Assessment of food retailers' awareness on hygienic food handling practices & attitudes towards cleanliness of the retail outlets

By

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DECLARATION

The work describe in this thesis was carried out by me at the Medical Officer of Health Office, Piliyandala under the supervision of Dr. Sarath Mandalawatte and Mrs. K.M.Somawathie. The report on this has not been submitted to another university for another degree.

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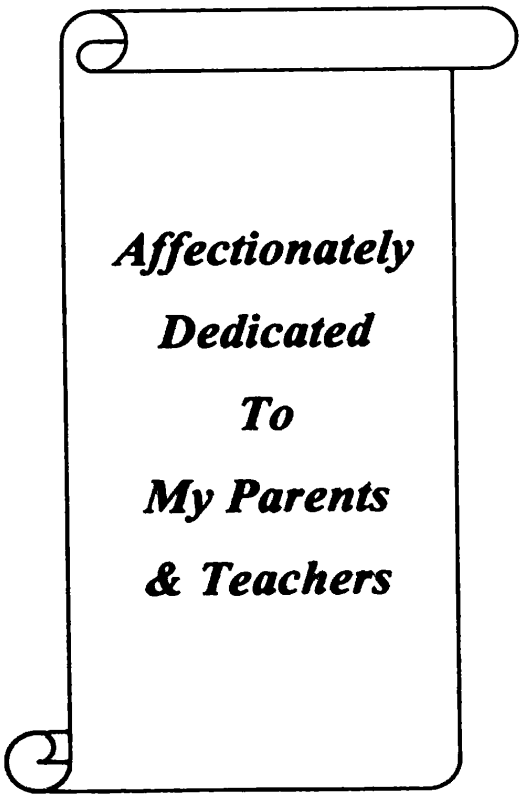
Affectionately
Dedicated
To
My Parents
& Teachers

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ABSTRACT

In Sri Lanka due to food borne illnesses many persons get illnesses but proper numbers are not reported. There are three main causes of food borne illnesses such as chemical added to food intentionally or as an incidental result of use in production, processing and distribution, poisonous plants, animals or due to micro organisms such as bacteria, molds, virus and parasites. To prevent food borne illnesses food safety practises are important. Hygienic food handling practises from food production to consumption especially in retail food handling is a crucial part in food safety.

There are many rules and regulations under Food Act in Sri Lanka to maintain hygienic conditions in retail outlets and these are mainly assessed by Medical Officer of Health (MOH) offices in the area. But maintaining the hygienic food handling practises and cleanliness of the retail outlets in the area are questionable. A research was conducted to assess the awareness and attitudes of food handlers about hygienic food handling practices and cleanliness of retail outlets in Piliyandala area. Firstly by analysing the secondary data which has been collected by MOH office some critical points were revealed. According to their grading system which is most concern about the cleanliness of retail outlets not about hygienic food handling practices, (91 %) of retail outlets were in good hygienic conditions("A" graded) but only (7.1 %)of food handlers have got proper training over food manufacturing and food handling practices. By discussions with the Public Health Inspectors (PHIs') in the areas was able to find that they also has identified that there are some problems in attitudes and awareness of hygienic food handling practises in retail outlets well as cleanliness.

Primary data was collected through a survey to get an idea about hygienic food handling practises and cleanliness of the retail outlets in Piliyandala area. Data was collected from 150 food retail outlets well as from food handlers working in them. Data was collected through a questionnaire and by using observation data. Gathered data was statistically analysed and found out that (15.4%) of retail outlets cleanliness was not up to the satisfactory level. Awareness of hygienic food handling practices were low in certain areas such as maintaining personal hygiene, prevention of cross contamination, maintaining outlet cleanliness and maintaining proper storage conditions. Collected data was statistically analyzed to find out which factors effect on hygienic

food handling practices as well as maintaining the cleanliness of the retail outlets. Effect of education level on hand washing practises well as effect of educational level on personal cleanliness was revealed. But there were no effect of education level on cleanliness of the retail outlet.

By gathering consumer ideas of safe food handling it was able to find out that some people concern only about quality of the food not the hygienic situation of the place where they buy the food or the person who sell the food. But nowadays lot of people are concern on the hygienic condition of the food, place they buy the food well as person where they buy the food.

Based on above findings a food safety awareness building program was designed to build awareness among retail food handlers about hygienic food handling practice and maintaining cleanliness of retail outlets. As important events under food safety awareness building program check lists were designed suitable for different kinds of retail outlets (bakery shops, meat shops, fish stalls, boutiques, super markets, street vendors etc.), posters and leaflets were designed and seminars were planned.

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LIST OF ABBREVATIONS

MOH	Medical Officer of Health
PHI	Public Health Inspectors
FS	Food Safety
FH	Food Handlers

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CHAPTER 01

1.0. Introduction

Food hygiene can be defined as sanitary science which aims to produce foods that is safe to consumer and good keeping quality. It aim to study methods of food production, preparation and presentation of foods with sanitary procedures design to prevent bacteria of human origin reach the food stuff. It covers not only the proper handling of food and all utensils and apparatus used but also care and treatment of food known to be contaminated by food poisoning bacteria.

Now a day due to busy life styles people are used to buy foods from retail outlets. There are many kinds of food retail outlets from street vendors to large scale super markets. Each can have its own particular hygienic problem but all of them should ensure that foods they sell are fit to eat and good quality. Food handlers also play vital part hygiene maintenance in retail outlet. They must concern of passage of micro organisms from person to food, from the nose, skin of hands and other surfaces and from bowel. Cross contamination should be avoided.

Over last few years in world there has been increase in reported food borne illnesses incidents. Lot of people caught food borne illnesses but proper numbers are not revealed. Reasons to this may be sicknesses and diarrhoea in family units are often not reported.

Food borne illnesses connected to retail outlets can be minimized by proper hygienic practises. It is retailers' responsibility to ensure that food is kept under conditions which will not encourage growth and spread of any food poisoning organisms. Improvement of methods of food preparation and handling and education of those responsible of provision of food in retailing would reduce the incidents in food poisoning. To accomplish this it is essential to know not only the food vehicle of infection, bacteria agents, the place where the incident occurred and where food is prepared but also the factors which have contribute to the incident.

1.1. Objectives

1.1.1. General Objective:

Assessment of awareness and attitudes of food handlers about hygienic food handling practices and cleanliness of retail outlets

1.1.2. Specific Objectives:

I. Assessing the awareness of hygienic food handling practices and attitudes of food handlers in retail outlets

II. Assessing the general cleanliness of the retail outlets

III. Find a relationship between awareness and the attitudes effect on hygienic food handling practices

IV. Development of a communication program to improve the awareness levels of food handlers on hygienic food handling practices

V. Development of self assessment checklists for retail outlets to maintain hygienic food handling practices in retail outlets

CHAPTER 02

2.0. Literature Review

2.1. Sri Lanka

2.1.1. Legal Food Control System in Sri Lanka

In Sri Lanka there is a Food Control System under the Ministry of Healthcare, Nutrition and Uva Wellassa Development. Director General of Health Services is the Chief Food Authority and also the Chairman of the Food Advisory Committee (FAC) established in terms of the Food Act No. 26 of 1980. The FAC is comprised of 19 members. They represent various stake-holders in food safety from Government Departments / Ministries as well as trade and consumers. There is also a Food Advisory Technical Sub Committee that deliberates on issues referred to it on a regular basis. The main function of the FAC is to advise the Minister in charge of the subject of health on food safety policy matters. The Food Control Administration Unit is in charge of the general administration of regulatory and training activities of the country. There are over 1700 Public Health Inspectors, 256 Medical Officers of Health, 44 Food & Drugs Inspectors who are Authorized Officers under the Food Act implementing the provisions of the Food Act and Regulations published under the Act. A food-borne diseases surveillance mechanism is also in place.

There are five approved food laboratories for chemical analysis and one microbiological laboratory in the country. Action has been initiated to establish a pesticide residue surveillance system.

Publication of regulations is under way and science-based, risk-based system is enshrined in the revised regulations. A codex contact point and an SPS enquiry point had been established in the Food Control Administration Unit. The anticipated Technical Assistance / Capacity Building have not materialized so far.

2.2. Food Safety

Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent foodborne illness. This includes a number of routines that should be followed to avoid potentially severe health hazards. Food can transmit disease from person to person as well as serve as a growth medium for bacteria that can cause food poisoning

2.2.1. Food Born Illnesses

Food-borne illness is the general term for illness linked to food. It covers both food poisoning and food-borne disease. Food-borne disease is the name given to illness caused my micro-organisms, such as bacteria and viruses, which use food as a vehicle to move to humans where they can multiply and produce symptoms. Food poisoning is an acute illness caused by the consumption of food contaminated by bacteria, other microbes, such as viruses, or physical or chemical contaminants.

Quality may be defined differently by each person, but safe food is universally desired. There are three main causes of foodborne illness as follows

- Chemical added to food intentionally or as an incident of result of their use in production, processing & distribution-Additives use intentionally in food to provide colour, flavour, & to preserve natural qualities of food. Chemicals added to food as additives must be approved to use by Food & Drug administration (FDA) & used within the guideline for approval which generally include a maximum level. Approved additives must serve a functional purpose which does not deceive the consumer or de harmful. Unintentional additives may occur in any part of the pathway of food from production to consumption especially in retail stage. Environment pollutant can enter water & food. Use of containers that are unsuitable can add additives to food. Migrant chemicals are transferred from containers or wraps on food by diffusion. Retailers must avoid plastic containers or wraps that were not intended for food use. Many cleaning chemicals if accidentally added to food in retail outlets can be toxic to humans. Many cleaning chemicals contain trisodium phosphate. If fairly large quantities it would be toxic.

Oxalic acid. Chlorine & Iodine are poisonous. There are many metals that can get in to our foods in retail outlets via utensils, contaminated foods, glazes on pottery, & enamelware, plating on metal cookware & galvanizing on equipment or shelving. Cadmium, Tin, Zinc, Copper & Lead are soluble in milk, fruit juice, soy sauce, vinegar, & other acid foods. Should avoid the food storage in soluble containers in retail outlets.

- Poisonous plants & animals-This may be avoid by using only foods which are generally known to be edible. Wild mushrooms, shell fish & some sea foods are known to be poisonous.
- Micro organisms, including bacteria, molds, viruses & parasites-Foodborne illnesses occur when food contain large enough numbers of pathogenic micro organisms (foodborne infections) or a toxin produced by micro organisms(foodborne intoxication) is consumed. Food borne infections can be caused by bacteria that either produced toxins as they multiply inside intestinal tract (toxicoinfections) or invade the intestinal mucosa where they multiply or pass to the blood & system.

  The occurrence of bacterial food poisoning depends on peculiar set of circumstances & some or all of the following factors are as follows:

  - The infecting organism(causal agent), in food stuffs, in the food handler or in animals;
  - The hands of the food handler transmitting the organism from raw to cooked food & to utensils, cloths, & other kitchen tools or from the person of food handler to cooked food;
  - Surface contaminated by raw foods;
  - Food suitable for bacterial growth;
  - Conditions favourable for warm storage over a period of 2hrs or more;
  - Susceptible human subject;

The investigation & prevention of food poisoning depend on the ability to examine the situation with these six factors in view.

Following are some infecting organisms which causes food poisoning & Foodborne illnesses.

2.2.2. Toxic bacteria causing Food poisoning

2.2.2.1 Botulism

Botulism is one of the best known food intoxications because it can be fatal or leave the victim with extensive neurological damage. Early symptoms of botulism are dizziness, fatigue, headache, nausea, vomiting & diarrhoea. Many botulism food poisoning outbreaks occurred from restaurant foods in USA eg: Illnois restaurant outbreak onions sauted in margarine & held warm were the culprit when served with sandwiches (Shirly J.V. and Margy .W, 1999)

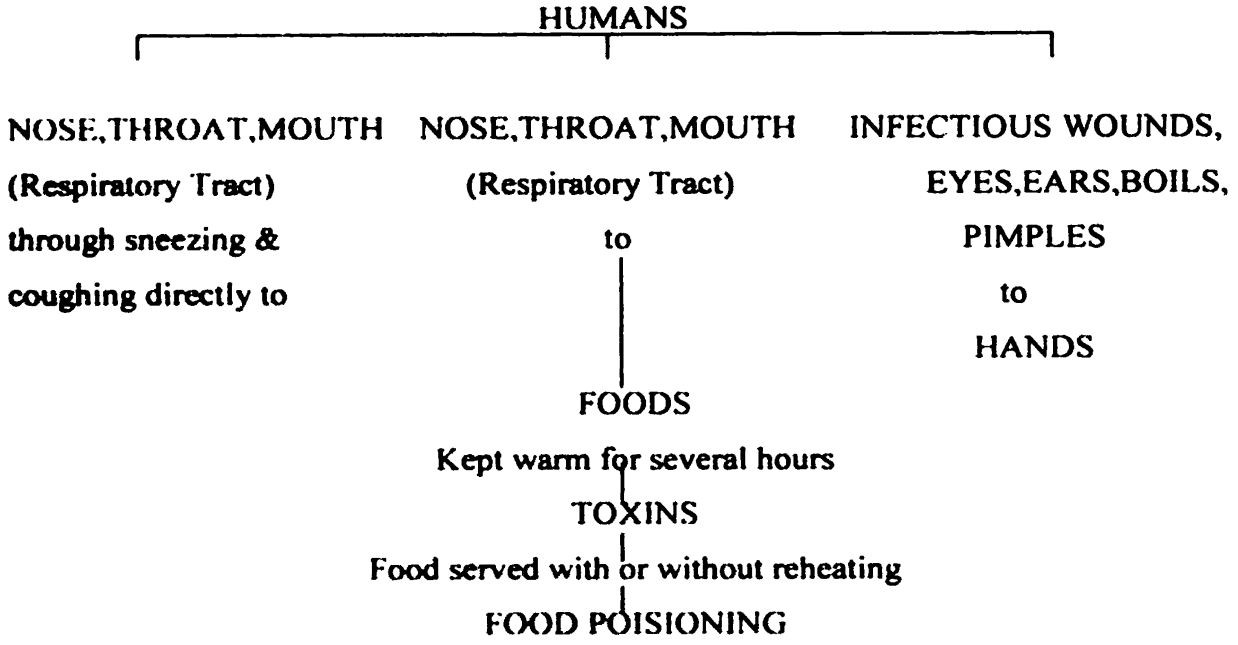
Clostridium botulinum organisms are classified by the type of toxins produced to seven types of spores (A to G) (Betty.C.C and Diane.R,1993). There spores are commonly found in soil, dust & all parts of the world. They grow on the foods & cause food spoilage which can be detected by off odour & gas production in the foods. Type E & some type B are non proteolytic thus it is possible for these bacteria to produce toxins in foods without spoilage being evident (Betty.C.C and Diane.R,1993). Because of that even food is not spoiled it can carry toxins of botulisms. Botulism toxins is readily inactivated by heat 185°F (85°C) or above (Betty.C.C and Diane.R,1993).

Botulism outbreaks are associated with consumption of preserved or semi preserved foods in cans or cured products. In retail area this can be prevented by maintaining the proper storage conditions which prevent germination of any surviving spores & growth along with toxic production well as prevent damagers to the can which may re introduce botulisms to the canned content. The advice "Keep cold foods cold & hot foods hot" can prevent botulism food poisoning because then can prevent the growth of botulism micro organisms.

2.2.2.2. Staphylococcal Food poisoning

Staphylococcal food poisoning is caused by eating foods which contain one of the heat stable staphylococcal entero toxins produced by staphylococcal growth. *S.aureus* is selectively favoured in cooked foods & slightly salty foods such as hams (Lewis J.M. 1983). Cooked foods (ham, cured meats, beef, poultry, eggs, salads, dairy products) are

contaminated by *S.aureus* mainly by humans. Human nose and skin of the hands are the main sources of *S.aureus*. Food perpetrators & handlers can decrease the likelihood of contaminating the food by washing hands after nose and mouth contact & using utensils instead of hands (Lewis J.M, 1983). The most important control is preventing bacterial growth by chilling foods promptly or holding it hot.



Sources and routes for infection due to S.aureus (Shirly .J.V. and Margy .W, 1999)

A common scenario for the transmission involve a low acid food being cooked , thereby eliminating the possibility of competing organisms. The food is then contaminated by the human & kept at optimum temperature for *S.aureus* growth, either by being left at room temperature or by the slow cooling of a large amount of food. By consuming staph containing foods severe vomiting, with diarrhoea, abdominal pains & cramps can occur. Staph can be destroyed by heat of pasteurization & normal cooking (killed by temperature above 55°C) (Betty.C.C and Diane.R,1993). Staph control can be done by preventing contamination of the food with staphylococci, preventing their growth, by destroying staph in foods. Reduction of contamination can be done in retail area through

proper sanitation, using only foods that has not being standing too long at room temperature and eliminating employees with colds & boils.

2.2.2.3 Bacillus cereus Foodborne illness

Bacillus cereus as a cause of illness seldom reported but believe a fairly common problem throughout the world. *B.cereus* is found in the environment & produce spores so it may be in food ingredients & dust. It is an aerobic organism with the capability of also growing anaerobic. Diarrhoea producing enterotoxin which is not heat sealable & an ematic (vomiting) toxin which is more heat sealable are two toxins which produced(Betty.C.C and Diane.R,1993).

B.cereus is controlled by holding cooked, perishable food at temperature at or below 40°F(4°C) or above 140°F(60°C) to prevent multiplication of bacteria & toxin production(Betty.C.C and Diane.R,1993). In retail outlets long moist storage of warm cooked foods in which spores are still alive encourages the growth of the organisms to large numbers & the consequent formation of toxins amount able to cause illness. Spores are often found in cereals & other foods. Eg: Cornflour sauce in Norway & boiled & fried rice in Britain has cause an outbreak of *Bacillus cereus* Foodborne illness (Shirly .J.V. and Margy .W, 1999)

2.2.2.4.Toxins from Molds

Molds are widely distributed in the environment & may occur as part of normal flora of food, on inadequately sanitized food processing equipments, or as air born contaminants. Molds are poor competitors and grow slowly, their growth is often a problem under conditions that are unfavourable to bacterial growth. Foods with low PH, low moisture, high salt or sugar concentrations, & those stored at refrigeration temperatures are susceptible to molds. These molds produce toxic substances called mycotoxins which cause mycotoxicoses illness from eating the toxins that are produced by the molds (Shirly .J.V. and Margy .W, 1999). *Aspergilus & Penicilium* are the most common molds grow in the foods. Aspergillus flavus produces mycotoxins called Aflatoxins. Aflatoxins has been detected in manyfoods including peanuts, peanut butter, unrefined oil, corn, wheat, cotton seeds, sweet potatoes, cassava, rice, sorghum, soybean, milk etc.. Ingesting mold

toxins can cause acute or chronic symptoms depend upon dosage or frequency. Moldy foods that was stored above refrigeration temperature of 45°F (7°C) should not be consumed (Betty.C.C and Diane.R,1993). It's strongly recommended that more attention should be given to the danger of eating moldy foods.

In Sri Lanka Food poisoning is clearly visible with recorded cases of 1290 in year of 2008 by Epidemiologist Unit in Sri Lanka (Appendix 1)

2.2.3. Foodborne Infections

2.2.3.1 Escherichia coli

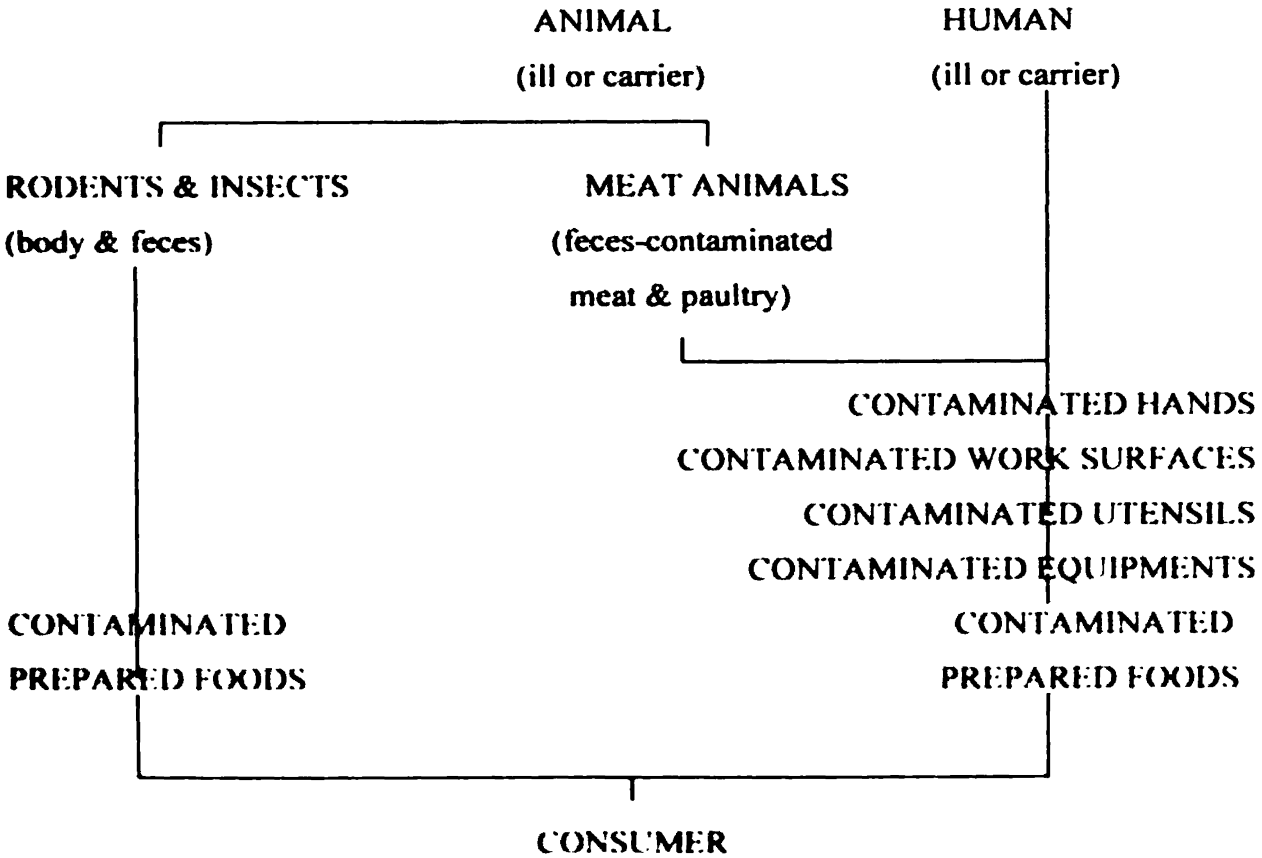
One of the leading causes of infant & traveler's diarrhoea. *E.coli* is part of the natural flora of the large intestine of the large intestine of warm-blooded animals. These bacteria routinely leave the intestine in faeces & contaminate soil & water through untreated sewage, or can contaminate many foods through contaminated hands. In *E.coli* most strains are not pathogenic, four different groups of *E.coli* are now known to cause illnesses (Lewis .J.M, 1983). The enterohemorrhagic strain O157:H7 cause extremely serious illnesses, and lead to renal failure in children (Lewis .J.M, 1983). Prevention of *E.coli* contamination in retail sector can be done through by good control measures including washing hands after using the rest room, cleanliness of surfaces, containers & other equipments to prevent cross contamination & holding foods at temperature that prevent bacterial growth.

2.2.3.2.Salmonellosis

Salmonellosis is a collective term for all illnesses of human or animals caused by the salmonella bacteria. This include *Salmonella typhi & Salmonella paratypi.* Although Salmonella typhi & typoid fever are no longer major problems salmonellosis is. Animal originally become infected through contaminated feed or from other animals. In cutting processes of meat in retail outlets the equipment is not cleansed between & cross contamination can occur. A cutting board may have been reused without thorough scrubbing it. Humans to humans transfer of the organism is also documented. Symptoms of the Salmonellosis are fever, headache, chills, & prostration sometimes occur.

Preventing cross contamination in the retail area is most important. Using plastic cutting boards & washing them thoroughly, cleaning all the surfaces with the brush & soap after contact with raw meat, poultry & sea foods. Simple hand washing before food handling is important. Salmonella can be readily killed by temperature above 55°C (Betty.C.C and Diane.R.1993).

.Salmonella can grow in pork, veal, sausage meat, canned ham, yeast powder, pie meat, salami sticks, poultry, eggs, ice cream, confectionary & milk have been found. Salmonellae control can be done by avoidance of contamination of the food with bacteria either from vector or from infected foods, adequate refrigeration to inhibit the growth & good food handling procedures can be followed in retail sector.



Sources and routes for infection due to Salmonella, Campylobacter, or Escherichia coli (Shirly J V and Margy .W, 1999).

2.2.3.4.Shigelosis

Shigellosis commonly known as bacillary dysentery, is a term for infections of shigella bacteria. Contamination of the food supply is through feces of an infected person. This is most common in retail areas due to poor personal hygiene. A typical scenario involves the human carrier with contaminated (unwashed) hands handling foods that is then served without further heating. Shigellosis is characterized by abdominal pain, fever, & often vomiting. Prevention is primarily through educating food handlers on hand washing after use of the toilet, providing safe water supplies, & adequate sewage disposal.

2.2.3.5.Campylobacteriosis

An acute gastroenteritis.Most important species *C.jejuni.* After ingestion of very low numbers of C.jejuni, the organism infect the gastrointestinal tract & illness usually occur within 3 to 5 days (Shirly .J.V. and Margy .W, 1999). This bacteria is a frequent part of birds & animals. They may be present in raw meat & poultry & from there cross contaminate the other foods well as direct infection from raw poultry to food handlers. Raw or imperfectly pasteurized milk has been the most commonly implicated vehicle of infection. Eg: 2500 school children were infected through imperfectly pasteurized milk in UK (Shirly .J.V. and Margy .W, 1999). Water born outbreaks were there in some occasions. Campylobacter is not heat resistant & can be killed by pasteurization & cooking well as in it does not multiply in refrigeration but survive well. To prevent from this food borne illness in retail outlets prevention of cross contamination between raw foods of animal origin & ready to eat foods must be done. Humans may be carriers during an infection & for weeks afterwards. Instruction for food handlers for sanitation is important.

2.2.3.6.Clostridium perfingeas infection

Clostridium perfingens is probably one of the most common types of human foodborne though reported incidents comprise only a small proportion of the total. This organism produce spores that present in soil, dust & animal feces (including humans). Commonly found in foods as meat, cereals, vegetables. Spores survive in cooking. Cooking "Heat shocks" the spores activating them for germination (Betty.C.C and Diane.R,1993).

The anaerobic nature of the organism enable it to multiply in crevices, rolls & internal cavities of meat products. Another characteristic of this organism is rapid generation time but large dosage of vegetative cells need to cause an infection. Multiplication of cells take place during long slow cooling & warm storage of food in the kitchen or retail outlet. Symptoms of *Clostridium perfingens* infection are abdominal pain, profuse diarrhoea & nausea.

Prevention of *C.perfringens* cases is by holding hot foods above 140°F (60°C), cooling rapidly to below 64°F (18°C), & holding the foods at a temperature below 40°F (4°C) (Betty.C.C and Diane.R,1993) .As an additional safety measure in retail outlets left over foods may be heated to at least 160°F(71°C) to kill those organisms that present & should not keep the hot food warm for long time (Betty.C.C and Diane.R,1993).

2.2.3.7.Vibrio parahaemolyticus infection

Common in countries raw sea foods are consumed. *V. parahaemolyticus* found in marine water, especially the warmer ones, and in fresh water containing large amount of organic matter. Both raw and cooked sea foods, for examples crab, lobster, shrimp & prawn are vehicles of infection. Symptoms of the *Vibrio parahaemolyticus* infection are diarrhoea, vomiting, dehydration & fever. Contaminated fish & shell fish which are allowed to stand at unsafe temperatures and not thoroughly cooked can cause the gastroenteritis, & cooked sea foods may be cross contaminated from raw, such as reusing the shell fish container. To control this illness, in retail outlets should prevent cross contamination & refrigeration can be done.

2.2.3.8.Cholera

This is considered by many to be a disease of middle ages or occurred after natural disaster. Humans are the only known natural reservoir for *Vibrio cholerae*. Both those suffering from the illness & carriers without symptoms shed the organisms in their feces. Contamination occurs when feces come in to contact with food, drinking water, or shellfish growing in contaminated water. Large numbers (10^8-10^{10}) must enter the body for illness to occur, because many of the organisms are killed by the acid condition in the stomach(Betty.C.C and Diane.R,1993). Cholera is self-limiting disease, but requires

immediate attention since 50-75% patients who become dehydrated will die without treatment (Shirly .J.V. and Margy .W, 1999). Prevention in retail outlets is by sanitary sewage disposal to protect water supplies & washing hands after possible contact with feces.

2.2.3.9.Yersiniosis

The organisms had been isolated from pork, ham, beef, lamb, paultry, cutting boards in butchers shops, dairy products such as raw milk, whipped cream & ice cream.
Since only limited number of strains of *Y. enterocolitic* are pathogenic, it is difficult to determine the extent of the problem in our food supply (Lewis J.M, 1983). Symptoms of the illness include vomiting, fever, diarrhoea, & pain the mimics an appendicitis attack. Prevention of the illness as same as *E.coli.*

2.2.3.10. Listeriosis

Listeria monocytogenes occurs widely in the environment. The bacteria may be found in soil, water, sewage, and almost all animals, birds, insects, and on plants. Humans who are not ill well as those who are ill, may excrete the organisms in their feces. Listeriosis is most serious when it occurs in infants, older persons, pregnant woman, & those with comprised (lowered) immunity (Shirly .J.V. and Margy .W, 1999). For other people, the illness is commonly temporary, slight infection with no symptoms. The organism may be transmitted to man by means of contaminated food stuff at any point of the food chain from the source to retail. The challenge to the food & dairy industries is to ensure that all ready to eat foods contain no viable *L. monocytogenes.* To control this illness, in retail outlet should prevent recontamination of the product from machinery, packaging, air or water born organisms well as refrigeration of perishable foods recommended. *Listeria* survive well on room surfaces, in drains & on equipment.

2.2.3.11. Hepatitis A & Eateric Viruses

Hepatitis A, also known infectious hepatitis, is caused by a virus. Virus can be carried in food & water, but they can only multiply in living cell. When they enter the cell, the cell metabolism is changed so that it produces more of virus. Hepatitis A is spread by fecal-

oral route so waterborne and food borne out breaks can occur (Betty.C.C and Diane.R,1993). Raw or under cooked meat from sewage contaminated water or foods contaminated by food handlers are the usual vehicles. The disease symptoms are malaise, vomiting, abdominal pain, fever & headache. Current research suggest that viruses do not multiply in food & tend to become inactivated during storage. Better personal hygiene & less handling of food through the use of utensils or disposable hand coverings would decrease the spread of hepatitis A & E. All food handlers should routinely wash their hands after using the rest room & again before touching foods.

2.2.3.12. Trichinosis

Trichinella spiralis a round worm, causing painful muscle infection in humans. The disease is acquired by ingesting the larva stage of the worm in inadequately cooked infectious meat of the carnivores(pigs, bears, walrus).First symptoms of trichinosis occur from 1-14 days from ingestion of larvae invade the small intestine wall of humans (Shirly .J.V. and Margy .W, 1999). Abdominal pain, diarrhoea, vomiting, sweating are common. When larvae migrate to the muscles & encyst of human, muscle pain, edema, fever, fatigue, & swelling are primary symptoms. Prevent this illness should cook the pork until it reaches a temperature of at least 155°F (68°C) or until there is no pink colour (170°F or 77°C) (Betty.C.C and Diane.R,1993).

2.2.3.13Other parasitic infections

Parasites may present in the food throughout the world. Their spread (usually through feces) is from one infected animal or human to another. When untreated human sewage contaminated the water & soil where food-animals are grown , they become infected. Species of *Anisakis* commonly infect herring which , when consumed raw is a vehicle for human infection (Shirly .J.V. and Margy .W, 1999). *Gnathostoma spinigarum, Angiustrongyls spp.*, & fluke(flat worm) infections may also be acquired through consumption of raw or under cooked fish or shell fish (Shirly .J.V. and Margy .W, 1999).. Tape worm infections can result from insufficiently cooked pork, beef or fish.

Protozoa single-celled complex micro organisms may be transmitted from animal or humans to victims through food (food handlers to consumers) or water via sewage. The

most important are *Giardia*, amoebae, & *Cryptosporidium*. Toxoplasmosis is a serious infection for both mother & fetus since the parasite can be transferred through placenta (Shirly .J.V. and Margy .W, 1999). Infection causes congenital defects, abortions & central nervous system problems in infants.

To decrease the incidents of parasitic infections proper sewage disposal practices & filtration step in water purification is needed.

2.3. Carriers of Contaminations

Carriers of Contamination, called vectors, are man, animals, soil, air, water, insects, birds, equipment, & others. Man is the chief offender closely followed by rats, flies, & roaches.

2.3.1. Rats

Rats' bodies & faeces carry diseases as does their urine. They carry lice & other insects that spread diseases. Lice carry rickettsiae that cause typus, scrub typus, and Rocky Mountain fever(Betty.C.C and Diane.R,1993). Fleas on mice can carry can carry bacteria that cause bobonic plague caused by *Yersinia pestis* which was spread from rat to rat & from rat to man & other diseases(Betty.C.C and Diane.R,1993). The virus of hepatitis is found in the urine of rats. Spaces where rats can enter the retail outlet should be sealed off. Trapping should be used together with ultrasonic sound waves that keep them away. All areas surrounding food services such as parking lots & landscaped areas should be well drained & free of debris & pockets where rats can hide & breed. Survival of rat needs food, warmth & housing. These should be restricted to them.

2.3.2. Flies

Flies carry diseases in their bodies, in their faeces, & in their stomach. When they eat they regulate mucus from their stomach & when they walk sticky substances are in their feet which filled with bacteria which they track around. Their feces are left as spots to spread bacteria & diseases. To eliminate them from retail outlets can use air screens, fly traps, insecticides, & other means should be used to eliminate them. Garbage, soft drink bottles, & mops that could furnish food for flies should be cleaned or enclosed.

2.3.3. Cockroaches

These creatures breed in moist places such as sewers & drains or behind sinks & in other dark & moist areas. Cockroaches are known to carry other pathogenic organisms, including dysentery & tubercle bacilli, the cholera vibrio, streptococci & staphylococci. Cockroaches & other insects may be controlled by trapping, insecticides & cleanliness. They feed on filth & spread filth & disease as they moved about. Through proper sanitation in retail outlets can control them.

2.3.4. Ants

There are two kinds as garden ants nest outside & Pharoah's ants nest in warm buildings. Garden ants not a public health importance but they are nuisance in food retail outlets. Pharoah's ants have been shown to carry organism in significance of human disease. Much can be done avoid attracting ants in retail outlets, by careful observance of cleanliness, removal of waste foods, even the smallest crumbs & the repair of structural cracks & crevices in walls & floors which afford nesting sites of ants.

2.3.5. Other pests

Weevils-Large number of insects & mites are of significance in spoilage of stored foods; they are often imported in the raw materials. Although they are severely destructive & may impart an odour to infested food they are not a hazard to heath. Methods of control are careful surveillance of raw materials, general hygiene & warehouse should be inspected frequently.

2.3.6. Birds

Birds are hazard in food establishments because their droppings may contaminate food with organisms of the salmonella group & other pathogens. Also they may be vectors of pests which spoil stored products. Screens on windows & doors would help to exclude birds from retail outlets

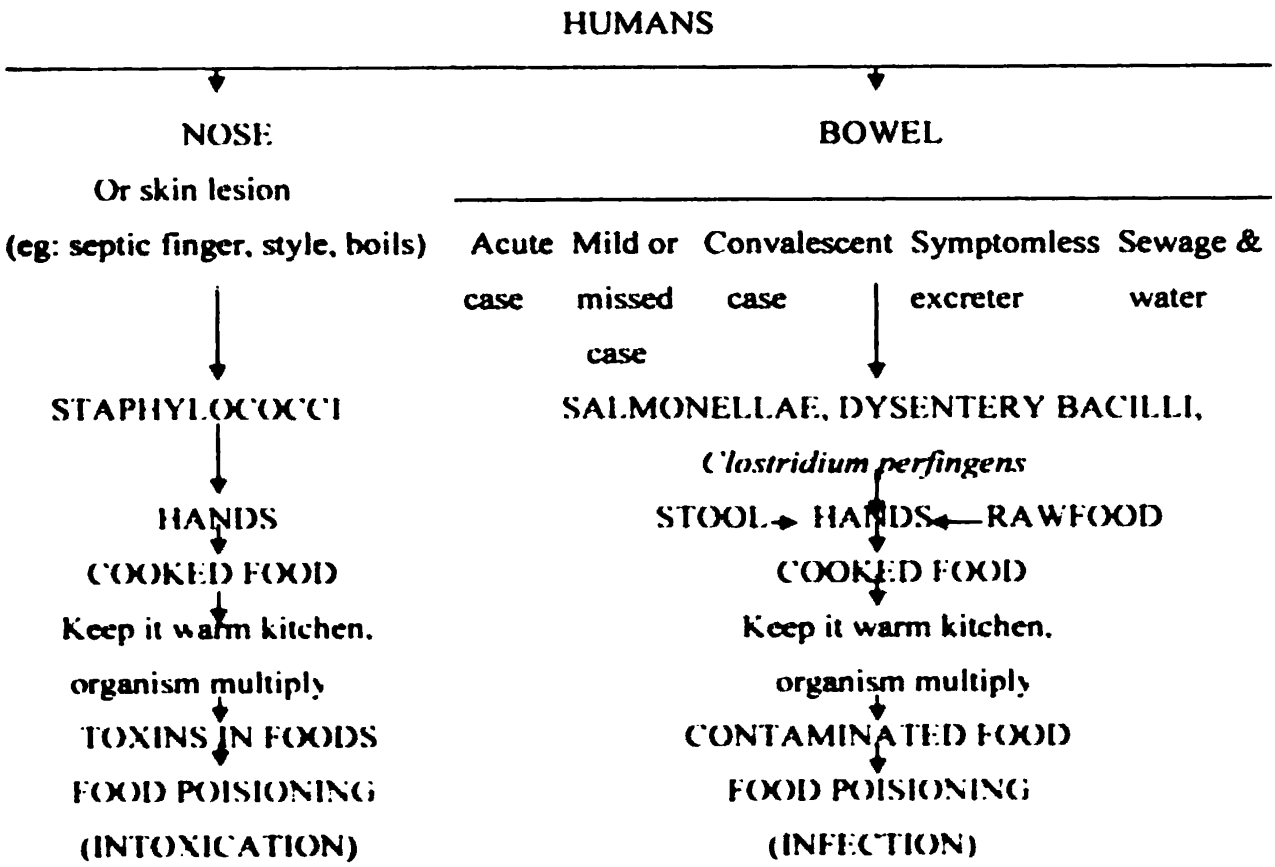
2.4. Humans

2.4.1. Human Carriers

Bacteria in certain conditions are able to grow & multiply in tissues of body, some in one tissue & other in another. During illness, germs can be transferred from one person to

another, from animal to animal, & from animal to man or man to animal, either directly or by means of a medium such as food. The human nose, hand, & skin are primary habitat & natural home of many microbes.

In any outbreak of infectious disease there will be the possibility of one of four types of reactions: acute illness; ambulant cases with mild symptoms which may be ignored or attributed to other indispositions; convalescent carriers who will continue to excrete the organisms in their feces for sometimes after recovering from the illness; and tempory carriers or symptom less excretes who may harbour the infectious organisms for a short time without exhibiting the symptoms. The excretion of *S.typihi* in stools may persist for many years, but other *Salmonela serotypes* & dysentery *bacili* are excreted for few weeks only (Betty.C.C and Diane.R,1993)



Human reservoirs of food poisoning organisms (Betty C C and Diane R. 1993)

Water droplets that spray from flushing lavatories, soiled seats, pull chains, door handles & taps may pass infection from person to person. Contaminated hands may pass infection to food. Most intestinal organisms are readily washed from the skin by soap & water & they are not harboured in skin like *staphylococci.*

The human nose, hand, & skin are primary habitat & natural home of *Staphylococcus aureus;* they reside in mucus membrane of the nose & the skin of man & animal.30-50% general public carry staphylococci in nose & 14-44% in the hands (Betty.C.C and Diane.R,1993). Nasal secretions contain large number of bacteria; from that *staphylococci* contain large number. These can penetrate in to deeper layers of skin, where they live & multiply in the pores & hair follicles.

In retail outlets hands infected in this way may be washed & scrubbed to remove the organisms but *stapylococci* remain (Shirly .J.V. and Margy .W, 1999). Antiseptic lotions, hand creams & soaps may help to reduce the skin carriage of *stapylococci.* There are also preparations available to the treatment of nasal carriers. Food handlers known to be habitual carriers of staphylococci in the skin of the hands should avoid working with foods such as cooked meats, poultry, egg & milk dishes with encouraged bacterial growth. The pus from stapylococcal skin lesions, eg: boils, carbuncles, whitlows & sycosis barbae , septic cuts & burns will contain innumerable organisms & small specs of pus could inoculate food with millions of *staphylococci* (Shirly .J.V. and Margy .W, 1999).

Hands also being a direct source of contamination, hands will also transmit bacteria from food to food. Because human is the chief reservoir of micro organisms which contaminate the food their personal hygiene is very important.

2.4.2. Personal hygiene of Food handlers

Food handlers has an important part to play in prevention of food poisoning & other food borne illnesses. The common concern is passage of organisms from person to food, from the nose, skin of hands & other surfaces & from bowel. More important still is

transmission of organism from raw to cooked foods with hands as means of transport as well as surface utensils & cloths. Hands are rarely free from bacteria, which may be transient or semi-permanent in or on the skin. The commensally flora of hands usually consists of staphylococci (Shirly .J.V. and Margy .W, 1999).

They cling to the skin surface & not easy to remove. Hands should be washed with plenty of soap & water, preferably warm, and rinsed in running water. This removes or at least reduce the numbers of coliform & other Gram negative intestinal organisms picked up from the food. Nails should be short , unvarnished & scrupulously clean. The hands must be washed carefully before touching the foods of any sort & particularly after handling raw food ingredients. Hands must be washed after handling waste foods & refuse and after visits to the toilet. Wearing jewellery can be problematic such as salmonella could survive on the moist skin surface beneath rings as an example. Although hands are washed *stapylococci* remained in hair folices & cracks in the skin can come to the surface (Shirly .J.V. and Margy .W, 1999). Because it is difficult to alter residential flora of organisms in hands, washed hands do not necessary mean safe hands. Thus foods that readily support the growth of *stapylococci* such as cured & uncured cooked meats, creams, cooked sea foods & other foods eaten without further heat treatment should not be touched with hands.

2.4.2.1.Hands

Dry hands without immediate washing have fewer organisms than wet hands. After touching raw materials such as meat & poultry, & after handling wet cleaning clothes, sponge & rags enormous number of organisms can be found on hands (Lewis .J.M, 1983). Because of that in retail outlets food handlers must try to keep the hands dry much as possible. If it is considered advisable to use disinfectant dip in retail outlets, the hands should be washing with soap & water before application or submergence of chemical solution just as a work surface should be clean before application of chemical disinfectant.

Washing facilities should be in clean & good order, and should include a hand washing basin in the kitchen separate from the sink intend for food preparation. Wall dispenses can be used for liquids, finely flaked or powdered soap can be used. If tablet soap is used

it should be stored dry & soap dishes wash & dried daily. When soap is passed from hand to hand, bacteria may be trapped in the scum or curd & remain in the surface. Soap in any form can include hexachlorophene. It is necessary to use the soap in cake or liquid form exclusively or frequently for a prolong period of time, it may help to reduce the bacterial flora in the hand & distribution of contaminants. Disposable paper towels & electrically operated hot air drier are used in some retail outlets to dry the hands. Communal roller towels can transfer infection from person to person.

In foreign countries in some food establishments dispense creams & lotions for hands uses. They can be plain barrier cream to decrease the sensitivity of the skin to certain food substances which are known to cause dermatitis. It helps to keep the hands soft & supple & to reduce the roughness & the cracks which harbour bacteria. Well as it has a disinfectant quality. Cuts burns & other raw surfaces, however small & apparently healthy can harbour staphylococci. When food handling in retail outlets all the lesions must be covered or if its inflammation & pus formation these people should not handle foods. Various skin diseases are colonized by *staphylococci*, such as dermatitis by handling certain food ingredients (Betty.C.C and Diane.R,1993).

Care should be taken to avoid touching irritant substances, unnecessary contact with dirt, chapping or exposure to very hot water. Rudder gloves worn by food handlers may not necessary help to improve the bacteriological conditions of the food, unless the gloves remain a smooth, unbroken surface & are washed frequently. Gloves are recommended with the procedures with frozen foods. Disposable gloves are also their which are more suitable to assembling salads & sandwiches which prevent transfer of staphylococci from hands to food. But not prevent transfer of *salmonella* from product to another product or from raw to cooked foods.

Heat disinfectant implements should be used to manipulate foods where practicable; tongs, metal meat slices & other metal gadgets are available.

2.4.2.2 Nasal & Throat carriage

The usual sites of harbouring *staphylococci* are the nasal mucosa, hands & other skin surfaces, cuts, burns abrasions & pustular lesions such as boils, carbuncles, witlows & styes (Betty.C.C and Diane.R,1993). Rarely staphylococci found in throat. The habit of

fingering the nose & spots will increase the hazard of passing the *stappylococci* from hands to food. Clean cloth & paper handkerchiefs are almost free from bacteria but when they are dirty they may harbour millions of micro-organisms including *staphylococci.* Cloth handkerchiefs should be washed & boiled frequently. The use of tobacco in any form by food handlers must be prohibited. Although smoke & ash are harmless they are aesthetically distasteful & the fingers will be contact with the mouth. Licking the fingers to lift paper or turn the pagers is unhygienic particularly if the paper contaminated with saliva to be used to wrapping foods. Other habits such as chewing gum or taking snuff while on duty should be discourage for fear of contaminating the hands, environment & the food.

The hair & head less likely to touch by hands .If a cap, net or head scarf is worn, & the loose hair will be prevented from falling on to food. The hair should be clean & tidy the scalp free from dandruff. Abrasions on the scalp may spread staphylococci in dry scale of skin. Beards must not be encourage unless short, well trimmed & clean and should preferably be covered with a beard guard.

2.4.2.3.Intestinal secretions

Intestinal bacteria more likely to spread from fluid stools excreted from those suffering from diarrhoea. Aerosol sprays are formed when the Latrine is flushed, & general toilet cleanliness is much difficult with fluid excretes. Food handlers suffering from food poisoning, or certain other diseases, or carrying the causative organisms, shall not be allowed to work with food.

2.4.2.4.Cloths

Protective clothing should be light coloured & light in weight. It should be changed frequently. All large food retail establishments should provide with adequate changing rooms, with means to store cloths & other belongings. Equipment to dry cloths such as hot air racks, or tumble dryers should be available. Provision of shower baths in changing rooms also recommended. Addition to changing rooms, areas for rest & relaxation are essential together with canteen facilities.

2.4.2.5.Health

Health education, personal hygiene, & nutrition education should be given to employees

Medical examination

Physical examination is usually required at the beginning of employment to establish freedom from tubercle infection, intestinal pathogens & skin infections. Also a medical certificate should state freedom from past typhoid like illnesses & skin disease. Typhoid carriers are in different category any discovered should not be permitted to work in food premises, & it is advisable to give specific treatments. During & after of an outbreak of food poisoning , it is necessary to trace the origin of the agent of infection or intoxication.

There are many ways to control these food poisoning bacteria which we have discussed up to this point (Appendix 2) By controlling these food poisoning bacteria food safety in retail outlets can be assured.

2.5. Food hygiene in retail Outlets

2.5.1. Retail Outlets

Today retailing of food cover many different outlets. They vary from tiny corner shop to large super markets. Each can have its own particular hygienic problem but overriding factor is to ensure that the food sold to the customer is fit to eat & good quality.

Over the last few years there had been a general increase in food poisoning incidents reported but those are rare to traced back to the retail outlet (Betty.C.C and Diane.R,1993). Reasons for this are sickness & diarrhoea occurring in family units often not reported and if food is contaminated the contamination usually can be traced to a stage prior to it entering the retail outlet

It is retailer's responsibility to ensure that food is kept in a manner & under condition which will not encourage the growth & spread of any food poisoning organism. In retail outlets food handlers must concern more about open foods (foods which are not in a container of such material & so closed as to exclude the risk of contamination)

2.5.2. Bakery shops

Bakery trade has shown dramatic improvement in standards. Major concern in bakery shops are avoidance of "foreign objects", eliminate of infestation, and control of perishable commodities such as those filled with cream or custard. Ease of cleaning and cleaning practices should also receive particular attention.

Foreign objects control is important. The two golden rules : keep it covered" and "work tidy" should be continually repeat to all staff , whilst equipment design should reflect these practices (Shirly .J.V. and Margy .W, 1999). Examples of good control of foreign objectives are filling racks and shelves from top downwards, not placing the containers on the work surfaces, not allowing carbon to build up in racks and trays, maintaining the decorations and equipments in good condition to prevent flaking of paints, not allowing the use of loose types of rodent baits, taking care when maintaining the machinery, looking for loose nuts and bolts and elimination of wood

There should be separate cleaning protocols to cover the removal of daily soiling and long term residual dirt. All machinery, bread trays and bread tins should be include in separate deep cleaning. All machinery and equipment should be designed for ease of cleaning.

Infestation can be reduced through avoidance of residual debris collection in machines by cleaning them thoroughly. Commodity storage areas require particular attention to prevent infestation. To prevent flying insects coming to the bakery shop fly proof windows and ultraviolet machines are essential.

2.5.3. Fresh meat sales

The operations have become easy with delivering of primal cuts, rather than whole carcass from slaughter house.

Cleaning- Day to day soiling must be removed by cleaning. If cleaning is only superficial there will be long term protein build up thus the choice of cleaning detergent is important. Since trays are widely used for meats, a tray washer is desirable. The dominant food contacting surface is the chopping board or the block (Shirly .J.V. and Margy .W, 1999).

Which should be colour coded, made of a suitable synthetic material and when scored, planed or replaced.

Product control-Many butchers now a day receive vacuum packed units of meat from whole sellers. Shelf life control is vital (correct storage) and also detection of leaking packs(Betty.C.C and Diane.R,1993). Control atmosphere retail packs are also introduced.

Other matters-Personal hygiene should not be a major problem in these units. But there may be a risk in cross contamination if butchery preparation or sale of raw meats are mixed with other goods , in particular cooked foods. All cutting and display of raw meats should be segregated from cooked products both physically and by fine hygiene practices.

2.5.4. Wet fish sale

Various supermarket retail chains are also has begin to sell fish in their outlets. The hygienic problems relating to fish retailers have remained unchanged over many years but demand in customers has made increase in perceived standard.

Cleaning-Protein build up will inevitably occur on all surfaces, and cleaning schedules and methods must take this in to consideration. Aggressive low PH cleaners will be necessary to clean some metal surfaces to remove the compounds resulting from chemical reactions between metal surfaces and "drip "fluids from fish(Betty.C.C and Diane.R,1993). Attention to detailed cleaning is important due to the unfavourable characteristics of the product fish scales and proteins will build up in all cracks, crevices and inaccessible areas. The corners and sides of display cases will attract similar soiling. When cleaning through scrubbing with appropriate materials, of all equipments including scales, scale pans, spoons, tongs and price labels and bag dispenses.

Cross contamination-All fish should be screened from the customer. Different kinds of fish should be segregated from one another. Care is required to prevent contaminations from external surfaces of delivery pack materials.

Other matters-Gutting area should be provided with running water for sluicing the chopping board, a suitable sanitizing solution should be available to use afterwards. Careful attention should be given for disposal of refuse, especially fish soaked cartons.

2.5.5. Produce Sale

Food safety is important and there are several problem areas. Pest control is neglected in some outlets, whilst customer aesthetic, foreign object control and cut foods are all of concern. Developments are taken place in refrigerated display. When selling loose dry products such as dates, cashew food hygiene must be really concerned.

Cleaning-Attention should be taken when purchasing of display and storage equipments that can be easily cleaned. Cleaning should remove soil and debris, build up which is likely to harbour pests, both native and related to products.

Food handling- Many outlets carry out various minor preparation tasks, such as cutting and wrapping of melon, pumpkin, cucumber. These operations only can regard as open food operations and should receive care and attention in handling knives and cutting surfaces. Food debris should be kept separately sealed, seepage is particular attractive to the pests. Package and cardboard should be separated. Staff food taking areas must be separated with the retail outlets otherwise if they have any diseases it can cross contaminate.

2.5.6. Non open food premises

Pre packed grocery sales-In here only package foods are sold. It's unlikely to occur food poisoning unless packs become damage by infection, dampness and bad handling. All the products (canned or dry foods) must be kept in a dry ambient condition with little fluctuation of temperature (Betty.C.C and Diane.R,1993). If not cans can become rusty and deteriorate, allowing air to enter. With regards to dry goods, damp packaging can cause mold growth, especially with commodities such as tea and flour. Good stock rotation is essential and when shelves are refilled old stocks should be brought to the front.

Pre packed perishable sale- These are vulnerable products and special care must be taken in to ensure they are stocked and retailed in suitable refrigerated cabinets. Display cabinets should be maintained at a temperature of 3-5°C, and not allow to fall below 0C or rise above 10°C Perishable foods should be transferred to refrigerated storage with minimum delay(Betty.C.C and Diane.R,1993). Stock rotation and checking the expiry

dates are important. During code checking leaking products, deteriorated products and molded products should be removed. Correct maintenance of cabinets are important to prevent breakdowns and subsequent loss of foods. Cabinet interior require regular cleaning and sanitizing to prevent build up of debris and fat residues from dairy products.

2.5.7. Delicatessen products

Range of delicatessen products continuously increasing & posses various hygienic risks. Cross contamination both between raw & cooked foods & between foods of distinctive flavour. Major groups of foods should be displayed separately & should keep apart by display dividers. Individual spoons & other handling equipments should be provided for each individual product, with separate colour coded equipment for raw & cooked foods. Scales & slices should be only used for define group of products. Type of products handle considerably varies accordingly to their product life. Proper stock control must be there to prevent over stocking. Pre sliced foods should not carried over from day to day. Where used by dates are given it is now an offence to sell the product after that date. Stock rotation and checks are therefore is very important (Betty.C.C and Diane.R,1993). Daily checks should be a part of the retail outlet. Each counter should be provided hand wash basin, liquid soap, nail brush and paper towel, double internal sink particularly if raw and cooked foods handled, refrigerated counter-screened from customer contaminations, adequate refrigerated storage, storage for packaging materials, storage for cleaning materials, sufficient spoons, scoops, slices, knives, and sanitizing cleaning agents in buckets, or suitable container with clean whipping machine

Product removed from freezer or refrigerator for slicing or packaging must be returned to the freezer or refrigerator after use and not left on slices or work tops. Mechanical efficiency and physical conditions of all chillier units should be regularly checked. Temperature checks should be carried out and record should be maintained for inspection.

2.6. Construction and layout of the premises

In food handling premises there are general laws by the government to maintain the hygienic conditions (Food Act, No 26 1980 gazette notification of No560/13 in 1989- Appendix 4) Following must be considered when designing the food premises and equipment.

- Layout- The working space required will vary according to the menu, the extent that pre- prepared or convenience foods are used and the type of equipment installed
- Floors-Surface should be durable, non-absorbent, anti slip and without joints and crevices in which dirt, bacteria and insects can lodge. They should not be adversely affect by grease, salt, vegetable or fruit acids or other materials used in preparation of foods, and should be capable of being effectively clean and light in colour. Angles in the floor level should be avoided and the junctions between floor and wall covered.
- Walls-Smooth, impervious, light in colour, durable wall surfaces from floor to ceiling are required to allow cleaning without deterioration. The basic materials for wall structure are brick or concrete blocks
- Ceiling-A ceiling is necessary in food preparation area to prevent dust falling from the roof or upper structure. Ceiling should be smooth, fire resistance, light coloured, covered at wall joints and easy to clean. They may be solid or suspended.
- Lightning-Good lightning in retail outlets improve concentration and safety; it also deter insects and vermin. Good natural lightning is desirable. Light fitting should be set in sites of equipment and preparation areas including sinks, stoves and tables. Spot lights can be placed directly over the server counter to complement the overall lightning. Additional lamps may be required to aid cleaning of the less accessible dark areas.
- Windows and doors-Windows situated behind the equipment are not easily accessible for cleaning. Louvered windows are not recommended as they may be difficult to clean and maintain. Doors should be tight fitting and self closing; where necessary they should be proof against insects and vermin

- Ventilation-The operations of preparations, cooking, serving and washing up generate large amount of water vapour, which if not extracted will condense to create moisture drip from ceiling or running down walls. In addition there also are volatile fats. Proper ventilation control or extractor fans should be used.
- Services-Services to retail outlets include water, drainage, electricity, gas and ventilation; numerous points are required so that services may be trapped readily. Ducts can provide routes to vermin to enter leave and infest building. Services should be chased in to walls, where possible and fettered to the walls to allow proper cleaning.
- Sanitary and washing facilities-In all premises where person are employed, include buildings used for preparation of foods, toilets and washing facilities should be incorporated. Premises require specific appliances(water closets, urinals, and wash basins) be provided and maintained in cleaned conditions at places where food and drink sold to members of public to take away or consumption in the premises.
- Waste disposal-Most of retail waste is organic. Immediate disposal by disintegration and flushing to drainage system or paper or plastic sacks filled with waste placing in bins are popular.
- Equipments-Equipment should be design and sited so that all surfaces are accessible for cleaning. Every item should be reached and removed easily.

2.7. Storage

2.7.1 Cooling

Refrigerators are intend to keep food cold, and not to cool heat foods which may damage the cooling coils and cause moisture to condense on adjacent cold foods; this may encourage the growth of slime bacteria and molds. Cooked foods should be cooled before they are placed in refrigerator. The cooling time should be short within 2hrs of cooking (Shirly .J.V. and Margy .W, 1999). Hot meat should be left in cool and doughty place for not longer than 1.5hrs before refrigeration. Large bulk of foods should be portioned into

smaller lots to accelerate cooling, and liquids decant in to shallow containers of the same reason. Shallow rather than deep containers provide a large cooling area. Many outbreaks of *salmonella* and *C.perfingens* caused by faults in preparation and storage.

In coolers foods should be covered but all materials should allow an exchange of air otherwise there will be increase in humidity , which will encourage mold and bacterial growth .*C.perfimgers* grows rapidly in food left to cool in warmth of the kitchen(Betty.C.C and Diane.R,1993). Adequate cold storage facilities would reduce the incidents of food poisoning; there is no other method which can effectively replace cold storage as preventive method.

Cold affect micro organisms in different ways depending on its intensity. As the temperature falls, bacteria activity declines; there for foods which support bacterial growth should be stored at low temperatures to prolong their life and maintain safety (Betty.C.C and Diane.R,1993).. When foods are "chilled" or stored at low temperatures near but above freezing point , some bacteria will grow slowly. But in frozen or solid state, many micro organisms will be killed directly in the process of freezing; the remainder will not multiply and the numbers tend gradually to diminish. Hence freezing preserve foods for long time, while chilling merely delay the growth of organisms and extend the shelf life of the food.

2.7.2. Chilled Storage

"chilling is used to cover any reduction in normal temperature of article concerned. Some foods cannot be chilled at too low temperatures because there may be harmful changers. eg; flesh of apple change brown if chilled below 3.5°C(38.5°F) and resistance of some fruits to moulds may be destroyed by chilling, so that rate of spoilage by mould is increased(Betty.C.C and Diane.R,1993). With regard to pathogenic organisms some strains of salmonella will grow at 10°C.*Staph aureus* will not grow below about 10°C; between 15 and 20°C there is growth and toxin production. The sporing anaerobic organisms *C.perfringens* will not grow at temperature much below 15-20°C and no growth was observed in 6days at 6.5°C Most species of *C.botulinum* will grow very slowly at 10°C. and in some instances toxins may be formed at this temperature; in

general there is no growth or toxin formation at 5°C. although some strains of type B, E and F can grow and produce toxins at 3.5°C (Shirly .J.V. and Margy .W, 1999).

Unlike most organisms both *Yersinia enterocolitica* and *Listeria spp* can grow slowly at refrigerator temperature; this fact must be born in mind when it is necessary to store foods like to be contaminated with these organisms for prolong period at chill temperatures

Many other bacteria are able to increase slowly at chill temperatures, and under prolong domestic refrigeration at 4-5°C they will gradually spoil foods (Lewis .J.M, 1983). Milk for example will develop 'off' flavours and odours from the growth of bacteria better adapted to cold than those which grow and sour the milk at normal temperatures.

Foods at good bacteriological quality may be kept in satisfactory condition at 4°C for 3-4 days (Betty.C.C and Diane.R,1993). The education of food handlers in matter of food hygiene should include instructions in the correct use of refrigerator and cold rooms. In particularly they must be taught that the cleanliness and safety of refrigerated food stuff are dependent on the extent of bacterial contamination before refrigeration as well as on the temperature of refrigeration; also that extreme cold merely delays the growth and multiplication of the bacteria, which immediately renew their activity when the food is transferred to a warm room.

2.7.3. Deep freeze storage

The freezing the food stuff to approximately -18°C (0°F) kills many organisms, and the rate of death of reminder will depend partly on the temperature of the storage (Lewis J.M, 1983). From the food poisoning organisms salmonella group said to be killed most rapidly on freezing. They disappear in 1 month and staphylococci in 5 months. The spores of *C. perfingens* and *C. Botulinum* has considerable resistance to alternate freezing and thawing at a temperature as low as -50°C (Betty.C.C and Diane.R,1993). *Staphylococci* enterotoxin has shown to with stand a temperature of -18°C for several months (Betty.C.C and Diane.R,1993). Mould and yeast endure freezing conditions better than bacteria, thus refrigerators and freezers should be kept thoroughly cleaned and free from fungal and yeast growth in retail outlets.

2.8. New Developments

Probably the most fundamental change in retail trade in near future is growth in professionalism in retail food management. Profit margins are small so all outlets must be managed skilfully for maximum profit. Retail manager should be expecting to include sound hygiene as one of his prime objective. Packaging and production change has reduced the need of skilled product knowledge. Only correct temperature control and obedience to shelf life principles are required for quality maintenance. Management should have intimate knowledge of flow of goods through the premises (stock holding, wastage, through put etc..)There should be daily and weekly audits of hygiene, which will inevitably produce action lists; the skill manager would grade the urgency of these tasks. Skilled trade persons (butchers, bakers) should receive high level of training in relation to food handling. All the staff should receive basic training in following areas: personal hygiene; temperature control; cleaning procedures; foreign object control; infectious disease notification; first aid procedure

CHAPTER 03

3.0. Materials & Methods

- Firstly information gathered from MOH office by Medical officer of Health and Public health inspectors about what kind of food safety procedures are followed by them according to the Sri Lankan law (According to 1980 no 26 Food Act) in order to obtain background information (Appendix 3). A Gazette notification of No560/13 in 1989 specially concerned on hygiene of the retail outlets and hygienic conditions of the food handlers (Appendix 4) were also concerned also. Then discussions were carried with the PHIs to get a basic idea what kind of a service MOH & PHIs provide to the retail outlets to keep them in a good hygienic condition well as selling hygienic foods.
- Discussion group was conducted with the PHIs to get an idea of what kind of problems arise in the retail outlets regarding hygienic food handling practices, cleanliness of the retail outlets in the area, awareness of the food handlers about the hygienic food handling practices and attitudes of food handlers about cleanliness of the retail outlets.
- There were continuously collected data from the food establishments in the area in the Medical Officer of Health office. All these secondary data was analyzed statistically. (Appendix 6)
- A questionnaire & an observation sheet were designed considering areas such as personal hygiene of food handlers, dry storage, refrigeration storage, and freezer storage & garbage disposal in retail outlets. (Appendix 12)
- The questionnaire was presented to randomly selected 150 retail outlets and food handlers in Piliyandala area as well as the observation data sheet was filled observing the food handling practices well as cleanliness of the same retail outlet. When selecting 150 retail outlets stratified sampling was used. Among retail outlets 50 was grocery shops(boutiques),30 was restaurants & hotels,20 was

- bakery shops.15 was street vendors.3 was major retail outlets. 16 were meat & fish shops. 16 were vegetable only sold shops (Appendix13)
- Then a pilot testing was done using 10 retail outlets & their food handlers which were randomly selected.
- After collecting the data. data were statistically analyzed using statistical software as MINITAB.(Appendix 14)
- Another questionnaire was designed and administered for consumers of the food retail outlets to get a basic idea what kind of hygienic conditions they expect from the food retail outlets(Appendix 15)
- The gathered data was analysed.(Appendix 16)
- By using the information and data gathered checklist was designed suitable to food retail outlet which retail outlet owners can assess the hygienic condition within the retail outlet and can improve on weak areas.(Appendix 17)
- Leaflets & posters were designed which are suitable for different kind of food establishments to make the food handlers aware of the hygienic food handling practices (Appendix 18)
- Seminars were planned for retail food handlers to improve their awareness on hygienic food handling practices in retail outlets. Main areas concerned were personal hygiene. food storage. retail cleanliness and garbage handling which were covered through the check list and leaflets and posters.

CHAPTER 04

4.0. Results & Observations

4.1. Collected information about the systems in MOH

There is a well structured system in the MOH office to concern about Food Safety issues. Under officer of MOH there are PHIs working who are responsible for each divisional areas in Piliyandala region. They are routinely checking all the Food establishments to confirm that they are maintained up to the standards. When they are checking there is a data collection sheet which they note down the information (Appendix 5). They are checked whether they are complying with the Food Act in the country. In their Checking they concern on following areas:

When checking a food establishment they categorize them in to three groups.
"A" grade-Food establishments which are in good hygienic conditions
"B" grade- Food establishments which are in satisfactory in hygienic conditions
"C" grade- Food establishments which are not in a good hygienic conditions

When Food establishment is "A" graded PHI advice them to maintain the good hygienic conditions. They continuously check whether they are maintaining the good hygienic conditions in the food establishments.
When Food establishment is "B" graded PHI advice them to improve the hygienic conditions to a good level. They continuously check whether they are improving on the weaker areas of hygienic conditions in the food establishments. When Food establishment is "C" graded PHI is more concern about the Food establishment .He advice them about the problematic areas concern on the food hygiene of the food establishment & advice on how to overcome the problems & how to improve. They continuously check the food establishment to find out whether they have achieved the

satisfactory hygienic levels. If they are not trying to improve on the weaker areas PHI I s compelled to file a case against the food establishment in the Kasbawe courts under Criminal Act.

If PHI get an negative idea about the food establishment due to low hygienic conditions & if the foods look unhygienic, they collect food samples from the retail outlets. (Appendix 7).Then these food samples are sent to Government analyst for quality checking to check microbiological safety, moisture amounts, etc (Appendix 8). Water is sent to Medical Research Institute for quality checking (Appendix 9).A statement from the food sellers are taken to certify the food samples are collected by their retail outlets (Appendix 10). For each food there is a set of standard which is recommended by the government under food act. eg: for the bread. Then a detail report from the government lab will be sent to the PHI (Appendix 11) .If there are negative reports PHI I s compelled to file a case against the food establishment in the Kasbawe courts under Code of Criminal procedure act, No 15 of 1979.

Always PHI offices try to give a chance to the food establishment to improve the weak areas of food hygiene & if they are neglecting their responsibility he take action about it. If hygienic conditions so much low by checking the food for hygienic conditions by the government lab of conditions are very low they directly take an action over such places.

By the discussion group carried out with Public Health Inspectors were able to find that Food handlers and retail outlets owners are very corporative with them. Well as when they are instructed about the weakness areas in food hygiene in retail outlets they are willing to improve their food establishment without growing the case up to a court case. Most of the food handlers are aware about hygienic food handling practises but they are not practising them. This may be due to their attitude problems. Some food handlers are low in awareness in some areas of hygienic food handling practises.

4.2. Collected data by the MOH (Table 4.1)

	Criteria Checked (Food establishments)	Condition		
		Good	Satisfactory	Bad
1	Situated location and environment (Pollution in the place, smells in the area, free from animals such as fly, cockroaches, ants, dogs, cats, rats)	83.9%	16.1%	
2.	Building (Strength of the building, spaciousness, lightning, ventilation and maintenance)	94.6%	5.4%	
3.	Food preparation area (General cleanliness, walls, floors, ceiling, door, window, to protection of foods from contamination and spoilage)	87.5%	12.5%	
4.	Equipments (Cleanliness, maintenance of the equipments)	89.3%	10.7%	
5.	Food storage (Protection of food from foreign matter, insects and pollutants, storage of quick deteriorating foods in proper temperature, storage space and refrigeration storage)	91.1%	8.9%	
6.	Water supply (Source of water, adequate supply and water storage)	94.6%	5.4%	
7.	Waste controlling (Waste collection, storage, disposal and latrine facilities)	85.7 %	12.5 %	1.8%
8.	Foods (Appearance of the foods, merchandising, packaging, expiry dates, labelling, spoiled foods)	89.3%	10.7 %	
9.	Food handlers' personal sanitation (Personal hygiene, cleanliness of cloths, hair caps, mouth covers, medical reports in previous years)	91.2 %	8.9 %	
10.	Food handlers' training (figure)	14.3 %	82.1%	3.6%

- In food establishments when considering number of people working in the food establishments 30.4% food establishments has only one employee, 48.2% work with two employees, 10.7% work with only three employees, 7.1% work with four employees, 1.8% work with five employees and 1.8% food establishments has more than 10 employees
- Food establishment can be categorised in to A, B or C. From the checked food establishments 91% were in "A" category with good hygienic conditions.9% were in "B" category with satisfactory hygienic conditions

Figure 4.1

4.3. Collected data from retail outlets through questionnaire and Observation sheet

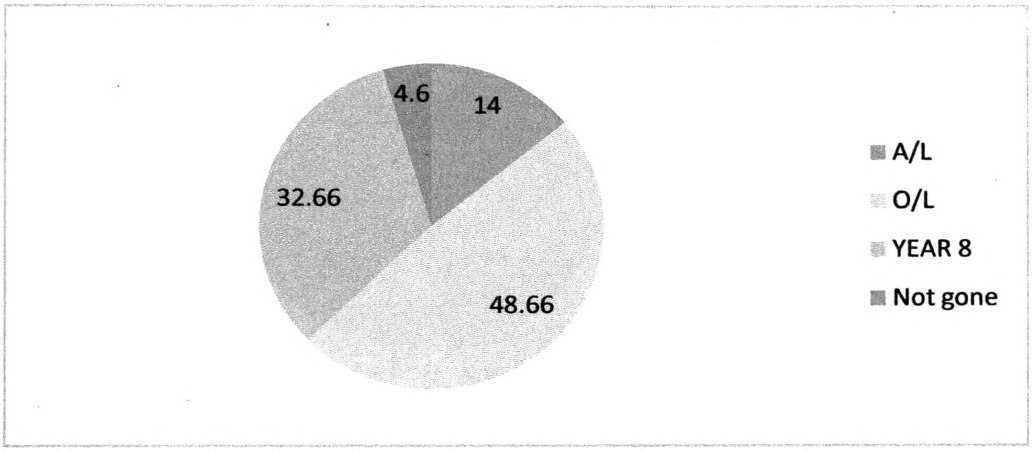
4.3.1. Collected data through questionnaire

- Hand washing practises were checked by questioner as the first question. Among food handlers in retail outlets 44% washes hands frequently in the day while they work in the retail outlets.

Figure 4.2

- All the food handlers (100%) told that they caught any kind of disease very rarely.
- Among food handlers in retail outlets 14% has educated up to their A/L,48.66% is educated up to O/L, 32.66 % has educated up to year 8, 4.6% has not gone to school.

Figure 4.3



- The number of times the food serving dishes or containers are cleaned was questioned by food handlers.88.8% told that they wash the dishes before they use them frequently.
- But other said they wash the dashers or containers for two times by 3.7% of food handlers and 7.5% said they wash them for three times a day.
- The number of times the waste is removed by the dust bin was questioned.77.3% food handlers said that they removed the waste bins when they are filled only.7.3% food handlers said they removed the waste in the bins routinely twice per a day & 15.4% said that they removed the waste in the bins routinely thrice per a day.
- Food handlers in retail outlets expressed (100%) that they would get advantages due to food safety practises. Among them 30 % told that sales have been increased, 14% told that profit has been increased26.6, % said that customer satisfaction has increased, 29.4% said that outlet has been popular due to that.
- How the food handlers got to know about food safety was questioned and 73.3% said that they was able to got to know via Public Health inspectors in the area,

13.3% said that they was able to got to know via television. 13.4% said that they was able to got to know via other people.

- Only 6.6% food handlers has got proper training over food handling and food preparation practises.93.4% food handlers has not got proper training about food handling practises.

Figure 4.4

4.3.2. Collected observation data

4.3.2.1. Personal sanitation of the food handlers

(Table 4.2)

	Criteria Checked (Food handlers)	Good	Bad
1.	Cleanliness of the food handlers' outer garments (dressings)	62.6%	37.4%
2.	Personal hygiene	66.6%	33.4%
3.	Cleanliness when foods are served	82%	18%

- Only one food handler was found who splits in the surrounding area where the food is sold. This is only 0.66% of total sample.
- No one was found taking foods or smoking while they handle the foods.

4.3.2.2. Hygienic conditions in food handling and packing

(Table 4.3)

	Criteria Checked (Food handling practises)	Done	Not done
1.	Packing of foods in packagers, pans or in containers	68%	32%
2.	Heaters are usage	0.02%	0.98%
3.	Touch the foods when they are offering the foods	95.4%	4.6%
4.	Touch the interior of the glasses or the interior of the food containers	81.4%	18.6%
5.	Quickly rotten or perishable foods kept in room temperature	0%	100%

4.3.2.3. Dry storage

(Table 4.4)

	Criteria Checked (Dry storage)	Done	Not done
1.	Cleanliness of the food stored racks	94%	6%
2.	Remove packing materials and litter was properly	76.2%	23.8%
3.	Food stored properly (orderly) (away from poisonous, pesticides and away from non food materials)	100%	0%
4.	Properly packing of bulk foods	56.4%	44.6%
5.	Storage of foods above the ground	70.4%	29.3%

4.3.2.4. Freezer storage

(Table 4.5)

	Criteria Checked (Freezer storage)	Done	Not done
1.	Orderly storage of the food products	67.1%	32.9%
2.	Properly clean and maintenance	45%	55%

4.3.2.5. Refrigerator storage

(Table 4.6)

	Criteria Checked (Refrigerator storage)	Done	Not done
1.	Storage conditions and orderliness maintenance	98%	2%
2.	Cleanliness inside the refrigerators	96.9%	3.1%
3.	Stored any rotten or spoiled foods	0%	100%

4.3.2.5. Cleanliness of the food served area

(Table 4.7)

	Criteria Checked (Cleanliness of the food served area)	Visible	Not Visible
1.	Food sold area cleanliness	84.6%	15.4%
2.	Flies and other insects	73.4%	26.6%
3.	Cleanliness of the tables and chairs	90.9%	9.1%
4.	After consuming the foods the dishes were cleaned and removed	77.3%	22.7%
5.	Containers kept on table such as sugar, sauce containers cleanliness	75%	25 %

4.3.2.6. Waste storage and disposal

- Cleanliness of the waste bin was examined. 8.6% of retail outlets waste was put even around the waste bin not only inside of the dustbin. 91.4% retail outlets waste was properly put only inside the waste bin.
- In 5 % of food retail outlets the waste bin was covered and in 94 % of food retail outlets waste bin was not covered.

By using statistical analysis package (MINITAB) analysis was done to find out which kind of factors had effect on hygienic food handling practises. Among the factors analysed there was an effect of food handlers education level on their hand washing frequency well as effect of food handlers' educational level on cleanliness of their dressings. By using statistical analysis package (MINITAB) analysis was done to find out which kind of factors had effect on cleanliness of the retail outlets. Among the factors analysed there was no effect of food handlers' education level on cleanliness of the retail outlet.

4.4. Collected data from consumers through questionnaire

By consumer questionnaire able to find out that all the consumers (100%) think that they can buy the entire food requirement by the piliyandala area. When buying the foods from retail outlets still 6% 0f the consumers only consider about only the cleanliness of the food not any other factors in retail outlets which affect the hygienic conditions of the food. 94% of the people consider both the cleanliness of the food well as cleanliness of the retail outlet.32% people consider the cleanliness of the food, cleanliness of the retail outlet and cleanliness of the people who handle foods.

CHAPTER 05

5.0. Discussions

Firstly by getting a thorough knowledge about activities conducted in Medical Officer of health office (MOH) by Public Health Inspectors (PHI) was able to identify that there is systematic procedures well organise to maintain food safety conditions in the Piliyandala area. Even though the systems are established regular checking of the food establishments was not done, there are some weaknesses in the system due to lack of motivation of government employees. Though there is a Food safety day in 17th September and a Food safety week preceding that general public and health authorities are mainly concern about food safety on that day only on other days only routine checking are done.

PHIs are frequently checking the food establishments & helping the food retailers to upgrade the hygienic conditions in the retail outlets through advising them about the areas wherethey are weak. People in the area are very cooperative & willing to accept advice & improve accordance with the regulatory standards. This is mainly due to unlikeness of food establishment owners create conflicts with the law not because they understand the true importance of hygienic food handling practises. There are less number of court cases (per year 10) generated in the area due to unhygienic food handling. PHIs are also not interested to create unnecessary issues with the people but like to work cooperatively with them. People in the area have basic idea about hygienic food handling practices.

Awareness of hygienic food handling practices is satisfactory but need to be improved. Hygienic conditions of the Food establishment are satisfactory well as the cleanliness of the retail outlets. PHI also has a good idea about even newly started food establishments & their hygienic conditions. Because there are newly created laws when start up food establishments should follow. By these laws it prevents generation of food hygiene practises from the start up of the business.

By analysing the collected data by MOH office regarding the hygienic conditions in food establishments some critical things were revealed. These collected data by MOH office

was mainly based on checking of the hygienic conditions of the food establishments not much of the hygienic food handling practises of food handlers in food establishments.
From the food establishments checked by MOH office location of food establishments and cleanliness of outside environment, building, food preparation area, equipments used, and also food storage conditions used were in good conditions in most food establishments. Food establishments' water supply sources were clean in conditions well as waste controlling was good in most retail outlets. Hygienic conditions of foods in the food establishments and food handlers' personal sanitation were good. Food handlers' training was the problematic area which found. Most of the food handlers have not got a proper training over hygienic food handling practises. If proper training was given to food handlers hygienic conditions of food establishments can be improved. In the food establishment checked most of them had less number of employees as one or two employees. When awareness programs designed government should take lead on them because due to less numbers of workers in retail outlets retail outlet owners are not much concern on the training aspects.
When food establishment are categorised according to hygienic conditions most of them are in good hygienic conditions (categorised to "A" group). By these results can say that hygienic conditions of the food establishments in Piliyandala area are good.

By the questionnaire presented to food retail outlet food handlers it was able to collect data mainly on the awareness well as attitudes of the food handlers in retail outlets about hygienic food handling practises. Among food handlers in retail outlets most of the food handlers washes hands frequently in the day while they work in the retail outlets. The term frequently may change from person to person as they express. But all the food handlers are aware that they should wash their hands thoroughly after using latrine facilities, when they start working in the morning and before handling foods. In between handling foods most of the food handlers wash their hands. This should be done with proper understanding why we wash the hands before touching the foods. The idea that hands could cross contaminate the foods should deliver properly to the food handlers. When hands are washed proper washing using soap is necessary. Food handlers were

aware they must use soap and how much its practise is questionable though they express they properly wash the hands.

Most of the food handlers had good education background. They have the ability to understand things easily. Using documented materials such as posters and leaflets will be easy when designing an awareness programs about hygienic food handling practises.

Food serving dishes or containers were cleaned frequently by most of the food handlers prior to use. If they are not cleaned properly cross contamination can occur and food borne illnesses may create.

Most of the food handlers said that they removed the waste bins when they are filled. This is a good practice whenever the waste bin is full waste should be removed or it will create unnecessary smells and cross contaminate the foods. But if until the waste bin is full if kept the waste bin for days is not a good practise for that routing waste disposal and keeping the waste bin clean is very important.

All the food handlers in retail outlets expressed that they would get advantages due to food safety practises. Food handler and owners have identified that food safety is importance for existence of their retail outlets in this competitive world. Attitudes of food handlers about hygienic food handling practices are very good. Because of that if a food hygiene awareness building program is designed food handlers will give their corporation.

Most of the food handlers got to know about food safety trough Public Health Inspectors in the area. They have worked hard to educate food handlers about food hygiene. Some food handlers got to know about food safety through television and by other people. When awareness building program about hygienic food handling practises done these mediam can be used effectively to communicate to the food handlers.

Very few numbers of food handlers has got proper training on food handling practises. This was revealed by the Medical Officer of Health office collected data also. Because of that proper training over hygienic food handling practises should be given to food handlers.

By observation data collected personal sanitation of the food handlers was analysed. Cleanliness of the food handlers' outer garments (dressings) was good condition in most

of the food handlers but some food handlers' dressings were unlearned. The cleanliness of the food handlers dressing can be improved more.

Personal hygiene was good in most of the food handlers but some of the food handlers' personal hygiene was bad. Personal hygiene of the food handlers can be improved in the areas of hair caps wearing, nails are keeping cut and cleaned.

Cleanliness when foods are served was good in most of food handlers but not good in few food handlers in retail outlets. This can be improved concerning on not touching the face and head and coughing when serving the foods. Cleanliness in food serving is important because it will prevent cross contamination of food stuff by humans.

When considered hygienic conditions in food handling and packing most of the foods in the retail outlets were properly packed in packagers, pans or in containers but some were not packed in containers. Foods must be packed in containers if not the foreign matters would be added to food well as cross contaminate and food borne micro organisms will enter to foods which cause food borne illnesses.

Heaters usage to keep the foods was very low in food retail outlets. This may be due to lack of awareness of food retailers or due to high expenses due to power usage. But if heaters are used foods can be kept in good hygienic conditions to prevent microbial growth.

When foods are served to customers most of food handlers touch the food when they are offering the foods but very few were not touch the food when they are offering the foods. They have used tongs, gloves or packing material to touch the food. Direct touching would cross contaminate the food with micro organisms which are in the hands causing food borne illnesses. Direct touching of the foods should be avoided.

Most of the food handlers were touching the interior of the glasses or the interior of the food containers or food trays but few not doing that. When food handlers touching the interior of the glasses or food trays their hands can cross contaminate the food products by micro organisms which cause food borne illnesses. Because of that touching the interior of the glasses or food trays must be avoided.

In dry storage packaged foods stored racks cleanliness were good in most of the retail outlets only in few it was not in satisfactory condition. To bring this to a satisfactory condition cleaned the dust in racks and packagers removing can be done. This will

prevent cross contamination of foods in retail outlets. Packaging material and litter removal was properly done in most of the retail outlets.

Most of the food retail outlets o bulk foods were stored in different containers properly packed and in some retail outlets this was not visible. Bulk foods should be properly packed and labelled in different container. If not properly packed insects tend to grow well as there are possibilities to cross contaminated by humans.

In most of the food retail outlets all the foods were stored above the ground and in some retail outlets this was invisible. If foods are stored on the ground it can be cross contaminated with the soil borne micro organisms so all foods should store above the ground.

In freezer storage most of the retail outlets foods were stored in an order manner and some of retail outlets foods were not stored in orderly manner in the freezer. This can be improved by providing good and preventing over packed in the freezer and storing foods separately. It would prevent rotten of the foods quickly well as cross contamination.

Most of the retail outlets freezers were not properly cleaned and maintained. Smells and frosting were visible in many freezers. Cleanliness is important to prevent cross contamination well as due to frosting internal temperature may be increase. Due to improper maintenance temperature controlling may be not working. Because of the above reasons cleanliness and maintenance of the freezer is important.

Storage conditions and orderliness of foods storage within the refrigerator was good in most of the retail outlets. This is important to prevent cross contamination. This can be improved by storing packed foods separately.

Cleanliness inside the refrigerators was in good condition in most of the retail outlets. This is important to prevent cross contaminations. This can be improved by properly cleaning preventing nesting of different kinds of smells in retail outlets.

Most of the food retail outlets food sold area was cleaned but in some retail outlets food sold area was dirty. Keeping the food sold area clean is important to prevent cross contamination of foods via humans well as other insects like flies. Conditions in the food retail outlet can be improved by cleaning the package materials which visible in floors and cleaning of the restaurants left over foods and serviettes visible on the floor.

In most of the food retail outlets flies and other insects were visible. They can cross contaminate the foods so prevention of growth of these insects is important.

In most of the retail outlets which has facilities to consume foods in the premises tables and chairs were cleaned but in few food retail outlets they were not clean. If they are not clean left over foods and liquids can cross contaminate the foods.

After consuming the foods the dishes were cleaned and removed in most of the food retail outlets but they were removed and not cleaned in some food retail outlets were observed. Food dishes kept unclean for long time difficult to clean afterwards and not properly cleaned. So these can cross contaminate the other food products. Cleaning the dishes as soon as consumers finishes taking the foods are more advisable.

Containers kept on table such as sugar, sauce containers cleanliness was not good in many retail food establishments only few was in good condition. Because of the dirtiness of the containers cross contaminations can occur when these containers are re filled. Cleanliness of the containers is very important.

Waste storage and disposal in retail outlets were good in many food retail outlets using a waste bin properly and putting the waste inside to it. But in few retail outlets litter and waste was put even around the waste bin and this would cause cross contamination of foods via insects like flies. Waste bin was not covered in most of the food retail outlets so the foods can be cross contaminated via insects like flies due to open waste bins. So all the waste bins should be closed properly to prevent cross contamination.

By statistically analysed data via MINITAB found out there is an effect of education level on hand washing practises well as on cleanliness of dressings. This may be due to knowledge they are using in retail outlets and day to day life is basically attained through their education and most of them has not got any proper training on hygienic food handling practises. But there were no effect of food handlers' education level on cleanliness of the retail outlet. This may be because retail outlet is a place where lot of workers work and their knowledge might be different and though they concern more on personal hygiene they may less concern on the cleanliness of the retail outlet.

By the questionnaire presented to consumers was able to find out that all the consumers think that they can buy the entire food requirement by the Piliyandala area. When buying the foods from retail outlets few of the consumers only consider about only the cleanliness of the food not any other factors in retail outlets which affect the hygienic

conditions of the food. Some people are considering cleanliness of the retail outlet, cleanliness of the people who handle foods and their hygienic conditions and storage conditions. If customers are demanding more hygienic conditions from the food retail outlets no doubly the hygienic conditions of the retail outlets will improve by the retail shop owners.

According to the all the findings by Office of Medical Officer of Health, retail outlets data collected via questioner and observations and by consumer questioner was able to get a fair knowledge about awareness of food handlers about hygienic food handling practices, their attitudes towards hygienic food handling practices and cleanliness of retail outlets.

Due to low awareness in certain areas of hygienic food handling practices of food handler in retail outlets an awareness building program was designed to educate food handlers about hygienic food handling practises.

CHAPTER 06

6.0. Conclusions and Recommendations

Sri Lanka most of the people get food borne illnesses but reported cases are less. Even though reported cases are less we must ensure that the foods we are consuming are safe. Foods can be contaminated in any stage in supply chain from production to consumption. Among these foods safety in food retailing is very important.

In food retailing, understanding the food handlers' awareness and attitudes of the hygienic food handling practises are important to maintain the food safety in retail sector. A good knowledge about the hygienic conditions of the retail outlets are also important to maintain food safety in those retail outlets.

Personal hygiene of food handlers was not up to satisfactory level. Food borne illnesses can transmit from person to food due to lack of personal hygiene. Because of that improvement of personal hygiene in food handlers is important.

Food storage in retail outlets in terms of dry storage is satisfactory but refrigeration and freezer storage should be improved.

Cleanliness of the place where the foods sold was satisfactory but conditions should be monitored frequently using the checklist.

Garbage disposal systems were satisfactory but need improvement in waste storage areas.

No training is given to the food handlers working in retail outlets. Food handlers are the direct source for transmission of food born diseases. Proper training to food handlers is important.

Attitudes of the consumers in Piliyandala area with respect to food hygiene were poor.

By PHIs in the area got to know that food handlers and retail outlets owners are very co operative. They are willing to improve the hygienic conditions in their retail outlets and this is important because it is easy to plan a food safety awareness building campaign.

Food safety awareness program should be build through the MOH office using the skills and knowledge of the PHIs which are more accepted by the retail community.

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Appendices

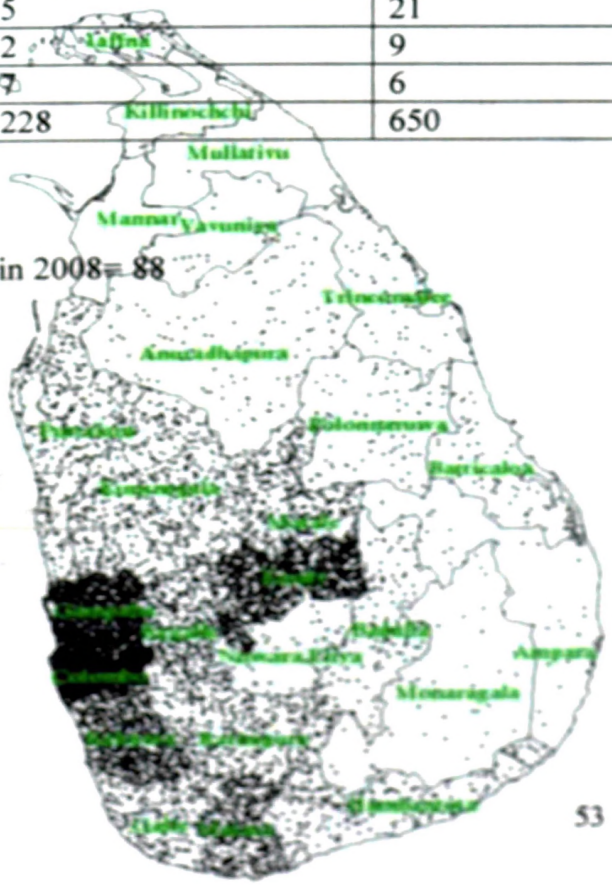
Appendix 1

SUMMARY OF FOOD POISIONING IN 2008 IN SRI LANKA

Region	1ST QUARTER 2008	2ND QUARTER 2008	3RD QUARTER 2008
Colombo	56	6	26
Gampaha	65	1	32
Kalutara	15	1	4
Kandy	22	17	49
Matale	2	2	6
Nuwara Eliya	107	3	56
Galle	42	1	0
Hambantota	6	1	5
Matara	2	0	4
Jaffna	2	6	7
Kilinochchi	0	0	4
Mannar	0	0	0
Vavuniya	6	7	6
Mullaitivu	0	12	1
Batticaloa	17	2	7
Ampara	0	0	283
Trincomalee	1	11	2
Kurunegala	2	11	10
Puttalam	3	18	5
Anuradhapura	4	1	4
Polonnaruwa	4	2	15
Badulla	1	12	82
Moneragala	10	100	6
Ratnapura	42	5	21
Kegalle	0	2	9
Kalmunai	3	7	6
Total	412	228	650

Total Food poisoning cases in 2008= 1290

Colombo District Total Food poisoning cases in 2008= 88



Appendix 2

Sources and control of food poisoning bacteria

Source	Public Health Control	Laboratory Control
Salmonella		
Animal Stools, coats, hooves, paws	Rearing method Feeding stuff Farm hygiene Slaughterhouse hygiene	Diagnosis media for stool samples, swabs and foods Bacterial counts on foods and feeds Biochemical tests Seriological and bacteriophage typing
Food stuff (animal origin) Meat and poultry, Feeding stuff for animals, Egg products, raw milk	Hygiene of production Treatment to render the storage	
Environment of food preparation	Cleaning of equipment, utensils and storage	
Water for drinking and preparation of food	Treatment by filtration and chlorination	
Human stools .hand	Care of handling foods Avoidance of cross contamination from raw to cooked foods Personal hygiene	
Staphylococcus aureus		
Human Nose, throat, hands, skin, lesions	Care in handling foods Storage of cooked foods Personal hygiene and habits	Domestic media for swabs and foods Bacteriological counts on foods
Animal Cow, goat	Care of mastitis	Coagulation test Bacteriophage and seriological typing
Food Stuff (dairy) Milk, cheese, cream	Hygiene of milk production Heat treatment of milk Intended to drinking and for cream and cheese	Entero toxins detection By immunological techniques
Clostridium prefringens		
Food stuffs Meat and poultry Dehydrated foods	Cooking and cooling techniques Storage of cooked foods	Diagnostic media for stool samples and food Bacteriological counts on food
Environment Of food preparation (food and dust)	Cleanliness of equipments and surfaces	*C perfringens* counts on stools
Human stools		Sereological typing Enterotoxin testing

Animal Stools and dust		
Clostridium botulinium		
Soil and mud Fish Food stuffs Fish, meat and vegetables	Processing and cooking	Toxic identification (neutralization test in mice) Diagnostic media
Bacillus cerus and other Bacillus spp		
Food stuff(cereals) Dust and soil	Storage after cooking Cleanliness of the environment	Diagnostic media Bacteriological counts on foods Serological typing Toxin detection
Vibrio parahaemolytics		
Sea foods	Warning against eating raw fish and other sea foods Avoidence of cross contamination from raw to cooked sea foods	Diagnostic media Bacteriological counts on foods Serological typing
Campylobacter jejuni		
Animals	Pasteurization	Diagnostic media
Water	Chlorination	Serological typing
Food stuff **Milk,poultry**	Hygiene of production	
Listeria monocytogenes		
Food stuff Raw and cooked plant and animals	Hygiene of production Treatment to render safe storage	Diagnostic media Bacteriological counts on foods Serological and bacteriophage typing
Environment of food preparation	Cleanliness of equipments and surfaces	Swab culture
Yersinia enterocolitica		
Food stuffs Raw and cooked	Hygiene of production Treatment to render safe storage	Diagnostic media Bacteriological counts on foods Serological typing
Environment of food preparation	Cleanliness of equipments and surfaces	
Other organisms, e.g.*Streptococci*		
Humans Animal Food stuff	General care in food storage	Diagnostic media Bacteriological counts on foods Serological typing

Appendix 3

Food Act, No. 26 of 1980

[Certified on 17th July, 1980]

L. D.—O. 61/78.

AN ACT TO REGULATE AND CONTROL THE MANUFACTURE, IMPORTATION, SALE AND DISTRIBUTION OF FOOD, TO ESTABLISH A FOOD ADVISORY COMMITTEE, TO REPEAL THE FOOD AND DRUGS ACT (CHAPTER 216) AND TO PROVIDE FOR MATTERS CONNECTED THEREWITH OR INCIDENTAL THERETO.

BE it enacted by the Parliament of the Democratic Socialist Republic of Sri Lanka as follows :—

Short title and date of operation.

1. This Act may be cited as the Food Act, No. 26 of 1980, and shall come into operation on such date as the Minister may appoint by Order published in the *Gazette*.

PART I

PROHIBITION IN RESPECT OF FOOD

Prohibition on manufacture importation, sale and distribution of food.

2. (1) No person shall manufacture, import, sell or distribute any food—

(a) that has upon it any natural or added deleterious substance which renders it injurious to health ;

(b) that is unfit for human consumption ;

(c) that consists in whole or in part of any unclean, putrid, repugnant, decayed, decomposed or diseased animal substance or decayed vegetable substance or is insect infested ;

(d) that is adulterated ;

(e) that has in or upon it any added substance in contravention of the provisions of this Act or any regulation made thereunder ; or

(f) in contravention of the provisions of this Act or any regulation made thereunder.

(2) No person shall manufacture, prepare, preserve, package or store for sale any food under insanitary conditions.

(3) No person shall import, sell or distribute any food manufactured, prepared, preserved, packaged or stored for sale under insanitary conditions.

Labelling, packaging, advertising, &c.

3. (1) No person shall label, package, treat, process, sell or advertise any food in a manner that is false, misleading, deceptive or likely to create an erroneous impression regarding its character, value, quality, composition, merit or safety.

(2) Any food that is not labelled or packaged as required by the regulations made under this Act or is labelled or packaged contrary to such regulations shall be deemed to be labelled or packaged contrary to subsection (1)

Where standard is prescribed.

4. Where a standard is prescribed for any food, no person shall label, package, sell or advertise any food which does not conform to that standard in such a manner as is likely to be mistaken for the food for which the standard has been prescribed.

Sale for purposes other than human consumption of food rendered unfit for human consumption.

5. No person shall offer for sale, expose for sale or sell for use as animal food or for other purposes any food which has been spoilt or rendered unfit for human consumption except with the permission of, and in accordance with the directions issued by the Chief Food Authority or such other person authorized by him in writing in that behalf.

Warranty

6. (1) No manufacturer or a distributor of or a commission agent or a dealer in any food shall sell such food to any vendor unless he also gives that vendor a warranty in the prescribed form in respect of the nature substance and quality of that food.

(2) A bill, cash memorandum or invoice, in respect of the sale of any food given by a manufacturer or distributor of or a commission agent or a dealer in any such food to the vendor of that food, shall be deemed to be a warranty under the preceding provisions of this section in respect of that food, if such bill, cash memorandum or invoice contains a description of the nature, substance and quality of that food.

(3) No manufacturer or distributor of, or a commission agent or dealer in, any food shall under subsection (1) give a warranty which is false.

Licensing.

7. (1) No person shall manufacture, prepare, preserve, package, store or sell any food in any premises unless such premises has been licensed by the relevant Food Authority who shall be the licensing authority.

(2) No person shall manufacture, prepare, store or sell or distribute any food unless he is the holder of a licence authorizing him to manufacture, prepare, store or distribute any food otherwise than in accordance with the terms and conditions of such licence.

Appendix 4

ශ්‍රී ලංකා ප්‍රජාතාන්ත්‍රික සමාජවාදී ජනරජයේ ගැසට් පත්‍රය

අති විශෙෂ

The Gazette of the Democratic Socialist Republic of Sri Lanka

EXTRAORDINARY

අංක 560/13 - 1989 ජූනි 02 වැනි සිකුරාදා - 1989.06.02

No. 560/13 — FRIDAY, JUNE 02, 1989

(Published by Authority)

PART I: SECTION (I) — GENERAL

Government Notifications

L.D.—H. 11/60

FOOD ACT, No. 26 OF 1980

REGULATIONS made by the Minister of Health in consultation with the Food Advisory Committee under Section 32 of the Food Act.

Dr. RANJIT ATAPATTU,
Minister of Health.

Colombo,
27th December, 1988.

Regulations

1. These regulations may be cited as the Food Regulations, 1988, and shall come into operation on the 1st of July, 1989.

PART I

Premises relating to the preparation, storage or sale of food

2. Every person including the owner and the manager engaged in the preparation, storage or sale of food intended for human consumption shall ensure that the premises or part thereof used for the purpose is so constructed that the windows, internal walls, floors, ceiling, wood-work and all other parts of the building are maintained in good order and repair so as to facilitate cleanliness and to prevent as far as practicable, infestation by rats, mice, insects and birds.

3. Sufficient light and ventilation to conform to the Urban Development Act or to the Housing and Town Improvement Ordinance in areas where they are in force shall be provided, in the rooms which are artificially ventilated or where air conditioning is provided.

4. Where any food is prepared, stored or exposed for sale in any premises or part thereof—

(a) no sanitary convenience, dust-bins or open drains shall be within, or communicate directly with that section of the premises ;

(b) the gutters for the exit of waste water from within the premises, shall be so constructed with due provision of traps or screens to prevent the entry of rodents and other vermin ;

(c) no fresh air inlets or any ventilation pipe connected to a drainage system shall be situated in the premises unless such intake is properly trapped ;

(d)-(i) no refuse or filth whether solid or liquid shall be deposited or allowed to accumulate in the premises ;
(ii) no dogs, cats or other animals or birds shall be kept in such premises.

(e) all necessary steps shall be taken to prevent the risk of contamination of food by dust, dirt, flies and foul odours or by customers touching such food.

5. There shall be provided within the premises adequate sanitary facilities, adequate hand washing facilities, including warm water, soap or other detergent and clean towels for the use of persons employed in the premises and of customers.

6. The premises used in connection with the preparation of food, or the sale of such food, shall be provided with an adequate supply of water, conforming to the specifications which covers the quality of potable water as provided for by the Sri Lanka Standards Institution Act, No. 6 of 1984.

7. No person shall use as a sleeping place premises intended for use in the preparation or preparation of food for human consumption. No sleeping place adjoining such premises shall communicate with such premises except through an intervening ventilated space.

PART II

Cleanliness of articles and equipment ; accommodation for clothing, etc., and furniture for washing food and equipment

8. (1) All articles or equipment with which food comes into contact, shall be kept clean, and with the exception of non returnable containers, shall be so constructed of such materials and be kept in such good order, repair and condition as to be—

(a) facilitate thorough cleaning ;
(b) prevent as far as is reasonably practicable, any contaminating matter being absorbed or accumulated,
(c) prevent any risk of contamination of food.

(2) All containers intended for containing food in the process of preparation whether or not they come into contact with such food, shall be protected and kept free from contamination.

4 A

9. No person shall use in connection with the preparation of food or the sale of such food any utensil which is worn out, cracked, corroded or in such a condition that it cannot be cleaned clean and sanitary by washing.

10. (1) Subject to any certificate of exception by a Food Authority every person engaged in the handling of exposed food, shall be provided with proper accommodation within the premises for clothing and footwear not worn during working hours.

(2) Such clothing and footwear shall not be kept in any place on or about the premises other than in the place provided for such purpose.

(3) Where such accommodation is situated in a food room it shall be in the form of lockers and cupboards.

11. Every person engaged in the preparation of food, shall provide in any premises where exposed food is handled suitable and sufficient washing facilities including sinks for the washing of food and equipment used in such preparation.

PART III

Food to be protected from risk of contamination

12. Every person engaged in the handling of food intended for sale shall, while so engaged, take all such steps to protect the food from the risk of contamination, and in particular—

(a) shall not place the food in any place where there is a risk of contamination ;

(b) shall ensure that any food kept within the premises for sale is not unfit for human consumption ;

(c) shall ensure that all food kept within the premises or about the fair ground or yard of the premises or in any stall outside, thereto, hawked or kept, shall not be placed below eighteen inches from above the level of the ground, unless such food is adequately protected from contamination ;

(d) shall ensure that food while exposed for sale or during sale or delivery, is kept covered or is otherwise effectively protected from possible contamination ;

(e) shall not keep in any premises where food is stored or exposed for sale any animal food, disinfectant, liquid detergent, weedicide, pesticide, insecticide or fungicide or any other form of poisonous substance, unless it is in a container of such material and so sheeted as to prevent the risk of contamination. All such substances shall be stored away from the food.

(f) shall ensure that meat products, fish products and poultry be not stored with other food in the same refrigeration chamber so as to cause any risk of contamination.

Personal Cleanliness

13. Every person engaged in the handling of food intended for sale shall while so engaged—

(a) keep cautions on regularly all parts of his person which are liable to come into contact with the food ;

(b) keep clean all parts of his clothing or over clothing which are liable to come into contact with the food ;

(c) keep any open cut or abrasion on any exposed part of his person covered with a suitable waterproof dressing ;

(d) refrain from spitting ;

(e) refrain from the use of tobacco or any other smoking mixture or snuff, or the chewing of betel while he is handling any exposed food or while he is in any premises in which there is exposed food.

PART V

Clothing for persons handling exposed food

14. (1) Every person engaged in the handling of exposed food, other than raw vegetables shall while so engaged wear sufficient, clean and washable over clothing.

(2) Every person who comes in contact with exposed food which is liable to come into contact with his body, neck or head shall while so engaged wear clean and washable covering over his body, neck and head.

15. No person who is suffering or has recently suffered from any infectious, contagious or cutaneous disease, or has been recently in attendance on any person suffering from any such disease, shall take any part in the preparation or handling of food intended for sale, or in the sale of such food until the periods of infection or incubation has elapsed.

16. Whenever any person engaged in the handling of food becomes aware that he is suffering from, or is a carrier of, or has been in contact with a person having any infection, contagious or cutaneous disease he shall immediately inform his employer of that fact, and such employer shall immediately convey such information to the Medical Officer of Health of the relevant food authority. Where the person required to give such information is himself the person supplying on the business, such person shall himself give that information to the food authority.

17. (1) Every person who works in any establishment where food is processed, manufactured or served to the public in the capacity of a food handler, and every person engaged in the transport of food shall be medically examined by a Medical Officer registered under the Medical Ordinance (Chapter 105 and certified fit, prior to his employment in such capacity.

(2) For the purposes of paragraph (1) the relevant food authority shall issue to such person in writing a certificate of fitness.

18.—(1) Whenever the Food Authority requires a specific or routine examination or when clinically or epidemiologically such examination is considered necessary—

(a) every person who works in the capacity of a food handler in any establishment where food is processed or manufactured, or served to the public ; and

(b) every person engaged in the transport of food shall submit himself to an examination by a Medical Officer registered under the Medical Ordinance.

(2) The Medical examination referred to in paragraph (1) of regulation 17 and paragraph (1) of regulation 18, shall comprise of tests and examinations as set out below :—

(*a*) Physical examination for skin ailment,

(*b*) a stool culture test where the trade is in Ice Cream, Milk or Milk Products.

(3) For the medical examination referred to in paragraph (1) of regulation 17 and paragraph (1) of regulation 18, the relevant food authority shall be entitled to charge a fee for such medical examination. A part of such fee shall be paid to the medical officer who perform such examination.

PART VI

Wrapping an Transportation of Food

19. Every person engaged in the handling of food intended for sale shall not while so engaged—

(*a*) carry any food in a container together with any article from which there is a risk of contamination of the food, or with any live animal or live poultry, without taking all such precautions so as to avoid the risk of contamination ;

(*b*) use for wrapping or containing any exposed food any paper or other wrapping material or container which is not clean or which is liable to contaminate the food, and shall not allow any printed material for wrapping or containing food to come into contact with any food other than uncooked food.

PART VII

Interpretation.

20. In these regulations—

"act" means the Food Act, No. 26 of 1980 ;

"food" has the same meaning as in the Act ;

"handling" means any stage in the transit of food from the places of manufacture or other source of origin to the consumer

"relevant Food Authority" has the same meaning as in the Act ;

Appendix 5

H-800 (සංශෝධිත)

ආහාර පරිහරණ ව්‍යාපාර - පරීක්ෂණ වර්ගීකරණ ආකෘති පත්‍රය

වෙළඳ ස්ථානයේ නම සහ ලිපිනය.............................. ම.සෞ.ප. කොට්ඨාශය..............................

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ගොඩනැගිල්ලේ අයිතිකරුගේ නම.............................. සේවක සංඛ්‍යාව..............................

ව්‍යාපාරය අයිතිකරුගේ නම.............................. පළාත් පාලන ආයතනයේ අනුමැතිය ඇත/නැත

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වෙළඳ ස්ථානයේ ස්වභාවය ආහාර නිෂ්පාදන, බේකරිය, හෝටල්, ආපනශාලා, ස්නැක් බාර්, තේ කඩ කෝපි කඩ, සිල්ලර වෙළඳසැල් වෙනත්

වර්ගීකරණය ලකුණු	සතුටුදායකයි	සාමාන්‍ය	අසතුටුදායකයි
	7 - 10	4 - 6	0 - 3

	වර්ගීකරණය	ලකුණු
1. පිහිටීම සහ පරිසරය ස්ථානයේ දූෂිත වීමෙන් දුගඳින් සහ සතුන්ගෙන් තොරවීම (මැස්සන්, කැරපොත්තන්, කුහුඹුවන්, බල්ලන්, බළලුන්, මීයන් සහ වෙනත්)		
2. ගොඩනැගිල්ල ශක්තිමත් බිමැදුම්, ප්‍රමාණවත් ඉඩපහසුකම්, ආලෝකය සහ වාතාශ්‍රය [illegible], නඩත්තු කිරීම		
3. ආහාර පිළියෙල කරන ස්ථානය සාමාන්‍ය පවිත්‍රතාවය, බිත්ති, පොළව, සිවිලිම, දොර, ජනෙල් ආදිය ආහාර දූෂණය වීමෙන් සහ සතුන්ගෙන් ආරක්ෂා කිරීම		
4. උපකරණ පවිත්‍රතාවය නඩත්තු කිරීම, පලිබෝධයන්ගෙන් වළක්වාලීම		
5. ආහාර ගබඩා කිරීම ආහාර දූෂණය වීමෙන් සහ කෘමි උවදුරෙන් ආරක්ෂා කිරීම, ශීතකරණයේ තබනවිට ආහාර සුදුසු උෂ්ණත්වයේ ප්‍රමාණවත් ඉඩකඩ සහිතව ගබඩා කිරීම (ශීතකරණ)		
6. ජල සැපයුම සතුටුදායක ප්‍රභවය, ප්‍රමාණවත් සැපයුම් ජලය ගබඩා කිරීම		
7. අපද්‍රව්‍ය පාලනය ඝන අපද්‍රව්‍ය එකතු කිරීම, ගබඩා කිරීම, බැහැරලීම, වැසිකිලි පහසුකම්		
8. ආහාර ද්‍රව්‍ය බාහිර පෙනුම, ඉදිරිපත් කර ඇති ආහාර, ඇසුරුම්, කා.ඉ.දි., ලේබල්, කල් ඉකුත් ආහාර, වෙනත්		
9. ආහාර පරිහරණය කරන්නන්ගේ සෞඛ්‍ය තත්වය පුද්ගලික සෞඛ්‍ය, ඇඳුම්වල පවිත්‍රතාවය, හිස්වැසුම්, මුඛවැසුම්, [illegible] වෛද්‍ය පරීක්ෂණ වාර්තා ඇත්ද යන වග		
10. ආහාර පරිහරණය කරන්නන් පුහුණුවක් ලබා තිබීම		
A: 70-100%, B: 31-69%, C: 0-30% — එකතුව		

පරීක්ෂාකරණ නිලධාරියාගේ
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තනතුර ....
අත්සන ....
දිනය ....

ව්‍යාපාරිකයාගේ/ අයිතිකරුගේ අත්සන ....
නම ....

Appendix 6

Data Gathered by the Medical Officer of Health Office in Piliyandala by Public Health Inspectors about Hygienic Conditions in Food Establishments

- Checked statements in food establishments (Horizontal axis in the table)

1. situated location and environment
2. Food establishments building
3. The food preparation area
4. Equipments
5. food storage
6. water supply
7. Waste controlling
8. Foods
9. Food handlers' personal sanitation
10. Food handlers' training
11. Percentage given according to Hygienic conditions in establishments

- Food establishments checked (vertical axis)
- Categorization rating given for checked statements from 1-10
  - 7-10 good hygienic condition
  - 4-6 satisfactory hygienic condition
  - 0-3 poor hygienic condition
- Percentage given according to Hygienic conditions in establishments
  - 70-100% - "A" category
  - 31-69% - "B" category
  - 0-30% - "C" category

Appendix 6:

Data Gathered by the Medical Officer of Health Office in Piliyandala by Public Health Inspectors about Hygienic Conditions in Food Establishments

2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
8	8	8	8	8	6	4	8	6	9	7	8	6	8	8	8	5	9	8	8	8	8	8	9	8	8	8
8	8	9	8	9	6	7	8	8	8	7	8	7	9	8	9	6	9	8	8	8	8	8	9	8	8	8
8	8	8	8	9	6	7	8	8	8	8	6	7	8	8	8	4	9	8	6	7	8	8	9	8	8	8
8	8	8	8	8	8	6	8	7	9	8	6	7	7	8	8	6	8	8	8	9	8	8	9	8	8	8
8	8	8	8	8	8	6	8	7	9	8	7	8	8	8	4	6	8	8	8	8	8	8	9	8	8	8
8	8	8	8	8	8	7	8	8	9	8	8	8	8	8	8	6	8	8	8	9	8	8	8	8	8	8
8	8	8	8	8	8	6	8	8	9	8	3	8	5	8	8	6	6	8	8	9	8	8	8	8	8	8
8	9	8	8	8	8	6	8	9	9	8	6	8	8	8	9	6	8	8	8	8	8	8	8	8	8	8
8	8	8	8	8	7	5	8	8	9	8	8	8	6	8	7	6	8	8	8	8	8	8	8	8	8	8
8	6	6	5	3	4	4	6	6	6	3	8	6	6	5	4	6	6	6	5	6	6	8	6	6	6	4
80	79	79	77	77	68	58	78	75	85	73	65	73	73	77	71	65	79	78	75	70	78	78	73	78	78	76

30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
8	8	8	8	8	8	8	8	8	8	8	8	9	8	8	9	8	8	6	8	7	8	6	8	8	6	8
8	8	8	8	8	8	8	8	8	8	8	8	9	9	9	9	8	9	8	8	7	9	8	9	9	8	8
8	8	8	8	8	8	8	8	8	8	8	8	9	9	9	9	8	9	6	8	7	9	5	9	9	5	8
8	7	8	8	8	8	8	8	8	8	8	8	9	9	9	9	8	10	8	8	6	9	5	9	9	5	7
8	8	7	8	8	8	7	8	8	8	8	8	9	9	9	9	8	9	6	8	7	9	5	9	9	5	8
8	8	8	8	8	8	7	8	8	8	8	8	9	99	9	9	8	9	8	8	8	9	8	6	9	8	8
8	8	8	8	8	8	7	8	8	8	8	8	9	9	9	9	8	9	6	8	8	9	5	9	9	5	8
8	4	8	8	8	8	8	8	8	8	8	8	9	9	9	9	9	9	8	9	8	9	5	9	9	5	8
8	8	8	8	8	8	8	8	8	7	8	8	9	9	9	9	9	9	8	9	8	9	5	9	9	5	8
6	5	6	6	5	6	6	6	6	6	6	6	9	8	6	6	6	10	6	6	6	5	5	6	5	5	4
78	72	77	78	77	78	75	78	78	77	78	78	90	88	86	87	80	91	70	80	74	85	56	83	85	56	75

Appendix 7

1980 අංක 26 දරණ ආහාර පනත යටතේ සාම්පල් ලබා ගැනීම

1 සාම්පල් අංකය..
2 සාම්පලයේ ස්වභාවය..
3 සාම්පලය ලබා ගත් දිනය හා වේලාව..

4 සාම්පලය ලබා ගත් ස්ථානය..

....

5 සාම්පලය ලබා ගත්තේ තැනැත්තා හෝ ආයතන ලිපිනය..
6 පරීක්ෂණ ද්‍රව්‍ය වශයෙන් යෙදේ ද යන වග..

....
වෙළෙන්දාගේ අත්සන හා මුද්‍රාව .... සාම්පල ගත් නිලධාරී හා තැනැත්තා හෝ ආයතන ලිපිනය

1980 අංක 26 දරණ ආහාර පනත යටතේ සාම්පල් ලබා ගැනීම

1 සාම්පල් අංකය..
2 සාම්පලයේ ස්වභාවය..
3 සාම්පලය ලබා ගත් දිනය හා වේලාව..

4 සාම්පලය ලබා ගත් ස්ථානය..

....

5 සාම්පලය ලබා ගත්තේ තැනැත්තා හෝ ආයතන ලිපිනය..
6 පරීක්ෂණ ද්‍රව්‍ය වශයෙන් යෙදේ ද යන වග..

....
වෙළෙන්දාගේ අත්සන හා මුද්‍රාව .... සාම්පල ගත් නිලධාරී හා තැනැත්තා හෝ ආයතන ලිපිනය

1980 අංක 26 දරණ ආහාර පනත යටතේ සාම්පල් ලබා ගැනීම

1 සාම්පල් අංකය..
2 සාම්පලයේ ස්වභාවය..
3 සාම්පලය ලබා ගත් දිනය හා වේලාව..

4 සාම්පලය ලබා ගත් ස්ථානය..

....

5 සාම්පලය ලබා ගත්තේ තැනැත්තා හෝ ආයතන ලිපිනය..
6 පරීක්ෂණ ද්‍රව්‍ය වශයෙන් යෙදේ ද යන වග..

....
වෙළෙන්දාගේ අත්සන හා මුද්‍රාව .... සාම්පල ගත් නිලධාරී හා තැනැත්තා හෝ ආයතන ලිපිනය

Appendix 8

අනුමත රස පරීක්ෂක / අතිරේක අනුමත රස පරීක්ෂක වෙත යැවෙන සන්දේශය

අංකය .... ස්ථානය ....

....

....

දිනය..

.... මහජන සෞඛ්‍ය පරීක්ෂක.. ගෙන්
අනුමත රස පරීක්ෂක / අතිරේක අනුමත රස පරීක්ෂක / ....වෙත

1- පහත විස්තර කර ඇති සාම්පලය 1980 අංක 26 දරණ ආහාර පනතේ 16 වන වගන්තිය යටතේ පරීක්ෂා කිරීම / විශ්ලේෂණය කිරීම සඳහා මේ සමග ඉදිරිපත් කරමි. පරීක්ෂා කිරීමෙන් / විශ්ලේෂණය කිරීමෙන් පසුව රස පරීක්ෂකගේ වාර්තාව ඉදිරිපත් කරන ලෙස ඉල්ලා සිටිමි

අ සාම්පලයේ ස්වභාවය..

ආ සාම්පලයේ වර්ගය..

ඇ සාම්පලයේ ඇති වෙනත් හඳුනාගැනීමේ අංකය..

ඈ එක්රැස් කරගනු ලැබූ ස්ථානය ....
....+

දිනය ....../....../...................

ඉ කල් තබා ගැනීමට යොදන ද්‍රව්‍යක් එක්කොට තිබේනම් එහි ස්වභාවය හා ප්‍රමාණය
....

2- සාම්පලයේ මුල් ලේබලයද මේ සමග තබා ඇති හෙයින් කිසි කටයුතු සඳහා යොදා ගැනීම පිණිස ඔබ වෙත එවනු ලබන නාමය හා ලේබලය රස පරීක්ෂක වාර්තාව සමග ආපසු එවීමට කටයුතු කරන ලෙස ඉල්ලා සිටිමි

3 රස පරීක්ෂක වාර්තාව එවිය යුතු ලිපිනය..
....
....
....

4 වෙනත් කරුණු..
....
....

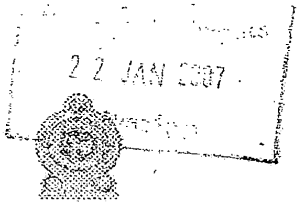
5 වාර්තාවේ අඩංගු විය යුතු කරුණු..
....
....

අ එක්රැස් කරන ලද වේලාව..............................

ආ භාරදුන් වේලාව ....

සාම්පලයේ එවීමට අදාළ මුද්‍රා ආකෘතියක් ද එවනු ලැබේ

වෙළෙන්දාගේ අත්සන /මුද්‍රාව	බලය ලත් නිලධාරියාගේ අත්සන / මුද්‍රාව



MEDICAL RESEARCH INSTITUTE
DEPARTMENT OF BACTERIOLOGY

12-Jan-2007

My Ref No : 29
Your Ref No : -

Bacteriological Examination of water

To,
PHI-Bokundara
MOH Office,
Piliyandala

Source of sample : Well
Date of collection : 06.01.07
Date of Receipt : 05.01.07
Appearance of sample: Clear

Parameter	Test Method	Limit	Results
Aerobic Plate Count at 30 °C	SLS 516 : 1 : 1991	Not Relevent	310 /ml
Presumptive Coliform Count	SLS : 614 : Part 2: 1988	Less than 10/100ml	140 / 100ml
Escherichia coli Count	SLS: 614 : Part 2 : 1988	Should not be detected/100ml	2 /100ml

Comment: This sample is bacteriologically unsatisfactory as drinking water.
There is evidence of contamination by faecal bacteria.

Dr. Karven J Cooray
Consultant Microbiologist

Medical Laboratory Technologist

Dr. Karven J. Cooray
MBBS, D Micro, MD
Consultant Microbiologist
Medical Research Institute
Colombo 8.

DR DANISTER DE SILVA MAWATHA. COLOMBO 8. SRI LANKA
PHONE: 94-11-2691350. FAX: 94-11-2691495

Received 2007 1/24
PHI/Bokundara

Advice people who belong to well.

Appendix 10

විකුණුම්කරුගේ ප්‍රකාශය

1 නම ....

2 ජා. හැ. අං ....

3 වෙළඳසැලෙහි ලිපිනය

4 දිනය ..../..../....

5 ..../..../.... වන අද දින .... හා .... මහජන සෞඛ්‍ය පරීක්ෂක මහත්වරුන් මාගෙ වෙළඳ සැලට පැමිණ මා දැනුවත් කොට වෙළඳ සැල පරීක්ෂා කොට ආහාර සාම්පල ලබා ගන්නා ලදී

6- සාම්පල් සඳහාලද ආහාරවල වටිනාකම රුපියල් රු .... වූ අතර ඊ සඳහා මා හට මුදල් ගෙවූ බැවින් මාගේ අත්සනින් යුතුව බිල්පතක් නිකුත් කළෙමි

7- මගේ වෙළෙඳසැලෙන් ලබා ගත් ආහාර සාම්පල් සඳහා ලබා දුන් සාම්පල් අංක දිනය හා වේලාව පහතින් සටහන් කරමි

දිනය	වේලාව	සාම්පල් අංකය

9 මෙම සෑම සාම්පලයක මාගේ අත්සන සහිත බවත් එවා මා ඉදිරිපිටදීම මුද්‍රා තබන ලදී. එම මුද්‍රා නොකඩා ආහාර සාම්පලය ඉවතට ගත නොහැකි බව පැහැදිලි විය

10 සෑම සාම්පලයකම තබන ලද මුද්‍රාවලින් එක් මුද්‍රාවක බැගින් මාගේ වම් අතෙහි මාපට ඇඟිලි සලකුණ සහිත අතර අනෙක් සෑම මුද්‍රාවකම මහජන සෞඛ්‍ය පරීක්ෂක තමාට ආවේණික වූ මුද්‍රාව තබන ලදී

11 මුද්‍රා තැබූ ආහාර සාම්පල් වලින් එක් වර්ගයකින් එක බැගින් මා හට තෝරා ගන්නා ලෙස දැන් වූ බැවින් මා එක් වර්ගයකින් එක බැගින් තෝරා ගන්නා ලදී

12 මා ලබා ගත් සාම්පල් ප්‍රවේශමෙන් තබා ගන්නා ලෙසත් මෙම ආහාර ආහාර පනත උල්ලංඝනය කර ඇත්නම් නීතිමය ක්‍රියා මාර්ග ගැනීමට සිදුවන බවත් මා හට පවසන ලදී

13 මෙම පත්‍රිකාවේ ඇති මුද්‍රිත අකුරු සහ අත් අකුරු මගෙ බවත් සඳහන් කරමි

14 මා හට ලබා දුන් විකුණුම්කරුගේ ප්‍රකාශය නැමැති මෙම පත්‍රිකාවේ අඩංගු කරුණු සත්‍ය බවත් නිවැරදි බවත් නිවැරදි බවත් මගේ අත්සන යොදමින් සහතික කරමි

විකුණුම්කරුගේ අත්සන / දිනය

Registered Post

Appendix 11

Food Act No 26 of 1980

Certificate

Government Analyst's Department
Colombo 7   02.06.2006
Report No [illegible]

To
P.S.C. Wickramasinghe
P.H.I. – Bokundara
MOH Office
Bokundara
Piliyandala

I, the undersigned, approved Analyst for the administrative area comprising the area within the administrative limits of the **Bokundara PHI's area** do hereby certify that I received on the 27th day of **February 2006** from the **P.H.I. – Bokundara** (name) a sample submitted as a sample of **turmeric powder** for analysis which was marked 03/A II/[illegible]/2006 and weighed 45 grams.

The sample was sealed, seals intact and similar to specimen seal.

I further certify that I have analysed it and, as a result of my analysis, I am of opinion that it is a sample of **turmeric powder**.

No alteration had occurred in the sample which would interfere with the analysis.

As witness my hand this 02nd day of June 2006 at [illegible]

(M.G.N.A. WIMALASENA)
Approved Food Analyst

(G. G. SOMAPALA)
Government Analyst

N.B. [illegible]
[illegible]

Food and Water Section,
Department of Bacteriology

Our Ref. No.

Your Ref. No.

To:

Medical Research Institute,
Dr. Danister de Silva
Mawatha,
Colombo 08.
Date

REPORT BY THE ADDITIONAL APPROVED ANALYST FOOD ACT No. 26 OF 1980, AMENDED BY FOOD (AMENDMENT) ACT No.20 OF 1991

Certified that

1. I ... Additional approved analyst under the food Act. No. 26 of 1980 for the all administrative areas of Sri Lanka received a sample purporting

to be

for analysis on the

by hand from

an officer appointed under the said act and it was found that the seals were intact/damaged

2. The sample was in a fit/unfit condition for analysis

3. On bacteriological analysis the following results were obtained

Aerobic plate count
Presumptive coliform count
Escherichia coli count
Staphylococcus aureus count
Salmonella species
Yeasts Count —
Moulds Count —

4. Comments

28th April 20

Signature
Additional Approved Analyst

C.C (1) Manufacturer/Vendor
(2) To be submitted to a court of law
(3) MOH of the area

Appendix 12

ආහාර විද්‍යාව සහ තාක්ෂණය උපාධි පාඨමාලාව

අවසාන වසර ව්‍යාපෘතිය

සබරගමුව විශ්ව විද්‍යාලය

බෙලිහුල්ඔය

මහජන පෝෂණ පර්යේෂණ කාර්යාලය

පිළියන්දල

ආහාර විකුණුම් ස්ථාන වල පිරිසිදු භාවය සහ ආහාර සම්බන්ධව කටයුතු කරන පුද්ගලයන්ගේ ආහාර සුරක්ෂිත භාවය ගැන ඇති දැනුවත් බව හා ආකල්ප සමීක්ෂණය කිරීම

ප්‍රශ්නාවලිය

ආහාර සම්බන්ධව කටයුතු කරන පුද්ගලයන්ගේ

1.අත්සේදීම

- වැසිකිළි යාමෙන් පසු පමණ [ ]
- දිනට __________ වරක් පමණ [ ]
- වැඩ ආරම්භයේදී පමණ [ ]
- නිරන්තරයෙන් [ ]

2.බෝවන රෝග සෑදීම

- නිරන්තරයෙන් [ ]
- කලාතුරකින් [ ]

3.අධ්‍යාපන තත්වය

- උසස් පෙළ දක්වා පමණ [ ]
- සාමාන්‍ය පෙළ දක්වා පමණ [ ]
- 8 වසර දක්වා පමණ [ ]
- පාසල් නොගිය [ ]

ආහාර සැකසීම, ඇසිරීම හා පිළියෙළකිරීම ආකාරය

4.ආහාර පිළියෙළවන මැස්ස සෝදන වාර ගණන

- දිනකට ....වරක් පමණි
- භාවිතයට පෙර පිරිසුදුවම සේදීම []

කුණු හා අපද්‍රව්‍ය ඉවත් කිරීම

5.කුණු බාල්දි වල කුණු ඉවත් කරන වාර ගණන

- දිනකට ....වරක් පමණි
- කුණු බාල්දි පිරුණු විට ඉවත්කරයි[]

ආහාර සම්බන්ධව කටයුතු කරන පුද්ගලයන්ගේ ආකල්ප හා දැනුවත්භාවය

6.ආහාර සුරක්ෂිත භාවය නිසා ඔබ සිතන පරිදි ඔබට ලැබෙන වාසි

- අලෙවිය වැඩි වී ඇත []
- ලාභය වැඩි වී ඇත []
- පාරිභෝගික සංඛ්‍යාව වැඩි වී ඇත []
- ව්‍යාපාරය හොඳ නමක් දිනා ඇත []

7.ආහාර සුරක්ෂිත භාවය ගැන දැනුවත් වූ ආකාරය

- මහජන සෞඛ්‍ය පරීක්ෂක []
- රූපවාහිනිය []
- ගුවන්විදුලිය []
- පුවත්පත් []
- වෙනත් පුද්ගලයන්ගෙන් []

[illegible]

ආහාර සම්බන්ධව කටයුතු කරන පුද්ගලයන්ගේ

1.ඇඳුම්වල පිරිසිදු බව

ඉතා පිරිසිදුයි ... ඉතා අපිරිසිදුයි

2.පුද්ගල සනීපාරක්ෂාව

- [illegible]
- නෑවීම
- නිය කැපීම
- නිය කොටට කපා ඇති බව
- හිස් ආවරණ පළඳී

ඉතා පිරිසිදුයි ... ඉතා අපිරිසිදුයි

3.ආහාර පිළියෙළකිරීමේදී පිරිසිදු භාවය

- ආහාර පිළියෙළකිරීමේදී [illegible] කෑම
- කැස්ස
- නාසය පිසදැමීම
- නාසය කැසීම
- මූණ අතගෑම
- ඔළුව කැසීම
- මුඛය ආවරණය නොකර කැසීම

4.ඔබ [illegible] අවස්ථා [illegible] වැඩ කරනවාද?

ඔව් නැත

5.ආහාර පිළියෙලවීම අතරතුර ආහාර කෑම හෝ දුම් පානය සිදු කරනවාද?

ඔව් නැත

ආහාර ගැනීම, ඇසිරීම හා පිළියෙළවීම ආකාරය

6.ආහාර ද්‍රව්‍ය භාජන වල සහ ආවරණ වල බහා ඇත්ද?

ඔව් [ ] නැත [ ]

7.ආහාර උණුසුම්ව තැබීමට උපකරණ භාවිතා කරයිද?

ඔව් [ ] නැත [ ]

8.පිළියෙල්වූ ආහාර ද්‍රව්‍ය අතින් ඇල්ලීම සිදු කරයිද?

ඔව් [ ] නැත [ ]

9.ආහාර බෙදන් ඇතුලත විදුරු කවචල් ඇතුලත අතින් ඇල්ලීම සිදු කරයිද?

ඔව් [ ] නැත [ ]

10.සැකසුමෙන් පසු වන ආහාර කාමර උෂ්ණත්වයේ තබා ඇත්ද?

ඔව් [ ] නැත [ ]

11.වැසිකිළිය පිහිටා ඇති ස්ථානය

- වැසිකිළියක් නැත [ ]
- ආහාර පිළියෙල කරන ස්ථානය අසල [ ]
- ආහාර පිළියෙල කරන ස්ථානයට ඈතින් [ ]

වියළි කසළ

12.ආහාර සේවා කරන භාජන වල පිරිසිදු කව

- සබන් ද්‍රවය ඉවත්කර ඇත [ ]
- භාජන දමින හෝදයි [ ]
- සැලසුම් සහිතව හෝදයි [ ]

....

අත: පිරිසිදු අත: පරීක්ෂක

13.මස් ද්‍රව්‍ය හා අපද්‍රව්‍ය මිශ්‍ර වෙන ලෙස ඉවත්කර ඇත්ද?

ඔව් [ ] නැත [ ]

14.ආහාර ගබඩා කිරීමේ ක්‍රමානුකූල බව

- ආහාර නොවන වියළුම් භාණ්ඩ සමග [ ]
- විෂ ද්‍රව්‍ය සමග [ ]
- කෘමි නාශක සමග [ ]
- වෙන වෙනම ගබඩා කර ඇත [ ]

15.ගොඩ ආහාර වෙනත් භාජන වල අසුරා ඇත්නම් ඒවා මිශ්‍ර වෙන ලෙස වසා තබාකර ඇත්ද?

ඔව් [ ] නැත [ ]

16.සියලු ආහාර පොළවෙන් ඉහල ගබඩා කර ඇත්ද?

ඔව් [ ] නැත [ ]

අධිශීත ගබඩාව

17.අධිශීතකරණය ඇතුළත ආහාර ගබඩා කර ඇති ආකාරය

- වාතය හොඳින් සංසරණය වන පරිදි [ ]
- ඇසුරුම් වල ඔතා ඇත [ ]
- වෙන්වෙන්ව ගබඩා කර ඇත [ ]

ඉතා අපිරිසිදුයි . . . . ඉතා පිරිසිදුයි

18.මස් වෙන පිරිසිදු කිරීම හා අනුමැතිය කිරීම සිදුකර ඇත්ද?

ඔව් [ ] නැත [ ]

මිල සේවාව

19.නිරෝධායන ඇතුලත ආහාර සේවා කර ඇති අයුරු

- උදේ හා දිවා ආහාර ඇසුරුම් වල බහා වසා ඇත [ ]
- උදේ හා දිවා ආහාර වෙනවෙනම ඇත [ ]
- රෑ හා වෙනත් ඉතිරි සුවද ආහාර වෙනවෙනම ඇසුරා ඇත [ ]

ඉතා අසතුටුදායි ←————————→ ඉතා සතුටුදායි

20.නිරෝධායන ඇතුලත පිරිසිදු බව

- රාත්‍ර පිරිසිදුව ආහාර කොටු වලින් රහිත බව [ ]
- මිශ්‍ර ලෙස පිරිසිදුකර පුස් හා සුවද රහිත බව [ ]

ඉතා පිරිසිදුයි ←————————→ ඉතා අපිරිසිදුයි

21.වරක්වූ ආහාර අසුරා ඇත්ද?

ඔව් [ ] නැත [ ]

ආහාර විකුණුම් ස්ථානයේ පිරිසිදු බව

22.ආහාර ගේනා ස්ථානයේ පිරිසිදු බව

බිම හා අවට

- ආහාර දමා ඇත [ ]
- අප මිශ්‍ර ගොනු දමා ඇත [ ]
- ඇසුරුම් දමා ඇත [ ]

ඉතා පිරිසිදුයි ←————————→ ඉතා අපිරිසිදුයි

23.මැස්සන් හා කෘමි සතුන් දක්නට

ඇත [ ] නැත [ ]

24.කෑම මේස හා පුටු වල පිරිසිදු බව

- ආහාර ද්‍රව්‍ය කෑම මේස හා පුටු වල වැටී ඇත [ ]
- දියර ද්‍රව්‍ය කෑම මේස හා පුටු වල වැටී ඇත [ ]
- ආහාර ද්‍රව්‍ය හා දියර ද්‍රව්‍ය මේස රෙදි වල වැටී ඇත [ ]

ඉතා පිරිසිදුයි ←――――――――――→ ඉතා අපිරිසිදුයි

25.කෑමෙන් පසු ඉතිරි වූ භාජන

- මේසය මතම ඇත [ ]
- ඉවත් කර නොසෝදා ඇත [ ]
- ඉවත් කර සෝදා ඇත [ ]

26.මේසය මතම පරතුරුව ඇති ආහාර දමා ඇති බඳුන්(පිඟන්,කෝප්ප) අපිරිසිදුයිද?

ඔව් [ ]　　　　නැත [ ]

කුණු හා අපද්‍රව්‍ය ඉවත් කිරීම

27.කුණු බාල්දියේ පිරිසිදු බව

- කුණු බාල්දිය වටා කුණු දමා ඇත [ ]
- කුණු බාල්දියේ පමණක් ඇත [ ]

28.කුණු බාල්දිය ආවරණය කර

ඇත [ ]　　　　නැත [ ]

Appendix 13:

Data gathered by food handlers and retail outlets

Questions in Questionnaire numbers were given according to answers

1. Hand washing- 5times a day-4, 6times a day-5, 7times a day-6, frequently-7

2. Caught any kind of disease- yes-1, no-2

3. Education level- A L -1, O L -2, Year 8-3, not gone to school-4

4.Numbers of times food serving dishes or containers are cleaned- twice a day-2, thrice a day-3, frequently-4

5.Number of times the waste is removed-twice-2, thrice-3, frequently-4

6.Advantagers due to food safety practises-sales-1, profits-2, customer satisfaction-3,popular-4

7.How the food handlers got to know about food safety-PHI-1, television-2, papers-4, others-5

8.Proper training-got-1,not got-2

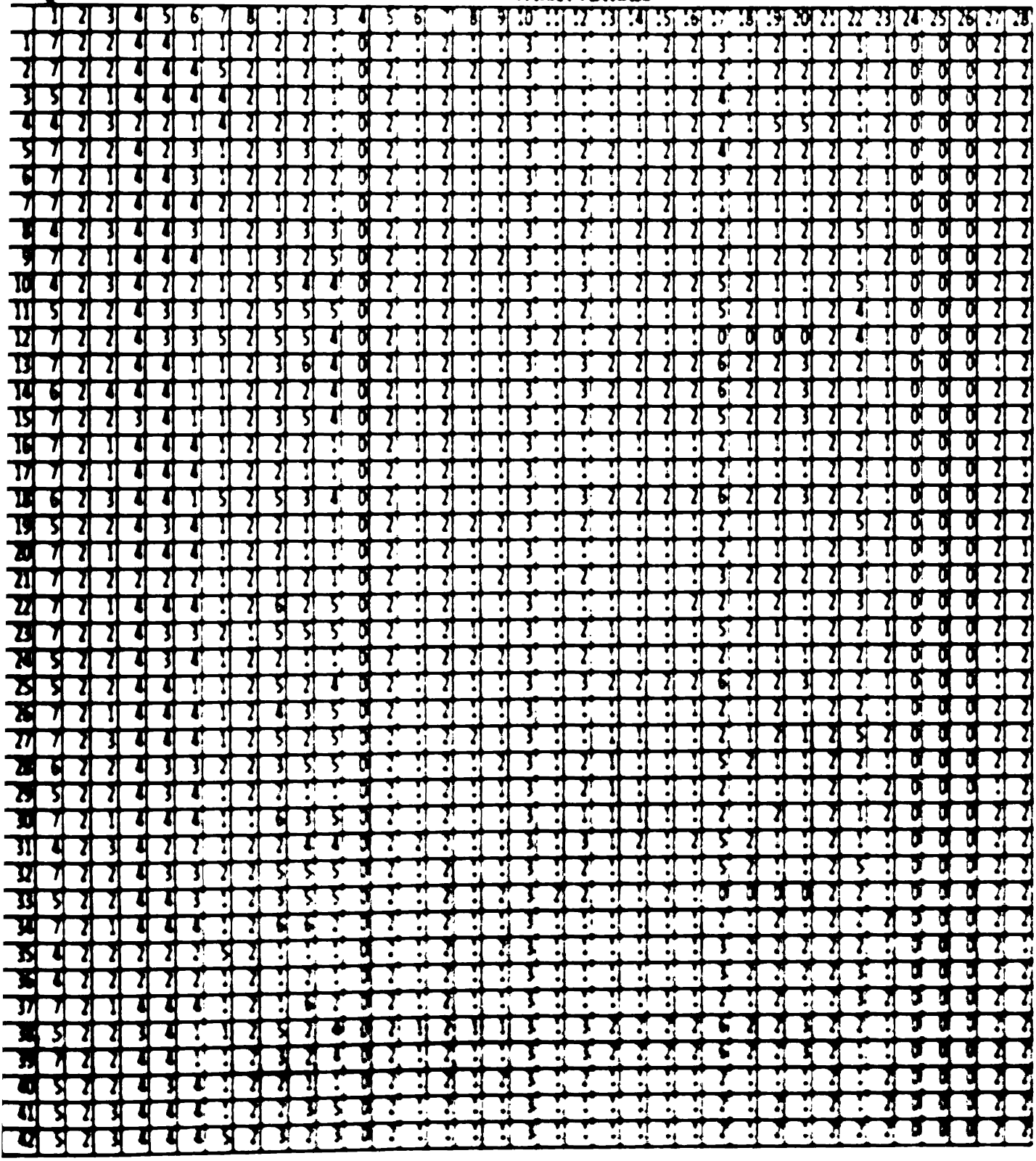
Observational data

Every observation getting Yes or No answers for Yes-1 and No-2 given

For every observation giving a wide description were categorized and given numbers from 1 to 7

Appendix 13: Assessment of food retailers' awareness on hygienic food handling practices & attitudes towards cleanliness of the retail outlets

Questionnaire **Observations**



Appendix 13: Assessment of food retailers' awareness on hygienic food handling practices & attitudes towards cleanliness of the retail outlets

	Questionnaire								Observations																										
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
85	5	2	2	4	3	4	1	2	2	1	1	2	2	1	2	2	2	3	3	2	1	1	1	1	2	1	1	1	2	1	2	1	3	1	2	2
86	5	2	3	4	4	3	2	2	2	2	2	2	2	1	1	1	1	3	1	2	1	2	2	1	3	2	2	1	2	2	1	2	3	1	2	2
87	7	2	2	4	4	3	1	2	2	2	2	0	2	1	2	1	1	3	1	2	1	2	2	1	0	0	2	1	2	1	2	0	0	0	2	2
88	6	2	3	4	4	1	1	2	5	6	3	2	2	1	2	1	1	3	1	3	2	2	2	1	6	2	2	3	2	2	1	2	3	1	2	2
89	5	2	2	4	4	1	5	2	5	3	4	2	2	1	2	1	1	3	1	3	2	2	2	1	6	2	2	3	2	1	1	1	3	1	2	1
90	7	2	1	4	4	3	1	2	2	2	2	0	2	1	2	1	1	3	1	2	1	2	2	1	0	0	2	1	2	2	2	0	0	0	2	2
91	6	2	4	4	4	1	1	2	2	6	4	2	2	1	2	1	1	3	1	3	2	2	2	1	0	0	2	3	2	2	1	2	3	2	1	2
92	7	2	2	3	4	1	1	2	3	5	2	2	2	1	2	1	1	3	1	2	1	2	2	1	5	2	2	3	2	2	1	2	3	1	2	2
93	6	2	4	3	4	1	1	2	3	5	4	2	2	1	2	1	1	3	1	2	2	2	2	1	5	2	2	3	2	2	1	2	3	0	1	2
94	7	2	1	4	4	3	2	2	2	2	2	2	2	1	2	1	1	3	1	2	1	2	2	1	3	2	2	1	2	5	2	5	2	1	2	2
95	5	2	2	4	3	4	1	2	2	1	1	2	2	1	2	2	2	3	3	2	1	1	1	1	0	0	1	1	2	1	1	1	3	2	2	2
96	7	2	2	4	3	4	1	2	2	1	1	2	2	1	2	1	1	3	1	2	1	1	1	1	0	0	1	1	2	3	2	3	3	1	2	2
97	4	2	3	4	4	3	1	2	3	3	3	2	2	2	2	1	1	3	1	2	1	2	2	1	2	1	1	2	2	2	2	2	2	2	2	2
98	4	2	3	4	2	2	1	2	5	4	4	0	2	2	2	1	1	3	1	3	1	1	2	1	0	0	1	1	2	1	1	0	0	0	2	2
99	5	2	2	4	3	3	1	2	5	5	3	2	2	1	2	1	2	3	3	1	2	2	1	1	0	0	0	0	2	2	1	2	3	1	2	2
100	7	2	1	4	4	3	1	2	2	2	2	0	2	1	2	1	1	3	1	2	1	2	2	1	3	2	2	1	2	1	1	0	0	0	2	2
101	4	2	3	4	4	1	5	2	5	3	4	1	2	2	2	1	1	3	1	4	1	1	2	1	0	0	0	0	2	5	1	0	0	0	1	2
102	3	2	3	4	4	1	2	2	6	4	6	2	2	2	2	1	1	3	1	5	2	2	2	1	0	0	0	0	2	4	1	0	0	0	2	2
103	7	2	2	4	4	3	1	2	4	3	3	2	2	2	2	2	2	3	1	2	1	2	1	1	0	0	0	0	2	2	1	0	0	0	2	2
104	5	2	3	4	4	1	5	2	3	2	2	2	2	1	2	1	1	3	1	3	1	2	1	1	0	0	0	0	2	5	1	0	0	0	2	2
105	3	2	3	4	4	1	2	2	5	3	4	2	2	2	2	1	1	3	1	5	2	2	2	2	0	0	0	0	2	4	1	0	0	0	2	2
106	3	2	3	4	4	1	2	2	6	4	2	2	2	2	2	1	1	3	1	3	1	2	2	1	0	0	0	0	2	4	1	0	0	0	2	2
107	5	2	2	4	4	3	1	2	4	3	2	2	2	2	2	1	2	3	1	3	1	2	1	1	0	0	0	0	2	3	1	0	0	0	2	2
108	7	2	2	4	4	1	5	2	3	2	2	2	2	1	2	1	1	3	1	4	1	2	1	1	0	0	0	0	2	4	1	0	0	0	2	2
109	3	2	3	4	4	2	1	2	5	2	5	2	2	2	2	1	1	3	1	4	1	1	2	2	0	0	0	0	2	1	2	0	0	0	1	2
110	5	2	3	4	4	1	5	2	3	2	2	2	2	1	2	1	1	3	1	3	1	2	1	1	0	0	0	0	2	3	1	0	0	0	2	2
111	3	2	3	4	4	1	5	2	4	4	4	2	2	2	2	1	1	3	1	5	2	2	2	1	0	0	0	0	2	4	1	0	0	0	2	2
112	5	2	2	4	4	3	1	2	6	2	3	2	2	2	2	2	2	3	1	3	1	2	1	2	0	0	0	0	2	3	1	0	0	0	1	2
113	7	2	2	4	4	1	4	2	3	2	2	1	2	1	2	1	1	3	1	5	1	2	1	1	0	0	0	0	2	5	1	0	0	0	2	2
114	3	2	3	4	4	1	2	2	5	5	4	2	2	2	2	1	1	3	1	5	2	2	2	1	0	0	0	0	2	4	1	0	0	0	2	2
115	2	2	3	4	4	1	5	2	6	3	6	1	1	2	2	1	1	3	1	3	1	1	2	2	0	0	0	0	2	1	1	0	0	0	2	2
116	7	2	2	4	4	4	1	1	1	1	1	2	2	1	1	1	2	3	1	2	1	1	2	1	1	1	1	1	2	1	2	0	0	0	2	1
117	7	2	2	4	4	4	1	2	1	1	1	2	2	1	1	1	1	3	1	1	1	1	2	1	1	1	1	1	2	1	2	0	0	0	1	1

Appendix 13: Assessment of food retailers' awareness on hygienic food handling practices & attitudes towards cleanliness of the retail outlets

Questionnaire **Observations**

	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
118	7	2	2	4	4	4	1	1	1	1	1	2	2	1	1	2	2	3	1	1	1	1	2	1	2	1	1	1	2	1	2	0	0	0	2	1
119	7	2	2	4	4	1	2	2	6	5	5	2	2	2	2	1	1	3	1	0	0	1	1	1	3	2	0	0	2	1	2	0	0	0	1	2
120	5	2	3	4	4	2	1	2	7	6	4	1	2	1	2	1	1	3	1	0	0	1	1	1	4	1	0	0	2	4	1	0	0	0	2	2
121	7	2	2	4	4	2	1	2	5	6	6	2	2	2	2	1	1	3	1	0	0	1	2	1	4	1	0	0	2	2	1	0	0	0	2	2
122	7	2	3	4	4	2	2	2	5	6	5	2	2	2	2	1	1	3	1	0	0	2	1	1	0	0	0	0	2	5	1	0	0	0	2	2
123	5	2	3	4	4	2	1	2	5	4	4	2	2	1	2	1	1	3	1	0	0	1	1	1	0	0	0	0	2	4	1	0	0	0	2	2
124	7	2	2	4	4	1	1	2	2	6	6	2	2	2	2	1	1	3	1	0	0	1	1	1	5	2	0	0	2	4	1	0	0	0	2	2
125	7	2	2	4	4	3	1	2	3	5	5	2	2	2	2	1	1	3	1	0	0	1	1	1	3	2	0	0	2	3	1	0	0	0	1	2
126	7	2	2	4	4	2	2	2	6	4	3	2	2	2	2	1	1	3	1	0	0	2	2	1	3	2	0	0	2	4	1	0	0	0	2	2
127	7	2	2	4	4	1	1	2	7	4	6	2	2	2	2	1	1	3	1	0	0	1	1	1	3	2	0	0	2	7	1	0	0	0	2	2
128	7	2	2	4	4	1	1	2	6	4	5	2	2	2	2	1	1	3	1	0	0	1	1	1	5	2	0	0	2	7	1	0	0	0	2	2
129	7	2	2	4	4	2	1	2	3	2	3	2	2	2	2	1	1	3	1	0	0	1	1	1	0	0	0	0	2	5	1	0	0	0	2	2
130	5	2	3	4	4	1	5	2	6	4	3	2	2	1	2	1	1	3	1	0	0	1	2	1	0	0	0	0	2	7	1	0	0	0	2	2
131	7	2	3	4	4	3	1	2	3	5	6	2	2	2	2	1	1	3	1	0	0	1	1	1	0	0	0	0	2	2	1	0	0	0	1	2
132	5	2	3	4	4	2	1	2	3	3	5	2	2	2	2	1	1	3	1	0	0	1	1	1	0	0	0	0	2	2	1	0	0	0	2	2
133	7	2	3	4	4	3	1	2	4	4	6	2	2	2	2	1	1	3	1	0	0	2	1	1	5	2	0	0	2	2	1	0	0	0	2	2
134	7	2	2	4	4	1	1	2	2	5	5	2	2	2	2	1	1	3	1	0	0	1	2	1	4	1	0	0	2	5	1	0	0	0	2	2
135	4	2	3	0	4	1	1	2	4	5	4	2	2	2	0	1	1	3	1	5	2	2	2	2	0	0	0	0	2	3	1	0	0	0	2	2
136	5	2	3	0	4	3	1	2	6	3	4	2	2	2	0	1	1	3	1	2	1	1	1	1	0	0	0	0	2	3	1	0	0	0	2	2
137	5	2	4	0	4	3	5	2	5	4	2	2	2	2	0	1	1	3	1	2	1	1	1	1	0	0	0	0	2	2	1	0	0	0	2	2
138	5	2	3	0	4	4	1	2	6	3	4	2	2	2	0	1	1	3	1	3	2	1	2	2	0	0	0	0	2	2	1	0	0	0	2	2
139	5	2	4	0	4	2	1	2	5	4	3	2	2	2	0	1	1	3	1	2	1	1	1	1	0	0	0	0	2	2	1	0	0	0	2	2
140	4	2	4	0	4	3	1	2	5	4	2	2	2	2	0	1	1	3	1	5	1	1	1	1	0	0	0	0	2	4	1	0	0	0	2	2
141	7	2	2	0	4	4	1	2	2	3	2	2	2	2	0	1	1	3	1	1	1	1	1	2	0	0	0	0	2	2	1	0	0	0	2	2
142	5	2	3	0	4	1	1	2	5	5	4	2	2	2	0	1	1	3	1	1	1	1	1	2	0	0	0	0	2	3	1	0	0	0	2	2
143	4	2	3	0	4	4	1	2	6	5	2	2	2	2	0	1	1	3	1	1	1	1	1	1	0	0	0	0	2	3	1	0	0	0	2	2
144	5	2	3	0	4	3	5	2	6	5	2	2	2	2	0	1	1	3	1	4	2	1	2	2	0	0	0	0	2	2	1	0	0	0	2	2
145	4	2	4	0	4	4	1	2	5	4	3	2	2	2	0	1	1	3	1	3	1	1	1	1	0	0	0	0	2	2	1	0	0	0	2	2
146	5	2	3	0	4	1	1	2	4	5	5	2	2	2	0	1	1	3	1	1	1	1	1	1	0	0	0	0	2	3	1	0	0	0	2	2
147	4	2	3	0	4	2	1	2	5	5	4	2	2	2	0	1	1	3	1	1	1	1	2	1	0	0	0	0	2	4	1	0	0	0	2	2
148	7	2	2	0	4	2	1	2	5	5	3	2	2	2	0	1	1	3	1	5	1	1	1	2	0	0	0	0	2	2	1	0	0	0	2	2
149	5	2	3	0	4	2	2	2	3	5	3	2	2	2	0	1	1	3	1	1	1	1	1	1	0	0	0	0	2	3	1	0	0	0	2	2
150	5	2	3	0	4	1	1	2	5	5	4	2	2	2	0	1	1	3	1	3	2	1	2	2	0	0	0	0	2	4	1	0	0	0	2	2

Appendix 14:

Tabulated statistics: Education Level, Frequency of hand washing

Rows: Education Level of the food handlers
1-Educated up to A/L
2-Educated up to O/L
3-Educated up to year 8
4-Not went to school

Columns: Frequency of hand washing
1-Freequently washes the hands
2-Non frequently washes the hands

	1	2	All
1	20	1	21
	9.10	11.90	21.00
2	40	33	73
	31.63	41.37	73.00
3	5	42	47
	20.37	26.63	47.00
4	0	9	9
	3.90	5.10	9.00
All	65	85	150
	65.00	85.00	150.00

Cell Contents: Count
Expected count

Pearson Chi-Square = 54.288, DF = 3, P-Value = 0.000
Likelihood Ratio Chi-Square = 64.846, DF = 3, P-Value = 0.000

*** NOTE *** 1 cells with expected counts less than 5

H0: Education level does not effect to the hand washing frequency
H1: Education level effect to the hand washing frequency
Because P<= reject H0
Education level effect to the hand washing frequency

Tabulated statistics: Education Level, Cleanliness of dressings

Rows: Education Level of the food handlers

Columns: Cleanliness of dressings
1-Clean dresses wearing
2-Unclean dresses wearing

	1	2	All
1	17	4	21
	13.16	7.84	21.00
2	52	21	73
	45.75	27.25	73.00
3	21	26	47
	29.45	17.55	47.00
4	4	5	9
	5.64	3.36	9.00
All	94	56	150
	94.00	56.00	150.00

Cell Contents: Count
Expected count

Pearson Chi-Square = 13.067, DF = 3, P-Value = 0.004
Likelihood Ratio Chi-Square = 13.165, DF = 3, P-Value = 0.004

* **NOTE** * 1 cells with expected counts less than 5

H0: Education level does not effect to the Cleanliness of dressings
H1: Education level effect to the Cleanliness of dressings
Because P<= reject H0
Education level effect to the Cleanliness of dressings

Tabulated statistics: Education Level, Outlet cleanliness

Rows: Education Level of the food handlers

Columns: Outlet cleanliness
1-Clean outlet
2-Unclean outlet

	1	2	All
1	19	2	21
	18.48	2.52	21.00
2	65	8	73
	64.24	8.76	73.00
3	39	8	47
	41.36	5.64	47.00
4	9	0	9
	7.92	1.08	9.00
All	132	18	150
	132.00	18.00	150.00

Cell Contents: Count
Expected count

Pearson Chi-Square = 2.546, DF = 3, P-Value = 0.467
Likelihood Ratio Chi-Square = 3.518, DF = 3, P-Value = 0.318

* **NOTE** * 2 cells with expected counts less than 5

H0: Education level does not effect to the cleanliness of the outlet
H1: Education level effect to the cleanliness of the outlet
Because P>= cannot reject H0
Education level has no effect to the cleanliness of the outlet

Appendix 15:

Customer data was gathered about food safety

1. Answer to the question- Yes-1, No-2
2. If customer concern on

   Cleanliness of food-1

   Cleanliness of the place buy the foods-2

   Food handlers dress cleanliness-3

   Food handler's personal hygiene-4

   Cleanliness in food serving-5

   Storage cleanliness-6
3. Have caught food borne illnesses

   Yes-1 No-2

Appendix 15:

ආහාර සුරක්ෂිත භාවය සම්බන්ධව පාරිභෝගික අදහස් සමීක්ෂණය කිරීම

1. පිළියන්දල ප්‍රදේශයේ ඔබගේ ආහාර අවශ්‍යතා සපුරා ගැනීමට තරම් ප්‍රමාණවත් ආහාර විකුණුම් ස්ථාන පවතිද?

ඔව් ☐ නැත ☐

2. ඔබ ආහාර මිළදී ගැනීමේදී වඩාත් සැලකිලිමත් වන්නේ?

❖ ආහාර වල පිරිසිදු භාවය

❖ ආහාර මිළදී ගන්නා ස්ථානයේ පිරිසිදු බව

(කෑම මේස හා පුටු වල පිරිසිදු බව, බිම හා අවට පිරිසිදු බව ,ආහාර බඳුන් වල පිරිසිදු බව)

❖ ආහාර සම්බන්ධව කටයුතු කරන පුද්ගලයන්ගේ ඇඳුම්වල පිරිසිදු බව

❖ ආහාර සම්බන්ධව කටයුතු කරන පුද්ගලයන්ගේ පුද්ගල සනීපාරක්ෂාව

(පිළුස්සීම, කැපීම, සීරීම් වලින් තොර බව, නිය කොටට කපා ඇති බව, හිස් ආවරණ පැළඳීම)

❖ ආහාර පිළිගැන්වීමේදී පිරිසිදු භාවය

(ආහාර පිළිගැන්වීමේදී කිවිසුම් හැරීම, කැස්ස, නාසය පිසදැමීම, නාසය කැසීම, මුහුණ අතගෑම, ඔළුව කැසීම, මුඛය ආවරණය නොකර කැසීම, පිළිගන්වන ආහාර ද්‍රව්‍ය හා ආහාර බඳුන් ඇතුලත විදුරු කටුවල ඇතුලත ආහාර සම්බන්ධව කටයුතු කරන පුද්ගලයන් අතින් ඇල්ලීම)

❖ විකුණුම් සේවාව, අධිශීතකරණ හා ශීතකරණ වල පිරිසිදු බව (රාක්ක වල පිරිසිදු බව, ප්‍රමාණවත් බව, නරක්වූ ආහාර හා නරක්නොවූ ආහාර එකට ඇසිරීම)

3. ඔබට අපිරිසිදු ආහාර ගැනීම නිසා ලෙඩ රෝග වැළඳී ඇත්ද?

ඔව් ☐ ______________________

නැත ☐

Appendix 16:

Research of consumers ideas about food safety and hygienic food handling practices in retail outlets

Consumers	1	2						3
		1	2	3	4	5	6	
1	1	1	2					1
2	1	1	2	3	4	5	6	1
3	1	1	2	3				1
4	1	1	2					1
5	1	1						1
6	1	1	2					1
7	1	1	2	3	4			1
8	1	1	2	3	4	5		1
9	1	1	2	3	4			1
10	1	1	2					1
11	1	1	2					1
12	1	1	2			5	6	1
13	1	1	2			5		1
14	1	1	2					1
15	1	1	2					1
16	1	1	2					1
17	1	1	2					1
18	1	1	2	3	4			1
19	1	1						1
20	1	1	2	3	4	5		1
21	1	1	2	3	4	5		1
22	1	1	2	3	4	5		1
23	1	1	2					1
24	1	1	2					1
25	1	1	2					1
26	1	1	2			5		1
27	1	1	2			5	6	1
28	1	1	2			5		1
29	1	1	2					1
30	1	1	2					1
31	1	1	2					1
32	1	1						1
33	1	1	2					1
34	1	1	2					1
35	1	1	2					1
36	1	1	2					1
37	1	1	2	3	4			1
38	1	1	2	3	4	5		1
39	1	1	2	3	4	5		1
40	1	1	2					1
41	1	1	2					1
42	1	1	2			5		1
43	1	1	2			5		1
44	1	1	2			5		1
45	1	1	2					1
46	1	1	2					1
47	1	1	2					1
48	1	1	2	3	4			1
49	1	1	2	3	4	5	6	1
50	1	1	2	3	4	5		1

Appendix 17: ආහාර විකුණුම් ස්ථාන වල පිරිසිදු භාවය සහ ආහාර සුරක්ෂිත භාවය පරීක්ෂාව

දිනය..... පරීක්ෂාකලේ.....

		ඔව්/ නැත	අතිරේක සටහන්
	ආහාර සම්බන්ධව කටයුතු කරන පුද්ගලයන්ගේ පුද්ගල සනීපාරක්ෂාව		
1.	පිරිසිදු ඇදුම් හාවිතා කරයි		
2.	පිලිස්සිම්, කැපිම්, සිරිම් තුවාල ඇත		
3.	බෝවන රෝග සෑදී ඇත		
4.	නිය පිරිසිදුව තොට්ට කපා ඇත		
5.	හිස් ආවරණ පලඳී		
6.	ආහාර පිළිගැන්වීමේදී කිවිසුම් හැරීම හා මුඛය ආවරණය නොකර කැසීම		
7.	නාසය පිසදැමීම්, නාසය කැසීම, මුහුණ අතගැම, ඔලුව කැසීම සිදුකරයි		
8	අත සෝදන බඳුන අවට බිම් හා කුණු හාජන අවට කෙලු ගැසීම		
9	ආහාර පිළිගන්වන අතරතුර ආහාර ගැනීම සහ දුම් පානය සිදුකරයි		
10.	වැඩ ආරම්භයේදී, වැසිකිලි යාමෙන් පසු හා නිරන්තරයෙන් අත්සේදීම		
11.	විවිධ පලදනා හා මුදු පැලඳීම		
12.	දහඩිය පිසින රෙදි කැබලි වෙනත් දෑ පිසීමට හාවිතා කරයි		
	ආහාර සැකසීම, ඇසිරීම හා පිළිගන්වන ආකාරය		
13.	ආහාර දුව්‍ය හාජන වල සහ අසුරන වල බහා ඇත		
14.	ආහාර උණුසුම්ව තැබීමට උපකරණ හාවිතා කරයි		
15.	පිළිගන්වන ආහාර දුව්‍ය අතින් ඇල්ලීම සිදු කරයි		
16.	ආහාර බඳුන් ඇතුලත විදුරු කටවල් ඇතුලත අතින් ඇල්ලීම සිදු කරයි		
17.	පහසුවෙන් නරක් වන ආහාර කාමර උෂ්ණත්වයේ තබා ඇත		
18.	කෑම මේස හා පුටු පිරිසිදු කර හෝ බඳුන් පිරිසිදු කර අත් නොසෝදා ආහාර පිළිගන්වයි		
19.	මුදල් හාවිතා කර අත් නොසෝදා ආහාර පිළිගන්වයි		
	වියළි තබඩාව		
20.	ආහාර තබා කරන රාක්ක වල කුණු, දුවිලි රහිතයි		
21.	හිස් දවටන හා අපදව්‍ය හිසි ලෙස ඉවත්කර ඇත		
22.	කැඩුණු පැකට් රහිතයි		

		ඔව්/ නැත	අතිරේක සටහන්
23.	ආහාර නොවන විෂඵූම් භාණ්ඩ හා ආහාර වෙන වෙනම ගබඩා කර ඇත		
24.	විෂ ද්‍රව්‍ය, කෘමි නාශක හා පිරිසිදු කාරක වෙන වෙනම ගබඩා කර ඇත		
25.	තොග ආහාර වෙනත් භාජන වල අසුරා ඇත්නම් ඒවා නිසි ලෙස වසා නම්කර ඇත		
26.	සියලු ආහාර පොලවෙන් ඉහලු ගබඩා කර ඇත		
	අධිශීත ගබඩාව		
27.	අධිශීතකරණයහි නිවැරදි උෂ්ණත්ව මාණ පවති		
28.	අධිශීතකරණය තුල උෂ්ණත්වය -18X(0Φ) හෝ ඊට අඩු උෂ්ණත්වයක පවති		
29.	වාතය හොඳින් සංසරණය වන පරිදි අධිශීතකරණය තුල ආහාර ගබඩා කර ඇත		
30.	ආහාර වෙන්වෙන්ව ඇසුරුම් වල බහා ගබඩා කර ඇත		
31.	ආහාර ඇසුරුම් හොඳින් වසා ඇත		
32.	නිසි ලෙස පිරිසිදු කිරීම හා අලුත්වැඩියා කිරීම නිසි ලෙස සිදුකර ඇත		
	ශීත ගබඩාව		
33.	ශීතකරණයහි නිවැරදි උෂ්ණත්ව මාණ පවති		
34.	ශීතකරණය තුල උෂ්ණත්වය 6X(45Φ) හෝ ඊට අඩු උෂ්ණත්වයක පවති		
35.	අමු හා පිසූ ආහාර වෙනවෙනම ඇසුරුම් වල බහා ගබඩා කර ඇත		
36.	සියළු ආහාර ඇසුරුම් වල බහා වසා ඇත		
37.	ඇසුරුම් ඉතා පිරිසිදුව පවති		
38.	කිරි හා වෙනත් ප්‍රබල සුවඳ ආහාර වෙනවෙනම අසුරා ඇත		
39.	මාළු වෙනවෙනම ගබඩා කර ඇත		
40.	පහසුවෙන් නරක් වන ආහාර අසුරා ඇත		
41.	නරක්වූ ආහාර අසුරා ඇත		
42.	ශීතකරණය ඇතුලත අධිකව ආහාර අසුරා ඇත		
43.	ශීතකරණය ඇතුලත රාක්ක පිරිසිදුව ආහාර තොල වලින් රහිත බව		
44.	ශීතකරණය ඇතුලත නිසි ලෙස පිරිසිදුකර තුස් හා සුවඳ රහිත බව		
	ආහාර විෂඵූම් ස්ථානයේ පිරිසිදු බව		
45.	ආහාර ගන්නා ස්ථානයේ බිම හා අවට ආහාර දමා, අත පිසන තොල දමා හෝ අසුරණ දමා ඇත		

		ඔව්/නැත	අතිරේක සටහන්
46.	ආහාර ගන්නා ස්ථානයේ බිම සෝදා පිරිසිදු කර ඇත		
47.	මැස්සන් හා කෘමි සතුන් දක්නට ඇත		
48.	උපකරණ ඉතා පිරිසිදුව ඇත		
49.	භාවිතයට නොගන්නා උපකරණ හා භාජන සෝදා පිරිසිදු කර ඇත		
50.	උපකරණ හා භාජන භාවිතයට පෙර සෝදා පිරිසිදු කර ගනී		
51.	කෑම මේස හා පුටු වල ආහාර ද්‍රව්‍ය වැටී ඇත		
52.	දියර ද්‍රව්‍ය කෑම මේස හා පුටු වල වැටී ඇත		
53.	ආහාර ද්‍රව්‍ය හා දියර ද්‍රව්‍ය මේස රෙදි වල වැටී ඇත		
54.	කෑමෙන් පසු ඉතිරී වූ භාජන මේසය මතම ඇත		
55.	කෑමෙන් පසු ඉතිරී වූ භාජන ඉවත් කර නොසෝදා ඇත		
56.	කෑමෙන් පසු ඉතිරී වූ භාජන ඉවත් කර සෝදා ඇත		
57.58.	මේසය මතම නිරතුරුව ඇති ආහාර දමා ඇති බඳුන්(සිනි,සෝස්) පිරිසිදුයිද		
59.	විකිණීමට මිළදී ගන්නා ආහාර නරක්නොවූ හොඳ තත්වයේ පවතින බව		
	කුණු හා අපද්‍රව්‍ය ඉවත් කිරීම		
60.	කුණු බාල්දියේ කුණු ඉවත් කර ඇත		
61.	කුණු බාල්දිය සෝදා පිරිසිදුව ඇත		
62.	කුණු බාල්දිය වටා කුණු දමා ඇත		
63.	කුණු බාල්දිය ආවරණය කර ඇත		

Appendix 18

ආහාර සම්බන්ධව සවිසුදු කරන පුද්ගලයන්ගේ පුද්ගල සනීපාරක්ෂාව රැකගැනීම

සෑම විටම පිරිසිදු ඇඳුම් හාවිතා කරන්න

වැඩ ආරම්භයේදී, වැසිකිලි යාමෙන් පසු හා ආහාර ඇල්ලීමට පෙර හොඳින් අත්සෝදන්න

නිය පිරිසිදුව කොටට කපා තබාගන්න

පිළිස්සීම්, කැපීම්, සිරීම් අවාලු හොඳින් ආරණය කරන්න

බෝවන රෝග සෑදී ඇත්නම් ආහාර සම්බන්ධ සවිසුදු වලින් වැලකෙන්න

හිස් ආවරණ පලඳින්න

විවිධ පලඳනා හා මුදු පැලඳීමෙන් වැලකෙන්න

ආහාර පිළිගැන්වීමේදී කිවිසුම් හැරීම හා මුඛය ආවරණය නොකර කැසීම සිදුනොකරන්න

ආහාර පිළිගැන්වීමේදී නාසය පිසදැමීම, නාසය කැසීම, මුහුණ අතගැම, ඔලුව කැසීම සිදු නොකරන්න

අත සෝදන බදුන අවට බිම හා කුණු හාජන අවට කෙළ නොතැවන්න

ආහාර පිළිගන්වන අතරතුර ආහාර ගැසීම සහ දුම් පානය සිදුනොකරන්න

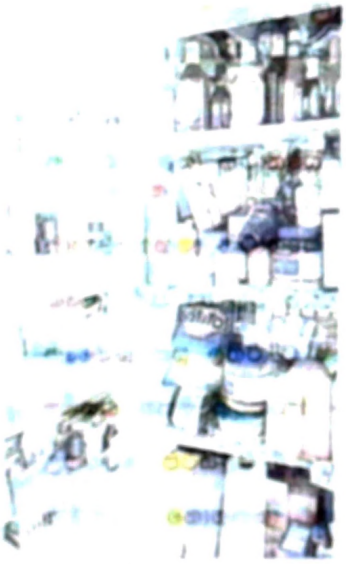
දහඩිය පිසින රෙදි කැබලි වෙනත් දෑ පිසීමට හාවිතා නොකරන්න

පිළිගන්වන ආහාර දවස අතින් ඇල්ලීම සිදු නොකරන්න

ආහාර බදුන් ඇතුලත විදුරු කටවළු ඇතුලත අතින් ඇල්ලීම සිදු නොකරන්න

සෑම මේස හා පුටු පිරිසිදු කර, බදුන් පිරිසිදු කර , කුණු ඉවත් කර අත් හොඳින් සෝදා ආහාර පිළිගන්වන්න

ආහාර ගබඩා කළයුතු අයුරු



වියළි ගබඩාව

ආහාර ගබඩා කරන රාක්ක වල කුණු, දුවිලි රහිතව තබන්න

බිත්ති දර්ටන, අපද්‍රව්‍ය, කැඩුණු පැකට් නිසි ලෙස ඉවත්කරන්න

ආහාර නොවන විකල්පම් භාණ්ඩ හා ආහාර වෙන වෙනම ගබඩා කරන්න

විෂ ද්‍රව්‍ය, කෘමි නාශක හා පිරිසිදු කාරක වෙන වෙනම ගබඩා කරන්න

තොග ආහාර වෙනත් භාජන වල අසුරා ඇත්නම් ඒවා නිසි ලෙස වසා නම් කරන්න

සියලු ආහාර පොලුවෙන් ඉහළ ගබඩා කරන්න

අධිශීත ගබඩාව

අධිශීතකරණය අඩු උෂ්ණත්වය -18°C(0°F) හෝ ඊට අඩු උෂ්ණත්වයක පවත්වා ගන්න

වාතය හොඳින් සංසරණය වන පරිදි අධිශීතකරණය අඩු ආහාර ගබඩා කරන්න

ආහාර වෙන්වෙන්ව ඇසුරුම් වල ඔතා ගබඩා කරන්න

ආහාර ඇසුරුම් හොඳින් වසා තබන්න

නිසි ලෙස පිරිසිදු කිරීම හා අලුත්වැඩියා කිරීම සිදුකරන්න

ශීත ගබඩාව

ශීතකරණය අඩු උෂ්ණත්වය 6°C(45°F) හෝ ඊට අඩු උෂ්ණත්වයක පවත්වා ගන්න

අමු හා පිසූ ආහාර වෙනවෙනම ගබඩා කරන්න

සියළු ආහාර ඇසුරුම් වල ඔතා වසා තබන්න

කිරි හා වෙනත් ප්‍රමිල කුවිඳ ආහාර, මාළු විවිධ වෙනවෙනම අසුරා තබන්න

ශීතකරණය ඇතුලත අධිකව ආහාර ගබඩා නොකරන්න

ශීතකරණය ඇතුලත රාක්ක පිරිසිදුව ආහාර කොල්ල වළින් රහිතව පවත්වා ගන්න

ශීතකරණය ඇතුලත නිසි ලෙස පිරිසිදුකර ප්‍රස් හා කුවිඳ රහිතව පවත්වා ගන්න

ආහාර වියන්නම් ස්ථානය පිරිසිදුව තබා ගනිමු

ආහාර ගන්නා ස්ථානයේ බිම හා අවට ආහාර දමා, අත පිසන තොලු දමා හෝ අපද්‍රව්‍ය නොදමන්න

ආහාර ගන්නා ස්ථානයේ බිම සෝදා පිරිසිදුව තබාගන්න

කෑම මේස හා පුටු ආහාර දවස හා දිගට දවස වළුන් නොවට පිරිසිදුව තබාගන්න

කෑමෙන් පසු ඉතිරි වූ භාජන ඉවත් කර සෝදා තබන්න

මේසය මතම කරපුරුවේ ඇති ආහාර දමා ඇති බඳුන්(කිනි,සෝස්) පිරිසිදුව තබන්න

උපකරණ පිරිසිදුව තබාගන්න

භාවිතයට නොගන්නා උපකරණ හා භාජන සෝදා පිරිසිදු කර තබාගන්න

උපකරණ හා භාජන භාවිතයට පෙර සෝදා පිරිසිදු කරගන්න

කුණු හා අපද්‍රව්‍ය ඉවත් කිරීම

කුණු බාල්දියේ කුණු පිරුණු විට ඉවත් කරන්න

කුණු බාල්දිය සෝදා පිරිසිදුව තබන්න

කුණු බාල්දියටම කුණු දමන්න

කුණු බාල්දිය ආවරණය කරන්න

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