

A qualitative study on personal hygiene knowledge and practices among food handlers at selected primary schools in Klang valley area, Selangor, Malaysia

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Abstract

A study was conducted to determine personal hygiene knowledge among 25 food handlers at 12 selected primary schools in Klang Valley area, Selangor, Malaysia. A qualitative approach using in-depth interviews was employed and respondents were selected by a convenience sampling. The results showed that the respondents had basic knowledge on personal hygiene practices, mainly on hand washing (30.7%) and glove use (18.7%). The food handlers (<11%) also demonstrated their knowledge on other good personal hygiene practices that were related to the use of hair restrain/cap/apron, keeping tidy hair/ clean nails/ clean hand, no bare hand contact with food, not wearing ring/jewelry, no smoking, tidy/clean attire and typhoid injection. Further assessment demonstrated that only 12% respondents were able to describe a reasonable procedure for hand washing and the steps that were missed most were the failure to specify the need to rinse and dry hands after washing. The respondents knew that the use of glove was to prevent bare hand contact (80%) and can reduce risk of food contamination (88%). All the respondents agreed that food handlers with abrasion or cuts on their fingers or hands should not touch unwrapped foods. A high percentage respondents (>90%) practiced various good hand washing practices, with only 36% did not practice washing hands after eating or drinking. Most respondents (>70%) practiced glove use, however more than 50% did not wash hands with every glove change, change gloves when change type of products and after preparing raw material. The study showed that the food handlers have basic knowledge on good personal hygiene practices. However, some discrepancies were revealed in the proper hand washing procedure. This study recommended good hand washing procedure to be reiterated among the food handlers. There is also an immediate need for continuous training among food handlers regarding good personal hygiene practices.

Keywords

Food handlers
personal hygiene
knowledge
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Introduction

Foodborne illness outbreaks are often caused by poor personal hygiene among food handlers. Although many efforts have been made to improve various hygiene standards and practices, training and education of food handler as well as consumer awareness, food-borne illness still remain a public health dilemma in many countries. A trend analysis on the occurrence of foodborne illness in selected food service establishments in the United States demonstrated that from 1998 – 2008, the non-compliance percentages remained high for three risk factors: Poor Personal Hygiene, Improper Holding of Food and Contaminated Food Surfaces/Equipment (FDA, 2010). Poor Personal Hygiene has been identified as one of the main risk factors in foodborne

diseases in other reports (FDA, 2009; FDA, 2000). It was also reported that poor hand hygiene contributed to 42% of food-borne outbreaks in the United States in the period of 1975–1998 (Aycicek *et al.*, 2004). Generally, personal hygiene covers the aspect of hand hygiene, clean attire, personal health and personal habit or behavior. Food handlers with poor personal hygiene can be sources in spreading the food-borne diseases directly, or due to cross-contamination. These factors are influenced largely on the knowledge and practices of the food handlers (Mead *et al.*, 1999).

In Malaysia, the incidences of food-borne illness are still increasing in schools. As food is being handled in schools by food handlers in the school canteen, it is crucial that the handlers practiced good personal hygiene. Therefore, food hygiene practices by the food handlers in school cannot be over looked

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and appropriate plan should be taken to improve these because the number of food poisoning cases among school children is increasing and school children have little knowledge about the safety of the food. They may not notice that they have consumed spoiled food in many of the food poisoning cases. They may have knowledge about food safety, so good hygiene practices of food handlers can make sure that they do not harm by the food that can cause illness to them. It is the responsibility of the food handlers to reduce the risk of food poisoning among school children. The importance of personal hygiene in preventing the dispersal of microorganisms via various food contact surfaces has been demonstrated in various studies. As there has been no data has been published on food handlers hand hygiene practices in primary schools in Malaysia, this study is crucial to determine the knowledge of food handlers in good personal hygiene practices.

Materials and Method

This study employed a qualitative approach and respondents were selected by a convenience sampling. A qualitative was done because it relies on the opinion of individuals; ask broad, general questions and data collection consists large of words or texts (Creswell, 2005). For this study, in-depth interviews were used as other methods such as questionnaires or observational analysis alone would not produce the in-depth information and perception about the food handlers' inner thoughts and feelings. The study was conducted in two stages and the results were compiled to obtain a rich data. The first stage was carried out between the periods of May – August 2010; while the second stage was between May – August 2011. A total of 25 food handlers who were working at 12 selected primary schools in Klang Valley area were willing to participate and to be interviewed. Of the 25 food handlers, 10 participants from 4 schools were interviewed in the first stage and the remaining 15 respondents from 8 schools participated in the second stage of the study. Prior to the interview, the respondents were given a full clarification about the research and confirmed the information gathered was solely for the purpose of the study. The interviewed were conducted in Mandarin and were recorded on digital recorder. The in-depth interviews were conducted based on a set of questions which consisted of three parts. Part A was about demographic characteristics, Part B was on food handlers' food hygiene knowledge and lastly Part C asked questions related to food hygiene practices of the food handler associated with hand washing and

glove use. The interviews session was taken about 30 minutes at the food handlers' preferred place. Finally, the interviews data were translated to English by using a reserve translation and transcribed manually.

Results

The sample includes a high number of male (68%) than female respondents (32%). The majority of respondents were between 41 years old to 60 years old (64%) followed by those aged from 30 years old to 40 years old (24%) and 61 years old to 70 years old (12%). Most respondents were well educated and the highest educational level was diploma (4%), followed by secondary school (64%), while the remaining completed primary school (32%). In term of work experiences, majority of the respondents had a 1 year to 5 years of experience (44%), followed by experience of more than 15 years (24%) and 6 years to 10 years (20%). The remaining respondents had been working for 11 years to 15 years (4%) and less than 1 year (8%). All respondents obtained a certificate in food hygiene training, typhoid injection and medical checkup as required by the Ministry of Health Malaysia. The details of respondents' demographic profiles are shown in Table 1.

This section discusses the percentage of food handler's knowledge towards personal hygiene. The open ended question "Name three examples of good personal hygiene while working" brought out 6 main response areas (Table 2). Hand washing was the most familiar practices performed by the respondents (30.7%), followed by glove use (18.7%). The other 4 main examples given by the food handlers were the use of hair restrain (10.7%), keeping clean nails (8.0%), the use of apron (5.3%) and the use of apron

Table 1. Demographic profiles of respondents

Demographic Profiles	N	(%)
Gender		
• Female	8	32
• Male	17	68
Age (years old)		
• 30 – 40	6	24
• 41 – 50	8	32
• 51 – 60	8	32
• 61 – 70	3	12
Level of education		
• Primary School	8	32
• Secondary School	16	64
• Diploma	1	4
Working period (years)		
• Less than 1	2	8
• 1 – 5	11	44
• 6 – 10	5	20
• 11 – 15	1	4
• More than 15	6	24
Food poisoning cases		
• Yes	0	0
• No	25	100
Seminar or talk		
• Yes	25	100
• No	0	0
Food hygiene training certificate issued by Ministry of Health Malaysia	25	100
Typhoid injection and medical check-up	25	100

and cap (5.3%). Although hand wash and glove use were the 2 main response areas, the respondents showed knowledge on some other good hand hygiene practices related to dirty or bare hand contact with food. These were highlighted by 3 respondents during the interview session:

- “Not touching cooked food with dirty hands.” (Respondent 2)
- “Not touching food with bare hands.” (Respondent 4)
- “Use spoon to prepare cook food.” (Respondent 10)

In addition to their response to the use of hair restrain, keeping clean nails and to the use of apron and/or cap, the respondents also provided other examples related to good work attire. Of 25 respondents interviewed, 3 respondents knew to keep tidy hair (4.0%) while 3 respondents (4%) knew to remove ring/ jewellery when handling foods. When the respondents were asked on tidy and clean attire, only 2 respondents (2.67%) had knowledge about it and these were supported by the following quotes:

- “Wear clean clothes.” (Respondent 6)
- “Wear tidy attire.” (Respondent C1)

Furthermore, some of the respondents had knowledge on good personal habits and these were stated by 4 respondents:

- “No smoking when cooking.” (Respondent 5)
- “No smoking while handling food.” (Respondent 5)
- “Not coughing towards foods.” (Respondent 2)
- “Wash equipment before use.” (Respondent 4)

As hand washing was the most familiar practices performed by the respondents, their knowledge on hand washing was further assessed by their ability

Table 2. Respondents' personal hygiene knowledge

Personal Hygiene	N=25X3=75	(%)
Hand washing	23	30.7
• Wash hand (14)		
• Wash hand after go to toilet (7)		
• Wash hand after sneezing and cough (1)		
• Wash hand before work (1)		
Glove use	14	18.7
• Wear glove (12)		
• Wear glove when handle cooked food (1)		
• Wear suit gloves (1)		
Hair restrain	8	10.7
• Wear cap (5)		
• Wear hat (2)		
• Wear hair net/cap (1)		
Clean nails	6	8.0
• Not keep long fingernails (6)		
Apron use	4	5.3
• Wear apron (3)		
• Wear apron/uni form (1)		
Apron and cap use	4	5.3
• Wear apron and cap (4)		
Bare/Dirty hand contact with food	3	4.0
• Not touching cooked food with dirty hands (1)		
• Not touching food with bare hands (1)		
• Use spoon to prepare cook food (1)		

Table 2. cont'd

Tidy hair	3	4.0
• Cut hair/Short hair/ Tied hair (3)		
Wear ring/jewellery	3	4.0
• No ring/jewellery (3)		
No smoking when handling/cooking food	2	2.67
• No smoking when cooking (1)		
• No smoking while handling food (1)		
Tidy and clean attire	2	2.67
• Wear clean clothes (1)		
• Wear tidy attire (1)		
• Not coughing towards foods (1)	1	1.33
• Wash equipment before use (1)	1	1.33
• Typhoid injection (1)	1	1.33

to describe good hand washing procedure. Although all of them responded that they knew the procedure, majority failed to describe the steps in hand washing procedure. Only 3 respondents (12%) were able to describe reasonable hand washing procedure based on the followings quotes:

- “Wash hands with soap and water for 10 second, rub both sides of the hand and the place between fingers, then rinse and dry with clean towel or paper towel.” (Respondent 4)
- “Wash hands with soap and water for 10 second, when washing hands have to scrub and rub the surface of the hand and the place between fingers, after that rinse with water and dry with clean towel or paper towel.” (Respondent 7)
- “Wash hand with soap and water for 10 second, after that rinse with water and dry with clean towel or paper towel.” (Respondent 8)

The steps that were missed most were the failure to specify the need to rinse and dry hands after washing. Some respondents mentioned only the 7 steps but they were unable to provide the proper procedure. These were supported by the following quotes:

- “Wash hand with soap and water and the hand is not oily and dirty after wash.” (Respondent 1)
- “Wash thoroughly with soap and running water.” (Respondent A1)
- “Wash hand cleanly and use many shampoo.” (Respondent D1)
- “Soap, cold water.” (Respondents B1, C1 & E1)
- “Wash hand with soap.” (Respondents E2 & G1)
- “Soap, 7 steps.” (Respondent A3)
- “7 steps, soap, scrub, plain water.” (Respondent F1)

When further asked whether they dried their hands after washing, 23 responded that they used clean towel to dry, while the remaining 2 did not dry their hands after washing them.

Additionally, 2 questions were asked to evaluate their knowledge on glove use. Twenty respondents

(80%) agreed that the use of glove was to prevent bare hand contact. The remaining 5 food handlers (20%) demonstrated their knowledge on glove use as illustrated by the following quotes:

“No. Use of glove when the hands or fingers have cut or injured.” (Respondent C1)

“No.” (Respondent D1)

“No. Use of glove for food preparation.” (Respondent G1)

“No. Use of glove for cooking and preparing.” (Respondent H1)

“No. Use of glove for cooking food.” (Respondent K1)

When asked whether the use of gloves can reduce risk of food contamination, 22 respondents (88%) agreed with only 3 (12%) in disagreement. The knowledge of the respondents on glove use was further illustrated by the following quotes:

“Glove is clean and do not have bacteria.” (Respondent 1)

“This is because hands full with bacteria, using gloves can reduce the chance for the bacteria to transfer to the food.” (Respondent 2)

“This is reducing the spread of bacteria.” (Respondent 3)

“The bacteria from hand can be prevented for contaminated the food when we using gloves to handle food.” (Respondent 4)

“Reduce bare hand contact with the food.” (Respondent 5)

“The bacteria on hand cannot transfer to the food when we wear glove.” (Respondent 7)

“The bacteria on hands cannot go to the food when you wear glove.” (Respondent 8)

In a more general question on hand hygiene, all the respondents agreed that food handlers with abrasion or cuts on their fingers or hands should not touch unwrapped foods as quoted by some respondents below:

“The bacteria and blood on the wound maybe spread to the unwrapped food if the staffs that have cut touch the unwrapped food.” (Respondent 7)

“Agree. Bacteria on the wound will transfer to food.” (Respondent A1)

“I agree with this statement. If injured, got bacteria, cannot touch food.” (Respondent B1)

It was interesting to note that some respondents were also able to relate hand hygiene with the use of glove and other measures to overcome the situation. These were supported by the following quotes:

“The staff should not handle the food because the bacteria that are on the wound might be transfer to the food. If the staffs have to handle the food, the staffs have to cover the wound with plaster and wear a glove to

Table 3. Respondents' hand washing and glove use practices

No.	Practice Items	Yes (N)	Yes (%)	No (N)	No (%)
Hand washing					
1	After visiting restroom	25	100	0	0
2	Before preparing food	24	96	1	4
3	Before and after preparing raw materials	25	100	0	0
4	Between handling raw food and food that is ready to eat	24	96	1	4
	After sneezing/coughing/blowing nose	23	92	2	8
6	After eating or drinking	9	36	16	64
7	After touching face, hair, or clothes	24	96	1	4
8	After handling rubbish or other waste	24	96	1	4
Glove use					
1	Do you wear glove while preparing food?	21	84	4	16
2	Do you wear glove while preparing raw material?	18	72	7	28
3	Do you wear glove when hands have cuts?	22	88	3	12
4	Do you wash hands with every glove change?	12	48	13	52
	Do you change gloves when change type of product?	8	32	17	68
6	Do you change gloves after preparing raw material?	10	40	15	60
7	Do you change gloves when damaged or dirty?	21	84	4	16

prevent the contamination of the food.” (Respondent 4)

“Yes. Unless have cover well with gloves.” (Respondent F2)

The respondents' personal hygiene practices were assessed using a structured interview questions based on 2 main good hygiene practices; hand washing and glove use. The results are shown in Table 3. All respondents washed their hands after visiting restroom and before/after preparing raw materials. A high percentage (96%) was demonstrated by the following hand washing practices; before preparing foods, between handling raw and ready to eat foods, after touching face, hair or clothes, and after handling rubbish/waste, while 23 respondents (92%) wash hands after sneezing/coughing/blowing nose. Although majority of the respondents had responded highly on good hand washing practices, 9 respondents (36%) did not wash hands after eating or drinking.

Most of the respondents (88%) wear gloves when their hands have cuts and 21 respondents (84%) changed gloves when they get damaged or dirty. Although 84% respondents practiced glove use while preparing foods, only 72% wear glove while preparing raw material. More than 50% of the respondents did not practice the followings: 52% did not wash their hands with every glove change, 68% did not change gloves when change type of products and 60% did not change gloves after preparing raw material.

Discussion and Conclusion

Food handlers in the selected schools demonstrated that they had basic knowledge on good personal hygiene. Their knowledge is crucial because lack of personal hygiene has been shown to be significant contributory factors to food-borne illness in various food retails (Taylor *et al.*, 2000; Aarnisalo *et al.*, 2006; Bao *et al.*, 2006; Lucca and Torres, 2006; Lues and Van Tonder, 2007), and in domestic home (Mead *et al.*, 1999; Collins, 2001; Cogan *et al.*, 2002; Gorman *et al.*, 2002).

Although hand washing was the most familiar practices performed by the respondents (30.7%), further important findings were made on their knowledge on proper hand washing. Most of the food handlers (88%) failed to describe good hand washing practices with drying hands been the most missed step. Studies have proven that it is essential to care hand cleanliness because hands can be an important vehicle for transmitting microorganism to food due to poor personal hygiene. Taylor *et al.* (2000) proved that the transfer of microorganisms to the hands was due to poor personal hygiene after visiting the toilet, while DeVita *et al.* (2007) found that contact surfaces that were more frequently contaminated were the hands as compared to food-contact surfaces. Therefore, appropriate hand washing procedure must be practiced by all food workers to reduce the risk of microbial spread as emphasized by some studies (Sobel *et al.*, 1998; Sattar *et al.*, 2002; Curtis and Cairncross, 2003). Incorrect practices among food handlers that led to cross contamination have also been emphasized, such as not using hair protection and long nails or wore nail polish, wore jewelry and skin infection (Campos *et al.*, 2009) and bad habits such as touching mouth with hands and wiping their hands on the face or clothes while working (Dag, 1996). Few studies suggested that lack of knowledge may result in poor hygiene practices among food handlers (Lambiri *et al.*, 1995; Cakiroglu and Ucar, 2008). However, there was considerable evidence that 63% of food handlers with knowledge of food safety actions did not conduct behavior in favor of food safety (Clayton *et al.*, 2002). Some observational studies also suggested that knowledge was not always put into practice by food handlers (Oteri and Ekanem, 1989; Manning and Snider, 1993). This study also revealed similar findings, that although all respondents had received training (100%) and demonstrated significant knowledge on good personal hygiene, these did not always translate into good practices such as did not wash hands after eating or drinking (36%), did not dry hands after washing (8%)

and did not use glove at all times (4%). The study also demonstrated that although food handlers may have basic knowledge on good personal hygiene, most of them do not grasp the essential aspects of hygiene such as hand washing procedure, and some cannot link the values of glove use with contamination or bare hand contact with foods.

Although the sample size seems to be smaller, it could be generally concluded that the basic personal hygiene knowledge of the food handlers was good but improvement of the food handlers' practices is needed to prevent the incidence of food borne illness among school children. The findings also concluded that the good hand washing practices among food handlers require strict attention.

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References

- Aarnisalo, K., Tallavaara, K., Wirtanen, G., Maijala, R. and Raaska, L. 2006. The hygienic working practices of maintenance personnel and equipment hygiene in the Finnish food industry. *Food Control* 17 (12): 1001–1011.
- Aycicek, H., Aydogan, H., Küçükkaaslan, A., Baysallar, M. and Baoustaoflu, A. C. 2004. Assessment of the bacterial contamination on hands of hospital food handlers. *Food Control* 15 (4): 253-259.
- Bao, M., Ersun, A. and Kavanc, G. 2006. The evaluation of food hygiene knowledge, attitudes, and practices of food handlers' in food businesses in Turkey. *Food Control* 17 (4): 317–322.
- Cakiroglu, F. P. and Ucar, A. 2008. Employees' perception of hygiene in the catering industry in Ankara (Turkey). *Food Control* 19 (1): 9-15.
- Campos, A. K. C., Cardonha, A. M. S., Pinheiro, L. B. G., Ferreira, N. R., deAzevedo, P. R. M. and Stamford, T. L. M. 2009. Assessment of personal hygiene and practices of food handlers in municipal public schools of Natal, Brazil. *Food Control* 20 (9): 807 – 810.
- Clayton, D. A., Griffith, C. J., Price, P. and Peters, A. C. 2002. Food handlers' beliefs and self-reported practices. *International Journal of Environmental Health Research* 12 (1): 25–39.
- Cogan, T. A., Slader, J., Bloomweld, S. F. and Humphrey, T. J. 2002. Achieving hygiene in the domestic kitchen: The effectiveness of commonly used cleaning procedures. *Journal of Applied Microbiology* 92 (5): 885–892.
- Collins, J. E. 2001. Impact of changing consumer lifestyles on the emergence/re-emergence of foodborne

- pathogens. *Emerging Infectious Diseases* 3 (4): 1–13.
- Creswell, J. W. 2005. *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. 2nd ed. Upper Saddle River, New Jersey: Merrill.
- Curtis, V. and Cairncross, S. 2003. Effect of washing hands with soap on diarrhea risk in the community: a systematic review. *Lancet Infectious Diseases* 3 (5): 275–281.
- Dag, A. 1996. Effect of hygiene training program developed for mass feeding services on information, attitudes and behavior. Ankara, Turkey: Hacettepe University, MSc thesis.
- DeVita, M. D., Wadhera, R. K., Theis, M. L. and Ingham, S. C. 2007. Assessing the potential of *Streptococcus pyogenes* and *Staphylococcus aureus* transfer to foods and customers via a survey of hands, hand-contact surfaces and food-contact surfaces at foodservice facilities. *Journal of Foodservice* 18 (2): 76–79.
- FDA (Food and Drug Administration). 2000. Report of the FDA retail food program database of foodborne illness risk factors. US: FDA Retail Food Program Steering Committee.
- FDA (Food and Drug Administration). 2009. FDA report on the occurrence of foodborne illness risk factors in selected institutional foodservice, restaurant, and retail food store facility types. US: FDA National Retail Food Team.
- FDA (Food and Drug Administration). 2010. FDA trend analysis report on the occurrence of foodborne illness risk factors in selected institutional foodservice, restaurant, and retail food store facility types (1998-2008). US: FDA National Retail Food Team.
- Gorman, R., Bloomfield, S. and Adley, C. C. 2002. A study of cross-contamination of foodborne pathogens in the domestic kitchen in the Republic of Ireland. *International Journal of Food Microbiology* 76 (1-2): 143 – 150.
- Lambiri, M., Mavridou, A. and Papadakis, J. 1995. The application of hazard analysis critical control point (HACCP) in a flight catering establishment improved bacteriological quality of meats. *Journal of the Royal Society of Health*. 115 (1): 26-30.
- Lucca, A. and Torres, E. A. F. S. 2006. Street-food: The hygiene conditions of hot-dogs sold in Sao Paulo, Brazil. *Food Control* 17 (4): 312–316.
- Lues, J. F. R. and Van Tonder, I. 2007. The occurrence of indicator bacteria on hands and aprons of food handlers in the delicatessen sections of a retail group. *Food Control* 18 (4): 326-332.
- Manning, C. K. and Snider, O. S. 1993. Temporary public eating places: food safety knowledge, attitudes and practices. *Journal of Environmental Health* 56 (1): 24-28.
- Mead, P. S., Slutsker, L., Dietz, V., McCaig, L. F., Bresee, J. S., Shapiro, C., Griffin, P. M. and Tauxe, R. V. 1999. Food-related illness and death in the United States. *Emergence Infectious Diseases* 5 (5): 607–625.
- Oteri, T. and Ekanem, E. E. 1989. Food hygiene behavior among hospital food handlers. *Public Health* 103 (3): 153–159.
- Sattar, S. A., Springthorpe, V. S., Tetro, J., Vashon, R. and Keswick, B. 2002. Hygienic hand antiseptics: should they not have activity and label claims against viruses? *American Journal of Infection Control* 30 (6): 355–372.
- Sobel, J., Mahon, B., Mendoza, C. E., Passaro, D., Cano, F., Baier, K., Racioppi, F., Hutwagner, L. and Mintz, E. 1998. Reduction of fecal contamination of street-vended beverages in Guatemala by a simple system for water purification and storage, hand washing, and beverage storage. *American Journal of Tropical Medicine Hygiene* 59 (3): 380–387.
- Taylor, J. H., Brown, K. L., Toivenen, J. and Holah, J. T. 2000. A microbiological evaluation of warm air driers with respect to hand hygiene and the washroom environment. *Journal of Applied Microbiology* 89 (6): 910-919.