

Cross-sectional study on food safety knowledge, attitude, and practices of food handlers in the CBD area, Kota Kinabalu, Sabah

Suriana Salasan, Mansoor Abdul Hamid, Shalawati Salwa Ibrahim

Faculty of Food Science and Nutrition, University of Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia.

Corresponding author*

surianasalasan@gmail.com

Abstract: Every year, diseases caused by contaminated food and water have caused the death of up to 2 million people, especially amongst children. However, some challenges prevent food handlers from adhering to proper food handling practices. Thus, this cross-sectional study, conducted from September 2024 to February 2025, aims to identify the levels of knowledge, attitude, and practice (KAP) among food handlers at food premises licensed by local authorities in the Central Business District (CBD) area of Kota Kinabalu. A total of 351 food handlers from restaurants were surveyed through a descriptive quantitative questionnaire, and the data were analysed using SPSS version 30.0 software. The result demonstrates that the food handlers have a good level of knowledge (4.41 ± 0.49), a very positive attitude (4.58 ± 0.44), and a very good level of practice (4.58 ± 0.43) in food safety. The food handlers have very good practices of preparing food on the table and not on the floor (4.73 ± 0.45), while the lowest score, but still of a good level, was about food handlers' understanding that taking anti-typhoid injections is intended to prevent typhoid fever (4.25 ± 0.78). Demographic factors such as age, education, salary, training, and work experience influence the KAP of food handlers. A positive association between knowledge and attitude ($r_p = 0.75$, $p < 0.01$), knowledge and practice ($r_p = 0.57$, $p < 0.01$), and practice and attitude ($r_p = 0.60$, $p < 0.01$). This is an indicator for policymakers to review and improve law enforcement, as well as provide guidance to food premises operators in planning selective food safety training based on the KAPs of CBD area food handlers.

Keywords: Knowledge-Attitude-Practice (KAP); Food Safety; Central Business District (CBD).

Introduction

Food is vital for human health and a necessity in everyone's daily life, as it provides energy and maintains human bodily functions. However, food contamination is a major public health concern, as foods can be contaminated by microorganisms (bacteria, viruses, parasites, and fungi), chemical contaminants (pesticides, heavy metals, and additives), allergens, and other substances at any stage from production to consumption that have detrimental effects on human health, known as foodborne disease (Delahoy et al., 2023; Gelen et al., 2024). Food handlers' behaviour significantly influences food contamination risks, stemming from various improper practices such as improper holding times and temperatures, lack of food

storage facilities, inadequate cooking or thawing, cross-contamination, insufficient cooking, poor personal hygiene, food from unsafe sources, and particularly handwashing and touch-based events (Kirchner et al., 2023). Even though food contamination can occur at any point in the production chain, food handlers seem to be a major source of food contamination that can lead to disease outbreaks (Engdaw et al., 2023). Hence, food handlers could also play a significant role in ensuring food hygiene (Errico et al., 2022). The knowledge and attitude of food handlers play an important role in defining their food safety practices. Improper practices during the preparation of food and unhygienic conditions in food preparation areas may cause outbreaks of food-borne diseases (Azanaw et al., 2022).

Previously, researchers have analysed food safety knowledge, attitudes, and practices (KAP) of food handlers to assess the prevailing conditions of food safety in selected regions (Afifah et al., 2020). Various studies have also associated the knowledge, attitude, and practices of food handlers with their demographic characteristics, such as age, gender, and level of education (Rupok et al., 2024; Nasir & Ezzaddin, 2025).

The Food Act 1983 and food regulations on food premises in Malaysia are overseen by the Ministry of Health Malaysia, and the Local Authority for the Kota Kinabalu area, overseen by the Kota Kinabalu City Council (DBKK), is responsible for implementing food safety standards and bylaws in the district and conducting restaurant inspections to ensure that they comply with the set standards. According to the registration list provided by DBKK, there are 593 registered restaurants in the CBD area, and anti-typhoid vaccination and food handler training are mandatory, where each food handler must undertake a basic food safety training programme to qualify as a food handler. In Kota Kinabalu, official statistics on foodborne outbreaks are limited due to the lack of surveillance and reporting systems, especially in the CBD area. In Kota Kinabalu, the food poisoning situation is still under control. Referring to data on food poisoning incidents at the Sabah State Health Department Regional Office (JKNS, 2023), there has been a decrease in poisoning incidents over the 5 years from 2019 to 2023. However, foodborne illnesses remain a major public health concern, as cases are still being reported. To address the issue of poor hygiene conditions and their possible consequences, this study assessed the KAP of food handlers and their association with sociodemographic characteristics in restaurants in the CBD area, Kota Kinabalu. This study is important to investigate the KAP of food handlers in the CBD, which potentially poses a risk of foodborne illness.

Materials And Methods

Study Design

This quantitative study is a cross-sectional study that aims to assess the level of knowledge,

attitudes, and practices of food handlers regarding food safety. Next, determine if there is a relationship between those variables and the impact of sociodemographic characteristics on KAP by collecting data through a questionnaire during a six-month survey from September to February 2025. The sampling technique used was stratified random sampling due to the classification of local authorities according to the hygiene grade of food establishments. A total of 300 out of 536 restaurants and small-scale eateries were visited and agreed to participate in the study.

Study Area and Sample Size

The survey was conducted in the city centre of Kota Kinabalu. It is known as the Business Center District (CBD). Almost 2836 food handlers were working at the food establishment in the CBD. The sample size was calculated using the Slovin formula, and a total of 351 respondents were involved in this study. A total of 300 out of 536 small-scale restaurants and eateries were selected randomly from the registration list provided by the City Hall of Kota Kinabalu.

The research was primarily based on a cross-sectional survey and conducted from September 2024 to February 2025 of food handlers ($n=351$) by using stratified random sampling due to the local authority classification of food establishment cleanliness grade. A total of 300 out of 536 small-scale restaurants and eateries in the CBD were visited and agreed to participate in the study. Male respondents recorded 50.10% (176 people), while female respondents were 49.90% (175 people), and the sample calculation was done using Slovin's formula. The data collected in the structured self-reported questionnaire form, which has been divided into 4 parts, including the profile, knowledge, attitude, and practices of food handlers, was analysed using statistical techniques for the evaluation of food safety KAP scores. The reliability of the food safety knowledge questionnaire was evaluated by conducting a pilot-scale study on 35 food handlers. Then the questionnaire was modified based on the reliability test results. The mean scores of KAP were calculated and subjected to a Pearson correlation test to determine the strength and significance of

the correlation between knowledge with attitude, knowledge with practices, and attitude with practices of participants. Furthermore, the association of demographic characteristics of food handlers with their food safety KAP attributes was studied by multiple regression.

Inclusion and Exclusion Criteria

The inclusion criteria are food handlers aged 18 years and above who work at restaurants in the CBD of Kota Kinabalu. Those respondents must be able to communicate in the local language, "Melayu", or English. Meanwhile, eligible food handlers were randomly selected and briefed on the objectives of the study and the contents of the questionnaires. The assurance that their identities would be kept anonymous. The exclusion criteria were employees who did not have direct contact with the food and those who refused to be respondents.

Questionnaire Design and Pilot Study

The structured questionnaire was designed to assess food handlers' KAP regarding food safety. The questionnaire includes ten questions about socio-demographics and twelve questions that assess knowledge, attitudes, and practices. The questionnaire employs a five-point Likert scale for scoring. For the knowledge section, the responses were "very unknowledgeable", "somewhat knowledgeable", "knowledgeable", "very knowledgeable", or "don't know" to reduce the likelihood of participants selecting answers by chance. The Likert scale ranges from 1 for "very unknowledgeable" to 5 for "very knowledgeable". The response of the attitude section scoring labels being "strongly disagree", "disagree", "undecided", "agree", and "strongly agree", and the practice section scoring labels being "never", "not often", "sometimes", "most of the time", and "always". The last section of the questionnaire is for an assessment of factors that influence food handlers to adopt good practices. The response of the section scoring labels was "strongly disagree", "disagree", "undecided", "agree", and "strongly agree". The final average score for these four sections ranges from the lowest at 1 to the highest at 5.

The questionnaire was piloted by 35 food handlers, and the Cronbach's alpha values were 0.90, 0.92, 0.86, and 0.95 in knowledge, attitude, practice, and factors influencing food handlers' good practice, respectively, indicating the stability and reliability of the questionnaire. For samples of 25–40 per group, the observed alpha should be at least 0.75 to have reasonable confidence that the population value is at least 0.70. The questionnaire was modified to improve clarity and was translated into Malay and English.

Data Analysis

A statistical analysis was conducted using SPSS software version 30.0. Descriptive statistics were used to summarize the demographic factors and knowledge, attitudes, practices, and factors that influenced the good practice of the respondents. To assess the statistical correlation in average KAP scores with respect to sociodemographic characteristics, the Pearson correlation and linear regression tests were employed due to the normal distribution of data.

Results And Discussion

Result-1 Status of Knowledge, Attitude, and Practices of Food Handlers

Table 1: Mean Score Of Knowledge, Attitude, And Practices Of Food Handlers

Status	Mean Score	Interpretation
Knowledge	4.41±0.49	Good
Attitude	4.58±0.44	Very Positive
Practices	4.58±0.43	Very Good

Table 1 as referred, descriptive data analysis shows that the overall level of 'knowledge' of food handlers towards food safety in the CBD area is good with an average score of 4.41±0.49 where they understand and know the obligation to wear clean clothes when handling food with the highest average score of 4.58±0.52 followed by the lowest score of 4.25±0.78 but still within the good category range, namely knowing that anti-typhoid injections are to prevent typhoid fever. In line with the 'attitude' of food handlers, it was also positive with

an average score of 4.58 ± 0.46 , making the attitude of washing hands cleanly after leaving the toilet the highest score of 4.64 ± 0.48 , while the item with the lowest score but still in a positive attitude was taking anti-typhoid injections is important to maintain food safety, which was 4.51 ± 0.58 . The results of the food handlers' practices also show that food handling practices are also good, with an overall average score of 4.58 ± 0.43 , and the practice that received the highest score was that food handlers complied with preparing food on the table and not on the floor, which was an average score of 4.73 ± 0.45 . The lowest score of the practice item was the thing that needed to be done to replace damaged equipment with new equipment, but the range was still in a good status, with an

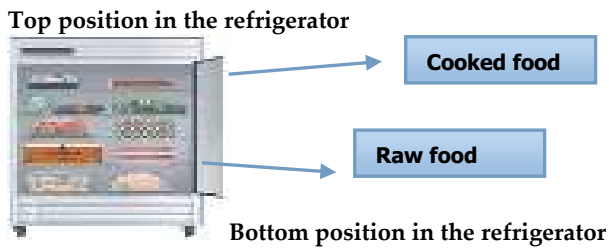
average score of 4.48 ± 0.74 . The results of the T-test determined the difference in the level of knowledge between men and women, giving a p-value of $= 0.47$ ($p < 0.05$), indicating that there was no significant difference between the knowledge of the two genders, which was not a factor determining the understanding of food handlers. This study contradicts previous studies by researchers Nasir & Izzaddin (2025), who stated that education influences practice. However, the level of education in this study shows that only knowledge is significant ($p < 0.01$), indicating a relationship compared to attitudes and practices, where no significant relationship is found ($p > 0.05$).

Table 2: Mean Score Of Respondents' Knowledge On Each Item

RESPONDENTS' KNOWLEDGE OF FOOD SAFETY	Score Mean ($\pm$s.p)
Know that anti-typhoid vaccine injections can prevent typhoid disease (Typhoid Fever).	4.25 ± 0.78
Know that you need to have a health checkup every year.	4.37 ± 0.65
Know that the Food Handling Training Certificate (SLPM) course is mandatory.	4.53 ± 0.55
Know the importance of maintaining personal hygiene when handling food.	4.58 ± 0.52
Knowing the safe temperature for food in the refrigerator and freezer reduces the risk of food spoiling.	4.38 ± 0.63
Know how to store food in covered containers.	4.49 ± 0.55
Know how to cook food at the correct temperature and time to kill germs.	4.37 ± 0.66
Know that reheating food can cause food poisoning.	4.27 ± 0.75
Know how to use the right cleaning products for equipment.	4.43 ± 0.58
Know how to report food safety problems.	4.32 ± 0.69
Know the signs of food poisoning, such as stomach pain, diarrhea, and vomiting.	4.45 ± 0.59
Know that if you are sick, you cannot prepare food and need to see a doctor.	4.48 ± 0.57

Table 3: Mean Score Of Respondents' Practices On Each Item

RESPONDENTS' PRACTICES IN FOOD SAFETY	Score Mean ($\pm$s.p)
Remove accessories such as rings/bracelet/watches when handling food.	4.56 ± 0.69
Cut nails short to ensure cleanliness and no dirt gets trapped.	4.70 ± 0.46
Prepare food on the table and not on the floor.	4.73 ± 0.45
Do not cook too early so that food does not spoil before serving.	4.56 ± 0.69
Must thaw frozen food with running water/microwave until completely soft before cooking.	4.57 ± 0.64
Separate cooked food at the top and raw food at the bottom of the refrigerator. Please refer to the diagram below.	4.49 ± 0.66



Use separate cutting boards for meat and vegetables.	4.56±0.71
Use a clean and separate towel for each use.	4.67±0.48
Must check the temperature of the heating area where cooked food is served to be above 60°C.	4.48±0.74
Must replace new equipment to replace equipment that is damaged, chipped, rusty, and cracked.	4.48±0.74
Control pests (such as rats, flies, cockroaches, and ants) to prevent the spread of disease.	4.49±0.68
Provide full cooperation and comply with all established rules and laws.	4.64±0.56

Table 4: Mean Score Of Respondents' Attitudes On Each Item

RESPONDENTS' ATTITUDES IN FOOD SAFETY	Score Mean (±s.p)
Taking an anti-typhoid injection is important to maintain food safety.	4.51±0.58
Do not touch food with sore hands.	4.56±0.50
Must wear a head covering, apron, and shoes while working.	4.60±0.49
Must wash hands thoroughly after leaving the toilet.	4.64±0.48
Be sure to wear gloves or chopsticks to prevent food from becoming contaminated.	4.58±0.53
Do not want to sneeze or cough towards food.	4.61±0.49
Use clean and good equipment to prepare food.	4.59±0.49
Must use a direct source of treated water from the Sabah State Water Department (JANS) for cooking.	4.52±0.54
It is very important to have a clean workplace before starting work.	4.58±0.49
Make sure the refrigerator where food is stored is clean at all times.	4.57±0.50
Make sure there is no smoking when handling food.	4.62±0.49
Believing in complying with food safety regulations is important.	4.61±0.51

Result-2-

Table 5: strength of correlation

Correlation coefficient (r)	Strength of association
0.00-0.19	Very Weak
0.20-0.39	Weak
0.40-0.59	Moderate
0.60-0.79	Strong
0.80-1.00	Very Strong

Source: Straightforward statistics for the behavioral sciences, Evans (1966)

Table 6: Strength Of Correlation Between Knowledge, Attitude, And Practice

Variables	Correlation coefficient (r)	Strength of association	Significance (p)
Knowledge - Attitude	0.75	Strong	p < 0.001
Knowledge - Practice	0.57	Moderate	p < 0.001
Attitude - Practice	0.60	Strong	p < 0.001

Table 6 shows the analysis revealed statistically significant positive correlations among knowledge, attitude, and practice variables ($p < .001$). A strong

correlation was observed between knowledge and attitude ($r = 0.75$), indicating that increased knowledge is closely associated with more

favourable attitudes. The relationship between knowledge and practice was moderate ($r = 0.57$), suggesting that while knowledge contributes to better practices, other factors may also influence behavioural outcomes. Meanwhile, the correlation between attitude and practice was strong ($r = 0.60$), highlighting the pivotal role of positive attitudes in shaping consistent and effective practices. These findings underscore the importance of not only disseminating information but also fostering supportive attitudes to drive meaningful behavioural change.

Conclusions

Finally, this study determined which items had the lowest average score in terms of food handler knowledge, attitudes, and practices. It emphasises the necessity of anti-typhoid injections in preventing foodborne infections, as well as avoiding using cracked, chipped, or rusted equipment, which is dangerous and must be replaced with faultless equipment. It is believed that the findings of this study would help regulators and researchers enhance food quality and safety. This is an indicator for policymakers to review and improve law enforcement, as well as provide guidance to food premises operators in planning selective food safety training based on the KAPs of CBD area food handlers. Therefore, this study is believed to make a meaningful contribution not only to academia but also to authorities and the food industry.

Acknowledgements: The authors would like to thank Dewan Bandaraya Kota Kinabalu (DBKK) for permitting us to conduct research in the CBD, Kota Kinabalu, which was funded by the State Public Service Department (JPANS). We would also like to express our gratitude to the study participants and the owners of the food establishments for their collaboration during data collection.

Conflict of Interest: All authors declare no conflicts of interest in this article.

References

- Abdul-Mutalib, N., Syafinaz, A., Sakai, K., & Shirai, Y. (2015). An Overview of Foodborne Illness and Food Safety in Malaysia. *International Food Research Journal*, 22, 896-901.
- Adam, A. (2020). Sample Size Determination in Survey Research. *Journal of Scientific Research and Reports*, 90-97. <https://doi.org/10.9734/jsrr/2020/v26i530263>
- Afifah, M., Asma, A., & Malina, O. (2020). Knowledge, attitude and practice regarding food poisoning and its prevention in Malaysia: a systematic literature review. *Journal of Food Science*, 4, 1832-1849. [https://doi.org/10.26656/fr.2017.4\(6\).145](https://doi.org/10.26656/fr.2017.4(6).145).
- Bujang, M., Omar, E., Foo, D., & Hon, Y. (2024). Sample size determination for conducting a pilot study to assess reliability of a questionnaire. *Restorative Dentistry & Endodontics*, 49. <https://doi.org/10.5395/rde.2024.49.e3>.
- da Cunha, D. T. (2021). Improving food safety practices in the food service industry. *Current Opinion in Food Science*, 42, 127-133. <https://doi.org/10.1016/j.COFS.2021.05.010>
- da Silva Cota, A., de Freitas, R. S. G., Lefèvre, F., & Stedefeldt, E. (2023). Food handlers' lack of knowledge, and misunderstanding of safe food temperatures: An analysis using the theory of social representations. *Food Research International*, 174, 113486. <https://doi.org/10.1016/j.foodres.2023.113486>
- Delahoy, M., Shah, H., Weller, D., Ray, L., Smith, K., McGuire, S., Trevejo, R., Walter, E., Wymore, K., Rissman, T., McMillian, M., Lathrop, S., LaClair, B., Boyle, M., Harris, S., Zablotzky-Kufel, J., Houck, K., Devine, C., Lau, C., Tauxe, R., Bruce, B., Griffin, P., & Payne, D. (2023). Preliminary Incidence and Trends of Infections Caused by Pathogens Transmitted Commonly Through Food — Foodborne Diseases Active Surveillance Network, 10 U.S. Sites, 2022. *Morbidity and Mortality Weekly Report*, 72, 701 - 706. <https://doi.org/10.15585/mmwr.mm7226a1>.
- Dewan Bandaraya Kota Kinabalu (2023). Kota Kinabalu : Dewan Bandaraya Kota Kinabalu. <http://dbkk.sabah.gov.my>
- Errico, E., Licata, F., Maruca, R., Costantino, N., Di Giuseppe, G., Napolitano, F., Pelullo, C., Della Polla, G., Angelillo, S., & Bianco, A. (2022). Preventing food contamination: preliminary results of a cross-sectional study among food handlers. *The European Journal of Public Health*, 32. <https://doi.org/10.1093/eurpub/ckac130.103>
- Engdaw, G. T., Tesfaye, A. H., & Worede, E. A. (2023). Food handlers' practices and associated factors in public food establishments in Gondar, Ethiopia, 2021/2022. *Heliyon*, 9(4), e15043. <https://doi.org/10.1016/j.heliyon.2023.e15043>

- Evans, J. D. (1996). *Straightforward statistics for the behavioral sciences*. Thomson Brooks/Cole Publishing Co.
- Ezzatpanah, H., Gómez-López, V. M., Koutchma, T., Lavafpour, F., Moerman, F., Mohammadi, M., & Raheem, D. (2022). Risks and new challenges in the food chain: Viral contamination and decontamination from a global perspective, guidelines, and cleaning. *Comprehensive Reviews in Food Science and Food Safety*, 21(2), 868-903.
- Fa, S. (2023). Hazards Causing Human Food Poisoning. *Food Science & Nutrition Technology*. <https://doi.org/10.23880/fsnt-16000336>.
- Fekadu, Y., Kinde, M. Z., Dagnaw, G. G., Dessalegn, B., Dejene, H., & Gessese, A. T. (2024). Knowledge, attitude, and practices on food safety among food handlers working in public food service establishments in Lemi Kura Subcity, Addis Ababa, Ethiopia. *BioMed Research International*, 2024(1), 2675894.
- Gallo, M., Ferrara, L., Calogero, A., Montesano, D., & Naviglio, D. (2020). Relationships between food and diseases: What to know to ensure food safety. *Food Research International*, 137, 109414. <https://doi.org/10.1016/j.foodres.2020.109414>
- Garcia, S. N., Osburn, B. I., & Jay-Russell, M. T. (2020). One Health For Food Safety, Food Security, and Sustainable Food Production. *Frontiers in Sustainable Food Systems*, 4, 1. <https://doi.org/10.3389/fsufs.2020.0000>
- Halim-Lim, S. A., Mohamed, K., Sukki, F. M., David, W., Ungku Zainal Abidin, U. F., & Jamaludin, A. A. (2023). Food Safety Knowledge, Attitude, and Practices of Food Handlers in Restaurants in Malé, Maldives. *Sustainability*, 15(17), 12695. <https://doi.org/10.3390/su151712695>
- Hamed, A., & Mohammed, N. (2020). Food safety knowledge, attitudes and self-reported practices among food handlers in Sohag Governorate, Egypt. *Eastern Mediterranean Health Journal*, 26(4).
- Iacoviello, L. (2021). FOOD BORNE ILLNESS. , 5. <https://doi.org/10.36648/2577-0586.5.1.E005>.
- Insfran-Rivarola, A., Tlapa, D., Limón-Romero, J., Baez-López, Y., Miranda-Ackerman, M., Arredondo-Soto, K., & Ontiveros, S. (2020). A Systematic Review and Meta-Analysis of the Effects of Food Safety and Hygiene Training on Food Handlers. *Foods*, 9. <https://doi.org/10.3390/foods9091169>
- Jebb, A., Ng, V., & Tay, L. (2021). A Review of Key Likert Scale Development Advances: 1995–2019. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.637547>.
- Kamboj, S., Gupta, N., Bandral, J., Gandotra, G., & Anjum, N. (2020). Food safety and hygiene: A review. *International Journal of Chemical Studies*. <https://doi.org/10.22271/chemi.2020.v8.i2f.8794>
- Kanda, A., Mpofu, M. W., & Nyamugure, T. (2019). Factors associated with safe food handling practices in the food service sector. *Iranian Journal of Environmental Health Science & Engineering*, 17(2), 1243–1255. <https://doi.org/10.1007/S40201-019-00424-4>
- Kaur, N., Esa, W., Zahlan, Y., Dony, J., Rahim, S., Jeffree, M., Lukman, K., Madrim, M., & Ahmad, Z. (2021). Factors of Food Premises Not Attaining "A" Grading in Sabah, Malaysia Borneo. *Universal Journal of Public Health*. <https://doi.org/10.13189/ujph.2021.090517>.
- Kirchner, M., Goulter, R. M., Bernstein, C., Lavallee, A., Schaffner, D., Chapman, B., & Jaykus, L. A. (2023). The role of hands in cross-contamination of kitchen surfaces during meal preparation. *American Journal of Infection Control*, 51(11), A44-A57. <https://doi.org/10.1016/j.ajic.2023.04.162>
- Kirk, M., Pires, S., Black, R., Caipo, M., Crump, J., Devleeschauwer, B., Döpfer, D., Fazil, A., Fischer-Walker, C., Hald, T., Hall, A., Keddy, K., Lake, R., Lanata, C., Torgerson, P., Havelaar, A., & Angulo, F. (2015). World Health Organization Estimates of the Global and Regional Disease Burden of 22 Foodborne Bacterial, Protozoal, and Viral Diseases, 2010: A Data Synthesis. *PLoS Medicine*, 12. <https://doi.org/10.1371/journal.pmed.1001921>
- Kong, Y., Zhu, X., Yang, Y., Xu, H., Ma, L., & Zuo, Y. (2024). Knowledge, attitudes, practice, and public health education demand regarding PARI prevention: A cross-sectional study among Chinese undergraduates. **Frontiers in Public Health*, 12*, Article 1387789. <https://doi.org/10.3389/fpubh.2024.1387789>
- Lim, E., Kim, J., Sul, W., Kim, J., Kim, B., Kim, H., & Koo, O. (2021). Metagenomic Analysis of Microbial Composition Revealed Cross-Contamination Pathway of Bacteria at a Foodservice Facility. *Frontiers in Microbiology*, 12. <https://doi.org/10.3389/fmicb.2021.636329>
- Nasir, K., & Ezzaddin, S. (2025). Food handlers' knowledge, attitudes, and practices regarding food safety in Sulaimani governorate, Iraq: A cross-sectional study. *Journal of Contemporary Medical Sciences*. <https://doi.org/10.22317/jcms.v11i1.1702>.
- Mohamed, K. A., Sakawi, Z., & Hussain, M. Y. (2022). AMALAN KEBERSIHAN MAKANAN DALAM KALANGAN PENGENDALI MAKANAN KANTIN SEKOLAH DI AMPANG SELANGOR. *e-BANGI Journal*, 19(1).
- Makhunga, S., Macherera, M., & Hlongwana, K. (2023). Food handlers' knowledge, attitudes and self-reported practices regarding safe food handling in charitable food assistance programmes in the eThekwin District, South Africa: cross-sectional study. *BMJ Open*, 13. <https://doi.org/10.1136/bmjopen-2022-065357>
- Robertson, O., & Evans, M. (2020). Just how reliable is your internal reliability? An overview of Cronbach's alpha (α). *PsyPag Quarterly*. <https://doi.org/10.53841/bpspag.2020.1.115.23>. **Here are three APA-style references you can cite to support

your correlation analysis between knowledge, attitude, and practice (KAP):**

Sahaharuddin, N. M., Chuweni, N. N., Abdullah, A. I., Mat Said, N. A., Teruk, K. A., & Zubir, N. (2024). *Assessment of Knowledge, Attitude and Practice (KAP) Correlation Among CFS IIUM Students Towards Sustainable Development Goals (SDGs)*. Asian Journal of Research in Education and Social Sciences, Special Issue: International Conference on Future and Sustainable Education (ICFSE). Retrieved from https://mysitasi.mohe.gov.my[https://mysitasi.mohe.g

ov.my/uploads/get-media-file?refId=e6f7c220-84a7-441b-b283-ffa13e10acfb)

The KAP Survey Model (n.d.). *Knowledge, Attitude & Practices: Data Collection and Quantitative Methods*. Retrieved from https://www.researchgate.net[https://www.researchgate.net/file.PostFileLoader.html?id=56acfe3160614b17788b4592&assetKey=AS%3A323666162716672%401454179434027)