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Research Article

Knowledge and Practices of Meat Safety by Meat Sellers in the Accra Metropolis of Ghana

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ABSTRACT

Promoting food safety is key to preventing foodborne diseases which are contracted through consumption of contaminated foods. The study was undertaken to assess the knowledge and practices of meat safety by meat sellers in the Accra metropolis. A descriptive survey design involving the use of semi-structured questionnaire was used to obtain information from 150 meat sellers on their knowledge and practice of food safety. The results revealed that all the respondents were males and majority aged between 18-50 years 149 (99.3%). Age had influence on knowing that eating/drinking increases risk of meat contamination (X=11.659, df=2, P=0.003) and contaminated meat causes illness (X=15.026, df=2, P=0.001). Age also had influence on the practice of sterilizing knives and equipment (X=50.680, df=2, P<0.001). Most of the respondents completed elementary education 85 (56.7%) and had more than 3 years' experience in selling meat 146 (97.3%). The level of education had no influence on meat seller's knowledge and practice in meat safety except the use of gloves (X=12.271, df=3, P=0.007). Work experience had influence on most of the meat safety practices examined. Majority 108 (72%) of the respondents were aware of meat safety from various stakeholders such as the Accra Metropolitan Assembly, Food and Drugs Authority and the media. The respondents 140 (93.3%) were aware eating contaminated meat can cause foodborne illness, however; there was a knowledge gap in the type of illnesses caused by contaminated meat. Majority of the meat sellers 103 (68.7%) were unaware of the importance of wearing gloves, although majority 136 (90.7%) wash their hands always before touching raw meat and cleaning equipment prior to and after work. Also, most 147 (98%) of the meat sellers do not sterilize their equipment which may harbour foodborne pathogens. Although the results obtained showed appreciable knowledge and practice of meat safety, more improvements need to be made. The meat sellers had minimal training in meat handling and its associated effects which should be a concern to stakeholders. Education of meat sellers through training programmes will help improve their knowledge, attitude and practices towards meat safety.

Key words: Meat safety, Meat sellers, Practices, Accra Metropolis

INTRODUCTION

Foodborne diseases still remain one of the issues of public health concern and substantial cause of morbidity and mortality worldwide (Scott, 2003). Foodborne diseases are caused by biological, chemical and physical hazards, which can contaminate food at several points during production and preparation process (Adzitey, 2016). Despite the numerous preventive and control measures being already applied in the food industry, the burden of foodborne diseases remains at unacceptably high level (Havelaar *et al*., 2010) especially in under developed countries. This is aggravated by the fact that, these countries lack robust laboratories for effective detection and monitoring, as such most illnesses go unreported.

Food safety assurance and education is needed to reduce the incidence of foodborne diseases. Food safety is a matter of great concern and of public health importance when the environment in which the food is handled is heavily contaminated (Soyiri *et al*., 2008). Most fresh foods especially those of animal origin like beef is highly vulnerable to microbial invasion and food poisoning since meat is an ideal medium for growth of several microorganisms due to its nutritive value (Soyiri *et al*., 2008). Most meats produced in Ghana are contaminated with foodborne pathogens and a potential source of foodborne infection (Agbodaze *et al*., 2005; Adu-Gyamfi

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et al., 2012; Adzitey *et al.*, 2014; Adzitey, 2015; Adzitey *et al.*, 2015a; Adzitey *et al.*, 2015b; Anachinab *et al.*, 2015; Hughes *et al.*, 2015). Post-slaughter handling of meat is associated with potential health risk to consumers due to presence of pathogens in meat and contaminated equipment (Abdullahi *et al*., 2006). Non-adherence to basic hygiene and sanitation practices can result in meat contamination and subsequently food poisoning. There is enough data indicating the incidence of cholera outbreak in the Accra metropolis but there is limited data that seeks to determine the specific source of contamination of food consumed in the metropolis. It is important that meat sellers take simple measures to reduce their risk of meat contamination when selling meat, hence this survey. This study was conducted to assess the knowledge and practices of meat safety by meat sellers in the Accra metropolis.

MATERIALS AND METHODS

Study area

The study was conducted in the Accra Metropolitan Assembly (AMA) which is the Regional Capital for the Greater Accra Region. In addition, it serves as the national capital of Ghana. The city of Accra is bounded to the North by Ga West Municipal, the West by Ga South Municipal, the South by the Gulf of Guinea, and the East by La Dadekotopon Municipal (Accra Metropolitan Assembly, 2017). It covers a total land area of 139,674km^2 (Accra Metropolitan Assembly, 2017). The population of Accra Metropolitan Assembly according to the 2010 Population and Housing Census was 1,665,086 (Ghana Statistical Service, 2012). The metropolis is entirely urban (Ghana Statistical Service, 2012).

Study design and data collection

A descriptive survey design was used to answer questions concerning the current status of meat hygiene and practiced among meat sellers. An interview was conducted using a semi-structured questionnaire made up of both close and open ended questions to assess the level of meat safety knowledge and practice among meat sellers in different meat establishments in Accra Metropolis. Random and purposive samplings were used to select the locations and respondents, respectively in Accra. The questionnaires used were developed according to comprehensive food safety literature reviews. The questionnaire was divided into four distinct sections: demographic characteristics, knowledge on meat safety, attitudes towards meat safety and personal hygiene practices of meat sellers. In total, 150 meat sellers were involved in this study.

Ethics

The purpose of the study was initially explained to the participants and those who agreed to participate were interviewed. Confidentiality of each respondent's answers was guaranteed.

Data analysis

Data collected was analyzed using Statistical Package for Social Sciences version 20. Significant differences were determined using Chi Square. Analyzed data was presented in the form of percentages in tables.

RESULTS

Socio-demographic characteristics of respondents

The result of this study showed that all the 150 respondents were males (Table 1). Majority of the respondents had ages ranging from 18-35 (50%) years and 36-60 (49.3%) years. Also 57% had elementary education as their highest educational level. Majority of the meat sellers were Muslims (78.7%) and had work experience of four years and above (97.3%). Majority of the meats sellers interviewed belong to Dagomba (34%) and Mamprusi (30%) ethnic group.

Knowledge of meat sellers in meat safety

All meat sellers interviewed indicated the abattoir as their source of meat. Majority 142 (94.7%) of the meat sellers patronized meat from the abattoir due to its hygienic nature. The other reasons were 1) it is cheaper to purchase meat from the abattoir 5 (3.3%) and 2) the abattoir is the approved place by the Accra Metropolitan Assembly 3 (2%).

The study revealed that 72% of the 150 respondents had heard about meat safety (Table 2). Also, 96.7% of the meat sellers knew meat can be contaminated with bacteria/germs as a result of poor handling. The study identified that 89.3% of the meat sellers have no form of training in meat safety. However, 93.3% of the meat sellers were aware that contaminated meat can cause foodborne disease/illness and 80% of respondents are not aware that eating and drinking while selling meat increases the risk of meat contamination. A greater proportion of the respondents (98%) were aware that proper cleaning and handling of instruments reduce the

Table 1: Social characteristics of meat sellers

Variable	Frequency	Percent
Age		
Below 18 years	1	0.7
18-35 years	75	50
36-50 years	74	49.3
Educational Status		
No formal education	40	26.7
Elementary education	85	56.7
SHS education	23	15.3
Tertiary education	2	1.3
Work Experience		
Less than 6 months	1	0.7
6-11 months	1	0.7
1-3 years	2	1.3
4 years and above	146	97.3
Religion		
Christian	32	21.3
Muslim	118	78.7
Tribe		
Ga	4	2.7
Ewe	6	4
Akan	8	5.3
Hausa	19	12.7
Dagomba	51	34
Mamprusi	45	30
Sissala	5	3.3
Frafra	1	0.7
Fulani	1	0.7
Songayi	9	6
Inchumuru	1	0.7
Total	150	100

Table 2: Awareness of meat safety and meat contamination

Parameters	Response	
	Yes, n (%)	No, n (%)
Meat sellers response to hearing about meat safety	108 (72)	42 (28)
Knowledge on meat contamination by poor handling	145 (96.7)	5 (3.3)
Aware contaminated meat can cause illness	140 (93.3)	10 (6.7)
Undergone training in meat safety	16 (10.7)	84 (89.3)
Aware that eating and drinking while selling meat increases risk of meat contamination	30 (20)	120 (80)
Aware that proper cleaning reduces risk of meat contamination	147 (98)	3 (2)
Aware that washing hands reduces risk of meat contamination	146 (97.3)	4 (2.7)
Aware that using gloves reduces risk of meat contamination	47 (31.3)	103 (68.7)
Take leave from work when infected with skin disease	138 (92)	12 (8)
Aware its necessary to refrigerate leftover meat	147 (98)	3 (2)

risk of meat contamination and 97.3% were also aware that washing hands reduces risk of meat contamination. Most of the meat sellers (68.7%) were not aware that using gloves during work reduces the risk of meat contamination. Furthermore, 92% of the respondents were aware it is necessary to take leave from work when infected with a skin disease. In addition, 98% of the respondents were aware it is necessary to refrigerate leftover meat. The meat sellers stated that they obtained knowledge on meat safety from stakeholders like the Food and Drugs Authority (FDA), Accra Metropolitan Assembly (AMA), Health inspectors, the media (TV & Radio), customers and from colleague meat sellers.

Hygiene practices among meat sellers

Majority of the meat sellers (65.3%) sell their meat on an open table in an enclosed building (Table 3). This study found that 93.3% of the respondents wash their chopping tables at the beginning and at the close of work. Majority (94%) of the meat sellers stated that they wash their knifes at the beginning and close of work each day. Also, 90.7% of the meat sellers said they always wash their hands before touching raw meat. Out of the meat sellers who wash their hands always, 95.3% of them used cold water and soap to wash their hands. Moreover, most (98%) of the meat sellers admit to never sterilizing their knifes and equipment used in selling meat. Only 55% of the meat handlers wore apron during work while few (2%) always wear gloves when selling meat. All leftover meat is stored in the refrigerator. In addition, majority (96%) of the meat sellers do not smoke at their workplace. Most (89%) of the meat sellers interviewed were clean with only few (4.7%) being unkempt.

DISCUSSION

Meat safety knowledge and practices by meat sellers in relation were encouraging. Food safety is a major health issue in both developed and developing countries. The results obtained from the study revealed that all the meat sellers were males and majority were between the ages of 18-35 and 36-60 years. These results agreed with report by Salifu and Teye (2006), who reported that the butchering profession is energy demanding and requires men who are strong and the youth who can cope with the business. Age had no influence ($P>0.05$) on all parameters of meat safety knowledge and practices measured except the awareness that contaminated meat causes illness ($X=15.026$, $df=2$, $P=0.001$), the awareness that eating/drinking increases the risk of meat contamination ($X=11.659$, $df=2$, $P=0.003$) and the practice of sterilization of knives and equipment ($X=50.680$, $df=2$, $P<0.001$). This study found that Muslims and Northerners especially Dagomba's and Mamprusis's dominate the butchering and meat selling business. This is consistent with findings by Mahaboubil-Haq and Adzitey (2016) in a study on meat production and consumption in the Wa Municipality of Ghana.

This study showed that majority of meat sellers had elementary education (57%) with 27% having no formal education. A study carried out in Tamale, Ghana by Adzitey *et al.* (2011) indicated that 64% of the butchers did not have formal education and none of them had secondary and college level education. This is in contrast to the findings of this study which indicated that about 16.6% of the meat sellers had either secondary or tertiary education. Education had no influence ($P>0.05$) on meat seller's knowledge and practice of meat safety except the awareness that using gloves during work reduces contamination ($X=12.271$, $df=3$, $P=0.007$). With regards to work experience, most of the sellers had been in the business for four or more years. Work experience had no influence on most of the meat safety knowledge parameters examined except the knowledge that meat is contaminated by poor handling ($X= 43.292a$, $df =3$, $P =0.000$), contaminated meat causes illness ($X= 15.026$, $df=3$, $P=0.001$) and eating/drinking increases risk of meat contamination ($X= 20.438$, $df =3$, $P=0.003$). Work experience had much influence ($P<0.05$) on the practice of meat safety with the exception of frequency of washing cutting/chopping tables ($X=0.294$, $df=6$, $P=1.000$), use of gloves ($X=0.171$, $df=9$, $P=1.000$) and apron ($X= 4.093$, $df = 3$, $P =0.252$) during work.

In addition, 90% of the meat sellers had no training regarding safe meat handling but according to the FAO (2003), food handlers should have the necessary knowledge and skills to enable them to handle food hygienically. Also, according to Adams and Moss (2008), training of food handlers regarding the basic concepts and requirements of personal hygiene plays an integral part in ensuring safe products to the consumer. Most of the meat sellers (97%) had greater work experience in the meat retail business and this should culminate in the practice of adequate meat safety. Most of the meat sellers obtained meat from the abattoir and had fore-knowledge of the hygienic nature of the meat produced from the abattoir. This further reiterates that the meat sellers are adhering to the AMA's directive for them to obtain meat from the abattoir and reduce the incidence of backyard slaughter.

Table 3: Hygienic practices among meat sellers

Variables	Frequency	Percent
What do you sell meat in/on?		
An Open table	36	24.0
Table with an enclosed net	16	10.7
Open table in a building	98	65.3
Frequency of washing chopping/cutting tables		
Several Times a day	4	2.7
At the beginning and end of work	140	93.3
Once in a week	6	4.0
Frequency of washing knifes		
Several Times a day	7	4.7
At the beginning and end of work	141	94.0
Once in a week	2	1.3
Frequency of hand washing before handling meat		
Always	136	90.7
Sometimes	13	8.7
Rarely	1	0.7
Materials used in hand washing		
Cold water	3	2.0
Warm water	3	2.0
Cold water and soap	143	95.3
Warm water and soap	1	0.7
Sterilization of knifes and equipment		
Yes	3	2.0
No	147	98.0
Wear apron during work		
Yes	83	55.3
No	67	44.7
Frequency of using gloves during work		
Always	3	2.0
Sometimes	2	1.3
Rarely	1	0.7
Never	144	96.0
Smoking at workplace		
Yes	6	4.0
No	144	96.0
Ranking meat sellers on neatness		
Dirty	7	4.7
Clean	133	88.7
Very Clean	10	6.7

The equipment used at meat shops are also potential sources of cross contamination for meat-borne pathogens. Cleaning equipment like knives before and after use can decrease meat contamination by pathogens. The study showed that majority (94%) of the meat sellers wash their knives and chopping tables at the beginning and close of work. However, the number of respondents that sterilize their knives and equipment was low (2%) in the metropolis which indicates higher risk of contamination. Considering meat sellers' knowledge on hand hygiene, 90.7% always wash their hands before touching raw meat. Thus, most meat sellers were aware of the critical role sanitary measures such as hand washing can play to reduce meat contamination.

Since the purpose of wearing overalls (aprons) is to protect both the food products and the meat seller from cross contamination, overalls should be suitable to wear over other clothing (Nel *et al.,* 2004). However, this study showed that 44.7% of the meat sellers did not wear aprons and majority (96%) have never wore gloves hence handle meat with their bare hands. This showed that they were unaware about adequate safety measures needed to be adopted to prevent them from cross contamination and other diseases. The meat sellers' reason for not wearing apron is because of the likelihood of losing their monies and the reason for not wearing gloves is the tendency for consumers to attribute the gloves to the meat sold being unwholesome. Majority of the meat sellers used cold water and soap/detergent to wash their hands. According to the Codex Alimentarius Commission (2003), improper food handling was a major cause of foodborne diseases and poor hand hygiene was an important risk factor in the occurrence of food contamination.

Moreover, 92% of the meat sellers were aware it was necessary to take leave from work when infected with a skin disease. The few who disagreed noted that they must make it to work to make a living. This observation is in contrast to those reported by Codex Alimentarius Commission (2003) which states that "sick food handlers who are known or suspected of having any diseases that might be transmitted by food are not allowed to work or deal with foods". Poor and faulty food handling practices have been identified as the leading cause of most of foodborne diseases (Clayton *et al.,* 2002). The study identified some poor hygiene practices exhibited at work. These include: lack of first-aid medication by most meat sellers, non-adherence to leave work when sick, non-adherence to sterilization of equipment and use of disinfectants, inadequate use of hand gloves during work and insufficient food hygiene training.

Conclusions

This survey provides very important information on the level of food safety knowledge among meat sellers in the Accra metropolis and difference/gaps in the knowledge among retail meat workers. The meat sellers in the metropolis were in the active working age and were aware of certain meat safety issues that are of concern to public health. Practices by meat sellers in relation to hygiene were encouraging. The meat sellers lacked training in meat handling which should be a concern to stakeholders. Meat seller's practices in relation to hygiene were satisfactory as they strive to maintain their shops clean. Further studies need to be conducted to ascertain the burden of foodborne diseases contributed by meat sellers in the Accra Metropolis

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REFERENCES

Abdullahi IO, VJ Umoh, JB Ameh and M Galadima, 2006. Some hazards associated with the production of a popular roasted meat (Tsire) in Zaria, Nigeria. Food Control, 17: 348-352.

Accra Metropolitan Assembly, 2017 Our Background Available at: https://ama.gov.gh/welcome/ background-info/ accessed on 25/03/2018.

Adams R and MO Moss 2008. Food microbiology. RSC Publishing. Cambridge, UK, pp: 1-436.

Adu-Gyamfi A, W Torgby-Tetteh and V Appiah, 2012. Microbiological quality of chicken sold in Accra and

determination of D10 value of *E. coli*. Food Nutr Sci, 3: 693-698.

Adzitey F, 2016. The prevention and control of bacterial foodborne hazards in meats and meat products-an overview. J Meat Sci Technol, 4: 1-10.

Adzitey F, 2015. Prevalence of *Escherichia coli* and *Salmonella spp*. in beef samples sold at Tamale Metropolis, Ghana. Int J Meat Sci, 5: 8-13.

Adzitey F, JK Nsoah and G Teye, 2015a. Prevalence and antibiotic susceptibility of *Salmonella species* isolated from beef and its related samples in Techiman Municipality of Ghana. Turk J Agric - Food Sci Tech, 3: 644-650.

Adzitey F, G.A Teye and IA Anachinaba, 2015b. Microbial quality of fresh and smoked guinea fowl meat sold in the Bolgatanga Municipality, Ghana. Asian J PoultSci, 9: 165-171.

Adzitey F, A Abdul-Aziz and O Moses, 2014. Microbial quality of beef in the Yendi Municipality of Ghana. Glob JAnim Sci Res, 2:10-17.

Adzitey F, GA Teye, WN Kutah and S Adday, 2011. Microbial quality of beef sold on selected markets in the Tamale Metropolis in the Northern Region of Ghana. Livestock Res Rur Develop, 23: 2011.

Agbodaze DA, PNA Nmai, FC Robertson, D Yeboah-Manu, K Owusu- Darko and KK Addo 2005. Microbiological quality of Khebab consumed in the Accra metropolis. Ghana Med J, 39: 46-49.

Anachinaba IA, F Adzitey and GA Teye, 2015. Assessment of the microbial quality of locally produced meat (beef and pork) in Bolgatanga Municipal of Ghana. Int JFood Safety, 17: 1-5.

Clayton DA, DJ Griffith, P Price and AC Peters, 2002. Food handlers' beliefs and self-reported practices. Int J Environ Health Res, 12:25-39.

Codex Alimentarius Commission, 2003. CODEX Alimentarius: List of standards Available at: http://www.codexalimentarius.org/standards/list-ofstandards/en/?provide=standard s&order Field=full Reference&sort=asc&num1= CAC/RCP accessed on 15/05/2017.

FAO, 2003. Recommended international code of practice general principles of food hygiene. Available at: http://www.fao.org/docrep/006/y5307e/y5307e02.htm#TopOfPage accessed on 25/03/2018.

Ghana Statistical Service, 2012. 2010 Population and housing census. Available at: www.statsghana.gov.gh/.../2010phc/Census2010_Summary_report_of_final_results.p accessed on 25/03/2018.

Havelaar AH, S Brul, A de Jong, R de Jonge, MH Zwietering and BH ter Kuile, 2010. Future challenges to microbial food safety. Inter J Food Microbiol, 139: S79-S94.

Hughes FA, A Adu-Gyamfi and V Appiah 2015. Microbiological and parasitological quality of local beef retailed in Accra and radiation sensitivity of *Salmonella sp*. Int J Curr Microbiol ApplSci, 4: 86-96.

Mahaboubil-Haq M and F Adzitey, 2016. Meat production and consumption in the Wa Municipality of Ghana. Int Food Res J, 23: 1338-1342.

Nel S, JFR Lues, EM Buys and P Venter, 2004. The personal and general hygiene practices in the deboning room of a high throughput red meat abattoir. Food Control, 15:571-578.

Salifu S and GA Teye 2006. The contribution of the various ruminant species to meat production in the Tamale Metropolis. The Savanna Farmer Promoting local innovation in Northern Ghana. The Association of Church Development Projects (ACDEP), Tamale, 7(2): 35-37.

Scott E, 2003. Food safety and foodborne disease in 21st century homes. Can J Infect Dis, 14: 277–280.

Statistical Package for Social Science, Inc., 2002. SPSS for Window (Version 20.0) SPSS. USA: Chicago, IL.

Soyiri IN, HK Agbogli and JT Dongdem, 2008. A pilot microbial assessment of beef in the Ashaiman Market, a suburb of Accra Ghana. Afri J Food Agric NutrDevelop, 8: 91-103.

World Health Organization, 1996. Essential safety requirement for street-vended foods. Available at: http://www.who.int/foodsafety/publications/street-vended-food/en/ accessed on 25/03/2018.