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Full Length Research Paper

Food hygiene practices and prevalence of intestinal parasites among food handlers working in Mekelle university student's cafeteria, Mekelle

Daniel Nigusse[1] and Abera Kumie[2]

[1]Mekelle University, Public Health Department, P.O. Box.1871, Addis Ababa, Ethiopia.
[2]School of Public Health, Addis Ababa University, P.O. Box 9086, Addis Ababa, Ethiopia.

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An adequate supply of safe and wholesome food is essential to the health and well-being of humans. Reports indicate that approximately 10 to 20% of food-borne disease outbreaks are due to contamination by the food handlers. The objective of this study was to assess food handlers practice on food hygiene and describe prevalence of intestinal parasites among food handlers working in Mekelle University student's Cafeteria. Institution based cross-sectional study was conducted in student's cafeteria of Mekelle University in January 2011. A total of 277 food handlers were used to collect data using structured and pre-tested questionnaire. Simple random sampling technique with population proportion to size allocation was used to identify study subjects. Stool samples of 229 were collected and subjected to microscopic examination to determine the prevalence of intestinal parasites through both direct and formol-saline ether sedimentation technique. The prevalence of intestinal parasites among the study groups was 49.4%. Food handlers working in Ayder campus [AOR: 20.15, 95% CI: (4.40-91.8)] and having good knowledge on food hygiene [AOR: 3.61, 95% CI: (1.51-8.65] were determinants for the practice of food handlers on food hygiene. The logistic regression analysis result also indicated that utilization of soap during hand washing [AOR: 0.15, 95% CI (0.06-0.38)], washing hands after toilet [AOR: 0.06, 95% CI (0.02-0.14)], practice of medical checkup [AOR: 0.47, 95% CI (0.22-0.97)] and history of de-worming [AOR: 0.25, 95% CI (0.11-0.54)] were determinants for intestinal parasitic infection. There existed poor food hygiene practice among food handlers. The learned behavior did not match with the intended hygienic practice. Hand washing practice after toilet, utilization of soap, medical checkup and de-worming history of the respondents were determinants for intestinal parasite infections. This study also found high prevalence of intestinal parasites among food handlers. The provision of food safety measures focusing on personal hygiene and periodical medical checkups is highly advised.

Keywords: Food handler, intestinal parasites, protozoa, helminthiasis, and University cafeteria.

INTRODUCTION

An adequate supply of safe and whole some food is essential to the health and well-being of humans (WHO, 1979). However, diseases spread through food are common and persistent problems that result in appreciable morbidity and occasionally in death across the globe (WHO, 2004). The main diseases which are caused by contaminated foods are typhoid, cholera, hepatitis A, food poisoning and dysentery (WHO, 2004; Teklu and Demisse, 2002).

According to the World Health Organization (WHO), the global incidence of food-borne diseases is difficult to estimate, but it has been reported that in 2008 alone 1.8 million people died from diarrheal diseases. A great proportion of these cases can be attributed to contamination of food and drinking water (Maizun and Nyi, 2002). In developing countries, up to an estimated

*Corresponding Author E-mail: danielnigusse@yahoo.com, danielnigusse@gmail.com; Tel +2510911914958

70% of cases of diarrheal diseases are associated with the consumption of contaminated foods (WHO, 1979; WHO, 2008).

Approximately 10 to 20% of food-borne disease outbreaks are due to contamination by the food handler. Investigations of outbreaks of food-borne disease throughout the world show that, in nearly all instances, they are caused by the failure to observe satisfactory standards in the preparation, processing, cooking, storing or retailing of food (Maizun and Nyi, 2002).

Transmission of intestinal parasites and entero-pathogenic bacteria is affected directly or indirectly through objects contaminated with faces. These include food, water, nails, and fingers, all of them which are indicating the importance of faeco-oral human-to-human transmission. Accordingly, food-handlers with poor personal hygiene working in public food-serving establishments could be potential sources of infections of many intestinal helminthes, protozoa, and entero pathogenic bacteria (Andargie et al., 2008).

All food caterers have a responsibility for ensuring customers are provided with safe food. Nevertheless, many outbreaks of food poisoning are reported each year. The cause is often related to poor hygienic practice and lack of awareness of the important issues in preventing food born diseases by the food handlers (Charles, 1983; Maritha et al., 2007). In some cases, meals served at establishments in higher learning institution are implicated in food borne disease outbreaks. Moreover, since the past two decades, there has been a radical expansion of universities in Ethiopia: from two Federal Universities to twenty two. Likewise, the annual student intake capacity which was 3000 ten years back now reaches more than 100,000 (Kate, 2010). This calls for the needs to ensure hygienic food handling and preparation practices in such environment to safeguard the health and well being of the young scholars who will assume future responsibilities. Because food prepared in large quantities is more liable to contamination, and there is a greater potential for the occurrence of food borne disease outbreaks if basic sanitary practices are not properly maintained (Charles, 1983). Few local studies conducted among food handlers also revealed that high prevalence of intestinal parasites and unsatisfactory practices of food hygiene measurements (Andargie et al., 2008; Kinfe and Kumie, 2007). The purpose of this study is therefore to assess food hygiene practices and determining prevalence of intestinal parasitic infections among food handlers working in higher teaching institution.

METHODS AND MATERIALS

The study was conducted in January, 2011 in Mekelle University, student cafeterias. The University is found in Mekelle town, which is the capital city of Tigray region. Around 461 food handlers are currently working in three different campuses (Ared, Adhaki and Ayder).

Across-sectional study design was carried out and the sample size was calculated using single proportion formula with the assumption of 95% confidence interval(two-sided), an estimated positive proportion of 58.4% for any one of intestinal parasite, marginal error of 4% and 10 % for non-response rate. Accordingly, a total of 284study subjects were selected after considering the correction formula. The calculated sample size comprised 56% of all food handlers.

All food handlers' who have direct contact in food preparation and handling time regardless of their employment status (either permanent or contract employee) were eligible for sampling. However, Food handlers who had taken annual leave during data collection time and those who were received medical treatment for any intestinal ailment within the past two - three weeks prior to the study were excluded from eligibility for stool examination.

The sample from the list of roster was taken through simple random sampling technique, lottery method, followed by population proportion to size (PPS) allocation. Face to face interviewing method using a structured questionnaire and observational checklist were used to collect data related to food handling and preparation practice and availabilities of facilities necessary for food safety. After interviewing, respondents were asked to bring 2-3gmsof fresh stool sample collected in to a plastic cup with a tight fitting lid for stool examination. The collected stool specimens was first examined microscopically through direct method within 30 minutes time and then examined by formol saline ether sedimentation technique to check for intestinal parasites in the samples. Code was given for each stool specimen sample collected from the food handler's on the outer face of the plastic cup for possible treatment of positive findings after examination.

Data quality was ensured at various activities of the study. One week prior to the actual data collection period, pretest was conducted on 20 food handlers working in food and drinking establishments in Mekelle town. The questioner was also translated to local language (Tigrigna) and back translated to English to ensure the consistency of the questionnaires. Data collection facilitators and supervisors were trained for a day before and after pretest. Well experienced lab technician was recruited for lab examination. Before the actual stool specimens examination for the study subjects, pre-test was conducted on five stool samples collected from patients attended in the student clinic to look the reliability/reproducibility of stool examination procedure by the laboratory technician with two different instruments/microscopes. A close supervision was applied during stool sample collection to make sure the participants bring their own stool specimen.

The data was entered by using EPI INFO version 3.5.1 and cleaned before transferring to SPSS version 16 statistical package which was used for data management and analysis. Knowledge, attitude and practice assessment questions was scored and changed in to single variable by rating

respondents knowledge and attitude in to good (>80% of responses), fair (60-80% of responses)and poor (<60% of responses). Since the data was normally distributed, food hygiene practice of respondents also scored and rated in to good (≥ the mean value) and poor (< the mean value) practice by considering the mean practice score value. A total of 28, 23 and 12 questions were used to assess food handler's knowledge, practice and attitude on food hygiene measurements, respectively.

Univariate and bivariate analysis were conducted and crude and adjusted odds ratio (COR) with 95% CI were calculated for statistical significance tests. Variables with significant at P < 0.3in a bivariate analysis were considered for multivariate analysis through multiple logistic regression model to look their relative effect on the outcome variable by controlling other possible confounding factors.

Ethical approval and clearance was obtained from Mekelle University research and ethics committee. Permission was also obtained from Authorities of Mekelle University to conduct the study. Verbal informed consent was also obtained from all study participants. Participants found positive for intestinal parasites were treated freely. Privacy and confidentiality were maintained throughout the study process. The right of study subjects to participate or not in the study was ensured during data collection.

RESULTS

Socio demographic characteristics

Two hundred seventy seven respondents were interviewed in this study, and the response rate was 97.5%. Of these 254 were females. The mean age was 32 ± 8.42SD and the majority of were orthodox Christian follower. Almost half, 135 (48.9 %) and 142 (51.3%) were elementary school completed (less than 8th grade) and married (living together with their spouse), respectively. The median income of the respondents was 397 ETB ranged from 250 to 1940 ETB.

Knowledge and practices of food handlers on food hygiene

Among the 277 food handlers who were interviewed for the knowledge and practice assessment, the majority, 179(64.6%) and 177(63.9%) of the respondents had fair knowledge (answered 60-80% of the questions) and good (>16 mean score value) practices on food hygiene measurements, respectively.

Among the total respondents, 195 (70.4%) of them stated that they had a habit of hand washing with soap or plain water particularly after toilet. Almost half of the respondents, 51.5% wash their hands after cleaning blowing nose, coughing and sneezing and the majorities, 202(72.9%) used soap when they washed their hands before preparing food in any situations.

The majority, 245(88.4%) reported that they kept their finger nail cut short. Of these, 101(36.5%), 66 (23.8%), 20 (7.2%) and 4(1.4%) respondents were cut their finger nail once, twice, thrice and more than three times per week respectively.

From the total respondents, 219 (79.1%) reported the provision of skin health by washing their body at least once in three days. The same respondents acknowledged washing their personal cloth, 257 (92.8%) and hair, 230 (83%) at least once per week

This study also revealed that almost half, 138 (49.8%) respondents had good (>7 mean score value) food handling and preparation practice (Table 1).

History of Food handlers' health and training status

Forty nine (17.7%) respondents were complained some intestinal illness in the past two to three weeks. Of these, 29 (59.2%) took prescribed medicine (drugs) for their illness.

One hundred two (36.8%) respondents had medical checkups and 117 (42.2%) respondents had a history of de-worming either once (73.5%), twice (17.9%) or thrice (4.3%), in the past one year prior to this study. Only 34 (12.3%) respondents were certified with six months formal food handler's training program from different training centers. Among these, 28(82.4%) of them reported that the training was useful for the provision of food safety in their work places.

Prevalence of Intestinal parasites

From the total study subjects (n=277), twenty nine of them were taken medicine in the past two or three weeks and nineteen of them were not willing to participate for a stool examination. As a result, a total of 229 food handlers participated for stool examination of whom 113 were positive for intestinal parasitic organisms, giving a prevalence rate of 49.3% (95% CI: 42.3–55.8%). The most prevalent intestinal parasite species was E – histolytic, in 84 (36.6%) participants. Of those infected, only 7(3%) had heliminthic infections, while the remaining 106 (46.3%) had protozoan infection with mixed 6 (2.6%) and single 100 (43.7%) infections (Table 2).

Determinants of good food hygiene practices and intestinal parasitic infections

Place of work, past experience, and overall knowledge on food hygiene were associated with food hygiene practice. Food handlers working in Ayder campus showed 20

Table 1. Food handler's practice on food handling and preparation in Mekelle University student cafeteria, January, 2011

Variables of food handlers practice on food handling and preparation	Frequency (n=277)	Percent (%)
Keep ready to eat foods in clean container and cover it properly		
Yes	269	97.1
No	8	2.9
Cook foods thoroughly before ready for consumption		
Yes	273	98.6
No	4	1.4
Check ingredients expiry date before using for food preparation		
Yes	205	74
No	72	26
Cover mouth with tissue paper, when coughing or sneezing accidentally during food preparation		
Yes	204	73.6
No	73	26.4
Parch (dry) washed utensil before ready for use		
Yes	260	93.9
No	17	6.1
Cutting raw and cooked foods in separate table		
Yes	136	49.1
No	141	50.9
Use separate utensils for raw and cooked foods		
Yes	243	87.7
No	34	12.3
Store foods which are capable of supporting Microorganisms growth in the refrigerator		
Yes	201	72.6
No	76	27.4

Table 2. Prevalence of intestinal parasites species among food handlers working in Mekelle University student cafeteria, January, 2011

Parasites species	Frequency (%)
Protozoa	
E- histolytica	84 (36.6)
- Cyst form	74 (32.2)
- Trophozoit form	10 (4.4)
G – lamblia	16 (7.0)
- Cyst form	11 (4.8)
- Trophozoit form	5 (2.2)
Helminthes	
S. mansonai	1 (0.4)
Taenia species	3 (1.3)
H. nana	3 (1.3)
Mixed protozoa	
Cyst G lamblia and E-histolytica	4 (1.7)
Trop. G-lamblia and E-histolytica	2 (0.9)
Over all parasite rate, %	49.3 (42.3,55.8)

times more satisfactory practice of food hygiene than food handlers working both in Adhaki and Arid campus [OR: 20.15, 95% CI: (4.40- 91.8)]. The logistic analysis result also revealed that, 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 (Table 3).

Food handler's who were using soap when they washed their hands had a more likely protective effect (with 85%) from intestinal parasites infection [OR: 0.15, 95% CI; (0.06-0.38)] than food handler's who did not use soap. The extent of intestinal parasites was less likely to occur (94% protective effect) among food handlers who washed their hands after toilet [OR: 0.06, 95% CI (0.02-0.14)] than food handlers who didn't wash their hand after

Table 3. Multivariate logistic regression analysis: predictors of food handlers practice on food hygiene working in Mekelle university student cafeteria, 2011.

Variables	Good FH practice No. (%)	Poor FH practice No. (%)	Crude OR (95% CI)	Adjusted OR (95% CI)
Work place				
Ayder	46 (95.8)	2(4.2)	17.2(4.02-72.6)*	20.15(4.4-91.8)*
Not in Ayder	131(57.2)	98(42.7)	1.00	
Experience				
Yes	97(70.3)	41(29.7)	1.74(1.06-2.86)*	1.58(0.92-2.72)
No	80(50.7)	59(49.3)	1.00	
Overall knowledge on Food Hygiene				
Good	163(67.6)	78(32.4)	3.28 (1.59-6.76)*	3.61(1.51-8.65)*
Poor	14(38.8)	22(61.2)	1.00	
Having food handler's training certificate				
Yes	27(91.3)	7(8.7)	2.39(1.01-5.71)*	2.18(0.87-5.47)
No	150(61.7)	93(38.3)	1.00	

Significant at P < 0.01* FH – Food hygiene

Table 4. Multivariate logistic regression analysis: Predictors for intestinal parasitic infection among food handler's working in Mekelle university student cafeteria, 2011.

Variables	Positive No. (%)	Negative No. (%)	Crude OR (95% CI)	Adjusted OR (95% CI)
Work place				
Ayder campus	17(37)	29(63)	0.53(0.27-1.03)	0.63(0.25-1.58)
Not in Ayder campus	96(52.4)	87(47.6)	1.00	1.00
Hand washing practice using soap				
Yes	63(38.8)	99(61.2)	0.16(0.07-0.33)*	0.15(0.06-0.38)*
No	44(80)	11(20)	1.00	1.00
Hand washing practice after toilet				
Yes	43(30.1)	100(69.9)	0.06(0.03-0.14)*	0.06(0.02-0.14)*
No	64(86.5)	10(13.5)	1.00	1.00
Medical checkup in last six months				
Yes	61(43.3)	80(56.7)	0.53(0.31-0.91)*	0.47(0.22-0.97)**
No	52(59.1)	36(39.9)	1.00	1.00
History of de-worming in last one year				
Yes	33(37.1)	56(62.9)	0.44(0.25-0.76)*	0.25(0.11-0.54)*
No	80(57.2)	60(42.8)	1.00	1.00

Significant at P< 0.01* Significant at P< 0.05**

toilet. The extent of intestinal parasite was also less likely to occur (with 53% protective effect) among food handlers who had a practice of medical checkup at least once in last six month [OR: 0.47, 95% CI (0.22-0.97)] than food handlers who didn't have medical checkup in the last six months. Food handler's history of de-worming at least once in the last one year prior to this study had a more likely protective effect (with 75%) from intestinal parasitic infection [OR: 0.25, 95% CI (0.11-0.54)] compared to food handlers who didn't have the same history (Table 4).

Availability of hygiene and sanitation facilities

The observational finding indicated that, shower and toilet facilities in the proximity of working areas were not available in all the three campuses while other hygiene and sanitation facilities such as; septic tank for liquid waste management, piped water supply, municipal containers for storing of wastes and refrigerators facilities were available.

DISCUSSION

This study is one of the few studies that have attempted to assess both the practice of food handler's on food hygiene and to what extent they are infected with intestinal parasites in higher teaching institutions, particularly in Mekelle University.

Poor personal hygiene, including inadequate hand washing

among food handlers is a common practice that contributes to food born diseases. Improvement of food workers' hand washing practice is, therefore, crucial to reducing the incidence of food borne illnesses (Macks, 2007).This study has found out 70.4% respondents practiced hands washing with soap or plain water after toilet which is much less than the study conducted in Bahirdar town of 90.6% (Bayeh et al., 2010) and much higher than the study conducted in India, 49.38% (Mudey et al., 2010)). Level of education, nature of the working environment, limited or no sanitary surveillance made by the responsible body and availability of facilities used for hand washing practice could explain this discrepancy. Our findings showed that hand washing facilities were not present within the proximity of food handler's work place. In this study, it is found that food handlers working in Ayder campus showed twenty fold better practices [OR: 20.15, 95% CI: (4.40- 91.8)] than in Adhaki and Ared campus. This difference might be, in Ayder campus there is a referral hospital (Ayder referral hospital) thus food handlers may be more conscious about their health due to environmental influence.

It is expected that food handler's maintain their personal hygiene in order to prevent themselves from infections of food born diseases (Mudey et al., 2010).This study showed that 84.8% and 66.8% of respondents had good personal hygiene (based on body, hair and clothes)and food handling practice, respectively, which seems higher than the study conducted in Malaysia, 63.7% and 54.7%.This discrepancy could be due to food handler's awareness towards the importance of personal hygiene practice and measurements during food handling (storage and preparation) time. These practices may also determine by the availability of facilities which are necessary for personal hygiene and food handling and preparation practices.

The present study found out 63.2% of food handlers have undergone medical checkup in the last six months prior to this study which is much higher than in the study conducted in Mekelle and Awassa town, 22.7% and 0.6%, respectively (Kinfe and Kumie, 2007; T/Mariam et al., 1999).This is also consistent with the study conducted in Bahirdar town (Bayeh et al., 2010).The difference with respect of the provision of medical checkup could be explained by better enforcement in Mekelle University. The benefit of medical checkups could be easily understood from the multivariate logistic regression that indicated the presence of significant difference between infected and uninfected food handlers for intestinal parasites [OR: 047, 95% CI (0.22-0.97) ($P<0.05$)].

Result of this study revealed that 42.2% of the respondents had a history of de-worming at least once in the last 12 months which is low compared to the study conducted in Accra, Ghana (Ayeh et al., 2009). This finding showed 60.1% of respondents had a history of de-worming either once, twice or more than twice in the past 12 months prior to this study. Availability and accessibility of medical checkups in addition to their socio-demographic in terms educational level might explain this discrepancy.

The provision of trained food handlers was found important in safe guarding food handling (Isara and Isah, 2009).The present study showed that 12.3% of the respondents had certificate on food handling training program and this finding is comparable with the study conducted in Bahirdar town, which was 14 % (Bayeh et al., 2010). However, it is less than the study conducted in Malaysia, 42.8% (Maizun and Nyi, 2002). Limited numbers of institutions working in the area of food handlers training, tendency of recruiting food handlers without considering certificate as a basic criterion and low monthly salary (payment) for food handlers could contribute to this difference.

Foods handlers may be infected by a wide range of entero pathogens and have been implicated in the transmission of many infections to the public through poor personal hygiene practice (Bayeh et al., 2010; Parikh and Murti, 1987). In this study, the overall prevalence of intestinal parasite among food handlers was 49.3%. The multivariate logistic regression model indicated that hand washing practice after toilet, utilization of soap during hand washing; medical examination and history of de-worming practices were identified as determinant factors for being food handlers infected by intestinal parasites. The study also revealed that there is a high protozoan infection, E-histoletica (84%) and G-lamblia (16%) than heliminthic infections. The transmission of these parasites occur via fecal-oral route, either directly from person to person or indirectly by eating or drinking focally contaminated food and water. The reason for this low prevalence of heliminthic infections may be due to unfavorable ecological and other prevailing socio cultural factors that influence their survival and transmission. Having access to clean water and toilet facility in the institution might contribute the low prevalence of helminthic infection. The prevalence of intestinal parasites in the present study was higher than the studies conducted in Bahirdar (41.1%) and Gondar (29.1%) and also lower than the study conducted in Awassa (63%) and Jimma (58.4%) (Andargie et al., 2008; Bayeh et al., 2010; T/Mariam et al., 1999; Sahlemariam and Mekte, 2001).

This study being operational and use of concentration method for stool examination are strengths. Limitation of the study could be the small sample size that might have underestimated some of the findings. Social desirability bias, particularly in food hygiene practice assessment is another concern of this study.

In conclusion, this study revealed that there existed poor food hygiene practice among food handlers and the learned behavior did not match with the intended hygienic practice. Food handlers' hand washing practice after or during critical times, medical checkup, and history of the respondents' on deworming were determinants of intestinal parasites. The study also found out high

prevalence of intestinal parasites infection among the study groups which was 49.3%. Therefore, the need to make available important facilities for personal hygiene practices such as shower and toilets nearby their working area and the provision of food safety measures focusing on sanitary surveillance, personal hygiene and periodical medical checkups is highly advised.

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REFERENCES

Andargie G, Kassu A, Moges F, Tiruneh M, Huruy K (2008). Prevalence of Bacteria and Intestinal Parasites among Food-handlers in Gondar town. J. health popul. Nutr. Int. centre for diarrheal dis. res. 26(4): 451-5.

Ayeh K, Quarcoo S, Kwakye G, Kretchy J, Osafo A, Mortu D (2009). Prevalence of Intestinal Parasitic Infections among Food Vendors in Accra, Ghana. J. Trop. Med. Parasitol. (32); 1-8.

Bayeh A, Fantahun B, Belay B (2010). Prevalence of Salmonella typhi and intestinal parasites among food handlers in Bahir Dar Town, Northwest Ethiopia. Ethiop. J. Health Dev. 24(1).

Charles R (1983). Mass Catering conditions, WHO Regional Publication, European Series. 15(2).

Isara A, Isah E (2009). Knowledge and practice of food hygiene and safety among food handlers in fast food restaurants in Benin City, Edo state, Niger. Postgraduate Med. J. 16(3); 207-12

Kate A (2010). Expanding and improving higher education in Ethiopia, university world news Africa edition.

Kinfe Z, Kumie A (2007). Sanitary condition of establishment's in Mekelle town, Tigray. Ethio. J. Health Dev. 21(1): 105-123.

Macks C (2007). Food workers' perspectives on hand washing behaviors and barriers in the restaurant environment in Oregon. J. environ. health 17(3).

Maizun MZ, Nyi NN (2002). Socio demographic characteristics and KAP of food handlers towards food sanitation in Malaysia. Southeast Asian j. trop. Med. and public health. 33(2).

Maritha M, Nelene C, Demetre L (2007). KAP of managers and food handlers on food safety in the proximity of Tygerberg academic hospital, SAJCN. 20(2).

Mudey A, Kesharwani N, Mudey G, Ramchandra C, Ajay K, Vasant V (2010). Health Status and Personal Hygiene among Food Handlers Working at Food Establishment around a Rural Teaching Hospital in Wardha District of Maharashtra, India. Glo. J. Health Sci. 2(2)

Parikh U, Murti P (1987). Salmonella carriers in food handlers in Bombay. *Ind J Pub Health* (31): 217–20

Sahlemariam Z, Mekte G (2001). Examination of Fingernail Contents and Stool for Ova, Cyst and Larva of Intestinal Parasites from Food Handlers Working in Student Cafeterias in three Higher Institutions in Jimma. *Ethio.p J. Health Sci.* 11(2).

T/Mariam S, Roma B, Sorosa S, Worku S, Erosie L (1999). Assessment of sanitary and hygienic status of catering establishments of Awassa town. Ethiop. J. Hlth Dev. *14 (1):91-98.*

Teklu HM, Demisse A (2002). Livestock Marketing Authority: A paper Presented on the Occasion of the National food Safety Conference, Addis Ababa.

WHO (1979). Establishing or Strengthening National food Contamination Monitoring Programmes: Guidelines, Geneva.

WHO (2004). World Health Organization global strategy for food safety: safer food for better health, Available at: http://www.who.int/foodsafety// publications/general/en / strategy_en.pdf Accessed date: December 2010.

WHO (2008). Food borne Disease: A focus for Health Education.