

Risk Factors Associated with Hygienic Practices Among Food Handlers in Dubai

Al Suwaidi A.¹, Hussein H.^{2,*}, Al Faisal W.², El Sawaf E.³, Wasfy A.⁴

¹Preventive Medicine Department, Ministry of Health, Dubai, UAE

²School and Educational Institutions Health Unit, Health Affairs Department, Primary Health Care Services Sector, Dubai Health Authority, Dubai, UAE

³Health Centers Department, Primary Health Care Services Sector, Dubai Health Authority, Dubai, UAE

⁴Statistics and Research Department, Ministry of Health, Dubai, UAE

Abstract

Background: Food handlers have a major role in the prevention of food poisoning during food production and distribution. Food handlers are defined as employees who are employed directly in the production and preparation of foodstuffs, including those in the manufacturing, catering and retail industries as well as those who are undertaking maintenance or repairing of equipment in food handling areas, whether permanent staff, workers on contract or visitors to food handling areas. **Objectives:** To study hygienic practices and factors associated with Food handling among Dubai food handlers. **Methodology:** A cross sectional study was carried out. The study was conducted in Dubai Municipality clinic which is the only authorized place for issuing medical fitness card for food handlers in Dubai. The study included food handlers attending the clinic for issuing medical fitness card. An appropriate sample size was calculated according to the sample equation obtained by using computer program Epi Info Version 6.04. The study sample was 425 food handlers with 100% response rate. **Results:** Significantly lower personal hygienic score was observed among females versus males (66.76 + 8.77 and 72.38 + 6.78 respectively) and house maid in contrast to cooks and kitchen helpers (65.31 + 7.90 and 75.04 + 5.51 respectively). General hygienic score was found to be significantly lower among secondary educated (87.07 + 6.78) compared to university educated (88.07 + 9.58), among house maid (84.60 + 5.00) in contrast to bakers and confectioners (89.87% + 4.85) and among the 1500-<2000 AED income category (85.30 + 10.61) in contrast to the <1000 AED category (88.85 + 5.53). Hygienic practices related to cooking showed significant difference only with income with maximum mean score obtained for the 1500-<2000 AED income category (91.75 + 6.15) and minimum mean score for the <1000 AED category (89.35 + 7.08). **Conclusions:** The most significant factor was found to be occupation. Those more likely to have fair to bad hygienic score were those working in restaurants or housemaid (at least 3 times more likely relative to bakers and confectioners).

Keywords

Risk Factors, Hygienic Practice, Food Handlers, Dubai

Received: June 8, 2015 / Accepted: June 10, 2015 / Published online: August 2, 2015

© 2015 The Authors. Published by American Institute of Science. This Open Access article is under the CC BY-NC license.

<http://creativecommons.org/licenses/by-nc/4.0/>

1. Introduction

Food handlers have a major role in the prevention of food poisoning during food production and distribution phases. Food handlers are defined as employees who are employed

directly in the production and preparation of foodstuffs, including those in the manufacturing, catering and retail industries as well as those who are undertaking maintenance or repairing of equipment in food handling areas, whether permanent staff, workers on contract or visitors to food handling areas.

* Corresponding author

E-mail address: hyhussain@dha.gov.ae (H. Hussain)

Food handling involves all aspects of treating and storing food from receipt of raw materials to the delivery of the final prepared product.⁽¹⁾ Food handlers may cause food borne diseases by cross-contaminating the raw and processed foodstuffs as well as cooking and storing food under inappropriate conditions and using contaminated equipment. They can be symptomatic carriers of food poisoning organisms.⁽²⁾ Therefore, food safety is a major concern of the food industry and a key public health issue at international, national and local levels.⁽³⁾

The WHO has identified five factors that contribute to these illnesses: improper cooking procedures, temperature abuse during storage, lack of hygiene and sanitation by food handlers, cross-contamination between raw and fresh ready-to-eat foods, and acquiring food from unsafe sources.⁽⁴⁾ Four of five of these practices are related directly to food service food handler behavior (acquiring foods from unsafe sources is the exception). Food borne diseases result from factors such as staff with unclean hands, low-level hygiene knowledge, wrong temperature applications, storage temperature of cold-stored foods and low level knowledge of acceptable freezer temperatures, food pathogens and similar issues⁽⁵⁾ Moreover, poor information on hand hygiene is also known to result in food borne diseases for instance, when staff prepare salad without washing his/her hands after going to the toilet or after touching raw meat.⁽⁶⁾ Inappropriate working conditions, low-level personnel hygiene and improper equipment used by food handlers may cause food poisoning.⁽⁷⁾ Improvements in the field of food hygiene may reduce the risk of food-borne diseases.⁽⁸⁾ A number of studies indicated that although training may bring about an increased knowledge of food safety it does not always result in a positive change in food handling behavior.^(7,9) Traces of the foods served by catering firms were found in nearly 22% of the food borne diseases in England, in 45% of the food borne diseases in the USA and in 50% of the food-borne diseases in Ireland.⁽¹⁰⁾ Intestinal parasitic infection is one of the most important food borne diseases. The studies that have been carried out on intestinal parasitic infections among different food handler groups in the Middle East and North Africa, showed a wide range of variation in prevalence rates. The highest rate was reported among Nigerian food handler (97%),⁽¹¹⁾ while a prevalence of 28.7%, 12.4% and 29.4% were reported successively from Lebanon, Yemen and Sudan.^(12,13,14) In one study in Iran "as an Asian countries", the rate of intestinal parasites among food handlers was found to be 29 %.⁽¹⁵⁾

The Gulf countries have experienced a rapid socio-economic development in recent years. The improved standards of living have led to a large influx of expatriate workers from developing countries where parasitic infections can be

expected among them.⁽¹⁶⁾ The expatriate laborers, largely coming from India, Pakistan, Sri Lanka, Indonesia, Philippines and Bangladesh, could be expected to have been infected with various types of parasites where intestinal parasites are major health problems in these countries.⁽¹⁷⁾ In UAE, a study done in Emirate of Al-Ain 1993 showed that the prevalence of parasitic infections among food handlers was 23.1%.⁽¹⁸⁾ Another studies conducted in Saudi Arabia, showed that the prevalence rates were 32.2%, 46.5% and 31.4%. Successively in Riyadh, Abha and AlKhobar.^(16, 19, 20) In Qatar, a study was done on patterns of infection with intestinal parasites among food handlers and housemaids where it revealed that the prevalence of infections was 33.9 %.⁽²¹⁾ This study is one of the very few or may be the unique study in Dubai to tackle hygienic practices among food handlers.

2. Objectives

To study Factors associated with Food handling and hygienic practice among Dubai food handlers.

3. Methodology

A cross sectional study was carried out. The study was conducted in Dubai city, the second largest city in U. A. E. Study was carried out in Dubai Municipality clinic which is the only authorized place for issuing medical fitness card for food handlers in Dubai. The study included food handlers attending Dubai municipality clinic for issuing medical fitness card. An appropriate sample size was calculated according to the sample equation obtained by using computer program Epi Info Version 6.04. the minimum sample size required was 420 food handlers. The study sample was 425 food handlers with 100% response rate. A systematic random sample procedure was carried out. Considering that filling the questionnaire was taking about 20-30 minutes, every 10th person was involved to select nearly 10 food handlers a day until accomplishment of the required sample size. A systematic random sample procedure was carried out. Considering that filling the questionnaire was taking about 20-30 minutes, every 10th person was involved to select nearly 10 food handlers a day until accomplishment of the required sample size. The data was collected through face-to-face interviews (Appendix, II) using structured questionnaire after Tonder Izanne et al., (2) and WHO. (11)The questionnaire was reviewed by community medicine consultants to review the face and content validity. Reliability of the questionnaire using cronbach's alpha with Guttman split half reliability coefficient was carried out.

4. Results

When hygienic practices were compared among socio-demographic data (tables 1-7), significant differences were observed by sex, education, occupation and monthly income. Significantly lower personal hygienic score was observed among females versus males (66.76 + 8.77 and 72.38 + 6.78 respectively) and house maid in contrast to cooks and kitchen helpers (65.31 + 7.90 and 75.04 + 5.51 respectively). General hygienic score was found to be significantly lower among

secondary educated (87.07 + 6.78) compared to university educated (88.07 + 9.58), among house maid (84.60 + 5.00) in contrast to bakers and confectioners (89.87% + 4.85) and among the 1500-<2000 AED income category (85.30 + 10.61) in contrast to the <1000 AED category (88.85 + 5.53). Hygienic practices related to cooking showed significant difference only with income with maximum mean score obtained for the 1500-<2000 AED income category (91.75 + 6.15) and minimum mean score for the <1000 AED category (89.35 + 7.08).

Table 1. Hygienic practices of food handlers by age.

Age (years)	No.	Personal hygienic practices		General hygienic practices		Cooking hygienic practices		Total score	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
<25	110	71.97	7.16	88.61	6.47	89.91	6.67	82.19	4.80
25-	131	71.72	7.77	86.77	7.50	89.89	7.89	81.62	5.66
30-	136	71.35	7.37	87.18	9.18	90.72	6.65	81.85	5.23
40+	48	69.81	7.29	87.64	5.95	88.91	9.28	80.72	5.49
Kruskal Wallis test		4.69		3.69		1.77		2.86	
P		0.196		0.297		0.622		0.414	

Table 2. Hygienic practices of food handlers by sex.

Sex	No.	Personal hygienic practices		General hygienic practices		Cooking hygienic practices		Total score	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Male	355	72.38	6.78	87.57	7.97	89.94	7.50	82.11	5.29
Female	70	66.76	8.77	87.00	6.14	90.57	6.79	79.87	5.89
Mann-Whitney test		5.28		1.51		0.05		4.08	
P		0.000		0.131		0.960		0.000	

Table 3. Hygienic practices of food handlers by nationality.

Nationality	No.	Personal hygienic practices		General hygienic practices		Cooking hygienic practices		Total score	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Indian	222	72.16	6.89	88.35	6.24	89.46	7.53	82.06	5.11
South East Asia	123	70.57	8.41	86.86	8.12	91.46	6.79	81.70	5.46
Arab	55	71.80	6.93	85.82	11.23	89.45	8.16	81.27	5.66
Others	25	68.73	7.42	86.40	7.32	89.60	6.40	80.20	5.15
Kruskal Wallis test		5.68		5.06		6.58		4.35	
P		0.128		0.168		0.087		0.226	

Table 4. Hygienic practices of food handlers by education.

Education	No.	Personal hygienic practices		General hygienic practices		Cooking hygienic practices		Total score	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Below secondary	53	70.97	8.46	87.74	6.05	89.53	6.63	81.43	5.34
Secondary	237	71.13	6.68	87.07	6.78	90.03	8.01	81.50	5.09
University/ higher	135	72.21	8.22	88.07	9.58	90.28	6.49	82.28	5.61
Kruskal Wallis test		4.83		8.89		1.10		3.83	
P		0.089		0.012		0.577		0.147	

Table 5. Hygienic practices of food handlers by occupation.

Occupation	No.	Personal hygienic practices		General hygienic practices		Cooking hygienic practices		Total score	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Baker and confectioner	26	73.63	4.58	89.87	4.85	89.81	6.96	83.16	3.83
Cooks and kitchen helper	118	75.04	5.51	89.66	6.71	90.97	5.82	84.08	4.34
Restaurant	260	70.10	7.66	86.47	8.25	89.49	7.97	80.75	5.51
House maid	21	65.31	7.90	84.60	5.00	92.02	7.69	79.15	4.13
Kruskal Wallis test		56.78		35.50		3.03		51.72	
P		0.000		0.000		0.387		0.000	

Table 8 illustrates results of stepwise logistic regression analysis of factors affecting hygienic practices. The most

significant factor was found to be occupation. Those more likely to have fair to bad hygienic score were those working

in restaurants or housemaid (at least 3 times more likely relative to bakers and confectioners).

Table 6. Hygienic practices of food handlers by duration of work.

Duration of work (years)	No.	Personal hygienic practices		General hygienic practices		Cooking hygienic practices		Total score	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
<1	53	73.01	7.63	89.18	5.27	90.94	5.99	83.11	4.57
1-	119	71.38	7.13	88.29	6.48	89.98	7.16	81.89	5.02
3-	123	71.00	7.53	86.75	9.73	89.74	8.69	81.27	6.07
5+	130	71.32	7.54	86.72	7.27	90.04	6.76	81.49	4.96
Kruskal Wallis test		0.65		4.35		0.23		1.14	
P		0.723		0.114		0.893		0.565	

Table 7. Hygienic practices of food handlers by monthly income.

Monthly income (AED)	No.	Personal hygienic practices		General hygienic practices		Cooking hygienic practices		Total score	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
<1000	81	71.63	6.73	88.85	5.53	89.35	7.08	81.93	4.75
1000-	145	71.88	7.19	88.41	6.40	89.41	6.93	81.94	4.97
1500-	90	70.48	7.74	85.30	10.61	91.75	6.15	81.36	5.79
2000+	109	71.56	8.00	87.00	7.48	90.00	8.84	81.65	5.79
Kruskal Wallis test		2.53		6.23		6.72		0.33	
P		0.282		0.044		0.035		0.847	

Table 8. Hygienic practices of food handlers by training.

Occupation	P	OR	95% CI	
			Lower	Upper
Baker and confectioner		1.00		
Cooks and kitchen helper	0.993	1.00	0.35	2.87
Restaurant	0.024	3.12	1.16	8.39
House maid	0.000	26.73	4.58	156.16

5. Discussions

The current study revealed no significant differences as regards age of the workers in association with hygienic practices. In HACCP study in Italy⁽²²⁾ it was found that the younger staff had significantly better knowledge and practices. In another study in china⁽²³⁾ it was found that male respondents, age less than 30 years, secondary education or above, five years or more of working experience, or who had previously attended a health training program within the last two years, generally performed better on the knowledge of food hygiene.

The study results reflected that those living in homes with one toilet had higher personal and general hygienic score compared to workers with two or more toilets. This may be explained by more care and worry practiced by those who had only one toilet as a compensatory act for the shortage in toilet facilities. In relation to training, it appears that those who were trained had significantly higher personal, general and cooking hygienic score than workers who were not trained. In agreement with our results, a recent study done in Nigeria⁽²⁴⁾ in Benin City, Edo State found that the majority (98%) of the respondents had formal education. There was good knowledge and practice of food hygiene and safety among the respondents. Knowledge was significantly

influenced by previous training in food hygiene and safety. A study carried out by Chukwuocha, (2009),⁽²⁵⁾ in metropolis in south eastern Nigeria, found no significant difference in attitude and practice between trained and untrained food handlers. Another study conducted in Shiraz, Iran⁽¹⁶⁾ revealed that there was a lack of knowledge due to lack of training among the catering staff about the critical temperatures of hot or cold ready-to-eat foods, acceptable refrigerator temperature ranges, and food-borne pathogens. Several studies^(6,26) have demonstrated that although training may increase food safety knowledge, a positive change does not always subsequently occur in terms of food handling behavior.

It was found that those more likely to have parasitic infection were workers who came for renewing their health cards, males from India and South East of Asia in contrast to other nationalities, working as bakers or in restaurants in contrast to home maid category and those with income <1000 or 1500-2000 AED/month in contrast to 2000+ AED/month. Many studies done in Makkah during Hajj Season,⁽²⁷⁾ Qatar (33.9%)⁽²¹⁾ and UAE⁽¹⁸⁾ showed a significant association between the nationality of the food handler and a positive stool specimen for parasites.

In Regards to home environmental factors, the study revealed that there was a significant association with parasitic

infection. Those living in homes with one toilet had significantly higher risk of parasitic infection compared to workers in facilities with two or more toilets. Other environmental factors didn't show significant association with parasitic infection. In contrast, Thailand study⁽²⁸⁾ showed of the total 20 analyzed factors, only three revealed significant correlations with intestinal parasitic infections which were low annual income, having inadequate toilets and eating undercooked food.

The poor hygiene practice might have been confounded by the fact that most food-handlers were individuals from the lower socioeconomic class with low level of education.

6. Conclusions

The most significant factor was found to be occupation. Those more likely to have fair to bad hygienic score were those working in restaurants or housemaid (at least 3 times more likely relative to bakers and confectioners). Developing food borne diseases surveillance and notification program and carrying out competent statistical analysis and addressing for the problem. Further studies are recommended.

References

- [1] Rocha Carvalho ML, Beninga Morais T, Ferraz Amaral D and Sigulem DM. Hazard analysis and critical control point system approach in the evaluation of environmental and procedural sources of contamination of enteral feedings in three hospitals. *J Parenter Enteral Nutr* 2000; 24(5):296.
- [2] Sanlier N. The knowledge and practice of food safety by young and adult consumers. *Food Control* 2009; 20(6):538-542.
- [3] Tahkapaa, S., M. Kallioniemi, H. Korkeala and R. Maijala. Food control officers perception of the challenges in implementing new food control requirements in Finland. *Food Control* 2009; 20(6): 664-670.
- [4] World Health Organization. 2006. Five keys to safer food manual. Accessed [August 10, 2010]. Available from: www.who.int/entity/foodsafety/publications/consumer/manual_keys.pdf.
- [5] Coleman P and Roberts A. Food hygiene training in the UK: a time for change. *Food Service Technology* 2005; 5(1):17-22.
- [6] Baş M., Şafak Ersun A and Kivanç G. The evaluation of food hygiene knowledge, attitudes, and practices of food handlers' in food businesses in Turkey. *Food Control* 2006; 17(4):317-322.
- [7] Çakıroğlu FPI and Uçar AI. Employees' perception of hygiene in the catering industry in Ankara (Turkey). *Food Control* 2008; 19(1):9-15.
- [8] Clayton DA, Griffith CJ, Price P and Peters AC. Food handlers' beliefs and self-reported practices. *Int J Environ Health Res* 2002; 12(1):25-39.
- [9] Howes, M., S. McEwen, M. Griffiths and L. Harris. Food handler certification by home study: Measuring changes in knowledge and behaviour. *Dairy Food Environ. Sanitat* 1996; 16: 737-744.
- [10] Bolton D, Meally A, Blair I, McDowell D and Cowan C. Food safety knowledge of head chefs and catering managers in Ireland. *Food Control* 2008; 19(3):291-300.
- [11] Idowu O and Rowland S. Oral fecal parasites and personal hygiene of food handlers in Abeokuta, Nigeria. *African health sciences* 2006; 6(3):160-164.
- [12] Baswaid SH and Al-Haddad A. Parasitic infections among restaurant workers in Mukalla (Hadhramout/Yemen). *Iranian Journal of Parasitology* 2008; 3(3): 37-41.
- [13] Saab BR, Musharrafieh U, Nassar NT, Khogali M and Araj GF. Intestinal parasites among presumably healthy individuals in Lebanon. *Saudi Med J* 2004; 25(1):34-37.
- [14] Babiker M, Ali M and Ahmed E. Frequency of intestinal parasites among food-handlers in Khartoum, Sudan. *Eastern Mediterranean Health Journal* 2009; 15(5):1098-1104.
- [15] Y. Garedaghi and S. Safar Mashaei. Parasitic Infections among Restaurant Workers in Tabriz (East-Azerbaijan Province) Iran. *Research Journal of Medical Sciences* 2011;5(2): 116-118
- [16] Al - Shammari S, Khoja T, El - Khwasky F and Gad A. Intestinal parasitic diseases in Riyadh, Saudi Arabia: prevalence, sociodemographic and environmental associates. *Tropical Medicine & International Health* 2001; 6(3):184-189.
- [17] Norhayati M, Fatmah M, Yusof S and Edariah A. Intestinal parasitic infections in man: a review. *Med J Malaysia* 2003; 58(2):296-305.
- [18] Ibrahim OM. Bener A and Shalabi A. Prevalence of intestinal parasites among expatriate workers in Al-Ain United Arab Emirates. *Ann Saudi Medicine* 1993; 13(2):126-129.
- [19] Al-Madani AA and Mahfouz AAR. Prevalence of intestinal parasitic infections among Asian female house keepers in Abha District, Saudi Arabia. *Southeast Asian J Trop Med Public Health* 1995; 26(1):135-137.
- [20] Abahussain NA and Abahussain N. Prevalence of intestinal parasites among expatriate workers in Al-Khobar, Saudi Arabia. *Middle East Journal of Family Medicine* 2005; 3(3):17-21.
- [21] Abu-Madi MA, Behnke JM and Ismail A. Patterns of infection with intestinal parasites in Qatar among food handlers and housemaids from different geographical regions of origin. *Acta Trop* 2008; 106(3):213-220.
- [22] Angelillo IF, Viggiani NMA, Greco RM and Rito D. HACCP and food hygiene in hospitals: knowledge, attitudes, and practices of food-services staff in Calabria, Italy. *Infection control and hospital epidemiology* 2001; 22(6):363-369.
- [23] Tang C and Fong U. A survey of food hygiene knowledge and attitudes among Chinese food handlers in Fong Song Tong district. *Asia-Pacific Journal of Public Health* 2004; 16(2):121-125.
- [24] Isara AR and Isah EC. Knowledge and practice of food hygiene and safety among food handlers in fast food restaurants in Benin City, Edo state, Niger. *Postgraduate Medical Journal* 2009; 16(3):207-212.

- [25] Chukwuocha UM, Dozie IN, Amadi AN, Nwankwo BO, Ukaga CN, Aguwa OC, Abanobi OC and Nwoke EA. The knowledge, attitude and practices of food handlers in food sanitation in a metropolis in south eastern Nigeria. *East Afr J Public Health* 2009; 6(3):240-243.
- [26] Powell S, Attwell R and Massey S. The impact of training on knowledge and standards of food hygiene: a pilot study. *Int J Environ Health Res* 1997; 7(4):329-334.
- [27] Wakid MH, Azhar EI and Zafar TA. Intestinal parasitic infection among food handlers in the Holy City of Makkah during Hajj season 1428 Hegira (2007G). *Journal of King Abdulaziz University Medical Sciences* 2009; 16(1):39-52.
- [28] Suwansaksri J, Garngarndee U, Wiwanitkit V and Soogarun S. Study of factors influencing intestinal parasitic infections in a rural community in Northeastern Thailand. *Southeast Asian J Trop Med Public Health* 2003; 34(2):94-97.