Basic health computer

Public health (Kenya Medical Training College)

KENYA MEDICAL TRAINING COLLEGE

DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCES

FACULTY OF PUBLIC HEALTH

FUNDAMENTALS OF ENVIRONMENTAL HEALTH

TERMINOLOGIES USED IN FUNDAMENTALS OF E.H

- **Environment**- It is a collective term used to describe all the living and non-living things that make up our surroundings.
- **Health**- A complete state of physical, mental and social wellbeing of an individual and not just merely the absence of disease or infirmity.
- **Agen**t- These are living organisms that transmit diseases.
    - Microorganisms that release toxins to environment that causes diseases or death.
- **Host**- A living organism where a parasite lives.
- **Health promotion**- It is an active process for better health, encompassing educational components, behavior change initiatives and environmental organizational and legislative interventions strategies.
- **Hygiene**- The science of health and the study of ways of preserving it, particularly by promoting cleanliness.
- **Demography**- The study of human population in terms of age and sex structure, its distribution and growth.
- **Public Health**- The science and art of preventing disease, prolonging life and promoting health through organized efforts by society, communities and individuals.
- **Sanitation**- This is the means of collecting and disposing of excreta and liquid waste hygienically.

- **Epidemiology**- Is the study of the distribution of diseases, risk factors and determinant of disease in population.
- **Community diagnosis**- Is the process of determining the nature of a disorder(disease) in the society by considering the community signs and symptoms, background, lab-tests or x-ray examination.
- **Incubation period**- It is the interval between exposure to an infection and the appearance of the first signs and symptoms.
- **Sign**- It is an indication of a particular disorder that's detected by a medical expert during examination.
- **Symptom**- An indication of a disease/disorder noticed by the patient.

HISTORICAL BACKGROUND OF E.H.S

The department of EHS is one of the oldest departments.

The first PHO, the then called Sanitary inspector was employed in 1907. The title has undergone several changes to the current PHO and PHT. Currently the department has 4185 certificate holders(PHT's) and diploma (PHO's).

PHT's are deployed to be in charge of public health activities at locations and sub-locations while PHO's take divisions and districts.

In some ways public health is a modern concept of human development in science, although it has roots and entiquity from the beginning of human civilization.

Early religions attempted to regulate the behavior that was specifically related to health from the type of food eaten to regulating certain indulgent behaviours such as drinking alcohol or sexual relations.

The establishment of government's placed responsibility on leaders to develop public health policies and programmes in order to gain some understanding of the causes of diseases and thus ensure social stability, prosperity and maintain order.

By Roman times, it was well understood that proper diversion of human waste was a necessary tenet of public health in urban areas. The Chinese developed the practice of variolation following a smallpox epidemic around 1000 BC. An individual without the disease could gain some measures of immunity against it by inhaling the dried crusts that formed around lesions of infected individuals. Also children were protected by inoculating a scratch on their forearm with the pus from a lesion. This practice was not documented in the west until the early 18th century and was used

on a very limited basis. The practice of vaccination didn't become prevalent until the 1820's following the work of **Edward Jennet** to treat smallpox.

The science of epidemiology was founded by **John Snow's** identification of a polluted public water well as the source of an 1854 cholera outbreak in London. **Dr Snow** believed in the Germ theory of disease as opposed to the prevailing Miasma Theory. Although Miasma theory correctly teaches us that a disease is as a result of poor sanitation, it was based upon the prevailing theory of spontaneous generation.

Germ theory developed slowly; despite **Antony Van Leeuwen Hocks** observations of microorganisms(Which are now known to cause many of the most common infectious diseases) in the year 1680. The modern era of public health didn't begin until the 1880's with **Louis Pasteur's** Germ theory and production of artificial vaccines.

Other public health interventions included latrinization, the building of sewers, the regular collection of garbage followed by incineration or disposal in a land field, providing clean water and draining stagnant water to prevent the breeding of mosquitoes.

This contribution was made by **Edwin Chadwick** ion 1843 who published a report on the sanitation of the working class population in Great Britain at the time. So begun the inspection of the modern public health. The industrial revolution had initially caused the spread of disease through large cornubations around work, houses and factories.

These settlements were cramped and primitive and there was no organized sanitation. Disease was inevitable and its incubation in these areas was encouraged by the poor lifestyle of the inhabitants.

From the earliest civilization some form of public health had existed as a conscious effort by authorities to apply social, scientific and medical knowledge to the protection of the health of the communities. In Egypt and Rome, both had sometime built modern towns and had fairly developed sanitary systems. In Rome, public baths were available to everyone and workers went in the evening to wash and do away with the fatigue of the day. Inoculation against smallpox was practiced in India and China before Christian era. Rome built Leprosaria and like Greece, sort to regulate prostitution.

The latrine and flash closets were intended many years before other Arabian cities had health departments with Public Health workers. In Europe, leprosy cases were isolated and almost eliminated. Some of the teachings in major religions can also be regarded as a form of public health aiming at cleanliness. The isolation of the sufferers and ritual absentation from foods likely to convey diseases.

MOSAIC LAW

This is a law that was given to the Israelites through Moses. They were to guide the Israelites on their way to the promised land. In our life today, some of the Mosaic law still apply to the public in safeguarding their health. It is also termed as founder of Modern Medicine and health practices.

The Mosaic law defined to the Israelites many of the things which were termed as unclean. In our modern health practice we know that any thing that's termed unclean can cause diseases to us.

Isolation were used by Israelites to prevent spread of diseases to different people. In modern isolation is used to control the spread of diseases e.g. leprosy, viral haemorrhage.

The directions that were given included strict forbidment on accommodation of waste either in lamps or in tents, disposal of hides from animals such as goats that were slaughtered was done by burial or cremation, specific foods were to be eaten and the rest termed unclean, were not to eat fatty foods, were not to mix any plants to come up with hybrid(The GMO's have today led to cancers) etc

SIR EDWIN CHADWICK

Sir Edwin Chadwick's history connected sanitation to diseases and then to poverty. This came out at the middle of the 19th century. It was at this time when poor sanitation continued in the westland and little efforts were put to keep towns, cities and other common areas clean and tidy. During this time the west made a lot of regulations and measures were taken to control the environment.

Sir Edwin Chadwick's work commented on poor water supply, lack of drainage, and the filth conditions of the mentioned places and impressed on the need for improvement.

In 1843, he chaired a royal commission which was to inquire into the causes of diseases amongst the inhabitants of the town. By the investigations, 40 towns were taken and conditions were considered tolerable in only 8 towns. The findings were enclosed and an activent made under which improvement of water supply and

sanitation was put out. It required of fit and proper person to be appointed as an inspector of nuisances.

Sir Edwin Chadwick was born on 24/Jan/1800 and died on July 1890 and was born when the sanitary condition of the population was very poor. He was an English Social Reformer noticed for his work to reform the poor laws and improve sanitary condition in public health. He believed his work would save public funds and expenses.

PUBLIC HEALTH IN KENYA

The first missionary society in Mombasa in 1888 appears to have been the first to undertake medical work in Kenya. Their main concern was the spread of Christianity which they did simultaneously with medical services. Consequently they laid foundation of curative and preventive medicine. Their work of preaching the gospel and healing the sick entailed considerable difficulties e.g. they had language problems and couldn't communicate with the local people easily. Secondly there were no roads and thirdly people were not prepared to accept their teaching. They used persuasions in order to get a few people to teach. Some parents refused to allow their children to be taught as they considered looking after cattle as more important.

The missionaries worked persistently and carried out curative and preventive medicine throughout Kenya and Uganda. They established missionary stations and built either dispensaries or small hospitals in every station which helped in the treatment and eradication of common diseases.

Medical services both in Kenya and Uganda were amalgamated but in 1903 the services were separately developed in the two countries. Active environment work started in Kenya between 1913 and 1920 when the first sanitary inspectors were employed.

Their work was to teach and inspect. They spent most of their time in teaching people in the rural areas how to build good houses and in addition conducted immunization campaigns against smallpox, plague, and other communicable diseases. The number of sanitary inspectors employed at that time was small and the government needed some local people to train in order to assist them in their work. During this period considerable interest was directed towards environmental sanitation which called for proper manning and policy making.

In 1920, the first director of Medical Services was appointed to advice the government on medical requirement for the whole country and to plan, execute preventive measures against communicable diseases.

In 1921 the first public health ordinance was passed and its basic aims were;

- **Suppression of infectious diseases**
- **Abatement of nuisances**
- **Sanitation improvement**
- **Housing improvement**

For the purpose of rural development, the native authority ordinance was passed in 1924 which required local councils to contribute funds for public health measures. The funds were used in improving facilities such as water supplies for use by the communities.

A number of people who were trained as masons or carpenters were designated as sanitary workers. They started rural sanitation by advicing the local people on how to build their houses, protect springs and were also responsible for immunization against communicable diseases.

Between 1933 and 1939 more European Health inspectors were employed to work in various districts and to plan and improve environmental health services. Further expansion took place between 1940 and 1954. These include;

- **Establishment of Medical Training Centre in which the first Health inspectors started to train in 1947**
- **Health centers were established and run by the local health authorities(Later these were taken by the central government.)**
- **Health education unit was established in 1954 mainly to produce materials and visual aid for teaching PH in the rural districts**.

APPOINTMENTS, TRAINING AND QUALIFICATIONS

- Law of Kenya Cap 242 specified that central and local government being health and authorities were to appoint health inspectors.
- The PH(Medical officers of health and health inspectors) rules 1963 prescribed the qualifications for persons appointed.
- Until 1963 there were 3 classes of PH officers
    - The health assistants whose preliminary qualifications was K.P.E then raised to form 2. The personale received 2 years of training one of which

was theoretical in MTC and the other one which was practical in the field. These officers were examined locally at Medical Training College.

- Health inspectors rormally called assistant health inspectors whose preliminary qualification was Cambridge school certificates. The period of training was 2 years 6 months of which were spent on field practical work with District Health Inspectors

  The examination was set by instructors in hygiene, the chief health Inspector and doctors. A local certificate was given to successful candidates.

- The rules quoted in paragraph two above required that only persons possessing the royal society of Health Certificate or other qualification required by the minister would be appointed as the health inspector.

- In 1962 the training of students was raised to Royal Society of Heal;th (RSH) standards requiring 3 years training of which 300 days would be spent in practical training in the field under the supervision of the District Health Inspector. The preliminary qualification for training was Cambridge school certificate of GCE-General Certificate of Education at O-level with passes in maths, English and one science subject. Candidates with credit in these subject were given preference. The exam papers were set by the royal society of Health in London and the practical and trial exams were set by local examiners. The controlling body was the East African Joint Examination Board which was a branch of Royal Society of Health. Examiners were doctors, health inspectors, veterinary, surgeons and engineers. Successful candidates received a certification in Public Health inspection for general overseas appointments.

  Additional qualifications were desirable such as;

  - **Certificate for inspection of meat and other foods**
  - **Diploma in tropical medicine**
  - **Diploma in Public Health Engineering**
  - **Diploma in Health education.**

DEPARTMENT OF ENVIRONMENTAL HEALTH AND SANITATION

The department of Environmental Health and Sanitation(DEHS) is one of the oldest departments in the Ministry of Public Health and Sanitation. The first Public health officer then called a Sanitary inspector was employed in 1907. The title has undergone several changes to the current Public Health Officer(PHO) and Public Health Technician(PHT). PHT's arte deployed to be in charge of public health activities at the community level(Locations and sub-locations) while PHO's take charge of the divisions and districts.

The current head of the department, the Chief Public Health Officer is Mr. Kepha M. Ombacho. He is deputized by Mr. John G. Kariuki. The department has seven(7) divisions namely;

- **Division of Sanitation and Hygiene Promotion**
- **Division of Food safety and Quality Control**
- **Division of Water safety and Quality Control**
- **Division of Pollution Control and Appropriate Housing**
- **Division of Port Health Services**
- **Division of Vector and Vermin control**
- **Division of Occupational Health and Safety.**
- **GOAL**

To improve the status of environment in order to reduce health risks for All Kenyans

VISION OF THE DEPARTMENT

High quality, efficient and effective environmental health provision.

MISSION OF THE DEPARTMENT

To provide comprehensive and effective environmental health services for the people of Kenya, ensuring that through appropriate interventions, monitoring, regulation, and enforcement, all can enjoy services which are so far as po0ssible safe and without risk to health or welfare.

ORGANOGRAM OF MINISTRY OF PUBLIC HEALTH AND SANITATION

Senior Deputy CPHO

Technical- Regulatory, planning, monitoring and evaluation, budgeting, programming

Chief public health officer(CPHO)

Overall manager of environmental health/public health services-(Policy, Guidelines and Regulation, formulation, planning, budgeting, management of resources and administration

Divisional PHO

Deputy CPHO/deputy

Deputize the CPHO/Director of Public health- (Training environmental health/public health/public health policies and guidelines)

Monitoring and evaluation of EH services and operational research(Senior DCPHO)

COMMUNITY

DHMT(DPHO)

PHMT(DPHO)

LHA(CPHO)

Div of occupational Health and safety

Div of pollution c control and appropriate housing

Div of port health services

Div. of Sanitation and Hygiene promotion

Div. of vector and vermin control

Div. of food safety and quality control

Div. of water safety and quality control

Senir Deputy CPHO 2- Field operatios, coordinations of environment health/public health policies and guidelines and staff development and deployment

LHA(CPHO)

LEGAL AND REGULATORY FRAMEWORK

They two main acts of parliament are the Public Health Act chapter 242 and the Food, Drugs and Chemical Substances Act chapter 254 Laws of Kenya.

RATIONALE AND MANDATE OF DEHS

Vast rural and urban human settlements in Kenya lack adequate sanitation. Lack of wholesome water supplies and basic sanitary facilities coupled with unsafe food, poor and inadequate housing result in high morbidity and mortality rates due to preventable diseases, mainly related to environmental sanitation. This therefore calls for more focus on Environmental Health Interventions.

In conformity with the current National Health Sector Strategic Plan (2005-2010) whose theme is “Reversing The Trends”, DEHS encourages active participation of communities and other sector players in the execution of environmental intervention activities.

CORE FUNCTIONS

Public Health Officers are appointed under the Public health Act, Cap 242, section 9(1). They carry out duties as specified in the Public Health Act (Cap 242), Food, Drugs and Chemical substances (Cap 254) among others. The department of Environmental Health and Sanitation plays a leading role in prevention and control of preventable diseases. The following are core functions of the department.

- **Sanitation and Hygiene Promotion**
    - Coordinating partners implementing environmental sanitation and hygiene activities through ESHWG
    - Formulation and implementation of health, hygiene and sanitation policies
    - Urban and rural sanitation
    - Sanitation of dwellings, markets, public places and informal settlements
    - Prevention and control of unsanitary nuisances
    - Hygiene education for positive behavior change.
    - Promotion of hand washing as a tool for disease prevention
    - Coordinating and implementation of PHASE, FOAM and PHAST and other participatory initiatives .
    - Capacity building for staff, partners and community artisan on alternative ecological sanitation

- Carry out research on appropriate alternatives in sanitation and adopting new technologies
- Promotion of safe re-u8se of wastes
- Carry out M&E on hygiene and sanitation
- Conduct hygiene and sanitation surveys
- Control of sanitation related diseases e.g. jiggers
- Promotion and assurance of safe disposal of healthcare wastes
- Coordination, supervise and management of both solid and liquid wastes

- **Food Safety and Quality Control**
  - Formulation of food safety policy and implementation
  - Food safety risk assessment, risk management and risk communication
  - Surveillance of food borne diseases/illnesses
  - Food safety, quality and hygiene control
  - Enforcements of food safety laws(Regulations)
  - Review of food safety legislation to be in tandem with changing trends
  - Infuriation dissemination to Public Health(Environmental Health) staff opn food safety dynamics
  - Participate in ensuring safety of Genetically Modified Foods
  - Conduct periodic surveys and operational research
  - Ensure compliance of foods articles and food establishments
  - Development, Harmonisation and enforcement of food safety standards
  - Efficient planning, procurement, financial and administrative management of food safety and quality control services
  - Conduct survey on food borne illness/diseases and development of a data bank
  - Development and dissemination of advocacy tool kits and education package on prevention of food borne illness

- Participation of WTO/TBT, codex meeting on food standards. Particip[ate in national codex committee in setting/formulation of food standards

- **Port Health Services**
  - Implementation of the international Health Regulations
  - Disease surveillance within the ports and frontier posts of entry and exit.
    - Screening of passengers from countries affected by internationally notifiable diseases and taking appropriate action as necessary
    - Investigation of any case of infectious diseases report at the port or aboard any vessel(Aircraft, ship, train or road vehicle) entering the country
    - Notification of any diseases as per IHR(2005)
  - Quarantine administration
    - Quarantine of passengers suspected of having an infectious disease
    - Fumigation of infected vessels and quarantine as need arises
    - Quarantine any vessel disinfected or disinfected as per IHR 2005 and other exiosting local laws and regulations
  - Inspection and certification of vessels(aircraft, ship, train or road vehicle)
    - Inspect all types of commercial vehicles to ensure appropriate sanitary conditions and hygiene standards are maintained
    - Review of documents on Maritime Declaration of Health
    - Issuance of ship Sanitation Control Exemption Certificate/ ship sanitation Control Certificate
  - Environmental sanitation within ports and frontier posts to control nuisances such as noise, dust, smoke and odour problems.
  - Vector/vermin control within and around ports and frontiers
    - Mosquito control
    - Control of scavengers
    - Control of other vectors and vermins
  - Food safety measures for both imports and exports

        - Inspection of food nconveyance vehicles to ensure that food is transported in hygienic environment.
        - Inspection(including sampling and testing) and certification of food imports in accordance with both international and local food safety laws and regulations.
        - Inspections of food manufacturing, processing and catering establishments
    - Vaccination of travelers and issuance of vaccination certificates
    - Respond to any health emergencies within and around the port area
    - Scrutinize plans and documentation regarding improvement of port area for approval
    - Liase with other stakeholders in implementation of port health activities
    - Revenue collection for chargeable services
- **Occupational Health and Safety**
    - Coordinate the implementation of World Health Organization(WHO) global plan of action on workers health
    - Collaborate with Director of Occupational Safety and Safety services(DOHSS) in attending the National Occupational Safety and Health Council meetings
    - Train Public health officers on workplace health promotion
    - Update the MPH and San on guidelines/protocols regarding occupational health and safety
    - Carry out occupational health and safety assessments in school and health institutions
    - Provide technical advice to industries in improving hygiene and sanitation of work places
- **Water Safety and Quality control**
    - Ensure public health safety of water sources
    - Capacity building on water quality surveillance using rapid test techniques
    - Mapping major pollution sources to water sources

- Ensuring major pollution services are reduced
- Ensure safety of recreation waters
- Promote treatment and management of water at points of use
- Vetting and approval of water treatment chemicals
- Ensure safety of containerized water
- Prosecution of polluters to abate nuisance in the environment.

- **Vector and Vermin Control**
  - Coordination and integrated Vector Management Activities
  - Enhance capacity-building of staff and sprayer on vector control
  - Coordinate Internal Residue Spraying (IRS) activities
  - Promote use of insecticide Treated Materials (ITMs)
  - Initiate procurement of chemicals, equipments and materials for vector control
  - To control rodents, insects and vermins and public health importance
  - Collaborate with other partners on operational research and the control of disease vectors, other insects and vermins
  - Monitoring and Evaluation
- **Pollution Control and Housing**
  - Solid and liquid waste management
  - Control of hazardous waste
  - Pollution control and housing improvement
  - Exhumation and control of cemeteries

CHALLENGES

The task of provision of Environmental Health and Sanitation services is enormous and is faced with fundamental challenges which include:

- Poor housing and its association with communicable diseases
- Emerging and re-emerging of diseases such as H1N1, aflatoxicosis, etc

- Inappropriate waste management by local municipalities
- Cultural practices which has adverse effect on health
- Mushrooming of cottage food industries and outside food catering
- High poverty level is a great challenge to Kenyans in meeting basic environmental health and sanitation services
- Inadequate housing
- Inadequate reagents and maintenance of services of machine/equipment
- Failure by partners in meeting their obligation due to inadequate funding and prioritization
- Burden of food borne diseases/illnesses
- Limited resource allocation
- The Public Health Standard Board hasn't been gazetted despite its provision in the Public Health Act Cap 242

PRINCIPLES OF ENVIRONMENT HEALTH

- **STAGES OF A DISEASE IN A HUMAN BODY**

  They are sub-divided into two:

  - **The sub-clinical stage**

    CLINICAL DISEASE

    SUB-CLINICAL DISEASE

    HEALTHY PERSON

    RECOVERY

    DEATH(Outcome)

    DISABILITY(Outcome)

    RECOVERY(Outcome)

    At this stage, the patient does not show signs and symptoms even though the micro-organisms are within the body. The only way to know the individual is infected in this stage is by taking samples of body fluids/biopsies which will indicate development of antibodies

against the particular Infection or indicate the actual organisms. However the individual may spread disease at this stage if its infectious.

- **The clinical stage**

  It should not noted that the sub-clinical stage of a disease may lead to clinical stage of an individual may recover without developing any signs and symptoms.

The clinical stage of a disease may have several possible outcomes i.e. Recovery, Disability or death.

- ## PROTECT PUBLIC AND THE ENVIRONMENT

Public health (Community health) is part of medicine which is concerned with the health of the population and prevention of disease from which they suffer. It is well known that prevention is better than cure this means that the best sort of prevention is before people become ill i.e. before a person departs from the pathway of health and starts down the pathway of disease this is known as Primary Prevention.

- **PRIMARY PREVENTION**

Primary prevention provided by a combination of methods mainly aimed at people and the environment in which they live.

Primary prevention can be done at 2 levels;

- Primary level
- Immunization
- Chemoprophylaxis
- Chemotherapy
- Physiotherapy
- Nutrition
- Personal Hygiene
- Good health practice
- Child spacing/family planning etc
- Environment Level
- Safe water supply
- Food hygiene
- Good housing
- Safe excretory disposal
- Disinfection and sterilization
- Vector and animal reservoir control
- Safe refuse disposal

- Safe excretory disposal

- **SECONDARY PREVENTION**

  Then next best time for prevention of diseases is after the disease has started but before symptom have appeared. This stage is called pre-colonial/sub-clinical/ Pre-symptomatic. Prevention at this stage is called Secondary prevention. The process of finding out this sub-clinical process is called Screening.

  Examples are weighing babies and young children to see if their weights fall into the nutrition danger area. Examining Urine and faeces for parasites for parasites and examining mothers for early signs of complications. Tracing of contacts is another form of screening for infectious diseases e.g. tuberculosis, leprosy to see if other persons in a family are also infected.

  Surveillance of diseases is another form of secondary prevention. It is achieved by keeping of records of the number of the new cases of diseases like measles and meningitis to see if a control programme is working or detect an epidemic early.

- **TERTIARY PREVENTION**

  This is when symptoms of a disease are recognized and diagnosis and treatment is done. Curative work in hospitals and health centres is concerned with these stages of disease. The methods are based on diagnosis and management of the disease. These tertiary prevention involves;

  - Diagnosis
  - Treatment
  - Management
  - Rehabilitation

- **Disability Limitation**- Adequate treatment to arrest the disease process and to prevent further complications. Provision of facilities/equipment to limit disability and to prevent death

- **Rehabilitation:**

  - Provision of hospital and community facilities for retraining and education for maximum use of remaining capacities

- Education of the public and industry to utilize the rehabilitated for as useful employment as possible
- Selective placement or redeployment

QUALITATIVE, QUANTITAVE RISK ASSESSMENT

Risk assessment is the determination of qualitative and quantitative value of risk related to a concrete solution, a recognized threat(Hazard)

In the context of p[public health, risk assessment is the process of quantifying the probability of harmful effect to individuals or population from certain human activities. In most countries, the use of specific chemicals or the operations of specific facilities e.g. power plant manufacturing plant is not allowed unless it can be shown that they do not increase the risk of death or illness above a specified threshold.

HOW THE RISK IS DETERMINED

- **Hazard Identification**- Aims to determine the qualitative nature of the potential adverse consequences of the contaminant (Chemical, radiation, noise e.t.c) the strength of the evidence it can have that effect. This is done for chemical hazards by drawing from the results of the science of toxicology, epidemiology e.t.c.
- **Dose-response analysis**- Is determining the relationship between dose, the probability of the incidence of effect (Dose-response assessment.). The complexity of this step in many contexts derives mainly from the need to extrapolate results from experimental animals to humans and/or from high to lower doses. In addition, the differences between individuals due to genetics or other factors mean that the hazard may be higher for particular groups called susceptible populations. An alternative to dose-response estimation is to determine an effect unlikely to yield on observable effects which are a no-effect concentration. In developing such a dose to account for the largely unknown effects of the animals to human extra populations, increased variabilities in humans, or a missing data, a prudent approach is often adopted by including safety factors in the estimate of the safe dose typically, a factor of 10 for each unknown step.
- **Exposure quantification**- Aims to determine the amount of a contaminate(dose) that individuals and populations will receive. This is done by examining results of the discipline of exposure assessment. At different locations, lifestyle, other factors likely to influence the amount of contaminant that is received, a range of distribution of possible values is generated in this step. Particular care is taken to determine the exposure of the susceptible population.

QUALITATIVE RISK ASSESSMENT

This includes a circulation of the single loss expectancy(SLE) of an asset. The SLE can be defined as the loss of value to asset based on a single security incident. The team then calculates the annualized rate of occurrence(ARO) of the threat to the asset.

The ARO is an estimate based on the data of how often a threat would be successful in exploiting a vulnerability. For this information, the Annualized Loss Expectancy(ALE) can be calculated. The ALE is a calculation of the SLE multiplied by the ARO or how much an organization could estimate to lose from an asset based on the risk threats and vulnerabilities. It then becomes possible from a financial perspective to justify expenditure to implement counter measures to protect the asset.

QUANTITATIVE RISK ASSESSMENT

In qualitative risk assessment one does not try to assign hard financial values to assets, expected losses and cost of controls. Instead, one calculates relative values.

The benefits of qualitative approach are that it overcomes the challenges of calculation accurate figures for asset values, cost of control and so on and the process is much less demanding on staff.

The drawback of a qualitative approach is the resulting figures are vague and some decision markers especially those with finance of accounting backgrounds may not be comfortable with the relative values determined during a qualitative risk assessment project.

PILLARS OF ENVIRONMENTAL HEALTH

- **Community Health**

  Is that part of medicine concerned with the health of the whole community in prevention of the disease they suffer from. This is achieved by making a community diagnosis of which diseases are important and which can be prevented and then organizing suitable control programmes.

- **Air Quality**

  Diseases related to respiratory tract are prevented by ensuring the air we breath does not contain disease causing organisms.

- **Pollution Control**

  Pollution is the presence of impurities/pollutants in our environment. These harmful substances will spoil the air, food, water and soil. These po0llutants may be from; Agricultural activities, Industrial and Social activities. The presence of pollutants in the environment will adversely affect the health of a population.

- **Food quality Control**

Food is essential for development, growth and energy. Food is also resp[onsible for the spread of many important diseases. The aim of food quality control is to prevent food spoilage or contamination at any stage of contact, collection, storage, sell, preparation and consumption.

- **Built Environment**

  Housing is one of the essential aspects of environmental health by protecting people from from environmental hazards. Poor housing exposes people to diseases leading to poor health. Dampness in buildings and overcrowding, inadequate ventilation, poor lighting encourage the spread of airborne/droplets infection.

  Dirty surroundings, poor waste disposal, lack of wholesome water, poor food storage and preparation facilities, poor excreta disposal are some of the factors associated with disease transmission. Poor housing provides harborage for disease carrying pest/vectors

- **Occupational Health and Industrial Hygiene**

  Workers in various occupations suffer from diseases other people suffer from. The work environment may expose workers to unique occupational hazards in addition to the common diseases. Occupational Health Services are provided to offer preventive and curative health care to workers in all occupations for all diseases whether arising from home or work place.

- **Management**

  To implement environmental health programmes we need resources and good management is required to manage these resources. These resources include; personnel, money, equipment and materials. To achieve desired results, good management is important.

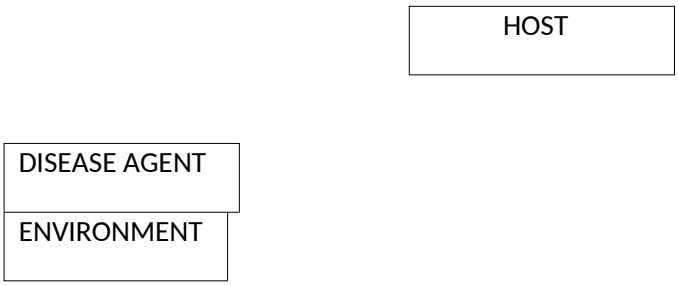
HEALTH AND ENVIRONMENT

Communicable diseases are diseases that are spread from one animal to another, man to man, man to animal.

To understand these diseases, we need to consider;

- The living agent
- The host it infects
- The environment that the host and the agent live in.

The living agents/organisms which can be virus, helminthes, microplasma, bacteria, etc need to grow, multiply and spread. To infect new cases or hosts, there must exist a balance between the host(People or animals), The agents and the Environment.



The arrows show that each of the factors can have an effect to the other two. People can become ill and die because of the agents, but people can also control or kill the agents. The environment van affect the agents and vice-versa.

When a disease is endemic, there is a fairly constant number of new cases. There is a balance between the host, agent and environment.

When the balance becomes up and favors disease agents the disease incidence rises and when this rise is rapid, there is an epidemic.

The aim of the disease control is to turn the balance against the agent in order to lower the disease incidence. The situation is maintained over a period of time until:

- The epidemic is said to be under control
- The disease is no longer a major problem
- The disease disappears altogether

Source of Infection

This can be a person, animal or soil.

TRANSMISSION

The main routes are:

- Direct contact
- Airborne droplet
- Faecal contamination of soil, food and water

- Vectors
- Contact with animals and their products.

SUSCEPTIBLE HOST

This is a host whose resistance is low enough for him/her to get the infections. This may be due to:

- Not having met the organism before and therefore having no immunity to it e.g. measles
- Certain infections only give a weak immunity e.g. Malaria
- Intercurrent debilitating illness like T.B.
- Malnutrition

PRINCIPLES FOR CONTROLLING COMMUNICABLE DISEASES

The aim is to lower the incidence. The method used to turn the ecological balance against the agent by attempting to break the transmission cycle operates at 3 key areas;

- **Attacking the Source**
  - Treatment of cases and carriers
  - Isolation
  - Surveillance of suspects and victims
  - Notification of cases
- **Interrupting the route of transmission**
  - Environmental hygiene
  - Personal hygiene
  - Vector control
  - Disinfection and Sterilization
  - Monitoring population movement

- **Protecting the susceptible host**

- Immunization
- Chemoprophylaxis
- Personal protection
- Good nutrition
- Reservoir control