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Factors affecting adherence to meat hygiene practices of beef butcheries in Kasangati Town Council, Wakiso District, Uganda

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Abstract

Poor meat hygiene practices are a major cause of food borne diseases which has led to morbidity and mortality globally. The World Health Organization estimates that over 600 million foodborne illnesses and 420 million deaths worldwide are due to poor hygiene practices in the meat sector, with the developing countries carrying the brunt of this load.

The situation in Uganda is not much different from the global statistics and many studies have been undertaken especially in the capital city Kampala on butcher hygiene. What was still unknown is the situation in the many peri urban centers around the country which are having rising population and host many residences. This study was therefore carried out in Kasangati town council, Wakiso district, Uganda, to specifically establish the level of adherence to meat hygiene practices among butcher operators, identify the factors affecting adherence to meat hygiene practices and identify the relationship between these factors in this per-urban center in a developing country.

Results of this study show that education level of butcher operators; availability of functional waste disposal tank in a butcher premises; availability and use of hand gloves were significantly associated with adherence to meat hygiene practices among the butcher operators. The study also found out that a large percentage (65.7%) of the butcher operators were not adhering to meat hygiene practices. This low adherence to the above factors which are significantly associated with meat hygiene practices inevitably contributes to contamination of meat and spread of meat borne diseases in this town.

The paper concludes by recommending a more effective law enforcement and education and awareness by the public health authorities and making a practical monitoring and evaluation regime to reduce non adherence and increase adherence to meat hygiene practices.

Keywords: Meat hygiene practices; Butcher operators; Food borne diseases

1. Introduction and background

Meat hygiene practices when not adhered to remains a great predictor of meat borne diseases. This is because it exposes meat to contamination and spoilage by pathogenic micro-organism [1]. Contamination may be due to contact with contaminated equipment which when combined with unhygienic meat hygiene practices such as non-adherence to hand washing and poor equipment handling practices can contribute to microbial contamination of beef [2]. Poor meat hygiene practices cause food borne diseases which inevitably leads to morbidity and mortality worldwide. The World Health Organization [3] estimates 600 million foodborne illnesses and 420 million deaths worldwide due to poor hygiene practices in the meat sector and children under 5 years account for almost one third of the deaths. At the global level, adherence to meat hygiene practices were reported in 2015 to be at 73% [3, 4] in which most of the developed

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countries were observed to be achieving a higher level of adherence compared to the developing countries. The developing countries in Africa for example recorded more than 500,000 new cases of human infection with meat related diseases every year [4].

In sub-Saharan Africa, meat handling and hygiene practices by butcher operators were rated at 54% which explained the high prevalence 5-55% of infection related to poor meat hygiene per year in different countries of Africa [5]. Most of the Sub-Saharan countries are reported to have introduced regulations governing meat hygiene practices but the level of adherence is very low especially in the rural areas where hygiene facilities such as hand washing sinks, toilets, clean serving environments, taps and other necessities are unavailable [6].

In East Africa, adherence to meat hygiene practices by beef venders has been reported by the WHO [7] to be 51% which is very low. The means 49% of butcheries in East Africa do not adhere to beef hygiene practices which results in outbreaks of infections related to poor meat hygiene. In 2017 it was reported [8] that in Kenya the level of hand washing and equipment handling practices were inadequate. This was attributed to a number of factors including failure to follow public health regulations, failure to be supplied with hygiene materials such as detergents, as well as lack of hygiene equipment such as hand washing sinks, toilets, waste disposal bins and running water or taps.

In Uganda, several studies [9, 10] have reported that 14% of all diseases treated in Uganda each year were due to consumption of contaminated meat which gets contaminated at the points of sale. And on butchery operators, while 31.5% of those in Kampala District had personal protective wear. 68.5% did not observe proper meat hygiene practices. More recently, it was established that 75% to 80% of butcheries in rural Uganda lacked cooling facilities and were associated with unhygienic handling practices of meat [10].

In Kasangati town council a peri-urban business center in Wakiso district on the outcasts of Kampala district in Uganda, poor hygiene practices such as, inadequate hand washing with clean water and soap, inadequate cleaning of utensils and inadequate education about meat hygiene practices among others has been reported to be exposing meat to contamination and spoilage by pathogenic micro-organism [11, 12]. It was further reported that 59% of butcheries did not adhere to the required meat hygiene practices in 2017 while a further 71% and 80% of butchery enterprises were charged by the public health officers for not adhering to proper meat hygiene practices in 2018 and 2019 respectively [11, 12]. The reports also indicated that this failure to adhere to proper meat hygiene practices has led to increase in food borne diseases related to consumption of contaminated meat in Wakiso district as a whole. In addition, 7.5% of people in Wakiso district were found to be having Brucellosis due to consumption of contaminated meat and that this was as a result of non-adherence to meat hygiene practices [11].

To mitigate the increasing cases of failure to adhere to meat hygiene practices, public health officers in Wakiso district have been offering training to meat handlers on how to adhere to the required meat hygiene practices. This action does not seem to have had the intended results [12]. Therefore it was found necessary to investigate the factors affecting adherence to meat hygiene practices among butcher operators focusing on Kasangati town council which is one of the major urban centers in Wakiso district where butcheries are many.

A review of some of the literature [1, 13, 14, 15] clearly indicates that contaminated tools and equipment harbor and introduce pathogens into beef and unhygienic processing and handling practices play a major role in beef contamination. In addition hands of food handlers who also proceed to carry out non-food related tasks for example handling money from customers, emptying bins, wiping counters with cloth are the most critical practices of transmitting foodborne pathogens from contaminated surfaces and items, hence cross contamination of food. This is made worse by reports [10] that 93.5% of beef handlers doubled as cashiers in Uganda and this is contrary to the hygienic requirements and regulations for butchers. On top of the above it has been [16] pointed out that there was poor knowledge, attitude and practices toward basic hygiene rules such as hand washing and body hygiene among meat vendors in Lubumbashi, Democratic Republic of Congo which concurs with other observations in Kampala, Uganda [9].

However, none of the above researchers and scholars have addressed the situation in Kasangati town council, Wakiso district, Uganda in regard to factors associated to adherence to meat hygiene practices and the relationship between these factors.

Objectives

The general objective of this study was therefore to investigate factors associated with adherence to meat hygiene practices and how they relate to each other among butcher operators in Kasangati town council, Wakiso district, Uganda.

1.1. The specific Objectives were

- To find out the level of adherence in meat hygiene practices among butcher operators in Kasangati town council.
- To identify the factors affecting meat hygiene practices adherence among butcher operators in Kasangati town council.
- To establish the relationship among factors affecting adherence to meat hygiene practices among butcher operators in Kasangati town council.

2. Methodology

This study used both cross-sectional and correlational research designs. The cross-sectional research approach was used to describe the situation at that material time in butcheries in Kasangati town council, while the correlation research approach was used to determine the relationship between factors associated with adherence to meat hygiene practices.

This study was carried out in Kasangati town council located in Nangabo sub–county, Wakiso district in the central region of Uganda. The town is located about 15km from Kampala capital city on the Kampala - Gayaza highway. The study was done in this area because of the poor hygiene practices among butcher operators in Kasangati town council and increase in the outbreak of meat borne diseases related to poor hygiene due to consumption of contaminated meat as reported by Wakiso district [12].

This study targeted 85 registered butcher operators in Kasangati town council and the sample of 70 was determined using various formulas [17, 18]. Of the 70, a total of 67 (96%) were interviewed.

Quantitative data was collected in this study and the Questionnaire tool was used. Each of the 67 butcher operators was visited following the Standard Operating Procedures put in place by the Uganda Government due to the COVID 19 pandemic. All the responses given by the butcher operators were voluntary.

Qualitative data from a key informant was collected from one Public Health Officer in the town council. This information was used to verify the responses given by the butcher operators and information from analyzed data.

3. Results and discussion

3.1. Individual Demographic Factors

The study established the respondents' individual demographic characteristics which included age, education level, marital status and religion of butcher operators in Kasangati town council. The findings are presented in Table 1 .

3.2. Age

The results in Table 1 above indicates that a large percentage (55.2%) of the respondents were youth (18-35 years). Since a lot of energy and movements is required ion this job, it inevitably attracts more youth. This finding is similar to those reported in Kampala, Uganda and in the Accra Metropolis of Ghana [16, 19].

3.3. Education level

The Results in Table 1 further show that half of the respondents (50.7%) had either never been to school for formal education or attained only primary school level.

This low level of education could be related to poor maintenance and appreciation of importance of good hygiene. This is in agreement with other studies done earlier in Ethiopia and in the Democratic Republic of Congo [20, 21].

3.4. Marital status

Despite the fact that most of the respondents were young (55.7%), the majority were married (68.7%). It has been reported [15] that in Democratic Republic of Congo the married meat vendors adhere more to meat hygiene than those not married. This could be because married people are considered to be matured compared to the unmarried ones.

3.5. Religion

Most (67.2%) of the butcher operators were of the muslim religion. This seems to be a common trend in most African countries which have a Muslim population [19].

Table 1 Individual Demographic Characteristics of the Butcher Operators in Kasangati town council

Demographic Characteristics	Frequency (N = 67)	Percentage (%)
Age in Years		
18-25	11	16.4
26-35	26	38.8
35- 45	25	37.3
above 45	5	7.5
Education Level		
Never been to school	10	14.9
Primary	24	35.8
Secondary	25	37.3
Tertiary	8	11.9
Marital Status		
Single	19	28.4
Married	45	67.2
Cohabiting	1	1.5
Divorced	2	3.0
Religion		
Catholic	11	16.4
Muslim	41	61.2
Adventist	5	7.5
Protestant	6	9.0
Others	4	6.0

Source: Primary Data

3.6. General level of adherence to meat hygiene practices among butcheries in Kasangati Town Council

Table 2 below shows the level of adherence in meat hygiene practices among butcheries in Kasangati town council.

Table 2 Level of adherence among butcher operators in Kasangatti town council

Adherence Status	Frequency (N = 67)	Percentage (%)
Adherent	23	34.3
None Adherent	44	65.7

Table 2 above shows that most butcher operators (65.7%) do not adhere to beef hygiene practices in Kasangati town council. This finding was further confirmed by the key informant (KI)who reported that:

The adherence level of hygiene practices among butcher operators in Kasangati Town Council is not that good because there are some butcheries which adhere to the set practices when the inspection is due and after the inspection they tend

to non-adhere. However, our team has been following up regularly and closing butcheries which are non-adhering till they comply with the set health standards for operating a butchery." (KI)

3.7. Adherence to specific meat hygienic standards and regulations by Butcher Operators

Table 3 below shows the level of adherence to specific meat hygiene standards and regulations by butcher operators in Kasangati town council.

Table 3 Adherence to specific meat hygienic standards and regulations observed by butcher operators

Adherence Aspects	Frequency (N = 67)	Percentage (%)
Possession of certificate of registration	52	77.6
Possession of a medical examination certificate	37	55.2
Maintain hygiene using clean water &soap	48	71.6
Wear protective gears while serving customers	28	41.8
Maintain sanitized butchery environment using approved food disinfectant	31	46.3
Dispose all waste from butcher in the dust bin	50	74.6
Does not handle money concurrently while serving meat	22	32.8

Note** Total %ge more than 100 because of Multiple Responses; (Source: Primary Data (2020))

The results in Table 3 above show that the majority of the respondents (77.6%) possess a certificate of registration which is given at the start of the business and renewed annually. However only 55.2% possessed the mandatory medical examination certificate required by all workers in the various butcheries.

A large number (71.6%) were maintaining hygiene using water and soap but less than half (41.8%) wear and / or use protective gears while serving customers and only 46.3% were using approved food disinfectant.

It was also found that a large number (74.6%) were disposing all waste in the dust bin and an equally large number (67.2%) handle money concurrently while serving meat. These results concur with a similar study done earlier in lake Victoria region in Uganda [4].

From these results the existence of meat infections could be resulting from the following four aspects: lack of mandatory medical examination of the meat handlers, not wearing personal protective equipment, not using approved food disinfectant and handling money while serving meat which is 43% of non-adherence to hygiene practices.

3.8. Organizational (Business related) factors affecting adherence to meat hygiene practices among butcher operators in Kasangati town council

Table 4 below shows the results on organizational factors affecting adherence to meat hygiene practices among butcher operators in Kasangati town council.

The results in Table 4 above show that the majority of the operators (61.2%) were not owners of butcheries; they are employees in the business.

The results (Table 4) further show that the majority of the butcher operators (65.2%) had and were using functional hygiene facilities (Hand washing, waste disposal and toilet facilities) on the premises. However an earlier report by the WHO [3] indicated that 58.8% of meat selling establishments were found to be in poor hygienic conditions mainly due to inadequate solid and liquid waste management practices. Also it has been reported that mere availability of toilet facilities does not ensure good sanitary conditions, and that unsanitary and soiled toilets create favorable breeding environments for insects and rodents which will carry pathogenic micro-organisms and intestinal parasites resulting in the contamination of food and utensils/equipment. The above would in turn result in occurrence of food borne illness which could easily arise from the 40.3% of the operators who may be using public toilets which are not properly managed [22].

Table 4 Organizational factors affecting adherence to meat hygiene practices among butcher operators

Business/Organization Factors		Frequency (N = 67)	Percentage (%)
Butchery ownership	Other	41	61.2
	Self	26	38.8
State of Hygiene Facilities			
Functional hand washing sink	No	28	41.8
	Yes	39	58.2
Butcher has a functional waste disposal tank	No	15	22.4
	Yes	52	77.6
Functional Toilet for this butcher	No	27	40.3
	Yes	40	59.7
Availability of Hygiene Materials			
Tiled floor	No	29	43.3
	Yes	38	56.7
Protective eye glasses	Not Available	32	47.8
	Available	35	52.2
Soap for washing hands	Never	17	25.4
	Sometimes	33	49.3
	Always	17	25.4
Detergents	Available	43	64.2
	Not available	24	35.8
Water for cleaning equipment	No, None	18	26.9
	Yes, Sometimes	24	35.8
	Yes, Always	25	37.3
Hand Gloves	No, None	9	52.9
	Yes, Sometimes	9	22.0
	Yes, Always	5	22..6
Regular Supply of Hygiene materials	No, None	17	25.4
	Yes, Sometimes	46	68.7
	Yes, Always	4	6.0
Adequate number of butchery attendants	No	22	32.8
	Yes	45	67.2

On the regular and efficient availability of hygiene materials, the results in Table 4 show that the majority of the facilities (56.7%) had tiled floors which is higher than that reported earlier [9] in Kampala district. 52.2% of these operators were having and using eye protective glasses, however only 37.3% had and used hand washing soap. This is despite the fact that 64.2% of the operators possessed detergents. Unfortunately only 37.3% of the operators have water for cleaning equipment. The implication is that they do not wash their hands during and after handling meat. Yet according to several studies [15,23] washing and drying of hands reduces microbial contamination because during various activities at work, hands quickly become contaminated and that washing hands should be done after disposing garbage, with less vigilance after smoking, sneezing or coughing. But now with the COVID 19 pandemic high vigilance in washing hands is paramount all the time irrespective of situations and / or circumstances.

The results on use of personal protective equipment (PPE) in particular hand gloves show that 52.9% do not have them and do not use them. On top of this only 6% were getting regular supply of hygiene materials for use at work. This as

indicated earlier creates a potential situation for various microbes to be transmitted from the butcher operators to the meat they are selling.

On the availability of adequate number of butchery attendants who support the butcher operators, 67.2% reported having adequate number of butchery attendants. This is a good observation because it means it is possible for the attendants to handle other operations while the butcher operator handles only meat. This would potentially reduce avenues for infection transmissions from human to meat.

The above results were duly confirmed by the Key Informant who reported that organizational factors were the main reason of non-adherence to meat handling hygiene practices by butcher operators:

There are many cases whereby the butchery owner or operator does not put in place hand washing sink, does not supply water, soap, detergent, waste disposal bin or ensure that there is a clean environment such as tiled serving floor and protective gloves" (KI)

3.9. Adherence to Regulations by Butcher Operators

The results of adherence to regulations by the butcher operators are summarized in Table 5.

The results in Table 5 above show that the majority (83.6%) of the butchers in Kasangati town council get inspected by Health Officers and that this inspection is mainly (71.6%) once a month. Given this high rate of inspection and regularity, it is expected to result into high level of cleanliness and good hygiene practices as reported in Ethiopia in 2017 [24].

In addition to the above, 56.7% of the operators reported receiving training on meat hygiene practices and the majority (68.7%) reported receiving regular reminders about good hygiene practices. Some researchers [15, 25] have reported that having regular training and reminders is significant in ensuring good hygiene and practices at butcheries.

Table 5 Adherence to the Regulatory factors affecting meat hygiene practices among butcher operators in Kasangati town council

	Regulations	Frequency (N = 67)	Percentage (%)
Public Health Inspections	No	11	16.4
	Yes	56	83.6
Regularity of Inspections	Twice a month	15	22.4
	Once a month	48	71.6
	After three months	3	4.5
	After every six months	1	1.5
Hygiene Inspection by public health officer	No	16	23.9
	Yes	51	76.1
Provision of training on hygiene practices	No	29	43.3
	Yes	38	56.7
Regular Reminders on hygiene practices	No	21	31.3
	Yes	46	68.7

The above challenges exist despite the continuous and consistent inspections done by the Health Inspection personnel of Kasangati town council as reported by the Key Informant:

I and my team first visit the slaughter house and ensure that animals to be slaughtered are healthy and free from any diseases. Then we ensure that tested meat is supplied to meat venders. Afterwards we visit the butcheries on regular basis to inspect their status of hygiene practices such as maintaining hygiene, using clean water and soap, operators have and

use personal protective equipment while serving customers, operators maintain sanitized butchery environment using approved food disinfectant, have waste disposal bins and do not handle money while serving meat to customers. (KI)**.**

The Key Informant further advised on the ways to improve the situation through regular trainings and seminars:

I believe there is a need for regular training of butchery operators on how they can achieve the required or set hygiene practices. Thus, there should be organized seminars which butchery owners and operators should attend and get training by public health officers on how to adhere to hygiene practices in butcheries. In addition, there should be regular or frequent reminders by the public health officers to butchery operators that they should always adhere to meat hygiene practices. (KI).

3.10. Relationship between personal, organizational and regulatory factors and the adherence to meat hygiene practices among butcher operators in Kasangati town council

In order to clarify the relationship between the factors identified above (personal, organizational and regulatory) and how they affect adherence to meat hygiene practices, inferential data analysis (first by bivariate and the followed by multivariate) was used and the results of that analysis are given below.

3.11. Personal Factors

Table 6 below shows the inference analysis results of the relationship between personal factors and adherence to meat hygiene practices in Kasangati town council.

Table 6 Relationship between personal factors and adherence to meat hygiene practices (Bivariate Analysis)

	Adherence Level to Meat Hygiene practices				
	adherent	**None adherent**			
Individual Factors	**N (%)**	**N (%)**	**χ^2**	**df**	**P - value**
Age in years					
18-35	13(35.1)	24(64.9)	.024	1	.877
36 and above	10(33.3)	20(66.7)			
Education Level					
At most Primary	17(50.0)	17(50.0)	7.520	1	**.006****
post Primary	6(18.2)	27(81.8)			
Marital Status					
Single	8(38.1)	13(61.9)	.193	1	.661
Married	15(32.6)	31(67.4)			
Religion					
Christian	7(31.8)	15(68.2)	.092	1	.762
Non-Christian(Muslims & Others)	16(35.6)	29(64.4)			

**Significant at 5%

The results in Table 6 above clearly show that education (p = .006 < 0.05) is the only personal factor having a significant effect on the level of adherence to good hygiene practices.

3.12. Organizational Factors

Table 7 below shows the inference analysis results of the relationship between organizational factors and adherence to meat hygiene practices in Kasangati town council.

Table 7 Relationship between organizational factors and adherence to meat hygiene practices (Bivariate Analysis)

	Adherence Level to Meat Hygiene practices				
Organizational Factors	**adherent**	**None adherent**			
State of Hygiene Equipment	**N (%)**	**N (%)**	**χ^2**	**df**	**P - value**
Functional hand washing sink					
Yes	12(30.8)	27(69.2)	.524	1	.469
No	11(39.3)	17(60.7)			
Functional waste disposal tank					
Yes	13(25.0)	39(75.0)	8.965	1	**.003****
No	10(66.7)	5(33.3)			
Functional Toilet Facility					
Yes	17(42.5)	23(57.5)	2.940	1	.086
No	6(22.2)	21(77.8)			
Availability of Hygiene Materials					
Tiled Floor					
Yes	10(26.3)	28(73.7)	2.500	1	0.114
No	13(44.8)	16(55.2)			
Protective glasses					
Yes	13(37.1)	22(62.9)	.257	1	.612
No	10(31.2)	22(68.8)			
Water for cleaning Equipment					
Yes, Always	7(28.0)	18(72.0)	2.196	2	.334
Yes, Sometimes	11(45.8)	13(54.2)			
No, None	5(27.8)	13(72.2)			
Gloves					
Yes, Always	5(55.6)	4(44.4)	7.197	2	**0.024****
Yes, Sometimes	9(22.0)	32(78.0)			
No, None	9(52.9)	8(47.1)			
Hand washing soap					
Yes, Always	5(29.4)	12(70.6)	.740	2	.691
Yes, Sometimes	13(39.4)	20(60.6)			
No, None	5(29.4)	12(70.6)			
Detergents					
Available	15(34.9)	28(65.1)	.016	1	.898
Not Available	8(33.3)	16(66.7)			

**Significant at 5%

The results above (Table 7) show that of all the organizational factors only functional waste disposable tank (p = .003 < 0.05) and availability of hand gloves (p = .0.024 < 0.05) has a significant effect on the level of adherence to Meat Hygiene practices among butcher operators in Kasangati town council.

3.13. Regulatory factors

Table 8 below shows the inference analysis results of the relationship between regulatory factors and adherence to meat hygiene practices in Kasangati town council.

Table 8 Relationship between Regulatory factors and Adherence to Meat Hygiene Practices (Bivariate Analysis)

	Adherence Level to Meat Hygiene practices				
	Adherent	**None-adherent**			
Organizational Factors	**N (%)**	**N (%)**	**χ^2**	**df**	**P – value**
Inspection by PHOs					
Yes	18(32.1)	38(67.9)	.723	1	.395
No	5(45.5)	6(54.5)			
Regularity of PH inspections					
Once a month	15(31.2)	33(68.8)	.711	1	.399
Others (Twice, Every 3 or 6mnths...)	8(42.1)	11(57.9)			
Hygiene Inspection					
Yes	16(31.4)	35(68.6)	.828	1	.363
No	7(43.8)	9(56.2)			
Training in Hygiene Practices					
Yes	14(36.8)	24(63.2)	.246	1	.620
No	9(31.0)	20(69.0)			
Regular reminders on Hygiene Practices					
Yes	13(28.3)	33(71.7)	2.397	1	.122
No	10(47.6)	11(52.4)			

**Significant at 5%

The results in Table 8 above show that none of the above regulatory factors significantly affect the level of adherence to Meat Hygiene practices demonstrated among butcher operators in Kasangati town council.

Having established (by bivariate analysis) which factors were significant it was necessary to conduct a multivariate analysis to establish which of those established by bivariate analysis were actually significant in adherence practices. This analysis is given in Table 9.

3.14. Education

While at bivariate level, Education had a significant effect on the level of adherence to meat hygiene practices among butcher operators (COR=4.50; 95%CI:1.48-13.67; p = 0.008), it is not significant after being considered in the multivariate analysis (AOR = 2.75; 95% CI:0.77-9.85; p = 0.121> 0.05) (Table 9). This means that education does not predict adherence to the recommended meat hygiene practices in Kasangati town council. This differs from earlier findings in Eastern Ethiopia [26]. This also means that even if someone is educated, there could be some other weaknesses that may prevent the conversion of education into attitude and real practices.

3.15. Functional Waste Disposal

After the multivariate analysis, a functional waste disposal was found to have a significant effect on meat hygiene practices (AOR = 0.14.; 95% CI:0.03-0.62; p = 0.01 < 0.05) (Table 9). This means that a functional waste disposal facility highly influences adherence to the recommended meat hygiene practices in Kasangati town council.

Table 9 The Multivariate Results for the factors influencing Adherence Level to Meat Hygiene practices among butcher operators in Kasangati Town Council

	Adherence Level to Meat Hygiene practices			
	Adherent	**None adherent**		
Personal Factors	**N (%)**	**N (%)**	**COR(95% CI)**	**AOR(95% CI)**
Education Level				
At most Primary	17(50.0)	17(50.0)	4.50(1.48-13.67)	2.75(0.77-9.85)
Post Primary	6(18.2)	27(81.8)	1	1
Organizational Factors				
Functional Waste Disposal Tank				
Yes	13(25.0)	39(75.0)	0.17(0.05-0.58)	0.14(0.03-0.62)
No	10(66.7)	5(33.3)	1	1
Functional Toilet Facility				
Yes	17(42.5)	23(57.5)	2.59(0.86-7.79)	4.39(1.05-18.35)
No	6(22.2)	21(77.8)	1	1
Gloves				
Yes, Always	5(55.6)	4(44.4)	1.11(0.22-5.63)	0.89(0.13-6.06)
Yes, Sometimes	9(22.0)	32(78.0)	0.25(0.08-0.84)	0.17(0.04-0.79)
No, None	9(52.9)	8(47.1)	1	1

**Significant at 5% Level

3.16. Functional Toilet Facility

A functional toilet facility has significant influence on level of adherence to meat hygiene in Kasangati town council after being considered in the multivariate analysis (AOR=4.39; 95% CI: 1.05-18.35; p=0.043<0.05) (Table 9).

3.17. Availability of Hand Gloves

The availability of hand gloves has significant effect on meat hygiene after being considered in the multivariate analysis (AOR=0.17; 95% CI: 0.04-0.79; p=0.023<0.05) (Table 9). The availability of hand gloves highly influences the level of adherence to meat hygiene practices. However it is important to note that the hand gloves are available but they may not be used and those who do not possess gloves might be using water and soap to frequently wash their hands.

4. Conclusion

This study examined the factors affecting adherence to hygiene practices among butcher operators in Kasangati town council and established that the education level of the operators, availability of functional waste disposal tanks and the availability of hand gloves were the most significant factors affecting adherence to meat hygiene practices among the butcher operators. This indicates that low level of education among butcher operators, lack of waste disposal tanks in butcheries and failure to use gloves among butcher operators significantly contributed to low adherence to meat hygiene practices. This inevitably leads to contamination of meat and spread of meat borne diseases in Kasangati town council.

On the other hand, factors such as age, marital status, religion, functional hand washing sink, functional toilet facility, tiled floor, protective glasses, water for cleaning equipment, hand washing soap, detergents, inspection by public health officials, regularity of health inspections, training and regular reminders on hygiene practices were not significantly associated with adherence to meat hygiene practices in this case.

Finally this study recommends that the public health authorities in Kasangati town council should enforce the availability and use of both waste disposal facilities and hand gloves for the butcher operators. These public health authorities should also contribute actively towards increasing the levels of education and awareness among butcher operators through training workshops and learning visits. There is also need to develop an effective monitoring and evaluation regime for meat hygiene in the Town Council.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interest. The sponsors and supporters had no role in the design, execution, interpretation, or writing of the study.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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