

INVESTIGATIVE STUDY ON EFFECT OF NUTRITION ON HIV INFECTED MOTHERS IN SOME SELECTED HOSPITALS IN DEKINA LOCAL GOVERNMENT AREA

Ocheni Joshua & Aye James

Department of Food, Nutrition and Home Science

Kogi State University, Anyigba

Email: Joshuaochenii56@gmail.com

ABSTRACT

The research was carried out on effect of malnutrition on HIV infected mothers in some selected hospital in Dekina local government area of Kogi state. It aimed at bringing to lime light the effect of malnutrition on infected mothers and to create awareness on the health importance of nutrition especially the proper and regular intake of antiretroviral therapy (ART). Samples were gotten from five different hospitals in Dekina local government area of Kogi state i.e. general hospital Egume, general hospital Iyale, Kogi state university teaching hospital Anyigba, Maria Goretti hospital Anyigba, and Grimard catholic hospital Anyigba using a structured questioner. All data obtained were analyzed statistically using a T-test at 5% level of significant. Statistical analysis was carried out in the various hospitals to determine the mean CD₄ before ART, the mean CD₄ after ART, the mean difference, and the T-values. Statistical analysis was also carried out to determine the mean BMI (body mass index) before, the mean BMI after, mean difference of BMI and T-values. In general, it was found that CD₄ count after placement on ART (293.43) was significantly less than CD₄ count before ART (38.53). For general hospital Egume, general hospital Iyale, Kogi state university teaching hospital Anyigba, Maria Goretti hospital Anyigba, and Grimard catholic hospital Anyigba. The CD₄ count before were 259.78, 209.98, 210.14, 364.82 and 422.48 respectively while the respective CD₄ count after were 32.84, 35.88, 38.1, 42.42 and 43.43. The highest level of significance was recorded for general hospital Iyale (T=24.1) with a mean difference of 174.1 while hospital with least significance difference was Grimard Catholic hospital Anyigba (T=11.6) with mean difference of 379.01. Aside patient in general hospital Egume all analysis of data obtained from all the hospital reveal statistically significant increase in BMI for those placed on ART. In general, there was BMI increment from 21.43 to 23.98 with a robust T-value of -2.27. Conversely, there was significant decrease in BMI for those not on ART i.e. 21.98 to 19.10 (T=11.49) the study there shows that nutritional counseling with strict adherence to the use of ART will tackle the problem of malnutrition by restoring the damage done to the body immune system especially to those infected with HIV/AIDs.

INTRODUCTION

The background of the study

Malnutrition is the condition in which nutrition is defective on quality and quantity. (Weinbaerg G.A *et al*/2002). Maternal malnutrition is a condition that has posed a threat to the survival of our women of child bearing age especially during pregnancy. HIV (Human Immunodeficiency Virus) account for significant immunosuppression in an infected individual. If the corroboratory indices' of good health are satisfactory, the suppression of immune defense can be mitigated. One of such index is nutrition. (Sweet *et-al* 1997). HIV (Human Immunodeficiency Virus) immune expression and nutrition interaction are complex and related to each other. Malnutrition accelerates the progress of HIV

infections to AIDS. HIV and AIDS is associated with biological factors as well as social factors that affect the individual ability to consume, utilize and acquire food. Once there is an infection with HIV, the patient's nutritional values decline further leading to immune depletion and HIV progression. One of the factors responsible for malnutrition in HIV infected mothers is reduced appetite which could be due to difficulty in ingesting food as a result of infection like oral thrushes, oesophagitis caused by Candida. A common opportunistic infection in HIV infected people are fever, side effect of medicine or depression, poor absorption of nutrient which may be due to accompanying diarrheas caused by bacterial infection like salmonella or mycobacterium avium. When HIV positive women become pregnant, additional nutritional considerations are warranted (Sherman D, Sherman 2001). Compared to routine prenatal nutritional assessment and intervention, pregnant HIV positive women have increased needs to promote a healthy outcome.

Pregnancy complicated by HIV infection is considered high risk (Jones & Verdego, 1999). A normal pregnant woman is highly immunosuppressed to protect the fetus from maternal antibody response to genetic materials that is foreign (e.g. the father's gene). The pregnant woman is not more susceptible to infection. But when an infection occurs it is much more difficult to treat (Gilbert & Harman 2002). While fertility is decreasing following HIV infection, pregnancy does not occur (Glynn et al 2000). Pregnancy does not worsen HIV status (Allegro et al 2003) and HIV and AIDS does not worsen pregnancy outcome other than transmission (American medical association 2004). The nutritional status is easily compromised during early type of infection. Generalized infection often results in reduced food intake and absorption of nutrients (Friis 2002). Utilization and loss of nutrients are also increased during an acute infection. Additional characteristics of infection; are fever, mouth sore and fatigue can further contribute to poor nutritional status while they have side effects such as nausea, vomiting, dry mouth, or alter the sense of taste or smell. Women of child bearing age who are infected with HIV need adequate nutrition to cope with the body's metabolic process in pregnancy, labor and lactation period (Samba R.D et-al 2002). Malnutrition is more or less endemic in our society because of poverty, poor nutrition, and poor knowledge of adequate food mixing and balanced meals, poor food hygiene and food preparation practices (Whitney E. N et-al 2002). The pregnant mothers are worst hit because of increased physiological, physical, metabolic demands and need of pregnancy itself and fetal demand (Winson G 2001). However, the pregnant mothers need adequate nutrients in terms of protein, carbohydrates, vitamins and minerals to be able to satisfy maternal and fetal requirements.

STATEMENT OF PROBLEMS

Malnutrition in HIV infected mothers is an age long problems in some part of the developing countries. It contributes to about 50% of obstetric complications (Papathakis 2005).

Preliminary Investigation

The researchers having lived for some years in Anyigba Dekina local government area Kogi State observed with interest that malnutrition in HIV mothers is still common and produces negative effect on mothers and pregnancy related issues. The major causes of anemia in pregnancy are related to maternal malnutrition. There is an increasing rate of blood transfusion on mother during Pregnancy due to malnutrition and anemia. They are not worried about HIV/AIDS transmission that is associated with blood transfusion. Malnutrition pre-disposes the fetus to complications such as abortion, intra uterus growth retardation, hypoxia and subsequently fetal malformation and finally intra/ uterine death (Kotler D.P et-al 1999). The effect of malnutrition on maternal wellbeing throughout pregnancy is very negative. Mothers are always weak, unhappy and unable to attend to their personal needs and problems. They are prone to frequent hospital visit and possible admission which, interfere with their family life. It becomes catastrophic if the mother experiences post-partum hemorrhage. Death may occur, as she is also prone to develop cardiac disease as well.

The above mentioned problems rekindle the interest of the researcher to study the factors associated with effect of malnutrition among HIV infected mothers in some selected hospitals in Dekina local government.

GENERAL OBJECTIVES

To determine the effect of malnutrition on HIV infected mothers.

Specific objectives

1. To determine the nutritional effect of ART (Ante Retroviral Therapy) on HIV infected mothers.
2. To determine nutritional status of HIV infected mothers among the selected hospitals through anthropometry.
3. To determine the effect of nutrients absorption on the viral load.
4. To determine the effect of viral load on nutrient absorption or nutritional status.

THE SIGNIFICANT OF THE STUDY

1. It will assist health care providers in the practical clinic towards providing adequate nutrition education to the mothers.
2. It educates the infected mothers on the available local source of proteins, vitamins and minerals.

3. It encourages the infected mothers on the importance of antiretroviral therapy (ART) which are supplement in nature as it aid their sustainability.
4. It encourages mothers to include vegetables and fruits to their daily diet thus increasing the quality of food intake.
5. It discourages families from patronizing food vendors rather than cook nutritional meal in their homes.

DEFINITION OF TERMS

Malnutrition: a condition in which nutrient is defective in quality and quantity.

Nutrition: the process by which living organisms have food materials and use them for energy, general maintenance of the body and growth.

Gestation: the condition of a woman during the period between conception and the birth of the child.

Fetus: the unborn baby after the second months of pregnancy.

Conception: The product of the union of male sexual cell (spermatozoa) with female egg (ovum).

Antenatal: The care given to the pregnant mothers during pregnancy till birth. The time during pregnancy before child birth.

Premature Baby: a baby born before its proper time and where weight is below 2.5kg.

Still Birth: the birth of a dead child after weeks of pregnancy.

Effect: result

Pregnancy: a condition of a woman being with a child in the womb before delivery.

Abortion: terminating pregnancy before 24 weeks of gestation.

Intra-Uterine Death: the death of the fetus in the uterus.

Intra-Uterine Growth Retardation: reduction in the growth pattern of developing fetus in the uterus.

Anoxia in Uterus: lack of oxygen in the uterine content.

Low Birth Weight Infant: any child that weighs less than 2.5kg at birth.

Maternal: pertaining to a woman of reproductive age.

HIV: human immune virus.

AIDs: acquired immune deficiency syndrome.

ART: anti-retroviral therapy.

CD4: cluster differentiation four.

CD4 count: cluster differentiation four counts.

Miscarriages: the spontaneous loss of a woman's pregnancy before the twentieth week that can be both physical and emotionally painful.

Obstetrics: is the field of studies concentrated on pregnancy, child birth and postpartum period.

REVIEW OF LITERATURE

Bailliere and Tindal (2001) defined malnutrition as a poor condition in which nutrient is defective in quantity and quality. Also Oxford advance dictionary defines malnutrition as the poor condition of health caused by lack of food or lack of right type of food. Nwokolo (2002) also defined malnutrition as the condition that emanate from lack of food (starvation) and lack of adequate intake of food nutrient in their right proportion for the body requirements. Nwokolo further stated that the factor quality and quantity are also important in defining malnutrition because for an individual to be nutritiously balanced, the food intake must be enough in quantity to satisfy body weight, hunger, health requirement and physiological requirement as seen in pregnancy. Secondly, it must be adequate in quality in order to provide required food nutrient like proteins, carbohydrates, vitamins, minerals, fat and oil, roughage's and water. When these are found in enough quantity in the diet, the individual will not suffer in the malnutrition. According to (Jones and Verdej 2003) malnutrition is defined as ill health caused by deficiency of calories, protein, vitamins, and minerals interrelating with infections and other poor health and social conditions. In other words malnutrition prefer to conditions of nutritional deficiency including under nutrition and micronutrients deficiencies. Malnutrition possesses varieties of threats to women. It weakens women ability to survive child birth, make them more susceptible to infection, and live them with fever reserve to recover from illness. HIV infected mothers who are malnourished may be more likely to transmit the virus to their infant and to experience a more rapid transition from HIV to full blown AIDs. Malnutrition undermines women productivity, capacity to generate income and ability to care for their families. Advising women, malnutrition has a positive effect because a healthy woman can fulfill their multiple role-generating incomes, ensure their family nutrition and having healthy children and more effectively and thereby help advance countries socio economic development.

Effect of Malnutrition in Women

Women are more likely to suffer from nutritional deficiencies than men. For reasons including women reproductive biology, low social status, poverty and lack of education. Socio cultural tradition and disparities in house hold work pattern can also increase women chance of being malnourished. Globally, 50%of all pregnant women are anemic and at least 120 million women in less developed countries are underweight (Jones and Verdej, 2002). Research shows that being underweight affect women productivity and can lead to increase rate of illness and mortality. In some regions, majority of women are underweight e.g. Asia, an estimated 60% of women are underweight. When HIV positive woman become pregnant, additional nutritional considerations are warranted compared to routine prenatal nutritional assessment and intervention. Pregnant HIV infected

mothers have increased needs to promote a healthy outcome. Pregnancy is a time of increase nutritional needs; the needs for absolute calories and some specific nutrient are augmented during this period. Satisfying additional nutritional needs, contribute to both fetal development and nutrient store for labor, delivery and breastfeeding. However, when pregnancy is complicated by human/immune deficiency virus (HIV) infection, specific additional considerations are warranted. Normal immune functions include specific and nonspecific responses to invading foreign substances (host cells) become so few in numbers that immune function is diminished. Diminished immune function permits normal body flora to proliferate, which can result in opportunistic infection (e.g. Candida (yeast) infection) (Jones 1999).

HIV and Pregnancy

Pregnancy complicated by HIV infection is considered high risk (Jones & Verdejo 2000). A normal pregnant woman is slightly immune suppressed to protect the fetus from a maternal antibody response to genetic material that is foreign (e.g. the father's gene). The pregnant woman is not more susceptible to infections, but when an infection does occur, it is much more difficult to treat (Gilbert and Harmon 1998).

Vitamin 'A'

Vitamin 'A' is essential for reproduction (Semba 2002) male human that are deficient in vitamin A are not able to produce sperm. Low vitamin 'A' level is also hypothesized to negatively affect female fertility. Vitamin 'A' has also been associated with placental infections. Pregnancy increase the risk of vitamin 'A' deficiency in the HIV positive infected mothers have been associated with increased infant mortality (Semba *et al* 1998). Recent research has shown the benefits of vitamin 'A' supplementation during pregnancy on infant mortality (Katz *et al* 2000). However maternal supplementation with carotene recently showed 50% in maternal morbidity (West *et al* 1999). High level of carotinoid concentration have been found in pregnant women with pre eclapsia in the U.S and Nigeria, and low circulating carotene circulation have been found with pregnant woman with preterm rapture of the fetal membrane (Semba 2002).

Iron

Most women are advised to take supplemental iron during pregnancy regardless of evidence of iron deficiency (Weinberg *et al* 2002). For complicated pregnancy, this routine practice is thought to be saving, and in certain circumstances may have some benefit (Weinberg *et al* 2002). Few data are available on how HIV/AIDS influences the pregnant women iron status. However, (Friis & Colleagues 2001) reported that Zink deficiency has been associated with HIV infections and result in the number of circulating T lymphocytes (Kupka and

Fawzi 2002). Host immunity plays a major role on how behavior may influence disease.

Nutrition in HIV Positive Mothers

Multiple micronutrient deficiencies develop early in the case of HIV infection and contribute to increase in micronutrients need among HIV infected individuals (Friis, Gomo et al 2000). Poor absorption reduces food intake, and decreased nutrient utilization and loss also contribute to the development of nutrient deficiencies. Individual infected with HIV however tends to accumulate iron in tissue especially bone marrow, the brain, muscles, livers and spleen (Weinberg et al 2002). This iron accumulation or loading is believed to be related to chronic inflammatory response that involves the retention of iron (Boelaert et al 2002). Iron may also accumulate with repeated transfusion of packed red blood cells. Low level of B12 may be associated with progression to AIDs.

Nutrition in HIV Positive Pregnancy

In animal models, nutrient deficiency during pregnancy has been shown to affect the immune function of the next generation (Friis, 2002). In HIV negative humans, individual born during the hunger season are more likely to have nutritional deficiency during pregnancy. When compared to individuals born during harvest season (Friis 2002). In the instance it is possible that the immune functions and several micronutrients in pregnant women living in Zimbabwe when compared to non infected pregnant women had the lower concentration of serum foliate, ferritin and hemoglobin (Friis et al 2001). Iron supplementation for most pregnant women in developing countries is probably safe because correlation have not been found between iron status and markers of HIV disease.

Vitamin Supplementation

Pregnant HIV positive women should be encouraged to obtain needed nutrient from a balanced diet. At this time no specific RDAs are available for pregnant HIV positive woman. A prenatal multivitamins or micronutrients is likely to be beneficial and is an easily cost effective means to improve maternal and neonatal health. Vitamin supplementation should occur as much as possible pregnancy and should continue for three month postpartum. Much vitamins improve the CD4 lymphocytes count and infant birth weight as well as reduced risk of growth restriction and severe prematurity (Fawzi *et al*/2000). When combined with vitamin C and E, high dose account in a sample if HIV positive pregnant woman (Fawzi et al 2000). Adequate protein intake is essential to maintain cell mediated immunity, complement and phagocytes (Gilbert & Harmon 1998).

Food Handling and Eating Pattern

Pregnant HIV positive woman can particularly vulnerable to food born infection (Ulutney & Rolfs 2002). Guidelines for handling, storing and cooking food should be reinforced and raw or under cooked sea food should be avoided. Pregnant woman who experience gastro intestinal imbalance or upset from medication associated with HIV treatment can be encouraged to eat small, frequent meals though out the day, consuming liquids between meals instead.

Types of Malnutrition in Pregnancy

Nwokolo (2004) also identified these types of malnutrition seen in pregnant mothers.

1. Protein malnutrition
2. Nutritional anemia
3. Protein and calories malnutrition.
 - **Protein Malnutrition:** is the condition when the mother diet is very deficient in protein. There is need to increase the mothers protein, encouraging her to use local available sources; but must include the animal sources which contain the essential amino acids.
 - **Nutritional Anemia:** Nwokolo continued to discuss that this may result to protein deficiency and others occur related to inadequate intake of other important food nutrients. The mother manifest as anemic mother with hemoglobin of less than 8 grams per dL in pregnancy.

Protein and Calories Malnutrition

This is the condition when the mother is lacking the entire major necessary food nutrient such as protein, carbohydrates, fats and oil, vitamin and minerals. It is very serious condition that requires urgent actions.

Causes of Malnutrition in Pregnancy

The causes of malnutrition in pregnancy may be seen as follows;

- Poor intake of protein, vitamins and minerals in the diet.
- Nausea and vomiting as seen in hypo remises gravidarum.
- Malaria in the tropics.
- Worm infestation due to poor hygiene.
- Eating disorder/pica of pregnancy
- Infections such as typhoid fever.
- Ignorance about balance diet.
- Poverty.
- Lack of education and empowerment of human.
- Lack of decision making status by women.
- Inadequate food availability all the year round.
- Cultural habit of depriving woman of protein and vomiting as seen in some food taboo.

- Bleeding in pregnancy like APH etc.
- Gender insensitivity especially on the female gender.
- Lack of male involvement in reproductive health services.

Poor Intake of Protein, Vitamins, and Minerals.

This is the condition that is commonly seen in our environment, because of poverty and ignorance. These important nutrients are generally lacking in the pregnant mothers diet predisposing her to malnutrition in pregnancy. Nausea and Vomiting As Seen In Hyper Emesis Gravidarum. Nwokolo (2004) continue to discuss nausea and vomiting as seen in hyperplasia gravidarum as one of the causes of malnutrition in pregnancy. (Snel et al 2002), in their study stated that over 50% of pregnancy are affected by hyperplasia gravidarum and that the exact cause is unknown and neurological response of pregnant mothers to pregnant. Nwokolo continued, that if this vomiting is severing in mothers, it will deplete the mother of already stored nutrient and also discourage adequate food intake by the mothers leading to malnutrition.

Malaria

Malaria has been identified as the major cause of anemia in mothers in their individual environment because they are more pregnant with a very poor nutrition status and haemoglobuline levels. Secondly, as pregnancy is associated with physiological immune - suppression they tend to have more episodes of malaria attacks which cause the haemolysis of the red blood cells predisposing the mother to nutritional anemia in pregnancy. Malaria has been identified as the major cause of maternal morbidity and mortality and account for 11% of maternal health (WHO, 2002).

Worm Infection

Nwokolo added this as the major cause of anemia in pregnancy in the tropics because of very poor environmental and food hygiene practices of mothers. They are predisposed to infestation that tends to reduce their hemoglobin especially the hook worm.

Eating Disorder/Pica of Pregnancy

Mothers in our environment at time due to pica pregnancy eat food that are of no value at all e.g. clay sand e.t.c. to the extent of not really eating the food that contains the required food nutrients for the pregnancy and this may result to malnutrition if not corrected by the midwife or skilled care giver on time.

Poor Cooking Method

This is a very serious factor in our environment. Certain foods like vegetables are often time over cooked making them valueless. Secondly other food sources of

vitamins such as tomatoes is also overcooked thereby depriving the body of it required vitamins and minerals. Mothers should be educated on cooking hygiene and methods of cooking food to retain its nutrients value before eating them. Nwokolo (2003) also identified other infections that are predominant in our environment and the method of treating them which most of the time are not properly done; thereby making mother's prone to nutritional anemia in pregnancy. Example of such infection in our environment is typhoid fever.

Poverty

Poverty, ignorance and diseases have been identified as a viscous cycle of disease causation in our environment and the factors also affects malnutrition in the pregnant mothers because she is not able to afford the food nutrient in enough quantity because of lack of educational and financial empowerment. Ignorance and lack of knowledge on the right type of food to eat is another hindrance. Some do have access to health intimation and health worker. Health workers in the community are also not helping in propagating the information to rural pregnant mothers. Some do not have any contact with the health workers or health facility throughout their child bearing experiences. Nwokolo (2003), further explained that cultural habit are attribute of the female gender which deprive them of taking important decision about themselves. Diet in pregnancy inclusive is not helping matters. Also in our society, there do still exist the same cultural taboo related to food, women and pregnancy, which deprive the mother of adequate nutrient intake. Example; pregnant mothers should not take snails, egg, glasscutter, meat and some fleshy part of meat which are all riches source of proteins that are available in the communities. Secondly the mother deprives herself of food, wanting her husband and children to be satisfied before she takes the remainder.

Type of Food Nutrient and Local Sources'

Rose and Wilson (2001), explained that nutrient is any substances that is digested, ascribed and utilized to promote body function. They further explained that these substances are;

1. Carbohydrates
 2. Protein
 3. Fat and oil
 4. Vitamins
 5. Mineral salt
 6. Water
 7. Raphages
- Carbohydrates'

These are found in a wide variety of food such as sugar, cereals, bread, biscuits e.t.c they exist of carbon, hydrogen and oxygen. The hydrogen and oxygen being in the same proportion as in water.

Carbohydrates are classified according to the complexity of the chemical substance of which they are found (Ross and Wilson 2001).

(A). Monosaccharide's

Is a form of carbohydrates that are digested in the alimentary canal and when absorbed they take in the same form e.g. glucose, fructose's, and gelatos.

Protein

These are composed of the element of Carbone, hydrogen and nitrogen some contains minerals such as iron, copper, zinc, iodine, sulphur, and phosphate. They are divided into two categories; essential and non-essential amino acids.(Ross and Wilson, 2001).

Essential amino acids: they are those that can be synthesized in the body. Therefore they must be included in the diet and those which can be synthesized in the body and they are from plant source.

Functions of proteins:

Amino acids are used for joints and repair of the body cell and tissues, synthesis of the enzymes, plasma, protein, antibodies (immunoglobulin) and some hormones. Provision of energy normally secondary function they become important why when there are no enough carbohydrates in the diet and fat store are depleted. Locally Available Proteins Include; beans, soya beans, Cray fish, cheese, fresh milk, snails, fish, meat, okpa, bambaranuts, ground nuts e.t.c

Fats

Fat consist of carbon, hydrogen and oxygen but they differs in carbohydrates such as hydrogen and oxygen are not in the same proportion as in water. Fats are divided into sub groups; saturated and none saturated (Ross and Wilson 2001).

Saturated far are solidified at the room temperature and they are gotten from animal and so they are actually referred to as animal fat.

Unsaturated fat are that remain liquid at room temperature and from plant sources, thus they are called vegetable fat.

These are chemicals, the simplest form in which carbohydrates can exist. They are made up of single. Unit or molecules which if they were broken down further, would cease to be sugar.

Disaccharides

This consists of two monosaccharide's molecule chemistry combined to form sugar e.g. sucrose, maltose and lactose.

Polysaccharides

These consist of complex molecule, made up of large numbers of monosaccharide's molecules in chemical combinations e.g starch, glycogens, cellulose and dextrin's. It should be noted that not all polysaccharide can be digested by human beings, e.g. cellulose and other substances present in the vegetables, fruits and some cereals pass through the alimentary canal's almost unchanged.

Functions of Digestible Carbohydrates

- This includes:
Provision of rapidly available energy and health.
- Protein sparing i.e. when there is an adequate supply of carbohydrates in the diet, protein does not need to be used to provide energy and health.
- Provision of the source of energy when carbohydrates are eaten in excess of the body's need as it is converted to fat and deposited in the fat depot e.g. under the skin.

Locally available carbohydrates: include rice, yam, bread, sorghum, sugar cane, sweet potatoes, beans and fruits.

Functions of Fats

1. Provision of chemical energy and health.
2. Support to contain body organs e.g. the kidney, the eyes.
3. Transport and storage of fat soluble vitamins A, D, E, K.
4. Formation of cholesterol and steroid hormones.
5. Insulation as a subcutaneous layer, it reduces heat loss through the skin.
6. Societal value when gastric content (chyme) containing fat enters the duodenum, the emptying time of the stomach is prolonged, postponing and return of hunger.

Locally Available Fats: oil, ground nut and coconut oil.

Vitamins

Are chemical compounds required in very small quantities which are essential for normal metabolism and health? They are found widely distributed in food and are divided into two main groups.

- Fat soluble vitamins; A, D, E and K.
- Water soluble vitamins: B complex and C.

Functions of Vitamins Include The Following

1. Maintaining healthy epithelial tissues and cornea.
2. Facilitate the absorption and use of calcium and phosphate in the maintenance of healthy bones and teeth.
3. Antioxidants; promote immune function.
4. Carbohydrate and protein metabolism.

5. Healthy skin and eyes.
6. Formation of prothrombin and factors Vii, ix and X in the liver.
7. Formation of collagens.
8. Maturation of red blood cells.

Locally available vitamins include; green vegetable, livers, red oil, fruits, egg yolk, nuts, cereals, yeast e.t.c.

Minerals Salt:

They are necessary within the body for all body process usually in only small quantity. They are also called inorganic compound (Ross and Wilson 2001). Examples of minerals salt are calcium, phosphate, sodium, potassium, iron and iodine.

Functions of Mineral Salt

1. Contraction of muscles
2. Transmission of nerves impulses
3. Maintenance of electrolyte balance in the body.

Locally available sources of minerals includes; milk, cheese, egg, green vegetables, fish bones, livers, kidneys and table salt e.t.c

Water

(Ross and Wilson 2001), further states that water is the sixth food nutrient. It explained that water makes up about 70% of the body weight in men and about 60% in women. A men's weight 65kg contains about 40 liters of water. He further stated that a large amount of water is lost each day in faeces, sweat and urine. Under normal circumstances this is balanced by intake in food and satisfying thirst. Dely dratum with serious consequences may occur if intakes do not balance loss.

Functions of Water

Provision of moist internal environment, which is required by all living cells in the body all the cells except superficial layer of the skin, the nails, the horn and outer harder layer of the teeth.

- Dilution and moistening of food.
- Regulation of body temperature as constituent of sweats which is secreted into the skin, it evaporates cooling the body surface.
- A major constituent of blood and body fluid.
- Dilution of incest product and poisonous substances in the body.
- Providing the medium for the excretion of wast product e.g urine and faeces.

Locally source of water: streams, borehole, rainfall, spring and river.

This will not be complete if i don't mention the seven classes of food because of its good function of elimination process.

Roughages:

It is the indigestible part of diet that comes from plants and meats. It consists of bran, cellulose, and other Psysaccharides. The daily requirement of fiber is not less than20gm.

Local sources of roughages include: whole meal flour, husk of cereals, vegetable, citrus fruits, and roughages part of carbohydrates.

Signs and Symptoms of Nutritional Anemia and Malnutrition in Pregnancy

These include:

- Pallor of the mucus membranes
- Weakness
- Dizziness
- Fainting attack
- Pedal oedema
- Tiredness'
- Ill-looking
- Feeling of usualness throughout pregnancy.
- Loss of appetite
- Cracked lips
- Schally skin
- Coated tongue
- Sore mouth among others.

Management of Nutrition Anemia and Malnutrition in Pregnancy

The management commence from preventive management in the prenatal clinic, which is as follows;

1. Adequate history taking to identify women at risk due to poverty, lack of knowledge and poor food preparation.
2. Nutritional education to empower the women on the knowledge of balance diet, including protein, iron and vitamins. These enables those to know the right type of food to eat during pregnancy and in what proportion the food should be to prevent malnutrition if already exercising to control it (Myles 2001).
3. Mother craft in the prenatal clinic should include food preparation and demonstration. To ensure that food is not contaminated to exclude infestation like hookworm, ascaris and infection like typhoid. Also to emphasize on the preparation of certain food not to be over cooked to retain their nutrient value e.g. green leafy vegetables.

4. Encourage women to have vegetables garden in their homes then will make vitamins readily available in their home and they also help to sell part to boost their financial strength (Nwokolo, 2003).
5. Women are to be encouraged to rear poultry or chicken to make protein readily available at homes. This can also be sold occasionally to get money.
6. Women should also embark on petty trading activities to help out because this can empower the women financially to be able to afford to buy what so ever she deserves to eat at any time.
7. To make use of adult literacy center to improve on their educational level because of malnutrition can be traced to high level of illiteracy in our environment.
8. Health talk to discourage pica of pregnancy and health education on environmental hygiene should be included to prevent water and our born disease (Nwokolo2003).
9. Seeing all prenatal mothers with infections like urinary tract infection, malaria and typhoid fever and treat them accordingly also screen mothers with worm infection and treat accordingly.
10. Proper PCV and hemoglobin estimation of pregnant woman at 16 weeks, 28 weeks, and 36 weeks of gestation to rule out nutritional anemia.
11. Emphasis should be placed on the importance of the proper of their routine haematinic in the prenatal clinic.
12. Anemia as a condition should be treated as follows;
 - a) **A Mild Nutritional Anemia:** this client should be treated as outpatient cases with ferrous sulphate, folic acid, vitamins B complex and vitamin C, women should also be advised on the improvement of their diet and on the right type of diet to embark upon to increase her hemoglobin level.
 - b) **Moderate Nutritional Anemia:** This is also treated as an outpatient case but with more frequent hospital visit and in addition with the haematinic given to a mild nutritional anemia. She requires the use of parenteral iron dextran IV serbitoil depending on the doctor's preference. Also dietary required will be given to help out
 - c) **Severe Nutritional Anemia:** This will be treated s an impatient, she will be admitted for close d monitoring and rehydration. Iron destrain treated in IV fluid will be administered and they may be need for blood transfusion to correct the severe anemia. Remember blood must be properly screened to exclude HIV and appetites B virus before transfusion to prevent infecting the mother (Nwokolo 2003).

Effect of Malnutrition on Pregnancy

The effect of malnutrition on pregnancy cannot be over emphasized because they are very obvious, (Myles 2003), that after conception and during pregnancy they effect of malnutrition seems to include the following;

- High prevalence and propensity of abortion
- High incidence of intra uterine growth retardation and subsequent low birth weight infants.
- Increase risk for complication like intra uterine fetal death.
- Bleeding disorder like postpartum hemorrhage.
- Malnutrition coupled with high risk for caesarean section deliveries' with the risk of surgeon.
- There is also another risk of blood transfusion in pregnancy according to (Nwokolo 2004), which may predispose the mother to HIV infections. There is also risk of mothers to fetus transmission of infection. Thus mothers immunity also compromised by pregnancy and malnutrition itself. When the mother was anemic before pregnancy coupled with malnutrition. It may delay detection of pregnancy early enough by obstetricians since the underlying condition may be focused on (Bonn, 1999). The mother and child are put at risk due to lack of prenatal care.

The high incidence of intra uterine growth retardation signal, fetal compromise, which is not positive in pregnancy. Since fetus is further predisposed to ultra-uterine fetal death due to oxygen carrying capacity of the placenta/blood causing anoxia in uterine. Eventually the child is delivered with low birth weight which is also a risk to the survival and can lead to neonatal and childhood morbidity and mortality. (Nwokolo 2003) continued to highlight the predisposition of mothers to post bleeding disaster such as postpartum haemolage during and after the third stage of labour. This calls for caution by the midwives and obstetricians managing such mothers to give syntonetrine at the delivery of the interior shoulder and to employ active management of the third stage of labour using control cord traction for the delivery of the placental. Malnutrition as seen in nutritional anemia make post natal mothers to be very weak, in active and not really able to cope with good child care practices important aspect such as establishing lactation and exclusive breastfeeding may become problematic if urgent step are not taken postnatally to correct malnutrition immediately through adequate diet. Supervision of breastfeeding and prevention of infection in the home. The mother with malnutrition postnatally is also prone to infection due to low immunity. There is also the risk of sub-involution leading to postpartum haemorrhage.

Effect of Malnutrition on Unborn Baby

Fairborn et al (2002), in their study of effect of malnutrition in the fetus also stated that these could be seen;

1. Intra uterine growth retardation which is a negative outcome pregnancy.
2. Small for gestational age or intra uterine growth retardation infant who are exposed to greater risk for fetal abnormalities including cleft lip, cleft palate, were seen in such infant according to the study.

Also similar study, (Peterson et al 1999) discovered in their own ways that the risk of the infant includes;

- Anoxia in uterus
- Me conium suspiration
- Fetal distress in the second week of labor
- Prenatal asphyxia
- Reduced lung capacity
- Hyperglycemia
- Polycythemia
- Mental retardation.

They also mentioned the neural tube defect as also seen in the previous study. Finally they also are glucose tolerance abnormalities. During the neonatal and childhood period such as neonatal or infant are also prone to high morbidity and mortality rate.

MATERIALS AND METHODS

Sample Area

The study was conducted in medical, surgical, antenatal, postnatal and pediatric wards in five hospitals in the areas under study.

Subject Sample

HIV infected mothers admitted in the various wards of the above hospitals were selected for the study.

Sample and Sampling Techniques

A total of 370 patients were selected randomly from the hospitals under study as shown in the table, 75 patients were selected from Gen. Hospital Egume, 74 patients from Gen. hospital Iyale, 74 patients from KSUTH Anyigba, 74 patients were also taken from Maria Goretti and 73 patients were selected from Grimard Hospital, Anyigba respectively which gave the total sample size of 370 HIV infected mothers.

Sample Area	Population size	Sample size
Gen. Hosp. Egume	200	73
Gen. Hosp. Yale	220	74
KSU Teach. Hosp. Anyigba	207	74
Maria Goretti Hosp. Anyigba	225	75
Grimard Hosp. Anyigba	215	74
Total	1067	370

Criteria for Inclusion of Subject in the Study

Three hundred and seventy (370) infected mothers admitted in the above hospitals with following criteria participated in the study.

- ❖ Must be tested positive for HIV and AIDS

METHODS OF DATA COLLECTION AND ANALYSIS

Questionnaire

Structured questionnaire was prepared, validated by senior lecturers in the department of home science, Nutrition and dietetics. The questionnaire comprised questions about patient's general characteristics. Example, age, sex, duration of infection and place of residence and other characteristics as follows.

ANTROPOMETRY

Height

The heights of the malnourished infected mothers were taken using a height measure calibrated in centimeter (cm). The subjects were measured without shoes on the flat floor. A good standing posture was maintained before measurement. Their heels were pulled together touching the base of the wall. The heads of the subject were erected and hands hanging at the side in natural manner. Their shoulders were level and knee placed together. The heights of the subject were recorded to the nearest 0.1cm.

Weight

The weights of the subject were measured using beam balance scale. The scales were adjusted to zero before each measurement. The subjects were weighed with minimum clothing to ensure accuracy. The readings were recorded to the nearest 0.1kg.

BMI

B.M.I = Weight (Kg)

Height (m)² = kg/m²

Waist circumference

The measurement were taken at the umbilicus using an inelastic tape and recorded to the nearest 0.1cm.

Hip Circumference

The subject hip circumferences were measured at the largest dimension while the patient stands with her feet together.

Waist to Hip Ratio (W.H.R)

The waist/hip ratio is derived by dividing waist measurement by the hip measurement.

Biochemical Assessment

Biochemical analysis or laboratory test assist to determine what is happening to the body internally. Most test were based on analysis of blood samples, which contain nutrients; enzymes and metabolic that reflect nutritional status. Other test such as serum, pinpoint disease related problems with nutritional implications (Eleanor and Sharon 2006). In this study, a blood sample were collected from patient on admission and on discharge were retrieved from the patient folder to determine the CD4 count on viral load of the infected mothers as well as the BMI were equally retrieved from the patient's folder.

Dietary Study

The patient sizes of food serve to the malnourished infected mothers were quantified by weighing all raw food and ingredients which were used in preparing the meals. The cooked saving portion were equally weighed and saved to the malnourished infected mothers based on their individual energy presumption. The weighed served portions were recorded on the form for each malnourished infected mother. The subjects were counseled on the snacks to take especially the undernourished. The subject were strictly instructed to adhere to the hospital diet and record all the foods and snacks consumed during the study period. Energy and nutrient composition of the diet were calculated for each individual using food composition tables (plat, 1995, FAO 1996), The result were compared with FAO/WHO recommended level of intake and physicians prescribed energy levels for the malnourished.

Statistical Analysis

Statistical analysis was done using the computer program statistical package for social sciences (SPSS). Manwhitneys and Kruskawallis test were used for compares of variables. Each of the anthropometric indices were compared with the corresponding standard.

Weight as an Indicator of Nutritional Status and Percentage Ideal Body Weight
Nutritional Status.

>120 Obessed

110 – 120 Overweight

90 – 109 Adequate.

80 – 89 moderately undernourished.

70 – 79 moderately undernourished.

< 70 severely undernourished.

Source: Gibney et-al (2004).

BMI AS INDICATOR FOR NUTRITIONAL STATUS

BMI < 18.5 underweight.

BMI 18.5 - 24.9 normal.

BMI 25 – 29.9 overweight

BMI 30 obessed

Source: WHO (2000).

Waist and Hip Circumference

Waist circumference greater than 102cm in men and 88cm in women are associated with a measured risk of metabolic complications (Gibney et-al 2004).

Waist and Hip Ratio

Woman with a ratio of 0.8 or greater and men with a ratio of 0.95 or greater were regarded as at high risk of obesity related health problems (Eleanor and Sharon 1996). Measurements of biochemical analysis were interpreted with the standard as follows. CD₄ – Cluster differentiation four. It is also refers to as the viral load of the patient.

REFERENCE

Alliegro M. B. et al (1997). Incidence and Consequences of Pregnancy in Women with Known Duration of HIV Infection. Archives of Internal Medicine. 157:2888. [PubMed].

American Medical Association (1997). Treatment Center: Perinatal transmission. Retrieved August 2000 from <http://www.ama-assn.org/aids>.

Boelaert J. R. et al (1996). Altered Iron Metabolism in HIV infection: Mechanisms, Possible Consequences, and Proposals for Management. Infectious Agents of Disease. 5:36-46. [PubMed].

- Buy H. *et al* (2002). Micronutrients in the Case Management of HIV Infection. In H. Friis (Ed.), *Micronutrients and HIV Infections* (pp. 201-217). Boca Raton, FL: CRC Press.
- Fawzi W. *et al* (2002). Randomised Trail of Vitamin Supplements in Relation to Vertical Transmission of HIV-1 in Tanzania. *Journal of AIDS*. 23:246-254. [PubMed].
- Friis, H. *et al* (2002). Micronutrients and HIV Infection: An Introduction. In H. Friis (Ed.). *Micronutrients and HIV Infection* (pp. 1-21). Boca Raton. FL: CRC Press.
- Friis, H. *et al* (2001). HIV and other Predictors of Serum Folate, Serum Ferritin, and Hemoglobin in Pregnancy: Across-sectional Study in Zimbabwe, *American Journal of Clinical Nutrition*. 73:1066-1073. [PubMed].
- Friis, H. *et al* (2002). Micronutrient Interventions and the HIV Pandemic. In H. Friis (Ed.), *Micronutrients and HIV Infection* (pp.219-246). Boca Raton. FL: CRC Press.
- Gilbert, E. S. *et al* (1998). Sexually and None Sexually Transmitted Genitourinary Infections. E. S. Gilbert & J. S. Harmon (Eds.). *Manual of High-Risk pregnancy and Delivery* (2nd ed.) (pp. 618-652). St. Louis, MO: Mosby.
- Glynn, J. *et al* (2000). Decreased Fertility among HIV-1- Infected Women Attending Antenatal Clinics in Three African Cities, *Journal of Acquired Immune Deficiency Syndrome*. 25:345-352. [PubMed].
- Huffinam, S. *et al* (1999). The Case for Promoting Multiple Vitamin and Mineral Supplements for Women of Reproductive Age in Developing Countries. *Food and Nutrition Bulletin*. 20:379-380.
- Jones, M. *et al* (1999). Human Immune Deficiency Virus and Acquired Immune Deficiency Syndrome. In L. K. Mandeville & N. H. Troiano (Eds.), *AWHUNN's High-Risk and Critical Care Intrapartum Nursing* (2nd ed.), (pp. 302-321). Philadelphia: J. B. Lippincott.
- Jurado, R. L. (1997). Iron, Infections, and Anemia of Inflammation. *Clinical Infectious Disease*. 25:888-895. [PubMed].

- Kanter, A. S. et al (1999). Supplemental Vitamin B and Progression to AIDS and Death in Black South African Patients Infected with HIV. *Journal of Acquired Immune Deficiency Syndrome*. 21(3):252-253. [PubMed]
- Katz, J. et al (2000). Maternal Low-dose Vitamin A or Carotene Supplementation has no Effect on Fetal Loss and Early Infant Mortality: A Randomized Cluster Trial Nepal. *American Journal of Clinical Nutrition*. 71:1570-1576. [PubMed].
- Kotler, D. P et al (1989). The magnitude of body cell Mass Depletion in the Timing of Death from Wasting in AIDS. *American Journal of Clinical Nutrition*. 50:444-447. [PubMed].
- Kupka, R. et al (2002). Zinc Nutrition and HIV Infection. *Nutrition Review*, 60(3): 69-79. [PubMed]
- Mateos, F. et al (1998). Iron Metabolism in the Lower Respiratory Tract. *Thorax*. 53: 594-600. [\[PMC free article\]](#) [\[PubMed\]](#).
- Montgomery, K. S. (2002). Web sites that that Addresses HIV and Pregnancy. *Journal of Perinatal Education*. 11(4):41-43. [\[PMC free article\]](#) [\[PubMed\]](#).
- Rabeneck, L et al. (1998). A Randomized Controlled Trial Evaluating Nutrition Counseling with or Without Oral Supplementation in Malnourished HIV – Infected Patients. *Journal of the American Dietetic Association* 98:434-438. [PubMed].
- Semba, R. D. (2002). Vitamin A, Carotenoids, and HIV Infection. In H. Friis (Ed.), *Micronutrients and HIV Infection* (pp. 73-90). Boca Raton, FL. CRC Press.
- Semba, R. D. et al (1998). Maternal Vitamin A Deficiency and Infant Mortality in Malawi. *Journal of Tropical Pediatrics* 44:232-234. [PubMed].
- Semba, R. D. et al (2001). Iron Status and Indicators of Human Immunodeficiency Virus Disease Severity among Pregnant Women in Malawi, *Clinics of Infectious Disease*. 32:1496-1499. [PubMed].
- Sherman, D. et al (2001). HIV/AIDS and Pregnancy. In C, A. Kirton, D. Talotta, & K, Zwolski (Eds.), *Handbook of HIV/AIDS Nursing* (pp. 361-379), St. Louis, MO: Mosby.

- Stack J. et al (1996). High-energy, High-protein, Oral Liquid, and Nutrition Supplementation in Patients with HIV Infection: Effect on Weight Status in Relation to Incidence of Secondary Infection. *Journal of the American Dietetic Association*. 96:337-341. [PubMed].
- Sweet R. L. et al (1995). *Infectious Diseases of the Female Genital Tract* (3rd ed.), Baltimore: Williams & Wilkins.
- Tang, A. M. et al (1997). Low Serum Vitamin B-12 Concentrations are Associated with Faster Human Immunodeficiency Virus Type 1 (HIV-Disease Progression. *Journal of Nutrition*. 127 (2):345-351. [PubMed]
- Tang, A. M. et al (1996). Effects of Micronutrient Intake on Survival in Human Immunodeficiency Virus Type -1 Infection. *American Journal of Epidemiology* 14:1244-1256. [PubMed].
- Tang, A. M. et al (1998). Selected Vitamins in HIV Infection: A Review. *AIDS Patient Care Standards*. 12:263-273 [PubMed]
- Weinberg, G. A. et al (2002). Iron and HIV Infection,. In H. Friis (Ed.), *Micronutrients and HIV Infection* (pp. 135-180). Boca Raton, FL: CRC Press.
- West, K. P. et al (1999). Double Blind, Cluster Randomized Trial of Low Dose Supplementation with Vitamin A or Carotene or Mortality Related to Pregnancy in Nepal. *British Medical Journal*. 318:570-575, [PMC Free Article [PubMed].
- Whitney, E. N. et al (2002) *Understanding Nutrition* (9th ed). Belmont, CA: Wadsworth.
- Winson, G. (2001). HIV/AIDS Nutritional Management. In C. A. Kirton, D. Talotta & K. Zwolski (Eds), *Handbook of HIV/AIDS Nursing* (pp. 344-359). St. Louis, MO: Mosby.
- UNAIDS (2004). *2004 Report on the HIV/AIDS Epidemic; 4th Global Report*. Geneva, UNAIDS.
- Saadeh, R. J. (2000). *Infant Feeding and HIV Transmission*. This Publication.
- WHO (2001). *New Data on the Prevention of Mothers-to-Child Transmission of HIV and their Policy Implication: Conclusion and Recommendations*.

Geneva, UNFPA/WHO/UNAIDS Inter-Agency Task Team on Mother-to-Child Transmission of HIV.

Nduati, R. et al (2001). Effect of Breastfeeding of Mortality among HIV-1 Infected Women: a Randomized trial. *Lancet*, 357:1656-1660.

Latham, M. C. et al (2000). Appropriate Feeding Method on Infant on HIV Infected Mothers in sub-Saharan Africa. *British Medical Journal*, 320:1656-1660.

Coutsoudis, A. et al (2002). Free formula milk for infants of HIV-Infected Women: Blessing or Curse? *Health policy plan*, 17:154-160.

Kiarie, JN. et al (2004). Infant Feeding Practices on Women in a Perinatal HIV-1 Prevention Study in Nairobi, Kenya. *Journal on Acquired Immune Deficiency Syndrome*, 35:75-81.

Papathakis, P. et al (2004). Are WHO/UNAIDS/UNICEF- Recommended Replacement Milks for Infants of HIV-Infected Mothers Appropriate in the South African Context? *Bulletin of the World Health Organization*. 82:164-171.

King, J. C. (2000). Physiology of Pregnancy and Nutrient Metabolism. *American Journal of Clinical Nutrition*, 71:1218S-1225S.

Institute of Medicine (U.S.) (1990). *Nutrition during pregnancy: part I, weight Gain: Part II, Nutrient Supplements*. Washington, DC, National Academy Press,

Abrams, B. et al (2000). Pregnancy Weight Gain: Still Controversial. *American Journal of Clinical Nutrition*, 71:1233S-1241S.

Kac, G. et al (2004). Gestational Weight Gain and Pregnancy Weight Influence Postpartum Weight Retention in Cohort of Brazilian Women. *Journal of Nutrition*, 134:661-666.

Abrams, B. et al (1995). Factors Associated with the Pattern of Maternal Weight Gain during Pregnancy. *Obstetrics and Gynecology*, 86:170-176.

Picciano, M. F. (2003). Pregnancy and Location: Physiological Adjustments, Nutritional Requirements and the Role of Dietary Supplements. *Journal of nutrition*, 133:1997S-2002S.

- King, J. C. (2000). Determinant of Maternal Zinc Status during Pregnancy. *American Journal of Clinical Nutrition*, 71:1334S-1343S.
- Assembly of Life Science (U.S.) (1978). *Laboratory Indices of Nutritional STATUS in Pregnancy*. Washington, DC, National Academy Press,
- WHO (1995). *Physical Status: the Use and Interpretation of Anthropometry*. WHO. Technical Report Series 845. Geneva World Health Organization,
- Ladipo, O. A. (2000). Nutrition in Pregnancy: Mineral and Vitamin Supplements. *American Journal of Clinical Nutrition*, 72:280S-290S.
- Scholl, T. O., Johnson WG. (2000). Folic Acid: Influence on the Outcome of Pregnancy. *American Journal of Clinical Nutrition*, 71:1295S-1303S.
- Brocklehurst, P. et al (1998). The Association between Maternal HIV Infection and Perinatal Outcome: a Systematic Review of Literature and Meta-Analysis. *British Journal of Obstetrics and Gynaecology*, 105: 836-848.
- Rush, D. (2000). Nutrition and Maternal Mortality in the Developing World. *American Journal of Clinical Nutrition*, 72:212S-240S.
- Allen, L. H. (2000). Anemia and Iron Deficiency: Effect on Pregnancy Outcome. *American Journal of Clinical Nutrition*, 71:1280S-1284S.
- Tomkins, A. (2001). Nutrition and Maternal Morbidity and Mortality. *British Journal of Nutrition*, 85(suppl 2): S93-99.
- West, K. P. Jr. et al (1999). Double Blind, Cluster Randomized Trial of Low Dose Supplementation of Vitamin A or Beta Carotene on Mortality Related to Pregnancy in Nepal. The NNIPS-2 Study Group. *British Medical Journal* 318:570-575.
- King, J. C. (2003). The Risk of Maternal Nutritional Depletion and Poor Outcome Increases in Early or Closely Spaced Pregnancies. *Journal of Nutrition*, 133: 1732S-1736S.
- Macallan, D. C. (1999). Wasting in HIV Infection and AIDs. *Journal of Nutrition*, 129:238S-242S. Hsu JW-C. et al. Macronutrients in HIV/AIDs. This Publication.

- Thea, D. M. et al (1996). Plasma cytokines, Cytokine Antagonists, and Disease Progression in African Women Infected with HIV-1. *Annals of Internal Medicine*, 124:757-762.
- Grinspoon, S. et al (1999). Body Composition and Endocrine Function in Women with Acquired Immunodeficiency Syndrome Wasting. *Journal of Clinical Endocrinology and Metabolism*, 82:1332-1337.
- Kotler, D. P. et al (1985). Body Composition Studies with Patient with Acquired Immunodeficiency Syndrome. *American Journal of Clinical Nutrition*, 42:1255-1265.
- Kotler, D. P. et al (1989). Magnitude of Body-cell-Mass and in the Timing of Death from Wasting in AIDs. *American Journal of Clinical Nutrition*, 50: 444-447.
- Palenicek, J. P. et al (1995). Weight Loss Prior to Clinical AIDs as Predictor of Survival. Multicenter AIDs Cohort Study Investigators. *Journal on Acquired Immune Deficiency Syndrome*, 10:366-373.
- Guenter, P. et al (1993). Relationship among Nutritional Status, Disease Progression in HIV infection. *Journal on Acquired immune Deficiency Syndrome*, 6:1130-1138.
- Wheeler, D. A. et al (1998). Weight Loss as a Predictor of Survival and Disease Progression in HIV Infection. Terry Bein Community Programs for Clinical Research on AIDs. *Journal of Acquired Immune Deficiency Syndrome*. 18:80-85.
- Linden, C. P. et al (1992). Predictor of Mortality among HIV-Infected Women in Kigali, Rwanda. *Annals of Internal Medicine*, 116:320-328.
- Macallan, D. C. Nutrition and Immune Function in Human Immunodeficiency Virus Infection. *Proceeding of the Nutrition Society*.
- Beach, R. S. et al (1992). Specific Nutrient Abnormalities in a Symptomatic HIV-1 Infection. *Aids*, 6:701-708.
- Baum, M. K. et al (1995). Micronutrient and HIV-1 Diseases Progression. *Aids*, 9:1051-1056.

- Bogden, J. D. et al (2000). Status of Selected Nutrients and Progression of Human Immunodeficiency Virus Type 1 infection. *American Journal of Clinical Nutrition*, 72:809-815.
- Skurnick, J. H. et al (1996). Micronutrient Profile in HIV-1 Infected Heterosexual Adults. *Journal on Acquired Immune Deficiency Syndrome* 12:75-83.
- Tang, A. M. et al (1997). Association between Serum Vitamin A and E levels and HIV-1 Disease Progression. *Aids*, 11:613-620.
- Friis, H (1997). Micronutrient and HIV Infection. A Review of Current Evidence. This Publication.
- Baum, M. K. et al (1997). HIV-1 Infection in Women is Associated with Severe Nutritional Deficiencies. *Journal on Acquired Immune Deficiency Syndrome*, 16:272-278.
- The European Collaborative Study and the Swiss HIV Pregnancy Cohort (1997). Immunological Markers in HIV-Infected Pregnant Women. *Aids*, 11:1859-1856.
- Hock, C. et al (1995). Prospective Cohort Study of the Effect of Pregnancy on the Progression of Human Immunodeficiency Virus Infection. The Group d'Epidemiologie Clinique Du SIDA an Aquitaine. *Obstetrics and Gynecology* 86:886-891.
- Temmerman, M. et al (1995). HIV-1 and Immunological Changes during Pregnancy: a Comparison between HIV-1-Seronegative Women in Nairobi, Kenya. *Aids*, 9:1057-1060.

KOGI STATE UNIVERSITY ANYIGBA, ANYIGBA
DEPARTMENT OF FOOD AND NUTRITION HOME SCIENCE
FACULTY OF AGRICULTURE. PMB. 1008, ANYIGBA

Date: 7th January, 2018

The medical director,
Grimard hospital,

Sir/Ma

REQUEST FOR HOSPITAL-BASE DATA FOR STUDENT RESEARCH WORK

The under mentioned postgraduate student from the department of Food, Nutrition and Home Science. Kogi State University is currently involved in his/her research project on effect of malnutrition on HIV effected mothers that require some hospital-base data. Please, kindly assist him to provide some relevant information-data needed.

Name: Ayeh James

Matric No: PG/PGD/16/1066

Best regards.

DR. C. O. Orishagbemi
Ag. HOD

PART ONE: Personal Data.

1. Sex
(a) Male[] (b) Female[]
2. Age
(a) 10 – 20[] (b) 21 – 30[] (c) 31 - 40[] (d) 41 – 50[] (e) 51 – 60[] (e) 61 and above[]
3. Place of residence:
Name

(a) Urban[] (b) Sub-urban[] (c) Rural[]
4. Educational background
(a) No formal education[] (b) Primary[] (c) Secondary[] (d) Tertiary[]
5. Occupation
(a) Unemployed[] (b) Student[] (c) Junior civil servant[] (d) Senior civil servant[] (e) Farmer[] (f) Trader[] (g) Others...specify[]

PART TWO: Anthropometric/Biochemical DATA

6. Height (m) BMI (kg/m²)
7. Weight (kg)
8. Waist (cm) w/h ratio
9. Hips (cm)

Biochemical assessment

10. CD 4 count or viral load of patient
 - On Admission.....
 - On Discharge.....
11. BMI of patient
 - On Admission.....
 - On Discharge.....

WEIGHED FOOD INTAKE

	BREAK FAST		LUNCH		DINNER		Remarks
	Intake	Leftover	Intake	Leftover	Intake	Leftover	
Monday							
Tuesday							
Wednesday							
Thursday							
Friday							
Saturday							
Sunday							

OTHER VITAL INFORMATIONS

- a. Food intake dislikes
- b. Patient comment about meal served
- c. Date admitted
- d. Date discharged
- e. Consultant comments