



UNIVERSITI PUTRA MALAYSIA

***KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) TOWARDS THE
CONSUMPTION OF RAW VEGETABLES ASSOCIATED WITH
PARASITIC INFECTION AMONG MEDICAL AND SOCIAL SCIENCE
STUDENTS AT UNIVERSITI PUTRA MALAYSIA***

GROUP 11

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CHAPTER 1

INTRODUCTION

1.1 Background

Fresh vegetables are widely regarded as essential to a healthy diet due to their nutritional value. They are a great source of vitamins, dietary fibre and minerals; and their regular consumption leads to reduced risk of cardiovascular diseases, stroke and certain cancers (Van Duyn & Pivonka, 2000). However, consuming raw vegetables without proper washing or sterilising first has shown to be a common way of parasites contamination (Slifko et al., 2000). In addition, a wide range of fresh vegetables have been implicated in several outbreaks of foodborne illness (Beuchat, 2002). These outbreaks had been increased in developing countries causing significant negative effects such as deaths, decrease in quality of life as well as huge monetary losses (Harapas et al., 2010).

Vegetables are proven to be an important cause in transmission of parasites. Consumption of the contaminated vegetables is one of the risk factors that is involved in parasitic contamination in humans. Previous study revealed that samples of parasites have been found associated with some vegetable-borne outbreaks are protozoa cysts, oocysts, helminth and hookworms' eggs (Erdogrul & Sener, 2005). A study conducted in a suburban market in Vietnam showed that 82 out of 317 vegetables were found to be contaminated with parasites, contamination being the highest in leafy vegetables followed by root vegetables and fruit vegetables (Uga et al., 2009). Another study conducted in Egypt showed that intestinal

parasites were detected in 31.7% of commonly consumed fresh vegetables (Said, 2012). One more study in Iran detected the parasitological contamination of market and farm vegetables to be as high as 38.5% and 48.9%, respectively (Olyaeyi et al., 2012).

In Malaysia, a study found that consuming raw vegetables was a main risk factor for soil-transmitted helminths infection in three Orang Asli tribes. Out of 500 enrolled participants, 285 of the tribesmen were found to be infected with *Trichuriasis* (Anuar et al., 2012). The sociodemographic and poor hygienic status such as indiscriminate defecation and poor sewage disposal as well as using human faeces as fertiliser are the contributing factors of the high prevalence of parasitic diseases among this population. Another study conducted in Vietnam also demonstrated that many vegetables were also found to be contaminated with helminth eggs. They also found that ~80% of the respondents (121 out of 149 villagers) used animal and human faeces as fertiliser (Uga et. al., 2009). The transmission increased when they distributed or exported their vegetables to the other regions and put the other people under the risk.

Vegetables are most commonly contaminated during different periods of production, most notably during harvesting, processing and distribution (Beuchat, 1998). The procedures involved the vegetables are being exposed to contact with multiple surfaces in the factory environment during transportation and to the airflow from dirty evaporators during storage which often contain microbial contamination (World Health Organisation, 2008). There is also an evidence that inadequate treated wastewater used for irrigation is responsible for the increasing rates of parasitic contamination. (Mahvi & Kia, 2006). Other studies suggested that by using night soil as fertiliser and faecal-contaminated water for irrigation increased the risk of parasites contamination on vegetables (Beuchat, 1998).

Other than factors mentioned above, food behaviours are also involved in the transmission of parasitic infections that are associated with raw vegetables consumption (Ramachandran et al., 2018). There is a strong belief that eating raw or undercooked vegetables will protect its nutrients, however without proper practices during preparation and consumption, the risk of infection is still there. Thus, it is suggested on how important it is to have good knowledge, attitude and practices in handling raw vegetables before consumption in a day-to-day routine in order to avoid infection. Therefore, this study aims to determine the knowledge, attitude and practices of raw vegetables consumption which is associated with parasitic infection among students in UPM.

1.2 Problem Statement

An absence of awareness of the issues and its seriousness is an obstacle in the reduction of knowledge, attitude and practice (KAP) of raw vegetables consumption among consumers. Without determining the level of KAP of raw vegetables consumption, it is hard to develop and implement effective public education initiatives and policies. Any strategies to reduce the risk of parasitic infection that is associated with raw vegetables consumption are related to the changes of practice in food safety and behaviours. Medical students particularly are a group of people who have certain knowledge concerning the problems and risk regarding consuming raw vegetables. However, the application of this knowledge may not be well-practised. These habits may not be obeyed although they are having the understanding that raw vegetables consumption is beneficial.

This phenomenon is a concern because as Medical students who are also to be the future doctors, they are advocate to the public to promote healthy eating behaviours. If they

do not have an adequate knowledge and poor practice on raw vegetables consumption, it will be difficult to create awareness on a larger scale. On the other hand, Social Science students who might have limited knowledge regarding parasitic diseases since this subject is not included in their study possibly could influence their KAP in food safety particularly in preventing parasitic diseases that are associated with raw vegetables consumption.

Besides that, having annual physical examination in relation to health status able to determine general health condition. This helps to check for any possible parasitic diseases and ensure that healthy diet or routinely exercise could be maintained. Without annual physical examination, KAP regarding parasitic diseases might not be enhanced and updated.

A copro-molecular study of amoebiasis among the indigenous community in Malaysia was conducted recently and this study demonstrated that the overall prevalence rate of amoebiasis among the rural community was 26.3%, as determined by microscopy examination. This finding indicated that amoebiasis are still prevalent and caused significant public health concern among the rural community (Ngui et al., 2020). Therefore, this study aims to investigate the knowledge, attitude and practice on the consumption of raw vegetables related to the risk of parasitic infections among students in UPM by comparing it between Medical and Social Sciences students.

1.3 Significance of Study

This study will provide the valuable data which are beneficial to improve healthy practices and knowledge of food security in regards to raw vegetables consumption in order to achieve recommended healthy vegetables way of intake among Medical and Social Sciences students. In this study, the respondents come from different fields of study; Medical

and Social Science students of Universiti Putra Malaysia. The purpose of this comparison is to assess the relationship between differences in field of study with KAP level of raw vegetables consumption that is associated with parasitic infection among students. Different fields of study may have different perceptions and knowledge towards healthy food behaviours in which Medical students may have an extra knowledge regarding this issue as they had been exposed in their course programme.

The importance of this assessment especially towards Medical students is because they will work with patients in healthcare settings in the future. Thus, this study aims to thrive Medical students to have an adequate knowledge, attitude and good practice towards vegetables consumption thus they can become a good example for patients and the public. Furthermore, this study is performed in hopes that it can help to create awareness on a larger scale regarding the risks of raw vegetables consumption. Based on prior research, it is anticipated that the basic value of awareness, attitudes and practices on vegetable consumption can be developed for use in future evaluations which will help to quantify the efficacy of health education programs in changing health behaviour.

1.4 Research Question

- i. What are the sociodemographic factors that can influence the knowledge, attitude and practice (KAP) levels on the consumption of raw vegetables that are associated with parasitic infection among Medical and Social Science students at UPM?
- ii. What is the level of knowledge, attitude and practice (KAP) among Medical and Social Science students at UPM regarding the consumption of raw vegetables that are associated with parasitic infection?

- iii. What is the association between risk/contributing factors (history of parasitic diseases, receiving health education, having annual physical examination) and the knowledge, attitude and practice (KAP) on consumption of raw vegetables that are associated with parasitic infection?

1.5 Study Objective

1.5.1 General Objective

To investigate the knowledge, attitude and practice on the consumption of raw vegetables that are associated with parasitic infection among Medical and Social Science students at UPM.

1.5.2 Specific Objective

- i. To determine the sociodemographic factors (age, gender, ethnicity, year of study, field of study, geographic area, and family incomes) that can influence the knowledge, attitude and practice level on the consumption of raw vegetables associated with parasitic infection among Medical and Social Science student at UPM.
- ii. To identify the knowledge, attitude and practice among Medical and Social Science students at UPM regarding the consumption of raw vegetables that are associated with parasitic infection.
- iii. To identify the association between risk or contributing factors (history of parasitic diseases, frequency of raw vegetables consumption, receiving health education,

having annual physical examination) and the knowledge, attitude and practice on consumption of raw vegetables associated with parasitic infection.

1.6 Hypothesis

1.6.1 Alternative hypothesis

1. The knowledge, attitude and practice on raw vegetables consumption is good among Medical and Social Science students at UPM.
2. There are an association between sociodemographic factors with the level of KAP among Medical and Social Science students at UPM.
3. There are an association between other contributing factors with the level of KAP among Medical and Social Science students at UPM.

CHAPTER 2

LITERATURE REVIEWS

2.1 Definition of Raw Vegetables Consumption

"You are what you eat" is a very well-known aphorism that is extremely supported by the facts that connects healthy diets to obtain maximum health and wellbeing (Rooney et al., 2013; Robberecht et al., 2017). High fruit and vegetable intake (FVI) is an important element of the relationship between nutrition and health (Lampe, 1999; Trichopoulou et al., 2003). Fruits and vegetables incorporate a wide range of micronutrients which are crucial for our physical and mental to function normally (Kaplan et al., 2007). Antioxidants such as ascorbic acid (Vitamin C) and beta carotene are believed to play a significant role in defending the body towards oxidative stress, which is involved in the development and remission of neurological disorders, chronic inflammatory disease, coronary artery disease, cancer, and some forms of mental illness (Byers & Perry, 1992; Irshad & Chaudhuri, 2002; Raison & Miller, 2011).

Some vegetables are eaten raw which mean the vegetables are eaten uncooked, have not yet been cooked, or that have not been cooked enough as salad to retain the natural taste and preserve heat labile nutrients (Slavin & Lloid, 2012). As reported by Akoachere et al. (2018), 55 percent of the vitamin C are losing in vegetables when cooking, compared with when eating them raw. Therefore, some consumers are preferred to consume raw or undercooked vegetables to retain a greater amount of nutrients. Consumption of raw

vegetables was a significant route of transmission of numerous infectious diseases due to their complex surface area and porosity, which dismally impedes pathogen adhesion and ability to survive (Kniel et al., 2002). The consumption of raw vegetables without adequate rinsing is an essential pathway throughout the transmission of parasitic infections (Slifko et al., 2000). The number of reported cases of food-borne illness associated with fresh vegetables has shown an increment (Institute of Medicine (US) & National Research Council (US) Committee, 1998). Many factors could lead to crop contamination. The vegetables may become contaminated while still in the plant in the fields, orchards, or during foraging, transport, processing, distribution and marketing, or even at home (Mahvi & Kia, 2006). These issues highlight the importance of having adequate knowledge, attitude and practices of raw vegetables consumption are necessary in order to decrease the transmission of parasitic diseases.

2.2 Definition of Parasitic Infection

Parasitism may very well be defined as a condition which a single organism (a parasite) either endangers to its host or, in certain way, lives at the cost of the host (Cummings & Turcos, 2009). The authors further added that parasites infections affect a large number of people around the world and cause immense suffering and death, especially in low income countries. A group of people who are mostly affected by the parasitic infections are those who suffer from poverty, that is, the population that having to live and being in direct contact with areas with poor sanitation, contagious vectors, farm animals and livestock (WHO, 2017). Malaria, leishmaniasis, trypanosomiasis, schistosomiasis, echinococcosis, onchocerciasis, taeniasis/cysticercosis, and lymphatic filariasis are some of the parasitic infections that kill thousands of people every year (Isah et al., 2016; WHO, 2017).

Parasites can be grouped into three which are protozoa, helminths and ectoparasites. However, only protozoa and helminths are involved in the parasitic diseases that can be transmitted through food consumption. Protozoa is the unicellular microorganism that can be divided into two; free living and parasites that can infect human. In human, it can be found in lumen, for examples; gastrointestinal and urogenital. Some of the protozoa are pathogenic that can cause damage to the host and some of them are commensal which didn't cause any damage to the host. Human can get infected by accidentally eating or drinking contaminated food or water that contains the infective stage (cyst) of the protozoa. In host, ingested cyst will be developed into trophozoites in GIT. These trophozoites will cause injury to the mucosal cell and lead to the disease in the host. Infected individuals are usually presented with diarrhoea and abdominal pain. These trophozoites will be divided into cyst which will pass in the faeces and later will contaminate the environment. The most prevalent intestinal protozoan parasites are: *Giardia intestinalis*, *Entamoeba histolytica*, *Cyclospora cayetanensis*, and *Cryptosporidium* spp. Diseases caused by these intestinal protozoan parasites are identified as giardiasis, amoebiasis, cyclosporiasis and cryptosporidiosis, which are correlated with diarrhoea (Davis et al., 2002).

Helminths is the parasitic worm that feeds on a living host to gain nourishment and protection, while causing poor nutrient absorption, weakness and disease in the host. Nematodes (roundworms), cestodes (tapeworms) and trematodes (flatworms) are some of the most frequent helminths in the human intestine. There are four species of intestinal helminthic parasites, also recognized as geo-helminths and helminths transmitted by soil: *Ascaris lumbricoides* (roundworm), *Trichuris trichiura* (whipworm), *Ancylostoma duodenale*, and *Necator americanus* (hookworms) (Haque, 2007). These infections are most common in tropical and subtropical parts of the developing world where safe water and sanitation equipment are inadequate (Savioli & Albonico, 2004). *Strongyloides stercoralis* is an

intestinal helminth with distinctive features. The parasite needs distinct diagnostic methods than other soil-transmitted helminths, and this is why it is frequently unidentified. Additionally, the parasite is not sensitive to albendazole or mebendazole and thus not affected by large-scale preventive treatment campaigns targeting other soil-transmitted helminths (Haque, 2007). Generalised parasitic nematode life cycle featuring invariable pattern of development of pre-infective to infective larvae outside the host and development to reproductive adults and their breed in the host (Lok & Unnasch, 2013). Idris et al., (2019) stated that helminths form three main life-cycle stages which are eggs, larvae and adults which adult worms infect definitive hosts whereas larval stages may be free-living or parasitise invertebrate vectors, intermediate or paratenic hosts.

Helminths are transmitted to humans in five major ways which are direct method, modified direct, skin penetration, bite and food-borne helminths (Idris et al., 2019). The authors explained, direct method involved direct contact of the host with eggs of the helminthes that are excreted through feces and hatches into larvae, while modified direct is when eggs of the helminths are passed in feces of the host during open defecation to the soil and go through developmental stages. The authors further added, infective larvae in the soil or free water can invade the skin of a susceptible host and get into the blood circulation for skin penetration transmission. The authors also emphasized that bite from infected insect vectors and poor uncooked or contaminated water with parasitic infection consumption are two of the modes of helminth transmission.

2.3 Prevalence of food-borne parasitic diseases

A comprehensive study on the detection of parasites in commonly consumed raw vegetables was conducted in Alexandria, Egypt. In this study, five types of green vegetables were selected; lettuce (*Lactuca sativa*), rocket (*Eruca sativa*), parsley (*Petroselinum hortense*), leek (*Allium porrum*) and green onion (*Allium ascalonicum*). These samples were selected randomly from commercial grocery stores, supermarkets, small shops, and hawker stall markets. Modified Zeihl-Neelsen and modified trichrome staining were used to identify the parasites and results found that 31.7% of the samples collected were positive with intestinal parasites that constituted with *Ascaris lumbricoides* eggs, *Toxocara* spp. eggs, *Hymenolepis nana* eggs, *Giardia* spp. cysts, *Cryptosporidium* spp. oocysts, *Cyclospora* spp. oocysts and *Microsporidia* spp. spores (Said, 2012).

Meanwhile, a study in Malaysia reported that vegetables collected from Pasar Tani Kuantan, Pahang were positive with intestinal parasites on pegaga (*Centella asiatica*), kangkung (*Ipomoea aquatica*), daun kesum (*Persicaria odorata*), belimbing (*Averrhoa carambola*), jambu air (*Syzygium samarangense*) and jambu batu (*Psidium guajava*). *Strongyloides* larvae, cyst of *Entamoeba* spp., cyst of *Blastocystis* spp. and unidentified flukes were found on the samples collected during the dry season (Yusuf et al., 2017). An extensive study done in Obudu town, Nigeria recorded that a high prevalence of hookworm infection (32%) among school children was associated with the consumption of fruit without prior washing. Parasitology assessment revealed that samples that collected from the stall nearby the school; *Cucumis sativus* (36.9%), and four vegetables *Brassica oleracea* (46.0%), *Telfairia occidentalis* (38.0%), *Latuca sp* (34.0%), and *Veronia amygdalina* (32.0%) were positive with hookworm eggs.

In the latest outbreak information, 690 people from 13 states in United States had been confirmed to be infected by *Cyclospora spp.* due to eating bagged salad mix before getting sick. It is likely that bagged salad mix containing iceberg lettuce, carrots, and red cabbage produced by Fresh Express is the cause of infection according to the epidemiologic and traceback evidence (Centre for Disease Control & Prevention, 2020)

2.4 Knowledge, Attitude and Practice on Consumption of Raw Vegetables

Previous research on the knowledge, attitude and practice of raw vegetables consumption reported that consumers in developing countries had a good level of practices regarding the importance of washing vegetables before consumption. A study conducted by Yusof et al. (2018) that targeted dietetic students and food handlers in a public university reported that 88.7% and 90.6% of the respondents, respectively, have understanding in the importance of washing vegetables before consumption.

A research on food safety that conducted in Africa and Asia demonstrated that 78% of the respondents washed their vegetables before eating (Olumide et al., 2019). Another research on food safety conducted in Kuwait showed that 95% of the respondents washed their vegetables under running water before consumption (Al-Kandari et al., 2019). Besides that, a study which assessed 646 food handlers from different nationalities including Indian, Filipino, and Arabs working in 88 restaurants, cafeterias or coffee shops located in Dubai and Sharjah identified a cross-contamination of parasite larvae between raw meat and vegetables showed 61% of them practice washing their knives when changing from cutting meat to vegetables (Sadi et. al., 2020).

Meanwhile, the study conducted in Kuwait showed that 67.5% out of the 402 respondents had an overall good knowledge on avoiding cross-contamination (Al-Kandari, et

al., 2019). A study done in Taif university in Saudi Arabia showed students have high knowledge as an average of more than 90% of 1020 students answered correctly and showed awareness that unwashed raw vegetables could cause parasite infection. 90% of the students also practice thoroughly washing their vegetables before consumption (Sharif & Al-Malki, 2010).

There are many studies conducted on the KAP of food-borne diseases. Unfortunately, only few studies focussed on KAP of raw vegetables consumption associated with parasitic diseases. Food-borne parasitic diseases are not only can be prevented by washing food prior consumption. There are few practices that need to be conducted in order to reduce the risk. Therefore, it is very important to assess the awareness, knowledge and practices among the consumers and the investigation on the associated risk factors also has to take into consideration.

2.5 Contributing factors of Knowledge, Attitude and Practice

2.5.1 Sociodemographic Factors

According to Gesis (2011), sociodemographic factors include age, sex, education, migration background, ethnicity, religious affiliation, marital status, household, employment and income. Different index variables are formed on the basis of sociodemographic variables. They include socioeconomic status which combines information on education and income. Sociodemographic details are often used to describe realised samples and to determine sampling error. The contributions devoted to sociodemographic factors provide an overview of available survey instruments or address the measurement of individual sociodemographic factors.

a. Gender

In a study of speculating gender differences in fondness for vegetables and predilection for a diversity of vegetables among 11-year old children in Finland, the outcome on gender difference in fondness for vegetables appeared that there were no gender differences in fondness for vegetables at first but fondness reduced further among boys than among girls between the first and the follow-up, resulting in girls' larger fondness for vegetables at the follow-up stage. Predilection for a diversity of vegetables were identical among girls and boys at first but during the one year between first and follow-up, girls had raised their predilection while boys had not, resulting in a larger predilection for a diversity of vegetables among girls than among boys. At first, boys also appeared further distinguished hurdles to eating vegetables and lesser vegetable ingestion than did girls (Lehto et al., 2015).

In another study in which vegetable ingestion among older adult Canadians was measured, it was shown that sufficient ingestion was greater among women (43.4%) than men (34.9%) (Rugel & Carpiano, 2015). These studies suggested that girl and women are more likely eat raw vegetables, therefore they might be involved in the contributing factors of knowledge, attitude and practice on the raw vegetables consumption associated with parasitic disease (Sang & Hoerr, 2005).

b. Age

A study on the correlation of sociodemographic factors and the attitude and practice of raw vegetables consumption was conducted by Kähkönen et al., (2020). The outcome of the study revealed that there was a relationship between age and the practice of raw vegetables consumption. Over 70% of the children consumed raw vegetables and at least 5–7 times/week

whereas only 19% of the children consumed berries and a few children (2%) consumed raw vegetables once a week or less. On average, mothers consumed the rawest vegetables and berries and significantly more than fathers, as well as more than the children. Between the parents, mother's consumption frequencies were significantly higher than father's in all four groups.

This result was supported by other studies that have confirmed mothers ate a mean of 2.92 portions of vegetables per day while children ate a mean of 2.41 portions per day. Nevertheless, it should be distinguished that there was a great degree of difference in ingestion with 9.8% of mothers consuming less than one portion of vegetables a day and 13.1% of mothers consuming five or more portions a day. Likewise, 18.8% of children were consuming less than one portion of vegetables a day while 5.3% of children were consuming five or more portions a day (Holley et al., 2018).

A study conducted to understand the status of knowledge, attitude, practice (KAP) on food-borne parasitic diseases of college students from 17 to 23 years' age group by She et al., (2015). The awareness rates of the students with ages (in Jiangsu Province) were significantly different (all $P < 0.01$). Another study also reported that the awareness rate of parasitic diseases in the students of senior Grade One was higher than that of Grade Two ($\chi^2 = 7.037, P < 0.05$). The formation rates of behaviours of refusing of raw food, refusing of unboiled water and dining at home or school in the students of senior Grade One were higher than those of Grade Two ($\chi^2 = 6.970, 12.749$ and 12.921 respectively, and all $P < 0.05$) (Gao & Liu, 2017).

c. Ethnicity

There was a study conducted among three Orang Asli ethnic groups in Malaysia explaining that the ethnic difference carries a small significant factor related to the raw

vegetables consumption. The Proto-Malays ethnic eat the least raw vegetables (OR=1.28; 95% CI=0.70, 2.34; $P=0.365$) compared with Negritos ethnic (OR=3.88; 95% CI=1.02, 10.10; $P=0.026$) (Anuar et al., 2012). In reference to ethnicity, it is interesting to note that a study in the Korean, Manchu, Mongol and Han ethnic groups in eastern and northeastern China identified that ethnicity has significance in contributing to raw vegetables consumption. For the Han group, bivariate analysis appeared that they had the highest ingestion of raw vegetables (OR 1.654, 95% CI 1.083–2.528) followed Mongol group (OR 0.767, 95% CI 0.398–1.479) and Manchu group (OR 0.631, 95% CI 0.328–1.214) (Zhang et al., 2016).

2.5.2 Other Contributing Factors

A KAP study related to parasitic infection among population in Khuzestan Province, Iran was conducted. In total, 3500 participants above 15 years old from the different districts of the county enrolled in the study. The number of participants from each district was selected according to its population. This study indicated that 50.2%, 48.9% and 41.5% were aware of the possible transmission of parasitic diseases through uncooked meat, dirty hands and close contact with animals respectively. Thus, it can be concluded that one of the reasons for the decreasing occurrence of parasitic diseases in the province in recent years is the increasing knowledge and awareness of people on the transmission pathways of these diseases (Baghlaninezhad et al., 2019).

Sithole et al., (2020) stated that consumers (54.2%: 189/349) agreed that pork infected with *T. solium* cysts could be harmful. Although 69.5% (234/352) trusted pork bought from butcherries, only 52.2% (187/358) were aware that butcherries must present a registration certificate in order to operate. This coincides with the fact that very few (<10%) were aware

of the legal requirements in terms of disease control, slaughter and food preparation. Most consumers (88.7%: 268/302) kept pork in the fridge and only 11.3% (34/302) kept it in a freezer ($p = 0.02$). Practices related to cooking have the potential to promote the transmission of human taeniasis and the fact that most respondents preferred stewed pork could be a positive sign as the cysts are destroyed during the cooking process.

2.6 Conceptual Framework

Independent variables

Sociodemographic factors:

1. Age
2. Gender
3. Ethnicity
4. Field of Study
5. Year of Study
6. Geographical Area
7. Family Income

Associated with

Dependent variable

Knowledge, Attitude & Practice of Raw Vegetables Consumption Associated with Parasitic Infection

Contributing factors:

1. Health Education
2. Frequency of Raw Vegetables Consumption
3. Annual Physical Examination
4. History of Parasitic Disease

CHAPTER 3

METHODOLOGY

3.1 Study Location

This study was conducted at the Faculty of Medicine and Health Sciences for Medical respondents. Meanwhile for Social Science respondents, the study was carried out at Faculty of Human Ecology, Faculty of Modern Language and Communication, Faculty of Educational Studies and Faculty of Economics and Management, Universiti Putra Malaysia in Serdang.

3.2 Study Design

The study design used was a cross-sectional questionnaire survey study.

3.3 Study Duration

The study was conducted from July to August 2020.

3.4 Sampling

3.4.1 Study Population

The study population consisted of Year 1 to Year 3 of Medical and Year 1 to Year 4 of Social Science students of UPM who are registered in the academic Year 2019/2020. A Bachelor of Medical Sciences is an undergraduate academic degree involving study of a variety of disciplines related to human health leading to an in depth understanding of human biology

and associated research skills such as study design, statistics and laboratory techniques while Social science is the branch of science devoted to the study of societies and the relationships among individuals within those societies.

Sampling Population

a) Inclusion Criteria

Year 1, Year 2 and Year 3 of Medical and Year 1, Year 2, Year 3 and Year 4 of Social Science students in UPM.

b) Exclusion Criteria

1. Medical and Social Science students who are on long leave.
2. Medical and Social Science students who are acutely unwell.
3. Medical and Social Science students who do not take vegetables.
4. Medical students' Year 4 and 5.

3.4.2 Sampling Frame

List of names of all Medical and Social Science undergraduates obtained from the Academic Unit, Faculty of Medicine and Health Sciences, Faculty of Human Ecology, Faculty of Modern Language and Communication, Faculty of Educational Studies and Faculty of Economics and Management, Universiti Putra Malaysia.

3.4.3 Sampling Unit

Medical students of Faculty of Medicine and Health Sciences, and Science of Human Development students of Faculty of Human Ecology, Faculty of Modern Language and Communication, Faculty of Educational Studies and Faculty of Economics and Management, Universiti Putra Malaysia.

3.4.4 Sample size estimation

Objective	Formula	n
1. To determine the sociodemographic factors (age, gender, ethnicity, year of study, field of study, geographic area, family incomes) that can influence the knowledge, attitude and practice level on the consumption of raw vegetables associated with parasitic infection among medical and social science student at UPM. 2. To identify the knowledge, attitude and practice among medical and social science students at UPM regarding the consumption of raw vegetables that are associated with parasitic infection.	Using one sample formula (Lwanga & Lameshow 1991): $n = \frac{Z^2_{1-\alpha/2} P(1-P)}{d^2}$ n = sample size Z = Z value (e.g. 1.96 for 95% confidence level) P = percentage picking a choice, expressed as decimal / prevalence d = precision Where n is the sample size of the study, z is the statistic for a level of confidence (95% standard value is 1.96), p is anticipated value from a previous research, and d is the acceptable margin of error for proportion which is 5% = 0.05.	The reference prevalence is 62.6% of good knowledge from healthy subjects by Oyebamiji et al., (2018). For the increasing the sample size, 10% non-respond rate will be included. n= 396
3. To identify the association between risk or contributing factors and the knowledge, attitude and practice on consumption of raw vegetables associated with parasitic infection.	Using Fleiss (1981) formula: $N = \left[\frac{Z\alpha \sqrt{(2\mu c(1-\mu c) - Z\beta \sqrt{(\mu T(1-\mu T) + \mu c(1-\mu c))}}}{\mu T - \mu c} \right]^2$ If $1 - \alpha$ is 0.95 then $Z\alpha$ is 1.960 If $1 - \beta$ is 0.80 then $Z\beta$ is -0.842 N = sample size μT = Proportion of exposed with outcome μc = Proportion of unexposed with outcome	The reference prevalence is 9.8% exposed and 21.5% unexposed with the outcome from Oyebamiji et al., (2018). For the increasing the sample size, 10% non-respond rate will be included. n= 197

3.4.5 Sampling Technique

The simple random sampling technique was used in this study. All Year 1, Year 2 and Year 3 of Medical and Year 1, Year 2, Year 3 and Year 4 of Social Science students of Universiti Putra Malaysia were listed (n=396). The students divided equally, and ID number were given. The random ID number were selected. According to the sample size estimation, 66 students were selected from each year of study.

3.5 Data Collection

3.5.1 Study Instrument

Data was collected through a set of questionnaires prepared in a Google form that had been disseminated to the respondents. This method was chosen due to the convenience of answering online as concerning the current situation of COVID-19. The knowledge and attitudes questionnaire were modified from the study by Baghlaninezhad et al. (2019) in order to meet the objectives of this research. For practice questions, validated questionnaire was used by following Baghlaninezhad et al. (2019). Initially, the questionnaire had been pre-tested and validated by a panel of experts in the parasitological and public health fields. The questionnaire was divided into four parts, which consists of:-

- i. Sociodemographic profiles (9 questions)
- ii. Knowledge on raw vegetables consumption and parasitic infection (10 questions)
- iii. Attitude on raw vegetables consumption (13 questions)
- iv. Practice on parasitic infection prevention (9 questions)

The sociodemographic part was asked the respondents about their age, gender, ethnicity, year and field of study, geographical area, family income history of parasitic

disease and if the respondent goes for annual physical examination. For the knowledge part, the respondents had to answer either yes, no or unsure to questions that asked about awareness, which agents can be transmitted through vegetables, common symptoms and complications of parasitic diseases, general knowledge of cross-contamination and most common contaminated vegetables, risk of parasitic infection through vegetables in Malaysia, prevention and information gathering.

The attitude part used Likert scale, where the value of each selected option was summed up to create a score for each respondent. The questions that used reverse scoring were questions 1, 2, 3, 5, 6, 7, 8, 12 and 13. The practice part also used Likert scale and was scored similarly. However, there is no reverse scoring used in this part. The questionnaire was in dual languages (Bahasa Melayu and English) and the average duration to complete the online questionnaire was about 10 to 15 minutes.

3.5.2 Data Collection Technique

The participants were asked to fill in the consent form prior answering an online questionnaire that will be distributed through email. In total, there were 396 respondents. The research objectives were explained to the participants before they begin answering. Once completed, they submitted it via online. In this study, we evaluated the difference on the level of knowledge, attitude and practice (KAP) of raw vegetable consumption that were associated with parasitic infections between Medical and Social Science students, and to observe an association between the sociodemographic factors and the knowledge, attitude and practice (KAP) of raw vegetables consumption that were associated with parasitic infection.

3.6 Validity & Reliability

Pilot study was done on 30 students who were from Science of Architecture, Biomedical Science and Doctor of Medicine courses. Statistical Package for the Social Sciences (SPSS) version-25 (SPSS Inc., Chicago, IL, USA) was used to analyse validity and reliability of the questionnaires using the Cronbach's Alpha value. Minimum acceptable value of Cronbach's Alpha is 0.7. Table 3.1 shows reliability assessment on knowledge. The Cronbach's Alpha value is 0.747 which is acceptable. The items in knowledge questionnaire are related to each other. Table 3.2 shows reliability assessment on attitude. The Cronbach's Alpha value is 0.734 which is acceptable. The items in attitude questionnaire are related to each other.

Table 3.1 Knowledge Reliability Assessment

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.747	.746	6

Table 3.2 Attitude Reliability Assessment

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.734	.721	13

3.7 Data Analysis

Statistical Package for the Social Sciences (SPSS) version-25 (SPSS Inc., Chicago, IL, USA) was used to analyse the data. The sociodemographic factors were analysed by descriptive statistics using frequency, mean, median and interquartile range. The association between two categorical variables which are KAP and sociodemographic characteristics were analysed using the Chi-square test. The significance level was considered at $P < 0.05$. Normally distributed continuous data were presented by mean and standard deviation, while abnormally distributed continuous data presented by median and interquartile range.

3.8 Study Ethics

The ethical clearance from Ethics Committee for Study involving Human subjects of Universiti Putra Malaysia (JKEUPM) was obtained with the reference number (JKEUPM-2020-220).

3.9 Variables

3.9.1 Dependent Variable

The dependent variable were the knowledge, attitude and practice of consumption of raw vegetables related to risk of parasitic infection of Medical and Social Science students of Universiti Putra Malaysia.

3.9.2 Independent Variable

The independent variables were sociodemographic factors (age, gender, ethnicity, year of study, field of study, geographic area, family incomes) and contributing risk factors (history of parasitic diseases, frequency of raw vegetables consumption, received health education,

had annual physical examination) of the Medical and Social Science students of Universiti Putra Malaysia.

3.10 Expected Outcome

The knowledge, attitude and practice regarding consumption of raw vegetables related to risk of parasitic infection among Medical and Social Science students of Universiti Putra Malaysia were determined. Apart from that, the sociodemographic factors of the students as well as their risk or contributing factors also were identified during this study.

3.11 Operational Definition

Terms	Definition
Age	It is determined by the respondents' date of birth
Gender	It is defined by being born as male or female
Ethnicity	It is defined as being Malay, Chinese, Indian and Others
Year of Study	Respondents' year in the Medicine or Science of Human Development Programme during the study
Knowledge on consumption of raw vegetables related to risk of parasitic infection	The knowledge score is assessed using the modification of self-administered Baghlaninezhad et al., (2019) questionnaire
Attitude on consumption of raw vegetables related to risk of parasitic infection	The attitude regarding consumption of raw vegetables related to risk of parasitic infection is assessed using the modification of self-administered Baghlaninezhad et al., (2019) questionnaire
Practice on consumption of raw vegetables related to risk of parasitic infection	The practice of consumption of raw vegetables related to risk of parasitic infection is assessed using the validated of self-administered Baghlaninezhad et al., (2019) questionnaire

3.12 Limitations

This study only focuses on the Medical and Social Science students of Universiti Putra Malaysia, hence the validity of this study was limited to those populations only. Moreover, the causal relationship could not be determined by the design of this study which was a cross-sectional study.



CHAPTER 4

DATA ANALYSIS

4.1 Response Rate

Table 4.1 shows the response rate of this study. 189 out of 227 respondents (63% response rate) which were among medical students (n=198), only 38 out of 198 students of Social Science were involved (19% response rate) to assess their knowledge, attitude and practice on raw vegetables consumption associated with parasitic infection.

Table 4.1 Calculation of Response Rate

Elements	Doctor of Medicine	Social Science
Original sample size		
Number of students approached	300	200
Number of targeted respondents	396	
Respondents		
Number of students who consented to answer	189	38
Response Rate	$\frac{\text{Number of completed questionnaires} \times 100}{\text{Number of eligible unit}}$	
	$= \frac{189 \times 100}{300}$	$= \frac{38 \times 100}{200}$
	= 63%	=19%

4.2 Normality Test

Table 4.2 shows the results for the normality for a variable. The assumption of normality was analysed statistically to decide on parametric and non-parametric test. Kolmogrov-Smirnov, skewness and kurtosis were used to determine the normality. Variables were not normally distributed if the p-value of Kolmogrov-Smirnov was less than 0.001 ($p < 0.001$). The p-value of Kolmogrov-Smirnov test for family income was less than 0.001. Hence, the continuous variable was not normally distributed.

Table 4.2 Normality assumptions of continuous variables

Variable	Kolmogorov		Skewness	Kurtosis
	Statistic	P value		
Family income	0.226	<0.001	0.128	-1.647

4.3 Socio-demographic characteristics

4.3.1 Socio-demographics of Respondents

Table 4.3 shows the distribution of respondents characterized by the socio-demographics of the respondents. This study consisted of respondents from Doctor of Medicine students which contributed to 189 out of 227 respondents (83.3%) and 38 (16.7%) from Social Science student. This study was also consisted of respondents aged 18-26 years old, with the age group 21 to 23 having the highest frequency, which was as many as 151 respondents. Majority of the respondents were female, which contributed to 160 out of 227 (70.5%), while male 67 (29.5%). Most of the respondents were Malay race (n= 131, 57.7%), followed by the Chinese population (n=49, 21.6%), then the Indian (n=39, 17.2%) and others (n= 8, 3.5%). The highest respondents were from Year 2 (n=98, 43.2%) followed by Year 1 (n=65, 38.9%), Year 3 57 (n=57, 25.1%), Year 4 (n=7, 3.1%). About 75.8% respondents were from urban area while only 24.2% were living in rural area. Majority of the respondents had family income between <RM4000 which contributed to 92 out of 227 respondents (40.5%), followed by >RM8000 (n=77, 33.9%), and finally RM4000-RM8000 (n=58, 25.6%).

4.3.2 Contributing Risks of Respondents

Table 4.4 shows the distribution of respondents characterized by the contributing risks of the respondents. Majority of the respondents (n=211, 93%) claimed not having any history parasitic infection while only 16 (7%) respondents had history of parasitic infection. Majority

of the respondents consumed raw vegetables in not every meal which contributed to 175 out of 227 respondents (77.1%), followed by never consumed raw vegetables in 32 respondents (14.1%) and 20 (8.8%) of respondents consumed raw vegetables in every meal. 157 out of 227 respondents (69.2%) rarely did physical examination and 22 (9.7%) of the respondents had never did physical examination. About 42 (18.5%) of the respondents did their medical examination annually, and 6 (2.6%) monthly.

Table 4.3 Socio-demographics characteristics of the respondents

Variables	Number of respondent(n)	Percentage (%)
Age		
18 - 20	68	30.0
21 - 23	151	66.5
24 - 26	8	3.5
Gender		
Male	67	29.5
Female	160	70.5
Ethnicity		
Malay	131	57.7
Chinese	49	21.6
Indian	39	17.2
Others	8	3.5
Year of Study		
Year 1	65	28.6
Year 2	98	43.2
Year 3	57	25.1
Year 4	7	3.1
Field of Study		
Doctor of Medicine	189	83.3
Social Science	38	16.7
Geographical area of home		
Urban	172	75.8
Rural	55	24.2
Family Income		
<RM4000	92	40.5
RM4000-RM8000	58	25.6
>RM8000	77	33.9

Table 4.4 Contributing Risks of Respondents

Variables	Number of Respondent(n)	Percentage (%)
History of Parasitic Infection		
Had a history of parasitic infection	16	7.0
No history of parasitic Infection	211	93.0
Frequency of Raw Vegetables Consumption		
Every meal	20	8.8
Not every meal	175	77.1
Never	32	14.1
Frequency of Annual Physical Examination		
Annually	42	18.5
Monthly	6	2.6
Rarely	157	69.2
Never	22	9.7

4.4 Knowledge, Attitude and Practice with regards to consumption of Raw Vegetables related to Risk of Parasitic Infection

4.4.1 Knowledge on the consumption of Raw Vegetables related to Risk of Parasitic Infection

Table 4.5 shows the knowledge on consumption of raw vegetables related to risk of parasitic infection among the respondents. Results showed that 96.8% and 76.3% of Medical and Social Science respondents had heard about the foodborne parasitic diseases through eating vegetables, respectively. Majority of the respondents from Medicine (92.1%) knew that soil transmitted helminths and intestinal protozoa can be transmitted through vegetables consumption. However, only half of respondents from Social Science (56.6%) knew about this information. Surprisingly, some of Medical respondents (2.1%) and 13.2% of Social

Table 4.5 Respondents knowledge on consumption of raw vegetables related to risk of parasitic infection

	Frequency (%)	
	Medical Students	Social Science Students
Have you ever heard about the foodborne parasitic diseases?		
Yes	183 (96.8%)	29 (76.3%)
No	5 (2.6%)	4 (10.5%)
Unsure	1 (0.5%)	5 (13.2%)
Have you heard about the risk of getting parasitic infections through eating vegetables?		
Yes	183 (96.8%)	29 (76.3%)
No	5 (2.6%)	4 (10.5%)
Unsure	1 (0.5%)	5 (13.2%)
Do you know which parasites can be transmitted through vegetables consumption?		
Soil transmitted helminths	174 (92.1%)	21 (55.3%)
Intestinal protozoa	107 (56.6%)	21 (55.3%)
Malaria	4 (2.1%)	5 (13.2%)
What are the symptoms of intestinal parasitic diseases?		
Diarrhoea	187 (99.5%)	29 (76.3%)
Vomiting	175 (92.6%)	24 (63.2%)
Abdominal pain	173 (91.5%)	26 (68.4%)
Pallor	99 (52.4%)	5 (13.2%)
Bloody stool	150 (79.4%)	13 (34.2%)
Fever	127 (67.2%)	9 (23.7%)
What are the complications of intestinal parasitic diseases		
Anemia	141 (74.6%)	8 (21.1%)
Weight loss	170 (89.9%)	23 (60.5%)
Growth stunting	114 (60.3%)	8 (21.1%)
Dehydration	149 (78.8%)	20 (52.6%)
Death	90 (47.6%)	15 (39.5%)

Table 4.5 Continued

	Frequency (%)	
	Medical Students	Social Science Students
In your opinion, is there any considerable risk of contracting a parasitic infection from raw vegetable consumption in Malaysia?		
Yes	137 (72.5%)	18 (47.4%)
No	18 (9.5%)	5 (13.2%)
Unsure	34 (18.0%)	15 (39.5%)
How to prevent parasite infection that related to consumption of raw vegetables?		
Make sure the vegetables and fruits are properly washed prior to Eating	188 (99.5%)	34 (89.5%)
Make sure the vegetables are properly cooked	183 (96.8%)	28 (73.7%)
Separate the raw and cooked food	170 (89.9%)	21 (55.3%)
Good personal hygiene	170 (89.9%)	26 (68.4%)
Where do you get information about risk of parasitic diseases through vegetables consumption?		
News	87 (46.0%)	14 (36.8%)
Internet	152 (80.4%)	35 (92.1%)
Pamphlet	40 (21.2%)	8 (21.1%)
Friends	52 (27.5%)	9 (23.7%)
Family	53 (28.0%)	9 (23.7%)
Health Professionals	146 (77.2%)	8 (21.1%)
Do you know parasites can cross-contaminate to vegetables from other sources as the use of manure and irrigation water system in the farm?		
Yes	175 (92.6%)	32 (84.2%)
No	5 (2.6%)	2 (5.3%)
Unsure	9 (4.8%)	4 (10.5%)

Science students mentioned that malaria is one of the etiologic agents. Majority of respondents (more than 89%) reported that making sure the vegetables and fruits are properly washed and making sure the vegetables are properly cooked prior to eating as a preventive way for parasitic infection that related to consumption of raw vegetables. However, more than half of Social Science respondents (~60%) knew that separating the raw and cooked food and good personal hygiene are among of the preventive measures.

Figure 4.1 shows the distribution of total knowledge scores regarding consumption of raw vegetables related to risk of parasitic infection among respondents. The total knowledge score of Medical respondents depicted negative skewness (-0.273) with standard error of 0.177 and positive kurtosis (0.506) with standard error of 0.352. Meanwhile, the total knowledge score of Social Science respondents depicted positive skewness (0.236) with standard error of 0.383 and negative kurtosis (-0.388) with standard error of 0.750. Figure 4.2 indicated that not all the scores were plotted along the straight line.

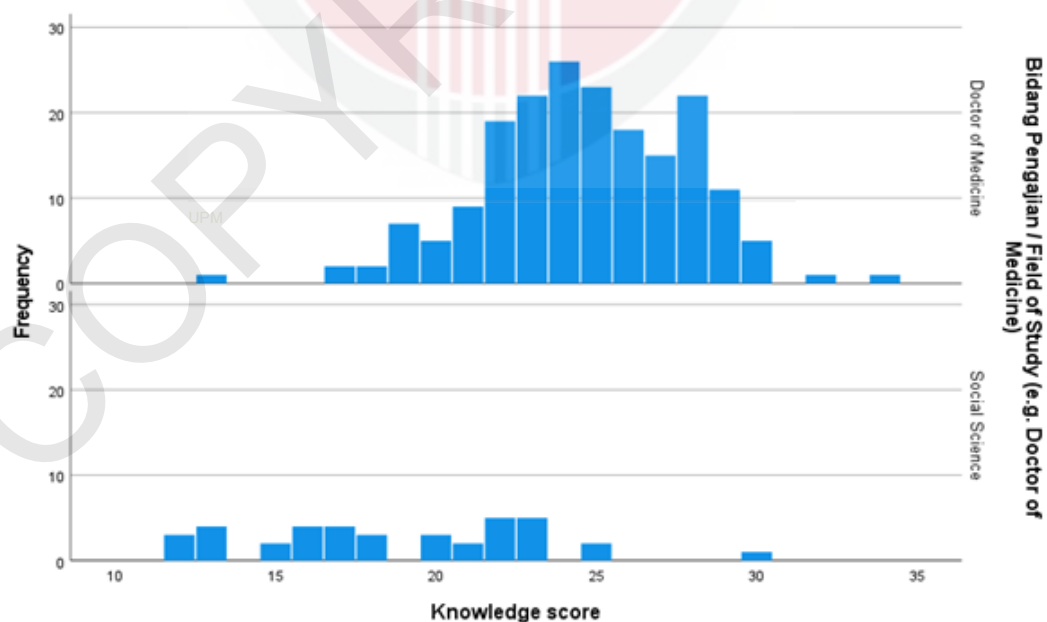


Figure 4.1 Distribution of total knowledge scores regarding consumption of raw vegetables related to risk of parasitic infection among the respondents (Histogram).

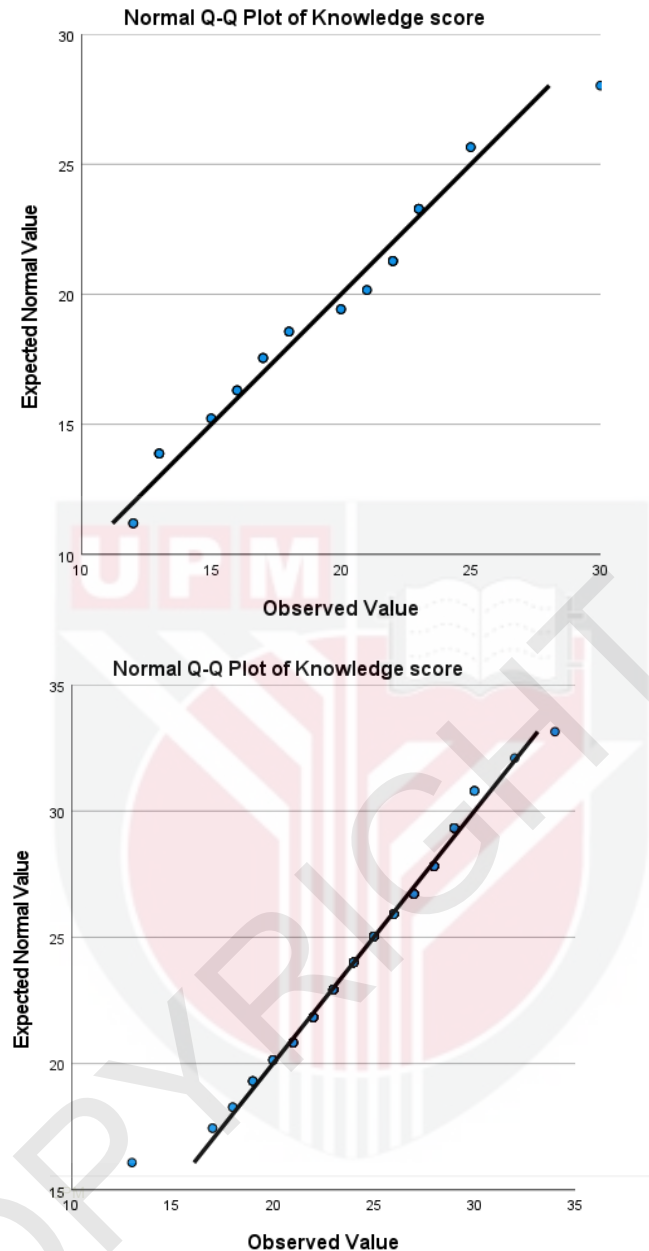


Figure 4.2 Distribution of total knowledge regarding consumption of raw vegetables related to risk of parasitic infection among respondents. (Q-Q plot).

Table 4.6 shows a significant value of Kolmogorov-Smirnov for Medical respondents' total knowledge score is 0.021. Therefore, the p-value was less than 0.05 and we reject the null hypothesis which was assumed that the data was normally distributed. Thus, we can assume that the data was not normally distributed with median score of 25.00. However, the significant value for Social Science students was higher than 0.05 (0.200) and

we accept the null hypothesis and assume the data was normally distributed with median score of 18.

Table 4.6 Test of normality of total knowledge scores regarding consumption of raw vegetables related to risk of parasitic infection among Medical (a) and Social Science (b) respondents

a)

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Knowledge score	.071	189	.021	.982	189	.014

a. Lilliefors Significance Correction

b)

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Knowledge score	.117	38	.200 [*]	.953	38	.109

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Total knowledge score was classified into three categories to determine the percentage of respondents in each category. The maximum knowledge score was 32, the minimum was 0. The respondents got 1 point for each correct answer and 0 score for wrong answer. A mean score of 23.63 and standard deviation of 4.03 were used to classify the subjects into three levels namely good level (more than 27), average level (19 to 27) and poor level (less than 19). Figure 4.3 indicated that 12 (6.4%) of Medical and 20 (52.6%) of Social Science respondents had poor knowledge, 137 (72.5%) of Medical respondents and 17 (44.7%) of Social Science respondents had average knowledge and 40 (21.2%) of Medical respondents and 1 (2.6%) of Social Science respondent had good knowledge regarding consumption of raw vegetables related to risk of parasitic infection.

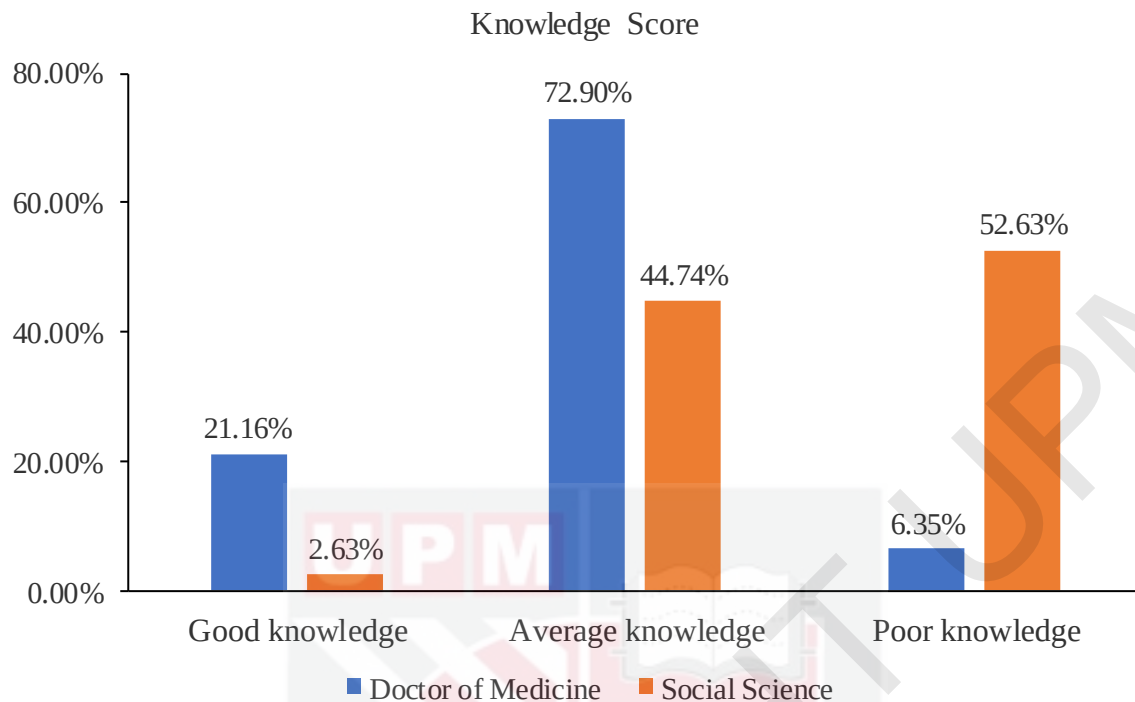


Figure 4.3 Level of knowledge regarding consumption of raw vegetables related to risk of parasitic infection (poor, average, good knowledge) among the respondents.

4.4.2 Attitude towards the Consumption of Raw Vegetables that related to Risk of Parasitic Infection among the respondents

Majority of respondents were neither agree nor disagree with most of the statements. About half of them were agree that they preferred to choose cooked vegetables at the food premise and will report to the authorities if the preparation of raw vegetables is not clean at the food premise. Most of respondents (56.1% from Medicine, 47.4% from Social Science) also strongly agreed that they need to see doctors if they have symptoms related to foodborne parasitic infection. Majority of them were not believe that the vegetables grown in the farm are not contaminated by parasites and vegetables in Malaysia are safe to be consumed without proper washing. More details are shown in Table 4.7.

Table 4.7 Attitude towards the consumption of raw vegetables related to risk of parasitic infection among the respondents

	Frequency (%)	
	Medical Student	Social Science Students
I'm not worried about eating organic raw vegetables as a salad.		
Strongly disagree	25 (13.2%)	3 (7.9%)
Disagree	48 (25.4%)	8 (21.1%)
Neither agree nor disagree	71 (37.6%)	14 (36.8%)
Agree	37 (19.6%)	12 (31.6%)
Strongly agree	8 (4.2 %)	1 (2.6%)
I'm not worried about eating inorganic raw vegetables as a salad.		
Strongly disagree	36 (19.0%)	8 (21.1%)
Disagree	56 (29.6%)	11 (28.9%)
Neither agree nor disagree	66 (34.9%)	11 (28.9%)
Agree	26 (13.8%)	8 (21.1%)
Strongly agree	5 (2.6%)	0 (0.0%)
I'm not worried about eating raw vegetables (salads) which I bought from the food premises.		
Strongly disagree	41 (21.7%)	6 (15.8%)
Disagree	57 (30.2%)	12 (31.6%)
Neither agree nor disagree	61 (32.3%)	13 (34.2%)
Agree	24 (12.7%)	5 (13.2)
Strongly agree	6 (3.2%)	2 (5.3%)
I prefer cooked vegetables over raw vegetables (salads) when I choose food at the food premises.		
Strongly disagree	7 (3.7%)	5 (13.2%)
Disagree	4 (2.1%)	2 (5.3%)
Neither agree nor disagree	38 (20.1%)	7 (18.4%)
Agree	56 (29.6%)	11 (28.9%)
Strongly agree	84 (44.4%)	13 (34.2%)

Table 4.7 **Continued**

	Frequency (%)	
	Medical Student	Social Science Students
I believe raw vegetables purchased in supermarkets are safer than vegetables purchased in the public market.		
Strongly disagree	13 (6.9%)	5 (13.2%)
Disagree	36 (19.0%)	9 (23.7%)
Neither agree nor disagree	97 (51.3%)	19 (50.0%)
Agree	32 (16.9%)	4 (10.5%)
Strongly agree	11 (5.8%)	1 (2.6%)
I believe the food handlers at restaurants will wash properly raw vegetables first before serving.		
Strongly disagree	28 (14.8%)	5 (13.2%)
Disagree	51 (27.0%)	11 (28.9%)
Neither agree nor disagree	80 (42.3%)	16 (42.1%)
Agree	25 (13.2%)	6 (15.8%)
Strongly agree	5 (2.6%)	0 (0.0%)
I believe all vegetables sold in Malaysia are free from foodborne parasitic diseases.		
Strongly disagree	26 (13.8%)	3 (7.9%)
Disagree	74 (39.2%)	16 (42.1%)
Neither agree nor disagree	76 (40.2%)	15 (39.5%)
Agree	9 (4.8%)	4 (10.5%)
Strongly agree	4 (2.1%)	0 (0.0%)
I believe all vegetables grown in the farm are not contaminated by parasites.		
Strongly disagree	31 (16.4%)	2 (5.3%)
Disagree	87 (46.0%)	19 (50.0%)
Neither agree nor disagree	58 (30.7%)	13 (34.2%)
Agree	10 (5.3%)	2 (5.3%)
Strongly agree	3 (1.6%)	2 (5.3%)

Table 4.7 **Continued**

	Frequency (%)	
	Medical Student	Social Science Students
I believe that vegetables in Malaysia are safe to be consumed without proper washing.		
Strongly disagree	91 (48.1%)	13 (34.2%)
Disagree	50 (26.5%)	17 (44.7%)
Neither agree nor disagree	36 (19.0%)	6 (15.8%)
Agree	9 (4.8%)	1 (2.6%)
Strongly agree	3 (1.6%)	1 (2.6%)

Figure 4.4 shows the distribution of total attitude scores regarding consumption of raw vegetables related to risk of parasitic infection among the respondents (Histogram). From the figure, the total attitude score for Medical respondents depicted negative skewness (-0.660) with a standard error of 0.177 and positive kurtosis of 1.549 with a standard error of 0.352 while the total attitude score for Social Science respondent depicted negative skewness (-1.172) with a standard error 0.383 and positive kurtosis 2.652 with standard error of 0.750. Graph plot (Figure 4.5) indicated that not all the scores were plotted along the straight line, but no extreme values were present.

Table 4.8 shows a significance value of the Kolmogorov-Smirnova for Medical Students is less than 0.05 and we reject the null hypothesis. Thus, it is proven that the data was not normally distributed with a median score of 39.00.

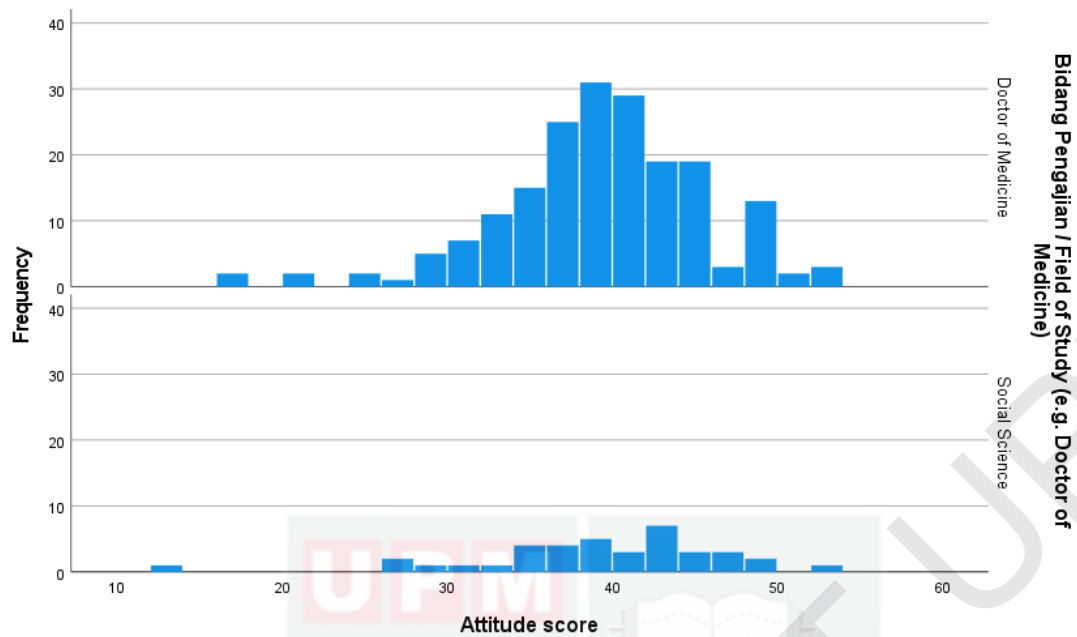
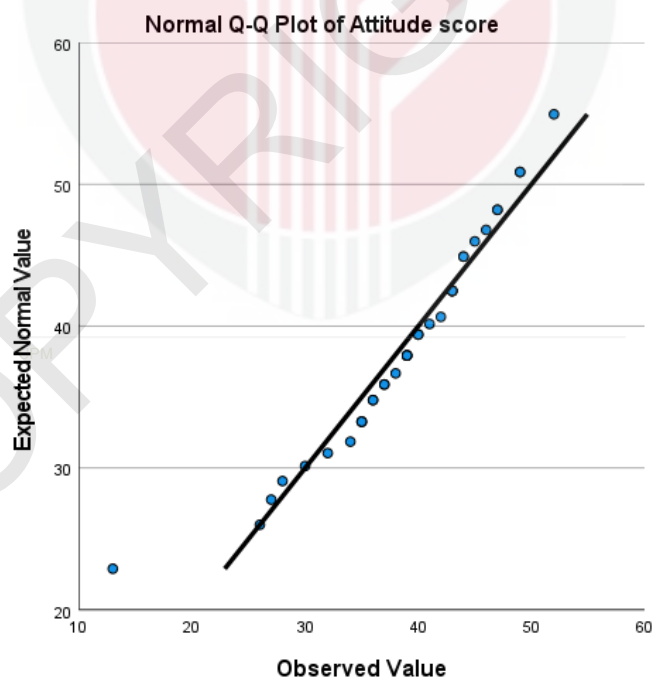


Figure 4.4. Distribution of total attitude scores regarding consumption of raw vegetables related to risk of parasitic infection among the respondents (Histogram).



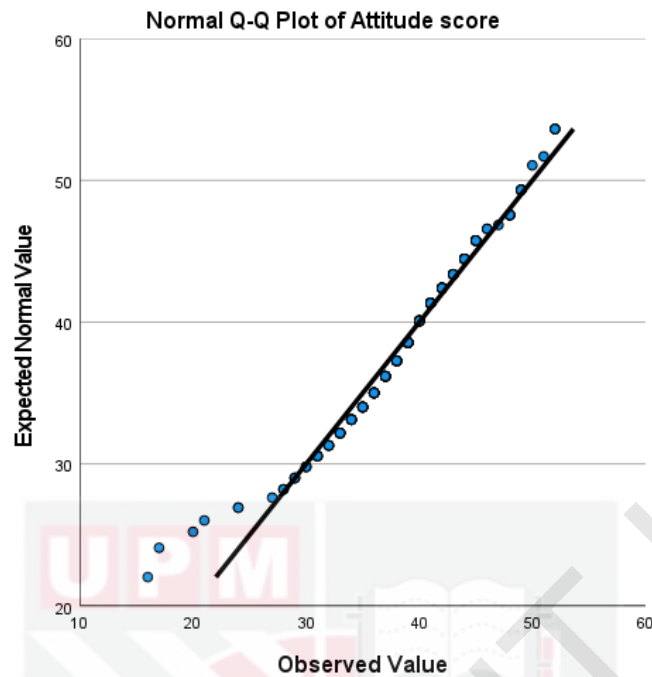


Figure 4.5 Distribution of total attitude score regarding consumption of raw vegetables related to risk of parasitic infection among the respondents (Q-Q plot).

Table 4.8 Test of normality of total attitude scores regarding consumption of raw vegetables related to risk of parasitic infection among medical (a) and social science (b) respondents

a)

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Attitude score	.086	189	.002	.965	189	.000

a. Lilliefors Significance Correction

b)

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Attitude score	.116	38	.200*	.931	38	.022

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Total attitude scores were assessed through 13 questions provided in the questionnaire. Total scores were then classified into three categories to study the percentage of respondents in each category, namely poor, average and positive. The score was 5 for strongly agree answer, 4 for agree answer, 3 for not sure, 2 for disagree and 1 for strongly disagree answer. However, there was also a reverse scoring method for questions 1, 2, 3, 5, 6, 7, 8, 12 and 13. The maximum mark was 65 while the minimum mark was 13. Highest and lowest scores from respondents were 52 and 13, respectively. A mean score of 38.87 and standard deviation of 6.42 was used to classify the subjects into three levels namely high level (more than 45), moderate level (32 to 45) and low level (less than 32).

Figure 4.6 indicated that 21 (11.1 %) of Medical respondents and 6 (15.8%) of Social Science respondents had a positive attitude towards consumption of raw vegetables related to risk of parasitic infection while as much as 145 (76.7%) of Medical respondents and 26 (68.42%) of Social Science respondents had an average outlook on this issue. A small number of Medical respondents (23, 12.2%) and Social Science respondents (6, 15.8%) fell into the poor category.

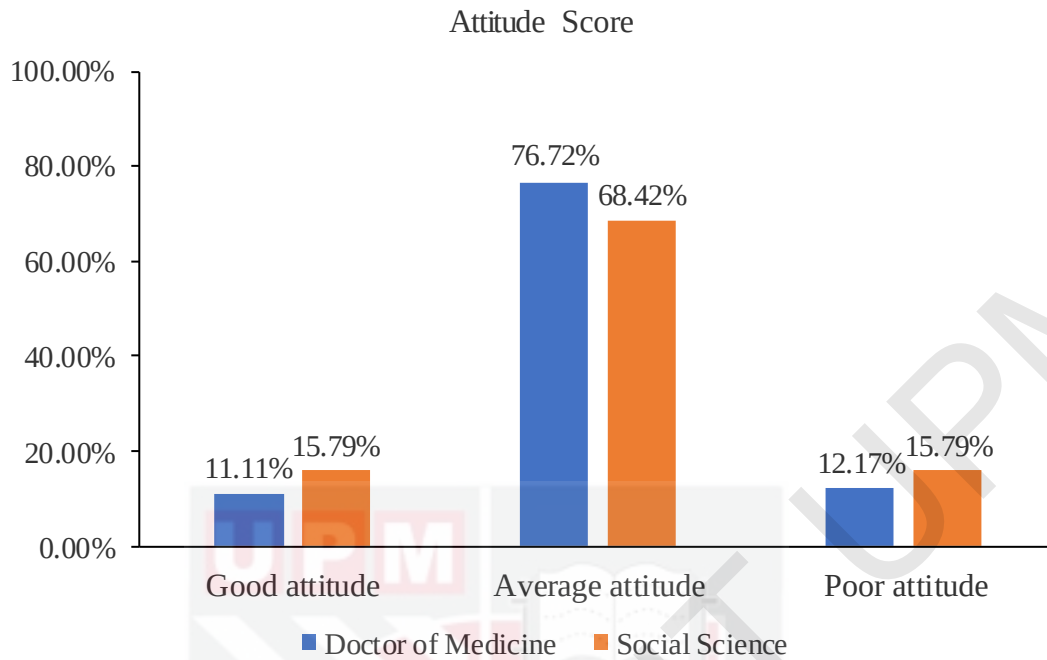


Figure 4.6 Level of attitude towards the consumption of raw vegetables related to risk of parasitic infection (negative, average, positive attitude) among the respondents.

4.4.3 Practice Regarding Consumption of Raw Vegetables related to Risk of Parasitic Infection Among Respondents

Nine questions assessed participants' practice toward consumption of raw vegetables related to risk of parasitic infection. Most respondents whether from Medical or Social Science always wash hand clean and will use liquid soap when washing hand before eating. Majority of them (91.5% from Medical, 86.8% from Social Science) also will wash vegetables with clean water prior eating. About half of respondents always (52.4% from Medical, 44.7% from Social Science) not choosing restaurant that have low clean grade. Only small percentage (~30%) were always used separate knife to cut meat and vegetables and use separate cutting board to cut vegetables and meat. Majority of respondents from Medicine (71.4) will always consult a doctor when having symptoms, meanwhile only half of respondents from Social

Science (57.9) will consult a doctor when having symptoms related to foodborne parasitic infection. More details are shown in Table 4.8

Table 4.8 Practice on consumption of raw vegetables related to risk of parasitic infection among the respondents

	Frequency (%)	
	Medical Students	Social Science Students
I. I wash my hand clean before eating.		
Never	1 (0.5%)	0 (0.0%)
Seldom	0 (0.0%)	2 (5.3%)
Sometimes	17 (9.0%)	6 (15.8%)
Always	171 (90.5%)	30 (78.9%)
II. I will use liquid soap over bar soap when washing my hands.		
Never	2 (1.1%)	1 (2.6%)
Seldom	6 (3.2%)	1 (2.6%)
Sometimes	29 (15.3%)	9 (23.7%)
Always	150 (79.4%)	27 (71.1%)
III. I wash the vegetables with clean water before eating them raw.		
Never	2 (1.1%)	0 (0.0%)
Seldom	2 (1.1%)	2 (5.3%)
Sometimes	12 (6.3%)	3 (7.9%)
Always	173 (91.5%)	33 (86.8%)
IV. I wash the vegetables with a specific vegetable wash before eating them raw.		
Never	61 (32.3%)	10 (26.3%)
Seldom	51 (27.0%)	16 (42.1%)
Sometimes	37 (19.6%)	7 (18.4%)
Always	40 (21.2%)	5 (13.2%)

Table 4.8 **Continued**

	Frequency (%)	
	Medical Students	Social Science Students
V. I don't choose a restaurant that doesn't show they have a good clean grade.		
Never	9 (4.8%)	3 (7.9%)
Seldom	33 (17.5%)	5 (13.2%)
Sometimes	59 (31.2%)	13 (34.2%)
Always	86 (45.5%)	17 (44.7%)
VI. I do not choose restaurants that have low clean grade.		
Never	8 (4.2%)	2 (5.3%)
Seldom	22 (11.6%)	8 (21.1%)
Sometimes	59 (31.2%)	11 (28.9%)
Always	99 (52.4%)	17 (44.7%)
VII. I use a separate knife to cut meat and vegetables.		
Never	26 (13.8%)	7 (18.4%)
Seldom	43 (22.8%)	10 (26.3%)
Sometimes	51 (27%)	11 (28.9%)
Always	69 (36.5%)	10 (26.3%)
VIII. I use a separate cutting board to cut vegetables and meat.		
Never	29 (15.3%)	5 (13.2%)
Seldom	42 (22.2%)	14 (36.8%)
Sometimes	46 (24.3%)	11 (28.9%)
Always	72 (38.1%)	8 (21.1%)
IX. I consult a doctor when I have symptoms related to foodborne parasitic infection.		
Never	8 (4.2%)	3 (7.9%)
Seldom	6 (3.2%)	8 (21.1%)
Sometimes	39 (20.6%)	5 (13.2%)
Always	135 (71.4%)	22 (57.9%)

Figure 4.7 shows the distribution of total practice scores regarding consumption of raw vegetables related to risk of parasitic infection among respondents. According to the figure, the total practice score for Medical respondents depicted negative skewness (-0.848) with a standard error of 0.177 and positive kurtosis of 1.871 with a standard error of 0.352 while the total attitude score for Social Science respondents depicted negative skewness (-0.132) with a standard error of 0.383 and negative kurtosis of -0.463 with a standard error of 0.750. Q-Q plot (Figure 4.8) indicated that not all the scores were plotted along the straight line but no extreme values were present.

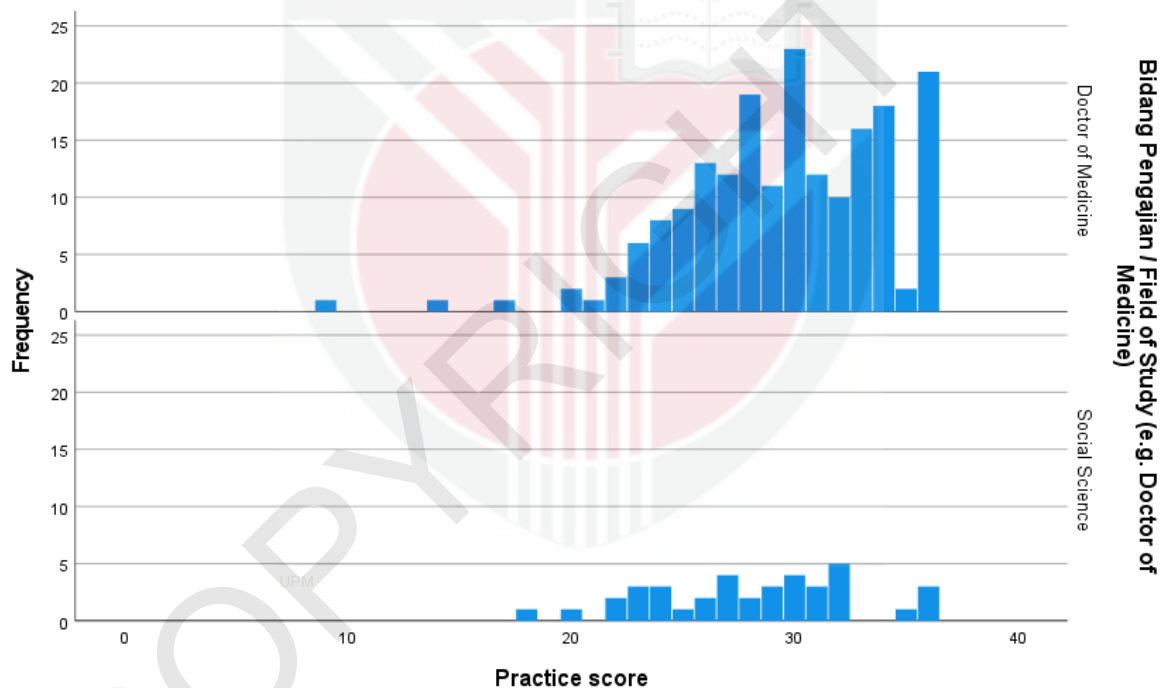


Figure 4.7 Distribution of total practice scores regarding consumption of raw vegetables related to risk of parasitic infection among the respondents (histogram).

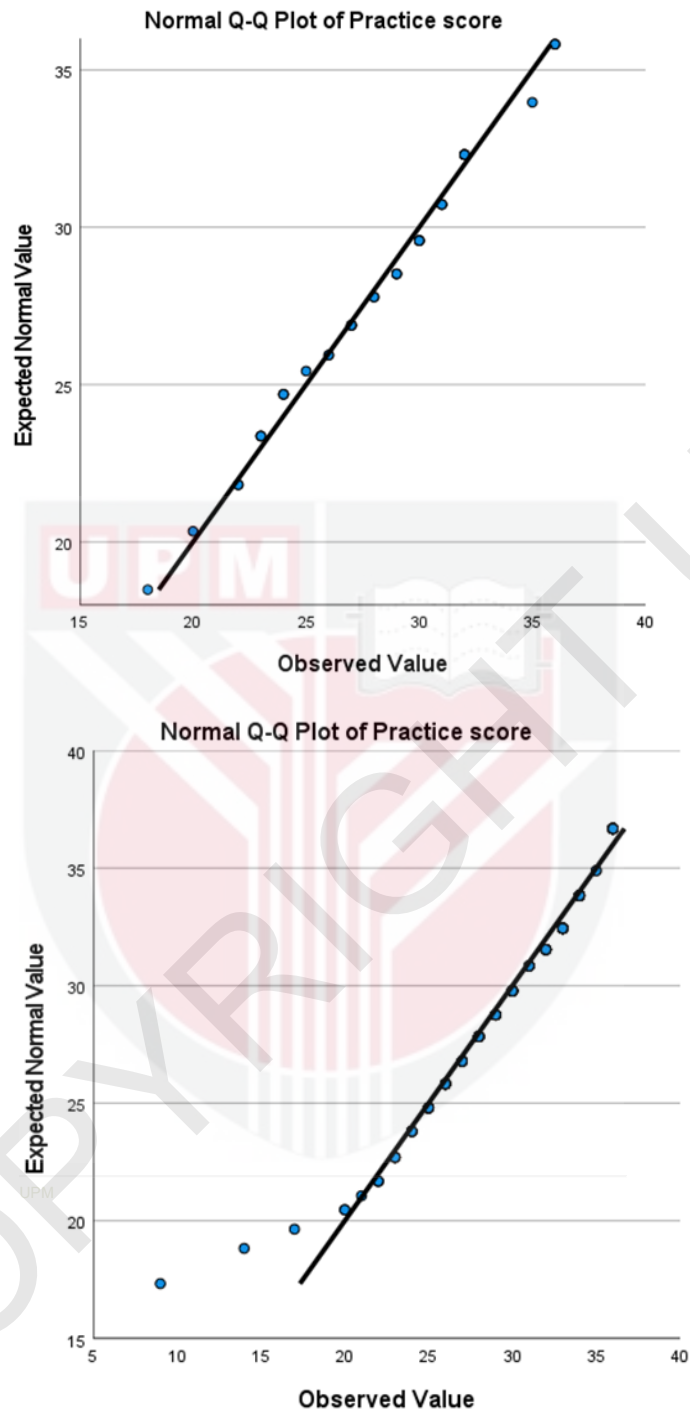


Figure 4.8 Distribution of total practice score regarding consumption of raw vegetables related to risk of parasitic infection among the respondents (Q-Q plot).

Table 4.9 shows the significance value of the Kolmogorov-Smirnova for Medical respondents was 0.004 which means that the p-value is less than 0.05 and we reject the null hypothesis to assume that the data was normally distributed. Thus, it was proven that the data was not normally distributed with a median score of 30.00. The Kolmogorov-Smirnova for Social Science respondents was 0.200 which means that the p-value was more than 0.05 and we accept the null hypothesis to assume that the data was normally distributed. Thus, it was proven that the data was normally distributed with a median score of 28.50.

Table 4.9 Test of normality of total practice scores regarding consumption of raw vegetables related to risk of parasitic infection among the Medical (a) and Social Science (b) respondents

a)

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Attitude score	.086	189	.002	.965	189	.000

a. Lilliefors Significance Correction

b)

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Attitude score	.116	38	.200*	.931	38	.022

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Total practice score was classified into three categories to study the percentage of respondents in each category. 1 point was given for never option answer, 2 point for seldom answer, 3 for some time answer, 4 for always option answer. The maximum knowledge score was 36, the minimum was 9. A mean score of 29.30 and standard deviation of 4.52 were used to classify the subjects into three levels namely high level (more than 33), moderate level (25 to 33) and low level (less than 25). Figure 4.9 indicated that 32 (16.9%) of Medical respondents and 11 (29.0%) from Social Science had poor practice. 116 (61.4%) of Medical and 23 (60.5%) of Social Science respondents had average practice. Meanwhile, 41 (21.7%) of Medical respondents and 4 (10.5%) of Social Science respondents had good practice regarding consumption of raw vegetables related to risk of parasitic infection.

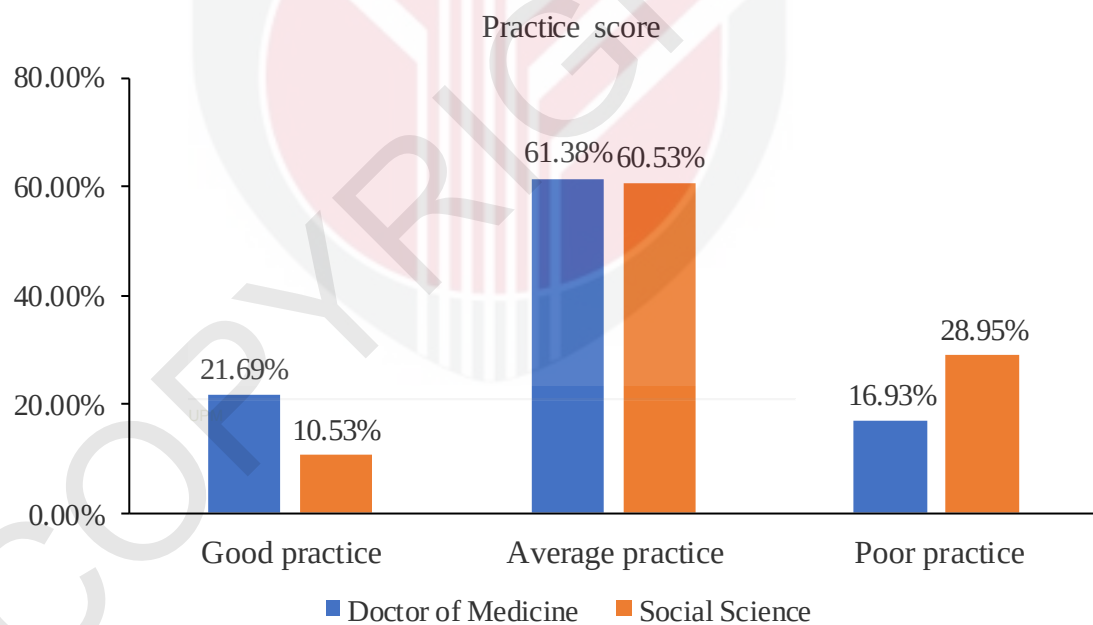


Figure 4.9 Level of practice regarding consumption of raw vegetables related to risk of parasitic infection (negative, average, positive practice) among respondents.

4.5 Association of Socio-demographic Characteristics (Age, Gender, Ethnicity, Year of Study, Field of Study, Geographic Area, Family Incomes) with Level of Knowledge, Attitude and Practice Regarding Consumption of Raw Vegetables related to Risk of Parasitic Infection Among Respondents

4.5.1 Association of socio-demographic characteristics with level of knowledge.

Table 4.10 shows the association of sociodemographic with level of knowledge regarding consumption of raw vegetables related to risk of parasitic infection among respondents. Age, gender, ethnicity, year of study and family income had no significant association with knowledge level ($p>0.05$) while field of study and geographical area of home had a significant association, ($p=0.001$) and ($p=0.005$) respectively.

4.5.2 Association of socio-demographic characteristics with level of attitude.

Table 4.11 shows the association of sociodemographic with attitude level regarding consumption of raw vegetables related to risk of parasitic infection among respondents. Result showed that all presented variables presented showed no significant association with attitude level among respondents ($p>0.05$).

4.5.3 Association of socio-demographic characteristics with level of practice.

Table 4.12 shows the association of sociodemographic with level of practice regarding consumption of raw vegetables related to risk of parasitic infection among respondents. Age, gender, ethnicity, field of study, geographical area of home and family income were not significantly association with practice ($p>0.05$). However, there was a significant association between year of study and practice level among respondents ($p=0.019$).

Table 4.10 Association of socio-demographic characteristics with level of knowledge regarding consumption of raw vegetables related to risk of parasitic infection.

Sociodemographic Characteristics	Knowledge Level n(%)			Total (n)	p-value
	Poor	Average	Good		
Age					
18-20	8(11.8)	48(70.6)	12(17.6)	68	$\chi^2=9.669$, df=4, p=0.111
21-23	20(13.2)	102(67.5)	29(19.2)	151	
24-26	4(50.0)	4(50.0)	0(0.0)	8	
Gender					
Male	6(9.0)	47(70.1)	14(20.9)	67	$\chi^2=2.280$, df=2, p=0.320
Female	26(16.3)	107(66.9)	27(16.9)	160	
Ethnicity					
Malay	23(17.6)	87(66.4)	27(16.0)	131	$\chi^2=10.641$, df=6, p=0.085
Chinese	7(14.3)	34(69.4)	8(16.3)	49	
Indian	1(2.6)	26(66.7)	12(30.8)	39	
Others	1(12.5)	7(87.5)	0(0.0)	8	
Year of Study					
Year 1	8(12.3)	47(72.3)	10(15.4)	65	$\chi^2=11.694$, df=6, p=0.061
Year 2	19(19.4)	64(65.3)	15(15.3)	98	
Year 3	3(5.3)	38(66.7)	16(28.1)	57	
Year 4	2(28.6)	5(71.4)	0(0.0)	7	
Field of Study					
Doctor of Medicine	12(6.3)	137(72.5)	40(21.2)	189	$\chi^2=57.683$, df=2, p<0.001
Social Science	20(52.6)	17(44.7)	1(2.6)	38	

Table 4.10 Continued

Sociodemographic Characteristics		Knowledge Level n(%)			p-value
		Poor	Average	Good	
Geographical Area of Home	Urban	17(9.9)	122(70.9)	33(19.2)	$\chi^2=10.434$, df=2, p=0.005
	Rural	15(27.3)	32(58.2)	8(14.5)	
Family Income	<RM4000	19(20.7)	58(63.0)	15(16.3)	$\chi^2=14.658$, df=8, p=0.066
	RM4000-RM8000	6(10.3)	39(67.2)	13(22.4)	
	>RM8000	7(9.1)	57(74.0)	13(16.9)	

Table 4.11 Association of socio-demographic characteristics with level of attitude regarding consumption of raw vegetables related to risk of parasitic infection.

Sociodemographic Characteristics	Attitude Level n(%)			Total	p-value
	Poor	Average	Good		
Age					
18-20	5(7.4)	55(80.9)	8(11.8)	68	$\chi^2=6.535$, df=4, p=0.146
21-23	21(13.9)	112(74.2)	18(11.9)	151	
24-26	3(37.5)	4(50.0)	1(12.5)	8	
Gender					
Male	12(17.9)	50(74.6)	5(7.5)	67	$\chi^2=3.538$, df=2, p=0.171
Female	17(10.6)	121(75.6)	22(13.8)	160	
Ethnicity					
Malay	13(9.9)	100(76.3)	18(13.7)	131	$\chi^2=5.791$, df=6, p=0.485
Chinese	10(20.4)	34(69.4)	5(10.2)	49	
Indian	6(15.4)	30(76.9)	3(7.7)	39	
Others	0(0.0)	7(87.5)	1(12.5)	8	
Year of Study					
Year 1	5(7.7)	52(80.0)	8(12.3)	65	$\chi^2=5.766$, df=6, p=0.454
Year 2	12(12.2)	72(73.5)	14(14.3)	98	
Year 3	10(17.5)	42(73.7)	5(8.8)	57	
Year 4	2(28.6)	5(71.4)	0(0.0)	7	
Field of Study					
Doctor of Medicine	23(12.2)	145(76.7)	21(11.1)	189	$\chi^2=1.196$, df=2, p=0.497
Social Science	6(15.8)	26(68.4)	6(15.8)	38	
Geographical Area of Home					
Urban	21(12.2)	130(75.6)	21(12.2)	172	$\chi^2=0.243$, df=2, p=0.886
Rural	8(14.5)	41(74.5)	6(10.9)	55	

Table 4.11 Continued

Sociodemographic Characteristics	Attitude Level n(%)			Total	p-value
	Poor	Average	Good		
Family Income					
<RM4000	14(15.2)	66(71.7)	12(13.0)	92	$\chi^2=2.921$, df=8, p=0.958
RM4000-RM8000	6(10.3)	47(81.0)	5(8.6)	58	
>RM8000	9(11.7)	58(75.3)	10(13.0)	77	

Table 4.12 Association of socio-demographic characteristics with level of practice regarding consumption of raw vegetables related to risk of parasitic infection.

Sociodemographic Characteristics	Practice Level n(%)			Total (n)	p-value
	Poor	Average	Good		
Age					
18-20	8(11.8)	43(63.2)	17(25.0)	68	$\chi^2=8.966$, df=4, p=0.075
21-23	31(20.5)	92(60.9)	28(18.5)	151	
24-26	4(50.0)	4(50.0)	0(0.0)	8	
Gender					
Male	16(23.9)	38(56.7)	13(19.4)	67	$\chi^2=1.549$, df=2, p=0.461
Female	27(16.9)	101(63.1)	32(20.0)	160	
Ethnicity					
Malay	21(16.0)	88(67.2)	22(16.8)	131	$\chi^2=11.442$, df=6, p=0.081
Chinese	15(30.6)	25(51.0)	9(18.4)	49	
Indian	5(12.8)	21(53.8)	13(33.3)	39	
Others	2(25.0)	5(62.5)	1(12.5)	8	
Year of Study					
Year 1	7(10.8)	43(66.2)	15(23.1)	65	$\chi^2=15.357$, df=6, p=0.019
Year 2	20(20.4)	65(66.3)	13(13.3)	98	
Year 3	12(21.1)	29(50.9)	16(28.1)	57	
Year 4	4(57.1)	2(28.6)	1(14.3)	7	
Field of Study					
Doctor of Medicine	32(16.9)	116(61.4)	41(21.7)	189	$\chi^2=4.406$, df=2, p=0.110
Social Science	11(28.9)	23(60.5)	4(10.5)	38	
Geographical Area of Home					
Urban	29(16.9)	104(60.5)	39(22.7)	172	$\chi^2=4.603$, df=2, p=0.100
Rural	14(25.5)	35(63.6)	6(10.9)	55	

Table 4.12 Continued

Sociodemographic Characteristics	Practice Level (%)			Total (n)	p-value
	Poor	Average	Good		
Family Income					
<RM4000	23(25.0)	51(55.4)	18(19.6)	92	$\chi^2=5.392$, df=8, p=0.715
RM4000-RM8000	11(19.0)	36(62.1)	11(19.0)	58	
>RM8000	9(11.7)	52(67.5)	16(20.8)	77	

4.6 Association of Risk Factors (History of Parasitic Diseases, Frequency of Raw Vegetables Consumption, Receiving Health Education, Having Annual Physical Examination) with Level of Knowledge, Attitude and Practice Regarding Consumption of Raw Vegetables related to Risk of Parasitic Infection Among Respondents

4.6.1 Association of risk factors with level of knowledge

a) Medical respondents

Table 4.13 shows the association of risk factors with level of knowledge regarding consumption of raw vegetables related to risk of parasitic infection among respondents. The history of parasitic diseases, frequency of raw vegetables consumption and annual medical examination of respondents had no significant association with knowledge level among Medical respondents ($p>0.05$).

b) Social Science Respondents

Table 4.14 shows the association of risk factors with level of knowledge regarding consumption of raw vegetables related to risk of parasitic infection among respondents. Result showed that there was no significant association of having history of parasitic diseases, frequency of raw vegetables consumption and annual medical examination of respondents with knowledge level among Social Science respondents ($p>0.05$).

Table 4.13 Association of risk factors with level of knowledge regarding consumption of raw vegetables related to risk of parasitic infection among Medical respondents.

Risk Factors	Knowledge Level n(%)			Total (n)	p-value
	Poor	Average	Good		
History of Parasitic Diseases					$\chi^2=0.018$, df=2, p=1.000
Yes	1(7.1)	10(71.4)	3(21.4)	14	
No	11(6.3)	127(72.6)	37(21.1)	175	
Frequency of Raw Vegetables Consumption					$\chi^2=2.536$, df=4, p=0.730
Every meal	0(0.0)	14(82.4)	3(17.6)	17	
Not every meal	9(6.4)	100(70.9)	32(22.7)	141	
Never	3(9.7)	23(74.2)	5(16.1)	31	
Annual Medical Examination					$\chi^2=4.789$, df=6, p=0.527
Annually	1(2.7)	27(73.0)	9(24.3)	37	
Monthly	0(0.0)	2(50.0)	2(50.0)	4	
Rarely	9(7.0)	93(72.1)	27(20.9)	129	
Never once	2(10.5)	15(78.9)	2(10.5)	19	

Table 4.14 Association of risk factors with level of knowledge regarding consumption of raw vegetables related to risk of parasitic infection among Social Science respondents

Risk Factors	Knowledge Level n(%)			Total (n)	p-value
	Poor	Average	Good		
History of Parasitic Diseases					$\chi^2=0.071$, df=2, p=1.000
Yes	1(50.0)	1(50.0)	0.0	2	
No	19(52.8)	16(44.4)	1(2.8)	36	
Frequency of Raw Vegetables Consumption					$\chi^2=4.783$, df=4, p=0.184
Every meal	0(0.0)	3(100.0)	0(0.0)	3	
Not every meal	19(55.9)	14(41.2)	1(2.9)	34	
Never	1(100.0)	0(0.0)	0(0.0)	1	
Annual Medical Examination					$\chi^2=2.771$, df=8, p=1.000
Annually	3(60.0)	2(40.0)	0(0.0)	5	
Monthly	2(100.0)	0(0.0)	0(0.0)	2	
Rarely	14(50.0)	13(46.4)	1(3.6)	28	
Never once	1(33.3)	2(66.7)	0(0.0)	3	

4.6.2 Association of risk factors with level of attitude

a) Medical Respondent

Table 4.15 shows the association of risk factors with level of attitude regarding consumption of raw vegetables related to risk of parasitic infection among respondents. Result indicated that history of parasitic diseases, frequency of raw vegetables consumption and annual medical examination was not significantly associated with attitude level of the respondents from Medical field of study.

b) Social Science respondents

Table 4.16 shows the association of risk factors with level of attitude regarding consumption of raw vegetables related to risk of parasitic infection among respondents. Result indicated that history of parasitic diseases, frequency of raw vegetables consumption and annual physical examination were not significantly associated with attitude level of respondents from Social Science.

Table 4.15 Association of risk factors with level of attitude regarding consumption of raw vegetables related to the risk of parasitic infection among Medical respondents

Risk Factors	Attitude Level n(%)			Total	p-value
	Poor	Average	Good		
History of Parasitic Diseases					$\chi^2=0.277$, df=2, p=0.895
Yes	2(14.3)	11(78.6)	1(7.1)	14	
No	21(12.0)	134(76.6)	20(11.4)	175	
Frequency of Raw Vegetables Consumption					$\chi^2=2.166$, df=4, p=0.644
Every meal	3(17.6)	11(64.7)	3(17.6)	17	
Not every meal	16(11.3)	109(77.3)	16(11.3)	141	
Never	4(12.9)	25(80.6)	2(6.5)	31	
Annual Medical Examination					$\chi^2=5.126$, df=6, p=0.576
Annually	2(5.4)	29(78.4)	6(16.2)	37	
Monthly	0(0.0)	4(100.0)	0(0.0)	4	
Rarely	17(13.2)	99(76.7)	13(10.1)	129	
Never once	4(21.1)	13(68.4)	2(10.5)	19	

Table 4.16 Association of risk factors with level of attitude regarding consumption of raw vegetables related to risk of parasitic infection among Social Science respondents

Risk Factors	Attitude Level n(%)			Total (n)	p-value
	Poor	Average	Good		
History of Parasitic Diseases					$\chi^2=0.974$, df=2, p=1.000
Yes	0(0.0)	2(100.0)	0(0.0)	2	
No	6(16.7)	24(66.7)	6(16.7)	36	
Frequency of Raw Vegetables Consumption					$\chi^2=1.624$, df=4, p=0.797
Every meal	1(33.3)	2(66.7)	0(0.0)	3	
Not every meal	5(14.7)	23(67.6)	6(17.6)	34	
Never	0(0.0)	1(100.0)	0(0.0)	1	
Annual Medical Examination					$\chi^2=5.809$, df=8, p=0.349
Annually	2(40.0)	2(40.0)	1(20.0)	5	
Monthly	0(0.0)	2(100.0)	0(0.0)	2	
Rarely	3(10.7)	21(75.0)	4(14.3)	28	
Never once	1(33.3)	1(33.3)	1(33.3)	3	

4.6.3 Association of risk factors with level of practice

a) Medical respondents

Table 4.17 shows the association of risk factors with level of practice regarding consumption of raw vegetables related to risk of parasitic infection among the respondents. Result demonstrated that the history of parasitic diseases and annual physical examination of respondents had no significant association with practice ($p>0.05$) while frequency of raw vegetables consumption had a significant association with practice level of respondents from Medical field of study ($p=0.016$).

b) Social Science respondents

Table 4.18 shows the association of risk factors with level of practice regarding consumption of raw vegetables related to risk of parasitic infection among respondents. With a p-value of more than 0.05, the history of parasitic diseases, frequency of raw vegetables consumption and annual physical examination of respondents had no significant association with practice level of Social Science respondents.

Table 4.17 Association of risk factors with level of practice regarding consumption of raw vegetables related to risk of parasitic infection among Medical respondents

Risk Factors	Practice Level n(%)			Total	p-value
	Poor	Average	Good		
History of Parasitic Diseases					$\chi^2=2.267$, df=2, p=0.351
Yes	2(14.3)	11(78.6)	1(7.1)	14	
No	30(17.1)	105(60.0)	40(22.9)	175	
Frequency of Raw Vegetables Consumption					$\chi^2=11.498$, df=4, p=0.016
Every meal	5(29.4)	6(35.3)	6(35.3)	17	
Not every meal	25(17.7)	92(65.2)	24(17.0)	141	
Never	2(6.5)	18(58.1)	11(35.5)	31	
Annual Medical Examination					$\chi^2=10.251$, df=6, p=0.102
Annually	2(5.4)	25(67.6)	10(27.0)	37	
Monthly	0(0.0)	3(75.0)	1(25.0)	4	
Rarely	23(17.8)	80(62.0)	26(20.2)	129	
Never once	7(36.8)	8(42.1)	4(21.1)	19	

Table 4.18 Association of risk factors with level of practice regarding consumption of raw vegetables related to risk of parasitic infection among Social Science respondents

Risk Factors	Practice Level n(%)			Total (n)	p-value
	Poor	Average	Good		
History of Parasitic Diseases					$\chi^2=1.377$, df=2, p=1.000
Yes	0(0.0)	2(100.0)	0(0.0)	2	
No	11(30.6)	21(58.3)	4(11.1)	36	
Frequency of Raw Vegetables Consumption					$\chi^2=11.166$, df=4, p=0.061
Every meal	1(33.3)	1(33.3)	1(33.3)	3	
Not every meal	10(29.4)	22(64.7)	2(5.9)	34	
Never	0(0.0)	0(0.0)	1(100.0)	1	
Annual Medical Examination					$\chi^2=6.051$, df=8, p=0.652
Annually	2(40.0)	2(40.0)	1(20.0)	5	
Monthly	1(50.0)	1(50.0)	0.0	2	
Rarely	8(28.6)	17(60.7)	3(10.7)	28	
Never once	0(0.0)	3(100.0)	0(0.0)	3	

CHAPTER 5

DISCUSSION

5.1 Response Rate

Out of 396 respondents, 189 were Medical students while only 38 were Social Science students which indicated that the response rates as 63% and 19%, respectively. The result of response rates showed unsatisfactory, primarily due to the attitude of respondents who refused to cooperate, particularly from the social science students. We were barely able to obtain responses from them resulting in our poor number of respondents who contributed to this study. In addition, the 3rd year of Medical students were having their End of Posting (EOP) examination during our data collection period, hence many of them refused to participate in our study. There was a very huge difference in number of respondents from both field of study which introduced bias and resulting the not significant association result between all the variables with KAP level in social science students. Time constraint also one of the limitations in this study as the ethical approval letter have been delayed and we were not able to utilise the one week given to its fullest.

5.2 Level of Knowledge, Attitude and Practice on Consumption of Raw Vegetables related to Risk of Parasitic Infection Among Respondents

5.2.1 Knowledge Regarding Consumption of Raw Vegetables related to Risk of Parasitic Infection Among Respondents

In this study, more Medical respondents were found to had good knowledge (21.2%) when compared to Social Science respondents which only one respondent had good knowledge (2.6%) and majority of them (52.6%) had poor knowledge. This could be attributed to that

Medical respondents have more access to parasitic diseases knowledge as most of them could get the information from experienced Health Professionals (77.2%). Meanwhile, only 21.1% Social Science respondents got the information from Health Professionals and most of them (92.1%) relied mainly on the internet to get information which could give them the wrong information. Medical respondents were also more familiar with symptoms and complications of parasitic diseases compared to non-Medical respondents as shown from the results of questionnaire which most Medical respondents answered correctly in the questions that asked about symptoms and complications of intestinal parasitic diseases. This study also indicated that most Social Science respondents were not aware of the importance of good personal hygiene and potential of cross-contamination between raw and cooked food (55.3%), which could be due to most of them living in rural area (57.9%) and were not well informed on food safety knowledge. However, such comparison might not resemble the accurate representation of knowledge among Social Science respondents due to the low response rate of the respondents.

5.2.2 Attitude Regarding Consumption of Raw Vegetables related to Risk of Parasitic Infection Among Respondents

This study highlighted that most respondents from both Medical and Social Science fields had an average attitude (76.7% and 68.4% respectively). This was similar to another study conducted on Taif University's students who had a moderate percentage mean score (67.3%) for the attitude component (Sharif & Al-Malki, 2010). Analysis of attitude component also showed that 84.7% of Medical respondents and 71.1% of Social Science respondents preferred to see a doctor if they have symptoms related to foodborne parasitic infection while only a small percentage of respondents choose not to consult a doctor and presumably decided to get self-medication or traditional medicine as a preferred choice of treatment of

parasitic infections. This finding was in line with a study performed in Iraq which only 6.1% of participants chose not to consult with doctor after contracting parasitic infection (Baghlaninezhad et al., 2019).

In the question that asked if the respondent was worried about eating organic and inorganic vegetables, most of respondents from Medical (37.6% and 34.9% respectively) field and Social Science (36.8% and 28.9% respectively) field were neutral on the subject while there were still some Medical respondents (23.8% and 16.4% respectively) and Social Science respondents (34.2% and 21.1% respectively) that were not worried on eating raw organic or inorganic vegetables. 42.3 % of Medical respondents and 42.1% of Social Science respondents also were neutral in believing that food handlers at restaurants will washed their vegetables properly before serving. These results showed that overall attitude of both Medical and Social Science respondents was average. Therefore, the improvement on attitude should be focused on the Medical respondents by Health authorities as it was related to their jobs as future doctors.

5.2.3 Practice Regarding Consumption of Raw Vegetables related to Risk of Parasitic Infection Among Respondents

Majority of respondents in both fields presented similar average level of practice (61.3% and 60.5%, respectively). This finding found to be different from a study conducted among Dietetic students and food handlers in a Malaysian public university where it was recorded that both had poor practice towards food poisoning which included raw vegetables consumption (Yusof et al., 2018). In the practice section, most of the respondent from both fields were able to answer favourably, with exception to the question about washing vegetables with a specific vegetable washer before eating them raw. This may be because not

many people were able to own a specific vegetable wash and may have thought that washing raw vegetables with clean water is sufficient. There were no other remarkable findings as there were limited previous findings on the practice of university students regarding vegetables consumption.

5.3 Risk factors (History of Parasitic Diseases, Frequency of Raw Vegetables Consumption, Receiving Health Education, Having Annual Physical Examination) of Respondents

5.3.1 History of Parasitic Diseases

Over 93% of respondents have had no history of parasitic infections. This could be due to several factors, a study by Baghlaninezhad et al. (2019) reported that some parasite infections were asymptomatic and the respondent who was infected did not realise that they have been infected by parasites. The study was also reported there could be a possibility that the respondent had been infected by parasite which was then diagnosed and treated by doctor, but for reasons such as it happened when they were a kid, the respondent might have forgotten about it. Other than that, the overall level of awareness among respondents has shown to be adequate for those who lived in urban areas and had sustainable family income, which majority of respondents did (75.8% and 59.5% respectively). Most parasitic diseases that were prevalent in Malaysia was also limited to rural areas such as in Orang Asli tribes instead of urban areas (Anuar et al., 2012). The decreasing prevalence in urban areas of Malaysia could be due to an excellent management by Ministry of Health and increasing awareness of the contamination of parasitic diseases.

5.3.2 Frequency of Raw Vegetables Consumption

Majority of respondents were consumed raw vegetables in not every meal which contributed to 175 out of 227 respondents (77.1%), followed by never consumed raw vegetables in 32 respondents (14.1%) and 20 (8.8%) of respondents consumed raw vegetables in every meal. This could be since over 74.6% of Medical respondents and 78.9% of Social Science respondents did not believe that vegetables in Malaysia were safe to consume without washing.

5.3.3 Having Annual Physical Examination

157 out of 227 respondents (69.2%) were rarely did physical examination and 22 (9.7%) of respondents had never did physical examination. About 42 (18.5%) of them did their physical examination annually and 6 (2.6%) monthly. This could be due to the fact that 92% of Medical respondents and 71.1% of Social Science respondents only consults a doctor when they have the symptoms of parasitic diseases and would not do so if the parasitic disease is asymptomatic.

5.4 Association of Socio-demographic Characteristics (Age, Gender, Ethnicity, Year of Study, Field of Study, Geographic Area, Family Incomes) with Level of Knowledge, Attitude and Practice Regarding Consumption of Raw Vegetables related to Risk of Parasitic Infection Among Respondents

5.4.1 Association of socio-demographic characteristics with level of knowledge.

Results indicated that there was a significant association between geographical area of home with knowledge level regarding consumption of raw vegetables related to risk of parasitic infection. Respondents who came from urban area found to be less knowledgeable on the risk factors of parasitic infection through vegetables consumption compared with respondents

who came from urban area. Rathninam et al. (2019) also reported that population that came from rural areas had less knowledge compared with those from urban areas. In another study on comparing the intestinal parasites of schoolchildren from an urban and a rural area on Penang island, Malaysia, the results indicated that there was a significant difference ($p < 0.05$) between rural and urban schoolchildren as regards to the prevalence of the three species of helminths (Rahman, 1998). According to Al-Mekhlafi et al. (2016), rural children were more exposed to infection sources as a result of their habits related to playing and other outdoor activities. It also stated that lack or low levels of father and/or mother education had been associated with higher infection rates in rural area. It was noteworthy that the role of water supply shortage in such rural areas in compounding the problem of not practicing washing of hands, fruits and vegetables could not be ruled out. This might lead to lack of knowledge on risk factors of parasitic diseases. Therefore, health education plays a significant impact on knowledge among students. A previous study demonstrated a significant increase in an infectious disease knowledge was observed for the students following health education by gamification among university students ($p < 0.01$) (Azhari et al., 2019).

In our study, it was noted that no significant association between age, gender, ethnicity, year of study and family income with level of knowledge regarding consumption of raw vegetables related to risk of parasitic infection ($p > 0.05$). It was supported by previous study that demonstrated knowledge regarding intestinal parasitic infection had no association with age, gender, ethnicity and parents' occupation of the respondents (Apidechkul, 2015)

5.4.2 Association of socio-demographic characteristics with level of attitude.

There was no significant association between gender and attitude level regarding consumption of raw vegetables related to risk of parasitic infection. In a study speculating

gender differences in fondness for vegetables and predilection for a diversity of vegetables among 11-year old children in Finland, there were no gender differences in fondness for vegetables at first but fondness reduced further among boys than girls between the first and the follow-up ages, resulting in girls' larger fondness for vegetables at the follow-up stage (Lehto et al., 2015). Another study was also stated that sufficient ingestion of vegetables was greater among women (43.4%) than men (34.9%) (Rugel & Carpiano, 2015; Sang & Hoerr, 2005). From these studies, we would assume that gender might be the contributing factors of attitude level regarding consumption of raw vegetables related to risk of parasitic infection, however the results from our study was contradictory.

It had shown that there was no significant association between ethnicity with level attitude regarding consumption of raw vegetables related to risk of parasitic infection. This finding was found to be in contrary with previous study conducted among Orang Asli community that demonstrated the ethnic differences amongst Orang Asli community carries a small significant factor related to the raw vegetables consumption ($p < 0.05$) (Annuar et al., 2012). It might be due to the different target population compared with this study. It is undeniable that the prevalence of parasitic disease was higher among marginalized society which might be due to the various contributing factors including using night soil as fertilizer, limited in medical facilities, poor personnel hygiene and food behavior. It was stated that consuming raw vegetables was associated with Entamoebiasis which could be directly related to the contamination of cysts from the soil garden where the vegetables were planted on (Anuar et al., 2012).

This study had also found that there was no significant association between age, year of study, field of study, geographical area of home and family income with attitude level

regarding consumption of raw vegetables related to risk of parasitic infection. Another study was stated that respondents in low income and education categories had significantly highest scores measuring barriers to fruit and vegetable consumption despite having high nutrition concern (Dittus et al., 1995). The cost of fruits and vegetables might partially explain the higher barrier scores for low income and education respondents; however, the result of our study was contradictory.

5.4.3 Association of socio-demographic characteristics with level of practice.

A significant association was reported between year of study with level of practice regarding consumption of raw vegetables related to risk of parasitic infection. We assumed that lower year of study might have lower knowledge, thus they were not aware about the risk of getting parasitic disease and it was nearly impossible for them to be enthusiastic to practice good preventive measures regarding consumption of raw vegetables related to risk of parasitic infection.

Based on our study, no significant association between age with practice level regarding consumption of raw vegetables related to risk of parasitic infection. In contrast, previous study revealed that there was a relationship between age and the practice of raw vegetables consumption (Kähkönen et al., 2020). The results of our study were contradictory as the age range between both studies was different. Our study focused on respondents aged between 18-26 while previous study was performed on respondents between 3-5 years old children and their parents.

Moreover, no significant association between the field of study and level of practice regarding consumption of raw vegetables related to risk of parasitic infection. A study

conducted by Yusof et al. (2018) which targeted dietetic students and food handlers in a public university was also reported that 88.7% and 90.6% of respondents, had the understanding about the importance of washing vegetables before consumption, respectively.

No significant association between gender, ethnicity, geographical area of home and family income with practice regarding consumption of raw vegetables related to risk of parasitic infection ($p>0.05$). However, previous study showed that consumers with low income preferred to bought products which close to due-by-date in which the supermarket usually offering discount prices (Mihalache et al., 2021). Another study also stated that fewer fresh fruits and vegetables were purchased in the United States due highly prices (Stenger et al., 2014).

5.5 Association of Risk Factors (History of Parasitic Diseases, Frequency of Raw Vegetables Consumption, Receiving Health Education, Having Annual Physical Examination) with Level of Knowledge, Attitude and Practice Regarding Consumption of Raw Vegetables related to Risk of Parasitic Infection Among Respondents

No significant association between history of parasitic diseases, frequency of raw vegetables consumption and annual physical examination with level of knowledge and attitude regarding consumption of raw vegetables related to risk of parasitic infection in both Medical and Social Science respondents. Previous study showed that college students in Wuhu City, China who were having insistence on the annual physical examination contributed to the awareness rate of knowledge on food-borne parasitic diseases (Ming & Huan, 2018).

In term of attitude level, there was no significant association with risk factors. Majority of respondents from both Medical and Social Science had an average attitude disregard to their history of parasitic diseases, frequency of raw vegetables consumption and

annual physical examination. There was a significant association between frequency of raw vegetables consumption and practice level regarding consumption of raw vegetables related to risk of parasitic infection in Medical respondents. It was revealed that a higher percentage of respondents who consumed raw vegetables every meal having a good practice (35.3%) while higher percentage of respondents who never or did not consume raw vegetables every meal were having an average practice (58.1%) and (65.2%) respectively. No significant association had been identified for the other related risks factor with practice. Majority of respondents from Medical field had an average practice disregard of to their history of parasitic diseases and annual physical examination.

CHAPTER 6

CONCLUSION, LIMITATON, AND RECOMMENDATION

6.1 Conclusion

We received 63% response from Year 1 until Year 3 of Medical students. However, for Social Science students, we received a response rate of only 19%. Based on the socio-demographic characteristics, the respondents who were females contributed to 70.5% while males made up the rest of the 29.5%. Majority of respondents were from age group 21 to 23 and Year 2 of study which contributed to 66.5% and 43.2%, respectively. Respondents who were Malays contributed to 57.7% and Non-Malays, 42.3%. Medical students contributed to 83.3% of total respondents and Social Science was 16.7%. We can also conclude that more than half of the Medical and Social Science students from UPM had a household income of less than RM 4000 and majority of them were living in urban area (75.8%). Based on the contributing risks, majority of them claimed had no history of parasitic infection (93%). A total of 175 respondents (77.1%) preferred to eat raw vegetables in not every meal while 157 out of 227 respondents (69.2%) were rarely did annual physical examination.

Two sociodemographic factors, field of study and geographical area of home had been significantly associated with level of knowledge, respectively ($p < 0.05$). No significance association between sociodemographic factors and the attitude level towards raw vegetables consumption associated with parasitic infection among respondents ($p > 0.05$). Meanwhile, Year of study was significantly associated with the practice level ($p = 0.019$). For Medical respondents, there was no significance association between contributing risks variables with

the knowledge and attitude levels ($p>0.05$). However, one of the contributing factors, frequency of raw vegetables consumption had a significant association with the practice level ($p=0.016$). For Social Science respondents, there was no significance association between the contributing risks variables with the knowledge, attitude and practice levels toward raw vegetables consumption associated with parasitic infection.

Majority of Medical students had average knowledge (72.49%), attitude (76.72%) and practice (61.88%). In contrast, Social science students showed poor knowledge (52.63%), average attitude (68.425) and practice (60.53%) regarding consumption of raw vegetables related to risk of parasitic infection.

6.2 Limitation

The response rate of Social Science students was very low; 19% because they were refused to answer the online questionnaire. The response rate of Year 3 of Medical students was lower than Year 1 and Year 2 because most of their time have to be commit at the hospital and was not available during this study. However, the limitations were overcome by personally contacting the respondents as all the Medical students are connected to one another by a system called 'Buddy Line'. Besides, this study only focuses on the Medical and Social Science students of Universiti Putra Malaysia, hence the validity of this study was limited to those populations only. We also used cross-sectional study design, which it is considered as the weakest observational design because it could not be used to identify the chronological relationship between outcome and any health intervention. In addition, the sample size calculated may also not have the capability to portray the entire population. Furthermore, information bias and recall bias may be occurred due to determinant of association between variables were based on the questionnaire and depend on answers filled by the respondents.

Hence, respondents may not remember and misjudge some important information related to this study.

6.3 Recommendation

Findings from this study provide an important information that majority of Medical students have the average knowledge, attitude and practice. In contrast, Social science students showed the poor knowledge, average attitude and practice regarding consumption of raw vegetables related to risk of parasitic infection. Therefore, there is a need to increase knowledge among the respondents with multi approaches such as continuous education programs because good knowledge will lead to better attitude and practice.

As our methodology of using online questionnaire through Google Form may be prone towards social desirability bias, future studies can be conducted through direct observational study instead as this method is more feasible and reliable in assessing practice components. For example, alternative to online questionnaire, self-administered questionnaire can be given under direct observation of an examiner to prevent the social desirability bias. This could also solve the low response rate of Social Science students as respondents under direct observation could not refuse to answer the questionnaire.

The sample population, which is done only among Year 1, Year 2 and Year 3 Medical students is a limiting factor in this study as it does not resemble all Medical students. Thus, future studies can incorporate all pre-clinical years and even include clinical students as to resemble the whole Medical students. Future studies could also incorporate other private or public institutions to compare for distinctive level of knowledge, attitude and practice in respective institutions. By doing so, the validity of the study would not be limited to Universiti Putra Malaysia students only, therefore increasing the validity of the study.

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APPENDICES

WORKPLAN

Table 1.0 Gantt Chart

		Year/ month						
		2020						
		Apr	May	Jun	Jul	Aug	Sep	Oct
1.	Proposal preparation							
2	Submission of Proposal for ethics approval							
3	Proposal Presentation							
4	Data Collection and Analysis							
5	Presentation of Data Analysis							
6	Preparation of Final Report							
7	Poster Presentation							
8	Final Presentation							

**ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS
(JKEUPM)
UNIVERSITI PUTRA MALAYSIA**

Research title	: Knowledge, Attitude and Practice (KAP) Towards the Consumption of Raw Vegetables-Associated With Parasitic Infection Among Medical and Social Science Students at University Putra Malaysia.
Study Site	: Faculty of Medicine and Health Sciences and Faculty of Human Ecology, Universiti Putra Malaysia in Serdang.
JKEUPM Ref No.	: JKEUPM-2020-220
Researcher	: Kama Amima, Tang Jin Nie, Hilmi Hamidon
Supervisor	: Dr. Norashiqin Misni

Documents received and reviewed with reference to the above study:

1. Ethics Application Form, Version 1 dated 24/6/2020
2. Respondent Information Sheet & Consent (English), Version 2 dated 25/8/2020
3. Respondent Information Sheet & Consent (Malay), Version 2 dated 25/8/2020
4. Proposal (English), Version 2 dated 25/8/2020
5. Questionnaires/ Interviews (English), Version 1 dated 24/6/2020
6. Questionnaires/ Interviews (Malay), Version 1 dated 24/6/2020
7. Curriculum Vitae of:
 - a. Dr. Norashiqin Misni
 - b. Dr. Nur Raihana Ithnin

The University Research Ethics Committee, Universiti Putra Malaysia (JKEUPM) operates in accordance to the ICH-GCP Guidelines.

Decision by JKEUPM:

☒

Approved

☒

Permission MUST BE OBTAINED from the respective hospitals/ institutions before conducting the research

☐

Disapproved

Please note that the approval is **VALID UNTIL 28 AUGUST 2021**

Researchers should comply with the following:

- I. Complete a Study Final Report upon study completion (Form 3.2).
- II. Ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.



FORM 2.4: RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE

Knowledge, attitude and practice (KAP) towards the consumption of raw vegetables-associated with parasitic infection among medical and social science students at Universiti Putra Malaysia.

2. INTRODUCTION

This study will be conducted by students from Bachelor of Medicine from 27th April 2020 until 5th August 2020. This study involves 396 respondents that consist of student year 1 until year 3 from Medicine and year 1 until year 4 from Science of Human Development Program, Universiti Putra Malaysia. This study will be conducted to identify the knowledge, attitude, and practice on the consumption of raw vegetables that are associated with parasitic infection among students in UPM. Besides that, this study also will be conducted to determine the sociodemographic factors such as age, gender, ethnicity, year of study, geographic area and family incomes that can influence the knowledge, attitude and practice level on the consumption of raw vegetables associated with parasitic infection among medicine and social science students of UPM.

3. WHAT WILL YOU HAVE TO DO?

Respondents have to fill up the questionnaire that will be distributed through online. Every section has to be filled by the respondents. Expected time to complete the questionnaire is 10 minutes. This research involves voluntariness in participation. Participants have the right and freedom to withdraw from study at any time.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

Medicine and Science of Human Development student's year 4 and 5, on long leave, dropped out of course, who do not eat vegetables or acutely unwell.

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

Participation of respondents will help the researchers to obtain information regarding the association between risk such as environmental risk, field of study, history of parasitic diseases and having annual physical examination and the knowledge, attitude and practice (KAP) on consumption raw-vegetables associated with parasitic infections. Through this, following steps can be taken such as health education programs and appropriate medical intervention. However, there will be no compensation given in the form of money or gifts to the participants who participate in this research study.

(b) TO THE INVESTIGATOR?

Results obtained from the feedback of respondents will help the researchers to investigate socio-demographics factors and the level of knowledge, attitude and practice (KAP of UPM students regarding the consumption of raw vegetables that are associated with parasitic infection.

6. WHAT ARE THE POSSIBLE RISKS?

There will be no risk towards the respondents who take part in this study. All information regarding the identities of respondents will be kept confidential. If students decide not to participate in this study, their decision will not affect their participation and grades in courses taught by the lecturers concerned.

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

Yes, all information and identities of the respondents that is stated in the questionnaire will be kept confidential.

8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

1. **Dr. Norashiqin Binti Misni: 03 8609 2932 (Supervisor)**
Parasitology and Entomology Lecturer
Department of Microbiology and Parasitology Medicine
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University Putra Malaysia
197231@student.upm.edu.my

Please initial here if you have read and understood the contents of this page_____

9. CONSENT

I Identity Card No.
address.....
.....hereby voluntarily agree to take part in the research
stated above (questionnaire-based).

I have been informed about the nature of the research in terms of methodology, possible adverse effects and complications (as written in the Respondent's Information Sheet). I understand that I have the right to withdraw from this research at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to my identity will remain private and confidential.

I * wish / do not wish to know the results related to my participation in the research

I agree/do not agree that the images/photos/video recordings/voice recordings related to me be used in any form of publication or presentation (if applicable)

* delete where necessary

Signature Signature
(Respondent) (Witness)

Date : Name :
I/C No. :

I confirm that I have explained to the respondent the nature and purpose of the above-mentioned research.

Date Signature
(Researcher)

SOAL SELIDIK (QUESTIONNAIRE)

BAHAGIAN 1 : PROFIL SOSIO-DEMOGRAFIK PART 1 : SOCIO DEMOGRAPHIC PROFILE

Bahagian ini merujuk kepada maklumat latar belakang sosio-demografik. Anda dikehendaki menandakan (✓) atau menulis jawapan dalam ruang yang disediakan.

This part is related to sociodemographic background. Please answer ALL the questions below or place a tick (✓) in the box which best describes you.

1. Umur / Age : tahun / years old

2. Jantina / Gender :

☐ Lelaki / Male ☐ Perempuan / Female

3. Bangsa / Ethnicity :

☐ Melayu / Malay ☐ Cina / Chinese ☐ India / Indian

☐ Lain-lain / Others : Nyatakan / Please specify :

4. Tahun Pengajian / Year of Study :

☐ Tahun 1 / Year 1 ☐ Tahun 2 / Year 2 ☐ Tahun 3 / Year 3

☐ Tahun 4 / Year 4 ☐ Tahun 5 / Year 5

5. Bidang Pengajian / Field of Study :

☐ Psikologi Sosial / Social Psychology

☐ Doktor Perubatan / Doctor of Medicine

6. Kawasan Geografi di Rumah / Geographical Area of Your Home :

☐ Bandar / Urban ☐ Luar Bandar / Rural

7. Pendapatan Keluarga / Family Income :

☐ <RM4000 ☐ RM4000-RM8000 ☐ > RM8000

8. Adakah anda pernah dijangkiti oleh penyakit parasit?

Have you ever been infected with a parasitic disease?

☐ Ya / Yes ☐ Tidak / No

9. Berapakah kerap anda menjalani pemeriksaan fizikal?

How often do you go for physical examinations?

- ☐ Setiap Tahun / *Annually* ☐ Setiap Bulan / *Monthly*
☐ Setiap Minggu / *Weekly* ☐ Jarang / *Rarely* ☐ Tidak Pernah / *Never once*



BAHAGIAN 2 : PENGETAHUAN TERHADAP PEMAKANAN SAYURAN DAN PERKAITANNYA DENGAN JANGKITAN PARASIT.

PART 2: KNOWLEDGE TOWARDS VEGETABLE CONSUMPTION AND THE ASSOCIATION WITH PARASITIC INFECTION.

Pernyataan di bawah menerangkan tentang pengetahuan terhadap pemakanan sayuran dan perkaitannya dengan jangkitan parasit. Kenal pasti pengetahuan anda dengan menandakan (✓) satu jawapan yang terbaik bagi setiap pernyataan dan sub-pernyataan berikut.

The statements below are related to knowledge towards vegetables consumption and its association with parasitic infection. Identify your knowledge by marking (✓) for the best answers in each of the following statements and sub-statements.

No	Pernyataan Statement	Pilihan jawapan(✓) Answer options (✓)		
		Ya Yes	Tidak No	Tidak pasti Unsure
1.	Pernahkah anda mendengar mengenai penyakit bawaan makanan yang disebabkan oleh parasit? <i>Have you heard about the foodborne parasitic diseases?</i>			
2.	Pernahkah anda mendengar mengenai risiko untuk mendapat jangkitan parasit melalui pemakanan sayuran? <i>Have you heard about the risk of getting parasitic infections through eating vegetables?</i>			
3.	Adakah anda tahu apakah parasit yang boleh dijangkiti melalui pemakanan sayur-sayuran? <i>Do you know which parasites can be transmitted through vegetables consumption?</i>			
	a. Helminths tanah / Soil transmitted helminths			
	b. Protozoa usus / Intestinal protozoa			
	c. Malaria / Malaria			

4.	Apakah simptom penyakit parasit usus? <i>What are the symptoms of intestinal parasitic diseases?</i>			
	a. Cirit-birit / <i>Diarrhea</i>			
	b. Muntah-muntah / <i>Vomiting</i>			
	c. Sakit perut / <i>Abdominal pain</i>			
	d. Pucat / <i>Pallor</i>			
	e. Najis berdarah / <i>Bloody stool</i>			
	f. Demam / <i>Fever</i>			
5.	Apakah komplikasi jangkitan parasit usus? <i>What are the complications of intestinal parasitic diseases?</i>			
	a. Anemia / <i>Anaemia</i>			
	b. Pengurangan berat / <i>Weight Loss</i>			
	c. Terbantut / <i>Growth stunting</i>			
	d. Penyahhidratan / <i>Dehydration</i>			
	e. Kematian / <i>Death</i>			
6.	Adakah anda tahu parasit boleh mencemari sayur-sayuran dari sumber lain seperti penggunaan baja asli dan sistem pengairan di ladang? <i>Do you know parasites can cross-contaminate to vegetables from other sources such as the use of manure and irrigation water system in the farm?</i>			
7.	Pada pendapat anda, adakah anda berisiko untuk mendapat jangkitan parasit dari pengambilan sayur-sayuran di Malaysia? <i>In your opinion, is there any considerable risk of contracting a parasitic infection from raw vegetable consumption in Malaysia?</i>			
8.	Pada pendapat anda, apakah jenis sayur-sayuran yang mempunyai risiko untuk mendapat jangkitan parasit sekiranya memakan secara mentah atau ulaman? <i>In your opinion, what are the types of vegetables that can contribute to the risk of getting parasitic infection if we eat it as raw?</i>			
	a. Saderi / <i>Celery</i>			

	b. Salad / <i>Lettuce</i>			
	c. Pegaga / <i>Centella asiatica</i>			
	d. Timun / <i>Cucumber</i>			
	e. Tomato / <i>Tomato</i>			
9.	Bagaimanakah cara untuk mengelakkan jangkitan parasit yang berkait mengenai pemakanan sayuran mentah? <i>How to prevent parasite infection that related to consumption of raw vegetables?</i>			
	a. Memastikan sayuran dan buah-buahan dibasuh sempurna <i>Make sure the vegetables and fruits are properly washed prior to eating.</i>			
	b. Memastikan sayur dimasak sempurna <i>Make sure the vegetables are properly cooked.</i>			
	c. Mengasingkan makanan mentah daripada makanan yang telah dimasak <i>Separate the raw and cooked food.</i>			
	d. Mengamalkan kebersihan diri yang baik <i>Good personal hygiene</i>			
10.	Di manakah anda mendapatkan maklumat mengenai risiko penyakit parasit melalui pengambilan sayur-sayuran? <i>Where do you get information about risk of parasitic diseases through vegetables consumption?</i>			
	a. Berita / <i>News</i>			
	b. Internet / <i>Internet</i>			
	c. Risalah / <i>Pamphlet</i>			
	d. Kawan / <i>Friends</i>			
	e. Keluarga / <i>Family</i>			
	f. Profesional kesihatan / <i>Health Professionals</i>			

BAHAGIAN 3: SIKAP TENTANG PEMAKANAN SAYURAN SECARA MENTAH PART 3: ATTITUDE ON CONSUMING RAW VEGETABLES

Pernyataan di bawah menerangkan tentang sikap sebagai pengguna terhadap pemakanan sayuran secara mentah. Anda dikehendaki menandakan (✓) dalam ruang yang disediakan. Anda dikehendaki menandakan (✓) SATU jawapan yang terbaik.

The following items describe the statements about your attitudes as a consumer when consuming raw vegetables. You are required to tick (✓) ONE best answer.

1	2	3	4	5
Sangat tidak setuju <i>Strongly disagree</i>	Tidak setuju <i>Disagree</i>	Samada setuju atau tidak setuju <i>Neither agree nor disagree</i>	Setuju <i>Agree</i>	Sangat bersetuju <i>Strongly agree</i>

No	Pernyataan Statement	Pilihan jawapan Answer options				
		1	2	3	4	5
1	Saya tidak bimbang memakan sayuran organik secara mentah (sebagai ulaman). <i>I'm not worried about eating organic raw vegetables as a salad.</i>					
2	Saya tidak bimbang memakan sayuran tidak organik secara mentah (sebagai ulaman). <i>I'm not worried about eating inorganic raw vegetables as a salad.</i>					
3	Saya tidak bimbang memakan sayuran mentah (ulaman) di kedai makan. <i>I'm not worried about eating raw vegetables (salads) which I bought from the food premises.</i>					
4.	Saya memilih sayuran yang dimasak berbanding sayuran mentah (ulaman) apabila memilih makanan di kedai makan. <i>I prefer cooked vegetables over raw vegetables (salads) when I choose food at the food premises.</i>					
5.	Saya percaya sayuran mentah yang dibeli di pasar raya adalah lebih selamat berbanding sayuran yang dibeli di pasar awam. <i>I believe raw vegetables purchased in supermarkets are safer than vegetables purchased in the public market .</i>					
6.	Saya percaya kepada pengendali makanan di kedai makan akan membasuh dengan betul terlebih dahulu sayuran mentah sebelum					

	dihidangkan. <i>I believe the food handlers at the restaurant will wash properly the raw vegetables first before serving.</i>					
7.	Saya percaya semua sayuran yang dijual di Malaysia bebas daripada parasit penyebab penyakit bawaan makanan. <i>I believe all vegetables sold in Malaysia are free from foodborne parasitic diseases.</i>					
8.	Saya percaya semua sayuran yang ditanam di ladang tidak dicemari oleh parasit. <i>I believe all vegetables grown in the farm are not contaminated by parasites.</i>					
9.	Saya akan pastikan gred kebersihan premis dalam membuat pemilihan kedai makan. <i>I will make sure the premises have a clean grade when selecting a restaurant to eat.</i>					
10.	Saya akan melaporkan kepada pihak berwajib sekiranya penyediaan sayuran mentah tidak bersih di dalam premis makanan. <i>I will report to the authorities if the preparation of raw vegetables is not clean at a food premise.</i>					
11.	Saya perlu berjumpa doktor sekiranya saya mempunyai simptom-simptom jangkitan parasit melalui bawaan makanan <i>I need to see doctor if I have symptoms related to foodborne parasitic infection</i>					
12.	Saya percaya wabak makanan adalah kejadian kehidupan semula jadi. <i>I believe foodborne outbreaks are a natural life event.</i>					
13.	Saya percaya sayuran di Malaysia selamat dimakan tanpa dibasuh sempurna <i>I believe that vegetables in Malaysia are safe to be consumed without proper washing.</i>					

BAHAGIAN 4: AMALAN TERHADAP PENCEGAHAN JANGKITAN PARASIT
PART 4: PRACTICE ON PARASITIC INFECTION PREVENTION

Perkara di bawah menerangkan tentang amalan anda sebagai seorang pengguna terhadap pencegahan jangkitan parasit. Anda dikehendaki menandakan (✓) dalam ruang yang disediakan

The following items describe the statements about your practices as a consumer on parasitic infection prevention. Please answer ALL the questions below by placing a tick (✓) in the box which best describes you.

	1 Tidak pernah <i>Never</i>	2 Jarang-jarang <i>Seldom</i>	3 Kadang-kadang <i>Sometimes</i>	4 Selalu <i>Always</i>
No	Pernyataan Statement			
1	Saya membasuh tangan sehingga bersih sebelum makan. <i>I wash my hand clean before eating.</i>			
2	Saya menggunakan sabun cecair berbanding sabun buku apabila membasuh tangan. <i>I will use liquid soap over bar soap when washing my hands.</i>			
3	Saya membasuh sayuran dengan air bersih sebelum memakannya mentah. <i>I wash the vegetables with clean water before eating them raw.</i>			
4.	Saya membasuh sayuran dengan pencuci sayuran sebelum memakannya mentah. <i>I wash the vegetables with a specific vegetable wash before eating them raw.</i>			
5.	Saya tidak memilih kedai makan yang tidak mempamerkan gred kebersihan. <i>I don't choose a restaurant that doesn't show they have a good clean grade.</i>			
6.	Saya tidak memilih kedai makan yang mempunyai gred kebersihan rendah. <i>I do not choose restaurants that have low clean grade.</i>			
7.	Saya menggunakan pisau yang berasingan untuk memotong daging dan sayuran. <i>I use a separate knife to cut meat and vegetables.</i>			

8.	Saya menggunakan papan pemotong yang berasingan untuk memotong sayur dan daging. <i>I use a separate cutting board to cut vegetables and meat.</i>				
9.	Saya mendapatkan khidmat rundingan daripada doktor sekiranya saya bergejala <i>I consult a doctor when I have symptoms related to foodborne parasitic infection</i>				

