Food Safety Training Manual for Street Food Vendors

NAIROBI CITY COUNTY

APHRC African Population and Health Research Center

Healthy Food Africa

UNIVERSITY OF NAIROBI

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FOREWORD

Street foods are ready-to-eat foods that are either eaten raw or with minimal preparation and are usually sold from mobile or stationary outlets. Street food vending is a trade that provides a means of income to the vendors, and also a source of food for millions of people, especially in the low-income urban setting. It has become a convenient and essential service in Kenya and more particularly in the city of Nairobi because of enabling environments created by socio-economic factors, feeding habits, and lifestyle changes.

Street foods are mostly preferred due to their convenience, availability, low cost and unique flavours. The street food sector has grown over the years due to high demand and is competing with the formal trade, but the safety and quality of the foods is often not guaranteed because of unhygienic preparation and handling which poses a health threat to consumers.

Food handlers play a major role in maintaining the safety of street foods. Poor food handling practices by street food vendors may lead to food contamination thus causing food-borne illnesses. Training of food handlers on safe handling and preparation of food, good hygiene practices and the hazards associated with their products, is an essential part of any strategy to improve food safety. This training manual has been prepared for public health officers to enhance the food safety knowledge and practices of street food vendors.

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DEFINITIONS

For the purpose of this manual, the following definitions apply:

Equipment - Items used for preparation, handling, serving, and storage of food products for commercial purposes.

Food - Any substance that is taken by a person, either by eating or drinking, and it provides satisfaction and essential nutrients.

Food contaminant - Any harmful substance not intentionally added to food from the environment or food production processes.

Food contamination - Refers to the presence of harmful physical, chemical, and biological substances in food which can cause consumer illness.

Food defense - The protection of food products from intentional contamination or adulteration where there is an intent to cause public health harm and/or economic disruption.

Food fraud - Any deliberate action of businesses or individuals to deceive others in regard to the integrity of food to gain undue economic advantage.

Food hazard - A physical, chemical, or biological agent in, or condition of, food with the potential to cause an adverse health effect.

Food holding - The storage of food for a defined period while awaiting purchase.

Food integrity - Occurs when the systems used to produce the food are authentic, ethical, and safe for human consumption, while food fraud refers to deception using food for economic gain.

Food poisoning - The result of ingestion of foodstuffs contaminated with biological or chemical hazards.

Food quality - Represents the sum of all nutritive and sensory properties of a food item that are acceptable to the consumer.

Food safety - Assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.

Food security - Is achieved when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

Food storage - The process of keeping raw or finished products in controlled conditions.

Risk - The probability of an adverse side effect and its severity, consequential to a hazard(s) in food.

Street food vendor - Any person with or without an establishment that provides prepared food for public consumption on or off its premises.

Street foods - Foods and beverages sold by vendors, especially in the streets and/or other similar places.

Tea towel - A cloth for drying washed cutlery.

Water fit for purpose - Water that is determined to be safe for an intended purpose through identification, evaluation, and understanding of potential microbiological hazards and other relevant factors.

ABBREVIATIONS AND ACRONYMS

HACCP - Hazard Analysis Critical Control Point
GHP - Good Hygiene Practices
PHO - Public Health Officer
WHO - World Health Organization

INTRODUCTION

Food security exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Hence food safety should be considered but it is often overlooked although it forms the basis of the right to adequate food. Globally, approximately 600 million people fall ill after eating food contaminated by bacteria, viruses, parasites or chemical substances and 420,000 die every year, hence the need for food safety interventions. Given that food contamination can occur at different stages of the food value chain, it is importantto address and consider ways in which foods are contaminated at the different stages as well as prevention measures.

Street foods, defined as ready-to-eat foods prepared and/or sold by vendors, especially in streets and other similar public places, account for a significant proportion of food consumed in urban areas in low- and middle-income countries. They are often the least expensive and the most accessible way of obtaining meals.

The socio-economic importance of street food and its associated risks are widely known. The main concern is food safety, although other problems exist, including sanitation (accumulation of waste on streets and blocked drains), congestion, obstructing pedestrians (occupancy of pavements by hawkers and traffic accidents), and the illegal occupation of public and private space and social problems (child labour, unfair competition for the formal trade sector). This raises concerns about the safety of food sold on the streets due to unhygienic food handling by food vendors, hence the need for food safety interventions. Policies and guidelines around food safety have been developed that include the general principles of food hygiene by Codex Alimentarius Commission and the five keys to saferfood by the World Health Organization but few target street foods.

This training manual therefore targets street food vendors. The manual aims to create awareness of the causes of food-borne illnesses and their symptoms, food contaminants and hygiene practices in food handling and storage, food preparation, and preservation. It hasbeen prepared for easy understanding of the food safety issues and the control measures that can be applied in street food preparation and vending and has been informed by international, regional and national guidelines and legal frameworks including Codex, Public Health Act, Cap. 242, Food Drug and Chemical Substances Act, Cap. 254 Laws of Kenya. It includes information on safe and hygienic handling of raw and cooked foods and has been designedfor public health officers. Designed in modular form, linking basic information with multiple illustrations and practical sessions, this manual is a resource tool for trainers addressing different audiences namely: street food handlers, vendors and other support bodies active in the street food sector.

Purpose

To equip street vendors with knowledge and skills to enable them to source,store,and prepare safe and nutritious foods for human consumption.

Expected Learning Outcomes

At the end of the training, the street food vendors will be able to:

i. Identify food safety hazards (biological, chemical, and physical) in different types of food that need to be controlled in food preparation and processing establishments to ensure food safety.
ii. Apply Good Hygienic Practices (GHP) in food preparation and vending establishments to control potential hazards.
iii. Serve safe food to their consumers with integrity.
iv. Support consumer education.
v. Illustrate traceability in food safety and take responsibility for sourcing and producing safe food. Demonstrate knowledge of regulations governing street food vending.

MODULE 1:FOOD CONTAMINATION

1.1 Learning objectives

The overall objective of this module is to provide street food vendors with basic knowledge and information on food contamination.

The specific objectives include:

1. Identification of food hazards;
2. Demonstration of hygienic food handling and preparation;
3. Description of major types of contamination that can affect food products and the resulting risks and harmful effects for consumers;
4. Illustration of the common foodborne illnesses.

1.2 Food Quality and Safety

Food quality and safety can be enhanced by food hygiene which refers to the practices needed to ensure the quality of food from production to consumption.

In cases where food hygiene is compromised, food hazards, which are any biological (bacteria, viruses, parasites), chemical (pesticides, mycotoxins, food preservatives), allergens or physical agents (pieces of metal, wood and sand) that are likely to cause foodborne illness or injury, may be introduced to food. Identification of foods that are not safe to eat is therefore important to ensure that the foods sold are safe for consumption.

Table 1 shows the different types of hazards and actions that can be taken to prevent food contamination, which is defined as the presence of harmful chemicals and microorganisms in food that can cause consumer illness.

It is important to protect food from contamination to prevent food poisoning and the entry of foreign objects (Figure 1). There are three main ways in which food can become contaminated:

- Microbial Contamination – introduction/presence of harmful microorganisms such as bacteria, viruses and fungi to food;
- Physical Contamination – introduction/the presence of foreign objects such as stones, pieces of metal in food;
- Chemical Contamination – introduction/presence of chemical substances such as pesticides in food. These may include allergens that cause harm to certain consumers.

BOX 1

Food quality is defined as the sum of all properties and attributes of a food item that are acceptable to the consumer.

BOX 2

Food safety is defined assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.

Table1: Food hazards and prevention measures

Nature of hazards	Types	Examples	Sources	Identification	Preventive measures
Biological	Pests	Cockroaches, weevils, houseflies	Environment	Presence of the pest in food, droppings, body parts. For weevils holes look out for holes in grains	• Handwashing • Food preparation in clean and hygienic environments, • Transportation of food in clean environments, Use of safe and clean water during food preparation • Reject meat that has a suspicious colour, texture, or odour • Reject baked goods or dairy products with signs of mould • Avoid untreated water, unpasteurised milk • Proper cooking of meat at high temperature for longer time
	Rodents	Rats	Sewer systems, dumpsites, food stores	Presence of droppings, body hair	
	Microorganisms	Pathogenic bacteria (Brucella, Listeria, E. coli, Typhi)	Milk, meat, eggs, human faeces,	Changes in colour, texture, smell. Note that not all contaminated smell/taste bad	
		Viruses (rotavirus-water and milk; hepatitis A and E)	Water, milk		
		Moulds		Presence of mould on food (black, green, white), strings in bread/cakes	
	Parasites	Worms (Hook worms, round worms, tapeworms), Protozoa (amoeba, giardia)	Undercooked meat (beef/pork)		
Chemical	Mycotoxins (Aflatoxins/ fumonisin, patulin)	Improperly dried from mouldy maize cereals nuts roots and pulses	Maize, groundnuts, beans, rice, green grams, flours, apples	Moulds, excessive broken products, change in colour, a lot of chaffs	Mature harvesting Dry storage
	Enterotoxins (may cause diarrhoea, vomiting, stomach ache, typhoid, cholera)	From bacteria – food poisoning bacteria	Contaminated food	Changes in colour, texture, smell. Note that not all contaminated smell/taste bad	Handwashing Food preparation in clean and hygienic environments Food holding at the right temperatures
	Neurotoxins (affects nerves)	From bacteria – food poisoning bacteria	Contaminated food		
	Pesticides and herbicides	Residue	Fresh produce (fruits, vegetables)	White spots on the fruits and vegetables, (residue may always be visible) Testing and analysis	• Use of safe and potable running water • Use of food grade detergents Store chemicals separately from food. • Follow chemical manufacturers' instructions for application, dilution, contact time, and water temperature. • Use pest control products carefully • Cover food during cleaning and pest treatment • Rinse surfaces, glassware, dishes, and cutlery properly • Wash fruits and vegetables to remove pesticides, fertiliser, and other residues
	Food preservatives	Formalin, sodium metabisulfite, hydrogen peroxide	Milk, meat,	Smell	
	Unconventional food preservatives/additives	Trainees to give examples, food colouring (non-food grade)	Fried potatoes, chicken	Appearance (colour)	
	Detergent residues	Cleaners/sanitizers-Due to inadequate rinsing, uncontrolled detergents (non-food grade)	Inadequate rinsing of food preparation surfaces, utensils and equipment	Traces of soap in food, smell of the food-note that it may not always be visible	

Nature of hazards	Types	Examples	Sources	Identification	Preventive measures
	Chemicals that develop as a result of food processing	Rancid oil, overused cooking oil, over roasted food products such as meat	Cooking practices (frying, roasting)	Charred surfaces, change in colour, taste	• Cook foods at the right temperature • Do not reuse and reheat oil
	Heavy metals	Lead, mercury, cadmium, arsenic	Food packaging, contaminated food products	Not visible to naked eye testing and analysis may be required	• Use only food-grade plastics and metals in a kitchen • Avoid supplies/ sources that are likely/ suspected of contamination
Physical	Pieces of metal, sand, human hair, pieces of cloth, threads, pieces of glass, pieces of soap, stones		Environment	Presence of glass, wood, metal fragments in food, presence of stones	• Food should be handled and stored in a clean environment that is free from physical hazards. • Wearing a hair net – don't forget about beards! • Remove jewellery for work hours. Jewellery can also be a source of microbial contamination. • Implement and maintain a strict pest control system. • Take damaged equipment, dishware, or glassware away immediately and repair it as soon as possible.

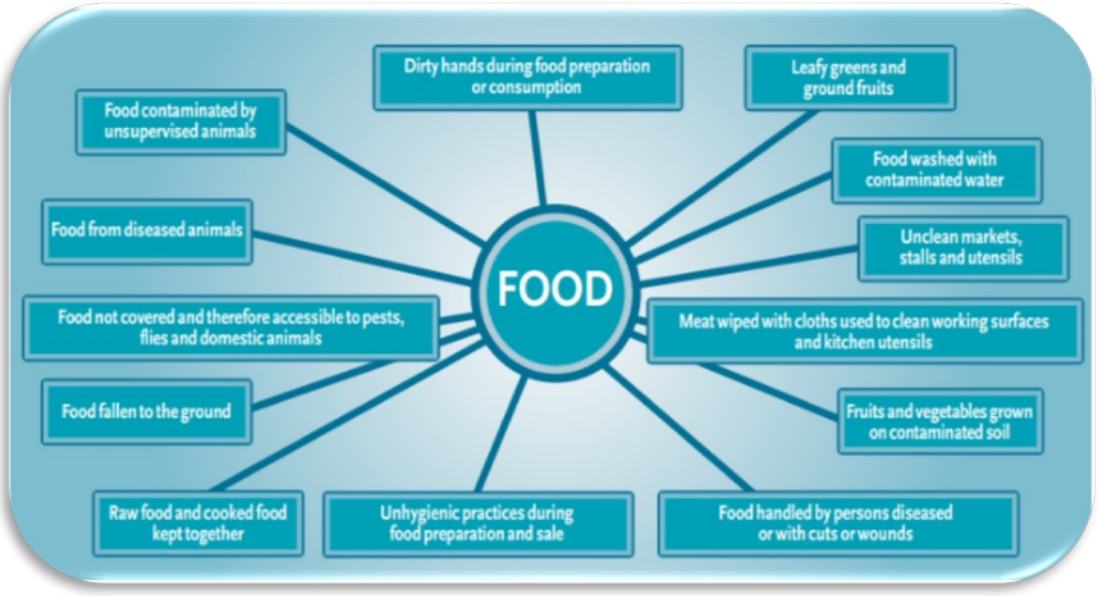


Figure 1: Causes of food contamination Source: Good hygiene practices in the preparation and sale of streetfood in Africa (FAO, 2009)

1.2.1. Germs/Microorganisms

Germs are invisible organisms (microorganisms) that are found in food and can cause food spoilage and illnesses (Figure 2). They are mostly found in:

- Human faeces and animal waste;
- Soil and dust;
- Air;
- Contaminated water;
- Rodents, insects and pests;
- Hide/skin of domestic and farm animals (e.g., dogs, fish, cows, chickens and pigs);
- Food handlers (bowel, mouth, nose, intestines, hands, fingernails and skin);
- Utensils and equipment, food handling surfaces;
- Unwashed fruits and vegetables;
- Contaminated food.

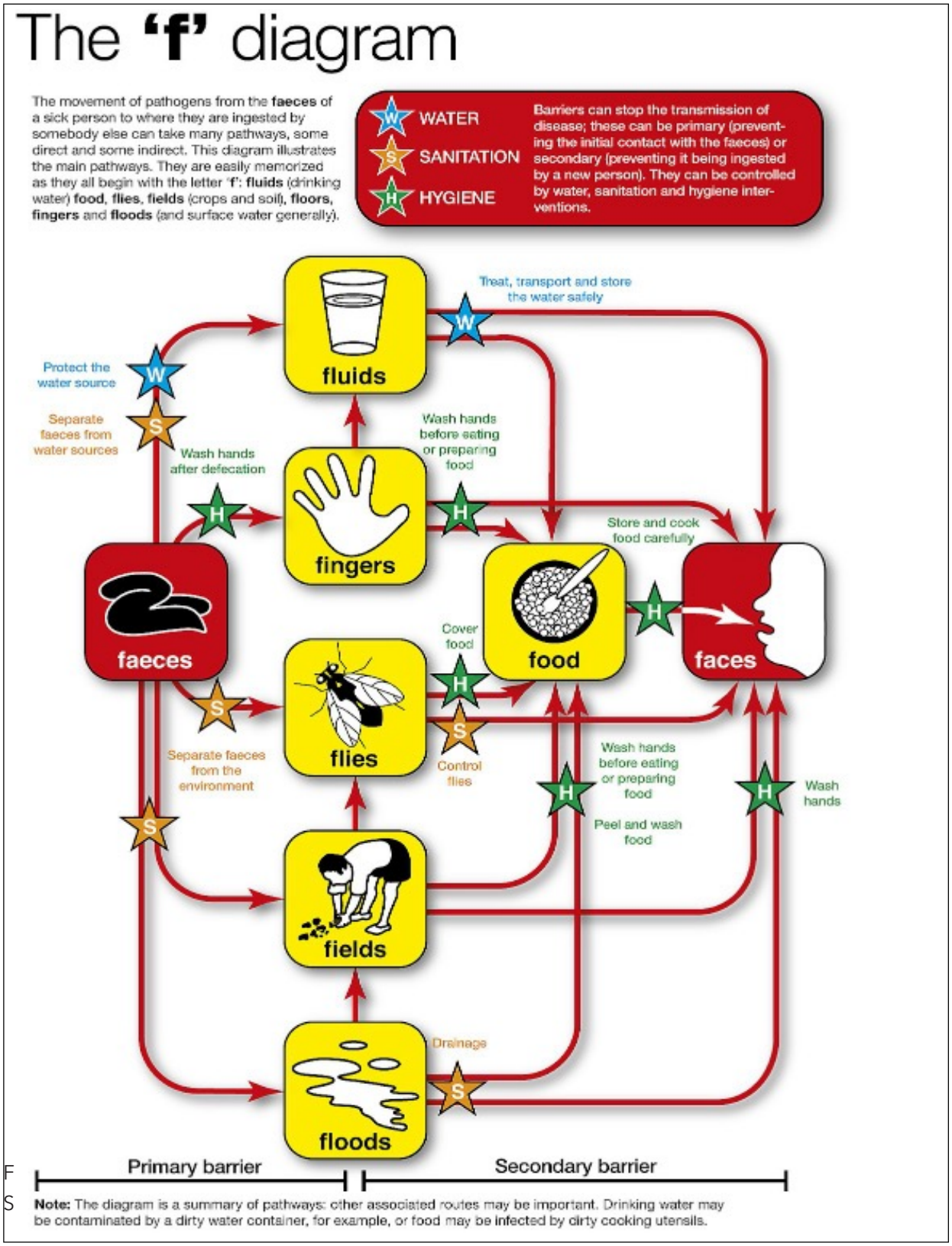
The presence of microorganisms in street food (prepared dishes, snacks, etc.) can be the result of contamination of the raw materials used for food preparation or of insufficient protection of the food during preparation and/or holding until consumption.

The raw materials used to prepare food are sometimes dirty, causing microbial contamination when cooking conditions are inadequate or ineffective.

A major cause of microbial contamination of raw plant materials (ground fruits, leafy greens) is untreated human or animal organic manure. Conditions are aggravated when these are not properly washed in clean water. Drinking water and ice sold in markets and streets are often contaminated with pathogens, causing an array of diseases, including cholera.

Figure2:Microorganismsgrowinginfoods:vegetables,breadandfruits(Source:Frontiersblog https://blog.frontiersin.org/2020/02/28/taking-a-bite-out-of-food-waste/accessed on June 8, 2023)

Faecal matter contains microorganisms and is a source of many diseases.
The F-diagram below (Figure 3) highlights the movement of pathogens from faeces to a new host, taking into consideration barriers that can prevent spread, including water, sanitation and hygiene.


The "f" diagram
The movement of pathogens from the faeces of a sick person to where they are ingested by somebody else can take many pathways, some direct and some indirect. This diagram illustrates the main pathways. They are easily memorized as they all begin with the letter 'f': fluids (drinking water) food, flies, fields (crops and soil), floors, fingers and floods (and surface water generally).
W WATER
S SANITATION
H HYGIENE
Barriers can stop the transmission of disease; these can be primary (preventing the initial contact with the faeces) or secondary (preventing it being ingested by a new person). They can be controlled by water, sanitation and hygiene interventions.
fluids
Treat, transport and store the water safely
Protect the water source
Separate faeces from water sources
Wash hands after defecation
Wash hands before eating or preparing food
fingers
Store and cook food carefully
faeces
food
faces
Cover food
flies
Separate faeces from the environment
Control flies
Wash hands before eating or preparing food
Peel and wash food
Wash hands
fields
Drainage
floods
Primary barrier
Secondary barrier
Note: The diagram is a summary of pathways: other associated routes may be important. Drinking water may be contaminated by a dirty water container, for example, or food may be infected by dirty cooking utensils.

F
S

1.2.2. Food-borne illness

Food-borne illnesses are diseases which are caused by eating food contaminated by microbes such as (bacteria, viruses, fungi, etc.) which grow and establish themselves in the human intestinal tract (food-borne infection) or toxins that result from the microbial growth in the food item (food intoxication) (Table 2).

For food intoxication to occur, the live microorganism does not have to be consumed. Symptoms of food intoxication can either be acute – that is, they occur immediately – or chronic, occurring after a long period, for example, aflatoxin poisoning.

Table 2: Microbial and viral diseases associated with food consumption (Source: Good hygiene practices in the preparation and sale of street food in Africa FAO, 2009)

Diseases	Microorganisms Responsible	Sources	VectorFoods
Botulism	Clostridium botulinum	Soil, water, intestinal tract of animals	Poorly sterilized pH >4.5 canned food, fish, salt-cured food without nitrites, vacuum-packed food or food in oil
Typhoid fever	Salmonella typhi	healthy carriers, faeces of diseased human, water	Food rich in proteins (meat, egg, fish, milk), raw produce, shellfish
Dysentery	Shigella dysenteria, S. Sonnei, S. Flexner	Faeces of the sick, water	Raw food, vegetables, salads, milk, water
Cholera	Vibrio cholerae	Faeces and vomit of infected persons, water	Raw food, vegetables and water
Malta fever (brucellocis)	Brucella melitensis	infected animals	sheep milk and uncured cheese
Tuberculosis	Mycobacterium tuberculosis, M. bovis	section of sick persons, animal milk	Raw milk in particular
Listeriosis	Listeria monocytogenes	Tissues, milk, and urine of sick animals	milk, milk products, meat, poultry
Intestinal anthrax	Bacillus anthracis	sick animals	raw meat, cold cuts
Tularaemia	Francisella tularencis	Blood and tissue of sick rabbits and hares	rabbit and hare meat
Enteritis necroticans	Clostridium perfringens C	Animal faeces	cooked meat and fish
Yersiniosis	Yersinia enterocolitica	soil, water, animals (pigs)	Raw vegetables, meat, raw milk, water

Diseases	Microorganisms Responsible	Sources	VectorFoods
Infection from Campylobac-terspp	Campylobacter jejuni	Sick animals	Water, raw milk, chicken, fish
Salmonellosis	Salmonella Tyhimurium, S. heldelberg, S. java, S. enteridis, S. montevideo. S. panama, etc.	Faeces of domestic animals, skin, acne, nasal secretions	Meat, poultry, shellfish, fish, milk, eggs
Staphylococcal enterotoxicosis	Staphylococcus aureus	Skin, acne, nasal secretions	Ham, meat, poultry, crustaceans, cheese, milk, cold cuts, salads, pastries
Enterobacterial infections	Escherichia coli(several serotypes), Proteus vulgaris (+3 other species), Klebsiella pneumoniae, Citrobacter aerogenes (+other species), Edwardsiella tarda	Faeces, water and soil	Meat, poultry, raw milk, and dairy produce, pastries, cooked foods, eggs, fish
Toxic infections	Clostridium perfringens	Human or animal faeces, soil	Cooked meat and poultry, raw food
	Vibrio parahaemolyticus	Water and seafood	Fish, crustaceans, salted meat
	Streptococcus faecalis	Human and animal faeces	Meat, cakes, milk powder
Gastroenteritis	Bacillus cereus	Soil, dust	Cereal products, cakes, sauces, rice, meat, bread, fish, vegetables, milk
Aflatoxicosis	Aspergillus flavus (and close strains)	Soil and plants	Plant products (grains), milk
Other mycotoxicoses	Fungi	Soil, plants	Fruits, grains, and milk
Hepatisis	Virus type A	Infected faeces, urine, blood	Milk, water, shellfish, citrus juices
Poliomyelitits	Poliovirus	Faeces, throat secretions of infected animals	Milk, water, pastries

1.2.3. Who is affected by food-borne illnesses and what are its effects?

- Foodborne illnesses affect everyone though infants, young children, elderly and the sick are most vulnerable.
- They exist as infectious and parasitic diseases and food poisoning.
- Food-borne microbial diseases can affect one or several persons at the same time.

1.2.4. What are the symptoms and causes of food-borne illnesses?

The most common symptoms include:

i) Stomach pains;
ii) Vomiting;
iii) Diarrhoea;

The main cause of foodborne illnesses is poor handling of food so proper food handling should be practised to prevent food contamination;

To prevent microbial contamination, it is important to understand the factors that facilitate their development or permit their destruction.

1.2.5. Factors that promote microbial growth and survival

It is important to understand the factors that facilitate and limit microbial growth. The most important factors are temperature, water, oxygen, acidity and chemical composition of the environment.

Temperature

Many microorganisms are destroyed by high temperatures. Microbes can be classified in three groups, according to temperature conditions for their development:

i) Psychrophilic and psychrotrophic microorganisms: Thrive at low temperatures between -7 °C and +10°C. They can contaminate refrigerated foods, especially meat, poultry, fish and dairy products;
ii) Mesophilic microorganisms: Thrive at ambient temperatures between 20 °C and 40°C;
iii) Thermophile microorganisms: Thrive at high temperatures between 45 °C and 65°C. They are most likely to survive incomplete heat treatment.

In many cases, preparing and cooking food properly controls and reduces microorganisms, as most are destroyed by temperatures over 70°C. It is important however to remember that some bacteria form spores that can survive such temperatures and subsequently regenerate as pathogenic microorganisms.

Water

Water is essential for the growth and survival of microorganisms because the simplest nutrients are dissolved in it and therefore can be absorbed by the microorganism through diffusion and osmosis. There are two concepts of water; moisture content and water activity.

i) Moisture content is a measure of the volumetric water content in a food product.
ii) Water activity is a measure of the availability of water for microbial growth or for chemical reactions. Fresh foods such as fresh vegetables and fruits, milk, meat and fish have a high water

activity and are easily spoiled by bacteria, while flour dry and dry grains have a low water activity and are not easily destroyed by bacteria but by fungi. Some fungi will grow and produce toxins like aflatoxins in moist grains or flour.

BOX 3

It is important to appropriately store dry foods otherwise they obtain moisture from the room or storage environment and hence encourage the growth of microorganisms. Solutes like salt, sugar and honey preserve foods due to their ability to lower the water activity of foods.

pH of foods

pH is expressed as the acidity or alkalinity of a food. Most microorganisms thrive at a neutral pH (around pH 7) and are destroyed at a low or acidic pH (around pH 4.5).

Meats, fish, fresh milk and most vegetables have a pH of about 7 and are therefore susceptible to microbial destruction while most citrus fruits are acidic and are not readily spoiled by bacteria but by fungi.

The foods with a pH close to the neutral pH are mostly spoilt by bacteria. Therefore, such foods need to be stored in low temperatures or be preserved by lowering their water activity or by innovative methods.

Fungi have a wide range of pH for their survival. The addition of Vinegar to vegetable and fruit salads increases the acidity which prevents spoilage of vegetable salads.

BOX 4

The main cause of foodborne illnesses is poor handling of food so proper food handling should be practised to prevent food contamination.

1.3 Chemical contamination

1.3.1. Contaminants of food at the preparation level

A food premise that deals with food must have an effective cleaning programme. This helps in maintaining a hygienic environment favorable for food processing and safe for both human and animal consumption.

The two main contaminants include:

- Chemicals and detergents used for cleaning of different natures including soups and sanitizers, chlorine;
- Improperly used food additives and preservatives such as sodium metabisulphite, benzoate, colourants and flavorants.

The risk of chemical contamination can be reduced by washing food before preparation and consumption (Figure 4).

Figure 4: Washing vegetables with running water can reduce the risk of chemical contamination

1.4 Ways in which food can be contaminated

1.4.1. Cross-contamination

It is the unintentional transfer of contaminants from one source to another. Cross- contamination can occur in three ways:

- People to food- can occur when a person handles food using unclean hands, when ill, touches raw meat then ready-to-eat foods.
- Food to food- when raw foods are mixed with cooked foods (in cooked foods we have eliminated most of the bacteria but not in raw foods). When stored or prepared together, the raw foods can contaminate the cooked foods making them dangerous to health (Figure 5).
- Surface/equipment/utensils to food- when using the same equipment (cutting board, knife) to handle raw foods such as meats and unwashed vegetables and then cooked food without cleaning them.

Figure 5: Food to food contamination (credit; Consumer Grassroots Association)

1.4.2. Contamination by handling (direct contamination)

This is one of the most common causes of food contamination (Figure 6). The food handler is the major risk factor for food contamination because of their constant contact with food.

Handler's diseases such as colds, and diarrhoea, can be transmitted to food by touching food with dirty hands, coughing or sneezing. The presence of wounds and cuts on the handler's hands can also lead to food contamination. Personal hygiene is therefore essential during food handling.

Figure 6: Contamination through handling

1.4.3. Contamination from the environment

The location where food is prepared/handled can also lead to contamination. Environmental contaminants include substances from natural sources or industry and agriculture.

Many of the naturally occurring contaminants in food are of microbiological origin and consist of harmful bacteria, bacterial toxins, and fungal toxins.

- Exhaust fumes, mud and dust can also be contaminants, especially in cases where food is sold by the roadside. Other sources of environmental contaminants include:
- Heavy metals such as lead, arsenic and mercury;
- Chemicals and drugs used for treating animals e.g. acaricides, antibiotics;
- Pesticide residues present in fruits and vegetables;
- Use of contaminated water to grow crops;
- Contaminated farm inputs such as soil, fertilizers and manure.

Food can also be contaminated during transportation because of cross-contamination, improper temperature control, improper loading practices, conditions and equipment. People also get sick from poisonous chemicals present in food such as toxins of microbial origin for example aflatoxin found in maize and groundnuts, biological toxins such as those present in potatoes (green potatoes) and cassava.

Water can also be a source of food contamination. Water that contains agricultural chemicals, drugs, bacteria, fungi and viruses when used during food production and handling can spread contaminants to food (Figure 7).

Figure 7: Contamination of food from irrigation with untreated wastewater (A) Source: Njenga et al. 2011. Contamination of food from pesticide sprays (B) Source: Henrich Bol Stiftung, 2022 https://ke.boell.org/en/2022/12/14/residues-kenya-toxic-side-dish

Exercise

Spot the hazards in these images

MODULE 2: SELECTION OF INGREDIENTS FOR PREPARATION OF SAFE STREET FOODS

2.1 Learning objectives

The overall objective of this module is to provide street food vendors with the basic knowledge and principles needed to guide them in the choice, purchase and management of good quality raw materials and ingredients.

The specific objectives include:

- Imparting knowledge on the basic principles to guide street food vendors in the selection and purchase of raw materials and ingredients;
- Gain knowledge and skills in assessing the hygiene of the food purchase points;
- Understanding the fundamental principles to be applied during the transport, storage and preservation of raw materials and ingredients.

2.2 General considerations

Food is susceptible to contamination at all stages of the food chain. Raw materials are therefore important to the safety of street-vended food because of the biological, chemical, and physical hazards that may be introduced to the vending operation and may persist through preparation and processing.

2.3 Sourcing of raw materials and ingredients

2.3.1. Sourcing channels

Street food operators generally source their agricultural raw materials from two main channels: from retailers and wholesalers or directly from producers.

During sourcing, it is important to carefully choose raw materials and ingredients from recognized traders who offer guarantees of sanitary quality.

2.3.2. Hygiene of purchase points

There are diverse purchase points for raw materials and ingredients: farms, garden, markets, butcheries, fishery landing sites, wholesale and retail shops, food stores, etc. The state and cleanliness of the purchase point are often indicators of a trader's professional approach. Unsanitary premises are likely to contaminate raw material of good quality, before purchase by the street food operator. Street food operators should select suppliers who operate in clean surroundings.

The source of raw materials will determine the sanitary quality of the food. Therefore, before selecting and purchasing raw materials, street food operators must:

- Know where the products come from by visiting the market stalls, stores and storage areas;
- If possible, find out about the conditions of transport and delivery of the products;
- Make sure that the products have been carefully protected against all contaminants and adverse weather conditions.

2.4 Management of raw materials

When taking delivery of goods from a supplier or market, it is important to check that the products meet quality requirements. One way of ensuring quality is to have a regular network of suppliers who are fully aware of the quality criteria for raw materials and ingredients and are thus able to ensure their quality.

2.4.1. Labelling of raw materials and ingredients:

Some of the key specifications to be checked include:

- Name of product;
- List of ingredients;
- Quantity;
- Name and address of producer, distributor or vendor;
- The shelf life of the product (expiry date);
- Storage instructions;
- The lot/batch identification number.

2.5 Quality Criteria when Choosing Raw Materials and Ingredients

he quality of raw materials and ingredients determines the quality of the end product. Poor quality can cause various forms of food contamination.

Contamination is possible when packaging is damaged when the expiry date has passed, and, for chilled produce, whenthe cold chain has not been maintained.

BOX 5

Preventive and surveillance measures are required: check the wrapping and packaging, check the expiry date, check

Table 3 shows a summary of things to observe when purchasing different types of ingredients.

Fish

Fish products require strict precautions that extend from catch to consumption, as they are very prone to spoilage. Good quality fish should have:

- An appearance of freshness and firm flesh;
- Fins that are intact and wet;
- Moist and shiny pink or red gills;
- Clear bright eyes that fill the whole orbit cavity;
- A tightly closed anus that is not greenish.

T

able 3: Signs to look out for when purchasing different types of food

Food	Signs to look out for
Milk	Foul smell, chunky/cuddled milk,
Bread and other baked products	Foul smell, presence of mould
Flour	• Avoid buying flour that is mouldy or that has been in contact • with moisture; • Check for the presence of visible foreign matter (insects, stones, pieces of metal, rodent excreta, etc.); • Lumps localised caking • Check that the products are free of foreign odour and/or flavour. • Threading/ roping/webs
Eggs	• At the market, avoid eggs exposed to sunlight; • A good egg held up against the sun has no black mark.
Canned foods	• Avoid buying cans that are swollen/bulged/indented as its contents are contaminated by microorganisms, some of which can cause a serious fatal sickness called "botulism"
Oils	• Colour: cooking oils should not be discoloured are a result of reuse. • Shelf life for refined oils. It is essential to check the expiry date on the packaging.

Meat

The following rules and criteria apply when choosing good quality meat:

- Should be bright red in colour; there should be no greenish, blackish or dark red colouring;
- Good meat should not smell bad;
- Swarms of flies over the display counter indicate contamination;
- Meat handled with bare hands and left in the open is exposed to serious contamination and should be avoided;
- Meat recognized as fit for human consumption bears a veterinary stamp certifying the good health of the animal of origin.

Fruit, vegetables and condiments

- Fruit, vegetables and certain condiments (chilli, tomato, onion, garlic, etc.) should always be bought fresh.
- One selection criterion for fresh vegetables is that they should be firm in appearance. Their skin should not be broken, nor damaged by pests. They should have no surface rot
- or dirt.
- Vegetables grown under poor conditions represent a real hazard for consumer health.
- Diseases are transmitted through the inappropriate application of manure and an excessive load of microorganisms or by irrigating vegetables with contaminated water.
- Ensure misused pesticides leave residues in vegetables.

Grains and seeds

Selected grains and seeds should be:

- Wholesome;
- Healthy and free of indications of rotting or spoilage which renders them unfit for consumption;
- Clean and practically free of visible foreign matter (stones, pieces of metal, rodent excreta, etc.);
- Free of foreign smells and/or flavours;
- Free of attack from pests, especially weevils and other parasites that can present a hazard to consumer health.

It is recommended that grains and seeds be free of microorganisms or heavy metals in levels that may present a health hazard and they should comply with the pesticide maximum residue limits of the Codex Alimentarius Commission.

2.6 Recommended conditions for the transport, storage and preservation of raw materials and ingredients

2.6.1. Transport of raw materials and ingredients

Transport conditions influence food quality and prevent the growth of microorganisms. It is important when transporting food to:

- Use clean and appropriate equipment;
- Avoid mixing products of animal origin with products of plant origin to prevent cross-contamination.
- Observe temperature control and maintain cold chain.

Raw materials should not be exposed to environmental contaminants during transport. The following should be observed:

- Raw materials that are intended for consumption in their raw state should be transported separately from other raw materials and non-food items.
- Raw materials should be transported in such a way as to limit pathogen growth or toxin formation by effectively controlling time, temperature and water activity.

Raw materials and ingredients should be properly stored after purchase as poor storage conditions facilitate the proliferation of germs, pollution and food deterioration.

It is essential to observe the following good conditions of hygiene when storing food products to protect them from pollutants, microbes and other harmful agents:

- Properly wrap the products;
- Store the products in clean and appropriate equipment on raised clean tables or shelves;
- Keep and maintain cleanliness of storage facilities;
- Control vermin;
- Systematically dispose-of all spoiled products;
- Ensure proper personnel hygiene.

The storage facilities should be properly designed to ensure that:

- They can be easily and thoroughly cleaned;
- Air can easily circulate;
- They are protected against vermin;
- No animal has access.

Raw materials should not be exposed to environmental contaminants during storage. The following should be observed:

- Raw materials that are intended for consumption in their raw state should be stored separately from other raw materials and non-food items.
- Raw materials should be stored in such a way as to limit pathogen growth or toxin formation by effectively controlling time, temperature and water activity.

BOX 6

Every vendor should ensure the following:

- Supply of ingredients, including ice, must be from known and reliable sources.
- The food handling method employed should be such as to minimise the loss of nutrients.
- Freshness and wholesomeness of ingredients to maintain quality and safety of food.
- Transportation of ingredients should be made in a manner so as to prevent exposure to the environment, spoilage and contamination.
- Only permitted food additives should be used and the amount added should follow the specifications provided.

Exercise

1. What are the key criteria or principles when selecting raw materials and ingredients? Give specific examples.
2. How can raw materials be stored to prevent deterioration? Explain with specific examples.
3. What are the key messages to inform the street food vendor in relation to the procurement of raw materials and ingredients?
4. Discuss food safety issues in raw materials of different street-vended foods such as local sausage (mutura), soup joints, fruits and vegetable products, boiled eggs (mobile premises), sausages and smokies.

MODULE 3: QUALITY AND SAFETY OF WATER USED IN PREPARATION AND VENDING OF STREET FOODS

3.1 Learning objectives

The overall objective of this module is to introduce trainees to the basic notions of hygiene in water management for the preparation and sale of street food.

The specific objectives include:

i. Description of the types and quality of water sources for use in the preparation of street food;
ii. Familiarization with methods and practices for keeping water clean;
iii. Familiarization with practical methods of handling wastewater;
iv. Differentiation of the channels of food contamination through water.

3.2 General considerations

The quality of water should be a fundamental consideration in any food production process. Water is an inherent component in food production at all levels besides being used as an ingredient.

The quality depends on the source of water and the actual application in food production. In the production of safe food, the safety of water assumes fundamental importance.

The pollution of water occurs at any stage in various ways. Physical, chemical, or biological agents can gain access in water causing significant health hazards in safe production of food.

Contamination of water by several pathological microorganisms creates major challenges in food safety and jeopardizes human health. Safe and readily available water, whether it is used for drinking, domestic use, or food production, is essential for the protection of public health.

In a very broad sense, there are four major uses of water in food production:

i. Primary production;
ii. Cleaning and sanitation;
iii. Processing operations;
iv. As food ingredient.

In principle, water must be devoid of microorganisms and other contaminants that may compromise public health and this can never be taken lightly. However, water quality and its impact on food products and various operations in food preparation are often underestimated.

Unsafe water, which results due to direct contamination or improper or inadequate water treatment processes, generally results in a contaminated food product. Even though all types of foods are at risk, the highest among them are ready-to-eat.

3.3 Water and food safety

Water quality describes the condition of the water, including chemical, physical, and biological characteristics, usually with respect to its suitability for a particular purpose such as drinking or cooking.

Water quality parameters include chemical (pH, conductivity and salinity and heavy metals), physical (colour, taste, odour, temperature, turbidity, solids), and biological properties (pathogenic microorganisms) and can be tested or monitored based on the desired water parameters of concern.

Water used for food handling and preparation should be safe and clean and should therefore be obtained from a safe and known source. Water from rivers, canals and shallow wells may contain parasites and germs which could cause cholera, diarrhoea and dysentery.

Untreated water from open sources like rivers, and shallow wells is unsafe and treatment before use is recommended to kill germs.

Many street food vendors have no connections to potable (tap) water so they depend on water from other sources such as wells, rivers and rainwater or buying from water vendors whose origin is not known.

In urban areas surface water is contaminated by water runoff which carries a lot of contaminants including sewage, and industrial effluents which have high levels of toxic chemicals and fumes from vehicles. Another source of water contamination may be from food handlers through;

- Use of dirty and uncovered water storage containers;
- Recycling of handwashing water results in excessive physical and microbial load.

Thus, water is a major source of potential contamination of street food.

Safe water is needed during food preparation in all processes which include:

- Washing /cleaning fruits and vegetables- Simple measures such as washing with clean and safe water, and peeling may reduce the risk from chemicals that are found on the surface of foods;
- Cooking;
- Preparation of juices;
- Making ice for cooling foodstuff;
- Cleaning cooking and eating utensils;
- Hand washing.

3.4 Water treatment

Basic water treatment methods include physical water treatment, chemical water treatment and biological water treatment. Physical methods include filtration using a variety of filter media with different pore sizes and the main purpose for treating water meant for domestic uses such as drinking and cooking is to eliminate and/or reduce contamination or non- desirable characteristics of watershed Table 3 below summarizes major waterborne pathogens, illness and appropriate cost-effective treatment methods for water used in drinking and cooking.

Table 4: Major waterborne pathogens, illness and appropriate water treatment methods

Pathogens	Illness	Water treatment Methods	Effectiveness
Protozoa 1. Cryptosporidium 2. *Giardiaintestinalis/Giardia lamblia* Source: *Animal and human fecal waste*	Gastrointestinal illness(diarrhoea, vomiting,cramps)	1. Boiling (Rolling boil for 1 minute) 2. Filtration using an absolute less than or equal to 1 micron filter) 3. Disinfection with chlorine Giardia; 4. Combination filtration and disinfection	High on Gardia High on Gardia Low to moderate on Gardia Very high in killing Gardia
Bacteria 1. *Campylobacter* 2. *Salmonella* 3. *Shigella* 4. *E.coli* Source: *Animal and human feacal waste*	Gastrointestinal illness (diarrhoea, vomiting,cramps).	1. Boiling (Rolling boil for 1 minute) 2. Filtration using absolute less than or equal to 0.3-micron filter; 3. Disinfection with chlorine 4. Combination filtration (absolute less than or equal to 0.3-micron filter) and disinfection.	Very high Moderate High Very high
Viruses 1. Enterovirus, 2. Hepatitis A, 3. Norovirus, and Rotavirus Sources: *Human and animal fecal waste*	Gastrointestinal illness (diarrhoea, vomiting, cramps) and, Hepatitis, Meningitis.	Boiling (for 1 minute minimum) Filtration Disinfection with chlorine	Very high Not effective High

MODULE 4: PERSONAL HYGIENE AND HYGIENIC PRACTICES IN STREET FOOD VENDING

4.1 Learning objectives

This module's overall objective is to guide participants on basic personal hygiene requirements, and practices when handling street vended foods.

The specific objectives include:

i. Description of basic personal hygiene requirements of a street food vendor.
ii. Application of knowledge and skills in hygienic preparation of street foods
iii. Preparing and offering for sale safe food

4.2 Personal Hygiene

Personal hygiene refers to actions geared towards one's care for their body as one handles and prepares foods.

Good personal hygiene is important in most situations, but it's especially crucial for food handlers.

Proper food handling, which includes good personal hygiene, is an important element in food safety.

Street food operators should keep the following basic principles in mind:

- All food handlers should be medically examined, clean and well-groomed;
- All food handlers must always be in protected garments;
- All the water used for personal hygiene should be water fit for purpose.

Our normal body temperature is favourable for bacteria to dwell and grow and is probably the source of most cases of food poisoning;

Observing and monitoring your staff's personal hygiene is therefore crucial in preventing food contamination.

Good personal hygiene is also good for business. Customers like to see food-handling staff who take hygiene seriously and practise safe food handling.

The following are main areas for maintaining good personal hygiene:

- Attire;
- Personal health;
- Handwashing;
- Environment.

4.3 Attire

These include uniforms, gloves, boots, aprons and hair nets (Figure 8).

Wearing clean work clothes before entering food preparation areas is important in preventing food contamination.

Work clothes should have bright colour (illumination) to help see dirt.

They should not have external pockets.

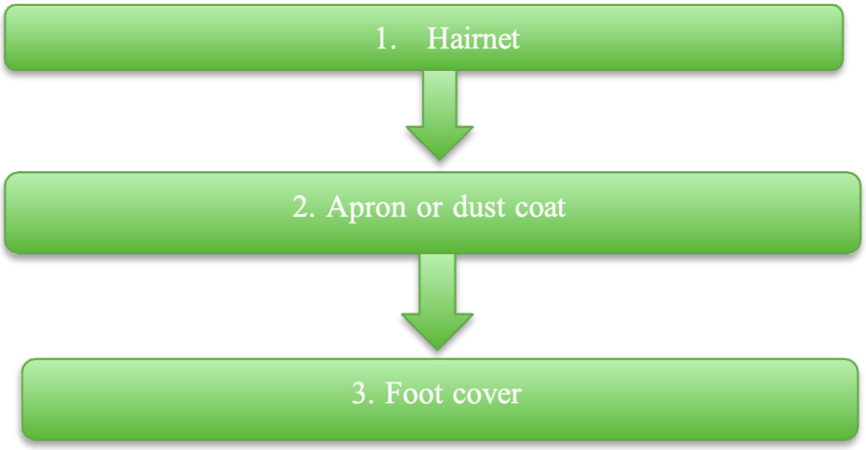
Work clothes should be kept in a separate place from other clothes.

Food handlers should also:

- Keep short fingernails and free from nail polish;
- Keep hair and beard neat;
- Wear protective clothing such as aprons, face masks and hair and beard nets;
- Avoid wearing jewellery;
- Wear closed shoes;
- Avoid wearing too loose or too tight clothes;
- Avoid strong perfumes.

Figure 8: Personal hygiene considerations for food handlers (https://foodhygieneasia.com/food-safety-posters/)

Key steps in putting on the attire



4.4 Personal health and practices

In cases where the food handler is sick, that is exhibiting signs of illness such as vomiting, fever, diarrhoea, and severe skin conditions, they should; inform the supervisor, avoid handling food and should not be allowed to work until fully recovered.

This is because they are likely to contaminate the food, especially in cases where good hygiene is a challenge. Food handlers should not:

- Go to work if they are sick with an illness that is likely to be transmitted through food;
- Return to work until full recovery. If unsure, they should contact their doctor for advice;
- Sneeze into food;
- Smoke in food preparation areas;
- Taste food with your finger or with cooking utensils.
- Avoid activities that can contaminate food as illustrated in Figure 9 and Figure 10.

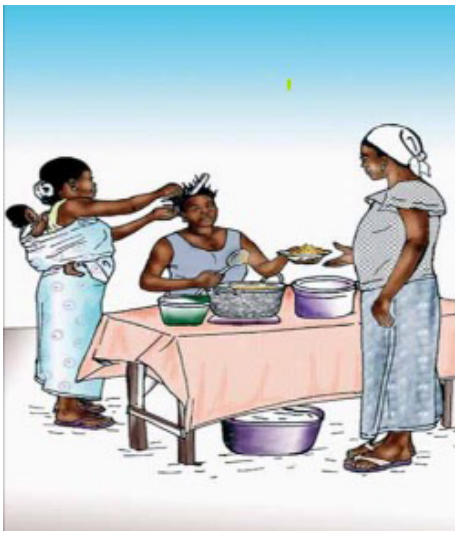


Figure 9: An example of improper food handling- Food vendor selling food while her hair is being combed (Source; FAO, 2009)

Figure 10: Woman tasting food directly from the cooking spoon (Source; FAO,2009)

If the food handler has cuts or wounds on their hands, they should avoid handling food.

If they have small cuts then they should be covered with waterproof food-grade bandages (or strips) that should be covered with food-grade gloves so that they cannot fall off and fall into the food.

This will prevent the micro-organisms in the wound from contaminating the food.

4.4.1. Hand washing with soap and water

This is the process of cleaning one's hands with soap or hand wash together with water to remove microorganisms, dirt, grease, or other unwanted harmful substances stuck on the hands (Figure 9).

Thoroughly washing your hands reduces the chance of contaminating food with bacteria from yourself.

Correct handwashing involves the following steps:

i. Wet your hands with clean running water and apply soap;
ii. Lather the soap;
iii. Scrub your hands for at least 20 seconds and make sure to get the back of your hands, between your fingers, and under your nails;
iv. Rinse off the soap with running water;
v. Air dry your hands or use a disposable hand paper towel.

Figure 11: Handwashing steps

Never use a tea towel or your clothes to dry your hands.

Wash your hands:

- Before handling food and often during food preparation;
- After handling money;
- After going to the toilet;
- After handling raw meat/poultry;
- After blowing your nose;
- After handling rubbish/cleaning;

- After handling chemicals;
- After handling animals- food preparation;
- Before and after handling raw food;
- After blowing your nose;
- After every break;
- After handling animals;
- After licking one's fingers;
- After touching your ears, nose, mouth or other parts of the body.

Hand washing facilities:

- Must be accessible to all food handlers;
- To be used only for the washing of hands;
- Provide soap and clean running water;
- Provide disposable towels for drying hands;
- Provide a bin for the disposable towels.

Figure 12: Handwashing using running water. Improvised system

4.5 Environmental precautions

While handling, preparing, and storing foods, consider the following precautions:

- Protect food preparation areas from pests and also prevent food from pesticide contamination;
- Cover food to avoid contamination from pests and animals;
- Keep dust bins covered and remove waste regularly;
- Keep food preparation areas in good condition (repair cracks which may potentially harbour germs);
- Keep animals away from food preparation areas;
- Prevent animals from licking plates and utensils used in food preparation and sale.

4.6 Washing/sanitizing food preparation areas

It is important to clean dishes, utensils, surfaces, and equipment to get rid of microorganisms that cause foodborne illness.

Cleaning involves 3 important steps:

1. **Washing:** Washing means removing leftover food, waste, and grease using hot/warm water and soap or dish detergent.
2. **Rinsing:** Rinsing means taking off the soap/detergent using clean hot water.
3. **Sanitizing:** Sanitizing means lowering the number of harmful microorganisms to reduce the risk of foodborne illness. Utensils can be sanitized using heat or food-grade sanitizers.

4.6.1. Reasons for cleaning

- To protect food from microbial contamination;
- To reduce opportunities for microbial multiplication by removal of matter in which they grow;
- To protect food from physical and chemical contamination by foreign matter;
- To avoid attracting pests by removal of materials that would provide harborage;
- To allow effective disinfection;
- To maintain a pleasant and safe environment such as stopping someone from slipping on a greasy floor;
- To create a good impression for customers by promoting favorable image;
- To prevent damage of equipment which reduces the maintenance;
- To carry out legal and moral obligations to keep food safe.

4.7 Cleaning and handling of utensils

Consider the following:

- Wash utensils with clean water and soap immediately after use.
- Clean/Wash utensils cutting boards, knives, and surfaces that have been in contact with raw meat and raw vegetables.

Exercise

1. As an individual or in groups, take a walk in the area and within a radius of 200m observe and note the different food vendors.
2. For each vendor, note down the personal hygiene aspects, and environmental set up and practices, and record your observations.

MODULE 5:FOOD PREPARATION

5.1 Learning objectives

This module aims to familiarise trainees with the rules of hygiene for street food preparation and vending premises and to encourage the application of those rules.

The specific objectives include:

1. Describing principles of hygiene that determine the selection, location and organization of their place of work;
2. Determining the equipment and utensils required for the preparation and sale of food;
3. Gaining knowledge and skills on the different methods of sanitizing and maintaining the equipment and workplace;
4. Demonstration of knowledge of the five keys to food safety during food handling and storage.

5.2 Preparation Environment

Foods should generally be prepared in safe and clean environments that are free from food hazards and risks of contaminants. Street food preparation and sale should occur in a hygienic and well-organized setting. Depending on the nature of the food preparation and vending operations and associated risks, the premises and utensils should be designed and fitted in such a way that:

- They are easy to clean, disinfect and maintain;
- They prevent food contamination.

Street food operators should keep the following basic principles in mind:

- The food should be prepared in a clean and well-lit area, sheltered from sun, dust, and wind, and far from all sources of contamination, such as solid waste, domestic animals, insects, rodents, etc.;
- Only food to be consumed on a day-by-day basis should be considered. Leftovers should not be carried forward to be served the following day. Storage and temperature should be monitored to prevent the growth of microorganisms that may lead to food poisoning.
- Fixed or mobile vending points should be located in areas where the risk of contamination from refuse, wastewater, and other harmful or toxic substances is eliminated/ prevented. The displayed food should be covered and protected from contamination.

5.3 Pest Control and pest control systems in the food preparation environment

Pests (mice, cockroaches, termites, etc.) are a major threat to food safety and sanitary quality. Pest infestation can occur when there are breeding grounds and a source of food.

Good hygienic practices should be adopted to avoid creating an environment favourable to pests;

Pests pose a major threat to the safety and suitability of food. Pest infestations can occur where there are breeding sites and a supply of food. Good hygiene practices shall be employed to avoid creating an environment conducive to pests;

Good sanitation, inspection of incoming materials and good monitoring can minimize the likelihood of infestation and thereby limit the need for pesticides. The following are ways in which pests can be controlled;

Premises should be kept in good state of repair and condition to prevent pest access and to eliminate potential breeding sites. Holes, drains and other places where pests are likely to gain access should be kept sealed;

Wire mesh screens, for example on open windows, and ventilators, will reduce the problem of pest entry. Animals should be excluded from food preparation sites;

Good food hygiene and handling is essential in all catering or food handling premises, so it is essential to follow a correct cleaning and disinfection protocol;

Good waste management during food preparation is also key and the following should be observed:

- Food waste should not be thrown on the ground to avoid attracting insects, rodents, and domestic animals (cats and dogs);
- Solid and liquid waste should be disposed of separately;
- Refuse bins should have a lid and be cleaned every day.

5.4 Food preparation, cooking, and service

During food preparation, vendors should wash fruits and vegetables with safe and clean water before cutting especially if eaten raw. The cut fruits and vegetables should be held on a clean surface separate from other raw foods.

5.4.1. Guidelines on how to ensure food is well-cooked

Food (especially meat, poultry, eggs, and fish) should be cooked thoroughly to kill all microorganisms.

Poultry and meat should be thoroughly cooked until the juices run clear (no traces of blood are present)

Eggs and fish should be cooked until firm and at least for seven minutes and served hot. This means that the fish and eggs are hot all the way through.

Soups and stews should be left to boil and served when hot

Food vendors should prepare enough food to avoid having leftovers. This is because leftover foods have a higher risk of contamination if they are not adequately handled

Food should remain covered to prevent contamination.

When preparing food, always observe the 5 keys to safe food:

i. **Keep clean:** Dangerous microorganisms are widely found in water soil, animals and people. These microorganisms can easily cross from items such as hands, utensils, cutting boards and wiping clothes to food, posing a great threat to consumers.
ii. **Separate raw and cooked food:** Raw food, especially meat, poultry and seafood, and their juices can contain dangerous microorganisms that can accidentally contaminate other foods during preparation and storage.
iii. **Cook thoroughly:** Proper cooking destroys almost all dangerous microorganisms. Cooking food at a temperature of 60oc destroys all microorganisms and ensures the food is safe for consumption.

iv. **Keep food at safe temperatures:** Microorganisms can multiply very quickly if food is stored at room temperature. Food can remain safe if held at below 5oc or above 60oc where the growth of microorganisms is slowed. This time should not go for more than two hours.

v. **Use safe water and raw materials:** Care in the selection of raw materials, washing and peering can reduce the risk of microorganisms.

All foods should be served in utensils that have been cleaned with safe and clean water and stored in a clean environment.

5.4.2. Vending equipment and utensils

Utensils used for food preparation and sale should not be used for anything else. Utensils (pans, pots, etc.) should be kept clean. They should be made of materials that do not release toxic or dangerous substances (copper lead, etc.) into food or beverages, especially when these are acidic. The use of stainless steel, for example, is recommended.

Cutting boards should be kept in good order and without cracks so that they can be easily cleaned.

A plastic cutting board is much easier to clean and keep in good order than a wooden board, which is difficult to clean properly.

Each vendor/handler should make sure that defective, damaged, cracked, rusty, chipped and generally unsuitable utensils and dishes are disposed of.

Exercise

1. What are the basic principles to observe during food preparation
2. What measures can a vendor put in place to minimize or eliminate pests in vending areas?
3. Review the five keys to food safety that are necessary during handling and preparation of food.

MODULE 6: FOOD HOLDING

6.1 Learning Objectives

The overall objective of this module is to equip the trainees with skills and knowledge in maintaining the safety of food during holding.

The specific objectives include:

i. Illustration of temperature requirements for different types of foods during holding;
ii. Identification of potential food safety hazards during food holding;
iii. Demonstration of the effectiveness of different types of containers in keeping the safety of food during holding;
iv. Illustration of safe ice-making and ice handling in food-holding.

6.2 General consideration

Food holding can be defined as the storage of food while waiting for customers or clients to come and buy. The holding intends to preserve food in the right conditions at business hours.

Vendors should prepare enough food to avoid leftovers that will need overnight or longer storage. This helps to ensure food safety as all freshly prepared is consumed within the shortest time possible.

During preparation and processing of food, it is important to avoid direct and indirect contact between raw and cooked foods or prepared foods that will be consumed without further heating.

Practices that could indirectly contaminate food include improper storage practices, handling food with unclean hands, use of dirty equipment and unclean surfaces such as cutting boards and knives.

To avoid contamination:

- Separate raw meat, poultry, and fish from cooked or prepared food during holding
- Equipment, utensils and other containers should be made of materials that do not
- release toxic or hazardous materials into food, especially when foods are acidic e.g. plastic utensils and packaging materials
- When required, food should be wrapped in food-grade material. Newspapers, used papers and other insanitary wrapping materials should not be used in direct contact with food.

6.3 Holding Temperatures

Bacteria grow most rapidly between 5-60°C and the number doubles in number every 20 minutes. This range of temperatures is known as the **danger zone** (Figure).
Cooked food should not be left at room temperature for a long time (more than 2 hours);
Prepared foods served hot should be kept at a holding temperature of at least 60°C to prevent microbial growth;
Place cooked food in chafing dishes, preheated steam tables, warming trays and/or slow cookers;
Keep cold foods at or below 5°C.

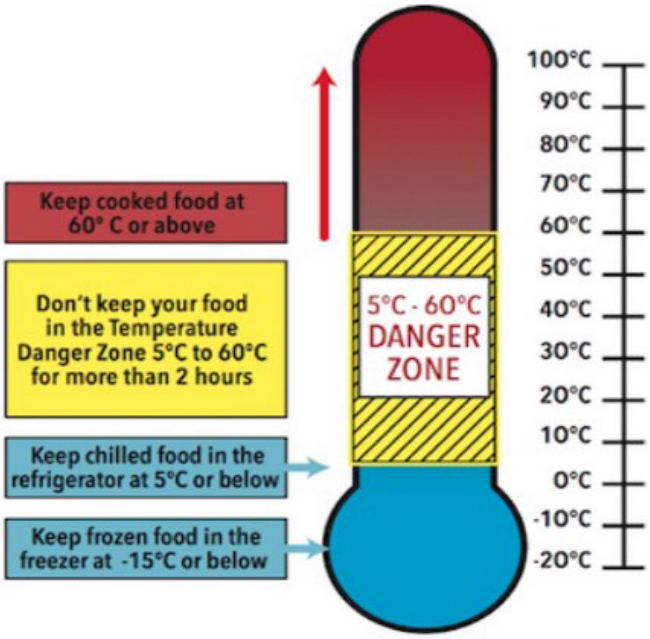


Figure 13: Food temperature danger zone (Source: https://www.foodsafety.asn.au/topic/temperature-danger- zone)

6.4 Display of street foods

- Foods should be covered to prevent contamination from insects, rodents, fumes and dust;
- Fruits and vegetables should be displayed in a raised structure that is covered/sheltered from the sun and dust;
- The environment where the food is prepared and/or sold should be clean, and away from rubbish, wastewater, animals and open toilet facilities;
- When a platform or cart is used to display food, the surface shall be corrosion-free and easy to clean. When not in use, the top should be covered and protected from insects,
- rodents, pet animals, and dust;
- Selling points such as tables, benches, boxes, cupboards, and racks for keeping the serving dishes, and cutleries should be kept clean and tidy;
- Do not use chipped utensils as they cannot be adequately cleaned;
- Use tongs to handle ready-made food. Do not touch with bare hands.

6.5 Handling of ice in cold food holding

Street food vendors frequently use ice to lower the temperature of drinking water and fresh drinks, as well as other forms of food such as salads are better when served cold.

Low-temperature storage prolongs the quality of food products. However, foods displayed on ice are exposed to several risks of food contamination.

To reduce the risk of food contamination, street food vendors should adhere to the following considerations:

i. How to prepare and handle ice:

- Obtain ice from an authorized producer;
- If you make your own ice, ensure that the water is clean so that it is not a source of contamination;
- Ice boxes must be clean and well-covered.

ii. Which foods to display on ice:

- Water, milk and fresh drinks;
- Vegetables and salads;
- Fresh fish and seafood.

iii. How to display foods on ice:

- Food must be clean and prepared on clean surfaces before storage in ice;
- Food must be surrounded by ice; placing foods on top of the ice promotes water loss, which can affect the quality of foods;
- Some types of food should not come into contact with ice, for example, leaf vegetables, milk or fresh drinks. These foods should be placed in a container
- before putting them on ice;
- Evenly distribute the food on ice to avoid cross-contamination.

MODULE 7: WASTE MANAGEMENT

7.1 Learning objectives

The overall objective of this module is to equip street food vendors with applicable and appropriate knowledge and skills in waste management.

- The specific objectives include:
- Identification of liquid/solid sources of waste from their business;
- Identification of problems, risks and hazards associated with poor/indiscriminate waste management;
- Classification of the different wastes for purposes of segregation/ separation;
- Demonstration of knowledge on the importance of waste management;
- Familiarization with methods and practices of waste storage at the workplace.

7.2 General consideration

- Waste can loosely be defined as any materials that is considered to be of no further use to the owner and is hence discarded.
- Waste is a direct consequence of all human activities which is generated universally and classified into liquid, solid, and gaseous form. It includes materials that are discarded rejected as worthless, unwanted and no longer useful to the vendor.
- Waste can be described as rubbish, trash, garbage, junk, refuse and consists of organic and inorganic matter in a wide variety of forms.
- Liquid waste may be in form of fluids such as waste water, fat oil or grease oil and hazardous liquid.
- Waste cooking oil should not be drained in drainages since it can lead to detrimental effects to the ecosystem. They should be properly sealed in a container before appropriately disposed of.
- Gaseous waste comprises gases and small particles emitted from cooking operations, fires, and incinerators.
- Basically, wastes are not hygienic and have negative effects on human health and can have adverse effects on the environment such as pollution.

7.3 Managing wastewater

- Domestic wastewater comes from cooking, washing/cleaning. Such water can contaminate food and needs to be hygienically removed in specially designed sanitary structures: latrines, septic tanks, and drainage systems.
- Domestic wastewater should not be left to accumulate in or near areas where food is handled and stored.
- It is the responsibility of street food vendors to ensure proper management of waste generated from all operations in their businesses.
- For wastewater disposal, street food facilities should:
  - Be equipped with one or more systems of containment and disposal of liquid waste. These can be communal or individual but need to be approved by the competent authority;
  - Keep their containment and disposal system in good order in compliance with regulations;
  - Wastewater from preparation and production operations should never be disposed of in the open/environment or open storm drains.

BOX 7

Every food vendor should collect and contain the waste until the time of disposal. Thus, every food vendor should have a waste collection and disposal management system. No waste should be disposed of in the open environment.

7.4 Managing solid waste

The waste generated during street food handling and production operations may include but not limited to non-edible parts of raw materials, wrappings or containers of the ingredients.

Waste generated from street food vending business is mostly biodegradable. However, it can also be reusable/ recyclable. Street food vendors must therefore have a way of collection, segregation, storage and method of disposal.

Street food vendors should ensure that the waste storage prevents access by vectors and vermin.

All waste storage facilities should always be covered as a best practice.

Figure 14: Example of bad and good waste management practices.

MODULE 8: FOOD INTEGRITY AND FOOD FRAUD

8.1 Learning objective

The overall objective of this module is to equip street food vendors with knowledge on food integrity and food fraud.

The specific objectives include:

1. Demonstrating an understanding of food integrity and food fraud.
2. Enhance a good food safety culture.

8.2 General observation

- Food integrity occurs when the systems used to produce the food are authentic, ethical, and safe for human consumption while food fraud refers to deception using food for economic gain.
- The difference between food fraud and food defense is that food fraud is done to make money, while food defense relates to acts that are done intentionally to cause harm.
- Highest ethical standards and a food safety culture that promotes high-integrity food supply chains are two of the most highly regarded aspects of food integrity.
- On another level, food enterprises should work to go above and beyond compliance of particular food safety standards by adding an integrity-based culture.
- Food quality, food safety, food fraud, and food defense should be monitored and regulated to ensure food integrity.

Food fraud can be orchestrated in some ways, such as:

- Mislabelling/selling a low-quality product as a premium product;
- Adulterating premium products with less expensive ingredients;
- Making false claims about a product's country of origin;
- Making false claims about how the product was made;
- Misrepresenting the product's nutritional qualities;
- Misrepresenting the weight of the product.

8.3 How to counter food fraud

- When food fraud is discovered, consumers must alert authorities, raise the alarm, and demand improved protection from the government and regulatory bodies.
- Consumers should use social media to broadcast food fraud cases globally.
- A food safety culture should be adopted by street food vendors to prevent foodborne illnesses. This can be achieved through:
  - Offering instructions and training to street food vendors;
  - Conducting frequent inspections by competent authorities;
  - Putting in place appropriate food safety procedures.

8.4 Instituting a culture change in street food business operations

- Although street food vendors are one-man businesses, they often have other people manning the street food businesses.
- A food safety culture is defined as people's shared beliefs, attitudes, perceptions, behaviours, and practices related to food safety, with a focus on what food business operators do in practice.
- Food safety culture improvement programs should be incorporated to transform the culture by inspiring and empowering employees at all levels, developing food safety management engagement skills, and promoting accountability and responsibility for food safety throughout the organization.

MODULE 9: REGULATION AND CONTROL OF STREET FOOD VENDING

9.1 Learning Objectives

The overall objective of this module is to familiarize street food vendors with the regulations governing street food vending businesses.

The specific objectives include:

i. Understanding the regulations applying to street food vending;
ii. Observing the regulations governing street food vending.

9.2 General considerations

- Food safety laws/regulations are designed to guide the handling, production, and trade to ensure food safety and quality and facilitate food trade.
- For street food vending businesses to be officially recognized, they should adhere to the laid down regulations that address the special needs of street food vendors. The regulations may be in the form of either standard operating procedures, general requirements, guidelines, or laws.
- To effectively regulate street-vended foods, inclusive participation and ownership of the regulations by all players is recommended to ensure accountability, efficiency, and uniform implementation.
- Challenges in addressing the issue of regulations arise due to:
  - Multiple responsibilities performed by the regulating officers, negate the benefits that may have emerged from having a focused inspection;
  - Inadequate knowledge of regulatory requirements by the street food vendors;
  - Lack of trust in regulators by the street food vendors;
  - Persistent harassment of street food vendors;
  - Difficulties in translating regulations to practice;
  - Lack of political goodwill.
- The mentioned challenges can be attributed to a lack of institutionalized communication between the street food vendors and the regulators which has negative implications on the effective regulation of street food vending businesses.
- Improved communication between street food vendors and regulators will strengthen the self-regulatory approach through organized vendor associations.
- These associations will also serve as a link between the street food vendors and regulators, thus act as an outlet for implementing street food control measures and for defending street food vendors against harassment.

9.3 Legal framework on street food vending

The Kenyan Constitution addresses food safety and related issues through various articles that emphasize the right to health, the right to clean and safe food, and the responsibility of the government to ensure public health. Here are key aspects relevant to street food vending and food safety:

i. Right to Health (Article 43): This article guarantees every person the right to the highest attainable standard of health, which includes access to clean water and safe food.
ii. Food Security (Article 43): The Constitution emphasizes the importance of food security, implying that safe food practices are essential for public health.

iii. Legislation and Regulation: The Constitution empowers the government to enact laws that promote public health and safety, including those regulating street food vendors.
iv. Environmental Rights (Article 69): This article calls for the protection of the environment, which indirectly relates to food safety by ensuring that food sources are safe and sustainable.

In the Public Health Act, Cap 242, various clauses pertain to food safety and public health standards, which can impact street food vending. Generally, these provisions focus on ensuring food is prepared, handled, and served hygienically to protect public health. Some of the clauses included in this legislation specify the following:

i. Health Standards: Requirements for food vendors to maintain hygiene and sanitation standards.
ii. Licensing and Registration: Mandates for street food vendors to obtain permits or licenses from health authorities.
iii. Inspections: Authority for health officials to inspect food vending operations for compliance.
iv. Food Safety: Provisions on the handling, storage, and preparation of food to prevent contamination.

The Food, Drug, and Chemical Substances Act, Cap 254, typically addresses regulations concerning the safety, quality, and labeling of food and drugs. Some key themes commonly found in this legislation that would affect street food vending include:

i. Food Safety Standards: Establishes requirements for safe food handling, preparation, and storage to prevent contamination.
ii. Prohibition of Unsafe Foods: Outlines conditions under which certain foods may be deemed unsafe and prohibited from sale.
iii. Labeling Requirements: Mandates accurate labeling of food products to inform consumers about ingredients and nutritional content.
iv. Inspection and Enforcement: Grants authority to health officials to inspect food vendors and enforce compliance with safety standards.
v. Licensing: Requires food vendors to obtain necessary licenses or permits to operate legally.

Counties have specific legislation that regulates street food vending, aimed at ensuring public health and safety. Here are some key points typically addressed in these bylaws:

i. Licensing: Street food vendors are required to obtain permits from local authorities to operate legally.
ii. Hygiene Standards: Vendors must adhere to strict hygiene and sanitation standards, including safe food handling and preparation practices.
iii. Health Inspections: Regular inspections may be conducted by health officials to ensure compliance with food safety regulations.
iv. Zoning Regulations: There are designated areas where street food vending is permitted, and vendors must operate within these zones.
v. Waste Management: Vendors are often required to manage waste properly to avoid

BOX 8

In summary, the regulations should emphasize the need for changes in consumer and street vendor attitudes based on equally necessary changes in their understanding of personal hygiene and food safety. It should be remembered that the basis for altering the present situation in the desired manner will be provided by training, education, and communication.

References

1. FAO. Rome Declaration on World Food Security and World Food Summit Plan of Action: World Food Summit, 13-17 November. Rome, Italy: FAO; 1996.
2. WHO. World Health Organization estimates of the global burden of foodborne diseases. Foodborne disease burden epidemiology reference group 2007- 2015. Geneva: WHO; 2016.
3. Steyn NP, McHiza Z, Hill J, Davids YD, Venter I, Hinrichsen E, et al. Nutritional contribution of street foods to the diet of people in developing countries: a systematic review. Public Health Nutrition. 2014;17(6):1363-74.
4. FAO. Street foods: report of an FAO expert consultation, Jogjakarta, Indonesia, 5–9 December 1988. Indonesia FAO; 1989.
5. WHO. Essential safety requirements for street-vended foods. Geneva: WHO, Food Safety Unit DoFaN; 1996.
6. WHO. Essential safety requirements for street-vended foods. Geneva: WHO; 1996.
7. WHO. Five keys to safer food manual. Geneva: World Health Organization 2006.
8. FAO. Good hygienic practices in the preparation and sale of street food in Africa. Italy: FAO; 2009.
9. Alrobaish WS, Jacxsens L, Luning PA, Vlerick P. Food Integrity Climate in Food Businesses: Conceptualization, Development, and Validation of a Self-Assessment Tool. Foods. 2021;10(6):1302.
10. Nwuneli N. Quartz.com2018. [cited 2023].
11. Institute CFS. 2023. [cited 2023]. Available from: https://www.foodsafety.ca/blog/what- food-fraud-and-why-it-big-deal.
12. McMahon, Glenda; Shaw, Rod (2019). The F Diagram (Portrait version). Loughborough University. Figure. https://doi.org/10.17028/rd.lboro.7837607.v1
13. Njenga, M., Karanja, N., Prain, G., Gathuru, K., & Lee-Smith, D. (2011). Community- Based Wastewater Farming and its Contribution to Livelihoods of the Urban Poor: Case of Nairobi, Kenya. Journal of Agriculture, Food Systems, and Community Development, 1(3), 151–162. https://doi.org/10.5304

APPENDICES

Appendix 1: Medical examination process

PROCESS OF OBTAINING A FOOD HANDLERS MEDICAL CERTIFICATE

i. Application of the certificate to the relevant authorities.
ii. Make a payment on the same and obtain a receipt.
iii. Visit a recommended government health facility for examination:

- Physical;
- Clinical;
- Laboratory.

iv. If found fit, a valid medical certificate is issued, specifying the validity period.
v. If Unfit, the food handler is referred for treatment, after which he/she is retested and if fit a certificate is issued.

NB: While the food handler is undergoing treatment, he/she is not allowed to handle food.

Appendix 2: Minimum requirements for a street vendor

1. Medical examination
2. Appropriate attire and/or PPE
3. Hand washing station/point with clean and running water and soap.
4. Personal hygiene-e.g. towels to wipe away sweat.
5. Covered bin for waste management.
6. Appropriate disposal of wastewater.
7. Justifiable proximity to a sanitary facility.
8. Maintain a clean vending environment e.g. avoid vending on top of drains and flooded sewer lines.
9. Put in place pest and vector control mechanisms.
10. Prepare food enough for the day and maintain temperatures of below or at 4°for cold foods and at or above 60° Celsius
11. Use clean and safe water for food preparation and hand washing.
12. Honesty in food preparation and sale.
13. Operate within legal requirements-
14. Source raw materials from a known source.