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## Assessment of knowledge, attitude and practices on food safety of beef among meat handlers at homes and slaughter houses in and around Babich and Gedo Towns, West Shewa Zone, Ethiopia

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### Abstract

**Background:** Food safety refers to the situations and practices that prevent contamination of food with unwholesome chemicals or microbes, and remains a serious public health concern worldwide. Food-borne diseases have been known as a major human health problem occurring commonly in both developed and underdeveloped countries, particularly in African countries, because of unhygienic handling of food and poor sanitation practices.

**Methods:** A descriptive cross sectional study was conducted from November 2021 to April 2022 in and around Babich and Gedo towns, West Shewa Zone, Oromia, Ethiopia. This study aims to assess knowledge, attitudes and practices of meat handlers at homes and slaughterhouses regarding food safety of beef. To address these objectives 160 meat handlers at homes, 9 slaughter personnel were participated as sample respondents. Semi-structured questionnaires and visual observation were used to collect data and the data was analyzed using the Statistical Package for Social Science (SPSS) software version 20. Descriptive statistics such as tabulation, frequency, percentage and mean were used to analyze the survey data collected from respondents.

**Results:** The overall result of meat handlers at homes showed that their knowledge, attitude and practices of beef safety were 56.8%, 45.4% and 60.1%, respectively, which were below the acceptable level. The overall knowledge, attitude and beef safety practices of slaughter personnel were 56.67%, 68.15% and 42.86%, respectively, which were also below the acceptable level. This study found that meat handlers generally had low levels of knowledge, attitudes, and practices related to food safety. This is mainly because of lack of training, poor structured slaughter facilities, improper waste and environmental management system.

**Conclusion:** To improve meat safety through regular training of all actors along the meat chain on safe meat handling as well as general and personal hygiene requires great attention.

**Keywords:** Babich, Beef, Ethiopia, Gedo, Meat Safety

### 1. Introduction

Food safety refers to the situations and practices that prevent contamination of food with unhealthy chemicals or microbes, remains a serious public health concern worldwide (WHO, 2015) [18]. Eating safe and healthy food is a difficult task in developing countries because of monumental reasons. Impoverishment is one of the leading cause of consuming unsafe food resulted from lack of access to adequate food and clean water, poor arrangement in government structure, perpetuating infectious diseases within the community, unsuitable environmental conditions to ensure food safety and poor handling and hygienic practices (Dewal, 2005) [6]. Livestock products and by-products in the form of meat, milk, honey, eggs, cheese, and butter supply etc. provide the needed animal protein that contributes to the improvement of the nutritional status of the people (CSA, 2021). Globally, meat and meat merchandise are wonderful sources of protein within the human foods (Fayemi and Muchenje, 2012) [9], and it also gives crucial dietary factors which include fats, vitamins, and minerals which are useful resources inside the regular functioning of frame structures of consumers. Currently, the meat intake in South Africa is about 58.7kg/capita/year (FAOSTAT, 2017) [8]. However, meat intake styles are unpredictable (Escriba-Perez *et al.*, 2017) [7] because of various factors associated with a client and his environment (Van Loo *et al.*, 2010) [17], Font-i-Furnols and Guerrero, 2014) [10]. Food borne diseases are preventable, If Food Protection principles are followed from primary production to the level of consumer. Ethiopia is not exceptional since the prevailing of poor food handling and sanitation

practices, inadequate food safety laws, weak regulatory systems, lack of financial resources to invest on food safety, and lack of education and training for food handlers. Meat is enormously liable to microbial contaminations leading to economic and health losses (Ahmad *et al.*, 2013) <sup>[14]</sup>. Beef contains 70-73% of water, 20-22% of protein and 4.8% of lipids. This chemical composition exposes beef to be easily infected through spoilage and pathogenic micro-organism, whilst good hygienic measures that start from preparation to delivery are not respected. In fact, tissue from wholesome animals are sterile, however, it is been pointed that in slaughter, dressing and cutting, microorganisms got there mainly from the outdoors of the animal and its intestinal tract, and more importantly extra can be introduced from cloths, air, and environmental system in general (Pal, 2012) <sup>[15]</sup>.

There are numerous causes of food borne illness when you consider the entire food chain, from farm to fork. Insanitary food handling practices, pathogen contamination of potentially hazardous foods, foods from questionable sources, storing food at room temperature for an extended period of time, insufficient time and/or temperature when first cooking or reheating, and contaminated equipment are the most frequently cited contributing factors (Kassa *et al.*, 2010) <sup>[12]</sup>. Strict adherence to appropriate slaughter house hygienic procedures is crucial for preventing microbial carcass contamination in the meat industry (Zweifel *et al.*, 2005) <sup>[20]</sup>. Food handlers are involved in the final step in preventing food-borne illnesses (AbdullahSani and Siow, 2014) <sup>[11]</sup>, and excellent hygienic practices should be in place to ensure that cross-contamination is minimized, thereby protecting consumers from food-borne illnesses (Abdul-Mutalib *et al.*, 2012) <sup>[2]</sup>.

Meat handlers have critical position in controlling meals borne pathogens either from infected utensils or from the animal itself consisting of different pathogens. They can also convey a few human unique meals borne pathogens through their hands, mouth, skin, hair and cuts or sores, and disseminate to consumer (Havelaar, 2013) <sup>[11]</sup>. To ensure that food handlers in abattoirs have the awareness, knowledge and practices related to proper food handling, training and education are essential parts of their job (Martins *et al.*, 2012) <sup>[14]</sup>. Ethiopia has not always been great because of negative hygiene and meals management practices, in sufficient meals protection laws, vulnerable management systems, loss of economic assets to make investments on meals protection, and shortage of training and education for meals handlers (Tessema, 2014) <sup>[20]</sup>.

To affirm that the entire network has the necessary awareness, understanding and exercise associated with an appropriate manner of dealing with meals; education and training are crucial elements in their job (Martins *et al.*, 2012) <sup>[14]</sup>. Knowledge, Attitudes and Practices (KAP) surveys are consultant research of a selected populace to acquire statistics on what is thought and acted on when it comes to a selected topic (WHO, 2008) <sup>[19]</sup>. In Ethiopia only a few researches were carried out on meals protection understanding, mindset and practices of meals handlers. Therefore the aim of this study was to assess knowledge, Attitude and practices of various stakeholders involved on food safety of beef in Liban Jawi and Chaliya districts, West Shewa Zone, Oromia, Ethiopia.

## 2. Materials and Methods

### 2.1 Description of the Study Areas

The study was conducted in and around Babich and Gedo towns in Liban Jawi and Chaliya Districts of West Shewa Zone, Oromia, Ethiopia. Liban Jawi District is one of the 22 districts found in West Shewa Zone and located about 162 km West of Addis Ababa, at altitude of 9°04'52" N and longitude of 37°28'30" E (<http://www.Weather-atlas.com>). The mean annual minimum and maximum temperatures are 18.87 °C and 23.7 °C, respectively. Liban Jawi district was bordered by Mida Kegn district to the North, Jibat district to the South, Toke Kutaye district to the East, and Chaliya district to the West. Mixed farming system is the mode of agriculture in the district in which livestock play an important role for the livelihood of the population. The livestock population of the area comprises of 73229 cattle, 24503 equine, 51764 shoaat and 90,025 poultry (LJDAO, 2021).

Chaliya district was also located in West Shewa Zone; Oromia Regional State of Western Ethiopia which is 178 km West of Addis Ababa. Chaliya district had a total population of 132348, of whom 62524 were men and 69824 women. The geographical locations of the study district lies at an altitude ranging from 1500 to 3051 meters above sea level. The annual mean minimum and maximum temperatures are 10 °C and 25 °C, respectively with average temperatures of 16 °C. Average annual rain fall is from 900 to 1400 mm (ChDAO, 2021).

### 2.2 Study Populations

Selected kebeles of Liban Jawi District had an estimated 301 households. There were about 13 slaughter house personnel (LJDAO, 2021). Selected kebeles of Chaliya district also had an estimated 317 households. There were 15 slaughter house personnel (ChDAO, 2021).

### 2.3 Sample Populations

A total of 160 meat handlers at home were interviewed from the two study districts. All kebeles in and around Babich and Gedo towns were identified for the study in consultation with livestock and fishery development offices of the respective districts, and the study kebeles were selected purposively based on their accessibility. Then after, household data were obtained from the local agricultural development agent offices, and individual respondents were randomly selected from the list provided. The respondents were interviewed after obtaining their verbal consent for participation. In addition to these, a total of 9 slaughter house personnels were randomly selected from the two districts and interviewed using the questionnaire format.

### 2.4 Study Design

A cross sectional study was conducted from November 2021 to April 2022 in and around Babich and Gedo towns. A semi- structured questionnaire survey technique was applied to gather information from individual respondents.

**Questionnaire survey:** Semi-structured questionnaires were adopted from a published research article by Adesokan and Raji (2014) <sup>[22]</sup> in order to meet the objectives of this study. A face-to-face interview technique was employed to collect information from the study respondents. The questionnaire was structured into four distinct parts:

The first part includes demographic information of the respondents: gender, marriage status, level of education, years of service, employment status, health certificate renewal and status of prior food safety training. The second section of the questionnaire deals on food safety knowledge of the respondents including knowledge on personal hygiene, cross contamination and time temperature control. Each question has three optional answers (“yes”, “no” and “do not know the answer”). The response was analyzed as categorical variables (Yes or No). Meat handlers that got overall score ( $\leq 63.63\%$  accuracy) were considered to have unsatisfactory and those scored ( $\geq 68\%$  accuracy) satisfactory knowledge of food safety. The third part of the questionnaire was about food safety attitude of the meat handlers. It comprises questions about attitude of hand washing, cross contamination, food handling, storage, etc. In this section, the respondents' answers were “agree”, “disagree”, and “don't know”. The response was analyzed as categorical variables (right or wrong answer). For evaluation, food-handlers that answered more (70% accuracy) or more questions correctly were measured to have “good” attitude whereas respondents answer less questions correctly were measured to have “poor” attitude. The fourth section of the questionnaire deals with food hygiene practices. The questions are comprised of the issues of personal hygiene, hand washing practices and cross contamination. These questions have two possible responses: “yes” and “no”. For evaluation, a score  $\geq 70\%$  considered as having “good” food hygienic practice (Ifeadike *et al.*, 2014) [23].

**Observation:** Primary data collection was performed through observations made during the sampling process in which a number of factors including facilities, equipment, and current status of food hygiene and status of knowledge and sanitation practice were assessed.

### 2.5 Sample Size and Sampling Technique

A cross sectional questionnaire based study was conducted from November, 2021 to April, 2022 to assess the level of awareness of meat handlers at homes, slaughter house personnel about their habitual practices on beef safety

management. The sample size for this questionnaire survey was calculated by using formula by Arsham, (2007) [24]:

$$n = (0.4225) SE^2$$

Where: n=sample size, SE (Standard error) =5%.

Accordingly, the calculated sample size for the survey were 169 and individual respondents were randomly selected.

### 2.6 Data Analysis

All data derived by direct observation and interview methods were entered into the Microsoft office excel spread sheet, edited, coded and later imported to the SPSS (Statistical Package for Social Science) software version 20 for the analysis. Descriptive statistics such as tabulation, frequency, percentage and mean were used to display the findings of the study.

## 3. Results and Discussion

### 3.1. Demographic Characteristics of Respondents

The family traits of respondents (Table 1) the data shown that all percentage of respondents, participated in the study areas were male headed (100%). The maritus status of respondents were married (78.7%), followed by single (21.3%) while religious were 98.2% Christians and 1.8% Muslims. The majority of the respondents were illiterate (44.3%), primary school (36.0%), and secondary school (14.7%) and followed by college (4.1%) and University graduates (2.9%). The employment statuses of the respondents were 94.7% uneneployed and 5.3% contract employed. The level of education attained, 44.4% of the slaughter personnel have got a level of secondary education which is lower than the report by Nyamakwere (2017) [31] and higher than that report by Mothafar (2018) [32] who reported about 48.3% and 18% secondary education level, respectively. But the 33.3% primary level education from this research is higher than the report of Nyamakwere (2017) [31] and Mothafar (2018) [32] who reported 31.25%, 26.7% and 26% primary education, respectively. However, 22.2% of them were illiterate which is lower than 25% showed by Nyamakwere (2017) [31]. In this finding, all the respondents have no health certificate which is not in agreement with the finding of Nyamakwere (2017) [31] and Mothafar (2018) [32] that reported majority (62.5% and 70%, respectively) had health certificates.

**Table 1:** Socio-demographic characteristics of respondents at the study area (N = 169).

Characteristics		N	%
Gender	Male	169	100.0
	Female	-	-
Maritus status	Single	36	21.3
	Married	133	78.7
Religious	Divorce	-	-
	Christian	166	98.2
	Muslims	3	1.8
	Others	-	-
Level of education	Illiterate	75	44.3
	Primary education	61	36.0
	Secondary education	25	14.7
	College	7	4.1
	University	5	2.9
	Daily	-	-
Employment status	Contract	9	5.3
	Permanent	-	-
	No employment	160	94.7

### 3.2. Food Safety Knowledge of Meat Handlers at Home

The overall food safety knowledge of the respondents was summarized in Table 2. About 56.8% of respondents had answered the questions correctly indicating unsatisfactory knowledge level which is below the cut of point ( $\geq 68\%$  accuracy) which is less than the given standard ( $\geq 68\%$ ). However, almost all meat handlers were aware of the fact that improper handling of meat could pose health hazards to consumers (89.4%) and regular washing of hands before and during meat processing reduce risk of contamination (88.1%). 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. Knowing the importance of proper handling of meat, proper hand washing and other important hygienic procedures by the meat handlers is very important since meat handlers can serve as vehicles for cross contamination and spread foodborne pathogens (Ansari-Lari, 2010) [25]. This study indicated that 100% of meat handlers have similar understanding about proper meat handling and hand washing which is higher than the report of Hapala and Probart (2004) [26] who reported correct answers by most of their participants about hand washing question.

The respondents had low knowledge level about eating and drinking in the work place as a causative factor to increase the risk level of meat contamination (8.1%), microbes found on the skin, nose and mouth of meat handlers as a causative factor of health problem (15.6%) and contaminated meat always has some change in color, odor or taste (100%). Most of the respondents did not know the fact that people with open skin injury, gastroenteritis, and ear or throat disease should not be allowed to handle meat and also did not know about cross contamination by meat handlers or utensils (34.4% answer correctly). Washing hands by food handlers during processing is considered as one key important hygienic practice to prevent cross contamination (Assefa, 2015) [27]. In this finding, 77.8% of the respondents washed their hands before and after handling meat. Even though the result of this finding contradicts with the reports by a number of authors from other places in the world where washing hand and sanitization was found to be inadequate (Abd-Elaleem, 2014; Jianu, 2014) [28, 29], which is lower than the finding reported by Assefa (2015) [27] who indicated all respondents always wash and properly sanitize their hands before starting the slaughter process.

**Table 2:** Food safety knowledge of meat handlers at home in and around Babich and Gedo towns (N =169).

Food safety knowledge	Response		
	Yes N(%)	No N (%)	Do not know N (%)
Improper handling of meat could pose health hazards to consumers	143 (89.4)	-	17 (10.6)
Regular washing of hands before and during meat processing reduce risk of contamination	141 (88.1)	-	19 (11.9)
Proper cleaning and sanitization of knives and hooks reduce the risk of meat contamination	117 (73.1)	3 (1.9)	40 (25.0)
Eating and drinking in the work place increase the risk of meat contamination	13 (8.1)	125 (78.1)	22 (13.8)
Washing and disinfection of working surfaces and tools are important for safety of meat	141 (88.1)	5 (3.1)	14 (8.8)
Microbes are on the skin, nose and mouth of healthy meat handlers	25 (15.6)	54 (33.8)	81 (50.6)
Cross contamination is when micro- organisms from a contaminated meat are transferred by the meat handlers or utensils to another	55 (34.4)	25 (15.6)	80 (50.0)
Contaminated meats always have some change in color, odor or taste	160 (100)	-	-
People with open skin injury, gastroenteritis, and ear or throat disease should be not allowed to handle meat	23 (14.4)	137 (85.6)	-
Total percentage mean of correct answer	56.8%	24.23%	18.97%

N=Number of respondents

### 3.3. Attitude of Meat Handlers about Food Safety at Home

Table 3 below summarized food safety attitudes of the meat handlers. Around 45.4% of the respondents have agreed answering correct attitude of food safety. In this finding, 77.8% of the respondents washed their hands before and after handling meat. Even though the result of this finding contradicts with the reports by a number of authors from other places in the world where washing hand and sanitization was found to be inadequate (Abd-Elaleem, 2014; Jianu, 2014) [28, 29], which is lower than the finding reported by Assefa (2015) [27] who indicated all respondents always wash and properly sanitize their hands before starting the slaughter process. Meat handlers' attitude towards taking regular training for better meat safety and hygienic practices (96.9%) is promising. They also have satisfactory knowledge about keeping working surfaces and utensils clean to reduce the risk of illness (91.2%). On the other hand, about 88.8% of the respondents believed that inspecting meat for freshness and wholesomeness is valuable. But, the respondents had the lowest attitude concerning the following points: meat handlers with wounds, bruises or injuries on their hands must not touch or

handle meat, safe meat handling to avoid contamination and they hardly consider this is part of meat handlers' responsibilities. They also don't understand that using different knives for meat and offal are worthy to reduce contamination and knives should be properly sanitized to prevent cross contamination (13.1%, 45.6%, 21.3% and 33.1%, respectively).

About 24.4% of the respondents recommended that wearing protective clothing and shoes could help to improve work safety and hygienic practices whereas, 18.1% said putting on hair cover on the head is a good practice. It is only around 18.1% of the respondents in this study who understood that sneezing or coughing without covering the nose or mouth could contaminate the meat. These showed that the respondents have generally low attitude on food safety. The result of this study showed that 66.7% of the slaughter personnel were wearing protective clothing which is similar to the report by Nyamakwere (2017) [31] who pointed out that most of the slaughter personnel always put on protective clothing during slaughtering.

Lack of training among food handlers has negative consequence on performing behaviors (Roberts, 2008) [30]. In this study, all of the slaughter personnel (100%) have not

attended food safety training. This is in contrary to that reported by Nyamakwere (2017) [31] who indicated a relatively lower proportion of respondents (30%) did not receive any food safety training before attaining abattoir

employment and contrary to a percent of trained workers (48%) reported by Mothafar (2018) [32]. Also it is not in line with the report by Nyamakwere (2017) [31] who reported a large majority (70%) of them had received training.

**Table 3:** Attitude of meat handlers at home about food safety in and around Babich and Gedo towns (N =160).

Statement	Response		
	Agree N (%)	Disagree N (%)	Do not know N (%)
Meat handlers with wounds, bruises or injuries on their hands must not touch or handle meat	21 (13.1)	139 (86.9)	-
Hand washing before handling meat reduces the risk of contamination	160 (100)	-	-
Regular training could improve meat safety and hygienic practices	155 (96.6)	2 (1.3)	3 (1.9)
Safe meat handling to avoid contamination is part of the meat handlers responsibilities	73 (45.6)	22.5 (36)	51 (31.9)
Keeping working surfaces and utensils clean reduces the risk of illness	146 (91.2)	3 (1.9)	11 (6.9)
Using different knives for meat and offal is worthy to reduce contamination	34 (21.3)	126 (78.8)	-
Inspecting meat for freshness is valuable	142 (88.8)	8 (5.0)	10 (6.3)
subsequent to processing of meat, any leftover should be kept in cool place	3 (1.9)	114 (71.3)	43 (26.9)
Knives can be a source of food contamination	61 (38.1)	68 (42.5)	31 (19.4)
Knives should be properly sanitized to prevent cross contamination	53 (33.1)	32 (20.0)	75 (46.9)
Sneezing or coughing without covering our nose or mouth could contaminate the meat	29 (18.1)	122 (76.3)	9 (5.6)
Wearing protective clothing and shoes could improve work safety and hygienic practice	39 (24.4)	93 (58.1)	28 (17.5)
Putting hair cover on head is good hygienic practice	29 (18.1)	91 (56.9)	40 (25.0)
Total percentage mean	45.4%	40.1%	14.5%

N=Number of respondents

**3.4. Food Safety Practice of Meat Handlers at Home**

The responses of meat handlers to questionnaires related to food safety practices and food hygiene were described below (Table 4). Out of the total respondents, it was found that about 60.1% of the respondents were not maintaining food safety practices. As per the survey result, 98.1% of respondents eat and drink at their work place and about 100% of meat handlers were not replacing their knives or sterilize them after each meat processing. Most of the

respondents (89.4%), handled/processed meat when they were ill and 95% of them were not removing their personal stuffs such as rings, necklaces, watch etc. while processing meat. Meat handlers with open skin injury, gastroenteritis, and ear or throat diseases should not deal with any meat production. But current study show that all of the meat handlers (100%) did not wash their hands after smoking, coughing, and sneezing.

**Table 4:** Food safety practice of home meat handlers in and around Babich and Gedo towns (N = 160).

Food safety practice	Response	
	Yes N (%)	No N (%)
Do you eat or drink at your work place?	157 (98.1)	3 (1.9)
Do you wash your hands before and after handling meat?	160 (100)	-
Do you wash your hands after handling waste/garbage?	160 (100)	-
Do you wash your hands after sneezing or coughing?	-	160 (100)
Do you replace knives or sterilize them after each meat processing?	-	160 (100)
Do you remove your personal stuffs such as rings, necklaces, watch etc. while processing meat?	8 (5.0)	152 (95.0)
Do you handle/process meat when you are ill?	143 (89.4)	17 (10.6)
Do you handle / process meat when you do have cuts, wounds, bruises or injuries on your hands?	141 (88.1)	19 (11.9)
Total percentage mean	60.1%	39.9%

N=Number of respondents

**3.5. Food Safety Knowledge of Slaughter Personnel**

The overall food safety knowledge of the respondents is summarized in Table 5. About 56.67% of respondents had unsatisfactory knowledge level as this is below the cut of point ( $\geq 68\%$  accuracy). However, almost all slaughter personnel were aware of improper handling of meat as a causal factor for health hazards to consumers. Regular washing of hands before and during meat processing reduces the risk of contamination. On the other hand, the respondents had least knowledge about eating and drinking

in the work place as a factor increasing the risk of meat contamination (22.2% correct answer). Only few of them also knew that microbes on the skin, nose and mouth of meat handlers are health hazards (44.4% correct answer). All of them knew that contaminated meat always has some change in color, odor or taste. Few of the respondents also knew that people with open skin injury, gastroenteritis, and ear or throat disease should not be allowed to handle meat (44.4% answer correctly).

**Table 5:** Food safety knowledge of slaughterhouse personnel in and around Babich and Gedo towns (N = 9).

Food safety knowledge	Responses		
	Yes N (%)	No N (%)	Don't know N (%)
Improper handling of meat could pose health hazards to consumer	9 (100)	-	-
Regular washing of hands before and during meat processing reduces risk of contamination	9 (100)	-	-
Proper cleaning and sanitization of knives and hooks reduce the risk of meat contamination	7 (77.8)	-	2 (22.2)
Eating and drinking in the work place increase the risk of meat contamination	-	2 (22.2)	7 (77.8)
Washing and disinfection of working surfaces and tools are important for safety of meat	9 (100)	-	-
Microbes are on the skin, nose and mouth of meat handlers	-	4 (44.4)	5 (55.6)
Cross contamination is when micro-organisms from a contaminated meat are transferred by the meat handlers or utensils to another	6 (66.7)	-	3 (33.3)
Contaminated meat always has some change in color, odor or taste	9 (100)	-	-
People with open skin injury, gastroenteritis, and ear or throat disease should not be allowed to handle meat	2 (22.2)	7 (77.8)	-
The health status of workers should be evaluated before employment	-	4 (44.4)	5 (55.6)
Total percentage of mean	56.67%	18.88%	24.45%

N=Number of respondents

**3. 6. Food Safety Attitude of Slaughter Personnel**

Around 68.15% of respondents have good attitude of food safety. The slaughter personnel attitude towards hand washing before handling meat reduced the risk of contamination, taking regular training for better meat safety and hygienic practices, keeping working surfaces and utensil cleaning reduce the risk of illness, inspecting meat for freshness and wholesomeness is valuable and wearing protective clothing and shoes could help to improve work safety and hygienic practices (100%, 77.8%, 100%, 100%

and 66.7%, respectively answers correctly). 55.6% of respondents have correct attitude on meat handling while having wounds, bruises or injuries on their hands. However, the respondents have little attitude towards sanitization of knives, using different knives for meat and offal, and sneezing or coughing without covering the nose or mouth to prevent cross-contamination (44.4% correct answer) whereas knives can be a source of food contamination and putting on hair cover on the head is a good practice (38.1% and 11.1%, respectively correct answer).

**Table 6:** The attitude of slaughterhouse personnel towards food safety in and around Babich and Gedo towns (N = 9).

Food safety attitude	Response		
	Agree N (%)	Disagree N (%)	Don't know N (%)
Meat handlers with wounds, bruises or injuries on their hands must not touch or handle meat	5 (55.6)	4 (44.4)	-
Hand washing before handling meat reduces the risk of contamination	9(100)	-	-
Regular training could improve meat safety and hygienic practices	7 (77.8)	-	2 (22.2)
Safe meat handling to avoid contamination and this is part of meat handlers responsibilities	9(100)	-	-
Keeping working surfaces and utensils clean reduce the risk of illness	9(100)	-	-
Using different knives for meat and offal is worthy to reduce contamination	4 (44.4)	5 (55.6)	-
Inspecting meat for freshness and wholesomeness is valuable	9(100)	-	-
Surface and equipment should be cleaned before reusing for meat processing	9(100)	-	-
After processing meat, any leftovers should be kept in cool place	7 (77.8)	2 (22.2)	-
Knives and hooks can be source of food contamination	-	2 (22.2)	7 (77.8)
Knives should be properly sanitized to prevent cross contamination	4 (44.4)	5 (55.6)	-
The same towel can be used to clean many places	9(100)	-	-
Sneezing or coughing without covering our nose or mouth could contaminate the meat	4 (44.4)	3 (33.3)	2 (22.2)
Wearing protective clothing and shoes could improve work safety and hygienic practices	6 (66.7)	3 (33.3)	-
Putting on hair cover on the head is good practice in food industry	1 (11.1)	6 (66.7)	2(22.2)
Total percentage mean	68.15%	22.22%	9.63%

N=Number of respondents

**3.7. Food Safety Practice of Slaughter Personnel**

The assessment result of food safety practices by nine meat handlers interviewed in this research was depicted by Table 7. It was found that about 42.86% of the respondents did not maintain food safety practices. As per the survey result, 66.7% of respondents eat and drink at their work place. All

of the meat handlers were not using gloves, aprons and hairnet did not replace knives or sterilize them after each meat processing as well as did not wash their hands after smoking, coughing and sneezing. About 55.6% of the respondents still handle meat when they get cuts or have wounds on their hands.

**Table 7:** The food safety practice of slaughterhouse personnel in and around Babich and Gedo towns (N = 9).

Food safety practice	Responses	
	Yes N (%)	No N (%)
Do you eat or drink at your work place?	6 (66.7)	3 (33.3)
Do you smoke inside meat processing area?	-	9 (100)
Do you use gloves while handling meat?	-	9 (100)
Do you wash your hands before and after handling meat?	7 (77.8)	2 (22.2)
Do you wash your hands after handling waste/garbage?	9 (100)	-
Do you wash hands after visiting toilet?	9 (100)	-
Do you wash your hands after smoking, sneezing or coughing?	-	9 (100)
Do you wear an apron while working?	-	9 (100)
Do you wash your aprons after each day's work?	-	9 (100)
Do you wear a hairnet or a cap while working?	-	9 (100)
Do you replace knives or sterilize them after each meat processing?	-	9 (100)
Do you remove your personal stuff such as rings, necklaces, watch etc. while processing?	-	9 (100)
Do you handle/process meat when you are ill?	9 (100)	-
Do you handle / process meat when you get cuts, wounds, bruises or injuries on your hands?	5 (55.6)	4 (44.4)
Total percentage mean	42.86%	57.14%

**3.8. Physical Observation of Gedo Slaughterhouse as per FAO Standards**

Gedo slaughterhouse has a slaughtering capacity of more than 16 heads of cattle per week. Ant-mortem and post-mortem inspections are not carried out to detect sick animals and other abnormalities. There is no water and no washing of animals prior to slaughter. Maximum fasting period practiced is not more than 10-12 hours prior to slaughtering. Therefore, the actual fasting period in the abattoir is not as per the standards of FAO. In this abattoir, there is no stunning box and animals are stunned being on the floor. All of the slaughtering processes are done manually on the floor by the slaughterhouse and none of the workers were using gloves during this survey. The slaughtering knife is not cleaned and sterilized at each carcass splitting process.

The loading and unloading of the meat is carried-out by daily laborers whose personal hygiene is very poor. The slaughterhouse workers do not wear aprons and hair covers. The hygiene of the workers are poor in terms of neatness. There was no restriction of workers movement from dirty to clean areas. Regarding the hygiene of slaughterhouse, the cleaning and sanitation of the slaughterhouse floor, walls and equipment were poor. Birds, rodents and insects freely move in and out of the abattoir. The slaughter slab has no toilet for its workers and 'one man one job' principle is not applied. Meat chilling and ventilation facilities are absent. In general, the slaughterhouse was not well constructed.

**Table 8:** Observation of the Gedo slaughterhouse in comparison with the FAO standards

Variables	Standard	Actual	Description
Cross contamination due to lay out	No	Yes	Flow of personnel, material and waste disposal cause cross contamination and lack of adequate facilities and equipment in meat slaughtering and distribution area
Ratio of number of toilet and number of workers at Gedo slaughter house	1:05	No	There is no toilet at all
Cattle washing before slaughtering	Optional	No	The cattle is not washed before being slaughtered so as to make clean the hide from different dirty materials which may lead to cross contamination
Fasting period/resting time	12-24 hr.	< 12 hr.	Fasting period is less than the recommended time
Stunning techniques	Bolt	Knife	We have seen that the stunning technique was conducted by knife
General personal hygiene of the Butchers	Good	Poor	The butchers did not wear protective clothing like white coat and white hair cover and also that they wears are not cleaned
Sanitation and sterility of the Equipment	Good	Poor	Sanitation and sterility of the equipment was not kept very well
Frequent use of clean water for washing	Must	Done	They used clean water to wash their hands and equipment
Cold chain management	Sustainable	No	cold chain management in sustainable ways was not seen
Butchers' renewal of health certificate	6 month's	No	They do not have it at all
Know-how of the butchers about personal and food hygiene	Good	Good	They know about the importance of personnel hygiene. But they did not translate to safety practice
Training about personal hygiene and food-borne diseases	Good	No	No worker has taken training concerning food safety practice
Separate transportation for beef and offal	Must	Not used	Both beef and offal transported to butcher shop in the same track and hanged together in meat retail outlet shop
Method of loading and unloading	Over handrail	Manual	Both loading and unloading activities were carried out manually using human labor

Source: FAO (2010)

**4. Conclusion and Recommendations**

In conclusion, meat handlers had unsatisfactory Knowledge mainly on food borne pathogens, time temperature control,

cross contamination, and difference between cleaning and sanitation. It may be due to high proportion of illiterate and primary school leaver meat handlers in the study area.







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