

RESEARCH ARTICLE

Assessment of food safety knowledge, attitudes and practices among home-based food consumers in Kubang Pasu District

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Abstract:

The COVID-19 pandemic restrictions have led to the growth of home-based online food businesses. The objective of this cross-sectional study was to assess the present status of food safety knowledge, attitudes and practices (KAP) among home-based food consumers in Kubang Pasu district. A validated, reliable online questionnaire was distributed among the community via social medial platforms. A total of 150 participants completed the questionnaire. The result showed that home-based food consumers had moderate attitudes (56.6 ± 15.3) and practices (61.3 ± 18.4) but have poor knowledge (49.5 ± 14.7) of food safety. Further statistical analysis using Chi-square test revealed that gender and monthly income were the factors associated with food safety knowledge, whereas gender and current employment status were the factors associated with food safety practices ($p < 0.05$). The study suggested that some aspects related to cross-contamination and time-temperature control should be given more attention. Therefore, awareness of food safety among home-based food consumers should be strengthened to prevent occurrence of food borne disease by taking into account the factors associated with the KAP. Food safety education should not only focus on theoretical aspects of knowledge but also positive attitudes towards food safety and promote good food safety practices.

Keywords: Consumers, Food safety, Home-based vendors, KAP, Kubang Pasu

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1. INTRODUCTION

Opening a food business is not a simple task. Many regulatory requirements that must be met by the owners of the food premises prior to and during selling their products. In Malaysia, there are requirements for food safety standards such as Food Act 1983, Food Regulation 1985, and Food Hygiene Regulations 2009 to protect the public against food related hazards and frauds. According to the Food Act 1983, food premises are defined as premises that are used to prepare, package, storage, transport, distribute or sale of any food reprocess or process food which includes home-based food business. Home-based food business is referred to the handling of food in a private home for purpose of sale include preparing of food for local markets, school canteens, catering for events and online food sales from home (Food Standard Australia and New Zealand, 2021).

Food premises in Malaysia must follow requirement in Food Hygiene Regulations 2009 such as food premises must register with Ministry of Health Malaysia, have food traceability system from production to distribution, location of food premises are away from sources of contamination and maintained in good condition. Besides that, food handlers which are defined as individuals who are directly involved in the food preparation also must follow the requirement under Food Hygiene Regulation 2009. Most important requirement is all food handlers are compulsory to

be trained or attending food handler course conducted by Food Training School that approved by Ministry of Health Malaysia and getting typhoid vaccination (MOH,2009).

The pandemic of COVID-19 has resulted in an increased unemployment rate of 4.95% in January 2021 (MOE,2021). This is the direct result of business shutdown and global lockdowns, causing employees to lose their jobs (Daim and Yunus, 2021). Due to the movement control order (MCO) in Malaysia, many food businesses have switched to online delivery-based methods to reach out the customers (Ikbal, Abdullah and Rahman, 2021) where about 44% of home-based food sellers started their business after the first lockdown (Shaw, 2021). Unfortunately, lack of regulations has increased the likelihood of foodborne diseases where evidence indicates that many cases of food-borne disease outbreaks are frequently related to home-prepared food (Azanza et al., 2018). Therefore, food safety issues should not be compromised in ensuring the quality of the food to be served is safe and secure from any harm (Sesotec, 2020). Moreover, awareness about food safety remains as a major issue for consumers in many countries whether in develop or developing countries (Odeyemi et al., 2019).

Most home-based food sellers are not aware of the importance of food safety during handling and preparing food at home. About 40.5% of food-borne outbreaks occurred at home (EFSA, 2019). The main risk factors

associated with reported food-borne illnesses at home are poor cooking, cross-contamination, and obtaining foods from an unsafe source (EFSA, 2015). Other risk factors related to home-based food sellers include clean water supply, environmental cleanliness and the quality of food that can threaten the customer's health (Osman, 2020). In addition, not all houses have a dedicated home kitchen space for food-related activities only. Some houses have to use the kitchen area for other daily activities such as laundry, school or work activities, socializing area due to limited space and even pets are free to roam around the house including the kitchen (Wills et al., 2015; Izyan et al., 2019).

Furthermore, home-based food sellers that deliver the food to the customers were untrained in food safety which can pose a risk to the consumer's health because the food can be contaminated if it is not packed properly and kept in the correct temperature (Limon, 2021). Moreover, the majority of the customers who order food through online platforms are not able to see whether their orders were prepared in a clean and hygienic manner. In 2020, we were shocked by one incident of death due to food poisoning after eating 'pudding buih' dessert purchased from an online home-based vendor. Another 99 victims suffered from diarrhea, vomiting and fever (Bernama, 2020). Investigations found that the usage of expired eggs by the trader for the making of the dessert was the source of food poisoning. So far, there are no changes in the existing Food Act in Malaysia to enforce regulations against those involved in the online food business (Osman, 2020). Therefore, it is very important to evaluate awareness of food safety in any society to obtain better health results (WHO, 2022).

At present, there are limited studies have been performed to assess food safety knowledge, attitudes and practices among home-based food consumers in Malaysia, especially in Kubang Pasu district. Therefore, this study aims to fill this gap by determining the level of food safety knowledge, attitude and practice (KAP) among home-based food consumers in Kubang Pasu district, Kedah and identify the relationship between demographic features with the knowledge, attitude and practice (KAP) scores.

2. MATERIALS AND METHODS

2.1 Study design, sample size and sampling

This cross-sectional study was conducted among home-based food consumers in Kubang Pasu district, Kedah using an online questionnaire. From the data, the relation between food safety KAP among home-based food consumers can be determined. According to the Department of Statistics (2020), the population size of Kubang Pasu is estimated to be 254,200 in 2020.

The sample size for this study was calculated using Raosoft software as suggested by previous researchers (Rajiah et al., 2015; Zulkarnain et al., 2022). The sample size was

calculated by keeping the margin of error at 8%, confidence interval at 95% and population size of 254,200. From the calculation, the number of sample size required for this study was 150.

An electronic questionnaire was prepared in Google Form and the link was distributed using social media such as WhatsApp, Facebook and Telegram within the Kubang Pasu community. This study successfully recruited 150 participants using a snowball sampling method, following similar approach from previous studies (Zulkarnain et al., 2022) where potential participants to take part in this study was approach and then, the participants were encouraged to share the link to recruit future participants among their acquaintances who are living in Kubang Pasu. The individuals who participated in this research had to be Kubang Pasu residents who had eaten home-based foods sold in the district at least once. The participants were provided with all the necessary information regarding the study, and at the beginning of the electronic questionnaire, their consent was requested by clicking the acceptance button. The participants were also informed that their involvement in the study was completely voluntary, and they were free to refuse to participate or withdraw at any time. The identity of the participants is kept anonymous.

2.2 Research instrument

The questionnaire for this study was adapted from the published article (Izyan et al., 2019). There are four sections in the questionnaire which were Section A (demographic information), B (food safety knowledge), C (food safety attitudes) and D (food safety practices). For each correct answer, a score of 1 was given while a score of 0 was given for wrong answer or "not sure". The total score for each domain was converted into percentage. A score of <50% is considered as having either poor knowledge, attitudes or practices towards food safety. A score between 50% to 75% is considered as moderate, while >75% is considered as good. The questionnaire was prepared in Malay and English languages. The validity and reliability of questionnaire was also tested through a pilot study and Cronbach's alpha coefficient was found to be 0.753.

2.3 Data analysis

Statistical Package for Social Science (SPSS for Windows version 20.0) was used to analyze the data obtained from this study. The demographic data, knowledge, attitudes and practices scores of participants was summarized using descriptive statistics in terms of percentage and frequency. Furthermore, the Chi-square test was used to identify the relationship between demographic factors with food safety knowledge, attitudes and practices (KAP) among home-based food consumers in Kubang Pasu District. The

significant value and confidence interval was set at 0.05 and 95% respectively.

3. RESULTS AND DISCUSSION

3.1 Demographic characteristics of the study participants

Table 1 summarized the demographic information for the participants in this study. Majority of the participants were between 46 to 55 years old (32.7%) with 66.6% female. Out of the 150 participants, 59.3% had a bachelor’s degree and 33.3% earned less than RM2,500 per month. Most participants were working full time (62.0%).

Table 1. Demographic characteristics of the study participants (n = 150)

Variable	Frequency, n	Percentage, %
Gender		
Male	50	33.3
Female	100	66.6
Age		
18- 25 years	37	24.7
26- 35 years	22	14.7
36- 45 years	25	16.7
46- 55 years	49	32.7
56- 65 years	17	11.3
Highest education level		
Form 6/ Certificate/ Diploma	49	32.7
Bachelor’s Degree	89	59.3
Master’s Degree	10	6.7
Doctorate’s Degree (PhD)	2	1.3
Current employed status		
Working full time	93	62.0
Working part time	9	6.0
Studying	25	16.7
Retired	11	7.3
Unemployed	12	8
Monthly income		
< RM 2,500	50	33.3
RM 2,501- RM 3,170	13	8.7
RM 3,171- RM3,970	8	5.3
RM 3,971- RM 4,850	12	8.0
RM 4,851- RM 5,880	13	8.7
RM 5,881- RM 7,100	38	25.3
RM 10,971 -RM 15,040	16	10.7

Figure 1 illustrates the participant's response to the question on whether they were confident in the food safety prepared by home-based vendors. The findings indicated that most participants sometimes (n=44) and rarely (n=32) had confidence in the safety of the food prepared by the home-based vendors. This result is consistent with the findings of a previous study, which showed that the majority of the respondents were not always confident about food safety when they purchased food from home-based vendors (Al Banna et al., 2022).

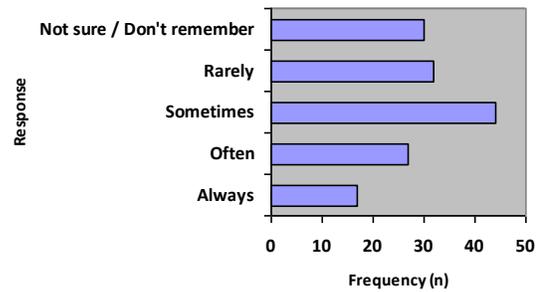


Figure 1. Confidence in the food safety prepared by home-based vendors

Figure 2 illustrates the participant's response to the question on the reasons for buying food from home-based vendors. Majority of the participants voted that saving their time was the main reasons for buying food from home-based vendors (62.0%). This finding is consistent with the previous research where consumers nowadays more preferred buy readymade meals that can save time (Raj, Suvadashini and Mishra, 2021). Participants also voted that easy to access (50.0%) and affordable price (50.0%) were another reason for buying the food, which is parallel with the finding from previous study (Al Banna et al., 2022). Although previous studies (Al Amin et al., 2020; Kumar et al., 2020) showed that consumers consider recommendations from friends and influencer regarding popular foods or beverages before making online food purchases or visiting any restaurants, the findings from this study are in contrast, showing that purchasing food from home-based vendors is now the least common reason (26%) for doing so.

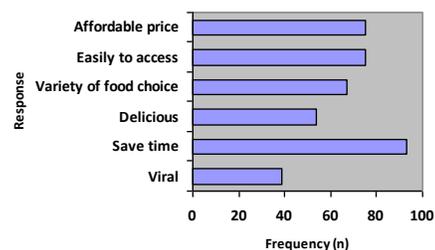


Figure 2. Reasons for buying food from home-based vendors

Figure 3 illustrates the participant's response to the question on whether they experienced any sign and symptoms of food poisoning after eating food bought from home-based vendors. This study revealed that the majority of the respondents did not experience any sign and symptoms of food poisoning after eating food bought from home-based vendors (83.3%). This study is pertinent to the cases of food poisoning recorded by the Malaysian Ministry of Health for the year 2021, when the number of cases reported was decreased 57% from the same period last year (Radhi, 2021). However, a study by Manko (2018) found more than half of the participants had an illness after eating the foods that

bought from food vendors such as upset stomach. Moreover, a study among food service operators in Kedah district include Jitra and Kubang Pasu reported that attitude of food service operators during preparation of food were synonymous with the occurrence of food poisoning incidence (Fatin, 2020).

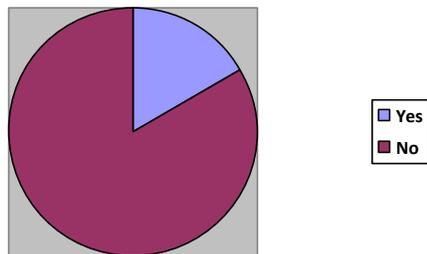


Figure 3. Experienced to food poisoning sign and symptom

Homes are acknowledged as one of the main places where the majority of food poisoning incidents take place (Maurer et al., 2008; Spittler, 2009; Redmond & Griffith, 2009), despite the fact that many consumers do not believe that homes can be a risky location for food poisoning. Home kitchens were multifunctional spaces with a lot more than just preparation and storage space. Home kitchens are used for a variety of purposes, which increases the risk of the entry of germs that can proliferate, spread, and contaminate food. *Salmonella*, pathogenic *Escherichia coli*, *S. aureus*, and *Campylobacter* are a few of the pathogens that have been identified in domestic kitchens (Byrd-Bredbenner et al., 2013). Moreover, there were studies that have found that the kitchen is more heavily contaminated with fecal coliforms than bathrooms (Borrusso and Quinlan, 2017).

3.2 Knowledge of food safety

Table 2 summarized the findings on food safety knowledge among home-based food consumers in Kubang Pasu District. Overall, participants in this study have poor knowledge on food safety (49.5±14.7). Even so, 96.7% of the participants correctly answer questions regarding personal hygiene is vital to ensure food safe during food preparation. This study outcome is in line with Izyan et al. (2019) which all most of participants agreed with the statement that personal hygiene is important to ensure safety of the food during preparation of the food. Besides that, 73.3% of respondent aware that home-based food sellers need to register under Food Safety Information of Malaysia (FoSIM). According to Chairman of Health and Environment Committee, home-based vendors are encouraged to register with FoSIM under Ministry of Health. Malaysia The registration of FoSIM was to help the home-based food business comply with the official guidelines on

food safety (Yeoh, 2020). Moreover, 89.3% of the participants were correct to questions regarding hand-washing procedures that is washing of hands with soap and water could reduce contamination of hands. The study outcomes are in line with reported by Abdul -Mutalib et al. (2012) that participants exhibited a high level of knowledge on hand-washing procedures and a recent study by Heard & Mori (2021) reported that COVID-19 pandemic had encouraged consumers to wash their hands more frequent and thoroughly before preparing or cooking the food compared before the pandemic.

Table 2. Food safety knowledge among home-based food consumers in Kubang Pasu District.

Statement	Correct (%)	Wrong (%)
1. Taking care of personal hygiene is vital to ensure safe food preparation.	96.7	3.3
2. Home-based food sellers need to register under FoSIM (Food Safety Information of Malaysia)	73.3	26.7
3. Wearing a watch during food preparation can cause food contamination.	57.3	42.7
4. Washing hands using warm water and soap before handling food reduces the risk of food contamination.	89.3	10.7
5. The use of mouth cover can reduce the risk of food contamination	92.0	8.0
6. Cooked food cannot be kept more than 4 hours at room temperature.	4.7	95.3
7. Foods “temperature danger zone” are between 5°C to 63°C.	39.3	60.7
8. The safe temperature of cooked food should be above than 63°C or below than 5°C.	40.7	59.3
9. Improper holding temperature of food is the leading factor of foodborne illness.	70.7	29.3
10. Freezer storage practices prevent the growth of harmful Bacteria.	83.3	16.7
11. Leftover cooked food can be kept in a refrigerator for more than 4 days.	40.7	59.3
12. Cooked food can be reheated many times.	48.7	51.3
13. Reheating food is more likely to contribute to food poisoning.	50.0	50.0
14. Preparation of the food in advance is more likely to contribute to food poisoning.	57.3	42.7
15. It is critical that the sources of the food are checked to ensure	92.7	7.3

that it is safe.

16. First-in first-out” (FIFO) method ensures the earlier ordered foods are used first.	72.0	28.0
17. The same towel can be used to wipe equipment, hand and table.	84.7	15.3
18. Food can be prepared on the floor if there is not enough working table.	75.3	24.7
19. Typhoid injection can prevent food handlers from typhoid infection.	70.7	29.3
20. Cross-contamination occurs when raw foods are stored together with ready-to-eat foods.	75.3	24.7
21. Cross contamination is one of the factors that contributed to food poisoning.	80.0	20.0
Total	^a 49.5±14.7	

^aTotal (Mean ± standard deviation) score of the participants.

There were same percentages (50%) of correct and wrong for statement regarding reheating food is more likely to contribute to food poisoning. A study by Abdullah & Ismail (2021) reported that food poisoning outbreaks in this study were caused by inadequate cooking and reheating (57.1%). There was a similar finding from MOH report, where 50% of food poisoning outbreaks were caused by improper handling of food procedures, such as prolonged handling and inadequate cooking and reheating (MOH, 2007). Besides that, there were (95.3%) of the participants gave incorrect responses regarding cooked food cannot be kept more than 4 hours at room temperature whereas more than (59.3%) of them gave incorrect responses related to leftover cooked food can be kept in refrigerator for more than 4 days. A study from Odeyemi et al. (2019), reported that many consumers were not aware of the likelihood of the food getting spoiled if left at room temperature for long. Moreover, similar findings by Webb & Morancie (2015) and Faour-Klingbeil et al. (2015) where majority of their participants had limited knowledge related to food temperature requirements.

According to CDC, the food cannot be left out at room temperature for more than 2 hours. Besides that, Hassan et al. (2014) reported that increase the surface temperature in Malaysia between the ranges of 2.7 °C–4.0 °C per century in past 400 years give effect to food poisoning outbreak. Furthermore, the hot and humid climate of our country can promote the growth of food-borne pathogen which can spread faster in the unsanitary environments especially in kitchen which usually the temperature was higher than at the dining room (Abdul-Mutalib et al., 2015). Therefore, the consumers are urged to adopt and adapt the WHO “The Five Keys to Safer Food Program” as outlined by the organization (WHO, 2022).

3.3 Food Safety Attitudes

The attitudes of home-based food consumers in Kubang Pasu district towards food safety is summarized in Table 3. Overall, participants in this study have moderate food safety attitudes (56.6 ±15.3). In this study, 86.6% of participants strongly felt that food should not be touched with a wounded hand. A similarly study by Sani & Siow (2014) reported that 82.8% of participants were aware about the danger of handling food with wounded hands but Faour-Klingbeil et al. (2015) reported that 43% of their participants were disagreed with this statement because they believe that food-borne pathogens cannot be transmitted through wounds if wounds were properly covered with the waterproof bandages.

88% of the participants agreed that hands should be washed by using water and soap before food preparation while 85.3% of participants agreed that working with dirty hands should be avoided but 14.7% of participants disagree with that statement. The previous study by Abdul-Mutalib et al. (2012), Al-Shabib et al. (2017), and Izyan et al. (2019) reported almost all participants agreed that hand washing is compulsory before food handling. According to CDC, handwashing is very important during food preparation because the germs can spread easily such as before, during, and after preparation of any food.

Table 3. Food safety attitudes among home-based food consumers in Kubang Pasu District.

Statement	Disagree (%)	Agree (%)
1. Food should not be touched with a wounded hand.	13.3	86.6
2. Defrosted food should not be refrozen.	35.3	64.7
3. Separate kitchen utensils must be used to prepare raw and cooked food.	16.7	83.3
4. Raw food and cooked food need to be kept separately.	14.0	86.0
5. The same towel can be used to clean different places.	84.7	15.3
6. Jewellery such as ring can be worn while handling food.	81.3	18.6
7. We should not rub our hand on the face while handling food.	26.0	74.0
8. The apron can be used as a towel to clean hand.	86.7	13.3
9. We must cover our mouth and nose when sneezing.	13.3	86.7
10. Working with dirty hand should be avoided.	14.7	85.3
11. Hands should be washed by using water and soap before preparing food.	12.0	88.0
Total	^a 56.6 ±15.3	

^aTotal (Mean ± standard deviation) score of the participants.

3.4 Food safety practices

Table 4 summarized the findings on food safety practices among home-based food consumers in Kubang Pasu District. Overall, participants in this study have moderate practices on food safety (61.3 ±18.4). Most of participants in this study were found sometimes touch unwrapped food with bare hands (60%) and a similar study by Mama & Alemu (2016) found more than half of the respondent likely to touch food with bare hands and this practice had statistically significant association with the pathogen’s infection. Moreover, study by Lieong, et al. (2017) found that 54.1% of consumer in Kuala Lumpur are still choose the food seller that touch the food with bare hand. Besides that, more than half of the participants (74.7%) sometimes refreeze defrosted food.

A similar study from Abdul-Mutalib et al. (2012) reported that about 83% of the participants are do not know about refreezing defrosted food while a study by Al-Shabib et al. (2016) found that 85% of the participants were aware about the defrosted foods should only refrozen once. The repeated thawing and refreezing of the food can pose a danger due to the increased number of microorganisms in the food. The previous studies by Buccheri et al. (2007) and Tokuc et al. (2009) also found similar results regarding the thawing and refreezing of the food. There was a similar result between never and sometimes use the same towel to clean different places (46.7%). According to Al-Shabib et al. (2016), about 50% of the participants always used that same towel to clean many places. This study was contrast with reported by Sani & Siow (2014) where more than 97.4% of the participants would use different clean clothes to wipe dining tables and food utensils but the finding by Abdul-Mutalib et al. (2012) found more than 40% of the participants’ use the same towel to clean many places.

Most of participants showed good food safety practices by always keeping the raw food and cooked food separately (64.7%), clean the work area before start working (62%) and wash hands by using water and soap before start work (63.3%). Many previous studies reported that it is very important to practice self -hygiene especially hand hygiene because hand is the major agent that transmit microorganisms and intestinal parasites to foods (Aarnisalo et al., 2006). However, some respondent practice showed can cause directly or indirectly food poisoning or cross-contamination such as touch the food with bare hands, refreeze defrosted of food and wear jewerelly when handling the food.

Table 4. Food safety practices among home-based food consumers in Kubang Pasu District

Statement	Never (%)	Sometimes (%)	Always (%)
1. I touch unwrapped food with a bare hand.	35.3	60.0	4.7
2. I refreeze defrosted foods.	18.7	74.7	6.7
3. I use separate kitchen	10.6	34.6	54.7

utensils to prepare raw and cooked food.			
4. I keep raw food and cooked food separately.	8.6	26.7	64.7
5. I use the same towel to clean different places.	46.7	46.7	6.6
6. I wear jewellery while handling food.	50.0	42.7	7.3
7. I rub my hand on my face while handling food.	58.0	37.5	4.0
8. I clean the work area before start working.	7.3	30.7	62.0
9. I use my apron as a towel to clean my hand.	56.0	40.0	4.0
10. I chew gum while cooking.	86.0	12.0	2.0
11. I wash my hands by using water and soap before start work.	9.3	27.3	63.3
12. I use a tissue to cover my nose and mouth when I am sneezing.	10.0	32.0	58.0
Total	^a 61.3 ±18.4		

^aTotal (Mean ± standard deviation) score of the participants.

3.5 Relationship between demographic factors and food safety KAP levels among home-based food consumers in Kubang Pasu District

Table 5 summarized the relationship between demographic features with the level of food safety knowledge, attitudes and practices (KAP) among home-based food consumers in Kubang Pasu District. The results found that the gender and monthly income had statistically significant with the food safety knowledge ($p<0.05$). A study by Tuglo et al. (2021) also reported that there were statistically significant between food safety knowledge with monthly income while a study by Stratev et al. (2017) found that the result showed there were no significant between gender and food safety knowledge. Moreover, the studies by Abdul-Mutalib et al. (2012), Ncube et al. (2020) and Ahmed et al. (2021) also did not find any significant between the participants’ food safety knowledge and demographic factors such as age and gender.

Besides that, there was no significance found between the food safety attitude and the demographic factors. This finding is consistent with study by Ncube et al. (2020). However, a recent study by Ahmed, Akbar and Sadiq (2021) reported that current job was statistically significant with food safety attitude. There were statistically significant found between gender and employment status with food safety practices ($p<0.05$). However, a previous study by Abdul-Mutalib et al. (2012) found that there was no

significant relationship between food safety practices and gender. Meanwhile, the same study by Ahmed et al. (2021) found that age, gender and current job were significantly with food safety practices.

Table 5. Relationship between demographic factors and food safety KAP levels

Variable	Knowledge		Attitude		Practices	
	χ^2	P-value	χ^2	P-value	χ^2	P-value
Gender	4.770	0.029*	3.646	0.056	8.254	0.004*
Age	9.689	0.046	4.743	0.316	7.254	0.123
Current employment status	8.122	0.087	4.191	0.381	10.934	0.027*
Monthly income	18.817	0.004*	5.928	0.431	6.663	0.353

* p-value is significant at <0.05

4. CONCLUSION

This study concludes that the level of food safety knowledge, attitude and practices (KAP) of home-based food consumers in Kubang Pasu district were satisfactory. However, some of the food safety knowledge need to be emphasis such as time- temperature control and cross-contamination. The relationship of demographic features with scores of food safety knowledge, attitudes and practices (KAP) showed that there were statistically significant between knowledge scores and practices scores with demographic features while no significant found for food safety attitudes. The food safety knowledge scores found that the gender and monthly income had statistically significant while for food safety practices had statistically significant with gender and current employment status.

The continuous education of food safety is important to increase awareness among home-based food consumers for prevent possible cross-contamination which can cause foodborne disease. Early education about food safety such as at school and kindergarten is crucial for them to have better understanding regarding food safety and also children is one of the categories of high risk with food poisoning. Education about food safety must not only focus on theoretical aspects of knowledge but also the positive attitudes towards food safety and promote good food safety practices. The foodborne disease outbreak which related to home-based vendors can be reduced when each and every one of us especially the consumers has enough awareness regarding food safety.

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