



## Factors Associated with Food Safety Practices on Food Handlers in Primary School Canteens

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### Abstract

Foodborne disease is one of the major health problems in the world wide as well as in Indonesia. Children are a group that is susceptible to this disease due to consuming unsafe foods because of their lack of knowledge. Unsafe food is identified from contamination of microorganism or chemical compounds. The purpose of this study was to determine the factors associated with food safety practices on food handlers in primary school canteens in Yogyakarta City. This research was conducted using an observational analytic study with cross sectional design. Samples in this study were 109 food handlers from 60 primary schools in Yogyakarta City. The research results showed that there was no association between gender ( $p=0.327$ ), age ( $p=0.144$ ), level of education ( $p=0.718$ ), experience ( $0.220$ ), training ( $p=0.180$ ), level of knowledge ( $p=0.143$ ) with food safety practices on food handlers. There was an association between attitude ( $p=0.031$ ) with food safety practices on food handlers in primary school canteens in Yogyakarta City.

### Abstrak

Penyakit bawaan makanan merupakan salah satu permasalahan kesehatan masyarakat di dunia maupun di Indonesia. Anak-anak merupakan kelompok yang rentan terhadap penyakit tersebut dikarenakan mengkonsumsi makanan yang tidak aman akibat ketidaktahuannya. Makanan tidak aman ditandai dengan kontaminasi mikroorganisme maupun senyawa kimia. Penelitian ini bertujuan untuk mengetahui faktor-faktor yang berhubungan dengan praktek keamanan makanan pada penjamah makanan di kantin sekolah dasar wilayah Kota Yogyakarta. Penelitian ini merupakan penelitian observasional analitik dengan rancangan cross sectional. Sampel penelitian ini berjumlah 109 penjamah makanan dari 60 sekolah dasar di wilayah Kota Yogyakarta. Hasil penelitian menunjukkan bahwa tidak ada hubungan antara jenis kelamin ( $p=0,327$ ), umur ( $p=0,144$ ), tingkat pendidikan ( $p=0,718$ ), pengalaman ( $0,220$ ), pelatihan ( $p=0,180$ ), tingkat pengetahuan ( $p=0,143$ ) dengan praktek keamanan makanan pada penjamah makanan. Ada hubungan antara sikap ( $p=0,031$ ) dengan praktek keamanan makanan pada penjamah makanan di kantin sekolah dasar wilayah Kota Yogyakarta.

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## INTRODUCTION

Food safety remains to be the major word concern because of its impact towards the economy and public health in both developed and developing countries. As one of many other types of foodservice operations, school canteens are most frequently cited locations for outbreaks of food borne disease (Rahman et al, 2012).

Primary school students are not able to choose safe snack during at school. Thus, schools are responsible for providing nutritious and safe food for their students (Aziz and Dahan, 2013). Children with low immune systems are at higher risk of food borne diseases than those who are healthy. As one of many food service providers, school canteen is the most commonly reported source of food borne disease outbreaks (Sanlier and Konaklioglu, 2012). Food handlers in schools have the responsibility of ensuring the production of safe foods. Their knowledge, attitudes and practices play a major role in the occurrence of food poisoning cases.

Food poisoning cases commonly occur at schools as a result of cross-contamination during food processing (Sanlier and Konaklioglu, 2012). Human action of non-compliance with hygiene practices during food processing is a major cause of contaminated food. Inadequate food safety knowledge among food handlers may lead to unsafe food handling practices and cross-contamination (McGill et al, 2015; Martins et al, 2012). Attitudes are also important factors that can influence food safety behaviours and practices, thereby reducing the incidence of food borne diseases and other health hazards (Al-Shabib et al, 2016). Individual hygiene plays an important role to ensure that food produced is safe for consumers. Poor hand hygiene is an important risk factor in food contamination. Food handlers should clean their hands especially before handling food, after meals, after touching contaminated materials, and after washing hands (Al-Shabib et al, 2016).

Based on the report of the Indonesia National Agency of Drug and Food Control (NADFC or *Badan Pengawas Obat dan Makanan (BPOM)*) in 2014, the highest contamination found in school snacks were bacteria. This contamination occurred due to poor raw material conditions and unhygienic processing. The occurrence of such problems is caused by food handlers who either intentionally or unintentionally ignore the rules of food security. Yogyakarta Province National Agency of Drug and Food conducted a study in 2015 used samples of snack foods taken from primary schools in the area of city and regencies in

the Province of Yogyakarta. The results of this study indicated that from 16 samples taken there were 2 samples (12.50%) which were not qualified because the microbiological contamination exceeds the safe limit (NADFC of Yogyakarta Province, 2015). The results of research by Laili and Purwani (2017) stated that there were still food vendors of primary school in Gondomanan and Mergangsan who practiced poor sanitation hygiene. The purpose of this study was to determine the factors associated with food safety practices of food handlers in primary school canteens in Yogyakarta City.

## METHODS

This is an observational analytic research with cross-sectional design. Independent variables were respondent's characteristics (gender, age, education level, experience and training), knowledge and attitude. The dependent variable was food safety practice on food handlers. The population in this study was all food handlers of primary school canteens in Yogyakarta City. The samples were taken with purposive sampling technique, with the criteria of food handlers processing their food and drink in their canteen room.

The samples in this study were 109 food handlers from 60 primary schools who met the criteria. Data were collected by using questionnaire and check list. The questionnaire used in this study consisted of 3 sections: Characteristics of respondents (5 questions); knowledge of food safety (11 questions) and attitudes regarding food safety (22 questions). The questionnaires of knowledge and attitude have been previously tested for their validity and reliability at 38 food handlers of primary school canteens in Bantul Regency. Checklist of food handler practices was used for direct observation to food handlers during the processing of food in the primary school canteens consisting of 11 items. Food safety knowledge consisted of favourable (positive) and unfavourable (negative) statements with an option of right and wrong answers. Meanwhile, the food safety attitude consisted of favourable and unfavourable statements with the option of answers including strongly agree, agree, disagree and strongly disagree. Meanwhile, the checklist of food handler practices was adopted from Regulation of the Minister of Health of the Republic Indonesia Number 1096/MENKES/PER/VI/2011 with "yes" (if appropriate) and "no" answer (if not appropriate).

Characteristics of respondents collected in this study were gender, age, education level,

job tenure and participation on food sanitation training. Age group was categorized into young (17-35 years old) and adults (36 years and above). Education categorized into low educated (graduated from secondary school or lower) and higher educated (graduated from high school to college). Experiences categorized into experienced (one year or more) and inexperienced (less than one year). The results of the questionnaires regarding knowledge, attitude and practice were then converted into percentages. Knowledge, attitude and practice were categorized as "poor" if the score was below 80% and categorized as "good" if the score was more or equal to 80%. Data were analysed in univariate and then continued in bivariate using chi-square test with 95% confidence level ( $p < 0.05$ ).

## RESULTS AND DISCUSSION

The distribution of respondent characteristics of 109 food handlers from 60 primary school canteens in Yogyakarta City was showed in Table 1. Respondents who have participated in this research were mostly female (92.7%) and majority

were adult (75.2%). Approximately, 3/4 of respondents (74.3%) were higher educated. Nearly all (93.6%) were experienced food handlers (1 year or over). Just half of the respondents had attended training on food sanitation hygiene (56%) and the remaining 44% had never attended the training. The majority respondents (83.5%) have good level of knowledge. The percentage of respondents who had good attitude towards food safety was 67.8% and the percentage of respondents who had good food safety practices was 81.7%.

The distribution of respondent's knowledge level in food safety was summarized in Table 2. Approximately 3/4 of respondents knew that utensils should be washed with running water (73.4%). Majority respondents knew that garbage should be collected in closed garbage bin (90.8%); sick food handlers are not allowed to process food (95.4%); aprons should be washed daily (91.7%); ring should be removed from finger while processing food (92.7%); not having talk during food processing (90.8%), toilet room should be separated from canteen room (92.7%), save food staples (95.4%), food goes stale quickly

Table 1. Characteristics of Food Handlers in Primary School Canteens in Yogyakarta City

Variable	n (%)
Gender	
Male	8 (7.3)
Female	101(92.7)
Age	
Young	27 (24.8)
Adult	82 (75.2)
Level of Education	
Low	28 (25.7)
High	81 (74.3)
Experience	
Experienced	102 (93.6)
Inexperienced	7 (6.4)
Training	
Ever	61 (56)
Never	48 (44)
Knowledge	
Poor	18 (16.5)
Good	91 (83,5)
Attitude	
Poor	35 (32.1)
Good	74 (67,8)
Practice	
Poor	20 (18,3)
Good	89 (81,7)

due to bacterial contamination (94.5%) and storage of finished materials and food should not in the same area (89.9%). Previous studies stated that 73.4% of food handlers in Kuala Pilah, Malaysia had good knowledge related to food borne pathogens (Abdul-Mutalib et al, 2012). It was in accordance with this research that the average knowledge of food safety among food handlers in primary school canteen was good. This could be related to the training of food sanitation hygiene that respondents have ever attended (56%) shown in Table 1. Training and education may be an effective means of increasing knowledge and practice of food safety among food handlers to prevent food borne diseases (Al-Shabib et al, 2016). However, knowledge does not always bring a positive change on behaviour of food processing (Ansari-Lari et al, 2010). In this study 31,2% of food handlers did not have inadequate knowledge in dealing with the importance of health checks issue. This study is in accordance

with research Wulandari et al, (2015) found that all employees who are in drinking water depots around Semarang State University never checks health periodically (6 months). The Codex Alimentarius (2013) recommends that all people involved with food must be aware of their role and responsibility in food safety. Food handlers must have the necessary knowledge and skills to handle food hygienically.

Respondents (74.3%) strongly agreed that hand washing using soap must be performed before processing the food. Approximately 66.1% of respondents strongly agreed about the use of clean clothes and absorbing sweat while working in the school canteen. Nearly all respondents (94.5%) did not agree to have long nails and did not agree to cover open wounds when processing food (81.7%). All respondents agreed on the use of clean water and utensils for cooking, washing the dishes using running water, choosing well-stocked foods, covering ready-to-eat food, provi-

Table 2. Knowledge of Food Safety at School Canteen Food Handlers in Yogyakarta City

Statement	True n (%)	False n (%)
The water for washing utensils is the water stored in the tub/bucket	29 (26.6)	80 (73.4)
School canteen could use opened garbage bin	10 (9.2)	99 (90.8)
Food handlers must have Medical Check-Up at least once in two years	75 (68.8)	34 (31.2)
Sick food handlers (skin diseases, infectious diseases, burns) can participate in food processing	5 (4.6)	104 (95.4)
Work clothes/aprons are washed daily after work	100 (91.7)	9 (8.3)
Remove rings when processing food	101 (92.7)	9 (8.3)
Eating and talking are not allowed when handling food	99 (90.8)	10 (9.2)
Food processing room must be separated from the toilet	101 (92.7)	8 (7.3)
Holding food without using food tongs will contaminate food	104 (95.4)	5 (4.6)
Food go stale quickly because of microbes contamination from animals, human and other objects	103 (94.5)	6 (5.5)
Storage of finished materials and food can be put into a cupboard	98 (89.9)	11 (10.1)

Table 3. Attitude of Food Safety at School Canteen Food Handlers in Yogyakarta City

Statement	Strongly agree n (%)	Agree n (%)	Disagree n (%)	Strongly disagree n (%)
Washing hands with soap should be done before processing food	81 (74.3)	27 (24.8)	1 (0.9)	0
Food handlers must use clean clothes and absorbing sweat	72 (66.1)	37 (33.9)	0	0
Food handlers can have long nails	3 (2.8)	3 (2.8)	50 (45.9)	53 (48.6)
Treating and closing open wounds is an unimportant thing to do when cooking	8 (7.3)	12 (11.0)	50 (45.9)	39 (35.8)
Food handlers are not allowed to sneeze or cough in front of cooked food	57 (52.3)	38 (34.9)	12 (11.0)	2 (1.8)
Clean water must be used in processing the food	69 (63.3)	40 (36.7)	0	0
Food handlers use clean utensils when processing food	68 (62.4)	41 (37.6)	0	0
The equipment must be cleaned first before being used	64 (58.7)	45 (41.3)	0	0
Food handlers dry the dishes or cups with cloth used to clean the table	4 (3.7)	2 (1.8)	58 (53.2)	45 (41.3)
Handlers wash the dishes with soap and running water	69 (63.3)	40 (36.7)	0	0
Food handlers use newsprint for wrapping fried food	3 (2.8)	2 (1.8)	60 (55.0)	44 (40.4)
Food handlers should choose good and clean food items	69 (63.3)	40 (36.7)	0	0
Separating raw and cooked food items to avoid contamination	57 (52.3)	51 (46.8)	1 (0.9)	0
The food handler closes the food with a clean and protected cover	65 (59.6)	44 (40.4)	0	0
Food handlers should provide suitable garbage disposal area	56 (51.4)	53 (48.6)	0	0
The hygiene of the stand should be kept by food handlers	64 (58.7)	44 (40.4)	1 (0.9)	0
Chemicals substances should not be placed near food items and cooked food storage areas	57 (52.3)	45 (41.3)	3 (2.8)	4 (3.7)
Avoid holding money and food that is not wrapped at the same time	51 (46.8)	53 (48.6)	4 (3.7)	1 (0.9)
Use disposable tissue to dry or clean hands	43 (39.4)	57 (52.3)	8 (7.3)	1 (0.9)
Food handlers must handle food hygienically	59 (54.1)	49 (45.0)	1 (0.9)	0
Food handlers must check the conditions of processed foods including check the expiration period	58 (53.2)	51 (46.8)	0	0
Good food management practices are implemented from raw material purchases to serving	58 (53.2)	51 (46.8)	0	0

ding garbage bin and checking the expired date for the use of packaged/processed food ingredients. This is consistent with the study conducted by Al-Shabib et al (2016) which stated that food handlers (82.8%) at Saudi Arabia's KSU Restaurant will inspect and dispose of expired food. There small majority respondents (12.8%) who stated that there was no prohibition for coughing/sneezing in front of food. It is also found in previous research that which 3.1% of respondents did not cover their mouths when coughing/sneezing while processing food (Abdul-Mutalib et al, 2012).

The practice of food handlers in the primary school canteen can be seen shown in Table 4. Most food handlers practicing safe behaviour during food processing, such as using clean clothes (96.3%), foot wears (92.7%), hair nets ( 92.7%), short and clean nails (94.5%), not using rings (83.5%), hand washing before handling food/holding money/after using restrooms (89.0%), no open wound in hands (97.2% ), no eating, no drinking, no chewing gum and no smoking during contact with food (96.3%) and not suffering from flu or a fever (96.3%). The results of this study were in line with Al-Shihab et al (2016) who

found that respondents had excellent personal hygiene practices in which 96.6% maintain safe practices, such as wearing uniforms and hair nets. In this study there were still food handlers who were not used a mask during contact with food (53.2%) and did not wear aprons (19.3%).

Statistical analysis of between independent and dependent variables could be seen in Table 5. It was statistically shown that there was no an association between gender with food safety practices among food handlers at primary school canteens in Yogyakarta City (95% CI = 0.824-6.021;  $p = 0.327$ ). Although it has no association but based on the prevalence ratio it can be found that male food handlers had a risk of unsafe food safety practices of 2,228 times higher than female food handlers. This study was in line with the study conducted by Abdul-Mutalib et al (2012) which stated that there was no significant association between gender variables and the level of hygiene practice of food sanitation on food handlers in Kuala Pilah, Malaysia. This study stated that good food safety practices could be practiced both male and female. This study was inversely proportional to study conducted by Siow and Sani (2011) which also stated that female

Table 4. Safety Food Practices on Food Handlers at School Canteens in Yogyakarta City

Statements	Yes n (%)	No n (%)
Food handlers use clean and appropriate clothes	105 (96.3)	4 (3.7)
Food handlers use clean aprons	88 (80.7)	21 (19.3)
Food handlers wear footwear	101 (92.7)	8 (7.3)
Food handlers wear a mask during contact with food	51 (46.8)	58 (53.2)
Wearing hair nets or hairbands	101 (92.7)	8 (7.3)
Short nails, not painted/shiny, clean and does not use fake nails	103 (94.5)	6 (5.5)
Not wearing rings on the right hand	91 (83.5)	18 (16.5)
Washing hands before contacting with food or after holding money or after using the restroom	97 (89.0)	12 (11.0)
Not having open wounds on hands	106 (97.2)	3 (2.8)
Not eating, drinking, chewing gum and smoking during contact with food	105 (96.3)	4 (3.7)
Food handlers are in a good health and are not suffering from flu or a fever	105 (96.3)	4 (3.7)

respondents were involved in better food handling practices than male respondents ( $p = 0.032$ ). Ansari-Lari et al (2010) found that there was no an association between the practice of handling food with gender ( $p = 0.306$ ).

The chi-square test found that there was no association between age with food safety practices of food handlers in the primary school canteens in Yogyakarta City (95% CI = 0.926-4.425;  $p=0.144$ ). Based on the value of prevalence ratio, it could be stated that young food handlers have a risk of poor food safety practices of 2,025 times higher than those of older food handlers. Previous study found that there was no a significant association between age and level of hygiene practice of food sanitation at food handlers in Kuala Pilah, Malaysia (Abdul-Mutalib et al, 2012). This Study found that food safety practices were not affected by age but may be influenced by other

things, such as the environment and sanitation facilities. A complete primary school canteen with its sanitation facilities, will be support food safety practices. Suryani (2014) states that there was a relationship between sanitation facilities with the number of microorganisms in eating utensils.

In this study, it was found no association between the level of education with food safety practice on food handlers in primary school canteen in Yogyakarta City (95% CI=0.264-1.981;  $p=0.718$ ). Based on the value of prevalence ratio can be stated the level of education was a protective factor from food safety practices and food handlers. This result indicated that level of education had no association with food safety practices.

The result of chi-square statistical analysis also showed that there was no association between working experience with food safety

Table 5. Association between gender, age, level of education, experience, training, knowledge and attitude with food safety practices of food handlers at school canteen in Yogyakarta City

Variable	Practice		n	P	RP (CI)
	Poor	Good			
Gender					
Male	3	5	8	0.327	0.824-6.021 (2.228)
Female	17	84	101		
Age					
Young	8	19	27	0.144	0.926-4.425 (2.025)
Old	12	70	82		
Level of Education					
Low	4	24	28	0.718	0.264-1.981 (0.723)
High	16	65	81		
Experience					
Inexperienced	3	4	7	0.220	0.985-6.710 (2.571)
Experienced	17	85	102		
Training					
Never	12	36	48	0.180	0.847-4.288 (1.906)
Ever	8	53	61		
Knowledge					
Poor	6	12	18	0.143	0.962-4.879 (2.167)
Good	14	77	91		
Attitude					
Poor	11	24	35	0.031	1.180-5.659 (2.584)
Good	9	65	74		

practices on food handlers in school canteens in Yogyakarta City (95% CI = 0.985-6.710;  $p = 0.220$ ). The value of the prevalence ratio could be showed that inexperienced food handlers had a risk of undertaking poor food safety practices of 2,571 times higher than experienced ones. This was in accordance with the study undertaken by Abdul-Mutalib et al (2012) which found that there was no significant association between variables of experience and the level of hygiene practice of food sanitation among food handlers in Kuala Pilah, Malaysia.

The association between training participation and food safety practices could be seen in Table 5. The results revealed that there was no association between training participation with food safety practices on food handlers in primary school canteens in Yogyakarta City (95% CI = 0.847-4.288;  $p=0.180$ ). The value of the prevalence ratio could be found that food handlers who have never attended the training had a risk of performing poor food safety practices of 1,906 times higher than that of the food handlers who had attended the training. It could be stated that the participation of food sanitation hygiene training by food handlers had no effect on the food safety practices. It could be caused due to the school Environmental Health Inspection performed by one of Public Health Officers of Yogyakarta City which includes the school canteen. Direct feedback with the instruction from the negative findings is given after gaining inspection results. In addition, Education Board of Yogyakarta City conducts school canteens competition for primary level each year which can motivate food handlers in each school. This study was in line with the study performed by Al-Shabib et al (2016) which showed that there was no positive association between training with personal hygiene on food handlers at King Saud University restaurant, Saudi Arabia. They stated that training will not be effective without support and motivation from management to food handlers. According Dudeja et al, (2017) food handlers training is a means but not an end because training does not always lead to improved practices.

The result of chi-square analysis also showed that there was no association between the level of knowledge with food safety practices on food handlers in primary school canteens in Yogyakarta City (95% CI = 0.962-4.879;  $p=0.143$ ). The value of prevalence ratio shows that food handlers with low knowledge have a risk of performing poor food safety practices of 2,167 times higher than that of food handlers who have attended the training. This result is also in accor-

dance with the study of Al-Shabib et al (2016) which found that there was no positive association between knowledge and personal hygiene of food handlers at King Saud University restaurant Saudi Arabia. This result is in accordance with the study conducted by Sanlier and Kanaklioghi (2012) that knowledge of food safety does not always lead to good handling practices. In addition, Ansari-Lari et al (2010) revealed a negative association between knowledge and practice.

The chi-square analysis reveals that there was association between attitudes and food safety practices of food handlers in primary school canteen in Yogyakarta (95% CI = 1.180-5.659;  $p=0.031$ ). The value of the prevalence ratio suggests that food handlers who have poor attitudes are at risk of doing poor food safety practices of 2.584 times higher than those of food handlers with good attitudes. This result was similar with the study conducted by Abdul-Mutalib et al (2012), which stated that a good attitude will also lead to good practice actions as outcomes. Knowledge, attitudes, and practices on food handlers are important for identifying how efficient training in food safety is allowing prioritize actions in planning training (Zanin et al, 2017, Seaman et al, 2010).

## CONCLUSION

There were no association between gender, age, education level, experience, level of knowledge with food safety practices on food handlers. There were association between attitudes with food safety practices on food handlers in primary school canteens in Yogyakarta. In general, it was revealed that the level of knowledge, attitude, and food safety practices of food handlers, in primary school canteen of Yogyakarta City is good. But improvements should be put into consideration.

## REFERENCES

- Abdul-Mutalib, N. A., Abdul-Rashid, M. F., Mustaf, S., Amin-Nordin, S., Hamat, R. A., Osman, M. 2012. Knowledge, attitude and practices regarding food hygiene and sanitation of food handlers in Kuala Pilah, Malaysia. *Food Control*, 27: 289-293.
- Al-Shabib, N.A., Mosilhey, S.H., Husain, F.M. 2016. Cross-sectional study on food safety knowledge, attitude and practices of male food handlers employed in restaurants of King Saud University, Saudi Arabia. *Food Control*, 59: 212-217.
- Ansari-Lari, M., Soodbakhsh, S., & Lakzadeh, L. 2010. Knowledge, attitudes and practices of workers on food hygienic practices in meat processing



- plants in Fars, Iran. *Food Control*, 21: 260-263.
- Aziz, S.A.A, and Dahan, H.M. 2013. Food Handler Attitude Toward Safe Food Handling in School Canteens. *Journal Procedia-social and Behavioral Sciences*, 105: 220 – 228
- National Agency of Drug and Food Control of Yogyakarta Province [Badan Pengawas Obat dan Makanan DIY]. 2015. *Laporan Kinerja Badan POM DIY Tahun 2015*. Yogyakarta: Badan Pengawas Obat dan Makanan
- Codex Alimentarius. 2013. *Food Hygiene (Basic Texts), fifth ed*. Rome: Food and Drug Administration of The United Nations.
- Dudeja, L.C.P, Singh, A., Sahni, N., Kaur, S., and Goel, S. 2017. Effectiveness of an intervention package on knowledge, attitude, and practices of food handlers in a tertiary care hospital of north India: A before and after comparison study. *Medical Journal Armed Forces India*, 73: 49–53.
- Laili, A.F., Purwani, E. 2017. *Gambaran Hygiene Sanitasi Penjaja Makanan Dan Jumlah Total Mikrobial Pada Jajanan Anak Sekolah Dasar Kecamatan Gondomanan dan Mergangsan Kota Yogyakarta*. Presented in Seminar Nasional Gizi, Program Studi Ilmu Gizi UMS, 6 Mei
- Martins, R. B., Hogg, T., and Otero, J. G. 2012. Food handlers' knowledge on food hygiene: the case of a catering company in Portugal. *Food Control*, 23(1): 184-190.
- McGill, C. R., Fulgoni, V. L., and Devareddy, L. 2015. Ten-year fiber and whole grain intakes and food sources for the United States Population: National health and nutrition examination survey 2001- 2010. *Nutrients*, 7: 1119-1130
- Rahman, M. M., Arif, M. T., Bakar, K., and Tambi, Z. B. 2012. Food safety knowledge, attitude and hygiene practices among the street food vendors in northern Kuching city, Sarawak. *Borneo Science*, 31: 95-103.
- Sanlier, N., and Kanaklioghi, E. 2012. Food safety knowledge, attitude and food handling practices of students. *British Food Journal*, 114(4): 469-480.
- Seaman, P. 2010. Food Hygiene Training: Introducing of Food Hygiene Training Model. *Food Control*, 21: 381-387.
- Siow, O. N., Sani, N. A. 2011. Assessment of knowledge, attitudes and practices (KAP) among food handlers at residential colleges and canteen regarding food safety. *Sains Malaysiana*, 40(4): 403-410.
- Suryani, D., 2014. Keberadaan Angka Kuman Ikan Bawal Bakar dan Peralatan Makan. *Jurnal KE-MAS*, 9(2): 191-196.
- Wulandari, S., Siwiendrayanti, A., Wahyuningsih, A.S. 2015. Higiene dan Sanitasi Serta Kualitas Bakteriologis Damiu di Sekitar Universitas Negeri Semarang. *Unnes Journal of Public Health*, 4(3): 8-15
- Zanin, L.M., Cunha, D.T., Rosso, V.V., Capriles, V.D., Stedefelt, E. 2017. Knowledge, Attitudes and Practices of food Handlers in food Safety: An Integrative Review. *Food Research International*, 100: 53-62