A STUDY ON KNOWLEDGE, ATTITUDE AND PRACTICE ABOUT PERSONAL HYGIENE AND DISEASE AWARENESS OF EAST WEST UNIVERSITY STUDENTS IN DHAKA CITY

Submitted by

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Id no. 2007-3-70-041

Dissertation Submitted to

East West University, Dhaka, Bangladesh

In partial fulfillment of the requirements for the award of the degree

Bachelor of Pharmacy

Under the Guidance of

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Dhaka, Bangladesh.

July,2012

Declaration by the Research candidate

I, Md. Mazharul Hossain, hereby declare that the dissertation entitled **"A study on knowledge, attitude and practice about personal hygiene and disease awareness of East West University students in Dhaka city"** submitted by me to the Department of Pharmacy, East West University, in partial fulfillment of the requirements for the award of the degree of Bachelor of Pharmacy (B.PHARM) is a complete record of original research work carried out by me during the period 2011-2012 under the supervision and guidance of **Dr. Sufia Islam Associate Professor and Chairperson** Department of Pharmacy, East West University and it has not formed the basis for the award of any other Degree/Diploma/Fellowship or other similar title to any candidate of any University.

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Dissertation Submitted to

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Certificate by the Supervisor

This is to certify that the dissertation entitled

"A study on Knowledge, attitude and practice about personal hygiene and disease awareness of East West University students in Dhaka city" is a bona fide research work done by **Md. Mazharul Hossain,** in partial fulfillment of the requirement for the Degree of Bachelor of Pharmacy.

Dr. Sufia Islam,

Associate Professor and Chairperson

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Endorsement by Head of the Department

This is to certify that the dissertation entitled

"A study on knowledge, attitude and practice about personal hygiene and disease awareness of East West University students in Dhaka city" is a bona fide research work done by **Md. Mazharul Hossain** under the guidance of **Dr. Sufia Islam**, associate professor and chairperson, department of pharmacy, East West University, Dhaka.

Dr. Sufia Islam

Associate Professor and Chairperson

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ACKNOWLEGDEMENTS

By the grace of Allah, I have completed this intellectual academic attempt. I would like to express my thanks to my research supervisor, **Dr. Sufia Islam,** Associate Professor and Chairperson, Department of Pharmacy, EWU, who had been always optimistic and full of passion and ideas. Her generous advice, encouragement, feedback and reminders have not only helped shape this study but also molded me into being a better researcher. Her in-depth thinking and motivation to guide had provided me with the motivation to continue and complete this research.

I express my sincere thankfulness to my caring parents for guiding me all through my life.

I would also like to thank to all of my friends for sharing information and thoughts in some critical moments.

And finally those students who gave their valuable time for filling the questionnaire annexure and sharing their knowledge.

Dedicated

To

All the people

Who

Like me

ABSTRCT

Hygiene is defined as any application made and any sanitary precaution taken to be protected from environments that can damage our health. Hygiene issues include personal hygiene, which is defined as self-care applications that individuals carry out in order to maintain their health. Personal hygiene is very important for protecting and maintaining health and addressing health problems and is also fundamental to the prevention of many diseases. This study is not only focus on personal hygiene but also discuss about street-vended food. This study was attempted to find out knowledge, attitude and practices about personal hygiene among East West University students. In addition to this, the study examined for other risk factors of poor personal hygiene practices. Study population of the study was 83 students of pharmacy department of East West University. Results of the study were showed that those students are very alert about their personal hygiene. Their hand washing habit is very good. But students (98%) take street-vended food which is very harmful for their health. Students who are coming from outside of Dhaka have some poor personal hygiene practices habit comparing who live permanently in Dhaka city with their family. This study is expected to provide important information to better understand the importance of personal hygiene. Thus the result of this study will contribute to students health by making awareness about the bad effects of poor personal hygiene and reduce the risk associated with poor hygiene practices.

Key words: personal Hygiene, water-borne disease, bacteria, virus, protozoa, salmonella, shigella, street-vended food, tar, nicotine, Carbon monoxide,

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1.INTRODUCTION

Hygiene is defined as any application made and any sanitary precaution taken to be protected from environments that can damage our health. Hygiene issues include personal hygiene, which is defined as self-care applications that individuals carry out in order to maintain their health. Personal hygiene is very important for protecting and maintaining health and addressing health problems and is also fundamental to the prevention of many diseases, particularly contagious diseases. Personal hygiene precautions include hand-face hygiene; regular bathing; using soap and running water in the cleaning process; washing hands before preparing food, before and after eating meals and after using the bathroom; hair care; and washing and using one's own clothes, towels, shoes and slippers Besides constituting a basis for personal and social health, hygiene is an indispensible part of living in society. Human beings are continuously affected by external environmental pollutants. Everyday activities may involve contact with many sources of environmental contamination; these may be touched with the hand, present on shoes while walking, or contained in dust on the body and hair; moving the hand to the mouth also causes microorganisms to enter the body. (Aslan et al., 2006; Yılmaz and Özkan 2009).

Hygiene refers to the set of practices perceived by a community to be associated with the preservation of health and healthy living. While in modern medical sciences there is a set of standards of hygiene recommended for different situations, what is considered hygienic or not can vary between different cultures, genders and etaryan groups. Some regular hygienic practices may be considered good habits by a society while the neglect of hygiene can be considered disgusting, disrespectful or even threatening.

1.1 HISTORY OF HYGIENE PRACTICES

Elaborate codes of hygiene can be found in several Hindu texts, such as the Manusmriti and the Vishnu Purana. Bathing is one of the five Nitya karmas (daily duties) in Hinduism, and not performing it leads to sin, according to some scriptures.

Regular bathing was a hallmark of Roman civilization. Elaborate baths were constructed in urban areas to serve the public, who typically demanded the infrastructure to maintain personal cleanliness. The complexes usually consisted of large, swimming pool-like baths, smaller cold and hot pools, saunas, and spa-like facilities where individuals could be depilated, oiled, and massaged. Water was constantly changed by an aqueduct-fed flow.

Bathing outside of urban centers involved smaller, less elaborate bathing facilities, or simply the use of clean bodies of water. Roman cities also had large sewers, such as Rome's Cloaca Maxima, into which public and private latrines drained. Romans didn't have demand-flush toilets but did have some toilets with a continuous flow of water under them. (Similar toilets are seen in Acre Prison in the film *Exodus.*)

Until the late 19th Century, only the elite in Western cities typically possessed indoor facilities for relieving bodily functions. The poorer majority used communal facilities built above cesspools in backyards and courtyards. This changed after Dr. John Snow discovered that cholera was transmitted by the fecal contamination of water. Though it took decades for his findings to gain wide acceptance, governments and sanitary reformers were eventually convinced of the health benefits of using sewers to keep human waste from contaminating water. This encouraged the widespread adoption of both the flush toilet and the moral imperative that bathrooms should be indoors and as private as possible.(Philippe Braunstein et al, 1988)

1.2 CONCEPT OF HYGIENE

Hygiene is an old concept related to medicine, as well as to personal and professional care practices related to most aspects of living. In medicine and in home (domestic) and everyday life settings, hygiene practices are employed as preventative measures to reduce the incidence and spreading of disease. In the manufacture of food, pharmaceutical, cosmetic and other products, good hygiene is a key part of quality assurance i.e. ensuring that the product complies with microbial specifications appropriate to its use. The terms cleanliness (or cleaning) and hygiene are often used interchangeably, which can cause confusion. In general, hygiene mostly means practices that prevent spread of disease-causing organisms. Since cleaning processes (e.g., hand washing) remove infectious microbes as well as dirt and soil, they are often the means to achieve hygiene. Other uses of the term appear in phrases including: body hygiene, personal hygiene, sleep hygiene, mental hygiene, dental hygiene, and occupational hygiene, used in connection with public health. Hygiene is also the name of a branch of science that deals with the promotion and preservation of health, also called hygienics. Hygiene practices vary widely, and what is considered acceptable in one culture might not be acceptable in another.(International Scientific Forum 2005)

1.3 IMPORTANCE OF PERSONAL HYGIENE PRACTICES

The human body provides protection against external environment pollutants to some extent. However, skin cracks and wounds can allow pathogens to enter the body. For this reason, personal hygiene is one of the most important practices in terms of protecting the body from diseases. Hygiene is a personal matter. Hygiene practices, taught during childhood by mothers, fathers or teachers, mostly through practicing, need to be continued by the individual after childhood. Correct adoption of these habits has a direct impact on a person's future health (Yılmaz and Özkan, 2009) Hygiene behaviour includes hand hygiene, personal care, home hygiene and food hygiene. Individual hygiene behaviours can be affected by many factors, including beliefs, values, habits, socio-economic and cultural factors, level of knowledge Personal preferences, family characteristics and physical and social characteristics of the work and living environments. Therefore, the hygiene habits of each individual differ, meaning that these habits are unique to individuals (Akşit et al 1997; Görgülü et al, 2000).

The most important aspect of maintaining good health is good personal hygiene. Personal hygiene which is also referred to as personal care includes all of the following: Bathing and Showering, Hair care, Nail care, Foot care, Genital care, Dental care Personal hygiene is keeping the body clean, and helps prevent the spread of germs. Grooming is caring for fingernails and hair examples of these activities would be styling hair, shaving, trimming and painting fingernails. Maintaining good health also includes the following areas: Nutrition, Leisure/recreation opportunities, sleep, and exercise. As you can see, there are many factors that contribute to feeling and looking good. Feeling and looking good are important to each individual's emotional and physical wellbeing.

Maintaining personal hygiene is necessary for many reasons; these can be personal, social, for health reasons, psychological or simply as a way of life. Essentially keeping a good standard of hygiene helps to prevent the development and spread of infections, illnesses and bad odours.

Personal Reasons

Many people, women in particular, are very conscious of their hygiene needs and practices. This can be a result of being taught of the importance from an early age, from being picked-on at school for head lice or similar, or as a way of making themselves more attractive to the opposite sex. Self-esteem, confidence and motivation can all be altered by our body image, often reflected on our ability to care for ourselves and keep good hygiene practices. A bright white smile with clean and healthy teeth can endear people to us, whereas brown, unhealthy

teeth can cause embarrassment and can alter our sense of well-being. Healthy hair, skin and nails are signs of a good well-balanced diet and can give us confidence in everyday life

Social Reasons

Most people hate to be talked about, especially in a negative manner. By ensuring that our body is clean and well presented, we are more assured of projecting a positive body image that reflects our personalities. Children should be taught the importance of hygiene and how to achieve good hygiene very early to keep themselves and others healthy and to reduce the risk of being bullied at school.

Health Reasons

If a person is due to go into hospital, sometimes that person becomes very aware of their hygiene. The thought of being vulnerable and exposed to strangers can cause the person to become very strict on their hygiene needs. If you have cut yourself, the wound should be cleaned and dressed suitably, this can help reduced the risk of infection and pain. Conditions such as head lice, athlete's foot etc. should be treated immediately to prevent further infections and spread to others. Hand washing cannot be emphasized enough as this simple action can prevent a plethora of illnesses and disorders developing. Many people 'forget' to wash their hands after using the toilet or before handling foods; this deed can cause a great deal of illness and even death.

Psychological Issues

By being well presented, clean and tidy, people can feel more confident, especially in social situations. Many job interviews and such like are highly dependent of hygiene as many decisions are made by first impressions within the first few minutes of meeting; these decisions are often made in the sub-conscious. Our chances of succeeding either in work or social settings, or even with the opposite sex can be altered by our maintenance of hygiene.

Maintaining hygiene practices helps to reduce the risks of ill health, but equally important affects how we and others perceive ourselves and can influence our levels of confidence and self-esteem which can affect many aspects of our lives.(Bloomfield SF, Nath KJ et al, 2008)

1.4 SOME HYGIENE PRACTICES IN EVERYDAY LIFE

1.4.1 Hand hygiene

Hand washing for hand hygiene is the act of cleaning the hands with or without the use of water or another liquid, or with the use of soap, for the purpose of removing soil, dirt, and/or microorganisms.

Medical hand hygiene pertains to the hygiene practices related to the administration of medicine and medical care that prevents or minimizes disease and the spreading of disease. The main medical purpose of washing hands is to cleanse the hands of pathogens (including bacteria or viruses) and chemicals which can cause personal harm or disease. This is especially important for people who handle food or work in the medical field, but it is also an important practice for the general public. People can become infected with respiratory illnesses such as influenza or the common cold, for example, if they don't wash their hands before touching their eyes, nose, or mouth. Indeed, the Centers for Disease Control and Prevention (CDC) has stated: "It is well documented that one of the most important measures for preventing the spread of pathogens is effective hand washing." As a general rule, hand washing protects people poorly or not at all from droplet- and airborne diseases, such as measles, chickenpox, influenza, and tuberculosis. It protects best against diseases transmitted through fecal-oral routes (such as many forms of stomach flu) and direct physical contact (such as impetigo).(Curtis V, Cairncross S. et al 2003)

Figure: An example of how minuscule particles can be caught between dermal ridges in the hand, yet remain unseen by the naked eye.

Substances used for hand washing

- Soap and detergents
- Water temperature
- Solid soap
- Antibacterial soap
- Hand antiseptic

Figure01: Procedure of hand washing

1.4.2Effectiveness of hand washing

This hygienic behavior has been shown to cut the number of child deaths from diarrhea (the second leading cause of child deaths) by almost half and from pneumonia (the leading cause of child deaths) by one-quarter. There are critical times in washing hands with soap and/or using of a hand antiseptic related to fecal-oral transmission: after using a bathroom (private or public), before eating and before preparing food or handling raw meat, fish, or poultry, or any other situation leading to potential contamination .To reduce the spread of germs, it is also better to wash the hands and/or use a hand antiseptic before and after tending to a sick person.

For control of staphylococcal infections in hospitals, it has been found that the greatest benefit from hand-cleansing came from the first 20% of washing, and that very little additional benefit was gained when hand cleansing frequency was increased beyond 35%.Washing with plain soap results in more than triple the rate of bacterial infectious disease transmitted to food as compared to washing with antibacterial soap. Comparing hand-rubbing with alcohol-based solution with hand washing with antibacterial soap for a median time of 30 seconds each showed that the alcohol hand-rubbing reduced bacterial contamination 26% more than the antibacterial soap. But soap and water is the more effective than alcohol-based hand rubs for reducing H1N1 influenza A virus and Clostridium difficile spores from hands. (Exner M, Fara GM, Nath KJ et al, 2008)

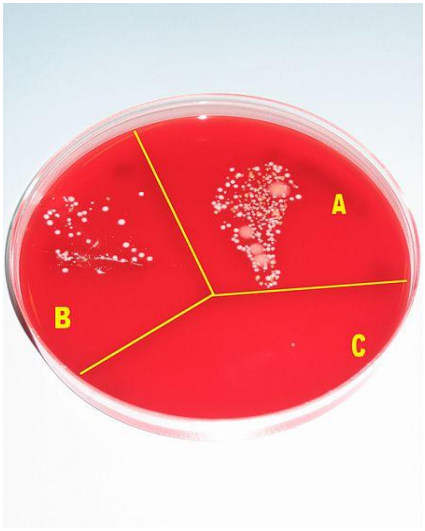


Figure02: Microbial growth on a cultivation plate without procedures (A), after washing hands with soap (B) and after disinfection with alcohol (C).

1.4.3 Respiratory hygiene

Correct respiratory and hand hygiene when coughing and sneezing reduces the spread of germs particularly during the cold and flu season.

- Carry tissues and use them to catch coughs and sneezes
- Dispose of tissues as soon as possible
- Clean your hands by hand washing or using an alcohol hand sanitize(Rook GAW et ql 2003)

1.4.4 Food hygiene at home

Food hygiene is concerned with the hygiene practices that prevent food poisoning. The five key principles of food hygiene, according to WHO, are:

- ✓ Prevent contaminating food with pathogens spreading from people, pets, and pests.
- ✓ Separate raw and cooked foods to prevent contaminating the cooked foods.
- ✓ Cook foods for the appropriate length of time and at the appropriate temperature to kill pathogens.
- ✓ Store food at the proper temperature.
- ✓ Use safe water and raw materials.

1.4.5 Household water treatment and safe storage

Household water treatment and safe storage ensure drinking water is safe for consumption. Drinking water quality remains a significant problem, not only in developing countries but also in developed countries; even in the European region it is estimated that 120 million people do not have access to safe drinking water. Point-of-use water quality interventions can reduce diarrheal disease in communities where water quality is poor, or in emergency situations where there is a breakdown in water supply. Since water can become contaminated during storage at home (e.g. by contact with contaminated hands or using dirty storage vessels), safe storage of water in the home is also important.

1.4.6 Methods for treatment of drinking water, include:

1. Chemical disinfection using chlorine or iodine
2. Boiling
3. Filtration using ceramic filters
4. Solar disinfection - Solar disinfection is an effective method, especially when no chemical disinfectants are available.
5. UV irradiation - community or household UV systems may be batch or flow-though. The lamps can be suspended above the water channel or submerged in the water flow.
6. Combined flocculation/disinfection systems – available as sachets of powder that act by coagulating and flocculating sediments in water followed by release of chlorine.
7. Multi barrier methods – Some systems use two or more of the above treatments in combination or in succession to optimize efficacy.(Fewtrell L, Kauffman RB et al,2005)

1.4.7 Hygiene in the kitchen, bathroom and toilet

Routine cleaning of "contact" (hand, food and drinking water) sites and surfaces (such as toilet seats and flush handles, door and tap handles, work surfaces, bath and basin surfaces) in the kitchen, bathroom and toilet reduces the risk of spread of germs.The infection risk from the toilet itself is not high, provided it is properly maintained, although some splashing and aerosol formation can occur during flushing, particularly where someone in the family has diarrhea. Germs can survive in the scum or scale left behind on baths and wash basins after washing and bathing.

Water left stagnant in the pipes of showers can be contaminated with germs that become airborne when the shower is turned on. If a shower has not been used for some time, it should be left to run at a hot temperature for a few minutes before use.

Thorough cleaning is important in preventing the spread of fungal infections. Molds can live on wall and floor tiles and on shower curtains. Mold can be responsible for infections, cause allergic responses, deteriorate/damage surfaces and cause unpleasant odors. Primary sites of fungal growth are inanimate surfaces, including carpets and soft furnishings. Air-borne fungi are usually associated with damp conditions, poor ventilation or closed air systems.

Cleaning of toilets and hand wash facilities is important to prevent odors and make them socially acceptable. Social acceptability is an important part of encouraging people to use toilets and wash their hands. (Beumer R, Bloomfield SF et al, 2003)

1.4.8 Laundry hygiene

Laundry hygiene pertains to the practices that prevent or minimize disease and the spreading of disease via soiled clothing and household linens such as towels. Items most likely to be contaminated with pathogens are those that come into direct contact with the body, e.g., underwear, personal towels, facecloths, nappies. Micro-organisms can also be transferred between contaminated and uncontaminated items of clothing and linen during laundering. Of concern are the new "community" strains of MRSA. Experience in the USA suggests that these strains are transmissible within families, but also in community settings such as prisons, schools and sport teams. Skin-to-skin contact (including unabraded skin) and indirect contact with contaminated objects such as towels, sheets and sports equipment seem to represent the mode of transmission.

Two processes are considered suitable for hygienic cleaning of clothing and linen:

- Washing or laundering at 60 °C (140 °F) or above
- Washing or laundering at 30 °C (86 °F) - 40 °C (104 °F) using a bleach-based product: This produces decontamination of fabrics by a combination of physical removal and chemical inactivation. However, some types of fungi and viruses that are harder to inactivate, may not be removed.

Washing at temperatures of 40 °C (104 °F) or below with a non-bleach product is considered to carry a risk of inadequate decontamination. (Bloomfield SF, Cookson B et al,2006)

1.4.9 Medical hygiene at home

Medical hygiene pertains to the hygiene practices that prevents or minimizes disease and the spreading of disease in relation to administering medical care to those who are infected or who are more "at risk" of infection in the home. Across the world, governments are increasingly under pressure to fund the level of healthcare that people expect. Care of increasing numbers of patients in the community, including at home is one answer, but can be fatally undermined by inadequate infection control in the home. Increasingly, all of these "at-

risk" groups are cared for at home by a carer who may be a household member who thus requires a good knowledge of hygiene. People with reduced immunity to infection, who are looked after at home, make up an increasing proportion of the population (currently up to 20%).The largest proportion are the elderly who have co-morbidities, which reduce their immunity to infection. It also includes the very young, patients discharged from hospital, taking immuno-suppressive drugs or using invasive systems, etc. For patients discharged from hospital, or being treated at home special "medical hygiene" (see above) procedures may need to be performed for them e.g. catheter or dressing replacement, which puts them at higher risk of infection.

Antiseptics may be applied to cuts, wounds abrasions of the skin to prevent the entry of harmful bacteria that can cause sepsis. Day-to-day hygiene practices, other than special medical hygiene procedures are no different for those at increased risk of infection than for other family members. The difference is that, if hygiene practices are not correctly carried out, the risk of infection is much greater.(International Scientific Forum 2003)

1.5 HOME HYGIENE IN LOW-INCOME COMMUNITIES

In the developing world, for decades, universal access to water and sanitation has been seen as the essential step in reducing the preventable ID burden, but it is now clear that this is best achieved by programs that integrate hygiene promotion with improvements in water quality and availability, and sanitation. About 2 million people die every year due to diarrheal diseases, most of them are children less than 5 years of age. The most affected are the populations in developing countries, living in extreme conditions of poverty, normally peri-urban dwellers or rural inhabitants. Providing access to sufficient quantities of safe water, the provision of facilities for a sanitary disposal of excreta, and introducing sound hygiene behaviors are of capital importance to reduce the burden of disease caused by these risk factors. (Jefferson T et al, 2007)

Research shows that, if widely practiced, hand washing with soap could reduce diarrhea by almost fifty percent and respiratory infections by nearly twenty-five percent[1]Hand washing with soap also reduces the incidence of skin diseases, eye infections like trachoma and intestinal worms, especially ascariasis and trichuriasis. (Agboatalla M et al, 2005)

Other hygiene practices, such as safe disposal of waste, surface hygiene, and care of domestic animals, are also important in low income communities to break the chain of infection transmission.

1.6 BODY HYGIENE

Body hygiene pertains to hygiene practices performed by an individual to care for one's bodily health and well being, through cleanliness. Motivations for personal hygiene practice include reduction of personal illness, healing from personal illness, optimal health and sense of well being, social acceptance and prevention of spread of illness to others.

Personal hygiene practices include: seeing a doctor, seeing a dentist, regular washing/bathing, and healthy eating. Personal grooming extends personal hygiene as it pertains to the maintenance of a good personal and public appearance, which need not necessarily be hygienic.

Body hygiene is achieved by using personal body hygiene products including: soap, hair shampoo, toothbrushes, tooth paste, cotton swabs, antiperspirant, facial tissue, mouthwash, nail files, skin cleansers, toilet paper, and other such products. (Agboatalla M et al, 2005)

Personal hygiene is the first step to good grooming and healthy life.

Grooming Routines

- ✓ Hair
- ✓ Skin
- ✓ Teeth
- ✓ Hands
- ✓ Nails
- ✓ Feet
- ✓ Menstrual Hygiene

Hair

Wash your hair at least once a week using soap or mild shampoo. Avoid shampoos with borax or alkalis. Rinse well. This is more important than working up a head load of lather.

Dry hair after a wash.

Brush your hair three to four times a day with a soft bristled brush or a wide toothed comb. Wash your brush and comb every time you wash your hair.

Oil the scalp, once a week, preferably an hour before hair wash.

There are no completely safe or permanent hair dyes as of now. Apart from causing scalp allergies, dyes can also cause allergic colds and throat conditions. Perform a sensitivity test every time you use hair colour.

Skin

Soap and water are essential for keeping the skin clean. A good bath once or twice a day is recommended, especially in tropical countries like India. Those who are involved in active sports or work out to a sweat would do well to take a bath after the activity.

A mild soap will do the job adequately. Germicidal or antiseptic soaps are not essential for the daily bath. You can use a bath sponge for scrubbing. Back brushes and heel scrubbers are available. But do not use abrasive material.

The genitals and the anus need to be cleaned well because of the natural secretions of these areas, in unhygienic conditions, can cause irritation and infection.

Wash off well after soaping. Drying with a clean towel is important. Avoid sharing soaps and towels.

Change into clean underwear after bath.

Around middle age the skin tends to go dry a bit. A moisturising oil or cream can be used. It is better to use this at night, because if you go out in the sun or commute on dusty roads when the skin is wet, dust sticks to it and oils may also give you a tan.

Teeth

Brush teeth twice a day and rinse well after every meal. Brushing before going to bed is important (especially recommended for people with a sweet tooth). For normal teeth this is adequate.

While brushing, pay attention to the fact that you are getting rid of the food particles stuck in between the teeth and in the crevices of the flatter teeth at the back, the molars and pre molars. Brush down on the upper teeth and brush up on the lower teeth. Use a circular motion. Pay attention to the tongue and the inner surface of teeth as well.

The brush should have resilient bristles. It should be rinsed well and left to dry after use. There are no perfect toothpastes or powders. Use one without harsh abrasives or strong antiseptics

Hands

Wash hands thoroughly with soap and water before and after every meal and after visiting the toilet. Soaping and rinsing should cover the areas between fingers, nails and back of the hand. Hands should be dried with a clean towel after wash. The towel at the wash stand has to be washed and changed every day.

While cooking, especially when packing lunches, you can prevent food from spoilage and minimize contamination by keeping your hands clean. While handling food avoid scratching, or touching the ears, nose, mouth or other body orifices. If you need to use a handkerchief or tissue, wash your hands after that. Keep your nails short.

Nail Polish users should see that it does not chip off into the food.

Nails

A healthy body ensures healthy nails. Brittle or discolored nails show up deficiencies or disease conditions.

Do not keep your nails painted continuously. It causes the keratin, of which nails are made, to split. Pamper your hands and nails once every three weeks with a manicure. This requires soaking your hands in warm water for ten minutes, massaging of hands, thorough cleaning and shaping of nails. Choose your manicure kit with care. In some kits, the instruments are crudely made and they will do more harm than good.

Feet

Those who use shoes constantly need to slip them off now and then. This airs the socks a bit and makes them less smelly. Wear cotton socks. Wear a clean pair every day. Powder your

feet before wearing socks. Many people have sweaty feet, and socks and shoes can get quite smelly. If possible do not wear the same pair of shoes every day. Keep at least one more pair and use it alternatively. Go for a pedicure once in three weeks.

Give importance to wearing comfort in the choice of footwear. For those who go barefoot indoors, door mats must be cleaned or changed frequently. Extra foot care is required for diabetics.(Aiello AE, Coulborn RM et al, 2003).

Menstrual Hygiene

No woman feels completely comfortable when she has her period. If it is not pre menstrual tension or stomach cramps it is the problem of dealing with the menstrual flow.

Technology offers sanitary pads, tampons or menstrual cups or caps to deal with the flow. The user has to decide what suits her best. Absorbent pads may be noticeable in form fitting clothes. They cause some soreness on the inner thighs.

Some women prefer tampon to external pads. A plug of absorbent cotton or gauze is inserted inside. But these should not be left unchanged beyond six hours. Some brands state that tampons left unchanged for more than 12-18 hours increases the possibility of toxic shock.

It is not clear what causes toxic shock. But there seems to be a link between tampons and *Toxic Shock Syndrome* (TSS). Approximately 1% of all menstruating women carry the bacteria in question (Staphylococcus aureus) in their vagina. Absorbent tampons provide the medium for them to grow and spread infection.

TSS cases were first reported in 1978. It is marked by high fever, severe vomiting and diarrhoea. The cases can be mild to fatal.

The menstrual cup (or cap), is inserted within and collects the flow and can be emptied, cleaned and re used.

Whatever the preference, washing is important. There need be no taboo about bath on these days. Some people have the problem of odour during menstruation. Cleanliness and change of pad/tampon as often as is necessary reduces this problem. It is not advisable to use perfumed pads or tampons. In fact, using powder in the genital area is not recommended. (West coast district health board November 2009).

1.6.1 Personal hygiene for women

The vagina is able to clean itself no special care is needed, other than washing the external genitals. Do not put anything like douches into the vagina, as the delicate skin can be damaged. Here are some personal hygiene suggestions for women:

- **Menstruation** - wash your body, including your genital area, in the same way as you always do. Change tampons and sanitary napkins regularly, at least four to five times a day. Always wash your hands before and after handling a tampon or pad.
- **Cystitis** - is an infection of the bladder. This is a common condition for sexually active young women. Urinating after sexual intercourse can help to flush out any bacteria that may be in the urethra and bladder.
- **Thrush** - some soaps and detergents can irritate the skin of the vagina, and make thrush infections more likely. Some people find that they often get thrush when they use antibiotics. Use mild soap and unperfumed toilet paper. Avoid tight, synthetic underwear. Try cotton underwear, and change regularly. There is medical treatment for thrush, so talk to your doctor or pharmacist.(Fewtrell L et al,2005).

1.7 CONSEQUENCES OF POOR PERSONAL HYGIENE

Failure to keep up a standard of hygiene can have many implications. Not only is there an increased risk of getting an infection or illness, but there are many social and psychological aspects that can be affected. Poor Personal Hygiene, in relation to preventing the spread of disease is paramount in preventing epidemic or even pandemic outbreaks. To engage in some very basic measures could help prevent many coughs and colds from being passed from person to person.

Body Odor

One of the first and most prominent consequences of bad hygiene is body odor. Body occurs due to the interaction of bacteria and sweat produced by the apocrine glands. As bacteria thrive in unwashed sweat, over time their byproducts produce the smell commonly associated with body odor. Body odor may also come from poor bathroom habits, resulting in feces or urine odor.(Rook GAW et al, 2003)

Bad Breath

Bad breath proves another easily recognizable consequence of poor hygiene. It commonly develops from not regularly brushing and flossing your teeth. Bad breath results because of two main reasons. First, bacteria thrive on particles of food that can stick to your teeth. As the bacteria digest this food, their byproduct results in odor. Food can also get stuck in your teeth and rot over time, producing a foul odor, according to the American Dental Association.(Scott E et al, 2005)

Dental Disease

Not only can poor dental hygiene lead to bad breath, it can also lead to dental disease. As you allow food particles and bacteria to build up on the teeth, a coating called plaque begins to form. The bacteria in this plaque release acids, which break down the enamel on your teeth. As this process continues over time, a hard substance called calculus can form on the teeth, irritating the surrounding gums. This irritation can progress into gingivitis, leading to inflammation of the gums, which can later lead to gum disease. Gum disease causes infection, and eventually may destroy your teeth. .(Scott E et al, 2005).

General Disease

Hygiene practices, such as washing your hands, prove the most effective ways to prevent contracting disease and spreading disease, according to the Mayo Clinic and the Center for Disease Control and Prevention (CDC). Your hands are in constant contact with both the environment and your face, providing easy transportation from the surface of an infected object or person to your nose or mouth. Washing your hands with clean running water and soap helps reduce the amount of bacteria on your skin, lessening your chance of contracting diseases such as the common cold, influenza (flu), salmonellosis, hepatitis A, typhoid, streptococcus and staph infections. .(Scott E et al, 2005).

Social Embarrassment

Social aspects can be affected, as many people would rather alienate themselves from someone who has bad personal hygiene than to tell them how they could improve. Bullies may use bad personal hygiene as a way of abusing their victims, using social embarrassment as a weapon.

Poor personal hygiene can have significant implications on the success of job applications or the chance of promotion; no company wants to be represented by someone who does not appear to be able to look after themselves.

Many sufferers of mental illnesses like dementia or depression may need extra support and encouragement with their personal hygiene. Their carriers should make sure that they have everything they need and assist them when permitted and when possible. .(Scott E et al, 2005).

1.8 SIDE EFFECTS OF BAD PERSONAL HYGIENE PRACTICES

Depression is a painful sadness or down mood that interferes with daily life. Many people feel down for short periods, but depression lasts a long time and may include anxiety, insomnia, and other symptoms. Life events such as the death of a loved one can trigger depression. The illness can run in families, but people with no family history also become depressed. Often there is no clear cause. Depression is a common but serious illness that usually doesn't go away without treatment. Counseling and/or antidepressant medication can treat depression in most people.

Narcotic abuse occurs when you take illegal narcotic drugs, such as heroin, or misuse prescription narcotics. Narcotic drugs stimulate the central nervous system. They can block the sensation of pain and make you feel elated, relaxed, and sleepy. Many people take prescription narcotics to relieve pain. But if you take narcotics that aren't prescribed, or if you take them for reasons other than why they are prescribed, you may be abusing them. Abusing narcotics can cause serious health problems and can lead to addiction.

Intoxication occurs when you take any kind of chemical or drug that affects your mental and physical abilities. These drugs can include marijuana, cocaine, heroin, opium, amphetamines, methamphetamines, PCP, LSD, and ecstasy. You can also become intoxicated by chemicals or fumes you accidentally consume, such as mercury, cleaning solvents, bleach, pesticides, gasoline, and paint fumes. Intoxication happens because drugs and chemicals change the signals that go to and from your brain. The symptoms of intoxication can vary widely depending on the type of drug or chemical you take. Intoxication can cause euphoria, slowed reaction time, dizziness, confusion, increased heart rate, paranoia, nausea, hallucinations, increased body temperature, impaired judgment, lowered inhibitions, impaired balance,

falling, drunk driving, numbness, sleeplessness, changes in emotions, increased sensitivity, anxiety, sweating, teeth clenching, reduced appetite, and violent behavior. If you take enough of a certain drug or chemical, it can cause stroke, coma, and death.(Perez V et al, 2009).

1.9 RISK ASSOCIATED WITH DRINKING WATER

Water-borne diseases are any illness caused by drinking water contaminated by human or Animal feces which contain pathogenic microorganisms.

The full picture of water-associated diseases is complex for a number of reasons. Over the past decades, the picture of water-related human health issues has become increasingly comprehensive, with the emergence of new water-related infection diseases and the re-emergence of one's already known. Data are available for some water-, sanitation- and hygiene-related diseases (which include salmonellosis, cholera, shigellosis), but for others such malaria, schistosomiasis or the most modern infections such legionellosis or SARS CoV analyses remain to be done.

The burden of several disease groups can only partly be attributed to water determinants. The where water plays an essential role in the ecology of diseases, it may be hard to pinpoint the relative importance of aquatic components of the local ecosystems.

Drinking water comes from a variety of sources including public water systems, private wells, or bottled water. Ensuring safe and healthy drinking water may be as simple as turning on the tap from an EPA-regulated public water system. Other water sources may need a water filter, a check on water fluoridation, or an inspection to ensure a septic tank is not too close to a private well. It is important to know where drinking water comes from, how it's been treated, and if it's safe to drink.(Rebecca L. Calderon 2002).

1.10MICROORGANISMS WHICH CAUSES WATERBORNE DISEASE

The following groups of microorganisms have been linked with the occurrence of waterborne disease. As each pathogen is isolated and identified as a threat to water quality, ORD researchers try to discover the most effective combination of barriers and disinfection methods to minimize risk of human exposure.

Bacteria: Bacteria are the most widely distributed life forms. Pathogenic bacteria range in length from approximately 0.4 to 14 mm (a mm or "micrometer" equals one one-thousandth

of a millimeter) and 0.2 to 1.2 mm in width. Key bacterial pathogens responsible for waterborne disease include *Legionella*, *Salmonella typhi*, *Shigella*, and *Vibrio cholerae*.

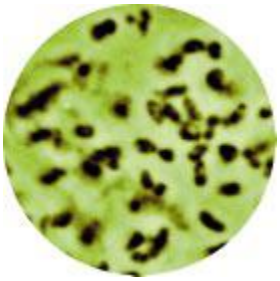


Figure 03 : *Salmonella typhi*,

Viruses: Viruses are inactive when outside of a living host cell. Viruses linked to waterborne disease have protein coats that provide protection from environmental hazards and range in size from 0.02 to 0.09 mm. Unlike bacteria and protozoa, they contain only one type of nucleic acid (RNA or DNA). Key pathogens include hepatitis A and Norwalk virus.

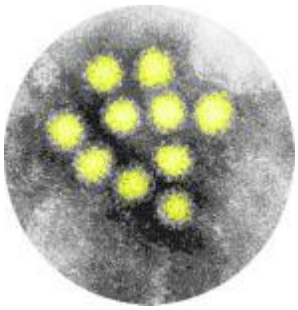


Figure 04 : Norwalk virus.

Protozoa: Protozoa, common in bodies of water, are much larger than bacteria and viruses. To survive harsh environmental conditions, some species can secrete a protective covering and form a resting stage called a "cyst." Encystment can protect protozoa from drinking water disinfection efforts and facilitate the spread of disease. Key protozoa being studied as agents of waterborne disease include *Giardia* and*Cryptosporidium*.

Figure 05 : *Giardia*

1.11 NAME OF WATER RELATED DISEASES:

- Anaemia
- Arsenicosis
- Ascariasis
- Botulism
- Campylobacteriosis
- Cholera
- Cryptosporiodiosis
- Cyanobacterial toxins
- Dengue
- Diarrhoea
- Dracunculiasis
- Fluorosis
- Giardiasis
- Hepatitis
- Hookworm infection
- Japanese encephalitis.
- Lead poisoning
- Legionellosis
- Leptospirosis
- Lymphatic filariasis
- Malaria
- Malnutrition
- Methaemoglobinemia
- Onchocerciasis
- Polio
- Ring Worm or Tinea
- Scabies
- Schistomiasis
- Trachoma
- Trichuriasis
- Typhoid

((R. Bos, Dec. 2004).

1.12 DIMENTION OF THE PROBLEM:

In developing countries four-fifths of all the illnesses are caused by water-borne diseases, with diarrhoea being the leading cause of childhood death.

The global picture of water and health has a strong local dimension with some 1.1 billion people still lacking access to improved drinking water sources and some 2.4 billion to adequate sanitation. Today we have strong evidence that water-, sanitation and hygiene-related diseases account for some 2,213,000 deaths annually and an annual loss of 82,196,000 Disability Adjusted Life Years .(R. Bos, Dec. 2004).

WHO estimates indicate that worldwide over 2 billion people are infected with schistosomes and soil transmitted helminthes and 300 million of these suffer serious illness as a result. Malaria kills over a million people every year, and a large percentage of them are under five as well, mainly in Africa South of the Sahara. In 2001 the estimated global burden of malaria amounted to 42.3 million DALYs, constituting 10 % of Africa's overall disease burden. Malaria causes at least 396.8 million cases of acute illness each year. Pregnant women are the main adult risk group. As one of the major public health problems in tropical countries, it has been claimed that malaria has reduced economic growth in African countries by 1.3 % each year over the past 30 years.

An estimated 246.7 million people worldwide are infected by **schistomiasis**, and of these 20 million suffer severe consequences of the infection, while 120 million suffer milder symptoms. An estimated 80% of transmission takes place in Africa south of the Sahara

Diarrhoea occurs worldwide and causes 4% of all deaths and 5% of the health loss to disability.

In Bangladesh alone, some 35 million people are exposed, on a daily basis, to elevated levels of arsenic in their drinking water, which will ultimately threaten their health and shorten their life expectancy.

After the Tsunami attack in Asia on Sunday the 26th of December 2004 people faced the threat of water borne diseases linked to flooding, like Shigellosis, Cholera, Hepatitis A, Leptospirosis, Typhoid Fever, Malaria and Dengue fever.

1.13 TRANSMISSION OF WATER-BORNE DISEASE

Water borne diseases spread by contamination of drinking water systems with the urine and feces of infected animal or people.

This is likely to occur where public and private drinking water systems get their water from surface waters (rain, creeks, rivers, lakes etc.), which can be contaminated by infected animals or people. Runoff from landfills, septic fields, sewer pipes, residential or industrial developments can also sometimes contaminate surface water.

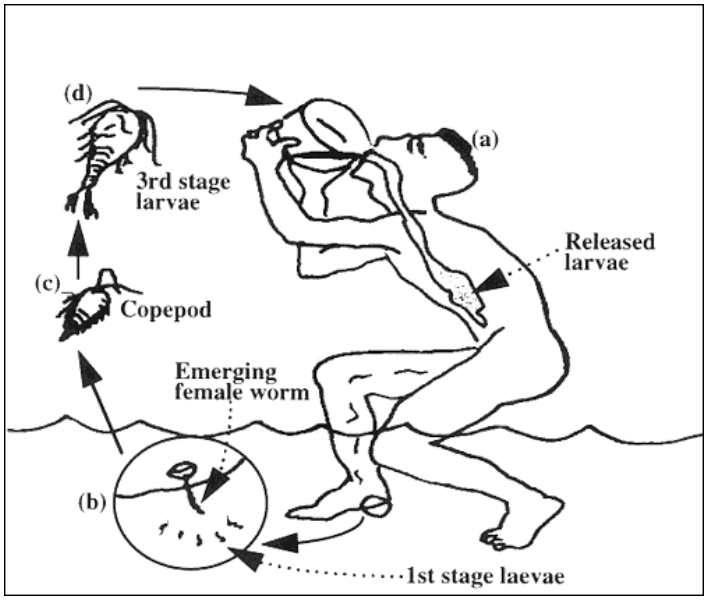
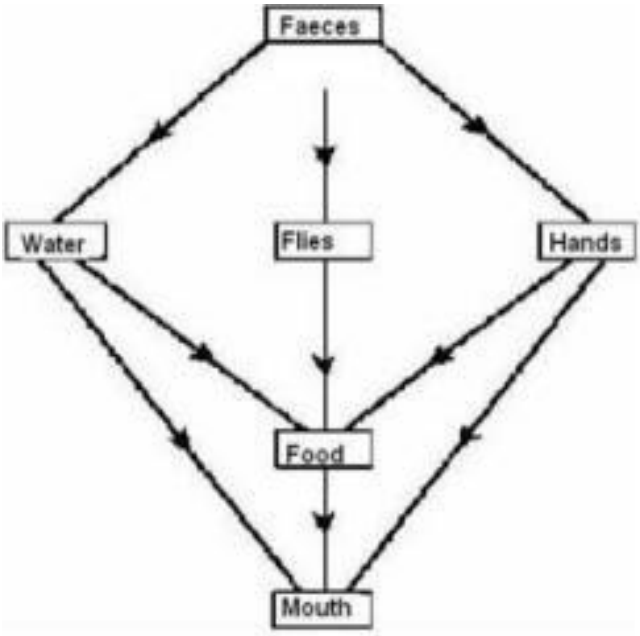


Figure06: Life cycle of a larvae.

This has been the cause of many dramatic outbreaks of fecal-oral diseases such as cholera and typhoid. However, there are many other ways in which fecal material can reach the mouth, for instance on the hands or on contaminated food. In general, contaminated food is the single most common way in which people become infected.

The following picture shows the faecal-oral routes of diseases transmission.



The germs in the feces can cause the diseases by even slight contact and transfer. This contamination may occur due to floodwaters, water runoff from landfills, septic fields, and sewer pipes.

The only way to break the continued transmission is to improve the people's hygienic behavior and to provide them with certain basic needs: drinking water, washing and bathing facilities and sanitation. Malaria transmission is facilitated when large numbers of people sleep outdoors during hot weather, or sleep in houses that have no protection against invading mosquitoes. Malaria mosquitoes, tropical black flies, and bilharzias snails can all be controlled with efficient drainage because they all depend on water to complete their life cycles.

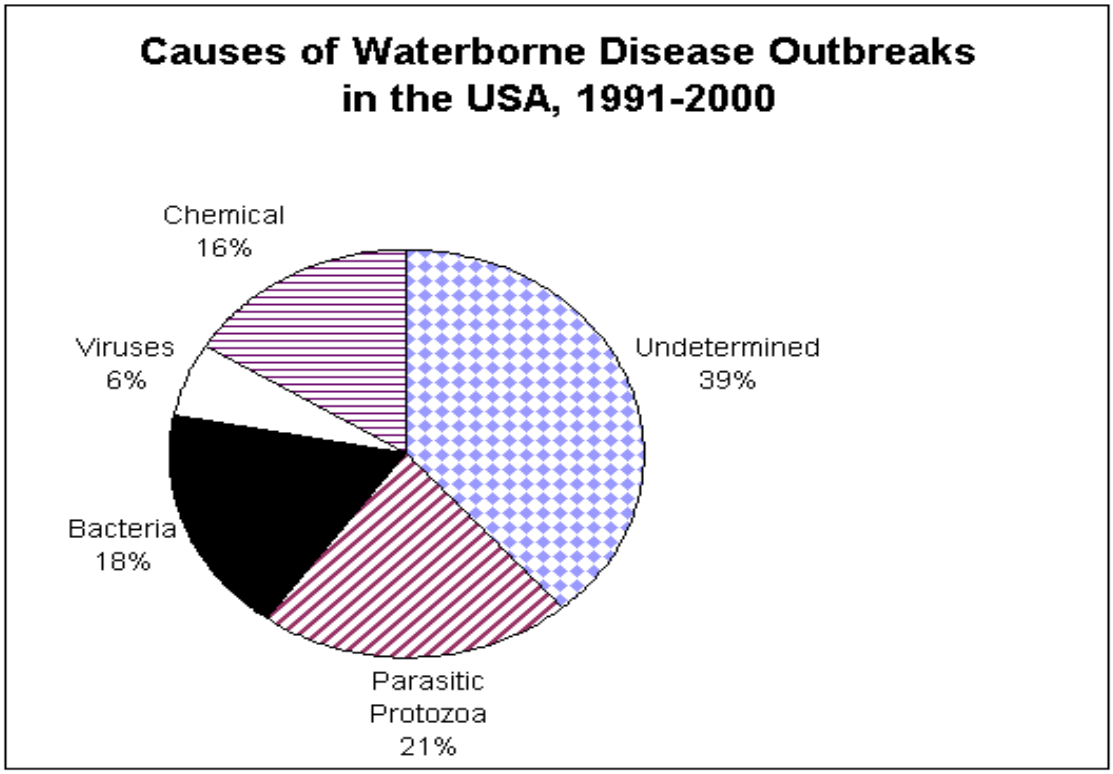


Figure07: Causes of waterborne disease outbreaks in the USA.

1.14 PREVENTION OF WATER-BORNE DISEASE

Clean water is a pre-requisite for reducing the spread of water-borne diseases. It is well recognized that the prevalence of water-borne diseases can be greatly reduced by provision of clean drinking water and safe disposal of feces. Water is disinfected to kill any pathogens that may be present in the water supply and to prevent them from growing again in the

distribution systems. Disinfection is then used to prevent the growth of pathogenic organisms and to protect public health and the choice of the Disinfect depends upon the individual water quality and water supply system. Without disinfection, the risk from waterborne disease in increased. The two most common methods to kill microorganisms in the water supply are: oxidation with chemicals such as chlorine, chlorine dioxide or ozone, and irradiation with Ultra-Violet (UV) radiation.(*The United Nations World Water Development Report 'Water for people Water for life'* p.102)

1.15 FOOD SAFETY

• Cleaning of food preparation areas and equipment/tools/utensils, for example using different/separate cutting boards and utensils for preparing raw meats and vegetables.
• Thorough cooking of meats
• Regular dish washing with soap and clean water
• Washing of hands after touching uncooked food when preparing meals
• Proper storage of food so as to prevent contamination by rodents or insects
• Refrigeration of foods (and avoidance of specific foods in environments where refrigeration is not available)

1.16 STREET-VENDED FOODS

"street-vended foods" or "street foods" which are defined as foods and beverages prepared and/or sold by vendors in streets and other public places for immediate consumption or consumption at a later time without further processing or preparation, which are sold outside authorized market areas for immediate consumption. Because of socioeconomic changes in many countries, this sector has experienced significant growth during the past few decades. Urbanization and population growth, especially in developing countries, are expected to continue into the next century and street-vended foods, which are largely but not exclusively an urban phenomenon, will expand accordingly. Street vended foods are appreciated for their unique flavors as well as their convenience, they are also often essential for maintaining the nutritional status of the population. Street food vending assures food security for low-income urban populations and provides a livelihood for a large number of workers who would otherwise be unable to establish a business for want of capital. Street food vending also offers business opportunities for developing entrepreneurs. (Frederick et al, 2004).

1.17 KEY FINDINGS OF THE WHO SURVEY OF STREET-VENDED FOODS

- 74% of countries reported street-vended foods to be a significant part of the urban food supply;
- Street-vended foods included foods as diverse as meat, fish, fruits, vegetables, grains, cereals, frozen produce and beverages;
- Types of preparation included foods without any preparation (65%), ready-to-eat food (97%) and food cooked on site (82%);
- Vending facilities varied from mobile carts to fixed stalls and food centres;
- Infrastructure developments were relatively limited with restricted access to potable water (47%), toilets (15%), refrigeration (43%) and washing and waste disposal facilities;
- The majority of countries reported contamination of food (from raw food, infected handlers and inadequately cleaned equipment) and time and temperature abuse to be the major factors contributing to foodborne disease; and
- Most countries reported insufficient inspection personnel, insufficient application of the HACCP concept and noted that registration, training and medical examinations were not amongst selected management strategies.(Frederick et al, 2004)

Figure08: Different types of street-vended foods

1.18 PROBLEMS OF STREET-VENDED FOOD

- Lack of basic infrastructure and services, such as potable water supplies.
- Difficulty in controlling the large numbers of street food vending operations because of their diversity, mobility and temporary nature.
- Insufficient resources for inspection and laboratory analysis.
- General lack of factual knowledge about the microbiological status or the precise epidemiological significance of many street-vended foods.
- Poor knowledge of street vendors in basic food safety measures.
- Inadequate public awareness of hazards posed by certain street foods.(Frederick et al, 2004)

1.19 SOURCES OF CONTAMINATION

Microbial contamination of ready-to-eat foods sold by street vendors and hawkers has become a major health problem. Street food vendors are mostly uninformed of good hygiene practices (GHP) and causes of diarrheal diseases which can increase the risk of street food contamination (Thomas et al, 2008).

From the initial contamination of raw foods with pathogenic bacteria to subsequent contamination by vendors during preparation; there are many factors that should be considered for the analyzing the hazards due to street foods. The vendors can be carriers of pathogens like *E. coli, Salmonella*, *Shigella*, *Campylobacter, Vibrio cholerae* and *S. aureus* who eventually transfer these food borne hazards to consumers. In most cases, running water is not available at vending sites; hands and utensils washing are usually done in one or more buckets, and sometimes without soap (Thomas et al, 2008). Wastewaters and garbage's are discarded nearby, and garbage's are discarded nearby, providing nutrients for insects and rodents, which may carry food borne pathogens The serving utensils used at the vending site are often contaminated with *Staphylococcus* sp. which may have originated from the vendors hands when they touch the food preparation areas, dish cloths and the water during dish washing and hand washing which indicates cross contamination between dish water, food preparation surfaces, and the food itself; consequently, perceive a major public health risk. Street foods are posed major public health risk due to lack of basic infrastructure and services, difficulty in controlling the large numbers of street food vending because of their diversity, mobility and temporary nature. A general lack of factual knowledge about the

epidemiological significance of many street vended foods, poor knowledge of street vendors in basic food safety measures and inadequate public awareness of hazards posed by certain foods has severely hampered the deployment of a precise scientific approach to this very serious problem. Therefore, the conditions of street food preparation and vending raise many concerns for consumer's health.

The commercial manufacture of the food sold on the streets consists of a small number of the operations, but this critical process can lead to the introduction of the microorganisms or the proliferation of those already present. Possible sources of the microbial contamination are

- unhygienic handling;
- raw material;
- inadequate cleaning of the machines used to cut the food, knives, contact surfaces, clothes and manipulators hands, and
- Air borne contamination (Thomas et al, 2008).

1.20 PERSONAL HYGIENE AND FOOD PREPARATION

1.20.1Domestic Food Preparation

As the employer would be educated in industry, the cook in the domestic setting must be aware of the need to keep surfaces clean at all times. Pets should not be permitted to share cooking and eating spaces and should be allocated separate eating and toilet environments. Babies' bottles and feeding equipment should be sterilized following the manufacturer's instructions, and children should not be encouraged to eat off the floor. Children should be educated from a very early age about the importance of personal hygiene and food preparation.

1.20.2 GENARAL ADVICE ABOUT FOOD PREPARATION

- Hand washing is extremely important when working with food. A suitable flow of water, cleansing agent and separate towel should be readily available.
- Hands should be washed at least following these actions: before and after food preparation, before and after using kitchen utensils, after using the toilet, after sneezing, coughing, blowing the nose, smoking, touching the hair or face and emptying bins.
- Never use food that has fallen to the floor even if the floor looks clean; the soles of shoes can carry millions of harmful bacteria including those from dog faeces!

- Do not cook if unwell, have a known infection or have an open and uncovered wound.
- The use of a clean and washable apron will help to prevent the cross contamination of bacteria from clothing to food stuff and vice versa.
- Best practices include cleaning and tidying as you cook to prevent not just contamination of food items but to avoid accidents.
- Clean cupboards, fridges etc. frequently, using a suitable cleansing agent. Surfaces should be wiped down before and after contact with food.
- Thoroughly cook meat and never share the surface or utensils used for raw meat or poultry with any other items until it has been thoroughly cleaned and dried.
- Jewellery should be removed, especially that with intricate design as these items can be a haven for bacteria which can transfer easily to food or utensils.
- Wounds should be covered with a waterproof plaster after being cleaned, preferably a blue colour, as there are no natural food products that are blue, so is the easiest to spot if it becomes loose and falls off.
- Check expiry dates of products before using.
- Do not share cutlery with others unless washing in between, and never taste from a utensil that is going to be placed back into the food source before it is served.

Personal hygiene is very important for preventing poisoning and illness. Hand washing, maintaining general cleanliness and being aware of the dangers of cross contamination between raw and cooked meats are the most important factors to remember when preparing food.

1.21 FOOD BORNE DISEASES:

Microorganisms can cause a variety of effects in food products including spoilage, which primarily affects product quality, and food poisoning, which is generally caused by pathogens. As regulators, we are most concerned with the effects that microorganisms have on food that leads to foodborne illness, because this affects public health.

A foodborne illness (or disease) is exactly what the term indicates - a disease or illness caused by the consumption of contaminated foods or beverages. It would seem rather obvious that a foodborne microbial pathogen, or a preformed microbial toxic product, or another poison such as a poisonous chemical that has somehow contaminated the food and/or beverage, leads to one of the many different foodborne illnesses (Thomas et al, 2008). There is no one “syndrome” that is representative of food borne illness/disease. Different diseases

have many different symptoms. However, the microbe or toxin enters the body through the gastrointestinal tract, and often causes the first clinical signs such as nausea, vomiting, abdominal cramps and diarrhea which are common symptoms in many food borne diseases. More than 250 different foodborne diseases have been described (Morton et al, 2002). Most of these diseases are infections, caused by a variety of bacteria, viruses, and parasites. Other diseases are poisonings, caused by harmful toxins or chemicals that have contaminated the food, for example, poisonous mushrooms or heavy metal contamination. There are several hurdles that the pathogen must overcome in order to cause illness. A simple summary of these hurdles are as follows.

- Survive the acidic environment of the stomach.
- Attach to/colonize intestinal walls.
- Compete against the natural micro biota of the gut.
- Survive the host defense mechanisms.
- Once attached in the large intestine: elaborate toxins and virulence factors, and cross the epithelial barrier, which then results in the symptoms characteristic to the disease or illness. (Thomas et al, 2008).

1.22 FOOD MICROBIOLOGY: CURRENT STATUS

In the early 20th century, studies continued to understand the association and importance of microorganisms, especially pathogenic bacteria in food. Specific methods were developed for their isolation and identification. The importance of sanitation in the handling of food to reduce contamination by microorganisms was recognized. Specific methods were studied to prevent growth as well as to destroy the spoilage and pathogenic bacteria. After the 1950s, food microbiology entered a new era (Thomas et al, 2008). Availability of basic information on the physiological, biochemical, and biological characteristics of diverse types of food, microbial interactions in food environments and microbial physiology, biochemistry, genetics, and immunology has helped open new frontiers in food microbiology. Among these are:

- Methods to detect emerging food borne pathogenic bacteria from contaminated foods
- Application of molecular biology techniques (nanotechnology) for rapid detection of pathogenic bacteria in food and environment
- Effective detection and control methods of food borne pathogenic viruses
- Transmission potentials of prion diseases from food animals to humans

- Importance of environmental stress on the detection and destruction of pathogens
- Factors associated with the increase in antibiotic-resistant pathogens in food
- Adherence of food borne pathogens on food and equipment surfaces
- Mechanisms of pathogenicity of food borne pathogens
- Effective methods for epidemiology study of food borne diseases and Control of pathogenic parasites in food. (Morton et al, 2002).

1.23 THE HYGIENIC HANDLING OF STREET-VENDED FOODS:

To enable official recognition and control of street foods it may be appropriate to develop government guidelines or regulations specific to this food service sector. As stated in the preface of this document, many governments consider a Code of Hygienic Practice as an essential tool in this regard. If governments are considering the development of a Code of Hygienic Practice for street-vended foods, the following requirements focus on hygienic handling requirements to cover special needs 3 resulting from the preparation and/or sale of foods on streets or other public places, often by mobile hawkers or peddlers. It takes into account the principles enunciated in the Codex document, "The Recommended International Code of Practice - General Principles of Food Hygiene", proposed by the twenty-eighth and twenty-ninth sessions of the Codex Committee on Food Hygiene. The information is presented in a format similar to that used in draft codes prepared for the discussion of a number of regional Codex Coordinating Committees, however emphasis has been placed on matters that relate directly to food safety rather than on those that are mainly aesthetic in nature. (Morton et al, 2002).

Bacteria are single-celled microorganisms which are too small to seen without the use of a very powerful microscope. They are everywhere – in the water and soil and inside other living organisms including animals and human beings. Some bacteria are essential for treating sewage or the breakdown of vegetable matter for compost. It also helps in our digestion. Diseases caused by bacteria:

- ✓ Sore throat (streptococcal infection)
- ✓ Pneumonia
- ✓ Boils and Abscesses (staphylococcus infection)
- ✓ Food poisoning (salmonella and staphylococcus aureus)

- ✓ Tetanus
- ✓ Cholera
- ✓ Some sexually transmitted diseases (Hayes et al, 2002).

Bacterial disease from:

- ✓ Infected animals and rodents.
- ✓ Insects
- ✓ Contaminated objects
- ✓ Contaminated food or water
- ✓ Infected human being (Hayes et al, 2002).

1.24 TOXINS

Bacteria are associated with the production of disease, only a few species are disease-producing or pathogenic.

Harmful bacteria: There are two types of harmful bacteria which affect the food we eat

- ➢ Pathogens
- ➢ Spoilage bacteria. (Meggitt et al, 2003).

1.24.1 Pathogens:

Pathogens cause illness and are responsible for most cases of food poisoning. They may be present in food in large number but cannot be seen and may not cause obvious changes to the food so it still looks smells and tastes wholesome. They include:

- Salmonella
- Staphylococcus aureus
- E. coli
- Campylobacter jejuni
- Bacillus cereus
- Listeria
- Clostridium botulinum
- Clostridium perfringens
- Bacillary dysentery (shigella). (Hayes et al, 2002).

1.24.2 Spoilage bacteria:

Spoilage bacteria cause food to rot and decay but they do not necessarily make people ill. Although you cannot see them, these bacteria cause changes to the food which you should be able to spot-changes in smell, taste, color and texture are usually enough to warn that the food is not fit to eat. Fungi that are yeasts and molds that causes food spoilage.

Food hygiene refers to the practices which should be followed to make sure that food is safe and wholesome throughout all the stages of the production from the purchase to consumption. Food hygiene is essential because the food we eat plays an important role in keeping us healthy. Food hygiene involves more than cleanliness. To help keep food safe and hygiene, you will need to:

- Protect it from the risk of contamination by harmful bacteria (germs), poisons, chemicals and foreign bodies – that is , anything which should not be present in the foods such as insects, a plasters from the food handler's finger , fragments of glass or china, jewellery , hair, and staples from food packaging.
- Prevent germs from multiplying to the point where the food is a risk to health.
- Destroy any harmful bacteria already in the food by thorough cooking at the correct temperature.
- Throw away unfit or contaminated food(Meggitt et al, 2003)

1.25 GROWTH OF BACTERIA IN THE IDEAL ENVIRONMENT:

Food poisoning bacteria can multiply very quickly, particularly in certain conditions. The factors that affect bacterial growth include:

- Food- Bacteria can live on a wide range of foods both raw and cooked- but prefer those which are moist and rich in nutrients. Putting food in the fridge stops the bacteria to multiply.

High risk foods are those which are likely to contain pathogenic bacteria and includes

- Raw meat
- Cooked meat and cooked poultry and products made from these.
- Milk, cream, and cheeses.

  - Eggs and products made from raw eggs example mayonnaise
  - Fish and shellfish.
  - Cooked rice
  - Food that is grown in or near the ground (Hayes et al, 2002)
- Time – In ideal conditions, one bacterium can multiply to more than two million in seven hours.
- Temperature – Food poisoning bacteria grow best in the temperature range between 5°C and 60°C. This is referred to as the 'temperature danger zone'. This means that we need to keep perishable food either very cold or very hot, in order to avoid food poisoning.
- Nutrients – most foods contain enough nutrients for bacteria to grow. This is especially the case with high risk foods such as dairy and egg products, meat and poultry and seafood (Doyle et al, 1997).
- Water – bacteria need water for their growth. Without water, growth may slow down or stop. That is why dried foods do not spoil.
- PH– is the measure of acidity or alkalinity and it is also important for controlling bacterial growth. Low pH (acid conditions) generally stops bacterial growth but where the pH of food is neutral, and this is the case for many foods, most bacteria grow quite well.
- Oxygen – Bacteria vary in their need for oxygen. Those which require oxygen called aerobes and those which do not called anaerobes. Some bacteria can grow whether they have oxygen or not (Meggitt et al, 2003).

Aerobes (need oxygen)	Anaerobes (Do not need oxygen)	Grow with or without oxygen
Bacillus cereus	Clostridium botulinum Clostridium perfringens	Salmonella Staphylococcus aureus

1.26 REASONS FOR FOOD POISONING OUTBREAKS

- Food which is not kept at right temperature for example: food that is prepared in advance and left at room temperature instead of being refrigerated .this will cause food poisoning bacteria to multiply.

- Cooling food too slowly before refrigeration. While the food is still warm, the bacteria multiply.
- Not reheating ready-to-eat food to high enough temperature to destroy food poisoning bacteria.
- Using cooked food contaminated with food poisoning bacteria.
- Not cooking to a high enough temperature or for the correct length of time.
- Not thawing frozen poultry correctly.
- Cross-contamination from raw food to a high risk food, for example: when the juices from uncooked meat drip onto a fruit mousse.
- Eating raw food such as, shellfish, milk or eggs, this may already be contaminated.
- Infected food handler, which includes people who are currently suffering from or have recently, had a food borne illness or any illness with similar symptoms.

(Meggitt et al, 2003)

1.27 CAUSES AND PREVENTION OF BACTERIAL FOOD POISONING:

Pathogens can either already be present in food or can come from other people, surfaces or equipment or other food by cross contaminations. The main causes of bacterial food poisoning and what to do to prevent it happening are shown below:

Causes and prevention of bacterial food poisoning

Causes	Example	Prevention
Undercooking	When the oven is not hot enough (or used for long enough) to ensure that meat or chicken is completely cooked	Frozen raw meat and poultry must be properly thawed before thorough cooking to ensure that pathogenic bacteria are destroyed. All food should be cooked to at least 75°c.
Food prepared in advance and not refrigerated	A ham sandwich left out of the freeze-uncovered or covered for several hours.	All food prepared in advance must be refrigerated to reduce bacterial growth. Fridge should be operating below 5°c. Food poisoning bacteria can multiply rapidly at room temperature.
Poor personal	A person preparing food	It is important that hands are washed as

hygiene	without washing their hands properly.	frequently as necessary but definitely before handling food or equipment, after visiting the toilet, in between handling raw and cooked food and after handling waste food or refuse. Poor personal hygiene can result in food becoming contaminated with bacteria
Cross-contamination	A knife used to cut raw meat is not washed and is then used to cut cooked or ready-to-eat foods	Food poisoning bacteria may be present in raw food such a meat and poultry. If these bacteria allowed contaminating food which is to be eaten without further cooking, food poisoning can result. Cross contamination from raw food may be happen as a result of poor storage, When the juices from raw meat are allowed to drip on to cooked food, or via a chopping board, work surface or utensils used for both raw and cooked food. Food handlers must wash their hand and equipment after handling raw meat.
Failure to keep cooked food hot	Serving food which has been allowed to stand and become cool- below 63°c- after cooking.	Hot food should be kept above 63°c. As thorough cooking does not destroyed spores, hot food kept below this temperature can allow the spores to geminate and produce food poisoning bacteria.
Infected food handlers	A person who returns to work after vomiting and diarrhea may still be a carrier of food poisoning bacteria	Anyone suffering from a gastrointestinal illness (vomiting, diarrhea and so on) should not prepare or serve food for others until totally clear of symptoms for at least 48 hours. Even then, very thorough hand washing is essential. Boils and cuts which have turned septic are other sources of pathogens. Wounds should be completely

		covered and protected by waterproof dressing.
Eating food from unsafe sources	Buying high risk foods from supply vehicle which does not have proper refrigeration.	Only buy chilled foods stored in refrigerated cabinets

(Meggitt et al, 2003)

It is difficult to say to when pathogenic bacteria in food have made someone ill. The general symptoms of food poisoning are: feeling sick, nausea and vomiting, diarrhea, stomach pain, fever, aching limps, headache. Some of the symptoms listed above can also be associated with other illness. The actual sickness can last for up to five days or even longer, depending on the type of bacteria (Meggitt et al, 2003).

1.28 FOODBORNE ANTIMICROBIAL RESISTANCES AS A BIOLOGICAL HAZARD:

The use of antimicrobial agents for the treatment and control of infectious diseases in animals and crops continues because of considerations regarding animal health and welfare, and plant health. Consequently the transfer of antimicrobial-resistant bacteria and bacteria-borne resistance genes from animals or crops to humans via food remains a matter of public health concern (Garner et al, 1985).

The use of antimicrobials at sub-therapeutic levels in food producing animals has long been viewed as undesirable e.g. the Swann report, 1969. Since January 2006 the use of all antimicrobial feed additives has been banned within the EU in order to reduce the numbers of resistant bacteria in farm animals. The effect of this ban on the extent of bacterial antimicrobial resistance both within farm animals, and with regard to human health, however, is unclear (Morton et al, 2002). Use of antimicrobial agents is the main driver for the development and spread of antimicrobial resistance. In addition, spontaneous mutation in foodborne bacteria or the spread of resistant bacteria in the absence of selective pressure may also contribute to the antimicrobial resistance burden in food (Garner et al, 1985).

Antimicrobial-resistant bacteria and bacteria-borne resistance genes can be spread to humans via food by different routes and mechanisms, for example:

• By foodborne spread of resistant zoonotic bacteria, e.g. *Salmonella* and *Campylobacter*. These bacteria may originate from various sources, including animals, the environment and humans (Garner et al, 1985).

• By foodborne spread of resistant non-zoonotic human pathogenic bacteria e.g. Shigella spp. and Vibrio spp. These bacteria do not have a primary reservoir in food animals, but can be spread from humans to food directly or indirectly through the environment, including water.

• By foodborne spread of resistant commensal bacteria carrying transferable antimicrobial resistance genes that can be passed on to human pathogenic bacteria. These resistant commensal bacteria may originate from various sources, including animals, the environment and humans (Doyle et al, 1997).

1.29 CONSUMER AWARENESS:

There is some evidence that consumer awareness is growing, according to FDA Food Safety Survey data collected from random samples of several thousand American consumers in 1988, 1993, 1998 and 2001 (Doyle et al, 1997). After years of little progress, the study showed significant improvements in the single most important measure consumers can take to prevent food borne illness — repeated and vigorous hand washing. From 1993 to 2001:

- The number of consumers who do not wash their hands after touch-ing raw meat declined from 29 percent to 15 percent.
- The number after cracking eggs went from 66 percent to 55 percent.
- And after cutting raw fish, from 11 percent to 4 percent.

FMI focus group research and surveys show that consumers know that food safety is important and that they personally should observe sound food-handling practices. It is clear, however, that they do not fully comprehend some of the most important messages, or they fail to take measures they do understand. These findings were reaffirmed by a 2004 survey of 4,900 consumers by the Partnership for Food Safety Education, a public-private coalition that FMI helped found. For example, 85 percent of consumers understand the importance of washing hands vigorously when handling food, but only 65 percent “always” do so. And while 94 percent have heard that surfaces used to prepare fresh meat and produce should be thoroughly sanitized, 76 percent “always” take this pre-caution (Batz et al, 2005).

FMI and government agencies have developed numerous resources to educate consumers. In 1997, FMI spearheaded the launch of Fight BAC! TM, a major public education program intended to compel consumers to "Keep Food Safe from Bacteria." The program emphasizes four basic sanitation measures: wash hands and surfaces often, don't cross-contaminate, cook to proper temperatures and refrigerate food promptly. In 2002, FMI adapted Fight BAC to provide year-round food safety training for store-level employees. And in 2004, the Partnership for Food Safety Education launched an animated and interactive Web site — www.scrubclub.org — to teach children proper hand-washing methods (Batz et al, 2005). FMI members have launched special hamburger-safety education programs for customers. These efforts were prompted by scientific research showing that color is not a reliable indicator that ground beef has been cooked well enough to kill all harmful bacteria. The only way to be certain that cooked ground beef has reached the safe internal temperature of 160^{o}F is to use a thermometer. Retailers and wholesalers communicate this message with stickers on ground beef packages (Batz et al, 2005).

1.30 FOOD BORNE BACTERIAL DISEASES BY *SALMONELLA AND SHIGELLA SPECIES:*

1.30.1 SALMONELLA:

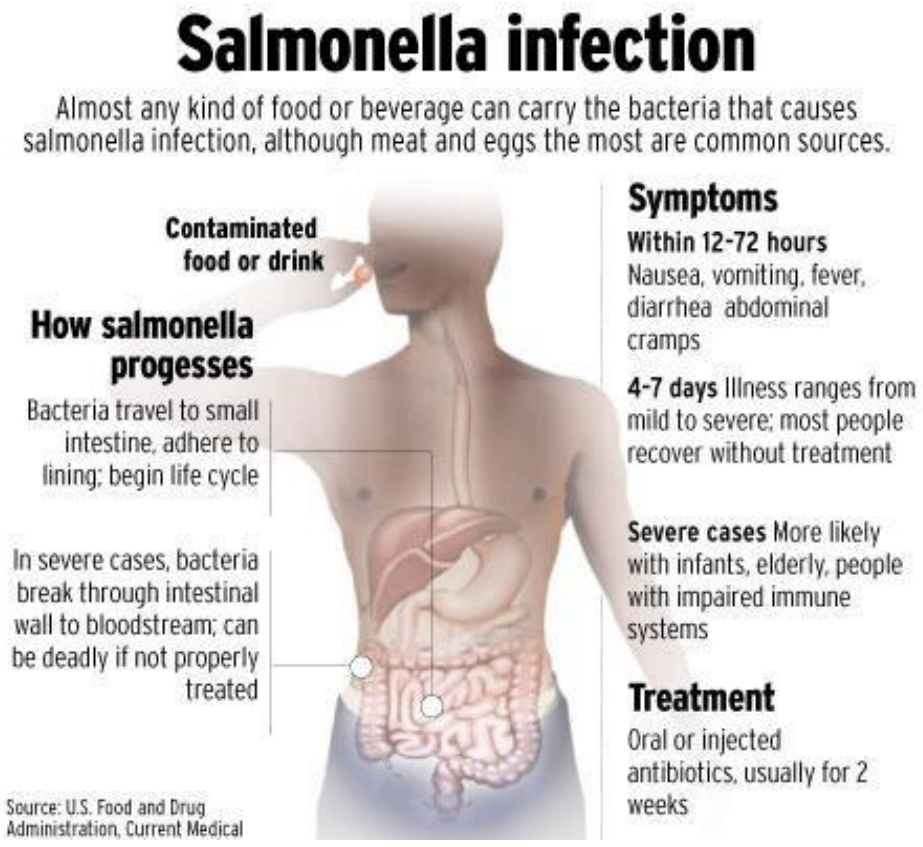


Figure09: Salmonella food poisoning effects on body

The second most common cause of food poisoning in the U.K. is salmonella. Large numbers of salmonella bacteria are usually needed to cause infections, although some outbreaks have been reported where the numbers have been small. Salmonella survives when refrigerated although it may multiply slowly. It is killed by thorough cooking and pasteurization or specific heat treatment (Chiara et al, 2008).

Salmonella is a gram-negative bacillus that causes inflammation of the GI tract and in some cases, if the immune response is not sufficiently powerful and treatment is not administered, can become systemic and cause even more serious conditions throughout the body. After ingestion, these bacteria cause infection by invading the epithelial cells of the small intestine and macrophages. Those who are most affected by Salmonella infection are infants, the elderly, and people with compromised immune systems. There are typically few to no long-term effects as a result of a Salmonella infection, more serious complications may arise. (Chiara et al, 2008).

History:

The genus *Salmonella* was named after Daniel Elmer Salmon, an American veterinary pathologist. While Theobald Smith was the actual discoverer of the type bacterium (*Salmonella enterica* var. *choleraesuis*) in 1885 (Chiara et al, 2008). Dr. Salmon was the administrator of the USDA research program, and thus the organism was named after him. Smith and Salmon had been searching for the cause of common hog cholera and proposed this organism as the causal agent. Later research, however, would show that this organism (now known as *Salmonella enterica*) rarely causes enteric symptoms in pigs, and was thus not the agent they were seeking (which was eventually shown to be a virus). However, related bacteria in the genus *Salmonella* were eventually shown to cause other important infectious diseases

Shape and Size:

The bacteria known as Salmonellae are gram-negative, rod-shaped bacilli that belong to the family Enterobacteriacea—they are typically anaerobic, unable to form spores, and motile, or able to move around spontaneously (Chiara et al, 2008).

Characteristics:

An important characteristic of the Salmonella bacteria is that they are able to grow and multiply outside living host organisms, thus having greater survival chances than otherwise. An increasingly common characteristic of Salmonella strains that may soon develop into an issue of great importance is its growing resistance to the antibiotics that have been used to combat it. [Chiara, R. T. 2008]. Rather than a temporary adaptation, which would not be too serious, some strains of Salmonella have developed multi-drug resistance (MDR) as a part of their fundamental genetics, thus having become permanently resistant to the drugs. MDR Salmonella is so far known to be resistant to fluroquinolones and third-generation cephalosporins (Gray et al, 2002).

Source:

Salmonella can be found in raw meat or raw egg or meat. It can also be found in unpasteurized milk, or carried by rats, mice and domestic pets. People may be also a source of these pathogens as they continue to excrete them for a long time after recovering from s bout of salmonella food poisoning (Chiara et al, 2008).

Antigens:

The bacteria can have a combination of three antigens: the O antigen, H antigen, and Vi antigen. The O antigen is located in the cell wall of the bacterium, and each salmonella bacillus may possess 2 or more O antigens on its surface. Also, the H antigen is a flagellar antigen that can be destroyed by heat and enables the motility of the Salmonella bacterium. The last antigen is known as the Vi antigen because this antigen is related the virulence of the bacterium. As a capsular antigen, its presence enhances the virulence of the bacterium that has it—of all the sub-species of Salmonella, only two, Salmonella enterica serovar (S.) typhi and S. choleraesuis, have the Vi antigen (Chiara et al, 2008).

Depending on whether the type of Salmonella has one of two antigens, the bacteria are either monophasic or diphasic, since the bacteria only produce one antigen at a time, each in a certain phase. Those that have only one set of antigens are monophasic: i.e. they have only one phase of antigen production—while those that have two sets of antigens are diphasic: i.e. they have to have two phases of production, one for each set of antigens (Meggitt et al, 2003).

Toxins:

Salmonella bacteria produce two toxins: an endotoxin and an enterotoxin, which is a factor associated with the cell wall that can cause diarrhea in mice. The production of enterotoxin is related to the incidence of gastroenteritis (Meggitt et al, 2003).

Serotypes:

There are numerous types, or serotypes, of the Salmonella bacteria, each causing different types of medical conditions. As of 2004, there had been a total of 2501 different Salmonella serotypes identified. The bacilli vary by whether or not they have capsular antigens (Vi antigens), flagellar antigens (H antigens), or envelope antigens (O antigens), and also by their different reactions to various antisera. Each type of Salmonella is distinguished by a specific protein coating called a serovar , but there are two main accepted methods of classifying the different types of Salmonella among scientists (Gray et al, 2002).

The first method dictates that the diverse species are all to be considered serovars of two main types, S. enterica and S. bongori. The second method of classification has the species be designated according to the names of the serovars, such as S. typhimurium, S. enteritidis, S. typhi, etc.

Most serotypes of Salmonella are not host-specific—in other words, the bacteria infect most animals (including humans) and can be easily transferred from one to another. Only a few have a limited host-spectrum, thus able to infect only certain organisms. S. enteritidis is one serotype that has very little host preference—though it is found in animals, it can easily transfer to humans and can survive in most living hosts (Chiara et al, 2008).

The two serotypes that most commonly infect humans in the United States have been found to be S. typhimurium and s. enteritidis. With respect to host-specific serotypes, S. typhi and S. paratyphi infect only humans, S. pullorum infects avian species, S. dublin infects cattle, and S. choleraesuis infects pigs. The latter three types of salmonella rarely ever infect humans, but if and when they do, they are extremely dangerous, invasive, and have high rates of mortality in humans. The most common serotypes that infect humans each year are S. enteritidis, S. typhimurium, and S. Heidelberg (Meggitt et al, 2003).

Disease pattern:

Salmonella generally has four disease patterns. These include

- Gastroenteritis,
- Enteric fever (also known as Typhoid Fever),
- Bacteremia with or without intestinal infection, and
- An asymptomatic carrier state common to humans and other animals.

Three common conditions caused by Salmonella are gastroenteritis, enteric fever, and bacteremia.

Serotypes	Diseses	Symptoms	Incubation period
S. typhimurium, S. enteritidis, and S. Newport	Human and animal gastroenteritis	Nausea, vomiting, abdominal pain, mild to severe diarrhea, temperatures ranging from 100.4 to 102.2°F (38 to 39 °C), and bloody stools appear.	Several hours to two days.
S. typhi and the paratyphoid	Human enteric fever	Increasing fever, a non-productive cough, frontal headaches, constipation, and occasionally diarrhea, bradycardia, sleep,liver enlargement, a sore throat, fevers of up to 104°F (40°C), sweating, and GI inflammation.	7 to 14 days, severe illness appears after 2 to 3 weeks.
S. choleraesuis	Deadly in animal host Bacteremia in pigs	Fever, chills, anorexia, weight loss, serious anemia, prolonged bacteremia, prolonged and intermittent symptoms as a result of fever, enlargement of the liver or spleen, and, in non-complicated septicemia, normal leukocyte count	

(Gray et al, 2002)

Survival of Salmonella:

The survival of Salmonella within people is highly dependent on a number of factors:

- The acidity of the stomach is one such factor. If the salmonella is to survive the high concentrations of stomach acids, it is better if the bacilli are ingested together with food which would buffer the acid or water which would dilute the acid. Also, any surgical procedures that affect stomach acidity also make people more susceptible to Salmonella infection, as do such diseases as liver cirrhosis, lupus, sickle cell anemia, and malaria (Gray et al, 2002).
- The virulence of the bacilli,
- The diminished resistance of the host, and
- The number of bacteria ingested (Chiara et al, 2008).

Infectious dose:

The infectious dose of Salmonella necessary to cause illness in humans is usually quite high—in one study conducted on human volunteers, it took 10,000 or more bacilli to cause disease in 25% of the subjects. However, the dosage required was noticeably decreased for those subjects who had taken antacid prior to the ingestion of the bacilli. Treatment with antibiotics that change the natural oral flora can also reduce the number of bacilli that must be ingested. In the case of animals other than humans, higher doses are typically necessary.

Despite the enormous fear surrounding salmonella, this disease has not yet reached the frightening proportions that many would be lead to believe—for the time being, it is still largely under control as a result of sanitary preparation and growing of food and effective inspection systems (Chiara et al, 2008). Nevertheless, we are by no means clear of Salmonella—the bacteria are gradually gaining resistance to antibiotics, and as time passes, they shall increasingly plague human society. It has not been vanquished, and as the issue of salmonella outbreaks becomes more of an issue, it is not preferable but necessary that this bacterium be understood. On the whole, salmonella is becoming more adapted to surviving in the human body and merits the attention of the public as a contemporary issue in the medical field (Meggitt et al, 2003).

1.30.2 SHIGELLA:

Bacillary dysentery (shigellosis) is a severe human disease caused by Shigellae. In recent years, a large amount of information has been generated regarding the host, pathogen and environ-mental factors that impact the pathogenesis of shigellosis at the cellular and molecular level. Shigella are Gram-negative, non-spore forming, facultative anaerobic bacilli closely related biochemically and antigenically to E. coli (Alfredo et al, 2004).

S. sonnei, also known as Group D *Shigella*, accounts for over two-thirds of shigellosis in the United States. *Shigella flexneri*, or group B *Shigella*, accounts for almost all the rest. In developing countries, *S. flexneri* is the most predominant cause of shigellosis, but *S. dysenteriae* type 1 is the most frequent cause of epidemic and endemic disease.

Figure10: Shigella

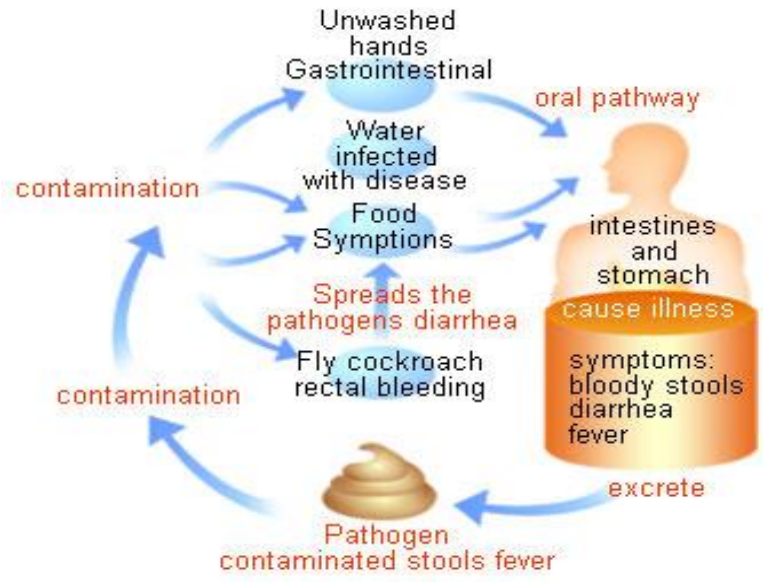


Figure11: Shigella food poisoning

Genus *shigella*:

There are four different species of Shigella, divided on the basis of differences in O antigen of their lipo-polysaccharide and some biochemical reactions, such as indole production or mannitol fermentation. These are named as

- *S. dysenteriae* (13 serotypes),
- *S. flexneri* (15 serotypes),
- *S. boydii* (18 serotypes), and
- *S. sonnei* (1 serotype) (Alfredo et al, 2004).

In general, *S. dysenteriae* accounts for deadly epidemics in developing countries, *S. flexneri* and *S. sonnei* are responsible for endemic disease, the former being prevalent in the developing world, the latter in developed countries, and *S. boydii* accounts for most cases of infection in India and neighboring countries (Alfredo et al, 2004).

Source:

It is another leading cause of food borne diseases and can be found in many places if food is not properly handled. The most common places that it is found includes: salads (potato, chicken, and seafood, vegetable), raw vegetables, milk and other dairy products, and meat products especially poultry. These foods usually are contaminated through cross-contamination from fecal matter (Alfredo et al, 2004). Shigella can be food borne or water borne since it is usually associated with feces. If the proper methods for handling food are followed then it is a very small chance that a person will become inflicted with shigellosis the disease caused by this bacteria. *Shigella spp*. is usually acquired by drinking water contaminated with human feces or by eating food washed with contaminated water.

Shigella food poisoning may be acquired from eating contaminated food, although contaminated food usually looks and smells normal (Alfredo et al, 2004).

- Infected food handlers who don't wash their hands with soap after using the bathroom may contaminate food.
- Vegetables can become contaminated if they are harvested from a field with sewage in it.

- Flies can breed in infected feces and then contaminate food.
- Water may become contaminated with *Shigella* bacteria if sewage goes into it or if someone with shigellosis swims in or plays with the water (especially in splash tables, untreated wading pools, or shallow play fountains used by daycare centers). *Shigella* infections can then be acquired by drinking, swimming in, or playing with the contaminated water.
- Outbreaks of shigellosis have also occurred among men who have sex with men (Alfredo et al, 2004).

Transmission of Shigella:

Shigella bacteria are present in the stools of infected persons while they are sick and for up to a week or two afterwards. Most *Shigella* infections are passed through the fecal-oral route. This happens when basic hygiene and handwashing habits are inadequate and can happen during certain types of sexual activity. *Shigella* outbreaks are particularly likely to occur among toddlers who are not fully toilet-trained. Family members and playmates of such children are at high risk of becoming infected (Alfredo et al, 2004).

Pathogenesis:

The essential incident in the pathogenesis of Shigella is the ability to invade and colonize the human intestinal epithelium. This triggers an intense acute inflammatory response with infiltration by polymorphonuclear leukocytes. The pathogenesis of Shigella is a multi-step process which depends on the capacity of the bacteria to cross the colonic mucosa via M cells associated with Gastrointestinal Associated Lymphoid Tissue (GALT). The bacteria then invade epithelial cells and have the capacity to reprogram these cells to produce pro inflammatory mediators, such as interleukin 8, which play a major role in the strong inflammatory response facilitating further bacterial invasion. Most of the virulence determinants responsible for invasion of epithelial cells are encoded on a 213 kilobase (kb) plasmid that is unique to virulent Shigella and enteroinvasive *E.coli* (EIEC) strains.

Toxin:

Shigella dysenteriae serotype 1 is unique among Shigella species in the production of a potent toxin known as the Shiga toxin (Stx). Stx is a bipartite molecule composed of a single enzymatic A subunit and a pentamer of receptor-binding B subunits. The toxin binds to a

glycolipid receptor found in target cells, globotriaosylceramide (Gb3: Galα1-4-Galβ1-4 glucosylceramide), and it is endocytosed preferentially by the clathrin-coated pathway.

The A subunit is proteolytically cleaved and reduced, generating an A1 and an A2 peptide. The A1 pep-tide inhibits mammalian protein synthesis by cleaving the N-glycosidic bond at adenine residue 4324 in the 28S RNA of the 60S host cell ribosome. The importance of this toxin is that infections with Stx-producing bacteria may lead to hemolytic uremic syndrome (HUS), an often-fatal kidney failure condition, particularly in children. In addition to Shigella dysenteriae type 1, related Shiga toxins are secreted by enterohemorrhagic E. coli (EHEC) strains and other bacteria that are associated with cases of HUS on a worldwide basis.

Clinical manifestations:

They cause a disease called dysentery (bacillary dysentery or shigellosis), an infection of the large bowel characterized by abdominal cramps, diarrhea, and fever. Initially, the diarrhea may be copious and the liquid stools often contain blood and mucus. Further complications of the disease may be seizures, toxic megacolon, reactive arthritis and hemolytic uremic syndrome (Alfredo et al, 2004).
Shigella dysenteriae secretes a toxin that most likely plays a role in tissue destruction and more serious systemic disease. Other symptoms include

- abdominal pain
- cramps
- diarrhea
- fever
- vomiting
- blood,
- Pus,
- mucus in stool,
- tenesmus (Alfredo et al, 2004).

Vulnerable population:

All people are at risk, but most cases are in small preschool-aged children, especially those who attend daycare centers. It is more common in the summer and fall seasons. According to the Centers for Disease Control and Prevention, about 14,000 cases of shigellosis are reported

annually in the United States, but the number of unreported cases is believed to bring the estimate up to 300,000 cases. In developing countries, the disease is endemic and can be fatal (Alfredo et al, 2004).

Outbreaks:

Shigella spp., continue to have an important global impact, causing an estimated 1 million deaths and 163 million cases of dysentery annually. The organisms have demonstrated extra-ordinary competence for acquiring plasmid-encoded multi-antibiotic resistance previously used as first-line therapy. This finding, in addition to the low infectivity and potential complications with complex or often unexplained pathogenesis, have led several laboratories to try to understand the pathogenesis of shigellosis, with the aim of developing a vaccine against the disease (Alfredo et al, 2004).

1.31 VARIOUS TYPES OF MICROORGANISMS WHICH GROW IN FOOD

Staphylococcus aureus

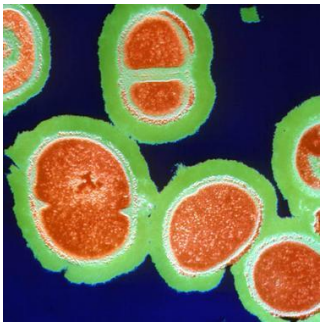


Figure12: *staphylococcus aureus*

Disease:Staph

Source: Carried by people on skin, in boils, pimples, and throat infections; spread when carriers handle food. Staph bacteria produce toxins (poisons) at warm temperatures. Meat, poultry, salads, cheese, eggs, custards, and cream-filled desserts are susceptible foods. Symptoms (after eating): Onset: 1-8 hours; vomiting, diarrhoea, nausea, and abdominal crams.

Prevention: Cooking won't destroy staph poison, so practice good personal hygiene and sanitary food handling. Don't leave perishable food unrefrigerated over 2 hours. For quick cooling, place hot food in small containers no more than 4 inches deep; cover when cool and refrigerate.

Clostridium botulinum

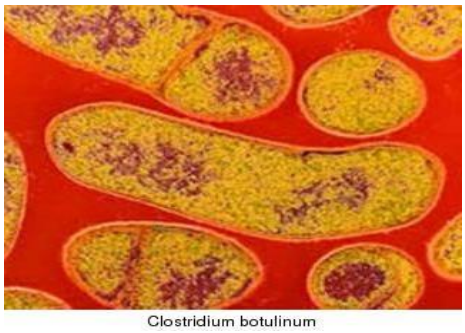


Figure13: *clostridium botulinum*

Disease:Botulism

Source: Most common in low acid foods canned improperly at home. The presence of these bacteria or their poisons is sometimes signalled by clear liquids turned milky, cracked jars, loose or dented lids, swollen or dented cans, or an "off" odour. Recently, botulism has also been associated with low oxygen cooked foods (i.e. foil wrapped; vacuum packaged) which have been held at room temperatures for long periods of time.

Symptoms (after eating): Onset: 4-72 hours; nervous system disturbances such as double vision, droopy eyelids, trouble speaking, swallowing, breathing. Untreated botulism can be fatal. If you or a family member have botulism symptoms, get medical help immediately. Prevention: Carefully examine canned goods (particularly those canned at home), and don't use any canned goods showing danger signs. Also, cook and reheat foods thoroughly, keep cooked foods hot (above 60 degrees C) or cold (below 5 degrees C) and divide large portions of cooked food into smaller portions for serving and cooling.

Campylobacter jejuni

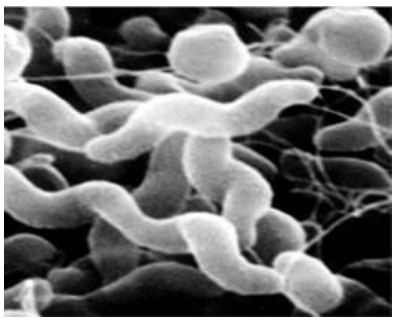


Figure14: *campylobacter jejuni*

Disease: Campylobacteriosis

Source: Contracted from untreated drinking water, infected pets, and when contaminated meat, poultry, milk, or shellfish is eaten raw or undercooked.

Symptoms (after eating): Onset: 2-10 days; severe diarrhoea (possibly bloody), cramps, fever, and headache lasting 1-10 days.

Prevention: Don't drink untreated water or unpasteurised milk. Wash hands, utensils and surfaces that touch raw poultry or meat. Thoroughly cook meat, poultry, and seafood.

Listeria monocytogenes

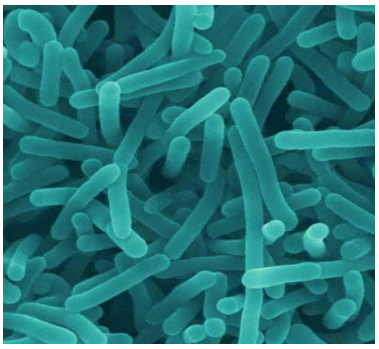


Figure15: *listeria monocytogenes*

Disease: Listeriosis

Source: Common in nature, food processing environments, and intestinal tracts of humans and animals. Spread in untreated water, unpasteurised milk and dairy products, raw meat and seafood, plus raw vegetables fertilized with infected manure.

Symptoms (after eating): Onset: 2-30 days. Adults can develop fever, chills, and intestinal flu-like symptoms. Infants may vomit, refuse to drink, or have trouble breathing. Possible complications-meningitis, meningo-encephalitis, blood poisoning, spontaneous abortion, stillbirths. Rare, but can be fatal. Pregnant women, newborns, the elderly, infirm, and immune-compromised are most at risk.

Prevention: Avoid raw milk and cheese made from unpasteurised milk. Follow keep refrigerated labels, observe sell by and use by dates, and thoroughly reheat frozen or refrigerated processed meat and poultry products before eating. Listeria monocytogenes is a

special problem since it can survive adverse conditions. It can grow in a pH range of 5.0-9.5 in good growth medium. The organism has survived the pH 5 environment of cottage cheese and ripening cheddar. It is salt tolerant surviving concentrations as high as 30.5 % for 100 days at 4 degrees C, but only 5 days if held at 37C. (Meggitt et al, 2003).

Escherichia coli

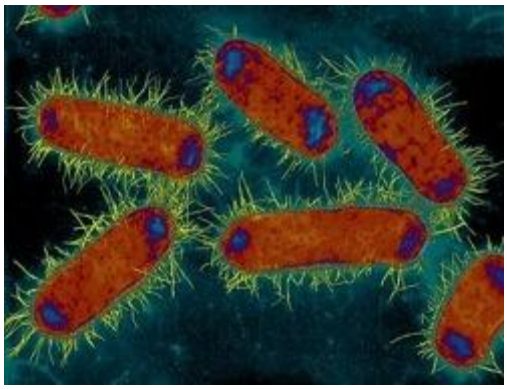


Figure16: *E. Coli*

Disease: Hemorrhagic colitis

Source: Serotype 0157:H7 toxin contracted by drinking water which contains raw sewage (usually during travel). Also, can occur in raw or rare ground beef and unpasteurised milk.

Symptoms (after eating): Onset: 3-4 days; severe abdominal cramps followed by diarrhoea (often bloody), nausea, vomiting, fever lasting to 10 days. May require hospitalisation. Possible complication-Hemolytic Uremic Syndrome (HUS), a urinary tract infection capable of causing kidney failure in children.

Prevention: Don't drink untreated water or unpasteurised milk. Thoroughly cook food and reheat it to at least 75degrees C. Don't leave perishable food unrefrigerated over 2 hours. (Meggitt et al, 2003).

Viruses: hepatitis A

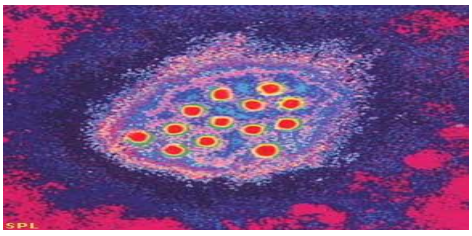


Figure17: Hepatitis A viruses

Disease: Infectious hepatitis

Source: Contracted when shellfish, harvested from water polluted by raw sewage, is eaten raw. Also spread by human carriers who prepare and serve uncooked food.

Symptoms (after eating): Onset: 14-50 days; fatigue, fever, nausea, vomiting, abdominal cramps, appetite loss, followed by liver enlargement, jaundice, and darkened urine. May cause liver damage and death.

Prevention: Avoid untreated drinking water and cook shellfish thoroughly. Also, practice good personal hygiene, handle all foods in a sanitary manner, and keep raw and cooked foods separated. (Meggitt et al, 2003).

Noroviruses

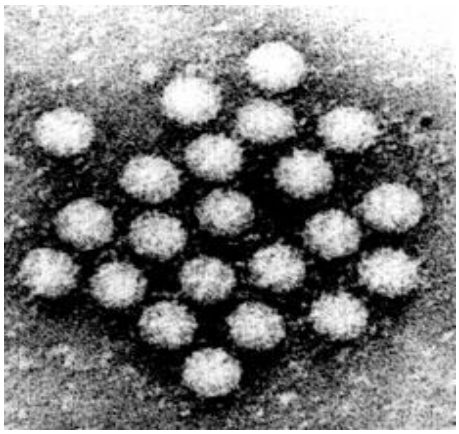


Figure18: Noroviruses

Disease: Viral gastroenteritis

Source: A group of viruses contracted when contaminated shellfish is eaten raw or partially cooked. Also, spread by infected people who prepare food when they are ill with these viruses.

Symptoms (after eating): Onset: 24-48 hours; diarrhoea, vomiting, nausea, abdominal cramps, fever, chills, and body aches.

Prevention: Cook shellfish thoroughly. Practice good personal hygiene and handle food in sanitary manner. Do not prepare or serve food when ill with diarrhoea or vomiting. (Meggitt et al, 2003).

Moulds

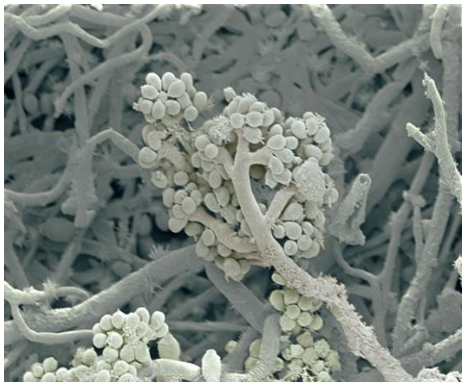


Figure19: Moulds

Mycotoxins
Disease: Mycotoxicosis

Source: Many foods are susceptible to a wide variety of moulds. Some mycotoxins (poisons produced by moulds) can be harmful if consumed in large amounts. When it occurs, mycotoxicosis is usually traced back to beans, peanuts, corn, and other grains that have been stored in warm moist places.

Symptoms (after eating): May cause liver and/or kidney disease. (This depends on the amount of mycotoxin and length of exposure.)

Prevention: Store foods properly, and check for visible mould and "off" colour, odour, or texture. Discard contaminated food and clean container or storage area. (Hard cheeses, salami, or dry cured country ham may be salvaged by cutting out an inch of product on all sides and below the mouldy area. (Meggitt et al, 2003).

1.32 SMOKING AND KIDS

- Each day, nearly 4,000 kids in the United States try their first cigarette and an additional 1,000 kids under 18 years of age become new regular, daily smokers. That’s nearly 400,000 new underage daily smokers in this country each year.

- The addiction rate for smoking is higher than the addiction rates for marijuana, alcohol, or cocaine; and symptoms of serious nicotine addiction often occur only weeks or even just days after youth "experimentation" with smoking first begins.
- Nearly 90 percent of all adult smokers begin while in their teens, or earlier, and two-thirds become regular, daily smokers before they reach the age of 19.
- 18.7 percent of high school students are current smokers by the time they leave high school.
- 18.1 percent of all high school students (9-12 grades) are current smokers, including 16.1 percent of females and 19.9 percent of males. White high school students have the highest smoking rate (20.3 percent) compared to Hispanics (17.5 percent), and African-Americans (10.5 percent). (Pierce JP, et al,1998)
- Roughly one-third of all youth smokers will eventually die prematurely from smoking-caused disease.
- Smoking can also seriously harm kids while they are still young. Besides the immediate bad breath, irritated eyes and throat, and increased heartbeat and blood pressure, near-term harms from youth smoking include respiratory problems, reduced immune function, increased illness, tooth decay, gum disease, and pre-cancerous gene mutations.
- Smoking during youth is also associated with an increased likelihood of using illegal drugs.
- The tobacco companies spend $10.5 billion each year to promote their deadly products – that's nearly $29 million spent every day to market cigarettes, and much of that marketing directly reaches and influences kids.
- Kids are more susceptible to cigarette advertising and marketing than adults. 81.3 percent of youth smokers (12-17) prefer Marlboro, Camel, and Newport, three heavily advertised brands, while only 54.1 percent of smokers over age 26 prefer these brands. For example, between 1989 and 1993, spending on the Joe Camel ad campaign jumped from $27 million to $43 million, which prompted a 50 percent increase in Camel's share of the youth market but had no impact at all on its adult market share. Additionally, a survey released in March 2008 showed that kids were almost twice as likely as adults to recall tobacco advertising. (Evans, N, et al, 1995)

1.33 CIGARETTE CONSTITUENTS

"Thus a tobacco product is, in essence, a vehicle for delivery of nicotine, designed to deliver the nicotine in a generally acceptable and attractive form Our industry is then based upon design, manufacture and sale of attractive dosage forms of nicotine."

1.34 CIGARETTE ADITIVES

Cigarette manufacturers have spent many years manipulating what goes into cigarettes by using additives.

Additive types include Humectants - up to 5% of the weight of a cigarette. These preserve moisture, as dry tobacco has harsh taste. Glycerol and propylene glycol are most commonly used. Flavour - added to counteract reductions in flavour due to filters and the use of reconstituted tobacco. Natural and synthetic flavour enhancers are used to give woody, spicy, minty, fruity, sweet and flowery flavours. Flavours also mask the 'harshness' of smoking, and may help young smokers begin and continue smoking.

1.34.1 Nicotine

A poisonous substance. Nicotine is the drug in tobacco, which causes addiction among smokers. It is a highly toxic chemical, and is often used in industrial pesticides. It is regulated in all circumstances apart from in cigarettes. Smokers inhale a very small dose of nicotine, and are not at risk of nicotine poisoning. However, children who eat or swallow cigarettes or butts should receive medical attention immediately. Nicotine has a number of direct effects on the body. It stimulates the sympathetic nervous system, increases the heart rate and blood pressure, and causes constriction of the small blood vessels under the skin.

1.34.2 Carbon monoxide (CO)

Carbon monoxide (CO) is an odour less, tasteless gas, giving no warning of its presence in most circumstances. In large amounts it is rapidly fatal. CO is strongly linked with the development of coronary heart disease. CO is formed when a cigarette is lit.

1.34.3 Tar

This is the term used to describe the mixture that is formed from the tiny particles in cigarette smoke. All cigarettes contain tar, even 'light' or mild cigarettes. Tar is made up of lots of chemicals – mainly nitrogen, oxygen, hydrogen, carbon dioxide, and carbon monoxide as

well as numerous organic chemical compounds. Also found in tar are carcinogenic compounds - chemicals that may trigger cancer - such as nitrosamines and polycyclic aromatic hydrocarbons.

Other chemicals in cigarette

- ✓ carbon monoxide
- ✓ cresols
- ✓ tar
- ✓ hydrogen cyanide
- ✓ nicotine
- ✓ styrene
- ✓ aldehydes
- ✓ acrylonitrile
- ✓ nitric oxide
- ✓ quinoline
- ✓ isoprene
- ✓ resorcinol
- ✓ acetone
- ✓ benzo[a]pyrene
- ✓ toluene
- ✓ cadmium
- ✓ formaldehyde
- ✓ & 2-aminonaphthalene
- ✓ Phenol
- ✓ lead
- ✓ acrolein
- ✓ nickel
- ✓ benzene
- ✓ 3- & 4-aminobiphenyl
- ✓ pyridine
- ✓ catechol
- ✓ 1, 3-butadiene
- ✓ chromium
- ✓ hydroquinone
- ✓ methyl ethyl ketone

(US Department of Health and Human Services et al 1988)

1.35 TOBACCO AND ADDICTION:

Most smokers have been aware that tobacco smoking is addictive for a long time. The US Surgeon General's 1988 report reached three key conclusions about dependence and tobacco.

- Cigarettes and other forms of tobacco are addictive.
- Nicotine is the drug in tobacco that causes addiction.

The pharmacological and behavioral processes that lead to tobacco addiction are similar to those leading to addiction to other drugs, such as heroin and cocaine.(Rockville, Maryland, 1988).

1.36 SIDE EFECTS OF SMOKING:

Even one cigarette quickly causes noticeable physical effects on a smoker's body. When a smoker inhales, the nicotine contained in the inhaled smoke reaches the brain via the blood stream in a matter of seconds. It also quickly reaches muscle tissue. Nicotine receptors (clusters of cells that react specifically to nicotine) in the brain and muscles quickly recognize its presence and a range of physical reactions take place, including the following:

- An increase in the heart rate (measured by your pulse rate)
- An increase in blood pressure, causing small blood vessels to narrow, and slowing of circulation, which is particularly noticeable in the hands and feet. Because of these things, skin temperature is also lowered.
- An increase in tension in some muscles. This can be measured by testing hand tremors with a tremor-testing machine before and after a cigarette. Strangely, nicotine can also relax some skeletal muscles at the same time.
- An increase in stomach secretions and changes brain activity.

The nicotine 'hits' the brain cell receptors and stimulates the release of many different neurotransmitters - the brain's chemical messengers. Some of the more important messengers involved in nicotine's actions on the brain are dopamine, acetylcholine and serotonin. The release of these messengers affects how people pay attention, think, eat,
deal with stress and feel pleasure.

New smokers generally feel the unpleasant side effects of nicotine, such as headaches or dizziness. But after a while their bodies get used to it, and these effects are no longer felt. Once you have been smoking for a while, your body becomes used to a certain level of nicotine, and without it, you no longer feel quite 'right'. As the effects of the nicotine wear off, you start to feel uncomfortable, uneasy and 'needing a cigarette' - these are the beginnings of withdrawal symptoms as your level of nicotine drops. To keep up your nicotine levels, you need to continually dose yourself by smoking. (Yeaman, A. Brown and Williamson et al, 1998)

1.36.1 side effects of carbon monoxide(CO)

CO is formed when a cigarette is lit. It has a number of toxic effects on the body, the most important of which is that it reduces the amount of oxygen that is carried in the bloodstream of smokers. CO binds with the hemoglobin in the blood instead of oxygen, meaning that less oxygen is available to body organs and tissue. The heart has to pump harder to make sure that

enough oxygen can get to all organs. In pregnant women, the unborn baby also has less oxygen available to it through the umbilical cord. Lack of oxygen also affects muscle performance. Generally speaking, smokers of all ages become short of breath and exhausted more quickly than non-smokers of similar age and fitness.

1.36.2 side effects of tar

Every time cigarette smoke is inhaled, tar goes into the lungs. Some is breathed out, but much condenses deep inside the airways of the lungs. Coughing is the body's way of trying to get rid of this tar, but chemicals in tobacco smoke paralyse the cilia (tiny hairs whose job it is to sweep foreign material out of the airways). Tar is a sticky brown substance, the same one that causes smokers' fingers to go brown, and teeth to stain yellow. It also causes throat and lung cancer. (Proctor, C. BAT Industries 1998)

1.37 THE EFFECTS OF SMOKING ON THE BODY

Smoking affects many parts of the body, both inside and outside. Some of the effects happen straight away and others take longer to occur. The diagram below shows some of the harmful consequences of smoking:

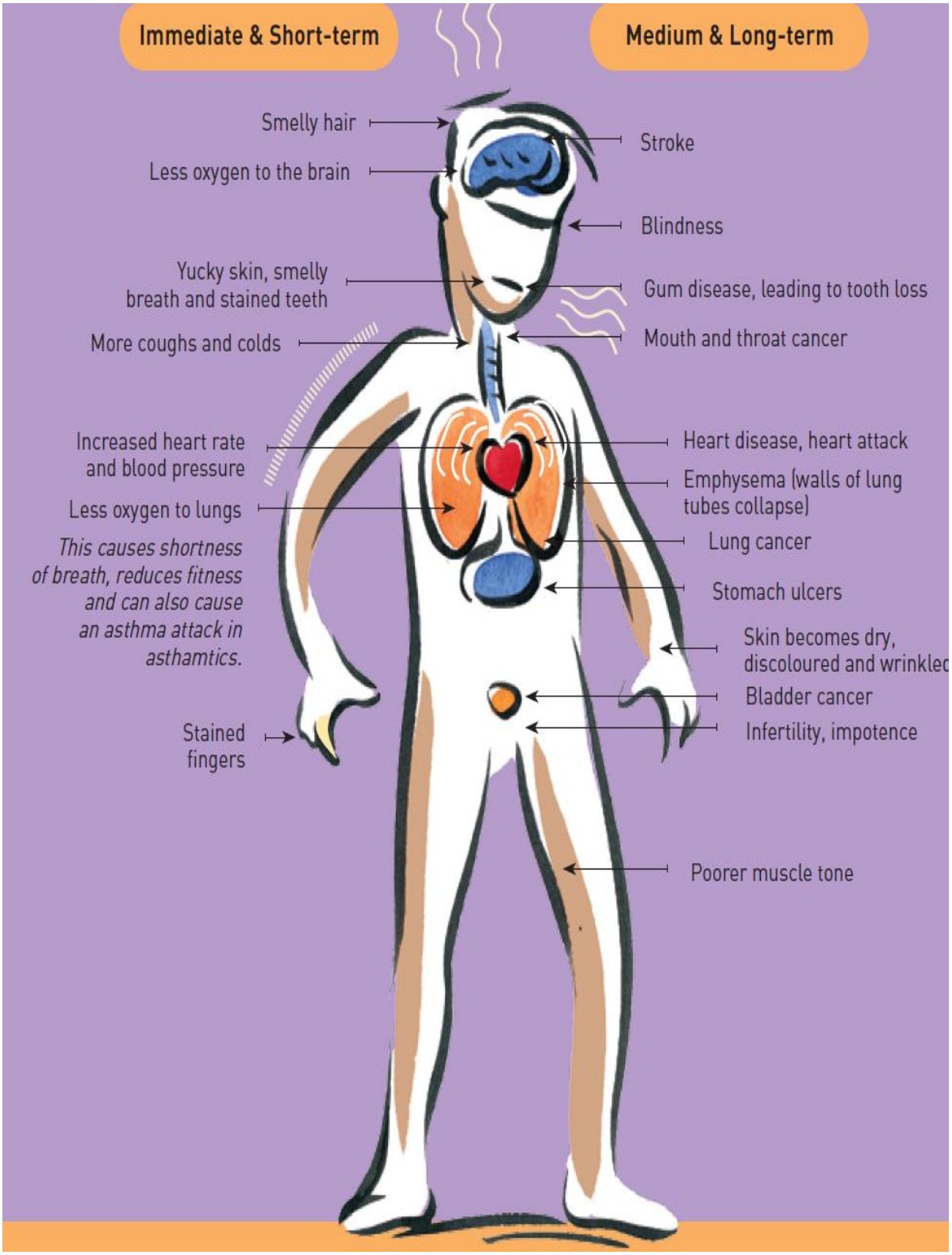


Figure 20: Immediate, medium and long term effects of smoking on human body

Many teenagers and adults think that there are no effects of smoking on their bodies until they reach middle age. Smoking-caused lung cancer, other cancers, heart disease, and stroke typically do not occur until years after a person's first cigarette. However, there are many serious harms from smoking that occur much sooner. In fact, smoking has numerous immediate health effects on the brain and on the respiratory, cardiovascular, gastrointestinal, immune and metabolic systems. While these immediate effects do not all produce noticeable symptoms, most begin to damage the body with the first cigarette – sometimes irreversibly – and rapidly produce serious medical conditions and health consequences.(Milam, JE et al, 2000)

1.37.1 IMMEDIATE AND RAPID EFFECTS ON THE BRAIN

Part of the addictive power of nicotine comes from its direct effect on the brain. In addition to the well understood chemical dependency, cigarette smokers also show evidence of a higher rate of behavioral problems and suffer the following immediate effects:

Increases Stress:

Contrary to popular belief, smoking does not relieve stress. Studies have shown that on average, smokers have higher levels of stress than non-smokers. The feelings of relaxation that smokers experience while they are smoking are actually a return to the normal unstressed state that non-smokers experience all of the time. (Parrott et al, 1999)

Alters brain chemistry:

When compared to non-smokers, smokers brain cells- specifically brain cell receptors- have been shown to have fewer dopamine receptors. Brain cell receptors are molecules that sit on the outside of the cell interacting with the molecules that fit into the receptor, much like a lock and key. Receptors (locks) are important because they guard and mediate the functions of the cell. For instance when the right molecule (key) comes along it unlocks the receptor, setting off a chain of events to perform a specific cell function. Specific receptors mediate different cell activities. Smokers have fewer dopamine receptors, a specific cell receptor found in the brain that is believed to play a role in addiction. Dopamine is normally released naturally while engaging in certain behaviors like eating, drinking and copulation. The release of dopamine is believed to give one a sense of reward. One of the leading hypothesis regarding the mechanism of addiction theorizes that nicotine exposure initially increases dopamine transmission, but subsequently decreases dopamine receptor function and number.

The initial increase in dopamine activity from nicotine results initially in pleasant feelings for the smoker, but the subsequent decrease in dopamine leaves the smoker craving more cigarettes. New animal studies have shown that brain chemistry and receptors may be altered early in the smoking process. Habitual smoking may continue to change brain chemistry, including decreasing dopamine receptors and thus yielding a more intense craving and risk of addiction. These brain chemistry changes may be permanent. In addition, because the role played by receptors in other cognitive functions, such as memory and intelligence, is unknown, how cigarette smoking effects other brain functions by altering brain chemistry is unknown.(DiFranza, JR, et al, 2002)

1.38 GOOD EFFECTS OF QUIT SMOKING:

Quitting smoking makes a difference right away - you can taste and smell food better. Your breath smells better. Your cough goes away. This happens for men and women of all ages, even those who are older. It happens for healthy people as well as those who already have a disease or condition caused by smoking.

Quitting smoking cuts the risk of lung cancer, many other cancers, heart disease, stroke, other lung diseases, and other respiratory illnesses. Ex-smokers have better health than current smokers. Ex-smokers have fewer days of illness, fewer health complaints, and less bronchitis and pneumonia than current smokers.

Quitting smoking saves money. A pack-a-day smoker, who pays $2 per pack can, expect to save more than $700 per year. It appears that the price of cigarettes will continue to rise in coming years, as will the financial rewards of quitting.

Quitting smoking may be hard but not impossible and remember where there is a will there is a way. (Evans, N, et al, 1995)

2. OBJECTIVES OF THIS STUDY:

The present study is conducted

1. To understand the knowledge, attitude and practices about personal hygiene of East West University students.
2. To find out the awareness of East West University students about personal hygiene.

From analyzing this study it is identified that students should maintain good hygiene practices which should be followed to make sure that they keep their body healthy.

The most important aspect of maintaining good health is good personal hygiene. Personal hygiene which is also referred to as personal care includes all of the following: Bathing and Showering, Hair care, Nail care, Foot care, Genital care, and Dental care Personal hygiene is keeping the body clean, and helps prevent the spread of germs.

2.1 SIGNIFICANCE OF THE STUDY

Maintaining personal hygiene is necessary for many reasons; these can be personal, social, for health reasons, psychological or simply as a way of life. Essentially keeping a good standard of hygiene helps to prevent the development and spread of infections, illnesses and bad odors.

This study is expected to provide important information to better understand the importance of personal hygiene. Thus the result of this study will contribute to students health by making awareness about the bad effects of poor personal hygiene and reduce the risk associated with poor hygiene practices.

3. Materials and methods

3.1 Type of study

It was attempted to find out knowledge, attitude and practices about personal hygiene among East West University students. In addition to this, the study examined for other risk factors of poor personal hygiene practices.

3.2 Place of study

The study was conducted in East West University. The university is largest private university of Dhaka city. It was established in 1996, situated in Aftabnagar, Dhaka 1212. This institute comprise of many department. A good number of teacher and lab specialists and other supporting staffs are provide their best for their students.

3.3 Study population

83 students of department of pharmacy.

3.3.1 Inclusion criteria of the cases:

1. Randomly selected students of pharmacy department.
2. Both sexes irrespective of religion.

3.3.2 Exclusion criteria of the cases:

1. Students of other department.
2. Student of first semester.

3.4 Study period

To complete the study in time a work schedule is prepared depending on different task of the study. From February 2012 to may 2012, four months was used to collect data. Subsequent months spent on report writing and submission of report.

3.5 Sample size

The objective of the study is to find out the practices of personal hygiene among pharmacy department students. The data of 83 students who are read in pharmacy department were included in this study.

3.6 Research approach

After getting the approval of the research proposal from the honorable faculty members for data collection. Research work was approached by collecting information from different pharmacy department students and who were agreed to give the information.

3.7 Data collection method

After explaining the purpose of the study to the students randomly they were interviewed by asking question in English and used thoroughly pre-tested questionnaires. The questionnaire contained general information and socio-economic status, personal hygiene practices and awareness and diseases awareness.

3.8 Data analysis

After collecting all data, data were analyzed with Microsoft office excels (Pie Charts & Bar Diagrams). Then we analyze the all data by different strategies based on our target of study. The results were presented in tabulated from as well as figures and drawings.

4. RESULTS:

4.1.Results from analyzing the Questionnaire:

4.1.1 Distribution of total students

Percentage of total students		
	male	female
Number of students	41	42
% in 100	49.40	50.60

Section 1: general information and socio-economic status

4.1.2 Distribution of the earning member in a family

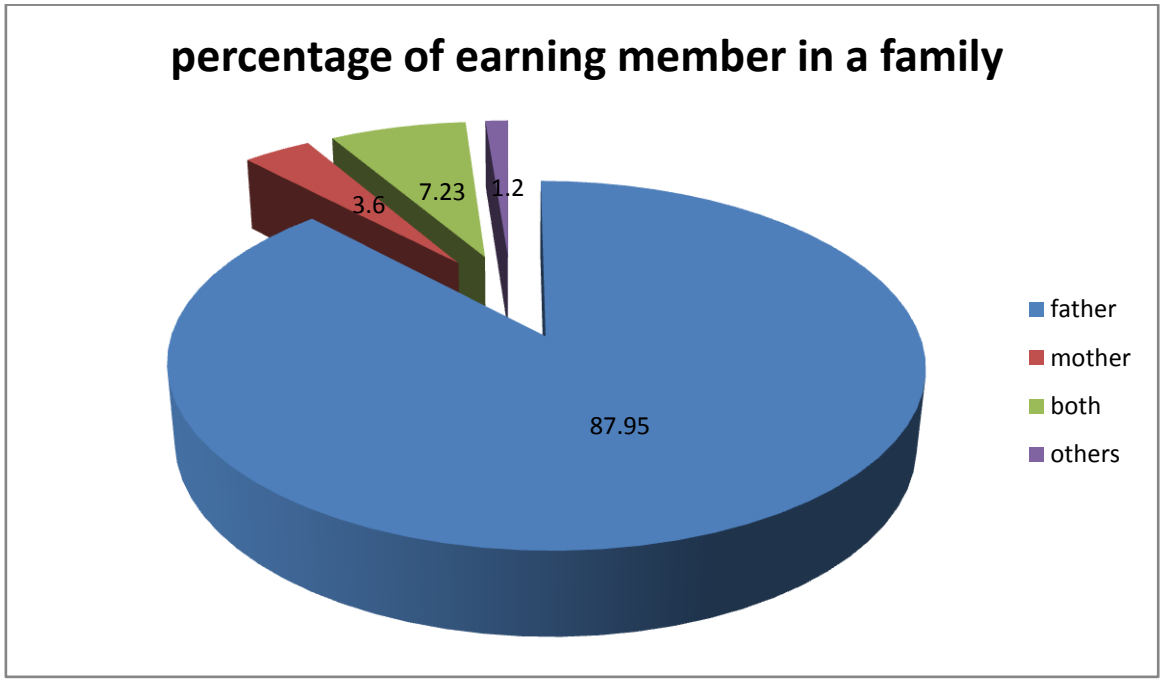


Figure:4.1: Earning member of their family

4.1.3 Distribution of his/her/their occupation

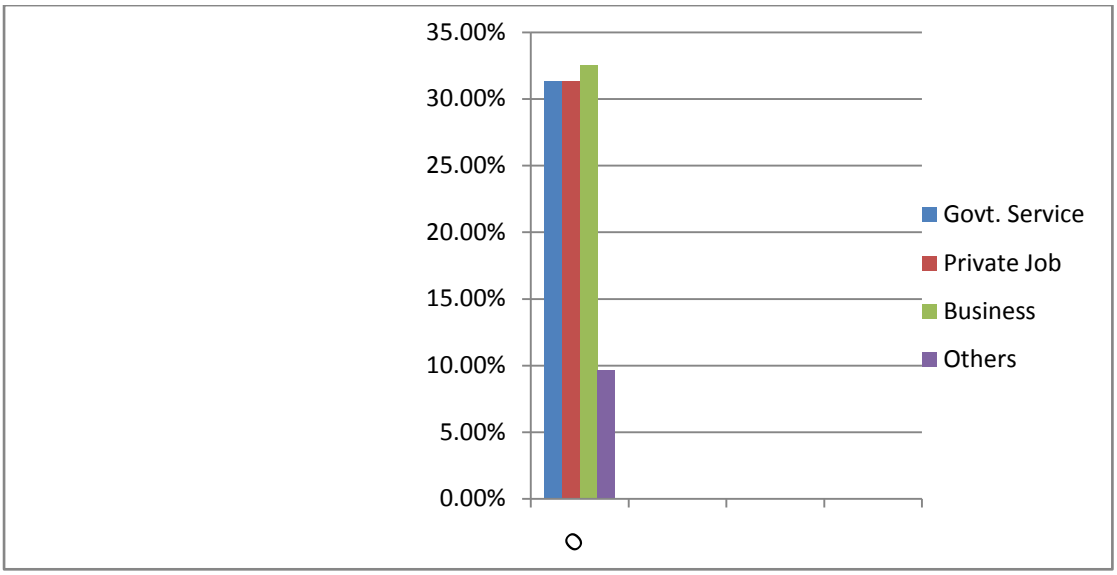


Figure4.2; name of occupation

4.1.4 Distribution of monthly family income

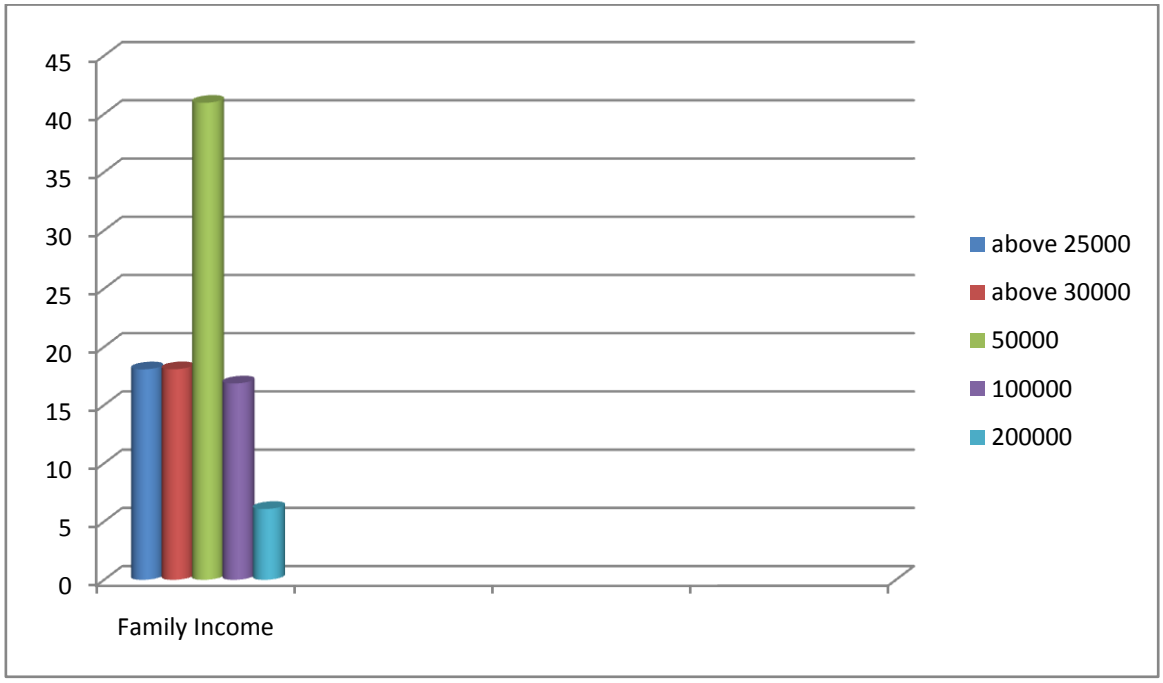


Figure4.3: Distribution of monthly family income

4.1.5 Distribution of brothers/sisters in a family

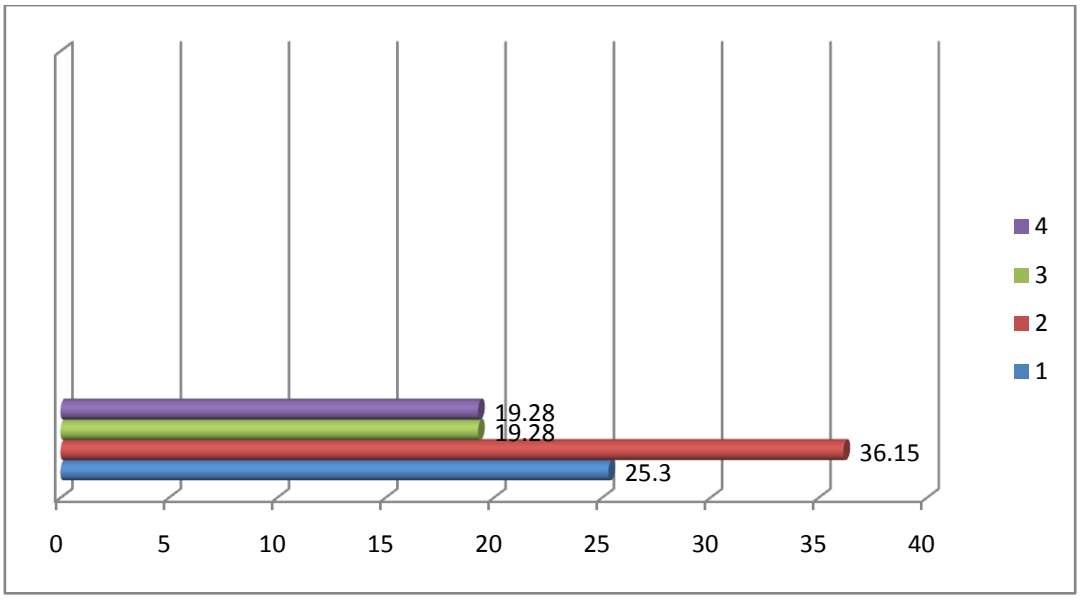


Figure 4.4: Distribution of brothers/sisters in a family

4.1.6 Reasons for admitting in a private university

Reasons for admission		
	To avoid session jam	others
Number of students	44	39
%in 100	53.02	46.98

4.1.7 Distribution of the amount of pocket money that they take from their parents

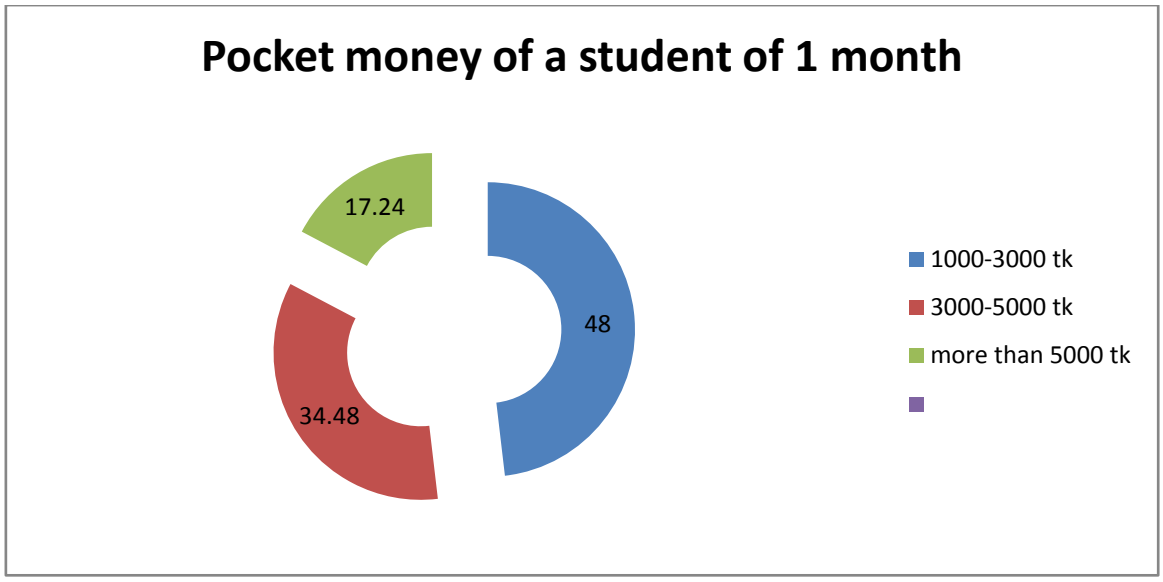


Figure4.5: Monthly pocket money

4.1.8 Distance from home to university

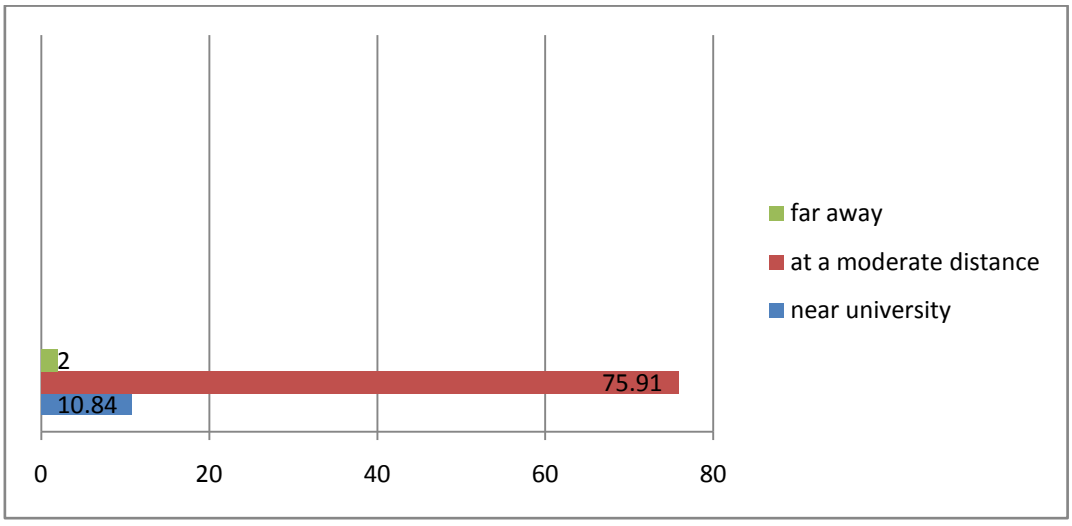


Figure 4.6: Distance from home to university

4.1.9 Source of washing/bathing water

Source of washing /bathing water			
	category	Number of students	percentage
	Tap	83	100
	tube well	0	0
	pond	0	0
	river	0	0
	Rain water	o	0

4.1.10 Source of drinking water

When at home

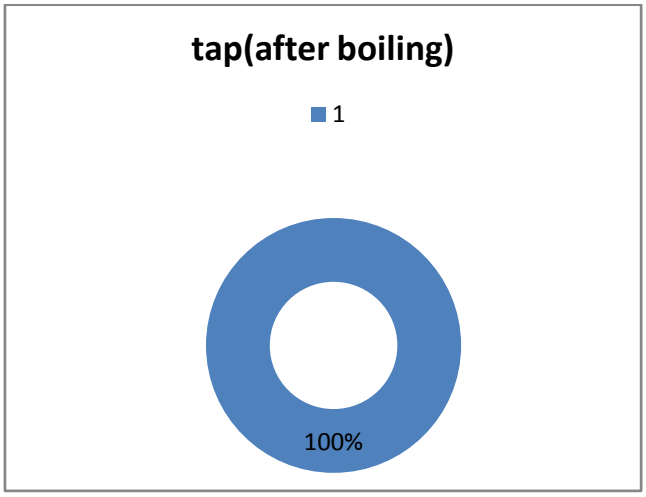


Figure 4.7: source of drinking water(When at home)

When outside

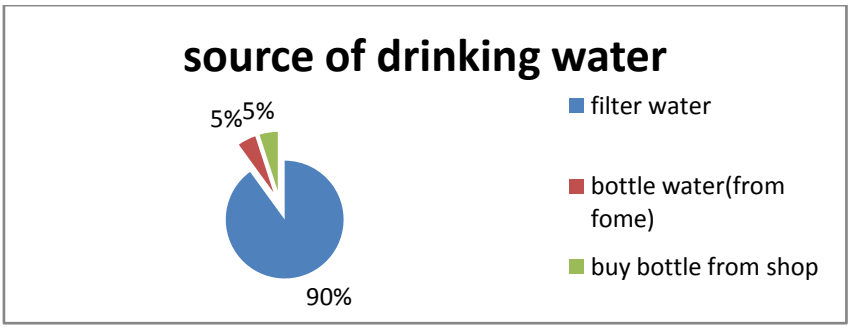


Figure 4.8: source of drinking water (when outside)

Section 2: personal hygiene practices and awareness

4.1.11 Distribution of knowing the standard process of washing hands

Ans.	No. of students	percentage
yes	83	100
no	0	o

4.1.12 washes their hands properly after coming from toilet

Ans.	No. of students	percentage
yes	83	100
no	0	0

4.1.13 washes their hands after coming from toilet

materials	No. of students	percentage
Using water only	0	0
With soap	83	100
others	0	0

4.1.14 washes their hand properly before eating foods

Ans.	No. of students	percentage
yes	83	100
no	0	0

4.1.15 material that using for washing their hands before you start taking foods

Materials	No. of students	percentage
Using water only	33	39.76
With soap	50	60.24

4.1.16 Habit of taking street-vended food

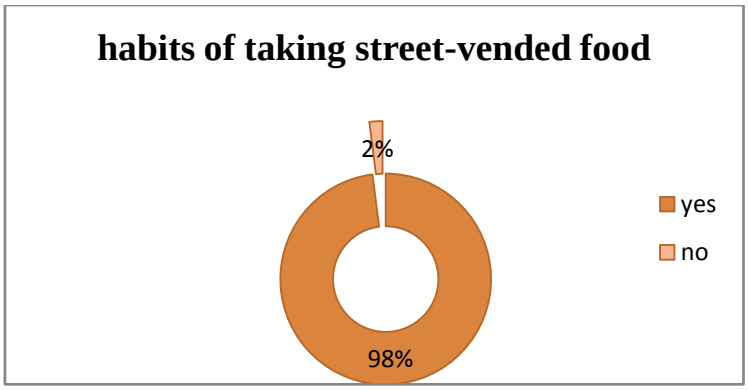


Figure 4.9: habit of taking street-vended food

4.1.17 students knowledge about contaminated foods

Ans.	No. of students	percentage
yes	72	86.75
no	11	13.25

4.1.18 students knowledge about the food-borne infection diseases

Ans.	No. of students	percentage
yes	75	90.36
no	8	9.64

4.1.19 reasons for taking foods from street side

reasons	No. of students	percentage
They are cheap	23	27.71
Very tasty/mouth watering	37	44.58
Easily available	18	21.67
others	5	6.04

4.1.20 Reasons of not taking foods from a good restaurant

Reasons	No. of student	percentage
Can't afford	20	24.09
It is too far away	42	50.60
Don't know	12	14.46
others	9	10.84

Section 3: disease awareness

4.1.21 Smoking habit of the Student

Smoking habits of the students (male)	No. of male	percentage
Non smoker	32	78.05
Smoking of cigarette	9	21.95
	Total-41	

Smoking habits of the students (female)	No. of female	percentage
Non smoker	42	100
Smoking of cigarette	0	0
	Total-42	

4.1.22Percentage of Suffering of diseases recently

Suffering in diseases recently	Number of students	percentage
yes	41	49.40
no	42	50.60

4.1.23 Type of infection or diseases of the student

Type of infection or diseases	Number of students	percentage
fever	12	29.27
Cough/cold	15	36.59
diarrhea	5	12.20
Vomiting/stomachache	3	7.32
Ear infection	1	2.44
Skin infection	2	4.88
others	3	7.30
	Total-41	

4.1.24 Sickness rate after taking street-vended foods on same day

Feeling sickness	**Number of student**	**percentage**
yes	47	56.63
no	20	24.10
Don't know	16	19.27

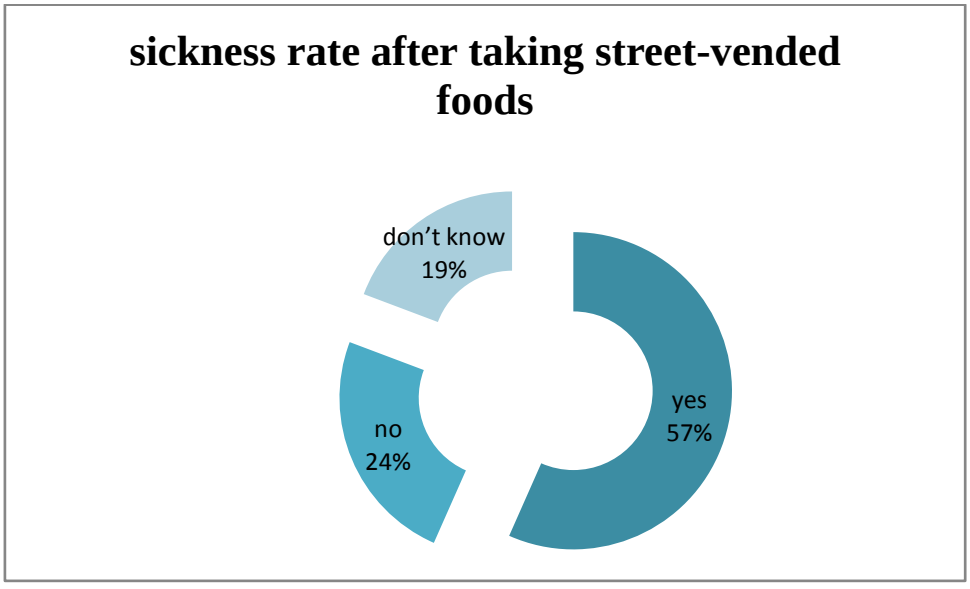


Figure4.10: Sickness rate after taking street-vended foods

5. DISCUSSIONS:

The most important aspect of maintaining good health is personal hygiene. Personal hygiene is keeping the body clean and helps prevent the spread of germs. Maintaining good health also includes nutrition, leisure/recreation opportunities, sleep and exercise. Hygiene is a personal matter. Hygiene practices, taught during childhood by mother, father or teachers, mostly through practicing, need to be continued by the individual after childhood. correct adoption of these habits has a direct impact on a person future health can be affected by many factors including beliefs, values, habits, socio-economic and cultural factors, level of knowledge personal preferences.

This study was done on 83 students of pharmacy department of East West University. In this study it is identified that most of the students are high middle class family. Father is the main earning member of their family (87.95%). 36% mother and both in 7.23% and others are 2.45%. Earning members occupation percentage like Govt. service 31.35%, 31.33% private job, businesses are 32.53% and others are 9.64%. Monthly income of their family 40.96% said above 50,000. But above 30,000 only 18.07% and above 25,000 only 18.07%.

Pocket money of most of the students (48%) is nearly 3000 per month. It is impossible to take food from a good restaurant daily. Although they are not live near university so transportation cost is a big issue here for costing their pocket money because most of the students (75.91%) live at a moderate distance.

Students stayed all day in their university. At that time they drink at least 6 or 7 glass or water. So water borne disease is also a issue on student hygiene practice. Drinking water comes from a variety of sources including public water systems and bottled water.

When students are in their home they drink boiled water which is coming from WASA. But when they are in the university most of the (90%) students drink filter water and rest of them bring bottle from home (5%) or buy bottle from shop (5%).

In this study one important thing is that most of the students wash their hand with soap after coming from toilet. Important thing is (100%) says that they wash their hand before eating. But only (60.24%) students take soap. But before eating washing hand properly is very much important because our hand is a main source of various microorganisms. So we should wash hand with soap or liquid before eating.

When students take street-vended food they don't wash their hand. That is a big reason for infection or diseases because 98% students take street-vended food. 44.58% students said that street-vended foods are very tasty or mouth-watering. 21.67% said that street-vended foods are easily available and 27.71% said that street-vended foods are very cheap for all those reasons street-vended foods are selling all day long. They all know that street-vended food is the main source of various diseases. But they don't care of this because they are very much bound to eat those cheap or tasty things.

Another important aspect of this study was to see students smoking habit. 23.81% boys have smoking habit. Even one cigarette quickly causes noticeable physical effects on a smoker body. Including the increasing in the heart rate, blood pressure, tension in some muscles, stomach secretions and changes brain activity. (Parrott et al, 1999)

In cigarette two main components is tar and nicotine. Tar causes damage of the cilia of lung thus results in lung cancer, bronchitis etc. and nicotine causes narrowing the blood vessels, altering the brain activity etc. (Parrott et al, 1999)

So inspire them for quit smoking. It will be decreases all the risk associated with smoking. Quitting smoking may be hard but not impossible because all we know that where there is a will there is a way.

According to this study recently suffering in diseases rate is 49.40% and most of the diseases related to fever (29.27%), cough/cold (36.59%) and diarrhea (12.20%). Stomachache 7.32%. All those are bad effects of street-vended food. All above diseases are related to water or food and their hygiene practices. Rate of becoming sick immediately that day after taking street-vended food are 56.63% and 19.27% said they don't know.

Good personal hygiene is a basic requirement for implementing food safety program. All food service employee and students must follow the standard procedure for personal hygiene. In this study a significant relationship was found between socio-economic status and personal hygiene practices or attitudes.

Students expressed the most positive hygiene behavior in the home hygiene, hand hygiene techniques, food hygiene and personal hygiene.

Hygiene is a personal issue with changing frequency for all; however, it is of great importance to wash hands after using bathroom and before eating or touching food. Majority

of students stated that they wash their hands after using bathroom. Which is a indicator of the fact that they have positive behavior towards this issue. Female students expressed much more positive behaviors about hygiene than male students.

Good personal hygiene is the basic requirement for implanting food safety program. Maintaining personal hygiene is necessary for many reasons; these can be personal, social, for health reasons, psychological or simply as a way of life. Essentially keeping a good standard of hygiene helps to prevent the development and spread of infections and illnesses.

6. CONCLUSION

According to the World Health Organization, health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Hygiene refers to practices associated with ensuring good health and cleanliness.

The main objectives of the study to find out knowledge, attitude and practices about personal hygiene and diseases of students of East West University students.

The result of this study confirms that there is highly significant association between personal hygiene practices and keep the body healthy among them who maintain hygiene practices than who does not maintain. Attention to personal hygiene will help a person look their best, feel their best, and can even help in avoiding disease.

Failure to keep up a standard of hygiene can have many implications. Not only is there an increased risk of getting an infection or illness, but there are many social and psychological aspects that can be affected.

The knowledge and practice of personal hygiene are vital in all our everyday activities. This study is expected to provide important information to better understand the importance of personal hygiene. Thus the result of this study will contribute to students health by making awareness about the bad effects of poor personal hygiene and reduce the risk associated with poor hygiene practices.

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