed Adil, M. A. (2013). Hygiene practices of food handlers at Malaysian government institutions training centers. *Procedia-Social and Behavioral Sciences*, 85, 118-127.
- Salkind, N. J. (2010). *Encyclopedia of research design: Vol. 1*. Sage.
- Salleh, W., Lani, M. N., Wan Abdullah, W. Z., Tuan Chitek, T. Z., & Hassan, Z. (2017). A review on incidences of foodborne diseases and interventions for a better national food safety system in Malaysia. *Malaysian Applied Biology*, 46(3), 1-7.
- Samapundo, S., Climat, R., Xhaferi, R., & Devlieghere, F. (2015). Food safety knowledge, attitudes and practices of street food vendors and consumers in Port-au-Prince, Haiti. *Food Control*, 50, 457-466. <https://doi.org/10.1016/j.foodcont.2014.09.010>
- Sanlier, N. (2009). The knowledge and practice of food safety by young and adult consumers. *Food Control*, 20(6), 538-542.
- Santana, N. G., Almeida, R. C., Ferreira, J. S., & Almeida, P. F. (2009). Microbiological quality and safety of meals served to children and adoption of good manufacturing practices in public school catering in Brazil. *Food Control*, 20(3), 255-261. <https://doi.org/10.1016/j.foodcont.2008.05.004>
- Santos, J. R. A. (1999). Cronbach's alpha: A tool for assessing the reliability of scales. *Journal of Extension*, 37(2), 1-5.
- Sarmiento, J. P., Sarmiento, C., Hoberman, G., & Chabba, M. (2021). Graduate certificate in local development planning, land use management and disaster risk management: a knowledge, attitude and practice (KAP) evaluation. *Disaster Prevention and Management: An International Journal*, 30(4/5), 510-524. <https://doi.org/10.1108/DPM-02-2021-0034>
- Sarter, G., & Sarter, S. (2012). Promoting a culture of food safety to improve hygiene in small restaurants in Madagascar. *Food Control*, 25(1), 165-171. <https://doi.org/10.1016/j.foodcont.2011.10.023>
- Schatzki, T. R. (2005). Peripheral vision: The sites of organizations. *Organization Studies*, 26(3), 465-484. <https://doi.org/10.1177%2F0170840605050876>
- Schmitt, N. (1996). Uses and abuses of coefficient alpha. *Psychological Assessment*, 8(4), 350-353. <https://psycnet.apa.org/doi/10.1037/1040-3590.8.4.350>

- Schopper, D., Doussantousse, S., & Orav, J. (1993). Sexual behaviors relevant to HIV transmission in a rural African population: How much can a KAP survey tell us?. *Social Science & Medicine*, 37(3), 401-412. [https://doi.org/10.1016/0277-9536\(93\)90270-E](https://doi.org/10.1016/0277-9536(93)90270-E)
- Sedgwick, P. (2012). Pearson's correlation coefficient. *BMJ*, 345. <https://doi.org/10.1136/bmj.e4483>
- Selamat, J., Shamsudin, M. N., & Dulatti, M. S. (2003). Pacific food system outlook 2002–2003–Malaysia. *Pacific Food System Outlook 2002-2003*, 30-34. https://www.pecc.org/resources/doc_details/306-pacific-food-system-outlook-2002-2003-malaysia?tmpl=component
- Sezgin, A. C., & Şanlıer, N. (2016). Street food consumption in terms of the food safety and health. *Journal of Human Sciences*, 13(3), 4072-4083.
- Shafiee, N. F., Karim, M., Razali, A., & Abidin, U. Z. (2018). Halalan toyyiban food handling practices: a review on street food vendors in Malaysia. *Journal of Islamic, Social, Economics and Development (JISED)*, 2, 385-394.
- Shafizi, A. W., Ridzuan, M., Ubong, A., New, C. Y., Mohhiddin, O., Toh, P. S., ... & Son, R. (2016). Assessing Staphylococcus aureus in ready to eat (RTE) food and risk assessment of food premises in Putrajaya. *International Food Research Journal*, 23(4), 1761-1766.
- Shankland, Cox, & Partners. (1973). Klang Valley regional planning and development study. Kuala Lumpur
- Sharif, L., & Al-Malki, T. (2010). Knowledge, attitude and practice of Taif University students on food poisoning. *Food Control*, 21(1), 55-60. <https://doi.org/10.1016/j.foodcont.2009.03.015>
- Sharifa Ezat, W. P., Netty, D., & Sangaran, G. (2013). Paper review of factors, surveillance and burden of food borne disease outbreak in Malaysia. *Malaysian Journal of Public Health Medicine*, 13(2), 98-105.
- Sheats, J. L., Middlestadt, S. E., Ona, F. F., Juarez, P. D., & Kolbe, L. J. (2013). Understanding African American women's decisions to buy and eat dark green leafy vegetables: An application of the reasoned action approach. *Journal of Nutrition Education and Behavior*, 45(6), 676-682. <https://doi.org/10.1016/j.jneb.2013.07.013>
- Shehasen, M. Z., & Mohammed, A. S. (2020). Street food consumption and associated health risk. *International Journal of Research Studies in Agricultural Sciences (IJRSAS)*, 6(7), 8-18. <http://dx.doi.org/10.20431/2454-6224.0607002>
- Shu-Teng, L., Zariyawati, M. A., Suraya-Hanim, M., & Annuar, M. N. (2015). Determinants of microfinance repayment performance: Evidence from small medium enterprises in Malaysia. *International Journal of Economics and Finance*, 7(11), 110.

- Siau, A. M. F., Son, R., Mohhiddin, O., Toh, P. S., & Chai, L. C. (2015). Food court hygiene assessment and food safety knowledge, attitudes and practices of food handlers in Putrajaya. *International Food Research Journal*, 22(5), 1843-1854.
- Simelane, N. B. (2005). HIV/AIDS knowledge, attitudes and risky sexual behaviours of college students at Nazarene Teacher Training College in Swaziland: A descriptive study [Doctoral dissertation, University of the Western Cape].
- Singh, P. K., Anvikar, A., & Sinha, A. (2022). COVID-19 related knowledge, attitudes, and practices in Indian Population: An online national cross-sectional survey. *PloS one*, 17(3), 1-20. <https://doi.org/10.1371/journal.pone.0264752>
- Siow, O. N., & Sani, N. A. (2011). Assessment of knowledge, attitudes and practices (KAP) among food handlers at residential colleges and canteen regarding food safety. *Sains Malaysiana*, 40, 403-410.
- Soares, L. S., Almeida, R. C., Cerqueira, E. S., Carvalho, J. S., & Nunes, I. L. (2012). Knowledge, attitudes and practices in food safety and the presence of coagulase-positive staphylococci on hands of food handlers in the schools of Camaçari, Brazil. *Food Control*, 27(1), 206-213.
- Soon, J. M. (2019). Rapid Food Hygiene Inspection Tool (RFHiT) to assess hygiene conformance index (CI) of street food vendors. *LWT Food Science and Technology*, 113, 1-17. <https://doi.org/10.1016/j.lwt.2019.108304>
- Soon, J. M., & Baines, R. N. (2012). Food safety training and evaluation of handwashing intention among fresh produce farm workers. *Food Control*, 23(2), 437-448. <https://doi.org/10.1016/j.foodcont.2011.08.012>
- Soon, J. M., Singh, H. & Baines, R. N. (2011). Foodborne diseases in Malaysia: A review. *Food Control*, 22(6), 823-830. <https://doi.org/10.1016/j.foodcont.2010.12.011>
- Sousa, S., Lança de Morais, I., Albuquerque, G., Gelormini, M., Casal, S., Pinho, O., ... & Padrão, P. (2022). Patterns of street food purchase in cities from Central Asia. *Frontiers in Nutrition*, 9, 1-12. <https://doi.org/10.3389/fnut.2022.925771>
- Stapa, I. (2002). *Pembangunan sektor ekonomi informal bandar: kajian tentang penjaja dan penajaan di Kuala Lumpur* [Doctoral thesis, Universiti Malaya]. <http://studentsrepo.um.edu.my/528/1/PEND.pdf>
- Steyn, N. P., Labadarios, D., & Nel, J. H. (2011). Factors which influence the consumption of street foods and fast foods in South Africa-a national survey. *Nutrition Journal*, 10(1), 1-10. <https://doi.org/10.1186/1475-2891-10-104>
- Steyn, N., Mchiza, Z., Hill, J., Davids, Y., Venter, I., Hinrichsen, E., ... & Jacobs, P. (2014). Nutritional contribution of street foods to the diet of people in developing countries: A systematic review. *Public Health Nutrition*, 17(6), 1363-1374. <https://doi.org/10.1017/S1368980013001158>

- Suguna, M., Wan-Nadiah, W. A., Liong, M. T., & Bhat, R. (2011). Microbial safety of street vended and laboratory prepared dragon-fruit (pitaya) juices in Penang, Malaysia. *International Food Research Journal*, 18(4), 1509-1513.
- Sujarwoto, S., Holipah, H., & Maharani, A. (2022). A cross-sectional study of knowledge, attitudes, and practices concerning Covid-19 outbreaks in the general population in Malang District, Indonesia. *International Journal of Environmental Research and Public Health*, 19(7), 1-16. <https://doi.org/10.3390/ijerph19074287>
- Sulaiman, M. S., Halim, N. M. H. N. A., Kamari, I. Z., Pungging, P., Wahab, N. A., Rahman, S. A. A., ... & Setapa, A. (2020). Raising food safety to street food vendors in urban area. *MAEH Journal of Environmental Health*, 2(1), 8-11.
- Suryani, D., Sutomo, A., & Aman, A. (2019). The factors associated with food safety practices on food handlers in primary school canteens. *Unnes Journal of Public Health*, 8(1), 1-9. <https://doi.org/10.15294/ujph.v8i1.22830>
- Sylvia, A. B., RoseAnn, M., & John, B. K. (2015). Hygiene practices and food contamination in managed food service facilities in Uganda. *African Journal of Food Science*, 9(1), 31-42. <https://doi.org/10.5897/AJFS2014.1170>
- Tambekar, D. H., Jaiswal, V. J., Dhanorkar, D. V., Gulhane, P. B., & Dudhane, M. N. (2008). Identification of microbiological hazards and safety of ready-to-eat food vended in streets of Amravati City, India. *Journal of Applied Biosciences*, 7(3), 195-201.
- Tan, S. L., Bakar, F. A., Karim, M. S. A., Lee, H. Y., & Mahyudin, N. A. (2013). Hand hygiene knowledge, attitudes and practices among food handlers at primary schools in Hulu Langat district, Selangor (Malaysia). *Food Control*, 34(2), 428-435. <https://doi.org/10.1016/j.foodcont.2013.04.045>
- Tasnim, F., Hossain, M. A., Nusrath, S., Hossain, M. K., Lopa, D., & Haque, K. M. (2010). Quality assessment of industrially processed fruit juices available in Dhaka city, Bangladesh. *Malaysian Journal of Nutrition*, 16(3), 431-438.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53-55. <https://dx.doi.org/10.5116/ijme.4dfb.8dfd>
- Taylor, A. K. (2000). Food protection: new developments in hand washing. *Dairy, Food, and Environmental Sanitation*, 20, 114-119.
- Teferi, S. C., Sebsibe, I., & Adibaru, B. (2021). Food safety practices and associated factors among food handlers of Fiche Town, North Shewa Zone, Ethiopia. *Journal of Environmental and Public Health*, 2021, 1-7. <https://doi.org/10.1155/2021/6158769>
- Terano, R., Mohamed, Z., & Jusri, J. H. H. (2015). Effectiveness of microcredit program and determinants of income among small business entrepreneurs in

- Malaysia. *Journal of Global Entrepreneurship Research*, 5(1), 1-14.
<https://doi.org/10.1186/s40497-015-0038-3>
- Tessema, A. G., Gelaye, K. A., & Chercos, D. H. (2014). Factors affecting food handling Practices among food handlers of Dangila town food and drink establishments, North West Ethiopia. *BMC public Health*, 14(1), 1-5.
- Todd, E. C., Greig, J. D., Bartleson, C. A., & Michaels, B. S. (2007). Outbreaks where food workers have been implicated in the spread of foodborne disease. Part 3. Factors contributing to outbreaks and description of outbreak categories. *Journal of Food Protection*, 70(9), 2199-2217.
<https://doi.org/10.4315/0362-028X-70.9.2199>
- Todd, E. C., Greig, J. D., Bartleson, C. A., & Michaels, B. S. (2009). Outbreaks where food workers have been implicated in the spread of foodborne disease. Part 6. Transmission and survival of pathogens in the food processing and preparation environment. *Journal of Food Protection*, 72(1), 202-219.
<https://doi.org/10.4315/0362-028X-72.1.202>
- Toh, P. S., & Birchenough, A. (1999, October 18–19). *Food safety knowledge: A study of hawkers in Malaysia* [Paper presentation]. 3rd International Conference on Food Safety and HACCP, Netherlands.
- Toh, P. S., & Birchenough, A. (2000). Food safety knowledge and attitudes: culture and environment impact on hawkers in Malaysia.: Knowledge and attitudes are key attributes of concern in hawker foodhandling practices and outbreaks of food poisoning and their prevention. *Food Control*, 11(6), 447-452.
[https://doi.org/10.1016/S0956-7135\(00\)00008-6](https://doi.org/10.1016/S0956-7135(00)00008-6)
- Tokuç, B., Ekuklu, G., Berberoğlu, U., Bilge, E., & Dedeler, H. (2009). Knowledge, attitudes and self-reported practices of food service staff regarding food hygiene in Edirne, Turkey. *Food Control*, 20(6), 565-568.
- Tones, K., & Tilford, S. (Eds.). (2001). *Health promotion: Effectiveness, efficiency and equity*. Nelson Thornes.
- Tongco, M. D. C. (2007). Purposive sampling as a tool for informant selection. *Ethnobotany Research and Applications*, 5, 147-158.
<http://hdl.handle.net/10125/227>
- Tsai, C. Y. (2010). Applying the Theory of Planned Behavior to explore the independent travelers' behavior. *African Journal of Business Management*, 4(2), 221-234.
- Tuglo, L. S., Agordoh, P. D., Tekpor, D., Pan, Z., Agbanyo, G., & Chu, M. (2021). Food safety knowledge, attitude, and hygiene practices of street-cooked food handlers in North Dayi District, Ghana. *Environmental Health and Preventive Medicine*, 26(1), 1-13. <https://doi.org/10.1186/s12199-021-00975-9>
- Turhan, Ö., Şenol, Y., Baykul, T., Saba, R., & Yalçın, A. (2010). Knowledge, attitudes and behaviour of students from a medicine faculty, dentistry faculty, and medical technology Vocational Training School toward

HIV/AIDS. *International Journal of Occupational Medicine and Environmental Health*, 23(2), 153-160. <http://doi.org/10.2478/v10001-010-0008-5>

Turner, S. P. (1994). *The Social Theory of Practices: Tradition, Tacit Knowledge, and Presuppositions*. University of Chicago Press. <https://philpapers.org/go.pl?id=TURTST&proxyId=&u=https%3A%2F%2Fdx.doi.org%2F10.1086%2F233665>

Uakarn, C., Chaokromthong, K., & Sintao, N. (2021). Sample size estimation using Yamane and Cochran and Krejci and Morgan and Green formulas and Cohen statistical power analysis by G* power and comparisons. *APHEIT International Journal*, 10(2), 76-88.

Uçar, A., Yilmaz, M. V., & Çakıroğlu, F. P. (2016). Food Safety – Problems and Solutions. In (Ed.), *Significance, Prevention and Control of Food Related Diseases*. <https://doi.org/10.5772/63176>

Ukenna, S. I., & Ayodele, A. A. (2019). Applying the extended theory of planned behavior to predict sustainable street food patronage in a developing economy. *Journal of Food Products Marketing*, 25(4), 404-434.

Ungku Zainal Abidin, U. F., Boo, H.C., Sambasivan, M., & Salleh, R. (2011). Foodservice hygiene factors – The consumer perspective. *International Journal of Hospitality Management*, 30(1), 38-45. <https://doi.org/10.1016/j.ijhm.2010.04.001>

United Nations. (2022). Why improving food safety is important. <https://www.un.org/en/observances/food-safety-day>

Vaiappuri, S. K. N. (2013). *Knowledge, attitude, and practices of swiftlet ranchers in sustainable swiftlet ranching in Johor, Malaysia* [Master's Thesis, Universiti Putra Malaysia].

van Dijk, F. J., Bubas, M., & Smits, P. B. (2015). Evaluation studies on education in occupational safety and health: inspiration for developing economies. *Annals of global health*, 81(4), 548-560. <http://doi.org/10.1016/j.aogh.2015.08.023>

Vandamme, E. (2009). Concepts and challenges in the use of knowledge-attitude-practice surveys: Literature review. *Department of Animal Health. Institute of Tropical Medicine*, 1, 1-7.

Vijayakumaran, R. K., & Nur Amalina, S. (2018). Influences of nutrition information on fast food consumption among undergraduates. *Food Research*, 2(3), 228-233. [http://dx.doi.org/10.26656/fr.2017.2\(3\).288](http://dx.doi.org/10.26656/fr.2017.2(3).288)

Vo, T. H., Le, N. H., Le, A. T. N., Minh, N. N. T., & Nuorti, J. P. (2015). Knowledge, attitudes, practices and training needs of food-handlers in large canteens in Southern Vietnam. *Food Control*, 57, 190-194.

- Vorster, H. H., Kruger, A., & Margetts, B. M. (2011). The nutrition transition in Africa: can it be steered into a more positive direction?. *Nutrients*, 3(4), 429-441. <https://doi.org/10.3390/nu3040429>
- Walker, E., Pritchard, C., & Forsythe, S. (2003). Food handlers' hygiene knowledge in small food businesses. *Food Control*, 14(5), 339-343. [https://doi.org/10.1016/S0956-7135\(02\)00101-9](https://doi.org/10.1016/S0956-7135(02)00101-9)
- Wan Nawawi, W. N. F., Ramoo, V., Chong, M. C., Zaini, N. H., Chui, P. L., & Abdul Mulud, Z. (2022). The food safety knowledge, attitude and practice of Malaysian food truck vendors during the COVID-19 Pandemic. *Healthcare*, 10, (6), 1-11. <https://doi.org/10.3390/healthcare10060998>
- Wang, J. H., Huang, C. L., & Knerr, B. (2010). Knowledge, attitudes, and practices of straybirds agricultural trainees in Taiwan. *Social Behavior and Personality: An International Journal*, 38(6), 795-804. <https://doi.org/10.2224/sbp.2010.38.6.795>
- Wang, J., Chen, L., Yu, M., & He, J. (2020). Impact of knowledge, attitude, and practice (KAP)-based rehabilitation education on the KAP of patients with intervertebral disc herniation. *Annals of Palliative Medicine*, 9(2), 388-393. <http://dx.doi.org/10.21037/apm.2020.03.01>
- Wessman, W. L. (2007). *The nature of thought: Maturity of mind*. University Press of America.
- WHO. (1996). *Essential safety requirements for street-vended foods* (No. WHO/FNU/FOS/96.7 Rev1). <https://apps.who.int/iris/handle/10665/63265>
- WHO. (2008). *Advocacy, communication and socio mobilization for TB control: A guide to developing knowledge, attitudes, and practices survey*. https://apps.who.int/iris/bitstream/handle/10665/43790/9789241596176_eng.pdf?sequence=1&isAllowed=y
- WHO. (2010). *Basic steps to improve safety of street-vended food* (No 3). INFOSAN Information Note.
- WHO. (2015a). *WHO estimates of the global burden of foodborne diseases: foodborne disease burden epidemiology reference group 2007-2015*. https://apps.who.int/iris/bitstream/handle/10665/199350/9789241565165_eng.pdf
- WHO. (2015b). *Food Safety: What you should know*. <https://apps.who.int/iris/handle/10665/160165>
- WHO. (2016). *Food safety*. http://www.searo.who.int/topics/food_safety/en/
- WHO. (2017). *Strengthening indicator-based surveillance. Stage 2 Booklet: Strengthening surveillance of and response to foodborne diseases*. <https://apps.who.int/iris/bitstream/handle/10665/259472/9789241513258-eng.pdf>

- WHO. (2022a). *Food safety is everyone's business in street food vending*. <https://www.who.int/publications/i/item/WHO-HEP-NFS-AFS-2022.4>
- WHO. (2022b). *Food Safety*. <https://www.who.int/news-room/fact-sheets/detail/food-safety>
- Winarno, F. G., & Allain, A. (1991). Street foods in developing countries: lessons from Asia. *Food, Nutrition and Agriculture*, 1(1), 11-18.
- Woh, P. Y., Thong, K. L., Behnke, J. M., Lewis, J. W., & Zain, S. N. M. (2016). Evaluation of basic knowledge on food safety and food handling practices amongst migrant food handlers in Peninsular Malaysia. *Food Control*, 70, 64 - 73. <https://doi.org/10.1016/j.foodcont.2016.05.033>
- Wu, Y., Liu, X., Chen, Q., Liu, H., Dai, Y., Zhou, Y., ... & Chen, Y. (2018). Surveillance for foodborne disease outbreaks in China, 2003 to 2008. *Food Control*, 84, 382-388. <https://doi.org/10.1016/j.foodcont.2017.08.010>
- Wu, Y., Wen, J., Ma, Y., Ma, X., & Chen, Y. (2014). Epidemiology of foodborne disease outbreaks caused by *Vibrio parahaemolyticus*, China, 2003–2008. *Food Control*, 46, 197-202. <https://doi.org/10.1016/j.foodcont.2014.05.023>
- Xie, Z. F., Wei, Q. F., & Zheng, X. L. (2017). Development of health education evaluation system for patients with colostomy based on KAP model. *Chinese Journal of Health Education*, 33, 544-7.
- Xue, J., & Zhang, W. (2013). Understanding China's food safety problem: An analysis of 2387 incidents of acute foodborne illness. *Food Control*, 30(1), 311-317. <https://doi.org/10.1016/j.foodcont.2012.07.024>
- Yatim, N. (2020). *Telur luput dalam puding buih punca 99 individu keracunan*. Sinar Harian. <https://www.sinarharian.com.my/article/85687/EDISI/Terengganu/Telur-luput-dalam-puding-buih-punca-99-individu-keracunan>
- Yotsumoto, Y. (2011). Profiles of Hawkers Working in Rizal Park, Manila, Philippines: Socio-Economic Status, Migration Motivations, and the Sale of Goods. *Ritsumeikan International Affairs*, 10, 303-320.
- You, W., Zhang, G., Davy, B. M., Carlson, A., & Lin, B. H. (2009). Food consumed away from home can be a part of a healthy and affordable diet. *The Journal of Nutrition*, 139(10), 1994–1999. <https://doi.org/10.3945%2Fjn.109.107615>
- Yu, C. P., Chou, Y. C., Wu, D. C., Cheng, C. G., & Cheng, C. A. (2021). Surveillance of foodborne diseases in Taiwan: A retrospective study. *Medicine*, 100(5), 1-6. <https://doi.org/10.1097%2FMD.00000000000024424>
- Yusof, A. M. M., Rahman, N. A., & Haque, M. (2018). Knowledge, attitude, and practice toward food poisoning among food handlers and dietetic students in a public university in Malaysia. *Journal of Pharmacy & Bioallied Sciences*, 10(4), 232. https://doi.org/10.4103%2FJPBS.JPBS_141_18

- Zahedi, L., Sizemore, E., Malcolm, S., Grossniklaus, E., & Nwosu, O. (2014). Knowledge, attitudes and practices regarding cervical cancer and screening among Haitian health care workers. *International Journal of Environmental Research and Public Health*, 11(11), 11541-11552. <https://doi.org/10.3390/ijerph111111541>
- Zan, H. U. A., & Fan, J. X. (2010). Cohort effects of household expenditures on food away from home. *Journal of Consumer Affairs*, 44(1), 213-233. <https://doi.org/10.1111/j.1745-6606.2010.01163.x>
- Zanin, L. M., da Cunha, D. T., de Rosso, V. V., Capriles, V. D., & Stedefeldt, E. (2017). Knowledge, attitudes and practices of food handlers in food safety: An integrative review. *Food Research International*, 100, 53-62. <https://doi.org/10.1016/j.foodres.2017.07.042>
- Zeng, Y., Hu, X., Li, Y., Zhen, X., Gu, Y., Sun, X., & Dong, H. (2019). The quality of caregivers for the elderly in long-term care institutions in Zhejiang Province, China. *International Journal of Environmental Research and Public Health*, 16(12), 1-12.
- Zhang, H., Lu, L., Liang, J., & Huang, Q. (2015). Knowledge, attitude and practices of food safety amongst food handlers in the coastal resort of Guangdong, China. *Food Control*, 47, 457-461. <https://doi.org/10.1016/j.foodcont.2014.07.048>
- Zikmund, W.G. (2003). *Business Research Methods* (7th ed.). Thomson/South-Western.

APPENDICES

Appendix A: Borang Soal Selidik

No. ID	
--------	--



BORANG SOAL SELIDIK

PENGETAHUAN, SIKAP, DAN AMALAN KESELAMATAN MAKANAN PENJAJA JALANAN DI KLANG VALLEY, MALAYSIA

Keselamatan makanan mendapat banyak perhatian kerana penyakit bawaan makanan adalah masalah kesihatan utama di dunia hari ini. Walaupun Malaysia dikenali sebagai syurga makanan yang mempunyai antara masakan popular di dunia, insiden keracunan makanan masih berlaku akibat pengendalian makanan yang kurang baik dikalangan pengendali makanan. Oleh itu, kajian ini secara khusus akan menentukan pengetahuan, sikap, dan amalan keselamatan makanan peniaga makanan jalanan. Sukacitanya dimaklumkan bahawa anda telah terpilih untuk menjadi responden bagi kajian ini. Terima kasih atas maklumbalas yang diberikan.

Sebarang pertanyaan, sila hubungi:

Nur Amelia Syakira Abdul Aziz
ameliasyakiraaa@gmail.com
018-912 3658

Prof. Madya Dr. Nitty Hirawaty
Kamarulzaman
nitty@upm.edu.my
03-8947 4907

BAHAGIAN A: CIRI-CIRI DEMOGRAFI

Arahan: Sila isikan maklumat pada ruangan yang disediakan dan tandakan (/) pada jawapan yang berkaitan.

1. Jantina

☐	Lelaki
☐	Perempuan

2. Umur : _____ tahun

3. Bangsa

☐	Melayu
☐	Cina
☐	India
☐	Lain-lain Sila nyatakan: _____

4. Agama

☐	Islam
☐	Buddha
☐	Hindu
☐	Lain-lain Sila nyatakan: _____

5. Status perkahwinan

☐	Bujang
☐	Berkahwin

6. Taraf pendidikan

☐	Sekolah Rendah
☐	Sekolah Menengah
☐	Sijil
☐	Diploma
☐	Ijazah Sarjana Muda
☐	Ijazah Sarjana
☐	PhD
☐	Lain-lain Sila nyatakan: _____

7. Jenis milikan perniagaan:

☐	Milikan tunggal
☐	Perkongsian
☐	Syarikat

8. Masa operasi:

☐	Pagi
☐	Petang
☐	Malam

9. Pengalaman dalam pengendalian makanan: _____ tahun

10. Jenis Gerai:

☐	Gerai bergerak
☐	Gerai statik

11. Bilangan pekerja: _____

12. Pendapatan bulanan: RM _____

13. Adakah anda mempunyai lesen perniagaan?

☐
☐

Ya

Tidak

14. Pernahkah anda menghadiri latihan keselamatan makanan?

☐
☐

Ya

Tidak

15. Pernahkan anda mengambil suntikan Tifoid?

☐
☐

Ya

Tidak

BAHAGIAN B: PENGETAHUAN KESELAMATAN MAKANAN

Arahan: Sila Tindakan (/) pada pernyataan di bawah berdasarkan skala yang diberi.

1	2	3
Tidak	Tidak Tahu	Ya

No.	Penyataan	1	2	3
1	Saya pernah mendengar tentang penyakit bawaan makanan.			
2.	Penyakit bawaan makanan disebabkan oleh makanan yang tercemar dan mikrob (bakteria, patogen, virus atau parasit) yang merosakkan makanan.			
3.	Penyakit bawaan makanan disebabkan oleh amalan yang tidak bersih dalam pengeluaran, pasca-penuaian, pemprosesan, dan penyediaan makanan.			
4.	<i>Salmonella</i> , <i>S. aureus</i> , dan <i>E-coli</i> adalah antara patogen bawaan makanan.			
5.	Pencemaran silang adalah faktor utama yang menyumbang kepada pencemaran makanan.			
6.	Penyediaan makanan lebih awal meningkatkan risiko pencemaran makanan.			
7.	Adalah penting untuk mengetahui suhu yang betul bagi peti sejuk dan peti sejuk beku untuk mengurangkan risiko kerosakan makanan.			
8.	Memanaskan semula makanan yang telah dimasak boleh menyumbang kepada pencemaran makanan.			
9.	Mencuci tangan sebelum mengendalikan makanan mengurangkan risiko pencemaran makanan.			
10.	Memakai sarung tangan adalah penting bagi pengendalian makanan yang selamat.			
11.	Makanan beku boleh membunuh mikrob yang menyebabkan kerosakan makanan dan penyakit bawaan makanan.			
12.	Makanan yang tidak selamat untuk dimakan dapat dikenal pasti melalui perubahan rupa, rasa, warna, dan bau.			
13.	Suntikan tifoid dapat mencegah demam tifoid.			
14.	Pengendali makanan yang mengalami kecederaan kecil tidak boleh terlibat dalam aktiviti pengendalian makanan.			
15.	Penyakit bawaan makanan adalah penyakit yang boleh berjangkit kepada orang melalui makanan.			
16.	Pembersihan dan sanitasi perkakas yang betul mengurangkan risiko pencemaran makanan.			
17.	Makan dan minum di tempat kerja boleh meningkatkan risiko pencemaran makanan.			
18.	Makanan yang dimasak dengan baik bebas daripada mikrob yang boleh menyebabkan penyakit bawaan makanan.			

BAHAGIAN C: SIKAP KESELAMATAN MAKANAN

Arahan: Sila tandakan (/) pada pernyataan di bawah berdasarkan skala yang diberi.

1	2	3	4	5
Sangat Tidak Setuju	Tidak Setuju	Neutral	Setuju	Sangat Setuju

No.	Penyataan	1	2	3	4	5
1.	Saya percaya bahawa mengendalikan makanan dengan betul dan selamat adalah tanggungjawab saya.					
2.	Saya bersedia untuk menghadiri latihan berkaitan keselamatan makanan.					
3.	Saya tahu bahawa kebersihan peribadi yang baik boleh mencegah penyakit bawaan makanan.					
4.	Saya bersedia untuk mengubah tabiat pengendalian makanan saya jika ia tidak selamat.					
5.	Saya percaya bahan mentah dan makanan yang telah dimasak mestilah disimpan secara berasingan.					
6.	Saya percaya bahawa memakai aksesori boleh menyebabkan pencemaran silang.					
7.	Saya percaya bahawa memakai topi, pelitup muka, dan sarung tangan adalah penting untuk mengelakkan pencemaran makanan semasa mengendalikan makanan.					
8.	Saya percaya penyimpanan makanan yang tidak betul boleh menyumbang kepada pencemaran makanan.					
9.	Saya percaya bahawa memakai pakaian yang bersih dan sesuai akan mencegah pencemaran makanan.					
10.	Saya percaya bahawa makanan yang telah dicairkan tidak boleh dibekukan semula.					
11.	Saya berpendapat status kesihatan pekerja harus dinilai sebelum mengambil pekerja.					
12.	Saya percaya bahawa menghasilkan makanan yang selamat adalah lebih penting daripada makanan yang sedap.					
13.	Saya percaya bahawa mendidik diri dengan pengetahuan keselamatan makanan meningkatkan keyakinan saya dalam mengendalikan makanan.					
14.	Saya bersedia untuk mengambil cuti jika sakit, mengalami demam, atau selsema.					
15.	Saya percaya adalah tanggungjawab saya untuk memastikan bahawa makanan yang disediakan adalah selamat.					
16.	Saya percaya adalah perlu untuk memeriksa suhu peti sejuk dan peti sejuk beku untuk mengurangkan risiko pencemaran makanan.					

17.	Saya berpendapat bahawa pengendali makanan yang mengalami calar atau luka pada tangan mereka tidak sepatutnya menyentuh makanan yang tidak dibalut.					
18.	Saya berpendapat premis makanan harus sentiasa dikekalkan dalam keadaan bersih untuk mengelakkan pencemaran makanan.					



BAHAGIAN D: AMALAN KESELAMATAN MAKANAN

Arahan: Sila tandakan (/) pada pernyataan di bawah berdasarkan skala yang diberi.

1	2	3
Tidak pernah	Jarang-jarang	Selalu

No.	Pernyataan	1	2	3
1.	Cuci tangan dengan sabun dan air sebelum dan selepas mengendalikan makanan.			
2.	Cuci tangan sebelum dan selepas menggunakan sarung tangan.			
3.	Cuci tangan selepas menggunakan tandas.			
4.	Pastikan kuku sentiasa pendek dan bersih semasa mengendalikan makanan.			
5.	Periksa kualiti bahan mentah semasa pembelian/penerimaan daripada pembekal.			
6.	Periksa tarikh luput bahan-bahan sebelum menggunakannya dalam penyediaan makanan.			
7.	Cairkan makanan beku pada suhu bilik.			
8.	Gunakan perkakas yang berasingan untuk menyediakan makanan yang telah dimasak dan bahan mentah.			
9.	Gunakan perkakas yang sesuai dan bersih semasa mengendalikan makanan.			
10.	Pastikan semua bahan mentah bersih sebelum digunakan.			
11.	Elakkan memakai aksesori semasa mengendalikan makanan.			
12.	Pakai apron yang sesuai dan penutup kepala pakai buang semasa mengendalikan makanan.			
13.	Pakai pakaian yang sesuai di premis makanan.			
14.	Pakai sarung tangan pakai buang semasa mengendalikan makanan.			
15.	Elakkan makan dan minum di kawasan pemprosesan makanan.			
16.	Elakkan daripada mengendalikan makanan dengan tangan yang terluka.			
17.	Kekalkan kawasan kerja yang bersih untuk pengeluaran makanan yang selamat.			
18.	Sentiasa sanitasi kawasan pengendalian makanan untuk mengekalkan persekitaran yang bersih.			

TERIMA KASIH ATAS KERJASAMA ANDA

Appendix B: Questionnaire

ID No.	
--------	--



QUESTIONNAIRE FORM

FOOD SAFETY KNOWLEDGE, ATTITUDE, AND PRACTICES OF STREET FOOD VENDORS IN THE KLANG VALLEY, MALAYSIA

Food safety gained huge attention because foodborne diseases are the main health problem in the world nowadays. Even though Malaysia is known as a food heaven country that has a lot of famous dishes, food poisoning accidents still happened caused of bad food handling among food handlers. Therefore, this study is conducted to determine food safety knowledge, attitude, and practices of street food vendors. Glad to be informed that you have been selected to become a respondent in this study. Thank you for all the assistance given.

Any enquiry, please contact:

Nur Amelia Syakira Abdul Aziz
ameliasyakiraaa@gmail.com
018-912 3658

Assoc. Prof. Dr. Nitty Hirawaty
Kamarulzaman
nitty@upm.edu.my
03-8947 4907

SECTION A: DEMOGRAPHIC CHARACTERISTICS

Instruction: Please fill in the information in the space provided and tick (/) for the appropriate answer.

1. Gender

☐	Male
☐	Female

2. Age: _____ years old

3. Race:

☐	Malay
☐	Chinese
☐	Indian
☐	Others Please specify: _____

4. Religion:

☐	Islam
☐	Buddha
☐	Hindu
☐	Others Please specify: _____

5. Marital status:

☐	Islam
☐	Buddha

6. Educational level:

☐	Primary school
☐	Secondary school
☐	Certificate
☐	Diploma
☐	Bachelor's degree
☐	Master
☐	PhD
☐	Others Please specify: _____

7. Business ownership:

☐	Sole proprietorship
☐	Partnership
☐	Company

8. Operation hour:

☐	Morning
☐	Evening
☐	Night

9. Experience in food handling: _____ year

10. Type of stalls:

☐	Mobile stall
☐	Stationary stall

11. Number of workers: _____

12. Monthly revenue: RM _____

13. Do you have a business license?

☐	Yes
☐	No

14. Have you attended food safety training?

☐	Yes
☐	No

15. Have you taken Typhoid injection?

☐	Yes
☐	No

SECTION B: FOOD SAFETY KNOWLEDGE

Instruction: Please tick (/) at the statement below based on the scales given.

1	2	3
No	Do Not Know	Yes

No.	Statement	1	2	3
1	I have heard about foodborne illnesses.			
2.	Foodborne illnesses are caused by food contaminated with microbes (bacteria, pathogens, viruses, or parasites) that spoil food.			
3.	Foodborne illnesses are caused by unhygienic practices in the production, post-harvest, processing, and preparation of food.			
4.	<i>Salmonella</i> , <i>S. aureus</i> , and <i>E. coli</i> are among the foodborne pathogens.			
5.	Cross-contamination is a major contributing factor to food contamination.			
6.	Preparing food in advance increases the risk of food contamination.			
7.	It is important to know the temperature of the refrigerators and freezers to reduce the risk of food spoilage.			
8.	Reheating cooked food can contribute to food contamination.			
9.	Washing hands before handling food reduces the risk of food contamination.			
10.	Wearing gloves is required for safe food handling.			
11.	Frozen foods can kill microbes that cause food spoilage and foodborne illnesses.			
12.	Foods that are not safe to eat can be identified by changes in appearance, taste, colour, and smell.			
13.	Typhoid injection can prevent typhoid fever.			
14.	Food handlers with minor injuries should not be involved in food handling activities.			
15.	Foodborne illnesses are illnesses caused by consuming food contaminated with harmful bacteria, viruses, parasites, or toxins.			
16.	Proper cleaning and sanitation of utensils lower the risks of food contamination.			
17.	Eating and drinking in the workplace increases the risk of food contamination.			
18.	Well-cooked foods are free from microbes that can otherwise cause foodborne illnesses.			

SECTION C: FOOD SAFETY ATTITUDE

Instruction: Please tick (/) at the statement below based on the scales given.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

No.	Statement	1	2	3	4	5
1.	I believe that handling food properly and safely is my responsibility.					
2.	I am willing to attend food safety training.					
3.	I know that good personal hygiene can prevent foodborne illnesses.					
4.	I am willing to change my food handling habits if it is unsafe.					
5.	I believe raw materials and cooked food must be stored separately.					
6.	I believe that wearing accessories can lead to cross-contamination.					
7.	I believe wearing caps, masks, and gloves is critical to avoid food contamination while handling food.					
8.	I believe improper food storage can contribute to food contamination.					
9.	I believe that wearing clean and appropriate attire will prevent food contamination.					
10.	I believe defrosted food should not be refrozen.					
11.	I think the health status of workers should be evaluated before employment.					
12.	I believe that producing safe food is more important than tasty food.					
13.	I believe that educating myself with food safety knowledge enhances my confidence in handling food.					
14.	I am willing to take leave when sick, with a fever or cold.					
15.	I believe that it is my responsibility to ensure that the food provided is safe.					
16.	I believe it is necessary to check the temperature of the refrigerators and freezers to reduce the risk of food contamination.					
17.	I think that food handlers with abrasions or cuts on their hands should not touch unwrapped food.					
18.	I think food premises should always be kept clean to prevent food contamination.					

SECTION D: FOOD SAFETY PRACTICES

Instruction: Please tick (/) at the statement below based on the scales given.

1	2	3
Never	Seldom	Always

No.	Statement	1	2	3
1.	Wash hands with soap and water before and after handling food.			
2.	Wash the hands before and after the use of gloves.			
3.	Wash the hands after using the toilet.			
4.	Keep the nails short and clean when handling food.			
5.	Inspect the quality of raw materials upon purchase/receipt from the supplier.			
6.	Check the expiration dates of ingredients before using them in food preparation.			
7.	Thaw frozen food at room temperature.			
8.	Use separate utensils for preparing cooked and raw food.			
9.	Use appropriate and clean utensils when handling food.			
10.	Ensure all raw materials are clean before use.			
11.	Refrain from wearing accessories while handling food.			
12.	Wear a suitable apron and disposable head cover when handling food.			
13.	Wear proper attire in the food premises.			
14.	Wear disposable gloves when handling food.			
15.	Refrain from eating and drinking in food processing areas.			
16.	Refrain from handling food with wounded hands.			
17.	Maintain a clean work area for safe food production.			
18.	Always disinfect the food-handling areas to maintain sanitary environment.			

THANK YOU FOR COOPERATION

BIODATA OF STUDENT

The student, Nur Amelia Syakira binti Abdul Aziz was born on 9th May 1997 in Kota Bharu, Kelantan. She attended her primary school at Sekolah Kebangsaan Zainab (1), Kelantan from 2004 until 2009. She did her secondary school at Sekolah Menengah Kebangsaan Zainab (1), Kelantan from the year 2010 to 2014. After she finished her secondary school, she further her study at Universiti Putra Malaysia (UPM) in Foundation of Agricultural Science (Asper) starting from 2015 until 2016 then continued her study for a Bachelor of Science in Agribusiness at UPM, which completed in 2020. After graduating, she then pursued her master's study in Master of Science in Agribusiness also at UPM from 2021 until 2023. She got a scholarship (Graduate Research Fellowship) for her study at UPM.



LIST OF PUBLICATIONS

Research paper

Abdul Aziz, N. A. S., Kamarulzaman, N. H., & Abdul Hadi, A. H. I. (2023). Evaluation of Food Safety Knowledge, Attitude, and Practices among Street Food Vendors in the Klang Valley, Malaysia. *Malaysian Journal of Agricultural Economics*, 30(1): 1-19.

Abdul Aziz, N. A. S., Kamarulzaman, N. H., & Abdul Hadi, A. H. I. (2024). Assessment of Food Safety Knowledge, Attitudes, and Practices Among Street Food Vendors in Malaysia. *Canrea Journal: Food Technology, Nutrition, and Culinary Journal*, 7(2): 180-198.

Conference attended

Abdul Aziz, N. A. S. and Kamarulzaman, N. H. (2021). Knowledge, attitude, and practices of street food vendors towards food safety. Abstract presented at Online ISSAAS International Congress and General Meeting 2021, 4th-5th November 2021, Kasetsart University, Thailand. Oral presentation.

