

BIOLOGY

THIRD TERM S.S. 1

Topic: Population Studies and Sampling Method

Population is defined as the total number of organisms of the same species, living together in a given area at a particular time. In an ecosystem, the community is made up of many populations of different species.

In population studies of habitat, the following are usually studied.

1. **Types of organism:** It involves the listing of various types of populations that are found in the particular habitat. It helps to determine the relationship that exist between the various organisms (plants and animals) in a habitat.
2. **Domnance:** It refers to these species that exist a greater influence or a major controlling effection, the other members of the community. The relative importance of a species in community is expressed by domnance. Domnance could be expressed in terms of:
 - i. Their Member
 - ii. Occupation of highest bromass (weight)
 - iii. Occupation of the largest ponnon of space
 - iv. The largest contribution to the energy flow in the habitat

For a specie to be dormant in a habitat, it should process some of these attributes over other species.

3. **Population Characteristics:** These includes:
 - a. **Population Size:** This refers to the total number of the species of the same kind in a given area or habitat. A large population stands better chance of surviving dangerous and unfavourable condition such as ases etc. while all small population can easily recompiled out.

- b. **Population Density:** This is defined as the number of individual organisms per unit area or volume of the habitat.

$$\text{Mathematically: Population density} = \frac{\text{Total Pop or Population size}}{\text{Area of habitat}}$$

- c. **Population Frequency:** It refers to the number of times an organism occurs within a given area of a habitat.
- d. **Percentage Cover:** This refers to the area or space covered or occupied by a given species in its habitat and it is expressed as a percentage.
- e. **Population Growth Rate:** This refers to the result of the influence of natality (birth rate) and mortality (death rate) of organisms in a given habitat.

Factors Affecting Population

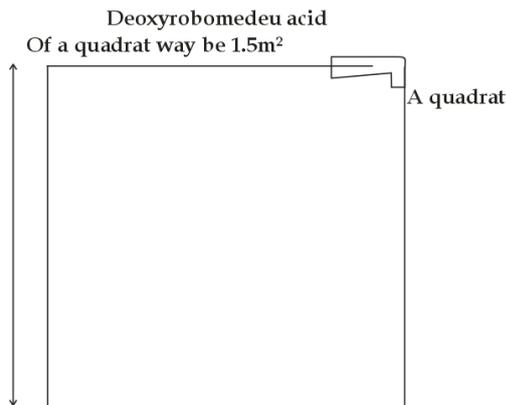
1. **Natality (Birth Rate):** It refers to the rate of giving birth to new organisms. It leads to an increase in population.
2. **Mortality (Death Rate):** It refers to the rate at which organisms die in a habitat. This leads to a decrease in population.
3. **Immigration (dispersal):** It is the movement of organisms from one habitat into a new habitat. This tends to increase the population of the new area.
4. **Emigration:** This is the movement of organisms out of a habitat due to either scarcity of food or unfavourable conditions or for breeding purposes. This decreases the population of that habitat.
5. **Availability of Food:** This increases the population of that habitat through a rapid rate of reproduction and other organisms coming into the area.
6. **Seasonal Climatic Changes:** Unfavourable climatic changes usually result in the decrease of population since most organisms may die or migrate out of the habitat.
7. **Breeding Periods:** Most of the organisms' movements in a habitat during the breeding period of a season, thereby the population of the habitat.
8. **Natural Disaster:** Natural disasters like flood, fire, drought, earthquake may lead to a decrease in population as many organisms may die or move to a new area.

Method of Population Studies

Population studies of sampling, method.

This can easily be carried out in a habitat especially in terrestrial habitat by sampling method making use of an instrument called the quadrates.

A quadrat is made of a square or rectangular frame, plastic, wooden or metal frame with predetermined area for example, the area of a quadrat may be 1.6m².



How to Conduct Population Studies

The population size and population density of a particular species in a terrestrial habitat can be estimated by the following procedures.

1. Choose and locate the sample plot
2. Then identify the species in the plot
3. Measures the area with a measuring tape to know the area of the habitat
4. Throw or toss the quadrat randomly at interval for up to 10 times or above
5. After each throw or toss, the number of species within the area of quadrat is recorded
6. The density of species is calculated by dividing the average number of times the pieces occur within the quadrat by the area of the quadrat. The calculation can be looked out this way:
 - a. Frequency of species = $\frac{x}{y}$
 - b. Number of tosses = 10
 - c. Average number of species per quadrat = $\frac{x}{\frac{y}{10}} = z$
 - d. Area of a quadrat = 1m
 - e. Density = 2

Area of Habitat

Estimation of population using the transect method

The tape should be stretched with marking at intervals. The plants at various intervals are recorded. This procedure is repeated number of times until an accurate estimate of the number and types of plants in the habitat are obtained.

Ecological Factors

Ecological factors are those factors in the environment which can influence living organisms or cause changes in any habitat.

Ecological Factors are grouped into two categories

Biotic Factors

1. **Competition:** This involves the interactions between two organisms of the same species or different species in which one outgrows the other and survive while the other cannot grow nor survive.
2. **Parasitism:** This is a close association between two organisms in which one called the parasite lives in or on and feed at the expense of the other organisms called the host the parasite benefits from the association, while the host usually suffers harm or even dies.
3. **Commensalism:** This is an association between two organisms in which only one (the commensal) benefits from the association while other is neither benefited nor harmed.
4. **Predation:** This is the type of association between two organism which the predators kill the other called the prey and feeds directly on it.
5. **Pathogens:** These are micro organisms which can cause disease in plants and animals, leading to their reduction through death.
6. **Mortality:** This is the death rate of organisms in an environment. It reduces the population of organisms in any habitat.
7. **Migration:** It is the movement of organisms either into a new habitat or out of a habitat. These movement usually have effect on the other organisms inhabiting that habitat.

8. **Dispersal:** This is the spreading of new individuals from their parents to new habitat so as to start a new life in the new environment.
9. **Natality:** This is the rate of giving birth to new offspring. It increase the population of the habitat which will lead to certain problems among the organisms in that habitat.
10. **Food:** Availability of food in a habitat can lead to increase in population, co-rule lack of food leads to starvation and death.
11. **Disease:** Disease are known to reduce the population of organisms in any habitat.
12. **Pests:** Pests are known to affect the yield and growth of plants. In some cases, the plants may even die.

ABOTIC FACTORS

Those factors comprises the following:

1. **Climate Factors:** These are temperature, rainfall, wind, pressure sunlight or sunshine, humidity etc.
2. **Chemical Factors:** These are made up of oxygen, carbondioxide, mineral salts, water and nitrogen.
3. **Edaptic Factors:** Those include soil, its water, chemical and physical composition, its PH, its nutrients, profile, structure and texture.
4. **Topographic Factors:** These are caused as a result of the shape of the soil. This surface e.g effects of rivers, rains, mountains and valley.

Ecological factors common to all habitat both aquatic and terrestrial habitat

These factors include:

1. Temperature
2. Rainfall
3. Light
4. Wind
5. Pressure
6. Hydrogen ion concentration (PH)

Ecological Factors common to Aquatic Habitat

Factors affecting or common to aquatic habitat are:

1. Temperature
2. Rainfall
3. Wind
4. Light
5. Pressure
6. Hydrogen ion concentration.
7. **Salinity:** It is defined as the degree of saltiness or concentration of salt solution in water. Salinity is low in fresh water high in sea water and moderate in brackish water. Aquatic organism need to maintain the osmotic balance in the body fluids and their aquatic surroundings to survive
8. **Turbidity/Transparency:** It is caused as a result of suspended materials in water. Clear water has low turbidity. Turbidity is influenced by season it higher during the raining season than in dry season. Turbidity reduces light penetration into the water resulting in the inability of aquatic green plants to carry out photosynthesis and it causes population.
9. **Dissolved Gases:** Dissolved gases in this case refers to oxygen concentration in water – oxygen is required by most aquatic organisms for respiration. It is also required to the decaying of organic substance.
10. **Density:** The density of water varies with the type of aquatic habitats. The density of pure fresh water is 1.00 while that of sea water is 1.028 at atmospheric pressure of 0°C.
11. **Currents:** Water currents increase Aeration and the turbidity of the water. It also affects the distribution of aquatic organisms the types of organisms found in an aquatic habitat is affected by speed of water current.
12. **Tidal Movement and Waves:** This affects the organisms in certain level of the water attach themselves to substances or may even live in burrow. Some may possess hard body cover to prevent evaporation of water from their bodies, in open sea, waves causes the aeration of the surface waters enabling aquatic organisms to have sufficient supply or dissolved gases for their respiration.

Ecological Factors common to Terrestrial

Habitat factors affecting or common to terrestrial habitat are:

1. Temperature
2. Rainfall
3. Wind
4. Light
5. Pressure

6. Hydrogen ion concentration (PH)
7. **Relative Humidity:** This is the amount of water vapour in the air. It results in the formation of water relativity affects the performance of plants and animals and also determines their distribution. It also determines the type of crops given in an area.
8. **Edaphic or soil Factors:**
 - a. **Soil Type:** This type of soil determines the fertility of the soil. It also determines the type of vegetation found in an area. Soil type defines the type of crops to be grown. The equality determines the porosity and water retaining capacity.
 - b. **Soil Texture:** It refers to the arrangement of the van of particles in soil. It determines the fertility of the soil and it's water retaining capacity. It also affects the level of soil organisms as well as the level aeration and percolation.
 - c. **Moisture Constants:** This is the amount of water available in the soil. It affects the type of vegetation of an area, the distribution of plants and animals. It also determines the fertility of the soil as well as the growth of plants or the habitat.
8. **Topographic Factors or land Surface:** This include:
 - a. **Eleraton:** This refers to the height of the land and a bore the sea levevation attacks the growth of plants and the level of erosion in an area. It also determines the distribution of plants and animals.
 - b. **Types of Drainage:** This is the removal of excess water from the soil. It acts the availability of water in the soil and determines leads to soil erosion and poor growth of plant.
 - c. **Degree of Exposure:** The degree of exposure of the land is affected by fall and vegetation cover how decrees ensure the availability of nutrient to plants and the distribution of plants and animals. It also has effect and evaporation.

SOIL

Soil is defined as the upper most layer of the earth's crust which provides support and nutrients for plant growth.

There are three main types of soil these are:

1. Sandy Soil
2. Clay Soil
3. Loamy Soil.

1. **Sandy Soil:** Soil is said to be sandy, the proportion of sand particles in the sample of the soil is very high.

Properties of Sandy Soil

1. Sandy soil is worse, grained and gritscky
2. It is loose with large pore spaces
3. It absorbs and looses water easily
4. It is not stocky when wet hence, it cannot form a castile for ribbon
5. It is well aerated with low water holding capacity.
6. Percolation in sandy soil is high but capillarity is low.
7. Sandy soil heats up easily during the day and cools down quickly during the night.
8. It supports leaching hence, it is low in plant nutrients.
9. It does not support water logging and erosion
10. Sandy soil is low in plant nutrient, hence, it does not support crop activation
11. It is brownish in colour.

2. **Clay soil:** Soil is said to be clay e.g of the proportion of clay in a simple of the soil is very high

Properties of Clay Soil

1. Clay particles are fine, powder and smooth when dry.
2. The particles are sticky and mouldy when wet
3. The particles are tightly bound together with little pore spaces
4. The structured is granuer and does not loose water easily
5. It is poorly aerated with high water holding capacity
6. Percolation in clay soil is low but capillarity is high
7. It does not support leaching hence, it contains plant nutrient
8. It is hard when dry and sticky when wet.
9. It can easily for a ribbon or Castile when mantled.
10. It supports water logging and erosion
11. It has a brownish or reddish colour.

3. **Loamy Soil:** Loamy soil is a mixture of sand and clay particle with high proportions of organic matters.

Properties of Loamy Soil

1. Loamy soil is moist, loose with moderate sized pore spaces
2. The structures breaks easily when wet and friable when dry
3. It has non-powdery and non-sticky texture
4. It can easily be cooked on or cultivated.
5. It contains dots of organic matter (humus)
6. It is well aerated and it can hold water
7. It does not support, erosion and water logging
8. It contains plant nutrient, hence, it is the best soil for cultivating crops.
9. It is dark, brown or black in colour.

Effects of Sandy Soil on Vegetation

Sandy soil is low in plant nutrients as a result of high level of leaching hence, it supports scarcity vegetation or fross land.

Effects of Loamy Soil on Vegetation

Loamy soil is fertile and contains plant nutrients. It is the best soil in which plants can grow. Loamy soil supports nutrient, vegetation such as forest.

Effects of Clay Soil on Vegetation.

Clay soil has little ability to retain plant nutrient, hence, it can support high vegetation such as savanna or shrub.

1. Sandy soil supports a desert type of vegetation which involves plant that need very little water or nutrient e.g cactus.
2. Loamy soil supports a type of vegetation that involves plant that needs very high quantity of water and nutrients e.g trees.

Factors that may affect Water Holding Capacity of Soil

- ✓ Size of soil particles
- ✓ Temperature
- ✓ Amount of rainfall

Relationship between Soil Types and Water Holding Capacity of Soil on Vegetation

To compare water holding / retaining capacity of sandy, loamy and clay soil

Apparatus: Filter funnel, cotton wool, measuring cylinder, water etc.

Method: The three samples of soil:- Sandy, Loamy and Clay are put in a filter funnel each and the funnel is put in a measuring cylinder as shown in the diagram below. Then water is poured into each funnel. Water is allowed to draw through as completed as possible until no more drops are noticed. The volume of water in each cylinder is read off.

Derivation: It is noticed that more water has drained through the sandy and the less water through the loamy soil, the least water is through the clay soil.

Conclusion: Sandy soil is porous because of its larger particles, while organic matter and larger pore spaces. Clay soil is least because it has a very fine particles of moderate air spaces, more organic matter slightly particles than clay.

Measurement: If 60cm^3 of water is poured equally into different funnels containing sandy, loamy and clay soils, 50cm^3 of water drains out of sandy soil, 40cm^3 drains out of loamy soil while 30cm^3 drains out of clay soil.

Calculation

Of drainage or porosity

More water (50cm^3) drains out of sandy soil followed by loamy soil (40cm^3) while clay soil experienced drainage of (30cm^3 of water). Before porosity is highest in sandy soil because of large pore spaces drained larger particle sizes, followed by loamy soil while clay soil has the most drainage because of its tiny pore spaces and fine particles of water holding capacity.

Amount of water poured into funnel = 60cm^3 .

Sandy soil = $(60 - 50)\text{cm}^3 + 10\text{cm}^3$.

15cm^3 of water is retained in sandy soil

Loamy soil - $(60 - 40)\text{cm}^3 = 20\text{cm}^3$

Clay soil - $(60 - 20)\text{cm}^3 = 30\text{cm}^3$

Note: Loamy soil is likely to retain more water than clay soil, if it retains large quantity of organic matter and if the experiment is allocated to stay for over two hours.

Ecological factors that require measurement are rainfall, temperature, relative humidity, pressure, light, PH, turgidity, depth of coat slope, etc.

	Instrument	Function/Uses.
1	Ran guage	Used for measuring the amount of rainfall
2	Minimum and maximum mecury in glass thermometer	Used to measure the lowest and highest temperature of the day.
3	Anemometer	Used for measuring the speed of wind
4		Used to indicate the direction of wind
5	Hygrometer	This is used to measure relative humidity
6	Barometer	For pressure measure
7	Photometr or lightmeter	Used to measure light intensity on land
8	Hydrophotometer	Used to measure
9	Calorimeter or PH indicator	Used to measure acidity or alkalinity of soil or solution.
10	Tull green funnel	Used for comparing the numbers and types of animals in different soil examples
11	Baemam funnel	Used for collecting tiny organisms that lives in soil water
12	Selehidibe	Used for measuring the turgidity or transparency of water.
13	Tape	Used for measuring height and length of objects
14	Depth guage or depth meter	Used for measuring the depths of turning or standing water.
15	Themography	Used for long period recording of temperature and relative humidity
16	Meter rule	Used for measuring the length of object

17	Slope guage	Used for measuring the slope of area of land
18	Water speed meter	Used for measuring the speed of water flow

An ecosystem is a basic functioning unit in nature. It is made up of living organisms (plants and animals) and the non-living environment. The biotic or living component environment resulting in the ecosystem being a fiction unit.

Autotrophy, Heterotrophy and Decomposers.

Autotrophy: These are organisms (green plants and some bacteria) which can use lights or chemicals to manufacture their food from organic substances, during the process of photosynthesis. Autotrophy are organisms capable of synthesis their own food, hence they are called **Prochicts**. Autotrophy, provide for the other organisms in the habitat. Terrestrial examples of autotrophy are grasses, trees and shrubs while aquatic autotrophy are grasses, trees and shrubs while aquatic autotrophy are phytoplankton’s, water hyacinths, sea weeds, etc.

Heterotrophy: These are organisms which cannot manufacture their own food but depend directly on plants for their food, hence they are called **Consumers**. Animals that feed directly on green plants (producers) are called herbivores or primary consumers are called carnivores or secondary consumers. Animals that feed on primary consumers (carnivores) are called tertiary consumers. Heterotrophy includes all animals’ carnivores, plants, fungi and some bacteria.

Organisms: They include all holozoic organisms such as herbivores, carnivores, omnivorous, decomposers and parasite. Some examples of consumers or heterotrophy is a terrestrial ecosystem are caterpillars, cow, dog, lion, include water fleas, tadpoles, larvae of insects and fishes.

Decomposers: These are organisms that feed on dead organisms and other decaying organic materials. Decomposers help to breakdown dead organic matter and release simple chemical compounds which plants

can absorb and use again. Examples of decomposers are insects such as: termite, larvae of housefly, bacteria and fungi.

Food Chain: This can be defined as a linear feeding relationship involving the transfer of energy through food from producers to consumers.

Examples of food chains in a terrestrial habitats are:

1. Guinea grass => Grasshopper => snake => hawk
(Producer) (Primary consumer) (Secondary consumer) (Tertiary consumer)
Grass => Antelope => Lion
(Producer) (Primary consumer) (Secondary consumer)

Food chain usually begins with a producer (green plant) that is fed on by a herbivores (Primary consumer) which is in turn fed on by snake and the snake is fed on by a bigger carnivore, such as the hawk.

E.g of a food chain in aquatic habitat

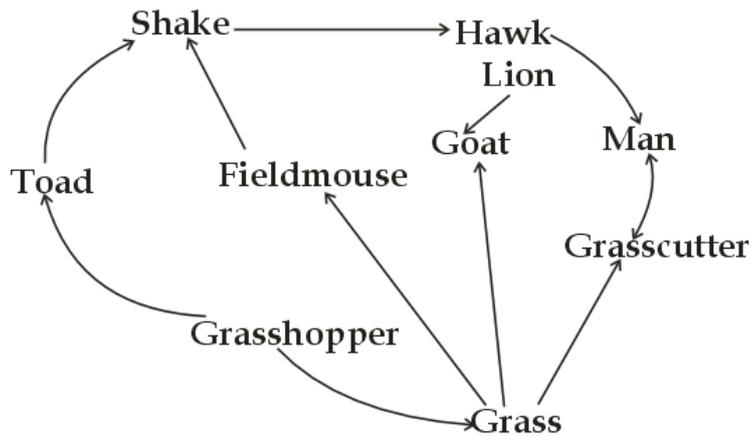
Diatoms => Mosquito larvae => Tilapia fish => lesloha
(Producer) (Primary consumer) (Secondary consumer) (Tertiary consumer)

During the process which occurs in food chain, food energy is transferred from one organism to another in a linear form. The arrow shows that direction in which the food is being transferred even though most food chains begin with producers. There are few examples that start with dead plants animals, e.g

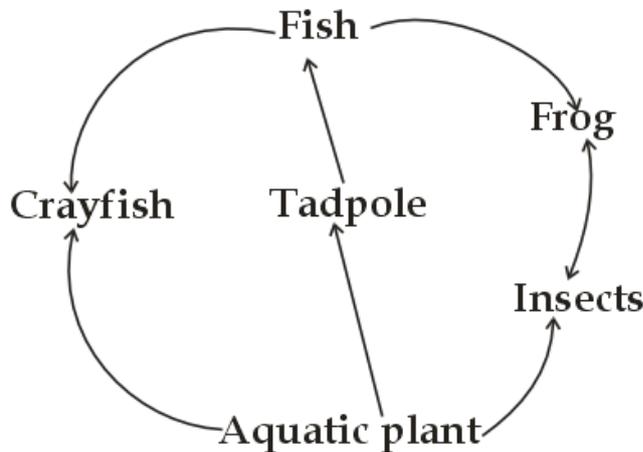
Humus => earthworm => Domestic => man => fowl

Food Web: This is defined as a complex feeding relationship among organisms in the same environment with two or more inter related food chains. The feeding relationships are more complicated because a single plant could be fed upon by more than one or two organisms. When a consumer feeds on different types of plant or animals in a food web. It has a better chance of survival in its ecosystem.

e.g of food in terrestrial habitat



e.g of food chain in an aquatic habitat



Differences between food chain and food web

	Food Chain	Food Web
1	It is a linear feeding relationship	It is a complex food relationship
2	It involves fewer organisms	It involves many organisms
3	It involves one food chain	It involves two or more food chains
4	Organisms have lesser chance of survival	Organisms have greater chance of survival

TROPHIC LEVEL

Trophic level can be also called feeding level. It is defined as the feeding level or each stage in a food chain or food web or trophic level is the number of links by which food energy is transformed from producers to final consumers. Examples of trophic level

Guinea Grass => Grasshopper => Toad => Lizard => hawk
 (1st Trophic) (2nd Trophic) (3rd Trophic) (4th trophic) (5th Trophic)
 Level Level Level Level Level

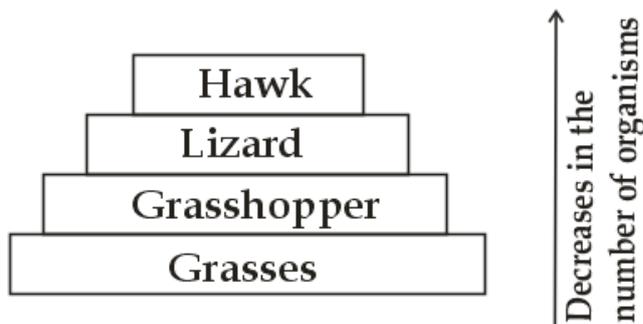
There are five trophic or feeding levels. These are five links by which energy is transformed from producers to final consumers.

Grass => Goat => Man
 (1st Trophic) (2nd Trophic) (3rd Trophic)
 Level Level Level

PYRAMID OF NUMBERS

To refers to the number of individual organisms at each trophic level which increase progressively from the first to the last trophic level in a food chain. Pyramid is a diagrammatic representation of food chain which producers from the apex in a food chain in food web, there are relative number of organisms decreased progressively from the first to the last trophic level.

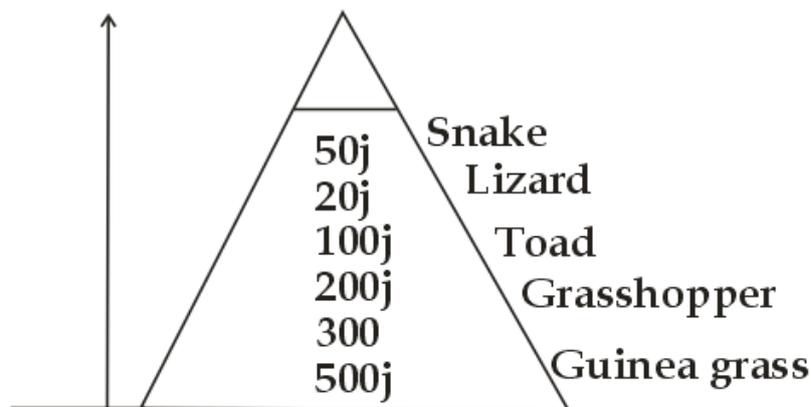
For example: Grasses => Grasshopper => Lizard => Hawk.
 The number of grasses eaten by a grasses eaten by a grasshopper is greater than the number of a grasshopper while the number of grasshopper eaten by lizards and finally the number of hawks eaten by lizards is greater than the numbers of hawks from the explanation, discover that there is a progressive decreases in the number of organisms from the first to the last trophic level. Trodigrammatic representation of this progressive decrease in the number of organisms, along the food chain is called pyramid of number.



PYRAMID OF ENERGY

This is defined as the act of energy present on the living organisms at different trophic levels of food chain, in other words the pyramid of energy represents a progressive decrease in energy from the first trophic level to the least trophic level.

In a food chain or web. Just like the pyramid of number the product at the first trophic level in an most of the energy. Just like the pyramid of number, the product at the first trophic level in an most of the energy. Just like the pyramid of numbers, the producers as in grasses from the apex, energy decreases from the base of pyramid in the apex.



PYRAID OF BIOMASS

This refers to the total wet or dry mass of the organism in each trophic level. To construct a pyramid of biomass the organism in a given area of the habitat are first counted and weighed. Then the total wet of biomass of the organisms in each trophic level is obtained from this data. Each horizontal bar in the pyramid therefore represents the total biomass of the organism all that trophic level in grains.

Per square meter (g/m^2) of the habitat biomass takes into account both the size of the individual organisms and their numbers. This is a pyramid of biomass gives a more accurate picture of the relative or srup between the organisms all the various trophic levels in a food chain than a pyramid of numbers most pyraid of biomass is weight.

FUNCTIONAL ECOSYSTEM

The energy from the sun passes through food chains, however only a small portion of the sun energy gets into the bodies of the final consumers. The rest of the energy is lost as heat along the food chain. This progressive loss of energy at each level of a food chain puts a natural limit on the total weight of living matter that can exist at each level that can exist at each level in autotrophy. The loss in energy affects primary production because there is loss of photosynthesis which affects the plants.

In ecosystem energy is lost through the vegetation soil, air, heat, evaporation of water, wind, only about 1.15% of the solar energy may be available to photosynthesis producer in most ecosystem.

ENERGY TRANSFORMATION IN NATURE

Energy exists in various forms.

These forms of energy are invertebrate that is one form of energy, can be transformed into another form. Such energy information are generated by the law of the thermodynamic in nature. Energy transformation is brought about by living organism their activities cause energy to flow through the ecosystem. The sun is the ultimate and external source of energy for ecosystem. The sun is the ultimate and external source of energy for ecosystem one aim.

LAW OF THERMODYNAMICS

There are two laws of thermodynamic.

- a. First law of thermodynamics
- b. Second law of thermodynamics

First law of Thermodynamics state that energy can neither be created nor destroyed in other words, the law state that energy can neither be created nor destroyed although it can be changed from one form to another.

Second law of thermodynamics states that in any conversions of energy from one form to another, there is always a decrease in the amount of

useful energy put in another way. The law states that transformation of energy from one state to another is ever low percent efficient.

ENERGY FLOW

- a. **Using the first Law:** As the producers convert the solar energy to use for energy this energy is progressively transformed from one trophic level to the next and so on. This means energy flows from producers to primary consumers, then to secondary consumers in a food chain. So the flow of energy in a food chain is one direction only.
- b. **Using the Second Law:** The transfer energy between trophic level is number 100%. It is not completely transferred successive levels have less and useful energy and support fewer organisms, an individual lives primary producers or plants have the highest amount of energy. When herbivores feed on plants. The energy level is reduced when carnivores consumer the herbivores, the energy level for the reduces.

RELEVANCE OF BIOLOGY TO AGRICULTURE

Biology and agriculture are closely related subject as both deal with plants and animals. Agriculture involves the growing of crops and rearing of animals for man's use. Biology on the other hand involves the study of plants and animals. Biology in many way have relevance to agriculture.

CLASSIFICATION OF PLANTS

Plants are generally classified based on three major. These are:

1. Botanical Classification
2. Agricultural Classification
3. Classification base on life cycle

BOTANICAL CLASSIFICATION OF PLANTS

Plants can be classified into:

1. Bryophytes examples – mosses and live warts
2. Lycophytes examples – club mosses
3. ptenodphytes examples – fern

4. Gymnosperms e.g palm like cycads, ginkgoes, gnetophytes and coniferous trees, such as pines, spruce and fir.
5. Angiosperm example includes all flowering plants:

AGRICULTURAL CLASSIFICATION OF PLANTS

In this classification, crops or plants are grouped into the following categories based on their uses. These include:

1. **Cereal Plants:** The plants belong to the grass family, guinea corn, wheat, barley, oats, etc.
2. **Pulses (grain legumes):** Pulses are crops which provide proteins for man and animals when eaten e.g cowpea, soybeans, groundnut, beans, pigeon pea, etc.
3. **Roots and tuber crops:** These crops produce tubers and they provide carbohydrate to human and animals when eaten e.g cassava, yam, cocoyam, sweet potatoes, Irish potatoes, carrot, etc.
4. **Vegetable Crops:** These crops provide vitamins and mineral salts to human and animals when consumed e.g tomatoes, amaranths, okra, spinach, bitter leaf, water leaf.
5. **Fruit Plants:** Fruit plants also provide vitamins and mineral salts to human and animals when consumed e.g orange, banana, pineapples, mango, paw-paw, cashew etc.
6. **Beverage Plants:** These crop plants provide food drinks when processed into finished products like bournvita, ovaltine, prosto, etc examples of beverages are cocoa, coffee, tea, kola, etc.
7. **Spices:** These crop plants provide vitamins and mineral salts to man and animals when consumed e.g ginger, peppers, onion, etc.
8. **Oil Plants:** Oil plants can provide oil when processed both for domestic and industrial uses. E.g oil palm groundnut, melon, coconut, soybeans, cotton etc.
9. **Fibre Crops:** These are crop plants used for making clothing materials, ropes and bags, e.g cotton, sisal, hemp, hibiscus.
10. **Latex Crops:** These are crops which provide some white sticky liquid (latex) used in plastic industries e.g rubber.

Classification of plants based on life cycle

Plant are usually grouped into three categories based on life cycle or the life span of the crop plants or the number of years, a plant is able to grow, mature and produce fruit. The groups are:

1. **ANUALS:** Annuals are plants which complete their life cycle in one season. In other words, the plants grow, mature, produce fruits and die within one year, examples of annual plants are maize, rice, cowpea, millet, vegetables, cotton, groundnut, etc.
2. **BIENNIALS:** These are plants which complete their life cycles within two years. These plants develop their vegetative parts during the second years. Examples of biennials plants are pepper, carrot, onion, ginger, etc.
3. **PERENNIALS:** Perennial plants grow, mature and produce fruits for more than two years. In this case, some plants can live for three, five, ten or even on twenty years. Examples of perennials plants are cocoa, banana, orange, oil palm, mango, rubber etc.

EFFECTS OF AGRICULTURAL ACTIVITIES ON ECOLOGICAL SYSTEM

- A. **Bush burning:** This involves the setting of fire on the post to the root of the vegetation.

EFFECTS OF BUSH BURNING

1. It leads to killing of some plants and animals
 2. It exposes the soil to erosion and leaching
 3. The atmosphere is polluted with smoke
 4. Many micro-organisms are killed
 5. Burning of bush destroys the organic matter in the soil
 6. It encourages sprouting
 7. It reduces the water holding capacity of the soil
- B. **Tillage:** This is the process of loosening the soil after the vegetation on a piece of land had been cleared. Tilling may be carried out using ploughs, spades or machines.

Effects of Tillage

1. Tillage exposes soil organisms and may kill some
2. It helps to loosen the soil
3. Tillage encourages leaching
4. It exposes the soil to erosion
5. Tillage also improves the aeration of soil

- C. **Application of Fertilizers:** It involves the application of certain chemicals or substances into the soil to improve it's fertility.

Effects of Fertilizer Application

1. It affects the life of plants and animals
2. It stimulates vegetative growth, hence it reduces soil erosion
3. It's nutrients content of the soil
4. Fertilizer increases the porosity of the soil
5. Fertilizer increases the population of micro-organisms in the soil

- D. **Application of Pesticides/herbicides:** Pesticides are chemical that are applied to plants to control pest while herbicides are chemicals that are used to kill weeds. The usually do not harm the crops that are being grown.

Effects of Pesticides and Herbicides Application

1. Exercise use of pesticides may destroy the crop plants.
2. Pesticides application can cause pollution of the environment
3. When such chemicals are washed into rivers and lakes, they can cause the death of aquatic animals.
4. It reduces the population of the insects.
5. Herbicides can persist for a long time in the soil and may be very toxic to other plants or animals.
6. The leaching of herbicides involve sources is harmful to aquatic animals.
7. The continues use of herbicides with the same mode of action may also generate herbicide resistant weeds.

- E. **Overgrazing:** This is a situation where more animals can be supported on a particular pasture are put there to graze in other hands, overgrazing is a way of exceeding the carrying capacity of the soil.

Effects of Overgrazing

1. Overgrazing destroys the soil structure
2. Fertility is dropped which could improve the fertility of the soil
3. It exposes the soil to erosion
4. It removes the vegetative cover of the soil
5. Weeds can easily be eradicated on such lands.

- F. **Clean or Bush Clearing:** This is the practice whereby the whole vegetation is cleared and removed thus leaving the land clean.

Effects of Clean or Bush Clearing

1. It leads to reduction of organic matter content of the soil
2. It exposes the soil to direct sunshine, hence it affects evaporation of water
3. It gets rid of weeds on the land
4. It leads to the removal of the rich top soil
5. It leads to reduction of soil organisms

- G. **Deforestation:** It is the continuous removal of forest stands (trees) either by bush burning or indiscriminate felling without replacing them.

Effects of Deforestation

1. It reduces the humus content of the soil
2. It reduces the population of soil life in the area
3. It encourages soil erosion
4. It results in loss of soil nutrient through leaching and erosion
5. Deforestation leads to desertification as sand particles are more likely to be eroded in areas without trees.

Effects on different types of forming an ecological system

- A. **Shifting Cultivation:** This involves planting crops on a plot of land for certain period of time. This is followed by a period of rest to allow the land to recover.

Effects of Shifting Cultivation

1. It destroys the activities of useful micro-organisms
2. Shifting cultivation waste valuable land
3. It destroys valuable plants and animals in the area

- B. **Crop Rotation:** It involves the use of the same plot of land to cultivate different crops in a planned, successive order.

Effects of Crop Rotation

1. It adds nutrients to the soil through the addition of leguminous crop in the rotation
2. Crop rotation controls erosion.
3. It also helps to control diseases
4. It controls the growth of weeds.

- C. **Monocropping:** This involves growing one type of crop on the same plot of land every year.

Effects of Monocropping

1. Monocropping depletes the soil of its nutrients
2. It increases the activities of the pests.
3. Such pest reduces the food and population of other animals
4. Monocropping provides abundant food for pests from the cultivated crop
5. It increase the population of pest.

Effect of Mixed Cropping

1. It reduces the growth of weed
2. It leads to higher yield of crops
3. It increases the fertility of the soil

4. There is a livelihood of crops being wiped out by adverse either conditions, diseases and pests.
5. There is possibility of competition between plants
6. There is need for proper nutrient management and the risk of damaging one type of crop when another types of crop is harvested.

E. **Pastoral Farming:** This is the rearing of livestock without the cultivation of crops. Pastoral farming can be of two types. Nomadic herding is in which animals are moved from one place to another. In search of pasture, a ranching, where animals are kept in continued areas of land.

Effect of Pastoral Farming

1. There is lack of diversification and low returns during times of disease outbreaks
2. In nomadic herding, overgrazing can destroy large areas of pasture and lead to desertification

F. **Mixed Farming:** It is the rearing of livestock together with the cultivation of crops on the same farms.

Effect of Mixed Farming

1. Pest may be built up in the land
2. Mixed farming adds nutrient to the soil through dungs produced by animals
3. Cultivated crops may be eaten up by animals
4. Diseases may also build up in the land
5. Mixed farming increase the use of available land

PESTS AND DISEASE OF AGRICULTURAL IMPORTANCE

Pests can be defined as any organism that causes harm, such as damaging crops and causing diseases in livestock and human.

Pests and Diseases of Livestock.

Farm animals include cattle, poultry, sheep, horses and pig, most pests of farm animals (ectoparasities) are vectors that carry disease causing endoparasities are vectors that carry disease causing endoparasites feed on the blood of animals which serve as their host.

	Diseases	Causative Agent	Affected Livestock	Effects on Toads	Control
1	Nagana	Trypanosome (protozoa) transmitted by tse-tse fly	Cattle, sheep	Body weakness, intermitted fever, progressive anatine, poor milk and meat producer.	Kill tse-tse fly with insecticides breed resistant, eliminate criminal that are host of parasite, clear breeding area of tse-tse fly, kill trypanosome with trypanism.
2	Pingiodrm	Trichoptytoncysm fungi	Cattle, sheep, goat	Formation of scars on the skin	Vaccinate the animals and disinfect environment
3	Fasalinns	Liver flukes (nematodes)	Cattle, sheep, goat	Damage the live of affect apomal, loss of blood, as it in anaemia, loss of meat	Fence off streams and ponds
4	Anthrax	Baccillus anteralis (bactasnim)	Cattle, Sheep, goad	Difficulty in breathing former of body, suredling in some part of the body, bleeding	- Vaccinate the animals threat infected animals with antibiotics studies penicillin. - Quarantine infected animals destroy the car cases of infected

				from body opening	animals and disinfect the ground thoroughly
5	Pinder pest	Pinder Pest Virus	Cattle, sheep, goat	Fever, severed diarrheal	- Vaccinate the animate - quarantine the infected animals
6	New castle disease	New disease virus through exposure to contaminated discharges of birds of contaminated feed.	Poultry	-Reduced appetite, - Difficulty in breathing, - nervousness, -yellowish and green diarrhoeass	- vaccinate the animals regularly - Clean and disinfect already where poultry are kept - Destroy the carcass of infected birds and disinfect the ground thoroughly

PESTS AND DISEASES OF AGRICULTURAL IMPORTANCE

1. **TSE-TES FLY** and Trypanosome: The tse-tse fly carries transmits the protozoan, trypanosome which cause the diseases. Iragona in farm animals, such as cattle. The trypanosome is an endoparasite that spends part of its life on the tse-tse fly and develops into the adult in the body of a livestock animals.

Note: Trypanosome infects humans and causes trypanosomeiasis also known as sleeping disease.

LIFE CYCLE OF TSE-TSE FLY

A single egg is fertilized and hatches to become a larva in the body of the female tse-tse fly. The fully developed larva is then deposited in the soil of a shady area where it borrows into the ground to forms a pupa. The adult fly will emerge from the pupa after 21 days.

When a tse-tse fly feeds on the blood of an infected animals, the trypanosome parasites are taken into the body of tse-tse fly where they multiply.

Life Cycle of Trypanosome

The life cycle of trypanosome alternates between as primary insect host (tsetsefly) and a secondary vertebrate host. It can be transmitted to farm animals through the bite of an infected tse-tse fly. The trypanosome parasites enter the vertebrates blood stream and multiply rapidly. They then move to other parts of the body such as the lymph nodes and central nervous system where they cause damage.

CONTROL

Tse-tse fly can be controlled by spraying the insects with insecticides livestock that are earners of the parasite can also be called **Bush land**, that as breeding grounds for the tse-tsefly should be cleared.

Trypanocidal drugs can be used to kill the trypanosome parasites.

LIVER FLUKE

Liver Fluke is an endoparasite which is also a flatworm that lives in the bile ducts of animals and causes the disease **Fascitigasis**. Farm animals such as cattle and sheep are being infected by liver fluke

The symptoms of infection include:

1. The presence of pale mucous membranes
2. Weight loss
3. Swelling under the chain of the animals

Life Cycle of Liver Fluke

The liver fluke lives in two hosts. The vertebrate animals (primary host) and the water snail (secondary host). It reproduces sexually in the primary host such as a sheep. The fertilized eggs are then passed out of the sheep's body. They develop into small ciliated larvae called **Milicides**. That infects a secondary host the fresh water snail. These larvae reproduce in the snail to form motile worms called **Cercariae**. These worms are able to swim to the edge of the water, where they attach to grass as a plant. The cercaria forms a tough water, where they attach to grass as a plant. The cercaria forms a tough water covering known as a cyst, which prevents dehydration. When a sheep drinks the water or feeds on the grass infected with cysts, the worms enter the body of the sheep. The borrow through the walls of the goat to attack the liver

and bile duct, where they develop into adult flukes. During this period of time, they suck blood from the lining of the bile duct and impair the function of the liner. In more severe cases, haemorrhage and liver damage can occur, leading to the death of the infected host. Sheep infected with flukes show weakness and poor health. They may have a decreased production of milk and produce poor quality fleeces.

CONTROL

1. New cattle to be introduced into a farm can be treated with flukicide to kill any fluke that may be present
2. Infected farm animals can be treated with flukicide and moved to clean pastures
3. Liver fluke can be controlled by fencing off streams or ponds which are the habitats of the fresh water snails
4. The population of snail can be reduced by draining water from affected areas or increasing the flow of water in ponds and streams. This may break the life cycle of the fluke in the snails.

PESTS AND CROPS

Pests that can cause damage to crops include; invertebrates, such as insects and nematodes, as well as vertebrates, such as monkeys, rats, pigs and birds. They can feed on the grain, fruits or roots of the crops. Many insects, pests lay their eggs on various plant parts, which become food for the larvae that hatch from eggs.

The control of vertebrate pests may include driving them away, fencing the farms using crops or introducing natural predators. Sometimes, the shooting of large pests, such as monkeys is necessary.

Diseases of Crops

Micro-organisms such as bacteria, viruses and fungi can resist in crop diseases and lead to great crop losses. Plants infected by these micro-organisms show symptoms which may include.

1. Stunted growth
2. Formation of galls
3. Formation of spots or stripes on the leaves and
4. Yellowing, whitening or curling of the leaves

FOOD PRODUCTION AND STORAGE

Food production can be discussed in three major ways. These include:

- a. Role of government in agricultural production
 - b. Environmental factors required for food production
 - c. Ways of improving crop production
-
- A. Roles of Government in Agricultural Production or ways of which government may increase food production include:
 1. Provision of financial assistance
 2. Provision of effective transportation network
 3. Provision of extension services
 4. Provision of high quality planting materials
 5. Provision of research work
 6. Provision of agro-chemicals
 7. Establishment of river base in development authorities
 8. Provision of storage and processing facilities
 9. Efficient quarantine measures
 10. Provision of tractors and other implements

 - B. Environmental Factors required for food production are grouped into:
 - i. Climatic factors
 - ii. Biotic factors
 - iii. Edaphic factors

(i). Climatic Factors Affecting Agricultural production

1. Rainfall
2. Temperature
3. Wind
4. Sunlight/Sunshine
5. Relative humidity
6. Solar radiation

(ii). Biotic Factors Affecting Agricultural production

1. Soil organisms
2. Pests

3. Parasites
4. Diseases
5. Weeds
6. Predators

(ii). Edaphic Factors Affecting Agricultural production

1. Soil PH
2. Soil texture
3. Soil structure

C. Ways of Improving Food Production

1. Use of good crop varieties
2. Crop improvement methods
3. Adoption of better cultivation methods
4. Control of weeds
5. Use of manures, and fertilizers
6. Proper timing of planting
7. Control of disease of crops
8. Use of resistant varieties
9. Control of pests of crops

THE CAUSES OF FOOD WASTAGE INCLUDE

1. **Late harvesting:** Most food are wasted when they are not harvested at the right time. Then this gives room for pests, diseases including rain to have negative effects on these crops. Thereby leading to food wastage.
2. **Poor Storage Facilities:** Most food produces wasted as a result of lack of storage facilities to store than even when these facilities are available; they may not be enough or may be of inferior quality which will not improve proper storage.
3. **Inadequate Processing Facilities:** Lack of processing facilities have caused most food which should have been processed into finished products to be wasted.

4. **Damage Caused by Pests:** The attack of pests on crops lead to reduction in the quantity of food produced as their activities lead to food wastage.
5. **Damages Caused by Diseases:** Attack of diseases on crops lead to low yield as the action of the diseases are known to waste food.
6. **Bush Burning:** When bush burning is not controlled it may spread to farm lands and destroy cultivated crops which eventually lead to food wastage and shortage
7. **Inadequate Transpiration Facilities:** This may be responsible for wastage as most food produced in vital areas cannot be moved to urban centres as a result of inadequate means of transpiration
8. **Natural Disasters:** Natural disaster like food and drought may cause food wastage as their effects normally reduces the availability of food.

Methods of Preserving and Storing Food

1. **Salting:** This is the dusting of farm products with table salt. Examples includes: meat, fish, etc.

Principles involved / Advantages of Salting.

- a. Salting raises the osmotic concentration of the food
 - b. It removes water from or dehydrates the food
 - c. It increases the taste and flavour of the food
 - d. It prevent the growth and activities of micro-organisms which ay spoil the food.
2. **Freezing / Refrigeration:** This involves the use of old storage facilities like refrigerators and deep freezers to store or preserve certain food such as meat, fish, vegetables, fruit, etc.

Principles involved / Advantages of Refrigeration.

- i. It provides lower temperature within the food.
- ii. Refrigeration slows down biological processes and spoilage.
- iii. Organisms in a food or it renders them in active
- iv. It can kill some of the micro-organisms in food.

3. **Drying / Sun drying:** This involves the drying of some crops or products using the heat from the sun. Examples include fish, eat, groundnut, yam, chips, plantain chips.

Principles involved / Advantages of Drying

- a. Drying removes water or moisture that is, it dehydrates the food
 - b. Treatment prevents normal microbial activities which require water.
 - c. It increases the osmotic concentration of food which kills the spoilage organisms.
4. **Smoking:** It is the drying of some farm product over the smoke of a naked fire. Examples include: meat, fish, groundnuts, tobacco, maize, okro.

Principles involved / Advantages of Smoking

- a. Smoking generates high temperature or heat
 - b. Smoking causes dehydration.
 - c. It also prevents the entry of new micro-organism.
5. **Chemicals:** This involves the use of addition of harmless chemicals to some food. Examples include: cakes, soft drinks, etc.

Principles Involved / Advantages of Chemical Preservation of Food

- a. Chemical suffocates spoiled organisms in food.
 - b. They dehydrate spoilage organisms in food.
 - c. They finally kill the micro-organisms
6. **Heating/Boiling/Frying:** This involves direct heating, boiling, frying or roasting of some farm productions in order to store or preserve them. Examples include: meat, fish, soup, yam, plantain, vegetables etc.

Principles Involved / Advantages of Heating

- a. It generates heat or high temperature.

- b. It increases the osmotic pressure which finally kills the microbes
 - c. The heat produced prevents the entry of new micro-organisms
7. **Irradiation:** This implies the subjection of some food to high temperature energy radiation such as ultra violet rays. Examples include: meat, canned food, seeds, tubers, fruit juice.

Principles Involved / Advantages of Irradiation

- a. It kills micro-organisms in food
 - b. It prevents the entry of micro-organisms into food.
8. **Canning/Boiling:** This involves the storage of processed and consumable food in cans or bottle under special conditions for future consumption. Examples include: fruits, meat, fish, beans.

Principles Involved / Advantages of HeatCanning/Boilingng

- a. It ensures long storage
 - b. It kills micro - organisms gradually in the food.
 - c. It prevents the entrance of new micro-organism.
9. **Pasteurization:** This involves the heating of some food products to about 72°C for about 15 minutes and is immediate cooling for the purpose of storage. Examples include: milk, cheese, beer.

Principles Involved / Advantages of Pasteurization

- a. It raises or generates high temperature
 - b. The high temperature kills the spoilage organisms
- C. Additional Method of storage e.g canning prevents the entrance of new micro-organisms.

FACTORS AFFECTING POPULATION GROWTH

These factors may have positive or negative effects on growth of the population. These factors include:

- i. **Availability of Food:** The availability of food leads to increase in population as human beings are more likely to give birth to more children but lack or shortage of food on the other leads to decrease in population growth.

- ii. **Availability of Water:** This helps to increase the birth of humans thereby increasing population growth. Lack of water either for domestic or industrial purposes also tends to reduce population growth.
- iii. **Natural Disaster:** Natural disaster like earth quakes lead to death of any people which eventually result in low population of the area it occurs.
- iv. **Wars:** Wars between communities and between nations leads to mass death which tend to reduce the population of the areas concerned.
- v. **Birth Rate of Natality:** This lead to increase in population growth rate of all countries
- vi. **Death Rate of Mortality:** This leads to decrease in population growth rate of all nations.
- vii. **Famine:** This reduces the size of population as human beings may die of starvation.
- vii. **Drought:** This leads to low agricultural production and this eventually leads to low population of growth.

Problems Associated with human over population

1. **Pressure on Natural Resources:** Natural resources like fertile farm lands become over exaotied where there is high population growth in an area.
2. **Traffic Congestion:** Many people travel on the roads at the same time and since they are usually many there will be traffic congestion most of the time.
3. **Development of Shrins and Ghettos:** As a result of high population concentration, shrins and ghettos easily develop, they will lead to poor standard of living.
4. **Increase of Crime Rate:** Areas of high population densities and usually associated with high crime rate like armed robbery, car snatching, hired assassins, etc. These may be lack of jobs, hence people result to crime.
5. **Inadequate Housing:** High population concentration leads to poor accommodation as the house available may not be enough for the high population.

6. **Pressure on Social Amenities:** Social amenities like pipe born water, electricity are usually over stressed by the influx of people into an area.
7. **Unemployment/under-employment:** Areas of high population densities usually do not have enough jobs for the ever increasing influx of people. This leads to unemployment and under employment
8. **Insufficient food Supply:** As a result of the high influx of people into an area, there will not be sufficient food supply to cater for the high population. This leads to food shortage especially in developing countries.
9. **Inadequate Health Service:** This is as a result of many cases of diseases outbreak in area of high population concentration.
10. **Environmental pollution:** This is as a result of poor housing pressure on natural and social facilities.

FACTORS AFFECTING THE AVAILABILITY OF FOOD

1. **Disease:** These are known to destroy crop and livestock which leads to low harvest and eventually scarcity of food.
2. **Pests:** Pests are known to destroy crops and these activities reduces yield and cause food shortage
3. **War:** During war, nobody farms since there is no agricultural production during the time of war, food will be scarce and expensive.
4. **Over Population:** This leads naturally to high demand of food, consumption which eventually leads to scarcity and famine.
5. **Poor Storage Facilities:** Most food produced are wasted as a result of lack of storage facilities and this ay leads to shortage.
6. **Drought:** The occurrence of drought in an area leads to how agricultural production and ultimately food shortage.
7. **Flood:** Heavy rainfall causes flood which destroys crops and livestock and this may lead to food shortage.
8. **Bush Burning:** This effects of bush burning reduce agricultural production and also may destroy crops and animals which then results in food shortage.

RELATIONSHIP BETWEEN AVAILABILITY OF FOOD AND HUMAN POPULATION SIZE

Population growth is very closely linked with food availability. When food is readily available the population size can increase. Food shortage cause a shrink in the population size over time, even with increased with rates. Family planning should be encouraged in countries that are facing high birth rates but have low food availability.

Micro-organisms are very small living things that cannot be seen with our naked eyes or micro-organisms are tiny organisms which can be seen with the use of microscope or magnifying lenses. The ranch of biology which deals with the study of micro-organisms is called micro-biology. Organisms are found in the air, water body. (ponds, rivers, streams, oceans) soil, food, clothes on our bodies insides our bodies, etc. Some of the micro-organisms are beneficial harmless while other are harmful which cause diseases and are referred to as pathogens.

TYPES OF GROUPS OF MICRO - ORGANISMS

Micro - organisms include

1. Bacteria
2. Protozoa
3. Viruses
4. Fungi
5. Algae

WAYS THROUGH WHICH MICRO - ORGANISMS ENTER OUR BODIES

1. **Alimentary Tracts through the Mouth:** Micro-organisms pass through the mouth when we eat food that is contaminated or drink contaminated water.
2. **Respiration Tract through the Nose:** Micro organisms pass through the nose to the respiratory tract when we breathe in contaminated air.
3. **Though blood transfusion:** Micro-organisms enter the body through contact e.g blood transfusion

4. **Genital tracts:** Micro-organisms can enter the genital tract for example vaginal opening
5. **Through the anus:** It can also enter the anus since is an opening
6. **Skin through open wounds:** Micro organisms can enter the body through open wounds.
7. **Sexual contact:** Micro-organisms can enter the body through sexual contacts e.g sexual transmitted disease (STDs) like gonorrhoea, syphilis, AIDs, etc.
8. **Birth:** Micro-organisms can enter the body during child birth through ambitious or vaginal cord.
9. By direct contact with the disease e.g chicken pox.

EFFECTS OF MICRO - ORGANISMS OR THE HUMAN BODY

1. The normal body metabolism is disrupted
2. They cause fever (high body temperature)
3. The body is forced to produce antibodies
4. May produce toxins in our body
5. May cause ugly sight like poliomeyhtis
6. They cause diseases which might result to death. They can cause dental cavities (tooth decay), ring worm and athletes foot.
7. At times, they cause the swelling of the lymph nodes.

CARRIERS OF MICRO - ORGANISMS

Carries are agents which have the ability of carrying micro organisms from one place to another. These agents are food, water and air. Animals are living agents which carry micro organisms from one place to another.

An organism that carries a disease causing organisms is a vector. Carriers uses various parts of their body to carry micro-organisms. Examples are: hairy bodies, wings, legs and mouth parts.

The micro-organisms are located in the mouth parts, hairy bodies of insects, legs and abdomen. The table below shows the carriers of micro-organisms, the micro organism they carry and the diseases

TABLE

Other carriers are:

1. **Patients:** Some sick persons are good sources of contacting disease
2. **Healthy Carriers:** Some persons carry disease causing micro - organism without actually suffering it. The tendency is for them to transfer it to another person
3. **Infected Animals:** Contact by man with infected animals can cause diseases
4. **Soil:** Saprophytes in the soil are known to cause a lot of diseases to man.

ECONOMIC IMPORTANCE OF MICRO-ORGANISMS

1. They are used in baking activities e.g the baking of bread
2. Micro-organisms can also help in compose or stage making
3. They are used in making drugs.
4. They are used in tanning of rude and skin
5. They are used in the preparation of vinegar or alcoholic drinks.
6. They help in the maintenance of soil fertility
7. They are used in curing tobacco
8. They are used in the breeding of yeast
9. Micro-organism can cause decomposition or decay or spoilage
10. The can also cause diseases
11. The help in fixing nitrogen into the soil
12. They are used in the fermentation of food e.g cassava, garn etc.
13. They are used in cheese or yoghurt making.

Micro - organisms helps us in nature or agriculture, in medicine and industries especially bacteria and fungi

1. In Nature or Agriculture
 - a. **Nitrogen fixation:** Atmosphere nitrogen is fixed by micro-organisms such as these bacterial. Phizobiu and bacillus radicicola (in the root nodules) and azotobacter and dostridusin (in the soil) fix atmospheric nitrogen into nitrates for plant life.

- b. **Nitrification:** Micro-organisms such as nitrosomonas and nitrobacter make trioxonitrate (v) and (nitrates) available for plants use using ammonia.
- c. Conversion of sewages into harmless forms by decomposition in order to control diseases spread
- d. Micro - organism like bacilli are known to eat up the larvae of mosquitoes. This is a biological control of material spread
- e. Micro - organisms are used in the manufacture of antibiotics used in controlling plants and animals disease.
- f. **Maintenance of soil fertility:** Some of the saprophytic bacterial as a result of their decomposition activities release nutrients into the soil which helps as fertility through nitrogen cycle.
- g. **Digestion of Cellulose:** Some bacterial living in the rumen of nutrient animals like sheep, goat and cattle help these animals to digest cellulose in the rumen
- h. **Compost formation:** The decay of dead organisms and humus by bacterial help in compost formation

2. In Medicine

- a. Micro organisms are used in the manufacture of antibiotics drugs and vaccines. Penicillin and antibiotics extracted from a plant fungus (penicillin) and streptomycin an antibiotic is extracted from a bacterium called streptomy ces grisells
- b. Yeast and certain bacterial are rich sources of vitamin B12 and K
- c. Micro-organisms like some yeast and bacteria are sources of enzymes like amylase and invertare.

3. In Industries

- a. Some micro-organisms like bacterial are used for food processing such as cheese, vinegar and yoghurt
- b. Yeast is used in brewing industries as it is used for the fermentation of sugar to produce alcohol
- c. Micro-organisms are used in the tanning of leather. This is done by the action of bacteria which converts hides and skin to leather during the tanning process.

- d. Some micro organisms like yeast (fungus) is used in baking industries as it causes dough to rise in bread
- e. Bacteria are used in the ripening of tobacco leaves.

HARMFUL EFFECTS OF SOME MICRO-ORGANISMS

1. **Bacterial Disease:** These are diseases caused by bacteria
 - a. Animals diseases caused by bacterial include cholera, bacillary dysentery, tuberculosis, typhoid, fever, leprosy, tetanus, pileumonia, anthrax, gonorrhoea, syphilis, pagile fever, yawds, diphtheria, manumits, and whooping cough.
 - b. Plant disease caused by bacterial includes leafy blight of cassava, cassava wilt, banana wilt, tomato root, galadina, bacteria wilt, yam wilt.
2. **Viral Diseases:** They are disease caused by viruses. Animals disease caused by viruses include. Small pox, influenza, yellow fever, common cold, tacharia, chicken pot, measles, phomyetics, etc. plant disease boundary, to diseases swollen shoot disease.
3. **Protozoa Diseases:** They are diseases caused by fugal.
 - a. Trypanosomiasis, red water, disease coccidiosis, trypanomoniasis.
4. **Fungal Diseases:** These are diseases caused by fungus
 - a. Animal disease caused by fungi includes: ringworm, eezema athlete root, asphergilosis.
 - b. Plant disease: Caused by fungi includes maize, rice, blight, maize rust, leaf - spot, cocoyam black spot, coffee, leaf rust, okro dawipping off on twister disease, rice, smut gummosis, citrus scab, paname disease black sport blast disease, anthrax nose and fredole disease.
5. **Air bone Disease:** These are disease caused by the air they are contracted through the air. They include snail pox, tuber closes, influenza, pneumonia, measles, common cold, meigitos etc.
6. **Water born Diseases:** These are disease carried by water they are attracted through water. These include cholera, typhoid, dysentery, enteric fever etc.

IMMUNITY

Immunity is the ability of the body to resist diseases, immunity is a natural or acquired resistance, provided to anti - biotic to a specific disease.

Immunization is the administration of a vaccine to protect individual, from a particular disease or infection.

Type of Immunity

1. **Natural Immunity:** This is a situation in which an individual pores naturally acquiring antibiotics, which will always kill any organism, that gain entry into the body or its is a situation where by an individual is suffering disease, provide antibodies to combact and neutralizes the effect of the causative organism and control for example when an individual must have suffered from small pox, the body produce anti bodies which resist reoccurring attack in future.
2. **Active Artificial Immunity:** This is done in inoculating the body with a vaccine, in a mild or dead pathogen in infected to the body of any organism, to stimulate the production of antibodies.
3. **Acquired Immunity:** This is a situation whereby substances are introduced to establish a resistance over a disease.
4. **Passilce Artificial Immunity:** In there by are blood strum containing already formed antibodies, is injected to the body to produce an immediate temporal protection. This is used on tetanus treatment.

Control of harmful micro-organism

1. **Use of Disinfectant:** Disinfectants like bad sentities, hytol carbonate should be used regularly to prevent the spread of disease caused by them.
2. **Preserving food by salting:** It is the application of salt on food to kill micro organisms to render them unactive thereby preserving the food
3. **Covering of food always:** Food should be covered always to prevent contact with vectors of disease causing organism.
4. **Meuse of high temperature:** To control micro-organism either through sterilized by boiling or heating food and other products to kill disease causing micro organisms as they are killed or destroyed at the very high temperature.

5. **Use of drug and antibiotics:** Drug or antibiotics can be taken in order to kill micro organisms e.g chlorine is taken to kill malaria parasite (plasmodium)
6. **Personal hygiene:** Such as washing hand before and after every defecation, should be practiced regularly to prevent the spread of pathogenic micro-organism.
7. **Immunization of vaccination:** This is a process whereby a healthy person is inoculated with a preparation, in called vaccine. Vaccination is given to prevent against deadly diseases such as measles, tetanus, tuberculosis etc.
- 8 **Use of antiseptics:** There are chemical that can kill or stop the growth of pathogenic micro-organisms. It is used on cut micro. It is used on wounds on skin to prevent infection by micro-organisms. Examples of antiseptic are dettol, hydrofen, texoxide mixture of iodine and chlorine, water etc.
9. Vectors of disease such as mosquitoes, black flies should be destroyed to the spread of disease caused by the.
10. Health education should be taught to people in order to create awareness and makes people know ways micro-organisms are transmitted and how to prevent them.
11. Quarantine serves or isolation of infected person or animals for evidence of a diseased before he or she mixes with a general population.

PUBLIC HEALTH AUTHORITY

They are responsible for carrying out health scheme they are able to achieve this by working hand in hand with ministry of information in order to send information to the public and at the same time educate them.

1. **Protection of Food:** Food manufactured industry are carried and determined to be fit for consumption by standard organization before it can be consumed
2. **Provision of Clean Water:** Tap waters are made available for the communities as well as bore hole. The water is chlorinated in order to avoid spread of water borne infection.

3. **Control of Diseases:**
 - i. people with infection diseases are kept in special hospital to avoid spread
 - ii. They administer vaccination or inoculation agent small pox, ponoyelitis, measles and yellow fever.
 - iii. Sanitary inspector who go from house to house to make sure that they are in good sanitary condition
 - iv. House are approved by the authority before they are built and effort are made to see that builders comply with that plans
 - v. Sanitary labourers are sent to clean drain and tidy up public like market places.
 - vi. The public is educated on the side effects of configuns disease through the mass media
4. **Refuse disposal:** Refuse and sewage are discharge and treated promptly. This help in controlling the spread of disease
5. Incinerator are made available to treat refuse and so convert them into agricultural use, especially in urban areas.

WAYS OF MAINTAINING GOOD HEALTH IN A COMMUNITY

Effective public health administration in a community can be achieved through the following ways. Provision of treated water or projection of water. This can be done in the following

1. Storage of water in clean container
 - i. Boiling of water before drinking
 - ii. Addition of chlorine to our microscopic germs
 - iii. Filtration of water in cooking
 - iv. Addition of alum to water
2. **Control of disease or prevention of disease:** This can be control by living in a clean environment the diseases can be prevented in the following ways.
 - i. Eating of balanced diet
 - ii. Cleaning of teeth regularly with tooth brush and past
 - iii. Living in well ventilated houses
 - iv. Fumigation of the environment
 - v. Taking of bath regularly
 - vi. Wearing of clean and neat dresses

- vii. Doing exercise regularly
 - viii. Taking no drug except those prescribed by doctors.
 - Ix Sweeping the surrounding daily.
3. **Proper refuse disposal:** This can be done through the following ways:
- a. Burning refuse incinerators
 - b. Providing dustbin in strategic location
 - c. Burying refuse in isolated area from human habitation
4. **Proper sewage disposal:** Sewage are waste materials this change from guidance kitchen, toilet, bathroom, eg. Urine and faces sewage disposal can be done in the following ways.
- i. The use of pit toilet where faces and urine are passed into deep pit.
 - ii. The use of septic fern where water is used to flush faces and urine into a big tank in the ground.
 - iii. Community treatment process where sewage from various homes are collected and treated before being discharge into the ocean or river.
5. **Protection of food and proper preservation method:** The diseases that can be contacted through food must be protected in the following ways.
- i. Keeping food in refrigerator or deep freezer.
 - ii. Avoid exposure of food to flies and other micro-organisms
 - iii. Boil or cook raw food properly before eating
 - iv. Washing of hand before and after eating of food
 - v. By proper food preservation method like boiling, salting of food, smoking, drying of food, canning of food, pasteurization of food.

HEALTH ORGANIZATION

Voluntary Organization

Health organization can be divided into two names:

- A. Public Health Organization
- B. Voluntary Organization

Voluntary Organization are divided into

- i. International Health Organization
- ii. Nation Health Organization

International Health Organization includes:

1. World Health Organization (WHO)
2. International Food and Agricultural Development (IFAD)
3. United Nations Drug Control Programme (UNDCP)
4. United Nation International, Children Emergency Fare (UNICEF)
5. Food and Agricultural Organization (FAO)
6. International Red Cross Society

National Health Organization includes:

1. National Agency for Food, Drug and Administration Control (NAFDAC)
2. National Red Cross Organization/Nationalized Cross Crescent Organization.
3. National Health Insurance Scheme (NHIS)
4. National Primary Health Care Development Agency (NPHCDA)
5. National Emergency and Relief Agency (NERA)
6. National Agency for the Control of Aids (NACA)
7. Nigerian Medical Association (NMA)

Functions of Health Organization

- A. World Health Organization (WHO)
 1. Provides food for refugees
 2. Assist member nation during emergency
 3. Standard drug
 4. Assist training medical and paramedical staff
 5. Informs member nations of any epidemic
 6. Promote good health
 7. Grants research for health
 8. Supplies drugs to countries in need
 9. It co-ordinates and provides health statistics

- B. Red Cross Organization
- i. Train people in how to aid involved people
 - ii. Maintains twice in war front
 - iii. Fortifies students against emergencies
 - iv. It provides foods, clothes, medical services to war and disaster areas
 - v. It supplies medical equipment to rural areas
 - vi. They provide the general first aid to patients
 - vii. Rehabilitates victims of catastrophes
- C. United Nations International Children Emergency Event.
- i. Helps developed countries to carry out along range health, nutrition and welfare programmes for their children
 - ii. It provides various equipment medicinal vaccination services
 - iii. It provides children with milk and portentous food
 - iv. It helps in feeding destitute children
 - v. Provides for the emergency needs of children in devastated areas.
 - vi. It helps in training mid wives.
- D. Food and Agricultural Organization
- i. Curves out free samples of plant species with high-yield.
 - ii. Advises on branches of agriculture e.g fisheries, poultry, grain production, plant protein production, etc.
- E. Nigerian Medical Association (NMA)
- i. Assists in the training of medical and paramedical staff needed in health care delivery
 - ii. Carrying out research into ways of preventing and controlling diseases
 - iii. Advising the government on how to improve the health status of the people
 - iv. Monitoring the recruitment of well trained doctors in hospitals.
 - v. Alerting the nation where, there is an outbreak of a disease.