



Assessment of compliance of butcher shops with food safety practices in Rungwe district Tanzania

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ABSTRACT

The present study examined the compliance of butcher shops to food safety practices. The study was done based on a survey of 61 respondents randomly sampled from 61 butchers in Rungwe district. Data were analyzed using IBM SPSS Statistics version 20 using descriptive statistics. The results indicated that the butcher environment and physical conditions had an average compliance score of 50.8%, the overall average awareness score on foodborne illnesses and hygienic practices was 65% whereas cleaning and sanitization had an overall average compliance score of 41.9%. Personal hygiene which was evaluated in terms of clothing, hands and individual health recorded 75.4% and 68.9% compliance scores for proper handwashing and drying respectively. The common hand drying practices involved the use of clean towels (62.8%) and disposable paper towels (11.5%), even so, 26.2% did not dry their hands at all. The use and cleanliness of aprons were adhered to by 93.7% of the respondents. Cross-contamination was deemed likely among 45.9% butchers due to non-separation and storage of spare clothes in the butchers. The common handling and storage practices was that of suspending meats on hooks at room temperatures (93.4%) with only 4.9% of butchers suspending on hooks at refrigeration temperature. This suggests none chilling of surplus meat at the end of the day sale by the majority of butchers. The compliance of butcher shops to food safety practices was generally modest which could be attributed to illiteracy in food safety and lack of proper meat handling and storage facilities.

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1. Introduction

Food safety is defined as the assurance that the food will not cause harm to the end user when it is prepared and/or consumed as per its intended use (FAO/WHO 1997). It also refers to safe steps in handling, preparing and storing food to lessen or avoid the risks of persons becoming sick from food borne illnesses. The aim of all foodstuff safety and health programs is to promote a safe food production. This involves regulatory compliance which refers to obedience by a target population with regulations. The foremost responsibility of food control (FAO/WHO, 2009) is to enforce the food law(s) in order to protect the consumers against unsafe, impure and fraudulently

presented food by prohibiting the sale of food not of the nature, substance or quality demanded by the purchaser. The United Republic of Tanzania (URT) has also in this regard developed a wide range of policies, acts, regulations and guidelines which aim at promoting, safeguarding food production and safety issues and public health in butcher shops and food related areas. These include Tanzania Food, Drugs and Cosmetics (Food Hygiene) Regulations 2006 (Under the Tanzania Food, Drugs and Cosmetics Act, 2003) and Meat Industry Act 2006. The Meat Industry Act, 2006 provides for the establishment of the Tanzania Meat Board (TMB) one of its function being to ensure stakeholders' compliance with national or international meat and meat products standards in

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collaboration with other quality control institutions. The food hygiene regulation on the other hand specifies the sanitary nature of food premises and facilities and the environment and hygienic practices, personal protective equipments and safer food contact surface. Nevertheless, Rungwe District is still challenged by preventable sanitation and food borne diseases. The main sanitation diseases are schistosomiasis (200 cases), while food-borne diseases are dysentery, typhoid, diarrhea and intestinal worms accounting for 944, 1374, 2191 and 3222 cases respectively (RDC HMIS Data Base, 2014). The document further indicates that butcher shops are among the areas which require special attention. Similarly, meat is among the most commonly eaten foods in Rungwe District which takes place in all sorts of food service settings such as restaurants, hotels, camps, schools, street vending sites as well as at family level. Due to its perishability nature (meat) is likely to spoil, decay and become unsafe if improperly and unhygienically handled. Thus the compliance of butcher shops to food safety practices is extremely important in protecting the consumers. Nonetheless there is little if any documentation regarding the compliance of butcher shops to food safety and hygienic practices. This study aimed at assessing the compliance of butcher shops to food safety and hygienic practices in Rungwe District. The findings would highlight on the practical behavior of meat handlers and their compliance to food safety practices and hence the health implication of the same to the consumers. This would create a base for interventions to address the community's food related health problems.

2. Materials and methods

2.1. Description of the Study Area

This study was conducted in Rungwe district council. The district lies between 080-090 South of Equator, and 330-340 East of Greenwich. It shares borders with Kyela District in the South, Buskelo District Council in the East, Ileje District in the West and Mbeya District in the North. The District's headquarter is Tukuyu Town along the Mbeya-Malawi highway, 74 Km from Mbeya City.

2.2. Sampling of Butcher shops and Respondents

A total of 61 licensed butchers from within the district were involved in this study. The random selection of respondents was confined to butcher workers and/or owners. One respondent (meat retailer) was randomly selected from each butcher to a total of sixty one respondents.

2.3. Data collection

Data collection was done through interview by using pre-structured questionnaires. The questionnaires were administered according to Green et al., (2007) with some modifications on the time spent. The purpose of the study and administration of the questionnaire was explained to the respondents by the research team. The respondents were encouraged to answer honestly and were assured that the results would not be used for any personal assessment and confidentiality would be guaranteed. Trained research assistants were used in data collection to increase the consistency of the data. In each butcher a meat retailer was interviewed to collect information on hygienic practices, food borne illnesses awareness, personal hygienic practices, meat handling and storage practices and cleaning and sanitization practices of butcher shops. The researcher then spent 10-15 min to make observation of the butcher to collect information on physical environment of the butcher (presence and number of sinks, general cleanliness and handling practices) to verify their responses on the questionnaire and another 20-30 min were used to observe one/more of the worker who were selling meat. Workers were chosen on the basis of the researchers' ability to observe them relatively unnoticeably. To limit the influence of the researcher on the worker, the researcher observed the worker for 10 min before beginning the 20-30 min data collection period to allow for the worker to adjust to the researcher's presence. Additionally, workers were not made aware of precisely which aspect of the behavior was being recorded during the observation.

2.4. Questionnaire design

The questionnaire was designed to examine the butcher workers compliance to food safety practices. In the beginning of the questionnaire there were simple instructions, the explanation of the purpose of the study and a statement that confidentiality were assured. The questionnaire was divided into five sections: (1) demographic section and indication of the location of the butcher, (2) physical environmental of the butcher (3) knowledge & awareness of food-borne diseases, (4) personal hygienic practices, (4) meat handling and storage practices, and (5) cleaning and sanitization practices. The questions in the knowledge, personal hygiene and meat handling and storage practices portions of the questionnaire were multiple. To reduce the possibility of the butcher shop workers selecting the correct answers by chance, all answers

included a 'don't know' option in the dichotomous ones to qualify them as multiple.

2.5. Data Analysis

Verification of collected data and coding were done daily following cleaning, processing and analysis. Analysis was done using IBM SPSS Statistics version 20 and analysed using descriptive statistics.

3. Results

3.1. Demographic information of the butcher shop staff
The results from the survey (Table 1) indicate that the majority respondents (about 50%) were aged 20-30 years and about one third were between 31-40 years. The least involved age group was that above 40 years (1.6%). Three quarters of retailers had primary level education and one quarter secondary level education. The period of engagement, indicate that the majority (~64%) had less than 5 years working experience. On the other hand, only about half of the respondents had undergone food safety trainings.

Table 1. Demographic information of respondent; (n=61)

Variable tested	Level	Frequency	Percent
Age	Below 20 years	10	16.4
	20 to 30 years	29	47.5
	31 to 40 years	21	34.4
	Above 40 years	1	1.6
Level of Education	Primary school Education	45	73.8
	Secondary School Education	15	24.6
	College	1	1.6
Length of Employment in Years	Below 5 years	39	63.9
	5 to 10 years	19	31.1
	16 to 20 years	3	4.9
Training on Food Safety	Yes	30	49.2
	No	31	50.8

3.2. Butcher Environment & Physical Condition Table 2 presents the results on the butcher environment and physical conditions. The majority (90.2%) butchers were free from standing water and 67.2% had well maintained floors, walls, ceilings, windows and screens. The results also indicate that 92% of the butchers had no cracks and holes but only the minorities (23%) were kept under good state of repair. Likewise over half of the butchers had no dustbin which implies poor handling of the butcher wastes. Nonetheless (85%) had well maintained platforms for

display of meat, 77% were located over 50 m far away from the garbage dump and 60.7% had hand washing facilities in place.

Table 2. The butcher Environment and Physical Condition (n=61)

Question Item	Yes	%	No	%
Standing water around the butcher shop	6	9.8	59	90.2
Maintained floors, walls, ceilings, windows and screens of the butcher	41	67.2	20	32.8
Presence of holes and cracks	8	13.1	53	86.9
Presence of adequate lighting	48	78.7	13	21.3
Butcher Kept under good state of repair	14	23	47	77
Existence of a dustbin with a lid	26	42.6	35	57.4
Platform for display of meat exists and kept in hygienic conditions	52	85.2	9	14.8
The butchery is more than 50 m from garbage skip or dump	47	77	14	23
Availability of hand washing facilities	37	60.7	24	39.3
Average Score		50.8 %		49.2 %

3.3. Awareness of hygienic practices and food borne illnesses awareness

The findings on the respondents' hygienic practices and food borne illnesses awareness (Table 3) indicates that about two-third (68.9%) of the respondents were aware of food borne illness. However, over half were ignorant that unhygienic practices such as poor hand washing, unprotected wounds and cuts are responsible for food borne diseases. Similarly awareness on preventive measures against food borne diseases was also extremely poor (37.7%). The majority (88.5%), though were fully aware of cholera and the way is transmitted. Other unhygienic practices included mixing of meat with offal (39.3%) which increases the risk of cross-contamination. The average score on hygienic practices and food borne illnesses awareness was 65%.

Table 3. Awareness of food borne illnesses and hygienic practices (n=61)

Level of awareness	Aware		Not aware	
	Yes	(%)	No	(%)
Awareness of food handlers about food borne diseases	42	68.9	19	31.1
Unhygienic practices such as poor hand washing, unprotected wounds and cuts are responsible for food borne diseases.	32	52.5	29	47.5
Aware that food borne diseases are transmitted through food.	39	63.9	21	36.1
Awareness about the preventive measures against food borne diseases.	23	37.7	38	62.3
Awareness of the most common agent of food-borne diseases in our country	45	73.8	16	26.2
Aware of cholera and the way is transmitted	54	88.5	7	11.5
Aware that diarrhea is the main symptom of a food-borne disease	45	73.8	16	26.2
Aware that is not recommended to mix meat with offal	37	60.7	24	39.3
Average score on awareness level		65%		35%

3.4. Cleaning and sanitization practices of butcher shops

Table 4 presents the results on cleaning and sanitization practices of butcher shops. The results show that four-fifth (80.3%) of the butchers' maintained cleanliness all the times, 86.9% frequently cleaned meat counters and cleanliness of meat counter at the end of the day was done by all butchers (100%). Furthermore 93.4% indicated that the cleaning of the premise also covered the underside of scale pans and handles on doors and equipments. It was further documented that only 21.3% of butchers used single use clothes and the rest (78.7%) non disposable clothes. A similar practice was indicated for cleaning clothes in which case the dominant category was that of reusable clothing (70.5%). The use of cleaning chemicals / sanitisers was reported among 80.3% of butchers.

Table 4. Cleaning and Sanitization of butcher shops and Equipment (n=61)

Question Items	Yes	%	No	%
Is the butchery kept clean at all times?	49	80.3	12	19.7
Do you clean food surfaces / counter frequently?	53	86.9	8	13.1
Do you clean food surfaces / counter at the end of the day?	61	100.0	0	0
Does the cleaning include the underside of scale pans and handles on doors and equipment?	57	93.4	4	6.6
Do you use single-use cloths and throw them away after each task?	13	21.3	48	78.7
Use reusable cleaning cloths thoroughly wash them, sanitise and dry them between uses?	43	70.5	18	29.5
Use any cleaning chemical / sanitizer in cleaning?	49	80.3	12	19.7
Could you mention the chemical used in cleaning?	10	16.4	51	83.6
Average Compliance Score on cleaning and sanitization	41.9	68.6	19.1	31.4

3.5. Personal hygienic practices of butcher shop workers

The results (Table 5) show that three quarters (75.4%) of respondents were thoroughly washing and drying their hands before handling meat and 68.9% washed and dried their hands again frequently during work. Similarly, 95.1% of the respondents washed and sanitized their hands after each toilet visit. The common hand drying practices were that of using clean towels (62.8%) and disposable paper towels (11.5%), nonetheless 26.2% did not dry their hands at all. Cleanliness of protective clothing such as overall or apron was adhered to by 93.4% but the frequency of washing and changing clothes varied among butcher staff. The commonest frequency of washing and changing clothes and aprons among butcher staff was that of everyday (50.8%) and washing after every 2-3 days (47.5%). Storage of spare clothes and other personal belongings away from the butchery was only practiced by 54.1% of the respondents. Though hand washing and sanitization after every toilet visit was reported by the majority (95.1%) but only 60.7% of the butchers had hand washing facilities in place. All respondents indicated to be keeping their finger nails short whereas trimming or protection of hair and beards was observed by 60.7% of the respondents. The respondents (70.5%) reported that in case of hand cuts or wounds would wear disposable gloves or cover the cuts or wounds with waterproof materials. Other documented risky practices practiced by a small but significant fraction included taking tea and food inside

the butchery, smoking, chewing gum, or eating in a butchery area, wearing jewelry, rings, and watches and Coughing or sneezing over meat or in the butchery area (Table 5).

Table 5. Personal hygienic practices of meat handlers

SN	Parameter	Yes	%	No	%
1	Do you thoroughly wash and dry your hands before handling meat?	46	75.4	15	24.6
2	Do you wash and dry them again frequently during work?	42	68.9	19	31.1
3	How do you dry your hands?				
	(a) With clean towels	38	62.3	-	-
	(b) With disposable paper towels?	7	11.5	-	-
	(c) Under an air dryer	0	0.0	-	-
	(d) Not at all	16	26.2	-	-
4	Frequency of washing and changing clothes and aprons				
	(a) Once in a week	1	1.6	-	-
	(b) Every 2 – 3 days	29	47.5	-	-
	(c) Every day	31	50.8	-	-
5	Do you wash and sanitize your hands after each toilet visit?	58	95.1	3	4.9
6	Do you keep your finger nails short?	61	100.0	0	0
7	Is your hair and beards trimmed or protected?	37	60.7	24	39.3
8	When you have cuts or wounds on your hands do you wear disposable gloves or cover it with waterproof material?	43	70.5	18	29.5
9	Do you wear clean protective clothing such as overall or apron?	57	93.4	4	6.6
10	Do you keep your spare clothes and other personal belongings away from the butchery?	33	54.1	28	45.9
11	Do you take tea and food inside the butchery?	15	24.6	46	75.4
12	Do you smoke, chew gum, or eat in a butchery area?	9	14.8	52	85.2
13	Do you wear jewelry, rings, and watches while working in the butchery?	5	8.2	56	91.8
14	Do you advise your supervisor if you feel unwell and don't handle meat?	52	85.2	9	14.8
15	Do you cough or sneeze over meat or in the butchery area?	8	13.1	53	86.9

3.6. Meat handling and storage practices in the butcher shops

The survey results (Table 6) show that all butchers always kept the meat hanged. About 93.4% butchers suspended meat on hooks at room temperatures but only 4.9% suspended meat on hooks at refrigeration temperature (with centrally controlled refrigeration systems). The results further revealed that only 1.6% butchers had single stand-out refrigerators and / or freezers. Lack of cooling facilities among the majority of butchers suggests none chilling of surplus meat at

the end of day sale by the majority retailers. Regarding meat protection the majority of butchers (72.1%) had provisions for protecting meat from flies (with wire mesh or shutter glass).

Table 6. Butcher meat handling and storage practices

SN	Parameter	Yes	%	No	%
1	Is meat always kept hanged / suspended?	61	100.0	0	0
2	Is meat suspended on hooks at room temperature?	57	93.4	4	6.6
3	Is meat suspended on hooks at chilling/refrigeration temperature?	3	4.9	58	95.1
4	Do cold storage facilities (fridge and / or freezer) exist?	1	1.6	60	98.4
5	Are the suspending hooks rust resistant?	12	19.7	49	80.3
6	Is meat protected from flies (wire mesh or shutter proof glass)?	44	72.1	17	27.9
7	Do you cut meat by using electrical knives?	20	32.8	41	67.2
8	Do you cut meat on a trunk using axe or cutlasses?	46	76.7	14	23.3

4. Discussion

Demographic information of the butcher shop staff was collected in order to establish their characteristics which are vital in paving a way for interventions to improve the working conditions (8) and food safety practices. The results indicate the involvement of active age groups in meat retailing business. According to Adzitey et al. (9) the butchering profession is dominated by the youth and middle aged men who are more energetic as the butchering trade requires much physical strength. Aburi (8) also views meat retailing as a hard work that cannot be tolerated by old men. The level of education established in the current study agrees with that of Adzitey et al. (9) who also recorded low level of education. This could hamper the acceptability of modern slaughtering practices and adherence to strict hygienic and standard slaughtering practices. Allam et al. (..) indicated that food handlers could create a potential risk to food safety owing to their low educational background and tiny or no knowhow of the risks of microbial or chemical contamination of food or how to evade them. However, contrary to Aburi (8) who documented 17% uneducated respondents, the current study had none. The short serving period of the majority workers could suggest the newness of the business in the area and /or poor retention and possibly their great mobility between and within the informal sector. This could similarly affect and reflect on the training challenges of meat handlers.

According to Rahman et al (11) knowledge positively influence attitude formation and the recipient's conception of health facts. Positive attitude formation leads to positive behavior. On the contrary (11) superficial knowledge leads to misconception and development of negative attitudes which increases harmful practices. The butchers' environment and physical condition have a determinant role in cross-contamination. A poorly maintained physical environment of the butcher can attract and even harbour the agents of contamination. A significant fraction of butchers wasn't free from standing water (10%) and 33% were poorly maintained. It is well known that standing water can be a shelter for bacteria depending on the source e.g. sewer line or flooding contaminated with fecal matter can be a shelter for harmful bacteria and disease causing agents according to Service Master of Baltimore, 2015). It is desired that the butcher shops like other food premises are constructed away from garbage's damp and in permanent and washable materials so as not to attract harmful microorganisms and flies. Poor physical condition is liable to affect cleaning efficiency and effectiveness e.g. a rough or cracked wall complicates the cleaning process. The lack of hand washing facilities in some butchers implies a substantial fraction of meat handlers are sparingly or do not at all practice hand washing. It is well documented that cross-contamination due to the transfer of bacteria from the food handler to product can occur in many ways but dirty hands is the main cause (13). According to Green et al. (2007) proper hand washing can significantly reduce the transmission of pathogens from hands to food and other objects. Parker (2007) associated cleaning with controls of human health via preventing transmission of human diseases in foods. Cleaning and sanitizing helps prevent pest infestations by reducing residues that can attract and support them. It also improves the shelf life and sensory quality of food products. According to FDA Food Code (2009) a butcher must be kept clean all the time in order to make meat free from unpleasant odors. The average score (50.8%) for the compliance of the butchers' environment and physical conditions to food safety requirements suggests the need for food safety training among respondents. The effectiveness of food safety laws and regulations enforcement can only be meaningful if complemented with proper training of food-handlers.

The present findings also indicate that though meat handlers were aware of food borne illness but they lacked proper knowledge about poor hygienic practices

that are responsible for food borne illness transmission. This reflects ignorance of food safety issues among them. Equally, poor handling of meat and offal show a great possibility of cross contamination and higher risks of forborne illnesses. This further implies inadequacy of food safety knowledge among meat handlers. Cleaning and sanitization aims at human health protection through controlling the transmission of diseases. The majority of butchers in the current study maintained cleanliness and the cleaning frequency was reasonably satisfactory which also involved the use of cleaning chemicals. However, the majority butchers used none disposable cleaning clothes. It is well documented that cleaning and sanitization prevents pest infestations by reducing residues that can attract and support pests as well as improving shelf life and sensory quality of food products (14). Dirt, food waste and other debris can be potential sources of microbiological and physical hazards and also attract pests that can contaminate the production environment. According to WHO (2009), cleaning prevents any accumulation of food residual which may decompose or support the organisms that may cause diseases or nuisance to the community. Effective cleaning on a regular basis is thus essential to remove dirt and debris from the food premises and effective disinfection of clean food contact surfaces is necessary to reduce bacteria to an acceptable level (17). It prevents the spread of disease by removing attractions for pests, reduce the spread of food poisoning bacteria, and maintain a safe working environment. It has also been observed that cleaning needs to be done regularly so as to prevent build-up of food residues (14). Additionally, all tools used in the butcher shop need also to be cleaned after every use and be stored in dry, clean and secure conditions. The overall average score on cleaning and sanitization practices was 68.6% which though above average but still indicates that a substantial fraction of butchers are not adhering to good cleaning and sanitization practices.

Personal hygiene is an important and key aspect in ensuring food safety in any food chain. Thus food handlers need to maintain high levels of personal hygiene and ensure that they do not directly or indirectly contaminate food during handling. The main areas of personal hygiene which were evaluated in the current study included clothing, hands and health. Hand washing and drying was a common practice among the majority meat handlers. According to Meat and Livestock Australia (2012) though cross-contamination due to transfer of bacteria from the food

handler to product can occur in many ways dirty hands is the main cause. A similar observation is also documented by FAO/WHO (2017) which implicates food handlers' hands to be the most common causes of contamination in any food industry if not kept clean and free from bacteria. Green et al. (2007) observed that strengthening hand washing behavior provided a turning point in reducing food-borne illnesses. Burton et al. (2011) further demonstrated that hand washing even with non-antibacterial soap and water is more effective for the removal of bacteria of potential faecal origin from hands than hand washing with water alone. Repeated use of towels which was also observed in this study could be a source of contamination if sanitary procedures are not observed. The greater part of meat handlers maintained clean protective clothing and regular washing and changing was observed by half of them. Effective cleaning of protective clothing reduces accumulation of contamination and thus lowers the chances of contamination. Accordingly frequent cleaning is an important element in avoiding accumulation of contamination. Spare clothing is a potential source of cross-contamination thus their non-separation from protective clothing and other food contact surfaces increases the risk of contamination. Separation of protective and personal belongings was practiced by just over half meat handlers.

Though hand washing and sanitization after every toilet visit was reported by the majority (95.1%), however only 60.7% of the butchers had hand washing facilities in place (Table 4.2). This could imply poor regular hand washing among meat handlers.

Bafanda et al. (2017) reported poor maintenance of personal hygiene by meat handlers owing to their illiteracy, unawareness, lack of facilities and nature of work. They further reported unavailability of proper hand washing facilities at both slaughterhouses and retail meat shops. Although all meat handlers indicated to keep their finger nails short, however, from observation their shortness varied among respondents and some of which could still harbour dirtiness. Long nails are undesirable as could harbor bacteria and other microbes and complicates getting rid of all the germs under nails. Wearing of hair restraints such as hair nets, hats, scarves, or beard nets that are effective in keeping the hair in control is desired for proper hygiene to minimize the risks of contaminating exposed food. Snyder (2008) indicated that contamination of food can be prevented, if all food handlers wear outer clothing to prevent contamination of food equipments, utensils, linens and single service and single use articles as well

as keeping their nails trimmed, filed and maintained so that the edges and surfaces are cleanable.

According to EHOA (2011) it is desired that raw and ready to eat foods are physically separated at all times during handling, storage and display. Food poisoning bacteria can be transmitted indirectly from raw meat to cooked or ready to eat foods through a vehicle such as the contaminated hands of a food worker, shared equipments or dirty clothes. According to Hutter and Amodu (2008) small businesses may experience particular difficulties complying with their legal obligations due to lack of sufficient resources (financial or technical) to understand what the law requires of them. The meat retail domain is not different from such other small businesses.

Handling and storage of meat is one of the steps in the food chain that is critical for the control of meat quality and safety. This subsection elucidates the handling and storage practices used by butchers. Hanging of meat at room temperature was the most common handling practice observed by over two-thirds of the butchers. According to Aburi (2012) chilled and frozen storage, transport, and retail display, and maintaining the temperature of meat will prevent excessive weight loss, reduced shelf life and deterioration of meat quality. Koutsoumanis and Taoukis (2005) identified temperature to be the most important factor that influences the spoilage as well as the safety of meat. Delmore (2009) documented that shelf-life of meat can be extended by creating unfavorable conditions for spoilage organisms which is achieved through manipulating oxygen availability, temperature, length of storage and presence of inhibitory gasses. Proper storage of meats and meat product can best be a benefit as it can; prolong the maintenance of its quality, delay of microbial spoilage, maintenance of desirable color and minimization of water loss (26). On the other hand, only about one third of the butchers had meat protection gears against flies. According to Lupo (2015) the presence of small flies in a processing area can be a major public health concern. The flies would feed, breed, and live in contaminated areas then fly to land on food or food surfaces, transporting pathogens and increasing the risk of food-borne illness in humans. She further indicated that the most effective means of maintaining flies control is through Integrated Pest Management (IPM) which includes (i) inspection measures, (ii) exclusion measures, (iii) sanitation measures, (iv) mechanical measures, (v) biological measures and (vi) chemical measures. In the present study exclusion and sanitation measures were the most common control measures applied by most butcher

shops. The common meat cutting practices among butchers during selling was that of placing meat on a trunk and cut using either an axe or cutlasses. It is well known that trunks cannot be effectively cleaned due to their non-impervious nature. Furthermore their absorbent characteristics are likely to contribute much to the contamination of fresh meat during cutting. The survey results generally show that the butchers were not exercising good handling and storage practices. It is thus important to educate the butchery staff about the appropriate meat handling and preservation method that could reduce the levels of contamination and spoilage during handling.

5. Conclusion

This study aimed at assessing the compliance of butcher shops to food safety practices in Rungwe district council. The findings indicate lack of compliances in almost all evaluated areas. The findings reveal that only about half of the butcher staff had attended food safety training which suggests the need to enhance meat handlers' food safety knowledge. On the other hand the average compliance score of the butchers' in maintaining good physical environment and physical conditions as per food safety requirements was 50.8%. This shows an average level of compliance which further justifies the need for food safety training needs. Food safety training is essential in ensuring safe preparation, storage and handling of safe food. Likewise the average score on hygienic practices and food borne illnesses awareness and cleaning and sanitization practices were 65% and 68% respectively. Although these scores are above average yet they indicate a substantial fraction of butchers is sparingly adhering on good cleaning and sanitization practices and the level of awareness is still in moderation. Adherence to personal hygienic practices by butcher staff also varied from between 50% to less than 100%. The survey results also show that the butchers are hardly exercising good handling and storage practices. It is thus important to promote meat handlers knowledge and skills.

Conflict of interest

Authors have no conflict of interest.

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