UNIVERSITI PUTRA MALAYSIA

KNOWLEDGE, ATTITUDE, AND PREVENTIVE PRACTICE OF FOOD POISONING AMONG POSTGRADUATE STUDENTS AT SELECTED PUBLIC UNIVERSITIES IN 2020-2021

MSHELIA DR ARHYEL BUBA

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By

MSHELIA DR ARHYEL BUBA

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

March 2022

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

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Chairman : Associate Professor Malina Osman, MD, MComm Health
Faculty : Medicine and Health Sciences

Objective: This study aims to determine knowledge, attitude, and preventive practice of food poisoning and its factors among postgraduate students in Universiti Putra Malaysia. **Methodology:** A cross-sectional study was conducted among selected 212 respondents who were selected through simple random sampling. The selection was made through an online random number generator from a list provided by the Graduate School Office. A validated and reliable questionnaire was used. **Results:** Of the 212 respondents, the majority were male (59.0%), aged less than 35 years old (77.4%), non-Malaysian (52.8%), single (58.0%), first-degree-holders (98.6%), not working (53.8%), and received an average monthly income of less than RM3,264 (82.1%). A larger number of the respondents (67.0%) are aware of food poisoning outbreak. And the source of their information of the food poisoning outbreak was television (21.69%), the internet (21.23%), newspaper (8.02%), online journals (7.55%), friends (3.30%), Facebook (1.89%), community (0.5%), nurse (0.5%), drinking raw milk for the second time (0.5%), information from parents (0.5%), relatives (0.5%), restaurant (0.5%), and radio (0.5%). A greater number of the respondents (55.7%) had a previous history of food poisoning illness. However, a greater portion of the respondents (53.8%) who had a previous history of food poisoning illness did not correctly detect or confirm the causes of their food poisoning illness, which should be either microbial or non-microbial causes. The majority of the respondents had poor knowledge (82.5%), an acceptable attitude (68.9%), and good preventive practice (55.7%) regarding food poisoning. There was a significant association between citizen, marital status, awareness of food poisoning outbreak, and previous history of food poisoning illness with knowledge of food poisoning ($p<0.05$). There was a significant association between gender and awareness of food poisoning outbreak with attitude towards food poisoning ($p<0.05$). There was also a significant association between attitude and preventive practice towards food poisoning ($p<0.05$). Binary logistic regression analysis showed that those who have married (AOR 2.342, 95% CI 1.051 - 5.220, $p=0.037$), not aware of food poisoning outbreak (AOR 2.736, 95% CI 1.062 - 7.049, $p=0.037$), and had no previous history of

food poisoning illness (AOR 2.245, 95% CI 1.004 - 5.017, p=0.049) are predictors for good knowledge. Being male respondents (AOR 2.347, 95% CI 1.237 - 4.451, p=0.009) and not aware of food poisoning outbreak (AOR 2.164, 95% CI 1.168 - 4.010, p=0.014) are predictors for acceptable attitude. **Conclusion:** Documentation of the identified poor level of knowledge and factors affecting the level of knowledge, attitude, and preventive practice provides essential information on the baseline indicators towards the risk of food poisoning among the respondents. A relevant interventional program is recommended to tackle the problem of poor knowledge of food poisoning; areas of focus should be viral causes of food poisoning, low-risks foods, high-risk foods, and complications or effects of food poisoning. Gender, citizen, marital status, awareness of food poisoning outbreak, and the previous history of food poisoning illness were identified factors that had significantly affected the level of knowledge, attitude, and practice of food poisoning. Therefore, it is recommended that when providing education on knowledge, attitude, and practice, there is the need to emphasize on the female gender, non-Malaysian, those who have not married, aware of food poisoning outbreak, and had a previous history of food poisoning illness. A relevant interventional program is recommended to intervene in the respondents' unacceptable attitude towards food poisoning. The focus domain should be the attitude of food handlers smoking during food preparation and handling. A relevant interventional program is also recommended to intervene in the poor preventive practice of food poisoning among the respondents; the area of focus should be the preventive practice of rejecting restaurants where food handlers do not wear gloves and head coverings when handling food. It will prevent the potential risks of food poisoning outbreak among them.

Keywords: food poisoning, postgraduate students, knowledge, attitude, preventive practice

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

PENGETAHUAN, SIKAP DAN AMALAN PENCEGAHAN KERACUNAN MAKANAN DALAM KALANGAN PELAJAR PASCA SISWAZAH DI UNIVERSITI AWAM TERPILIH TAHUN 2020-2021

Oleh

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Mac 2022

Pengerusi : Profesor Madya Malina Osman, MD, MComm Health
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Objektif : Kajian ini bertujuan untuk mengetahui tahap pengetahuan, sikap, dan amalan pencegahan keracunan makanan dan faktornya dalam kalangan pelajar pascasiswazah di Universiti Putra Malaysia. **Metodologi:** Kajian keratan rentas dilakukan dalam kalangan 212 responden terpilih melalui pensampelan rawak mudah. Pemilihan dibuat melalui kaedah rawak dalam talian dari senarai pelajar yang disediakan oleh Sekolah Pengajian Siswazah. Soal selidik yang disahkan dan boleh dipercayai digunakan dalam kajian ini. **Keputusan:** Dari 212 responden, majoriti adalah lelaki (59.0%), berumur kurang dari 35 tahun (77.4%), bukan warganegara Malaysia (52.8%), belum berkahwin (58.0%), pemegang ijazah pertama (98.6%), tidak bekerja (53.8%), dan menerima pendapatan bulanan purata kurang dari RM3,264 (82.1%). Sebilangan besar responden (67.0%) menyedari wabak keracunan makanan. Juga, sumber maklumat mereka mengenai wabak keracunan makanan adalah televisyen (21.69%), internet (21.23%), surat khabar (8.02%), jurnal dalam talian (7.55%), rakan (3.30%), Facebook (1.89%), masyarakat (0.5%), jururawat (0.5%), minum susu mentah untuk kali kedua (0.5%), maklumat dari ibu bapa (0.5%), saudara-mara (0.5%), restoran (0.5%), dan radio (0.5%). Sebilangan besar responden (55.7%) mempunyai sejarah penyakit keracunan makanan sebelumnya. Walau bagaimanapun, sebahagian besar responden (53.8%) yang mempunyai sejarah penyakit keracunan makanan sebelumnya tidak dapat mengesan atau mengesahkan penyebab penyakit keracunan makanan mereka dengan betul, yang sepatutnya menjadi penyebab mikrob atau bukan mikrob. Majoriti responden mempunyai pengetahuan yang lemah (82.5%), sikap yang boleh diterima (68.9%) dan amalan pencegahan yang baik (55.7%) terhadap keracunan makanan. Terdapat hubungan yang signifikan antara warga negara, status perkahwinan, kesedaran tentang wabak keracunan makanan, dan sejarah penyakit keracunan makanan sebelumnya dengan tahap pengetahuan ($p<0.05$). Terdapat juga hubungan signifikan antara jantina dan kesedaran mengenai wabak keracunan makanan dengan sikap terhadap keracunan makanan ($p<0.05$). Terdapat juga hubungan yang signifikan antara sikap dan amalan pencegahan terhadap keracunan makanan ($p<0.05$). Analisis regresi logistik binari menunjukkan bahawa mereka yang telah

berkahwin (AOR 2.342, 95% CI 1.051 - 5.220, p = 0.037) tidak menyedari wabak keracunan makanan (AOR 2.736, 95% CI 1.062 - 7.049, p=0.037) dan tidak mempunyai sejarah penyakit keracunan makanan sebelum ini (AOR 2.245, 95% CI 1.004 - 5.017, p = 0.049) adalah pembolehubah penjelasan untuk pengetahuan yang baik. Responden lelaki (AOR 2.347, 95% CI 1.237 - 4.451, p = 0.009) dan tidak menyedari wabak keracunan makanan (AOR 2.164, 95% CI 1.168 - 4.010, p = 0.014) adalah pembolehubah penjelasan untuk sikap yang boleh diterima. **Kesimpulan:** Dokumentasi tahap pengetahuan lemah yang dikenal pasti dan faktor yang mempengaruhi tahap pengetahuan, sikap, dan amalan pencegahan memberikan maklumat penting tentang petunjuk asas ke arah risiko keracunan makanan dalam kalangan responden. Jantina, warganegara, status perkahwinan, kesedaran tentang wabak keracunan makanan, dan sejarah penyakit keracunan makanan sebelum ini dikenal pasti sebagai faktor yang mempengaruhi tahap pengetahuan dan sikap dengan ketara. Oleh itu, adalah disyorkan apabila memberikan pendidikan tentang pengetahuan dan sikap, perlu dititikberatkan jantina wanita, bukan warganegara Malaysia, mereka yang belum berkahwin, sedar tentang wabak keracunan makanan, dan mempunyai sejarah penyakit keracunan makanan sebelum ini. Program intervensi yang berkaitan disyorkan untuk menangani masalah pengetahuan yang lemah tentang keracunan makanan; kawasan tumpuan hendaklah menjadi punca virus keracunan makanan, makanan berisiko rendah, makanan berisiko tinggi, dan komplikasi atau kesan keracunan makanan. Program intervensi yang berkaitan disyorkan untuk campur tangan dalam sikap responden yang tidak boleh diterima terhadap keracunan makanan. Domain tumpuan haruslah sikap pengendali makanan merokok semasa penyediaan dan pengendalian makanan. Program intervensi yang berkaitan juga disyorkan untuk campur tangan dalam amalan pencegahan keracunan makanan yang lemah di kalangan responden; kawasan tumpuan harus menjadi amalan pencegahan menolak dalam restoran di mana pengendali makanan tidak memakai sarung tangan dan penutup kepala semasa mengendalikan makanan. Ia akan mengelakkan potensi risiko wabak keracunan makanan dalam kalangan mereka.

Kata kunci: keracunan makanan, pelajar pascasiswazah, pengetahuan, sikap, amalan pencegahan

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This thesis was submitted to the Senate of the 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:

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Date: 9 June 2022

Declaration by Members of Supervisory Committee

This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

Signature: _____
Name of Chairman of Supervisory Committee: Associate Professor Dr. Malina Osman

Signature: _____
Name of Member of Supervisory Committee: Dr. Norashiqin binti Misni

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LIST OF ABBREVIATIONS

USDA FSIS	United States Department of Agriculture Food Safety and Inspection Service
DALYs	Disability-adjusted life years
WHO	World Health Organization
MID	Minimum Infectious Dose
UPM	Universiti Putra Malaysia
MoH	Ministry of Health
PCR	Polymerase Chain Reaction
FAO	Food Agricultural Organization
CDC	Center for Disease Control and Prevention
HSB	Health Seeking Behavior or Healthcare Seeking Behavior
HBM	Health Belief Model
NCI	National Cancer Institute
STPM	Sijil Tinggi Persekolahan Malaysia (in English, Malaysian Higher School Certificate)
GCE	General Certificate of Education
Ph.D.	Doctor of Philosophy
B40	Bottom 40%
SGOT	Serum glutamic-oxaloacetic transaminase
SGPT	Serum glutamic pyruvic transaminase
UN	United Nation
IV	Independent Variable
DV	Dependent Variable
AIFS	Australian Institute of Food Safety

CHAPTER 1

INTRODUCTION

1.1 Background of this study

Food poisoning is a disease caused by consuming food or water contaminated with bacteria and/or their toxins, chemicals, parasites, or viruses. Improper food or drink handling, production, or storage usually give rise to food contamination (Protus, 2014). Consequently, physical hazards, poisonous chemicals, or pathogenic microbes like bacteria, viruses, parasites, and toxins created by bacteria, algae, molds, or fungi can cause food poisoning. It can happen in four ways; firstly, by ingesting physical objects that can cause food poisoning and may also introduce microbes into foods; secondly, by consuming chemicals that, in most cases, are intentionally or unintentionally present in food or water at a more than average concentration. Thirdly, by consuming food carrying live microorganisms, which penetrate the host's live cells in the gastrointestinal tract, grow and multiply, and in some cases produce toxins in the process. Fourthly, when a considerable amount of toxins in food is consumed because of their presence in the environment or due to unhygienic handling of food, microbial growth and toxin productions occur. These developments are either known as food intoxication or food infection. Food intoxication has to do with consuming the chemicals in the food or already made toxins by a microbe that is still present or is absent in the food (Mackey, 2008).

Food infection can occur only when sufficient and desirable germs to cause it is in the food. Bacterial cells need to multiply to attain the Minimum Infective Dose for food infection to occur. Also, if the microorganisms grow and multiply to arrive at the Minimum Infective Dose (MID), that is the microbial number needed to cause food poisoning illness (USDA FSIS, 2012). The Minimum Infective Dose varies with type and species of pathogens; for example, ten cells for *Shigella* species and most likely *Escherichia coli* O157: H7 while *Staphylococcus aureus* is 100,000 cells. Food poisoning pathogens' virulence factors depend on their ability to withstand the host's immune system and live together with the different harmless gut microflora. And also to face the very acidic nature of the host's stomach before reaching the small intestine where they grow and multiply, to produce disease through food infection (Mackey, 2008). Infection of the host is influenced by the host immunity level, how favorable the microbe can attach and penetrate organs or compartments of a host, and the number of microorganisms a host is orally exposed to (USDA FSIS, 2012).

An estimated 600 million, nearly 1 in 10 individuals worldwide, fail ill after consuming contaminated food, and 420 000 die every year, giving rise to the loss of 33 million healthy life years (DALYs). Unsafe food presents a global health risk, putting everyone at risk. Infants, young children, pregnant women, the elderly, and those with an underlying illness are highly susceptible. Every year 220 million children develop food

poisoning and 96 000 die. Unsafe food produces a vicious cycle of diarrhea and malnutrition, risking the nutritional status of the most susceptible (WHO, 2019).

The risk of food poisoning is most serious in low- and middle-income countries. And it is related to unsafe water, poor hygiene, poor conditions of producing food and storage, lower level of literacy and education, and inadequate food safety legislation or establishment of such legislation. Food poisoning can cause short-term symptoms like nausea, vomiting, and diarrhea. Nevertheless, it can also give rise to longer-term illnesses like cancer, kidney failure or liver damage, brain and neural disorders. After the African region, the World Health Organization South-East Asia Region has the second-highest burden of food poisoning diseases per population. But concerning absolute numbers, more populations living in the Southeast Asia Region fall ill and die from food poisoning diseases every year than in any other World Health Organization Region, with more than 150 million episodes and 175 000 deaths annually (World Health Organization, 2015).

In Malaysia, the primary reason for food poisoning illness is unhygienic food handling approaches or techniques, which support 50% of the cases. For example, the prepared food in advance, wrong ways of cooling food, and low temperature during the reheating of food. These food mishandlings will allow the growth of microbial pathogens because they fail to destroy the pathogens like bacteria or assist in retaining the bacteria in a dormant stage before they reach the conducive temperature for their multiplication (Abdul-Mutalib et al., 2015).

Food poisoning prevention can be by practicing good hygiene as an essential requirement by food handlers. Sanitation (cleaning and sanitizing) re-establish or retains the state of cleanness and consequently raises the level of hygiene to prevent food poisoning. It is also an essential requirement for food safety procedures (Stier, 2020). Avoiding microbial, physical, or chemical contamination of food from an infected food handler or the food handling or production environment should be a necessary practice. Those who manage retail food establishments must ensure that they or other food handlers must be medically certified in personal hygiene and have obtained basic food safety training, particularly those food handlers that directly handle fresh or cooked foods (Mackey, 2008). They should also produce safe food, free from harm to consumers, by demonstrating sanitary food measures and safe food handling (Mackey, 2008).

Illustrating good hygiene means a food-handling environment that is in general lawfully acceptable and free of dirt, with a high level of health hygiene, adequate toilets, handwashing, and facilities for personal clothes changing. Also, there should be continual training on safe food handling. Although good hygiene is just a step for producing safe food in the complex food production chains, food handlers must adopt food hygiene in all stages of a food chain to prevent food poisoning (Mackey, 2008). Application of control measures which include remediation, giving more concern to social and political implications, and monitoring contamination levels, are required to

produce safer food worldwide. Although expensive on a large scale, remediation or correction may focus entirely on lowering contaminants in the environment or their concentrations in foods (Thompson and Darwish, 2019). Even if authorities control the occurrence of chemicals in food production by formulating lower limits that are safe for public consumption, it is still necessary to provide means of restricting chemical food contamination totally (Rather et al., 2017).

The main reasons for performing Knowledge, Attitude, and Practice study are to determine the baseline knowledge, myths, misconceptions, attitudes, beliefs, and behaviors concerning a particular health-related topic; understand, analyze, and report about topics or conditions of interest in the field; give information on requirements, issues, and barriers associated with the forming of effective, locally suitable public health interventions; assess post-intervention changes, and consequently, the effectiveness of intervention programs aimed at correcting and changing health-related knowledge, attitudes, behaviors, and practice (Andrade et al., 2020).

1.2 Statement of the problem

Microbial food safety is persisting as a severe problem worldwide; diarrheal disease agents, particularly non-typhoidal *Salmonella*, are the leading cause affecting countries like Africa, South East Asia, and the Eastern Mediterranean sub-regions. Also, the burden arises from unknown chemical and parasitic contaminants. It seriously impacts public health as it gives rise to morbidity and mortality. Apart from this, it significantly affects a country's socio-economic development (New et al., 2017).

Food poisoning is a public health problem in Malaysia and is among Malaysia's top five communicable diseases. 66.5% of food poisoning outbreaks happened in primary and secondary schools, followed by other educational institutions, like universities, colleges, and training centers. In schools, poor handwashing practices before eating food, and lack of appropriate handwashing facilities, are the key contributing factors to acute diarrhea (Abdullah and Ismail, 2021). Food handlers are the most frequent source of contamination. They can disseminate harmful organisms through the fecal-oral route or their skin lesions. Food contamination is also related to unhygienic kitchen utensils and counters. The principal reasons for school food poisoning outbreaks are the exceedingly extended time between the preparation and serving of food, the storage of cooked food under ambient temperature before serving, and cross-contamination (Abdullah and Ismail, 2021). Also, a study found respondents to have poor attitudes and practices regarding food poisoning in a public tertiary institution in Malaysia (Mohd Yusof et al., 2018; Sayuti et al., 2020).

Another primary contributor to food poisoning is noncompliance with food handling guidelines due to a lack of consumers' awareness about food safety preventive practices. A report shows that many consumers neither wash their hands before and after preparing food nor use an apron. Only an inappreciable percentage of consumers trimmed their fingernails frequently, even though long fingernails promote the transmission of

pathogens into food. In addition, improper food handling practices at home, such as improper cooking procedures, storage, cross-contamination, and temperature abuse, are recognizable factors that promote food poisoning outbreaks (Ruby et al., 2019).

In contrast to the dining areas, higher temperatures in kitchens generate an excellent condition for bacterial multiplication. There is also proof that the surfaces of the everyday kitchen items give conducive breeding grounds for foodborne bacteria. These include the exteriors of cutting boards, wiping cloths, sinks, cleaning sponges, and knives (Abdullah and Ismail, 2021). Food contamination is a problem of grave concern, as a high concentration of chemicals in foods constitutes severe health risks. Protecting populations from the magnitude of the harmfulness of contaminated foods has become a demoralizing task (Rather et al., 2017).

Between 2012 and 2016, Terengganu registered an escalating trend in school food poisoning outbreaks. But the evidence needed to identify nearly all the etiological agents, critical control points, and the food vehicles involved is presently lacking (Abdullah and Ismail, 2021). An assessment showed that consumers of food aged 18-29 have poor food handling practices disregarding their education above the secondary school level in contrast to others. Besides, most food handlers lack proper food safety and hygiene qualification, yet they are getting employment in the food industry. The Knowledge, Attitude, and Practice model recognized that a positive attitude originates from a compact knowledge of safe food handling and will allow individuals to develop safe food consumption practices. But attitude is rather a complicated process to be impactful in practice because of several risk factors that can affect it, such as culture, regulation, tradition, and education. This report has made it necessary to assess scholars' knowledge to resolve their understanding of food poisoning and later remake their behavior (Sayuti et al., 2020).

In some localities in Malaysia, problems occur in reporting food poisoning, like the patient did not seek medical treatment due to economic and health insurance problems (Salleh et al., 2017). In Malaysia, food safety is not regarded as a real problem nowadays. Most Malaysians prioritize more about food taste rather than the safety of the food. And the food is likely to be sold anywhere with neglect of food hygiene. The announced food poisoning cases escalated throughout the years, reflecting the actual food safety situation and simultaneously escalating the food poisoning burden. There is the easy transfer of foodborne pathogens from the soil, feces to hands, and eventually to food. The transfer can continue as long as the microbes adjust and grow when inappropriate food safety handling is practiced (New et al., 2017).

In 2016, Selangor turned out as the state with the highest reported cases of food poisoning, followed by Kedah, Perak, and Kelantan. Regardless of the importance of food, eating food now is no longer safe for consumption. The World Health Organization supports this statement, recognizing food poisoning outbreaks as principal public health risks globally in the twenty-first century. World Health Organization has, in addition, estimated that roughly 30% of populations in industrialized countries experience food

poisoning illness yearly. Individuals can figure this out from a series of recorded and compiled documentation of food poisoning on each continent in the past years. The outcome proves that food poisoning episodes are escalating significantly (Ismail et al., 2018).

From the study provided by Abdullah and Ismail, (2021) and Ismail et al., (2018) there is no doubt that university students in Malaysia are prone to food poisoning. And food poisoning outbreaks occur due to poor knowledge, negative attitude, or poor practice, and data about this health problem are inadequate.

There is no previous study to assess the knowledge, attitude, and preventive practice of food poisoning among postgraduate students in Universiti Putra Malaysia. During the research, all undergraduate students were at home because of the Movement Control Order; therefore, facilities were only available for postgraduate students. Postgraduate students in Malaysia comprise both local students and foreign students. According to the study by Mahmood et al., (2018), educational institutions are partly responsible for food poisoning outbreaks events in Malaysia, sharing 43% of the total. In the economic plan of Malaysia, RMK-9 (Rancangan Malaysia Ke-9), the authority aimed to have 200000 foreign students worldwide. As of the time of their survey, the number of foreign students in Malaysia was 135,502. Coincidently, the adjustment of foreign students about the knowledge of food safety is one of the major problems as their number is on the rise.

1.3 Significance of this study

When financial resources are hard to find, food control problems frequently obtain low public health planning precedence. Some individuals perceive food poisoning as a mild, self-limiting disease, and its economic and health importance is commonly neglected or left unnoticed. The scarcity of knowledge advances to misestimation of the health importance of unsafe foods. From time to time, the allocation of resources to food safety is lacking; consequently, there is an overlooking of food control procedures and food poisoning inspection and surveillance. Since there is no information on food poisoning illness, unsafe foods have more influence on health and the economy. Preventive strategy makers continue to give less concern to food poisoning illness; consequently, the cycle continues (Van de Venter, 2000). In some communities, the perceiving of diarrhea as a disease manifestation is missing and maybe unexpectedly thought about as a normal, natural circumstance. Many consumers may be carriers of food poisoning pathogens, which they may carry to their places of work or carry and travel from one place to another (Van de Venter, 2000).

In many communities, there are traditional fermented foods. Consumers and food handlers may not perceive the intrinsic risks or the inherent factors of these foods in some circumstances. Attention must focus on the significance of educating consumers and communicating knowledge to them about developing food poisoning risks (Van de

Venter, 2000). Furthermore, consumers can effectively control the transmission of pathogens if they prioritize personal hygiene (Ruby et al., 2019).

Foodservice outlets in universities are students' major dining platforms and give rise to a high dependency on food sold on campus. But cases of food poisoning in Malaysia are still happening in universities and colleges because of inappropriate practices among food handlers. The worry emerges when students are exposed to risks of food poisoning illness (Abu Bakar et al., 2021).

The benefit of this study to Universiti Putra Malaysia is that the research findings will provide crucial information on the baseline indicators for the risks of food poisoning among postgraduate students in Malaysia.

1.4 Research justification

i. There is a lack of previous studies to evaluate the knowledge, attitude, and preventive practice of food poisoning among students in Universiti Putra Malaysia. University students are a group of the population that confront many risks because of their unsafe food consumption practice. There were unsatisfactory findings on young adult students regarding knowledge, attitude, and practice because of an incompetent study designed on an acceptably large population size for the age group. As a result, finding ways to deliver better education and lower food poisoning illness is to have an endless understanding of young students' knowledge, attitude, and practice about food safety (Sayuti et al., 2020). Regardless of the attempts taken by the Ministry of Health, Malaysia, for institutions to check the premises and train food handlers to practice safe food handling, food poisoning outbreaks persist in happening. Consequently, we can conclude that education on safe food handling is not only for food handlers, but students and other populations, in general, should be educated on the knowledge of food poisoning. Also, it is paramount to determine the factors associated with knowledge among university students (Ali et al., 2018).

ii. This study will pay particular attention to postgraduate students in Universiti Putra Malaysia, who are either aware or unaware of food poisoning in this institution. It will be possible by using a questionnaire on knowledge, attitude, and preventive practices of food poisoning.

1.5 Research objectives

1. To determine the characteristics of the respondents based on demographic (age, gender, citizens) and socio-economic factors (educational level, monthly income, marital status, employment status); knowledge; attitude; and the preventive practice of food poisoning; awareness of food poisoning outbreak;

source of information of the outbreak; previous history of food poisoning illness; and the cause of the food poisoning illness.

2. To determine the respondents' level of knowledge, attitude, and preventive practice of food poisoning.
3. To determine an association between the respondents' sociodemographic characteristics, awareness of food poisoning outbreak, and previous history of food poisoning illness with knowledge, attitude, and preventive practice of food poisoning.
4. To determine the association of knowledge and attitude with the preventive practice of food poisoning.
5. To determine the predictors influencing knowledge and attitude towards food poisoning.

NB: No significant association was observed between preventive practice with the predictors.

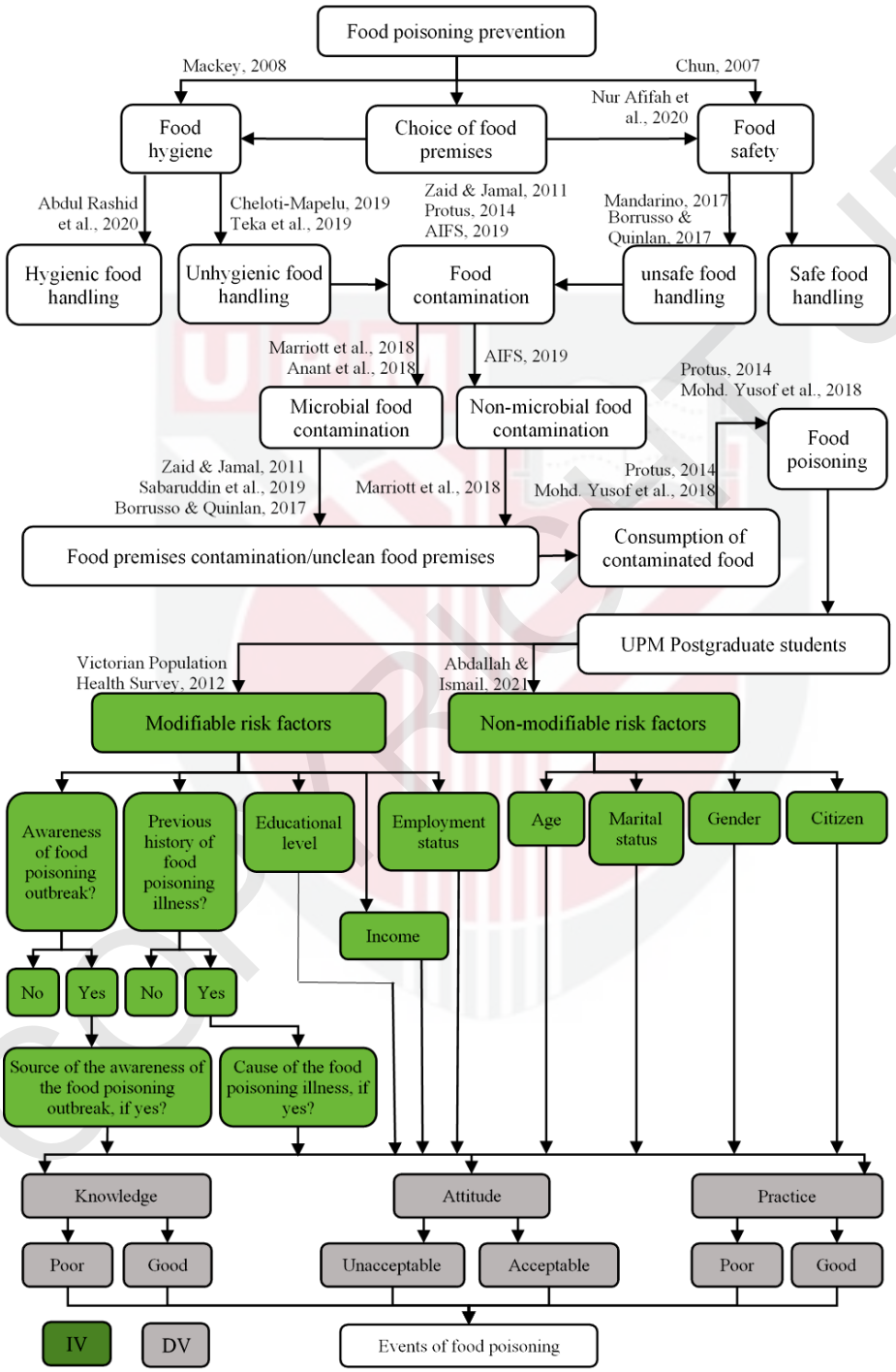
1.6 Research hypotheses

1. There is an association between the respondents' demographic characteristics, socioeconomic characteristics, awareness of food poisoning outbreak, and the previous history of food poisoning illness with knowledge, attitude, and preventive practice of food poisoning.
2. There is an association between knowledge and attitude with the preventive practice of food poisoning.

1.7 Definition of variables

The conceptual and operational definitions of variables are in **Appendix A**.

1.8 Conceptual framework



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