

Magnitude of hygienic practices and its associated factors of food handlers working in selected food and drinking establishments in Mekelle town, northern Ethiopia

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Abstract

Food service establishments are the sources of food borne illnesses and the food handlers contribute to food borne illness outbreaks. Purpose of this study was to assess the magnitude of hygienic practices and its associated factors on food handlers working in selected food and drinking establishment found in Mekelle town, northern Ethiopia. A facility based cross-sectional study was conducted from January-February 2014 among the 369 food handlers. A simple random sampling method was applied for data collection using a pre-tested structured questionnaire. The data entry, cleaning and analysis were performed using SPSS version 20. Bi-variable and multivariable analysis was carried out to see the association between dependant variables and independent variables. The mean age of food handlers was 22.7±6.36 years. Magnitude of hygienic practices of food handlers were 53.1%. Food handlers have an access to running water inside the kitchen [AOR=2.89, 95%CI: 1.43-5.87] and have cupboard for storing food utensils [AOR=3.81, 95%CI: 1.88-7.73] were strongly associated with good hygienic practices. This study identify variables like access to running water, availability of cupboard in the establishment and an owner and relative being a manager was main predictors. The study recommends food handlers need special attention on food safety training, medical checkup and personal hygiene that can increase food hygienic practices. It also recommends that to commence the small-scale enterprise to work on social market in terms of training centers on food safety..

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Introduction

An adequate supply of safe, wholesome and sound food is essential to the health and wellbeing of human being (WHO, 1979). Food-handling personnel play important role in ensuring food safety throughout the chain of food production and storage (WHO, 1989). Food handlers with poor personal hygiene and inadequate knowledge on food hygiene and safety are contributing factors of the food borne illness outbreaks (Charles, 1983), in developed and developing countries including Ethiopia (Tessema *et al.*, 2014).

The World Health Organization (WHO, 1989) estimated that in developed countries, up to 30% of the population suffers from food borne diseases each year, whereas in developing countries up to 2 million deaths are estimated per year. A USA based-study suggested that improper food handling practices contribute to about 97% of food borne illnesses in food services establishments (Sumner *et al.*, and

EHS-Net working group, 2011). Todd *et al.* (2008) reported that the risk of food being contaminated depends largely on the health status of the food handlers, their personal hygiene, knowledge and practice of food hygiene.

A very low frequency of hand washing and inspection of food handlers showed a low level of personal hygiene in Nigeria (Okojie *et al.*, 2005). As well, Mudey *et al.* (2010) from India revealed the hygienic practices of food handlers, majority of the participants were having clean nails and were cutting their nails (73.74%) satisfactorily. Finding from Ramallah Palestine on the health status of food handlers showed, 172 (56.0%) reported that they left work during sickness (Al-khatib and Al-Mitwall, 2009).

A study conducted in Accra, Ghana (Annor and Baiden, 2011) revealed that food handling was not influenced by gender, age, educational level and knowledge on the other hand; the place of work of respondents appreciably influenced their responses

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to food handling. The study from Benin (Isara and Isah, 2009) described that experience and knowledge on food hygiene of food handlers were associated with food hygiene practices. An investigation from India confirmed the association between education and their personal hygiene. Literacy level of food handlers was directly proportional to their personal hygiene practices (Mudey *et al.*, 2010).

A study from Bahir Dar (Kibret and Bayeh, 2012) reported that among 455 subjects 99 (21.8%) have had food hygiene training. It also revealed that they had poor knowledge in practice where they handled raw materials for food without washing their hands; wore hand jewelries and fondled their bodies while preparing food. Poor personal hygiene practices were observed commonly among food handlers in Awash-Sebat Kilo town in Ethiopia (Abera *et al.*, 2006). A study from Palestine also showed many workers had poor personal hygiene practices and among them 35.7% were found preparing food while they wore hand jewelry (Al-khatib and Al-mitwalli, 2009).

A significant difference in the number of trained and untrained food handlers with regard to practices of hand washing and sink accessibility was related to hand washing, which suggests that sink accessibility promotes hand washing (WHO, 2008; Abera *et al.*, 2010). A recent study conducted in Ethiopia in Dangila town, showed that majority of food handlers had poor knowledge score on food handling practices in food and drinking establishments (Tessema *et al.*, 2014). The study from Mekelle also revealed that, in university students cafeteria the practice of food hygiene was 3.6 time more satisfactory in food handler's having good knowledge [OR=3.61, 95%CI: 1.51-8.65] than food handlers having poor knowledge on food hygiene (Nigusse and Kumie, 2012). The factors like lack of basic infrastructure, lack of knowledge of hygiene, unavailability of potable water, lack of proper storage facility, inadequate facilities for garbage disposal and unsuitable environments can contribute to poor quality of foods (Kibret and Bayeh, 2012; Havellar *et al.*, 2013).

With the increase in urbanization, industrialization and tourism, food and drinking establishments are becoming increasingly popular in both industrialized and developing countries. This needs to ensure hygienic food handling and preparation practices in such public food establishments (Abera *et al.*, 2010). Despite of the above fact, different study conducted in different parts of Ethiopian towns revealed that there were poor hygienic practices, inadequate sanitary facility, improper handling and storage of food and food utensils, poor personal hygiene, improper waste storage and disposal were the major

findings. In addition, hand wash facility availability, having training on food safety, knowledge on food safety and availability of potable water were the main factors. In evidence of this, health and hygiene of food worker is major determinant factors for food safety (Abera *et al.*, 2006; Zeru and Kumie, 2007; Andargie *et al.*, 2008; Tessema *et al.*, 2014). A former study conducted in Mekelle, described the sanitary conditions of food establishments but not well described the food handler's hygienic practices (Zeru and Kumie, 2007). Moreover, this study aimed on assessing of the magnitude and associated factors of hygienic practices of food handlers.

Materials and Methods

This study used a facility based cross-sectional study design. Sample size was determined using single population proportion formula with prevalence estimates 46% (Zeru and Kumie, 2007). Assuming 95% confidence level the total sample size was calculated as 381. The number of food and drinking establishments and food handlers was obtained from the trade and industry of Mekelle town. In Mekelle town, there are 755 food and drinking establishments like hotel, restaurant, snack bar or cafeteria and juice house with total number of 2265 food handlers. A sampling frame was formed for all food and drinking establishments and one food handler was selected using lottery method from food preparing or serving area of the each establishment.

Food handlers working in preparation and service areas of food and drinking establishments regardless of their sex and employment status were included and respondents working in two and more than two establishment were excluded from the study. Five environmental health professionals were assigned to collect data from establishments other than their permanent workplace or catchment area in order to minimize interviewer bias. The data was collected using a structured questionnaire prepared in English and then translated to the local language, Tigrigna. The questionnaire comprises of questions about hygienic practices, sanitary conditions of the establishment and socio-demographic characteristics of the food handlers. It was piloted on 5% (n=18) food handlers to check the consistency and understand ability of the question and slight modifications in the data collection process was made based on frequent data quality checks.

The dependent variable in this study was hygienic practices of food handlers. The independent variables were several factors related to the food handler (sex, age, knowledge, income, educational status, training

and work experiences) and food and drinking establishments (availability of hand-wash facility, availability of private piped water, daily water consumption, availability of latrine, availability of dishwashing system, availability kitchen, ownership of the building, number of customers).

The collected data was analyzed using SPSS version 20 statistical package. Bivariate logistic regression analysis was carried out to distinguish the independent effect of each variable. Using multivariate logistic regression analysis, 95% confidence interval (CI) and adjusted odds ratio (AOR) were computed in order to identify any statistically significant associations between food handler's hygienic practices and associated factors. The level of statistical significance was set at $P < 0.05$. Ethical clearance was obtained from the Institutional Review Board of Mekelle University, College of Health Sciences. Letter of support from Mekelle Zonal Health Office and verbal consent was obtained from owners/managers of each food and drinking establishment and study subjects (food handlers). Confidentiality was maintained and food handlers were informed that participation is voluntary and they could withdraw at any time from the study.

Results

Socio-demographic characteristics of food handlers

The response rate of the present study is 97%. The mean age of the food handler was 22.7 ± 6.36 years. Among the interviewed food handlers, 326 (88.3%) were female while, the remaining 43 (11.7%) were male with female to male ratio of 7.8:1. The mean duration of work experiences of the food handlers was 1.72 year (Table 1).

Sanitation condition of food and drinking establishment and knowledge and health status of food handlers

Among the 369 food and drinking establishments, 232 (85.10%) had kitchens and majority 98.1% had some kind of dishwashing facility. Moreover, 54.6% have running water 33.7% and 28.5% were with hand washing facility and have an access to hot water respectively. Near to three fourth 74.3% of the food handler had information on food borne disease and their major sources of information were health professionals. A total of 58 (15.7%) food handlers have received food safety training. Regarding, the health status of the food handlers 10 (2.7%) has visible cut and boil (Table 2 and Figure 1).

Table 1. Socio-demographic characteristics of food handlers in Mekelle (n=369)

Variables	N (%)
Sex of food handler	
Female	326 (88.3)
Male	43 (11.7)
Marital status of food handlers	
Married	69 (18.7)
Single	286 (77.5)
Divorces	14 (3.8)
Educational status of food handler	
Literate	323 (87.5)
Illiterate	46 (12.5)
Level of education	
1-8	267 (87.5)
Above 9	38 (12.5)

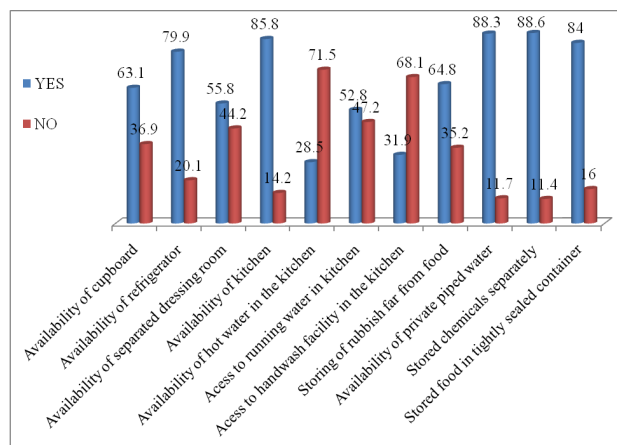


Figure 1. Sanitary conditions of food and drinking establishments in Mekelle (n=369)

Magnitude of hygienic practices of food handlers

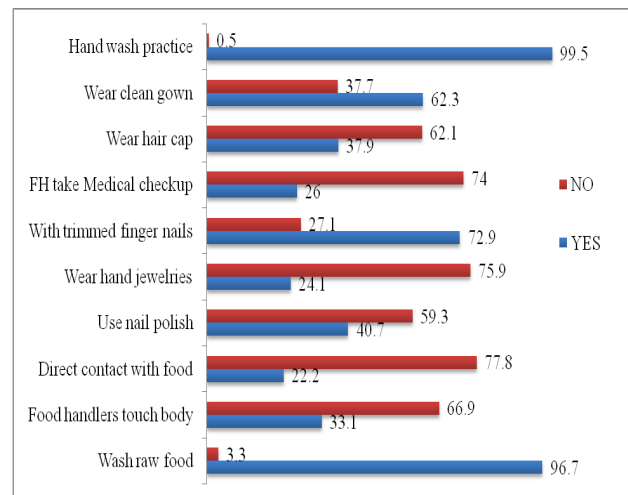
Almost all 99.5% of the respondents had hand-washing habit. Most of the food handlers trimmed their fingernails and not use nail polish with 269 (72.9%) and 219 (59.3%) respectively. Moreover, the food handlers wear their clean gown and did not wear hand jewelries when preparing food were 230 (62.3%) and 280 (75.9%) respectively (Figure 2).

Factors associated with hygienic practices of food handlers

Food handler that have worked in the establishment having access to running water, hand wash facility, hot water in the kitchen, availability of cupboard, refrigerator, ownership of the establishment building, use of detergent and educational status of the food handler were significantly associated with the hygienic practices in the binary logistic regression analysis. In the adjusted analysis, on first

Table 2. Sanitation condition of food and drinking establishment, and knowledge and health status of food handlers in Mekelle (n=369)

Variables	N (%)
Type of food and drinking establishment	
Hotel	31(8.4)
restaurant	95(25.7)
juices house	54(14.6)
cafeteria or snack bar	189(51.2)
Do inspected for last six month by the authorized person	
Yes	298(80.8)
No	71(19.2)
Availability of latrine in the establishment	
Yes	350(94.9)
No	19(7.1)
Toilet was opened at the time of visiting (n=350)	
Yes	326(92.9)
No	24(7.1)
Method of dish wash system (n=363)	
Three	264(72.7)
Two	52(14.3)
One	47(12.9)
Did you use any detergents for washing utensil	
Yes	333 (90.2)
No	36 (9.8)
Materials used solid waste handling	
Dust bin having cover	161 (43.6)
Open dust bin	80 (21.7)
Other	128 (34.7)
Do you ever heard about food borne disease	
Yes	274(74.3)
No	95(25.7)
What is your source of information	
Formal training certification	20(5.4)
Health professional	155(42.0)
Written display	62(16.8)
Mass media	37(10)
Do you take food safety training	
Yes	58(15.7)
No	311(84.3)
Acquisition of knowledge on food preparation	
Formal training	20(5.4)
Observation	349(94.6)
Do you know food safety	
Yes	224(60.7)
No	145(39.3)
Do you report when sick for your manager	
Yes	338(91.6)
No	31(8.4)
Any visible skin rash, boil, cut and wound	
Observed	10(2.7)
Not observed	359(97.3)
Discharging from nose, eye, ear and cough	
Observed	9 (2.4)
Not observed	360 (97.6)



*FH: Food Handler

Figure 2. Personal hygiene of food handler working in food and drinking establishments found in Mekelle (n=369)

food handler who have cupboard for storing food utensils were strongly associated with good hygienic practices (AOR=3.81, 95%CI: 1.88-7.73), followed by an access to running water inside the kitchen (AOR=2.89, 95%CI: 1.43-5.87). Availability of running water in the kitchen, availability of cupboard and being the owner and relative being a manager were the main predictors in the final model (Table 3).

Discussion

The present study focused on magnitude of hygienic practices of food handlers revealed that an improvement like access to running hot water and establishments with three dishwashing compartments which was found in Mekelle in 2005 (Zeru and Kumie, 2007). Most of the food handlers have trimmed their fingernails (72.9%) and not using nail polish (59.3%). These results are similar with study from India and Mekelle in the year of 2005 (Zeru and Kumie, 2007; Mudey *et al.*, 2010). Moreover, food handlers wear hand jewelries when preparing and serving food were higher than findings from Kenya, Ramallah, but lower from Mekelle (Zeru and Kumie, 2007; Al-khatib and Al-mitwalli, 2009; Nyamari, 2013). About 58 (15.7%) of the food handlers were taken food safety training. This is similar with findings from Bahir-Dar (21.8%), and Mekelle (12.3%) (Zeru and Kumie, 2007; Kibret and Bayeh, 2012).

Food handlers were undergone routine medical checkups, this finding is lower from Malaysia, Nigeria, but improved from previous study in Mekelle in 2005 (Maizun and Nyi, 2002; Okojie *et al.*, 2005; Zeru and Kumie, 2007). The main reason of the difference might be due to socio-economic status of the food handlers or affordability to pay and

Table 3. Factors associated with hygienic practices of food handlers in Mekelle (n=369)

Variables	Good hygienic practices	Poor hygienic practices	COR (95% CI)	AOR (95% CI)
Type of food and drinking establishment				
Hotel	21	10	2.41[1.08-5.39]*	1.141[0.31-4.32]
Restaurant	58	37	1.79[1.09-2.97]*	1.203[0.59-2.44]
Juices house	29	25	1.33[0.73-2.44]	0.889[0.31-2.58]
Cafeteria and snack bar	88	101	1	1
Who is manager				
Owner	158	153	0.28[0.10-0.79]*	0.09[0.02-0.57]**
Relative	20	25	0.37[0.11-1.22]	0.12[0.02-0.96]**
Other	18	5	1	1
Access to hot water for washing utensils				
Yes	70	35	2.19[1.37-3.51]*	1.66[0.77-3.59]
No	126	138	1	1
Ownership of the establishment building				
Private	157	152	0.56[0.31-0.99]*	0.88[0.36-2.15]
Rented	39	21	1	1
Hand wash facility inside the kitchen				
Yes	69	37	1.96[1.21-3.17]*	0.84[0.38-1.84]
No	102	107	1	1
Do you use any detergent				
Yes	183	156	2.15[1.05-4.41]*	0.81[0.28-2.30]
No	13	23	1	1
Do the kitchen have an access of running water				
Yes	113	59	2.81[1.77-4.44]*	2.89[1.42-5.87]**
No	58	85	1	1
Does the establishment have cupboard				
Yes	141	92	2.26[1.46-3.47]*	3.81[1.88-7.73]**
No	55	81	1	1
Does the establishment have refrigerator				
Yes	167	128	2.03[1.20-3.41]*	1.57[0.63-3.88]
No	29	45	1	1
Do you store rubbish far from food preparation area				
Yes	138	100	1.74[1.13-2.67]*	0.72[0.35-1.47]
No	58	73	1	1
Materials used to handle solid waste				
Dust bin with cover	99	62	2.12[1.32-3.39]*	1.11[0.53-2.32]
Open dust bin	42	38	1.47[0.84-2.57]	0.88[0.36-2.16]
Other	55	73	1	1
Reporting when sick				
Yes	187	151	3.02[1.35-6.76]*	1.21[0.26-5.59]
No	9	22	1	1

*: Significant variable at bi-variate, **: significant on the multivariate

attitude of the manager/owner of the establishment.

In the binary logistic regression analysis, access to running water, hand-washing facility, and hot water in the kitchen, availability of cupboard, refrigerator, and ownership of the establishment building and use of detergent were significantly associated. The analogous significant association with the sanitation condition of the establishment was found in the study

from EHS Net, Kenya, and Bahir Dar (CDC, 2011; Kibret and Bayeh, 2012; Nyamari, 2013).

In addition, socio-demographic factors of the food handler had no association with the outcome variable this finding was similar with Benin (Isara and Isah, 2009), Ghana (Annor and Baiden, 2011) and Bahir Dar (Kibret and Bayeh, 2012). This similarity might be due to socio-economic and level

of education resemblance. Also food safety training of food handlers have no any association analogous with study from Malaysia but finding from EHS Net, Kenya and Bahir Dar there were significant difference among trained and untrained food handlers in their hygienic practices (CDC, 2011; Kibret and Bayeh, 2012; Nyamari, 2013).

The study has included the critical area subjects in the establishments and has 97% response rate. Since, the study has a limitation to formulate a casual association, small sample size, recall bias and social desirability bias might have underestimated some of the findings.

Conclusion

The present study identified the major sanitary deficiencies as unavailability of hand wash facility, low access to hot water and access to running water in kitchen, in-appropriate solid waste receptacles, lack of standardized dish washing compartments, and lack of separated dressing room in a large number of establishments. There were also problems with hygienic practices of food handler in wearing hair cap, avoiding of nail polish, touch their body, working without medical checkup and having direct contact with food during preparation. Moreover, this finding identify access to running water, availability of cupboard in the establishment and owner and relative being a manager were strongly associated with food handlers hygienic practices. The study supported that poor food hygienic practices of food handlers as well as poor sanitary condition of food and drink establishments can contribute to the outbreaks of food borne illnesses.

Based on the study findings, we recommend that the regulatory body should pay due interest to growth of the standard of food and drinking establishments to acceptable level. Food handlers need special attention on food safety training, medical checkups and personal hygiene that can increase food hygienic practices. Both the owner and regulatory person should give an attention on continuous training of the food handlers. It is also crucial to intervene with sick food handlers working in food and drinking establishments unconditionally. We also recommend that to commence the small-scale enterprise to work on social market in terms of training centers on food safety. Future interventional research should be conducted with focus on enumeration of bacteria from food utensils and food handlers.

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