"WRONG PERCEPTION AND SCANTY KNOWLEDGE ON FOOD HANDLING: A RECIPE FOR FOOD CONTAMINATION AND POISONING."

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Abstract

Food processing is of vital importance in maintaining proper health as well as avoiding food poisoning and food contamination. The study is focused on bringing to light the concept of food safety and food handling. It is believed by the researcher that Sierra Leoneans do have a little knowledge on handling food and this has resulted to series of infections. Keeping food is scientific and the illiteracy rate is high giving rise for more people not to be able to follow precautionary measures in handling food. The research also focused on bringing out the different methods of food contaminations. These vary from biological, chemical and physical means. The biological components covers bacterial, virus and parasites, while the chemicals level looks into

various toxin, natural and marine toxins were also covered. The methodology was mostly empirical as literatures were reviewed from other research done by other writers. The researcher in his wisdom has therefore recommended that food be processed clean, hygienic procedures observed and children educated on the value of not playing with dirt.

Keywords: perception, food, poisoning, contamination, bacterial, chemical,

1.0 INTRODUCTION

Food safety is a scientific discipline describinghandling, preparation, and storage of food in ways that prevents foodborne illness. This includes anumber of routines that should be followed to avo idpotential health hazards. In this way food safety oftenoverlaps with food defense to prevent har m toconsumers. The tracks within this line of thought aresafety between industry and the market and thenbetween the market and the consumer. In considering industry to marketpractices, food s afety considerations include the origins of food includingthe practices relating to food labeling, f ood hygiene, food additives andpesticide residues, as well as policies on biotechnology and food andguidelines for the management of governmental import and exportinspection and certification systems for foods. In considering market toconsumer practices, the usual thought is that food ou ght to be safe in themarket and the concern is safe delivery and preparation of the food for thecon sumer.

Food safety is a matter that affects anyone who eats food. Whether or not a person consciously thinks about food safety before eating a meal, a host of other people has thought about the safety of that food, from farmers to scientists to company presidents to government officials and public health officials. Ensuring the safety of food is a shared responsibility among producers, industry, government, and consumers. Safe food is food that is free not only from toxins, pesticides, and chemical and physical contaminants, but also from microbiological pathogens such as bacteria, parasites, and viruses that can cause illness.

Those working in the field of food safety are most concerned about microbial foodborne illness, a widespread but often unrecognized sickness that affects most people at one time or another.

Most people have experienced foodborne illness, even though they might not recognize it as such, instead blaming it on the stomach flu or a twenty-four-hour bug. Usually symptoms disappear within a few days, but in some cases there can be more long-lasting effects such as joint inflammation or kidney failure. In the most severe cases people die from foodborne illness.

Stories of foodborne illness have become much more prevalent throughout the world. Is food less safe than it used to be, and if so, what factors account for this? News travels fast these days, both electronically and through the news media. What were once isolated events and stories, now reach millions within hours. Diagnostic techniques are constantly improving, allowing for identification of diseases, foodborne and otherwise, that would have been of unknown origin in the past. But even considering these facts, public-health officials believe that the risk of foodborne illness has increased over the past twenty years (GAO, 1996). Some threats to food safety have been around since ancient times, while others are newer, the result of changing demographics and lifestyles, production practices, and even evolution of microorganisms themselves.

1.1 RESEARCH OBJECTIVES

People must be aware of what hands are touching at all times. They should recognize when their hands become contaminated and wash them to keep from passing the contamination on to the food they are preparing and serving. It is always necessary to wash your hands. As a result of people's limited knowledge on this issue, the objectives of this study will focus on:

a. highlighting the concept of food poisoning ,
b. define and discuss food contamination,
c. discuss the various types of contamination,
d. bring forward the ways of preventing food poisoning and contamination,

1.2 PROBLEM STATEMENT

Food poisoning comes from eating foods that contain germs like bad bacteria or toxins, which are poisonous substances. Bacteria are all around us, especially when most of our children are allowed to play on grounds that are unhygienic. Because of this mild cases of food poisoning are common. Kids may have had mild food poisoning — with diarrhea and an upset stomach — but their mom or dad just called it a stomach bug or stomach virus for the knowledgeable one. Those who do not have knowledge on food poisoning will begin to attribute it to witchcraft.

Those who are educated might think the solution is to get rid of all the bacteria. But that isn't possible and they wouldn't want to do it, even if you could. Bacteria are all around us, including in food, and sometimes they can be good for us. It's confusing, but one thing is for sure — the bacteria in the rotten leftovers weren't the good-for-our kind. But we can learn how to avoid those bad germs in food, which is the problem for majority of our illiterate population in Sierra Leone.

2.0 LITERATURE REVIEW

2.1 INTRODUCTION:

The production and consumption of food encompasses multiple social, economic and environmental interactions and concerns. Agriculture is a key driver of climate change, is responsible for up to 30% of GHG emissions, accounts for 70% of freshwater use and contributes significantly to soil degradation, water pollution and loss of biodiversity (Lundqvist *et al.*, 2008; WWAP, 2009; Lotti, 2010; Garnett, 2011). Higher temperatures, changing and unpredictable patterns of rainfall, and an increase in extreme weather activity are all set to contribute to more difficult food production conditions (IPCC, 2014). On the demand side, expanding populations, urbanisation, changing diets, and concerns over obesity and diet related diseases have a significant impact on the global food system (FAO, 2009; Marsden, 2012; Westhoek *et al.*, 2014).

All of the aforementioned concerns relating to the food system are interlinked and need to be addressed simultaneously. However, addressing these problems on a global scale remains notoriously difficult. For these reasons, among others, there has been a growing interest in

'alternative' models of food provision that may address some of the deficiencies in the ability of the current dominant system to deliver fair, equitable and sustainable food for all (Sonnino and Marsden, 2006). These 'alternative' food systems, so-called as they are deemed to run counter to the prevailing globalised industrial food system, aim to reconnect consumers with the food they eat, reconcile the food system with the natural world, and closely link the various actors along the food chain (Renting *et al*., 2003; Watts *et al*., 2005; Goodman and Goodman, 2007).

2.2 HISTORY OF FOOD SAFETY

Very little about foodborne illness or food safety is found in historical records. Scientists did not begin to understand bacteria, and their relationship to disease, until the late nineteenth century. People did recognize that food spoils, but the reasons for that and the potential for becoming ill from food were not known. The history of food safety is really the history of the numerous discoveries, inventions, and regulations that all led to the present knowledge.

Food preservation methods such as drying, smoking, freezing, marinating, salting, and pickling have their beginnings thousands of years ago. Whether these methods were employed solely to keep food for later use, to improve flavor, or for other reasons is not known; but for whatever reason they were developed, they also had the effect of keeping food safer. Even cooking can be viewed as an ancient method of making food safer. The Chinese Confucian Analects of 500 B.C.E. warned against consumption of sour rice, spoiled fish or flesh, food kept too long, or insufficiently cooked food. The Chinese disliked eating uncooked food, believing that anything boiled or cooked cannot be poisonous. It is possible that the practice of drinking tea originated because tea required using hot water, which would make it safer than using unheated contaminated water (Trager, 1995). Doubtless other cultures in antiquity, while oblivious to the causes or prevention of foodborne disease, experienced it and prescribed methods to avoid it.

Much of the present knowledge about pathogens and foodborne illness is built on a foundation of scientific discoveries spanning back over three centuries. Italians Francisco Redi and Lazzaro Spallanzani performed experiments that dispelled the theory of spontaneous generation of organisms. The discovery of bacteria in the late nineteenth century, the increased understanding of bacteria's role in disease and the realization that there is a connection between human diseases

and animal diseases led to the ideas that cleanliness is important and that unsanitary conditions can contribute to disease. A leader in this effort was Hungarian physician Ignaz Semmelweiss, who in 1847 required hospital doctors to wash their hands before delivering babies. As a result, maternal death rates plummeted from 10 to 1.5 percent. His colleagues greeted his theory that doctors were carrying disease from person to person with ridicule. Instead they attributed maternal deaths to a phenomenon arising from the combustible nature of pregnant women. Lack of personal hygiene remains one of the main causes of foodborne illness 150 years later.

2.3 FOOD POISONING

Food poisoning is acute illness caused by the consumption of food or drinks contaminated with pathogens (including bacteria, viruses and parasites), bacterial or biochemical toxins or toxic chemicals.

You may have symptoms like nausea, vomiting, and diarrhea within hours of eating. But sometimes the symptoms can take days or more than a week to show up. That can make it hard to know if it's food poisoning or something else. The delay also makes it tricky to trace the illness back to the specific food or drink. The same food can affect people differently. Some may feel unwell after just a few bites. Others can eat a lot and have no reaction at all.

Food poisoning is both more common and riskier for people with weakened immune systems, infants and young children, pregnant women, and the elderly. It can be classified into bacterial and non-bacterial food poisoning. Food poisoning can be caused by bacteria, viruses, or parasites. They can exist in foods at any stage, such as when they're growing, packaged, shipped, stored, or cooked.

Certain foods are more likely to harbor harmful agents. These include raw eggs, unpasteurized milk and juice, soft cheeses, and raw or undercooked meat or seafood. Fresh produce is another risk. Foods made in bulk are problematic, too. A single bad egg could affect the whole batch of omelets in a buffet. You could make trouble for yourself by not washing the cutting board or your hands as you prepare different foods.

Your chances of getting food poisoning are higher in the summer. In 90-degree heat, food can start to spoil within an hour. At a picnic or during a camping trip, you are more likely to eat undercooked grilled meats or to handle raw meat without access to soap and water. Bacteria can grow quickly inside tepid coolers. So if you're picnicking on a hot day, put leftovers back in with fresh ice.

2.4 FOOD CONTAMINATION

2.4.1 Food Contamination -

This refers to any harmful substances unintentionally added to food. These substances may come from natural sources or environmental pollution, or arise from food processing.

We all hear the extreme stories of people who find a finger in their hamburger or the large outbreaks of food borne illnesses, such as listeria from lettuce. These are both examples of food contamination..

Some of these food recalls may not be anything actually wrong with the product, but often it is something wrong with the labeling. Allergens are considered a food contamination if it is not properly stated on the label that the food has specific allergens present (or have the possibility of being present if produced in a facility with allergens), like nuts. If something is not stated on the label then it is considered a food contaminant. The label is the legally binding document that tells us what is supposed to be in that product. If anything else is in the product that isn't on the label, then it is considered a food contaminant.

Food contamination is anything in food that reduces the safety or quality and is not supposed to be there. Food may be contaminated intentionally or accidentally. As a consumer, we never want to see our food to be contaminated but often the contamination we can see doesn't actually harm us, it is more often the unseen contamination that is most harmful.

2.4.2 TYPES OF CONTAMINATION

2.4.2.1 BIOLOGICAL CONTAMINATION

Biological hazards occur when hazardous or pathogenic organisms are introduced to food and thus pose a food safety concern to consumers. Biological hazards include bacteria, viruses and parasites of public health significance.

Biological hazards can be introduced to food from the environment (e.g. soil bacteria, agricultural run-off) or from inadequate sanitation practices and cross contamination during transportation, handling, processing, and storage (e.g., poor food hygiene practices). The type and magnitude of microbial growth is determined in part by the nature of the food, package conditions and storage environment.

2.4.2.1.1 Bacteria

Bacteria are single-celled microorganisms that exist in a range of habitats and can be free-living (e.g. in soil, air, water) or symbiotic (e.g. in intestinal tract or mucous membranes of animals and humans) and have a broad range of enzymatic, biochemical and/or pathogenic properties. The principal bacteria associated with food borne illnesses include:

Bacillus cereus, *Campylobacter jejuni*, *Clostridium botulinum*, *Clostridium perfringens*, *Escherichia coli* 0157:H7, *Escherichia coli* 0104:H4, *Listeria monocytogenes*, *Salmonella* spp., *Shigella* spp., *Staphylococcus aureus*, *Vibrio cholerae*, *Vibrio parahaemolyticus*, *Vibrio vulnificus*, *Yersinia enterocolitica*, *Cronobacter sakazakii*

Ingesting food contaminated with pathogenic microorganisms and/or their toxic by-products can lead to food-borne illness. These illnesses can take the form of infection or intoxication, or both. Infectious microorganisms are detrimental to their host through mechanisms which crowd out beneficial microorganisms, use up host resources, and destroy host tissue. A food-borne illness caused by an infection can take days or weeks to manifest which often makes it difficult to identify the causative agent. On the other hand, illness caused by intoxication often occurs within

hours of consuming the suspect food. Intoxications are caused by toxins that are produced by the microorganism, either in the food itself or after ingestion.

2.4.2.1.2 Viruses

In contrast to other microorganisms, active viruses consist of unique sections of DNA or RNA enclosed in a thin coat of protein, and cannot exist independently of their living hosts. Depending on the combination of DNA/RNA and the protein coating, viruses can be very infectious and often pathogenic. They reproduce by inserting themselves into a host cell and altering the function of that cell to replicate the component pieces that make up the virus. Viruses commonly associated with food safety issues include:

- Bacteriophage, Enteric Virus (other than Hepatitis A and Noroviruses), Hepatitis A virus, Norovirus, Norwalk virus, Rota virus

Viruses are typically introduced into food either through poor handling practices by people infected with the virus (i.e.poor personal hygiene practices) or via contaminated food ingredients (i.e. water).

2.4.2.1.3 Parasites

A parasite is any organism which obtains nourishment from its host organism in order to grow and reproduce. Unlike symbiotic organisms, which reciprocate by supplying their hosts with other resources the host would not otherwise be able to find, parasites do not supply the host with any resources, usually to the detriment of the host. Parasites commonly associated with food-borne illnesses include:

Cryptosporidium parvum, Giardia duodenalis or intestinalis, Taenia spp., Toxoplasma gondii, Trichinella spiralis, Entamoeba histolytica, Entamoeba coli

Parasites enter food through similar means as viruses (i.e., poor personal hygiene practices and contaminated ingredients).

2.4.2.1.4 OTHER BIOLOGICAL - PRIONS

Other biological food safety hazards not belonging to the above mentioned categories include prions, also known as proteinaceous infectious particles, which are infectious agents made of protein. They are known to cause a number of diseases that affect both humans and animals. BSE or "Mad Cow Disease" is a progressive, fatal disease of the nervous system of cattle. It is also known as a transmissible spongiform encephalopathy (TSE). Other TSEs include scrapie in sheep and chronic wasting disease in deer and elk. Creutzfeldt-Jakob disease in humans is thought to be caused by consuming cattle infected with BSE. Although the exact cause of BSE is unknown, it is associated with the presence of prions. There is no treatment or vaccine currently available for the disease.

2.4.2.2 CHEMICAL HAZARDS

Chemical hazards occur when chemicals are present in foods at levels that can be hazardous to humans. Contamination may occur through various pathways:

- The environment (air, soil, water),
- Intentional use of chemicals, such as pesticides and veterinary drugs,
- Manufacturing processes,
- Addition of food additives.

In the food industry, there are various types of chemical hazards, some notable ones include:

2.4.2.2.1 Mycotoxins

Mycotoxins are natural toxins which are produced by fungi and can be toxic to humans and animals. They are formed by moulds which grow on crops and foods under certain conditions. There are number of mycotoxins present in the environment but only a few are found in foods and they are usually associated with particular field crops like corn. The most prominent mycotoxins which cause health concerns in humans are aflatoxin, deoxynivalenol, ochratoxin, fumonisin and patulin.

Some of the general characteristics of mycotoxins are listed below.

- resistant to heat
- produced by fungi as secondary metabolites in response to competitive pressures from other fungi/bacteria
- can have antibiotic properties
- can cause toxic damage to cells of humans and animals
- can cause chronic effects such as various cancers, immunosuppression, growth retardation, birth defects, renal dysfunction
- can have serious long-term effects even at small concentrations
- usually associated with particular crops (i.e. corn, cereal crops, apples)

2.4.2.2.1.1 Aflatoxin

Aflatoxin is produced by the mould *Aspergillus flavus*. Commodities which have a high potential for contamination with aflatoxin include tree nuts, peanuts, peanut butter, figs and corn. It should be noted that contaminated feed can lead to elevated levels in milk as well. The proliferation of *Aspergillus* and the corresponding production of aflatoxin are affected by drought during the growing season and high humidity during storage.

Aflatoxin is a potential carcinogen associated with the development of liver cancer.

2.4.2.2.1.2 Deoxynivalenol (Vomitoxin)

Deoxynivalenol (DON) is produced by various species of mould, most notably, *Fusarium graminearum* and *F. sporotrichioide. Fusarium* species are widely dispersed and their toxins reportedly occur in a wide variety of cereals, grains and in animal feeds. DON is classified in the trichothecene family of mycotoxins, a metabolite most commonly found in crops, such as wheat, barley and corn.

DON is not known to be carcinogenic. However it is a potent inhibitor of protein and DNA synthesis and is known to have immunosuppressive and cytotoxic effects. Symptoms observed as a result of human exposure to these toxins are vomiting, dermatitis, cough and rhinitis.

2.4.2.2.1.3 ochratoxin A (OTA)

Ochratoxin A (OTA) is a toxic metabolite formed by Aspergillus ochraceus, Penicillium verrucosum and other mould species. It is one of the most commonly occurring mycotoxins in improperly stored food. OTA has been found in corn, peanuts and decaying vegetation. It has also been found in mouldy cereals such as wheat, rye, barley, oats, and other commodities, including bread, flour, beans, peas, rice, and coffee and in samples of meat where the slaughtered animal may have consumed feed contaminated with OTA.

2.4.2.2.1.4 fumonisin

Fumonisin is a toxin produced by various species of mould, most notably Fusarium verticilloides and Fusarium proliferatum. Fumonisin is one of the most frequent mycotoxins found in corn. High levels of fumonisin are associated with hot and dry weather, followed by a period of high humidity.

2.4.2.2.1.5 patulin

Patulin is a toxic chemical produced by various mould species including Penicillium spp., Aspergillus spp. and Byssochlamys spp. It is heat stable at a pH<6 and will survive thermal processing. Patulin can be found in mouldy fruits (i.e. apples, pears, peaches, grapes), as well as mouldy vegetables and grains; however the major source of patulin contamination is from apples and apple products. The use of mouldy fruit increases the likelihood of patulin contamination in juices or ciders. Patulin is known to be genotoxic, causing damage to DNA and chromosomes, which has led to theories that it may be carcinogenic.

2.4.2.2.2 NATURAL TOXINS

Natural toxins are biochemical compounds produced by plants in response to certain conditions or stressors.

2.4.2.2.2.1 glycoalkaloids

Potatoes can contain natural toxins called glycoalkaloids. The major ones found in potatoes are α-solanine and α-chaconine. These toxins are formed in response to stresses such as UV light and damage (such as bruising), and cannot be destroyed by cooking. Toxin concentrations are highest

in the peel and sprout of the potatoes and can be seen as a characteristic green color on those parts.

Exposure to glycoalkaloids can cause acute toxic effects such as burning in the mouth, diarrhoea, severe stomach ache, vomiting and gastrointestinal irritation. Death from glycoalkaloid poisoning is rare.

2.4.2.2.3 MARINE TOXINS

Marine toxins are a group of toxins that sometimes accumulate in fish and shellfish. There are two sources of marine toxins:

- decomposition
- microscopic marine algae (phytoplankton, including diatoms and dinoflagellates)

2.4.2.2.3.1 Decomposition

When certain fish, especially scombroid fish (i.e. tuna, bonito and mackerel), start to decompose, histamine is formed. Histidine, a naturally-occurring amino acid, is converted into histamine by an enzyme produced by certain bacteria during decomposition. Histamine, in small doses, is necessary for the proper functioning of the human immune system. However, histamine in higher does may trigger severe reactions when consumed similar to those seen in allergic reactions such as rash, nausea, vomiting, diarrhoea, headache, dizziness, burning throat, stomach pain and itchy skin. The presence of high levels of histamine indicates that decomposition has occurred, even if the decomposition is not obvious. Toxic amounts of histamine can form before a fish smells or tastes bad. As this typically only occurs in scombroid fish, this is called Scombroid Poisoning.

2.4.2.2.3.2 Microscopic Marine Algae

Many marine toxins are produced by and can accumulate in fish and shellfish if they ingest certain types of algae.

Table 2 lists some common marine toxins and the seafood they are commonly associated with.

2.4.2.2.4 ENVIRONMENTAL CONTAMINANTS

Environmental contaminants are chemicals that accidentally or deliberately enter the environment, often, but not always, as a result of human activities. Some of these contaminants may have been manufactured for industrial use and because they are very stable, they do not break down easily. If released to the environment, these contaminants may enter the food chain. Other environmental contaminants are naturally-occurring chemicals, but industrial activity may increase their mobility or increase the amount available to circulate in the environment, allowing them to enter the food chain at higher levels than would otherwise occur.

2.4.2.2.4.1 Arsenic

Arsenic is a naturally occurring element widely distributed in the earth's crust and is generally found in trace quantities in soil, rock, water and air. Arsenic can take two forms – organic and inorganic. Organic arsenic can be found in fish and shellfish and is the much less harmful form of arsenic. Inorganic arsenic compounds are found throughout the environment and can be released into the air through various processes such as volcanic action, mining of arsenic-containing minerals and ores and by industrial and commercial processes such as copper or lead smelting, wood treatment and pesticide application.

Inorganic arsenic is a carcinogen, and long-term exposure increases the risk of cancers of the skin, lungs, bladder, liver, kidney and prostate.

2.4.2.2.4.2 Cadmium

Cadmium is a rare element and is usually not found in nature in its pure state, but exists in combination with other elements, forming compounds such as cadmium oxide, cadmium chloride and cadmium sulphide. Cadmium is used in the manufacture of batteries, pigments, coatings, plating, stabilizers for plastics, ore processing and smelting, thus it finds its way into the environment through waste, waste water and soil uptake.

Most of the cadmium which enters the body is directly from plants grown in contaminated soil, or indirectly, from meat-producing animals which have eaten plants grown in contaminated soil. Cadmium and its compounds are highly toxic and are also suspected carcinogens.

2.4.2.2.4.3 Lead

Lead is a toxic heavy metal and is found in the environment in sources such as dust and soil. It can also be found in water and some food products (i.e. maple syrup and honey), that may have come into contact with older plumbing and cookware that contains lead-based solder. Lead may be found in older paint products as well.

Other effects are impaired mental function, visual motor performance and anaemia. Symptoms of exposure to lead may also be subtle, such as irritability, headaches, insomnia, gastrointestinal upsets, learning, behavioural and kidney problems.

2.4.2.2.4.4 Mercury

Mercury is a heavy metal which occurs naturally in rocks and soils and can be found in lakes, streams and oceans. Combustion of fossil fuels, mining, pulp and paper industries and burning garbage can also release mercury into the environment.

There are traces of mercury in almost all foods, with very low levels in vegetables and fruits, and high levels in certain types of fish such as shark, swordfish, marlin, escolar and orange roughly, which absorb the mercury from the organisms they consume as well as the surrounding water in which they live..

2.4.2.2.5 FOOD ADDITIVES

A food additive is any chemical substance that is added to food during preparation or storage and either becomes a part of the food or affects its characteristics for the purpose of achieving a particular technical effect.

Substances that are used in food to maintain its nutritive quality, enhance its keeping quality and make it attractive or to aid in its processing, packaging or storage are all considered to be food additives. However, some substances that aid in the processing of food, under certain conditions, are considered to be food processing aids, not food additives. Examples of food additives include:

food colours (natural and synthetic), pH adjusting agents, preservatives, bleaching agents, food enzymes, glazing and polishing agents, emulsifiers, gelling agents

2.4.2.2.6 PROCESSING-INDUCED CHEMICALS

Undesirable chemicals can be formed in certain foods during processing as a result of reactions between compounds that are natural components of the food. In some cases an undesirable chemical may be formed as a result of a food additive being intentionally added to food and then reacting with another compound in the food. When foods are heat-processed (baked, deep-fried, etc.), reactions occur between components of the food, resulting in the desired flavour, appearance and texture of the food. However, some of these reactions can lead to the production of undesirable compounds. Similarly, certain storage or processing conditions may allow reactions to occur that could generate potentially harmful compounds. For these reasons, the presence of processing-induced chemicals in food cannot always be avoided.

Examples of processing-induced chemicals include:

- acrylamide, ethyl carbamate, furan

2.4.2.2.6.1 Acrylamide

Acrylamide is a chemical that naturally forms in certain foods, particularly plant-based foods that are rich in carbohydrates and low in protein, during processing or cooking at high temperatures Asparagine (a natural amino acid) reacts with naturally occurring sugar (glucose) in the food and acrylamide is formed, but only if the temperature during the cooking process is high enough. The highest concentrations of acrylamide have been detected in potato chips and french fries, although it has been found in other foods as well including baked and roasted foods.

2.4.2.2.6.2 Ethyl Carbamate (Urethane)

Ethyl carbamate (urethane) is a chemical naturally formed during food processing especially in alcoholic beverages such as wine, beer, whisky, fruit brandies, and fermented foods such as bread and yogurt. Its presence was first identified in 1985.

2.4.2.2.6.3 Furan

Furan is a colourless, volatile organic compound that is used in some chemical manufacturing industries and may also be found in low levels in some heat-treated foods, such as canned or

jarred foods. Furan in foods can form through multiple pathways that involve different naturally-present starting compounds that undergo thermal degradation or chemical rearrangement during food processing. The presence of furan in food is a potential concern because of indications of liver toxicity, including carcinogenicity, in experimental animals that were exposed to furan in their diet over a lifetime.

2.4.2.2.7 PESTICIDES/AGRICULTURAL PRODUCTS

A pesticide is any substance or organism (including organisms derived through biotechnology) that is used to control, destroy, repel or attract a pest or to mitigate the effects of a pest. A pest is defined as an animal, plant or other organism that is directly or indirectly injurious, noxious or troublesome (*Pest Control Products Act, 2002*)

Pesticides consist of insecticides, fungicides and herbicides. The following are examples of pesticides on certain crop groups:

- Azoxystrobin on peaches, Captan on cherries, Clethodim on beans, Thiocarbamate on apples

A major issue associated with pesticides is that they can accumulate in the food chain and may contaminate the environment.

2.4.2.2.8 VETERINARY DRUGS

Veterinary drugs are often used in food-producing animals to control and/or prevent illness in the animal. If these drugs are used inappropriately or the withdrawal time prior to slaughter is not respected, residues from these drugs can be present in the food. These residues can be the drug itself or metabolites that are produced by the drug as it is digested by the animal and can be considered harmful to the consumer.

2.4.2.3 PHYSICAL/EXTRANEOUS MATERIAL HAZARDS

Extraneous material covers all materials (excluding bacteria and their by-products (toxins), viruses and parasites) which may be found in a food that are foreign to that particular food. These materials are usually non-toxic but are associated with unsanitary conditions of production, processing, handling, storage and distribution of food. Some examples of extraneous materials that may be found in food are insects, hair, metal fragments, pieces of plastic, wood chips and glass.

Extraneous materials can be differentiated into two categories: unavoidable and avoidable

Unavoidable extraneous material may occur in food as a by-product of the processing system or as something inherent to the product itself. Items such as stems in blueberries, microscopic airborne debris, dirt on potatoes, or minute insect fragments in figs are common examples of unavoidable extraneous matter.

Avoidable extraneous material is generally less tolerated than unavoidable because it is preventable. It consists of foreign matter which should not be present if proper GMPs are followed. Avoidable extraneous material may come in many different forms such as small glass fragments, pieces of plastic, chunks of rubber, pieces of jewelry, feather barbules, animal debris or any other unrelated foreign material.

4.0 FINDINGS AND DISCUSSION

It was discovered that food contamination usually causes abdominal discomfort and pain, and diarrhea, but symptoms vary depending on the type of infection. Transmission usually occurs via the fecal/oral route with the ingestion of the pathogen present in the contaminated food. After they are ingested, there is a delay, (incubation period) before symptoms appear, that may range from hours to days, depending on the organism. During this period, the microbes pass through the stomach into the intestine, where they start to multiply. Some types stay in the intestine, others produce a toxin that is absorbed into the bloodstream, and others can directly invade the deeper body tissues. The symptoms depend on the type of infection. Numerous pathogens cause similar symptoms, for instance diarrhea, abdominal cramps, and nausea.

The knowledge of the people on food contamination and food poisoning is low. Also, food handling is not properly done as the right method is not also used which most time ends to ailment. Hands were not washed and utensils not kept clean because they never knew that harmful bacterial move from one place to the other. They food they buy are not defrosted properly for those who have refrigerators. Others are not persevered properly because of lack of knowledge on food preservation.

5.0 SUGGESTIONS

Simple precautions can reduce the risk of contamination. For instance, meat left at room temperature promotes bacterial growth and refrigeration helps to suppress it. One can also be careful about eating certain foods. Eating raw meats and fish should be avoided as well as salads prepared in restaurants where meats and vegetables share a common surface during preparation.

The Mayo Clinic offers the following advice to prevent food contamination at home:.

- Wash hands, utensils and food surfaces often. Keeping hands, utensils and food preparation surfaces clean can prevent cross-contamination, i.e. the transfer of harmful bacteria from one surface to another
- Keep raw foods separate from ready-to-eat foods. When shopping, preparing food or storing food, keep raw meat, poultry, fish and shellfish away from other foods. This also prevents cross-contamination
- Cook foods to a safe temperature. You can kill harmful organisms in most foods by cooking them to temperatures between 140°F and 180°F
- Refrigerate or freeze perishable foods. Harmful bacteria can reproduce rapidly if foods are not properly cooled. Refrigerate or freeze perishable foods within two hours of purchasing or preparing them
- Defrost food safely. Bacteria can reproduce rapidly on meat, poultry and fish at room temperature. To defrost food safely, tightly wrap meat, poultry and fish so that the juices do not drip on other food as they thaw in the refrigerator. Another method is to put the frozen food in a plastic bag and immerse it in cold water, changing the water every 30 minutes. The sealed food package can also be placed under cold, running water. Cook food immediately after defrosting

- Use caution when serving food. Throw out any leftovers that have been at room temperature for more than two hours or in hot weather for more than an hour. If cold food needs to sit out for longer than two hours, use a tray of ice under the food to keep it cold. If hot food must sit out for longer than two hours, use warming trays to keep the food hot
- Throw it out when in doubt. If you are not sure if a food has been prepared, served or stored safely, throw it away
- Know when to avoid certain foods altogether

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