The need for nutrition by living organisms

Nutrition is the science of how our bodies obtain energy, build tissue, and control body functions using materials supplied in the food we eat. Nutrients are chemical substances needed by the body. The need for nutrition by living organisms is essential for survival in the sense that it provides energy and material for growth and repair and for the general function of the human system and its maintenance. Different foods we eat contain at least one of the seven major nutrients namely; carbohydrate, protein, fats, vitamins, minerals, roughages and water. There are two types of nutrition Heterotrops and Autotrops -

We are unable to make our own food from the sun as plants do. We get our food by eating plants or other animals.

Our bodies need food for a variety of reasons:

Growth: Food, especially proteins, makes new cells and tissues as we grow.

Energy: The body is like a working machine that needs energy to keep it going. During cellular respiration food is changed into energy for many activities e. g. the heart pumping blood around our bodies. Energy rich foods are carbohydrates and fats.

Replacing worn out and damaged tissues: Our cells are constantly dying or getting old so they need to be replaced. Red blood cells carry oxygen needed to live and therefore must be replaced regularly. Proteins, fats and mineral salts are especially important.

There are seven major nutrients, which are required by humans;

Carbohydrates-are compounds made of carbon, hydrogen, and oxygen (C6 H12 O6) They are energy providing foods for the body cells, they provide instant energy. These include rice, potatoes, pasta, bread and all starchy foods and sugars. There are three types of carbohydrates-monosaccharides- are single sugars such as glucose and fructose a sugar found in fruits, disaccharides- consist of two single sugars linked together, these include table sugar lactose, and maltose, and polysaccharides - is a long chain of sugars such as those in bread, pasta, and potatoes.

Proteins-are body building foods, which provide nutrients for making, growing and repairing, damaged cells. Proteins are made up of smaller units called amino acids. These include red meat, fish, eggs, beans, nuts and poultry.

Fats and Oils-are also sources of stored energy and may contain fat soluble vitamins A, D, E and K. They protect vital organs, keep our skin from drying out and insulate the body against changes in environmental temperature. Fatty Acids are classified as either saturated; (fats in animals) or unsaturated. (from plants)These include oil, butter, fat and dairy products.

Vitamins-are complex organic molecules that are needed by the body in very small amounts that serve as coenzymes. They maintain normal growth and metabolism. These include fresh fruits and vegetables. There are two main types of vitamins a) water soluble vitamins including B and C and b) fat soluble vitamins A, D, E, and K. If the body does not receive sufficient supply of vitamins, it could lead to vitamin deficiency diseases.

Minerals-are inorganic substances required for the normal function of the body. These include calcium in dairy products for bones and teeth, iron for transporting oxygen in blood potassium, sodium, calcium, and magnesium for the function of nerves and muscles.

Roughages-include cereals, bread, fruit and vegetables, this is to prevent constipation, and bowel disorders. It also makes you feel full.

Water-is the most important nutrient, it allows materials to dissolve, helps to regulate body temperature, and acts as the solvent in which food and enzymes are dissolved in the digestion system. Most water is replaced by drinking liquids, but it is also found in most foods we eat and as by-products of cellular respiration.

Digestion is the breakdown of food into simpler molecules that can be absorbed and used by the body. It begins with the mouth through the pharynx, oesophagus, stomach, small intestine, large intestine, rectum and then anus.

The first step of digestion is by ingesting the food; this is mechanically broken down and crushed by the teeth otherwise known as " mastication" the tongue helps to keep the food between the chewing surfaces of the upper and lower teeth by manipulating it against the hard plate." During this process, the salivary glands produce saliva and a digestive enzyme called salivary. The enzymes in the saliva kill bacteria and begin the process of chemical digestion by breaking down starches to sugars. The mucus in the saliva softens and lubricates the food and helps hold the food together. The

salivary amylase begins the chemical digestion of carbohydrates by breaking down some starch into disaccharide maltose.

Once the teeth and salivary glands have completed the initial processing, by gathering the food together in a ball called bolus, the tongue pushes it towards the back of the mouth and into the pharynx. As it moves into the pharynx it presses down on a small flap called the epiglottis, this is to prevent the food from entering the respiratory track to avoid the risk of choking. The bolus then enters the oesophagus, which is helped by its muscles to move towards the stomach. When it reaches the stomach, the stomach walls contract in opposite directions while mixing and churning the food. Chemical digestion starts the action of hydrochloric acid and pepsin; these are both secreted by the gastric glands in the stomach. Pepsin breaks down proteins into shorter chains of amino acids called peptides. Another fluid secreted by the stomach is mucus; this lubricates the food making it more easier to travel through the digestive tract.

After about three hours of chemical treatment in the stomach the food is reduced to a soft pulp called chyme and moves into the duodenum and then into the small intestine. The pancreas secretes pancreatic juice into the small intestine. The pancreatic juice contains enzymes that digest carbohydrates, proteins, and fats. The pancreatic juice also contains sodium bicarbonate, which neutralizes the hydrochloric acid in chyme protecting the small intestine. The liver secretes bile, which is stored in the gall bladder; this breaks down fats in the small intestine into smaller droplets in order to dissolve cholesterol. The small intestine is lined with finger like projections called villi; this increases the surface area of the lining of the small intestine,

making absorption of nutrients more efficient. These nutrients are absorbed through capillaries and tiny lymph vessels called lacteals.

After absorption in the small intestine the undigested material moves into the large intestine. The large intestine absorbs water from the material remaining in the digestive tract. When most of the water has been removed from the undigested material, a solid waste matter, called feaces remains. Peristalsis propels the faeces through the large intestine into the rectum towards the end of the large intestine, which is then eliminated through the anus also known as defecation.

According to Mullally (2002, p39), assimilation is " the process whereby the already digested foodstuffs are absorbed and utilized by the tissues". The liver is an example of organs that form or function in the process of assimilation of various digestive products. To explain this I will be highlighting the anatomy of the liver.

The liver is the largest organ in the body, which is divided by the falciform ligament into two lobes with the left lobe smaller than the right. The lobes are further more made up of smaller sections known as lobules, which are surrounded by hepatic arteries and portal veins The hepatic artery brings blood to the liver from the heart. This blood carries oxygen for the liver tissue itself as well as cholesterol and other substances for processing.

Blood from the intestine and heart then mix together and flow back to the heart through the hepatic vein. The liver receives blood from both the intestine and the heart. Tiny capillaries in the intestinal wall drain the portal vein, which is rich in nutrients, and enters into the liver. The blood then flows

through a latticework of channels inside the liver, where digested nutrients and any harmful substances or toxins are processed.

The liver performs many vital functions, from regulating the levels of chemicals in the body to producing substances that make the blood clot during bleeding, but the major function of the liver is to break down harmful substances absorbed from the intestine or elsewhere in the body, then excrete them as harmless by-products into the bile or the blood. These by-products are filtered out by the kidneys, which then leave the body in the urine.

It is now clear that the liver is responsible for many metabolic activities including the metabolism of protein, fats, and carbohydrates. However the liver also plays a role in digestion by secreting bile; bile is a yellowish-green liquid that hepatic cells secrete: it helps the digestion of fats, it is stored in the gallbladder. The liver sends bile to the small intestine. It is responsible for the elimination of certain waste products from the body particularly pigment from destroyed red blood cell and excess cholesterol and it assists in the digestion and absorption of fats.