IRON DEFICIENCY ANAEMIA: A PUBLIC HEALTH THREAT FROM NEONATE TO THE ELDERLY

By
PROFESSOR ROTIMI OLAJIDE ABIDOYE
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By

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INTRODUCTION

The historic record of what to eat and how to eat started in the Garden of Eden. Mankind was made perfect and head of God's creation by God Himself (Genesis 1). All animals were friends and neighbours to man. Eating was universal. However, man was forbidden to eat certain food, but, he chose to disobey God and he broke the first law of 'Nutrition'. "Thou shalt not eat this fruit and the day thou eat, thou shall surely die" (Genesis 1.17). Eating was pleasurable and fun then, but when uncontrolled, it resulted to mixed feeling, guilty pleasure, anxiety and curse. Man during early ages, before the great flood, fed on plants and recorded fantastic longevity, like Methuselah who lived for 969 years (Genesis 5:21). If Methuselah lived so long then our choice of diet could influence our long-time health prospects more than any other action we might take (Everet Koop, 1988).

After the great flood of Noah's time, mankind underwent an unprecedented revolution in his food habits. Life expectancy descended to a fearsome level. Seventy years for mankind was ungraciously low. Mortality and morbidity increased because of diet and nutrition revolution from plant food to animal food. The resulting world picture then was under-nourishment. Mankind became deficient and lost the ever increasing biological strength to resist the killing diseases. God in his infinite love directed man on what type of animal to eat in the book of Leviticus, Chapter 11. The guideline was to transform mankind thereafter. If God is so concerned about what we eat, it means nutrition is very important.
Today, we violate health and nutrition laws to our detriment by allowing various factors such as environment, tradition, taboos, culture, habits, ignorance, and personal life style to prevent us from eating right. Mankind is now experiencing food as a curse instead of as a blessing that God intended it to be. We need to go back to plants food just like it was in the Garden of Eden for life and longevity.

The Human Being's Essential Nutritional Needs

The human being needs food mainly to power the body and brain, for growth, body repair, maintenance and protection. Essentially food is needed to supply raw materials for the synthesis of new bone, blood, enzymes, muscle, hair, replacement and repair of cellular materials. The nutritional constituents that are needed for these functions are basically plenty of water, little carbohydrate, protein, little fat, vitamins, and minerals.

Water is considered the most important dietary constituent in that, about 60% - 70% of body weight is made up of water. It provides the body fluid that serve as coolant, thermal regulator, solvent for various substances that are essential for life and as a cleanser for dangerous metabolites in the body.

Carbohydrate serves as fuel to supply the energy needed by the body to work and this is divided into three main groups namely, monosaccharide, disaccharide and polysaccharide.

- **Carbohydrate**
  - Monosaccharide e.g glucose, fructose & galactose
  - Disaccharide e.g. Sucrose (table sugar), lactose & maltose
  - Polysaccharide e.g. Starch, glycogen (animal starch), cellulose

Fats are needed for cell membrane synthesis and lubrication. They are made up of fatty acids which are classified into essential and non essential types. The essential fatty acids, derived mostly from plant oils are arachidonic, linolenic and linolei while the animal fat contains mostly saturated fatty acids.

Protein is needed for growth, muscle building and formation of the enzymes that catalyze the wonderful chemistry of life. There are also essential and non-essential amino acids, depending on their source.

(a) The ten essential amino acids provided by the food we eat are –valine, histidine, threonine, isoleucine, leucine, lysine, methionine, phenylalanine, tryptophan and arginine.

(b) The examples of non-essential amino acids which can be produced in the body are glutamic acid, glycine, aspartic acid, serine, cystine, and glycine.

Minerals and vitamins are needed for body tissues and metabolic processes and protection.

Vitamins are chemically unrelated organic substances that make the chemistry of life happen. They are classified into two groups, the fat soluble Vitamins (A,D,E,K) and the water soluble vitamins
Macronutrients are the principal minerals in the body such as: calcium, phosphorous, potassium, sodium, chlorine, sulphur and copper. These are needed in larger amounts than micronutrients.

Micronutrients include magnesium, manganese, iron, iodine, fluorine, zinc, cobalt and selenium. These trace elements are required in extremely small amounts in the diet and are widely distributed in foodstuffs.

Malnutrition is the impairment of health resulting from inadequacy, excess, or imbalance of any of these nutrients in the body. Although all forms of malnutrition are detrimental to the wellbeing of man, the malnutrition of the micronutrients pose very serious challenge in the health sector.

IMPORTANCE OF IRON AS A MICRONUTRIENT
Blood is life, and carries oxygen and nutrients to the organs, fight infections and get rid of waste products. Iron in the blood is an essential part of haemoglobin that carries oxygen to the tissues. In simple terms iron serves a primary role in the body as a mediator of oxidative process, the heme compounds produced from iron are the carriers of oxygen to the tissue cells and the transporters of hydrogen to molecular oxygen as a part of the of the cellular electron transport system.

About two thirds of the very minute quantity of iron present in the body is located in the haemoglobin of the red blood cells. The rest one-third is distributed between the liver, spleen, bone marrow and muscles. Figure 2 summarises the roles and function of iron in the human body.

Iron exists in two components forms in the body; these are (1) an essential component which is about 70% of the total, and is contained in the haemoglobin, muscle, myoglobin, heme enzymes cofactor and transport and (2) the remainder nonessential storage iron which is found in the liver, spleen and bone marrow as ferritin, and hemosiderin (Lathan (1997).

Iron is a constituent of the enzyme system responsible for energy production and release in all cells. It is also a vital constituent of the muscles. Iron plays important role in the syntheses of collagen, and is also present in the enzymes like peroxidase, catalase and cytochromes. It is also required for hydroxylation of some amino acids such as proline and lysine in protocollagen. Iron is
transported in the plasma, bound easily to transfer, a beta globulin carrier protein, stored in the liver, spleen, and the bone marrow while the tiny quantities are found binding to protein in the blood plasma and respiratory enzymes (Latham, 1997).

Everyone needs iron in the diet. Table 1 shows the recommended daily iron requirements which have been found to increase with age.

<table>
<thead>
<tr>
<th>Group</th>
<th>Daily Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children</td>
<td></td>
</tr>
<tr>
<td>0-6months</td>
<td>6mg/day</td>
</tr>
<tr>
<td>6-12 months</td>
<td>10mg/day</td>
</tr>
<tr>
<td>1-10 years</td>
<td>10mg/day</td>
</tr>
<tr>
<td>Adolescent Male</td>
<td>12mg/day</td>
</tr>
<tr>
<td>11-14 years</td>
<td>10mg/day</td>
</tr>
<tr>
<td>19 years and over</td>
<td>10mg/day</td>
</tr>
<tr>
<td>Adolescent Female</td>
<td>15mg/day</td>
</tr>
<tr>
<td>11-50 years</td>
<td>30mg/day</td>
</tr>
<tr>
<td>Pregnant women</td>
<td>15mg/day</td>
</tr>
<tr>
<td>Breastfeeding</td>
<td></td>
</tr>
</tbody>
</table>

The iron absorption is usually hindered by the presence of tannic acid found in tea, cola drinks, coffee containing caffeine, phytic acid, phosvitin in egg yolk, excess of calcium and phosphorus in diet.

A deficiency of iron in the body occurs when these requirements are not being met. A deficiency of iron constitute a threat to life by the diminishing of the ability of blood to transport oxygen efficiently, reduction in the enzymatic system's energy production, and release functions, and a reduction in muscle functioning, (Ruth and Brown, 1975; Kloss, 1999).

**What is iron Deficiency Anaemia (IDA)**

Iron deficiency anaemia is a condition in which the level of haemoglobin in the blood, the haematocrit, or the red corpuscles become abnormally low due to deficiency of one or more essential nutrients (WHO, 1998). This condition in which the haemoglobin level falls below the normal standard level of 11 gram percent (gm%), is a common ill health among the Nigerian population. Figure 3 displays some iron deficiency anaemia issues presented in this lecture.

Iron deficiency remains the most prevalent of all the nutritional deficiencies. The most widespread incidence of iron deficiency is seen among children in their early years, preschool, children, adolescents and women during their childbearing years, including the pregnant women and the elderly. The severity of this was studied among the children, adolescents and women and the elderly in Nigeria (Abidoye and Situ, 1988; Abidoye and George, 1999 and Akinwande, 2002).

When deficiency occurs in the body the transfer is not adequate and without adequate iron the body cannot produce enough haemoglobin for red blood cells. The change in the iron binding capacity at plasma iron levels, is a useful diagnostic indicator of iron deficiency anaemia. The lowered capacity to provide oxygen in iron deficiency is largely responsible for the fatigue and apathy that are characteristic symptoms of iron deficiency anaemia. Other symptoms are weakness, not doing well in work or school, low body temperature, pale skin, rapid heartbeat, shortness of breath, chest pain, abdominal pain, weight loss, irritability, numbness and coldness of hands and feet, low blood pressure and headache.
Iron deficiency anaemia remains a very serious public health problem both in the developed and developing countries including Nigeria. In the course of my research spanning almost 20 years, the predisposing factors found to be responsible for iron deficiency among the populace were culture, tradition, taboos, environment, food production, processing, food conservation, food insecurity, and parasitic infection (Abidoye 1985 – 2003) and other predisposing conditions for anaemia include lack of folate, protein, iron, copper, vitamin C, B complex, and vitamin B12 complex.
calibrated graphically, (Dacie and Lewis 1968). Haematocrit determination was done by the micro method. This procedure measured essentially red blood cells (RBC), white blood cells (WBC) and platelets.

The Mean Corpuscular Haemoglobin Concentration (MCHC) was calculated from the values of the PCV (Packed Cell Volume) and Hb (Haemoglobin) Concentration. This parameter measured the percentage of haemoglobin in each red blood cell (Dacie & Lewis 1968).

Using this technique the total quantity of iron in the body by weight, the heme concentration, size, and sex were estimated to average the quantity of iron which is about 50mg per kg of body weight in adult men and 35mg per kg in adult women and supposed to be higher in pregnancy. The subjects stool specimens were examined microscopically and macroscopically for active eggs and cysts (Chatterjee 1975).

IRON DEFICIENCY ANAEMIA IN WOMEN
The dual roles played by the women as mothers and as productive workers with marginal food intake often lead to physiological depletion of nutrients, malnutrition and maternal depletion syndrome. Women are over burdened physically, with little rest and little food leading to inevitable weight loss, resulting in miscarriage, stillbirths and malformed foetus and abortion. Abidoye and Olukoya (1990) reported this among pregnant women in Lagos. The prevalence differed from one geographical area to another as reported by Scott (1949) in Glasgow and Knowttenbelt (1973) in Harare. Iron deficiency in the broadest sense, in women leads to less energy and personal resources for adequate care (Winikoff, 1988 and Akinwande 2002). The situation was more chronic in the rural than in the urban areas [Abidoye and Olukoya, (1990) Ojo (1952) reported 11.3% Chuwudebelu, and Obi (1975) reported 33.7% and Fleming (1982) reported this also among Northern Nigerian women. In the rural communities, constant loss of both micronutrients and macronutrients occurred as a result of agricultural involvement while in urban, women engage themselves in long hours of work even in pregnancy. The heavy labour demands high nutritional need which are not being met.

The anaemic woman is depressed or exhausted from heavy physical labour. Her care-giving abilities diminish similarly, and her ability to provide preventive and curative care for her children become limited, (Chatterjee 1989). Reproductive factors also affect a woman's caring capacity especially close pregnancies as well as other siblings. Chatterjee (1989) Many African women who went into pregnancy were ill prepared with poor nutritional status: Abidoye and Olukoya (1993), reported that rural African women had low haemoglobin level when compared with their urban counterparts. Intestinal parasites were reportedly higher in rural pregnant woman than the urban ones who attended antenatal clinics.

Ascaris was the commonest parasites found in this study, which agreed with the Zimbabwe study, of Goldsmid (1968), Fleming (1982) in the Northern Nigeria, Ojo (1965) at Ibadan studies and Chukwudebelu (1979). At pregnancy a woman needs energy from food and liquid for herself and the baby. As she feeds herself the foetus also grows and the breast tissues get prepared for lactation.

In addition, women need more iron than men because of the superimposed requirements related to reproduction, menstruation, pregnancy and lactation. The prevalence and severity of iron deficiency are therefore, considerably greater in women during their reproductive years than they are in men. (INACG 1977).

The prevalence of anaemia among the pregnant women was found to be about 31% while anaemia rate was found to be
highest in the third trimester. The mean haemoglobin level for the pregnant women was found to be 11.49gm\%, (Abidoye and Olukoya, (1992) and Knottenbelt (1973).

ANEAMIA, CULTURE, CAFFEINE, AND THE UNBORN BABY

Effect of caffeine Consumption by the Pregnant Mother on the Newborn

Kolanut called “obi” by the Yorubas, “oji” by the Igbo and “goro” by the Hausas is eaten on many occasions by our people including the pregnant women. During the naming ceremony of a child, it is taken to signify long life for the child. Other uses are for the wedding engagement, as part of the presents brought by the suitors’ family during the introduction, as a sign of respect exchanged among the traditional families. However, until recently there was little interest in the effect of caffeine on the foetus and newborn and it seemed that few epidemiologic studies have emerged to correlate maternal caffeine with birth weight in humans. Reports on the safety of caffeine ingestion during pregnancy are controversial and conflicting. The volume of caffeine consumption in Nigeria is not documented, however, in the developed countries the incidence of low birth-weight babies has been linked to caffeine consumption. Ninety-five percent of the estimated world’s twenty-two million low birth weight babies that are born annually are from developing countries. Caffeine contents can reach a particular level in the blood as to precipitate undesirable side effects. It is a potent stimulator. Kolanut contains many ingredients one of which is caffeine (methylated xanthine: 1,3,7 trimethy xanthine). When consumed during pregnancy caffeine gets to the foetus via the placenta. Nigerian women chew kolanut indiscriminately during pregnancy for nausea. In a study conducted to investigate the relationship between maternal caffeine consumption among pregnant women who attended Island Maternity Hospital and consumed kolanut for nausea and the birth weight of their babies Abidoye and Chijoke (1990) reported that maternal caffeine intake affected the weight of the newborn babies in our study. Positive correlation occurred between maternal caffeine ingestion and the weight of the newborn. Anthropometric measurements showed head circumference, and chest circumference fell below the anthropometric standard of 42-45cm and 30-35cm respectively as a result of intake of kolanut during pregnancy. A higher percentage of babies whose mothers took kolanut (71%) fell in the 30-35cm head circumference group while 65% of babies whose mothers did not take kolanut fell in this group. None of the babies whose mothers took kolanut fell to the 42- 47cm group only 2% of babies whose mothers did not take kolanut belonged to that group. There was a significant correlation between kolanut consumption and head circumference (P<0.05).

It has been documented that reduced head circumference as a result of intake of caffeine during pregnancy may result in cognitive impairment as nutrition is critical to the development of the brain. (Noble, 1960 and Akinwande, 2002). Maternal malnutrition have been shown to have a damaging effect on the young brain and during the gestation and lactation the quantities of nutrients provided for the growth of the foetus and suckling is limited. Abidoye and Chijoke 1999, Akinwande 2002).

ANAEMIA IN THE NEONATE AND SUCKLING

Breast Feeding and the Anthropometric effects on Nigerian children

Mr Vice-Chancellor Sir, our culture and tradition is for mothers to breast feed their babies. I will not over emphasize the importance of breast milk which undoubtedly I and many others took advantage of for 3 years or more. I suckled breast milk for over 3 years. In recent years it is the belief of the high socio-economic mothers that suckling for such along period is barbaric. Few breast feed their babies briefly while many do not. It is heart warming that much of the new researches and publications concerning nutrition in childhood over the past few years have continued to focus on the importance of breast feeding. Both the short term and long-term benefits and the advantage can not be

About 98.8% of mothers who breastfed were the low socio economic mothers, while 2.9% started breastfeeding from the first day of birth, with less than 40% rate of colostrums discarded. We found out that some of the working mothers 11.6% expressed breast milk for preservation for a maximum of 2.3hrs. The advantage of breastfeeding, aside from the nutritional values include protection against infection, reduced incidence and severity of allergy (Hamos, Ellis Pallock, and Henderson 1996 & 1997), Hamburger 1988) and increased psychological binding to the mothers, (WHO,1995).

Abidoye and Situ (1987) in a study of students in Kings College and Queens College Lagos showed that those breastfed among them selected mostly science subjects including additional mathematics. High intelligence quotient (IQ} has also been reported in breast fed babies (Hamos et al 1996 and, Abidoye and Situ 1988,Abidoye and Eze (2000). The foundation of life is solidly laid if the mother adequately breastfed her baby. The normal infant needs breast milk exclusively for six months. The energy needs during infant life is crucial. Breast milk contains all the necessary nutrients required to sustain the optimal physical growth and mental development of infants in the first six months (Halin Zoni, 1994; Diaz et al 1995; Abidoye and Nwachie 2001).

Watt, Ngandu, and Wray (1990) noted that growth was good in the first six months of the population of breastfed babies. Abidoye and Nwachie (2001] saw a statistical significant relationship between breastfeeding and growth (P<0.02) in six month old babies fed with vitamin A. Breastfeeding was identified with high school performance, (Abidoye and Eze, 1991; Abidoye and Nwachie, 2000). Breastfed infants performed intellectually better in school than those that were not breastfed. (Abidoye and Nwachie, 2000; Krammer, Rue and Gergan, 1995; and Oyedeji 1997). Breast milk contains important lipids needed for the postnatal development of the brain. Other studies found that children not breastfed in Ghana, and Tanzania had predominance of anaemia (38%).The prevalence of anaemia was found to be high among the school children studied across this nation and impairment of learning abilities was commonly seen among them, (Abidoye, Situ, Eze and George (1992 – 2002).

ANAEMIA IN ADOLESCENTS
Adolescence is a period of growth and rapid development. This is the period when their bodies need everything for growth and repair but unfortunately adolescent nutrition has not received good attention in this country. The tradition of gainfully engaging the adolescents in this country, is eroding fast, many are now engaged in begging, prostitution and street hawking. The situation has not received our attention. The prevalence of anaemia found among the adolescents was 47.7%. Iron deficiency anaemia was found to be 36.4% among pregnant adolescents with poor nutritional status (Abidoye, 1997). The mean haemoglobin level of the adolescents in our study was 11gm% comparatively lower than WHO standard of 12gm% (Abidoye and Darkwa 1991). The contributing factor to this anaemia apart from poor nutritional status was intestinal parasites such as ascaries and trichuirs which was 47% among the adolescents studied (Azubike, 1977; Abidoye and Darkwa, 1991).

Good nutrition for all mankind is a basic human right. The situation in Nigeria has become gloomy since the failure of the Structural Adjustment Programme. Now the nation is experiencing economic collapse with high rise in the price of petroleum...
products affecting every segment and reducing the economic power of every home. The food security in every family is unattainable dreams. The iron level is low among our adolescents and the prevalence of anaemia is getting higher everyday. Malnutrition is victorious in every home in Nigeria because families could no longer afford three meals daily. Balance diet is eternity dream. Anguished husbands helplessly wait for poverty alleviation programme to come from the government. Majority of Nigerian homes embark on the popular formula of .001 or 010, 110.daily. African countries have about 70% of occurring death under five, in contrast to 5% in developed countries. The ever worsening political climate in most sub-Saharan African regions has resulted into war and refuge problems with restricted inflow of foreign capital investments consequently tilting the economy of these countries downwards with unprecedented hardship on its citizenry (WHO, 1996). The sum total is poverty which is known to have direct bearing on the nutritional intake of the Nigerian families. Nutritional deficiencies coupled with unfriendly environment breed negative impact on the mental and social competence of our children thus high mortality and morbidity rate thrive.

The Elderly and Iron Deficiency Anaemia
Ageing is a process of physiological degeneration of the dynamic functions of the body. The elderly need all the nutrients to keep their function active since this is a stage of physiological degeneration of the body. Their metabolic rate is slower, they eat less, and they exercise less. The elderly need good foods that provide all the necessary nutrients for maintenance of the body and for productivity. This is the age for caution because chronic diseases like hypertension, obesity, atherosclerosis, heart disease, loss of teeth, dental caries, prostate and other cancers, diabetes, osteoporosis and osteomalacia associated with macro and micronutrients dysfunction appear. Osteoporosis characterized by reduced bone mass in the elderly resulting in bone fragility and fracture of the bones, (WHO 1994) found mostly in the urban elderly (Abidoye, 2000; Johnston and Lathan, 1982). The elderly were malnourished from our studies with manifested diseases like anaemia and fear of tomorrow from our studies (Abidoye and Situ, 1985; Abidoye and Oyemade, 1989). The African tradition of keeping our aged with us and not institutionalizing them is eroding. Our social and psychological norm is that African elderly would feel more at home where he/she is able to play with grandchildren, immediate relatives and engage in semi-cooking and petty house duties. This trend is radically changing as a result of economic empowerment.

In developed countries, the aged are committed to institution for caring; this practice has resulted into high life expectancy rate as a result of better nutrition and healthcare. The trend of keeping our aged is changing and government needs a radical policy on nutrition and health for the aged to meet the present challenges, while communal family care of the elderly should be reemphasized though societal norm is not favourably disposed to committing our elderly to institutions where they could be well taken care of. The elderly in our studies were malnourished with problems such as anaemia, (Abidoye and Situ, 1985), loneliness, socio medical problems, fear of the future and frequent bone fracture as a result of under mineralization in elderly (Abidoye and Oyemade, 1989). Hercberg et al (1981) estimated that about 500 million to 1 billion individuals in the world are affected by nutritional anaemia in which the elderly are included. Abidoye and Situ (1985), investigated three Institutions in Lagos and found a rate of 46.7% anaemia compared to non-institution elderly which was 47%. Other medical problems observed were arthritis, hypertension, diabetes, obesity, cardiovascular, (Abidoye and Situ, 1987), osteoporosis and multiple fracture of bones, (Abidoye and Oyemade, 1989).

Future plan needs to be in place to establish good institutions to take care of both the rural and urban elderly. The present population of elderly is facing multiple problems, such as lack of
qualitative and quantitative food intake. Our elderly need therapeutic, preventive and supportive care as they deserve the best. Supplementation is needed, including vitamins D etc for those who do not have high intake of food rich in calcium.

CULTURE, TRADITION, TABOOS, BELIEFS, HABITS AND NUTRITION ANAEMIA

Culture, tradition, taboos, beliefs and habits are complex configuration of learned behaviours which constantly change slowly or rapidly and influence mankind massively and pervasively (Clifford 1975). Cultural forces are powerful and could be modified by educational experience and socio-political settings (Abidoye and Situ, 1988). Food and culture are reciprocally linked and each contributes to identify where people come from and how they eat. Within this culture, man is endowed with ever increasing desire to manipulate his diet in hope of becoming stronger, more attractive, healthier, happier and live longer (Hodges, 1980).

ETHNICITY, HABITS AND NUTRITION ANAEMIA

Mr Vice-Chancellor Sir, the cultural environments in which people grow up have major influence, on what food they eat and prefer. An Ekiti or Oke Igbo man in Ondo, would never say he has eaten any day, until he has eaten pounded yam, and even an Ijesha man after all night sitting and collecting from his debtors, would go home to eat pounded yam no matter how late. The Oyos would prefer ‘amala’ while the Hausas prefer ‘tuwo’ and for the Igboos it is ‘apu’. Food habits are among the last and most difficult habits to change. The strongest influence on food preferences are tradition, and cultural background and no matter how simple or complex societies are they all have primary ways of maintaining culture, and tradition. People around us influence our food choices as we prefer the food we grew up with and to a larger extent our culture define our attitude as “one man’s food is another man’s poison”. Our culture, our beliefs and taboos sometimes lead us negatively.

CULTURAL TABOOS AND IRON DEFICIENCY

This negativity of culture was studied using social-structural stratification survey of Hausa and Yoruba pregnant women in Agege, Lagos. Abidoye and Akinpelu (1997) confirmed by this study that different tribes in Nigeria have culture, beliefs and taboos that have negative effects on maternal nutrition. A total of 148 Hausa and Yoruba pregnant women were randomly sampled to study their culture and beliefs on why they abstained from certain foods such as protein rich foods. Each woman was asked to list the food items eaten and avoided during pregnancy.

Analysis of the pre and post haemoglobin levels showed that the mean before the study for the Yoruba, was 11.5gm% while that for the Hausa was 10.5gm%. While the mean packed cell volume (pcv) for both at the beginning of the study was 34.2% and 35.4% while the Hausa was 31.5gm%, and 34.2gm% respectively. The post-haemoglobin level for the Yoruba was 12.9gm% compared with 11gm% for the Hausas. Table 2 shows some of the food items identified by these tribes and table 3 shows avoided foods and reasons for avoidance.
Table 2: Percentage frequency of mention of perceived nourishing food during pregnancy by Hausa and Yoruba women

<table>
<thead>
<tr>
<th>Food item</th>
<th>Hausa women %</th>
<th>Yoruba women %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENERGY GIVING FOODS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Cassava meal (manihot utilissima pohl)</td>
<td>47.2/74</td>
<td>93.2/74</td>
</tr>
<tr>
<td>2. Yam flour (Disarea rotunda pohl)</td>
<td>60.8/74</td>
<td>83.7/74</td>
</tr>
<tr>
<td>3. Yam (Boiled, fried or pounded)</td>
<td>27.0/74</td>
<td>94.5/74</td>
</tr>
<tr>
<td>4. Tuwo masara/Steamed Corn pap (Zea mays)</td>
<td>100.0/74</td>
<td>81.0/74</td>
</tr>
<tr>
<td>5. Rice/ Tuwo shinkafa (Oryza sativa)</td>
<td>100.0/74</td>
<td>91.8/74</td>
</tr>
<tr>
<td>6. Bread</td>
<td>54.0/74</td>
<td>74.3/74</td>
</tr>
<tr>
<td>7. Sweet potato</td>
<td>74.3/74</td>
<td>-</td>
</tr>
<tr>
<td><strong>PROTECTIVE FOODS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Locust beans</td>
<td>47.2/74</td>
<td>-</td>
</tr>
<tr>
<td>2. Beniseed (Ishwa)</td>
<td>51.3/74</td>
<td>-</td>
</tr>
<tr>
<td>3. Melon</td>
<td>37.8/74</td>
<td>-</td>
</tr>
<tr>
<td>4. Spinach (Tete) (Amaranthos species)</td>
<td>-</td>
<td>67.5/74</td>
</tr>
<tr>
<td>5. Plantain (Musa sapientum var)</td>
<td>-</td>
<td>40.5/74</td>
</tr>
<tr>
<td>6. Water leaf (Talinum species)</td>
<td>-</td>
<td>33.7/74</td>
</tr>
<tr>
<td>7. Ewedu (Cochorus olitoris)</td>
<td>-</td>
<td>27.0/74</td>
</tr>
<tr>
<td><strong>BODY BUILDING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Beef / Organ meat (Liver, Kidney)</td>
<td>52.0/74</td>
<td>27.0/74</td>
</tr>
<tr>
<td>2. Cheese (Wara) / Milk</td>
<td>52.7/74</td>
<td>31.0/74</td>
</tr>
<tr>
<td>3. Beans</td>
<td>-</td>
<td>20.2/74</td>
</tr>
<tr>
<td>4. Fish</td>
<td>44.5/74</td>
<td>56.7/74</td>
</tr>
<tr>
<td>5. Eggs</td>
<td>54.0/74</td>
<td>33.7/74</td>
</tr>
</tbody>
</table>

Table 3: Percentage response on avoided food items during pregnancy and reasons for avoidance

<table>
<thead>
<tr>
<th>Food item</th>
<th>Hausa reasons for avoidance</th>
<th>Yoruba reasons for avoidance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENERGY GIVING FOODS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Cassava meal</td>
<td>Causes abdominal discomfort, ache and heaviness. (17.1)</td>
<td>Dislike odour and colour (29.5)</td>
</tr>
<tr>
<td>2. Yam flour (Amala)</td>
<td></td>
<td>Causes heaviness of stomach (31.2)</td>
</tr>
<tr>
<td>3. Yam (Boiled, fried or pounded)</td>
<td>Causes belching at delivery (20.0)</td>
<td>Causes abdominal discomfort (30.1)</td>
</tr>
<tr>
<td>4. Cocoyam</td>
<td>Causes dysentery. Spoils human relationship (18.5)</td>
<td></td>
</tr>
<tr>
<td>5. Sweet potato</td>
<td>Too sweet, causes diarrhoea and diabetes (12.3)</td>
<td></td>
</tr>
<tr>
<td><strong>PROTECTIVE FOODS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Pumpkin leaf (Cucurbita pepo)</td>
<td>Cause slit in new born babies (55.2)</td>
<td>Cause diarrhoea (42.5)</td>
</tr>
<tr>
<td>2. Beniseed (Ishwa)</td>
<td>Cause excessive mucus formation in mothers womb which causes blindness in baby (72.5)</td>
<td>Cause yellow fever; affects child's teeth (38.5)</td>
</tr>
<tr>
<td>3. Mango</td>
<td>Disliked for its odour (90.2)</td>
<td></td>
</tr>
<tr>
<td>4. Oranges</td>
<td>Cause breast milk to be watery (85.5)</td>
<td>Disliked for its taste (42.6)</td>
</tr>
<tr>
<td>5. Guava</td>
<td>Cause constipation; abortion (89.3)</td>
<td></td>
</tr>
<tr>
<td>6. Banana</td>
<td>Cause intestinal worms (78.6)</td>
<td></td>
</tr>
<tr>
<td>7. Bitter leaf (Veronica amygdalina)</td>
<td>Make child to be a liar. Cause dizziness; Disliked for its odour (76.8)</td>
<td>Disliked for bitter taste and odour (98.2)</td>
</tr>
<tr>
<td>8. Melon</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BODY BUILDING</strong></td>
<td>Disliked on religious grounds (100.0)</td>
<td>Disliked on religious grounds (100.0)</td>
</tr>
<tr>
<td>1. Pork</td>
<td>Dislike the taste and odour (72.1)</td>
<td></td>
</tr>
<tr>
<td>2. Chiken</td>
<td>Excessive water intake after eating. Abdominal discomfort (88.5)</td>
<td></td>
</tr>
<tr>
<td>3. Beans</td>
<td>Forbidden by family. Babies will behave like animals when grown 52.0</td>
<td></td>
</tr>
<tr>
<td>4. Meat (bush meat, rabbit, antelope)</td>
<td></td>
<td>Family taboo. Excessive salivation (89.3)</td>
</tr>
</tbody>
</table>
Table 4: Mean Hemoglobin (Hb.) level and PCV of Hausa and Yoruba pregnant women pre and post registration

<table>
<thead>
<tr>
<th></th>
<th>Hausa Women</th>
<th></th>
<th>Yoruba Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre- Booking</td>
<td>Post booking</td>
<td>Pre- Booking</td>
</tr>
<tr>
<td>Mean Hb. level (g/%)</td>
<td>10.6</td>
<td>11.0</td>
<td>11.5</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.73</td>
<td>1.18</td>
<td>1.35</td>
</tr>
<tr>
<td>Mean PCV</td>
<td>31.5</td>
<td>34.2</td>
<td>34.2</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>5.19</td>
<td>3.54</td>
<td>4.05</td>
</tr>
</tbody>
</table>

T = 1.21 P < 0.05 (statistically significant)

Nutritional anaemia was found to be higher among the Hausa women than the Yoruba from 56.7% to 72.9%. The incidence of the low birth weight babies in the study among the Yoruba was 14.8% while the Hausa was 22.9%. Head circumference and chest circumference median recorded for the Yoruba was 38.5cm and 32.5cm and for the Hausa babies it was 32.5cm and 26.5cm chest circumference respectively, (Abidoye and Akinpelu, 1997). About 75% of the Hausa identified that mother in-laws were instrumental to these taboos, and beliefs while, the Yoruba also identified mothers- in-law as the source of reinforcement of the taboos and beliefs. The taboos and beliefs identified were almost similar among the Hausa and the Yoruba except that the Hausas associated animal protein (snake, rabbit, snail and bush meat) with threatened abortion and excessive salivation, (Abidoye & Akinpelu,1997).

Both the vegetable and animal proteins which are beneficiary to the pregnant women were therefore not encouraged. Cowley (1963) stated that nutritional problem might arise when pregnant women moved to new environment where they are unfamiliar with the foods. The Hausa women in this study had lived for more than 2 years in this environment (Agege) yet they all maintained their taboos and beliefs.

Even though, the Yoruba and the Hausa women in this study were not ignorant of food items nourishing to them and their babies, they were overwhelmed by "fear" of consequences of a revolt to food taboos and thus unwilling to expose themselves to unforeseen consequences during and after the delivery. Culture, tradition and taboos bred malnutrition in this study.

The community and its environs also differ in social setting and have their norms, tradition and culture and techniques which affect nutritional status, and further create deviant behaviours. For instance the practice of withholding food as punishment ("Iwo omo yi, o ni jeun loni!") produced negative results. The effect of food withdrawal or food deprivation as a treatment module in African homes, a practise for treating deviant in Yoruba families is counter productive. This treatment from our study was found to lead to nutritional anaemia, alcoholism and smoking among children of mean age 11.4 years in Remand Homes in Lagos, (Abidoye, 1990). A total of 75% of juveniles surveyed, rebelled against the parents and society. West (1977) also postulated that environmental factors lead to the cause of juvenile delinquency. Thus food deprivation used in these families led to personality disorder, low productivity in school, armed robbery, malnutrition, drug trafficking, injury to others and hatred to family and other societal problems (Abidoye, 1990). The cultural and traditional food deprivation a form of treatment for delinquency, used in African societies is mentally, psychologically, physiologically unhealthy and undesirable and should therefore be avoided.

THE ECONOMY AND IRON DEFICIENCY ANAEMIA: HOW AVAILABLE IS FOOD

World population is geometrically increasing at alarming rate thus putting the entire world in extreme jeopardy. The exodus from the rural to urban areas in search of green pasture has not helped agricultural productivity. There are more part-time farmers than full-time farmers. The Nigerian population was about 90-100 million 10 years ago, now it is estimated at about 130-150 million and food is not available for the masses.
The population explosion makes the needs and competition for food more complex. There is low productivity and high demand and low purchasing power among the majority of Nigerians, thus families eat what they can afford and not what the body needs which makes every family prone to diseases while our environment remains endemic with malnutrition and diseases. (Abidoye and Soro, 1998; Abidoye and Ihebuzor, 2000; Abidoye and Izuma, 2002). This nation cannot feed its citizens. Among the workers iron deficiency anaemia is a problem and this was reported among Lagos women bankers by (Abidoye and Izuma, 2002). This affected their productivity and increased frequency of visitations to the clinics, and much absenteeism from work. Iron deficiency anaemia affects the economy (Abidoye and Izunma 2002). Economy is precipitating anaemia both in public and private sector. The situation is gloomy with increasing rise in the price of petroleum products which will bounce back on the price of food and living condition. Our dietary intake continues to suffer and the incidence of iron deficiency anaemia increases in this population.

FOOD SECURITY AND POLITICAL POWER OF THE PEOPLE

Food security is the access opportunity by people at all times to sufficient food required for a healthy and active life. Access to adequate food is not present in most Nigerian homes and thus diminishing the political power in the homes. Absence of political power is the result of physical and economic inaccessibility to adequate food. An ideal household should have the ability, the will power, knowledge and resources to produce or procure food needed for all members of the family. The Human Right to adequate food as recognized by the Universal Declaration of Human Rights (1990) does not exist in Nigerian homes.

There is no national development policy that embraces food security for every home. The population has scarce means of satisfying their energy needs. Therefore, there is food deficit in the three quarters of Nigerian homes.

Food security at home is not available to serve as an intervention programme for growth and development in the children. The homes with no food security is a non-conducive environment for physical, mental, social and spiritual development. In the absence of food security the myriad of environmental factors, that bring holistic development become impossible. The intricate links between the development of a child and household food security showed in our studies that families that lacked food security bred malnutrition, diseases and deficiencies leading to educational underachievement (Abidoye, 2002).

Nigeria is one of the agrarian countries in Africa with 70% of her population engaged in agriculture. Today this scenario has changed to heavy dependence on importation of food while the entire population rely increasingly on the rest of the world for supply of food with decline economy allowing malnutrition to thrive. (Tayo, 2003; Abidoye and Situ, 1989; Abidoye and Achegbulu, 1990; and Abidoye and George, 1991) We agreed with Rao (1987) that any nation that could not feed her citizens looses her sovereignty through dependence on other nations for her food supply. Idachaba (2000) stated that Nigeria had undesirable agricultural policies over the years. Since 1974, many programmes and institutions have been introduced in the nation such as National Accelerated Food Production Project, Operation Feed the Nation, Green Revolution Programme, River Basin Development Authority, Directorate of Food and Road Infrastructures, Federal Ministry of Water Resources, Fertilizer Subsidy, Food Security and Poverty Alleviation Programme, and Federal Coordinating Unit and National Agricultural Land Development Authority, but all these programmes had corruption as their baseline. The failure of these plans had resulted in high prevalence of malnutrition in Nigeria. Rao (1987) and Onachiyo (1998) identified Nigeria as one of the countries that has become a laughing stock to the world. Population is growing geometrically while food production increases arithmetically and our rural area is becoming desolate while the urban becomes more over
crowded. There is inverse proportion in population and food production (Tayo, 2003). Food unavailability is a national problem.

BIOTECHNOLOGY THE WIND OF CHANGE BLOWING THROUGH AFRICA

Mr Vice-Chancellor Sir, one would wonder whether biotechnology has any direct effect on our national food security. Food biotechnology is a controversial development in the food industry and the big question across Africa is whether Africa is ready for biotechnology. The principle behind the biotechnology or Monsanto terminator technology, as it is called, sterilizes seed so that it cannot be re-planted, and this makes it, too costly for an average farmer. The policy on biotechnology in Africa must take into cognizance, the values of the people, their tradition, culture, environment, population and poverty which are our common denominators. Our tradition and culture also permit sharing of seeds for growing. All these variables make seeds infection rate high and disease control very difficult. The popular saying is, it cannot come to Africa where the 85% of the populace is below the poverty line.

The genetic modification of plants and seeds have, never received a balanced discussion in the field of Agriculture due to trails of contaminations. This method is widely used in America and Europe. The farmers in these developed countries are economically buoyant; therefore, the needs to trade seedlings do not arise. The farmers can afford to buy certified seeds from authorized dealers.

The first generation of biotechnology focused on input to benefit household food security, while controlling the seed supply chain and plant resistance, but the mighty companies hijacked the technology and placed the farmers at economic disadvantage. The developing countries need to understand this technology before dismissing it. There are advantages and disadvantages.

The disadvantages however outweigh the advantages in our society where poverty is the order of the day.

There is no preservation of seeds, the farmers need to go back and buy the seedling for every planting season. It is an economic and agricultural slavery and suicide to developing countries. Though, the International Council with over fifty researched reviews certified the safety of genetically modified seeds yet, there is no comprehensive regulatory safety in place, for Africa to ensure safe trade, and transfer of seeds. Africa is blessed with lands, and good weather for agriculture. Farmers need to be educated to stop the use of genetically modified seeds/organisms (GMOS). Biotechnology is a method in vacuum when there are no facilities and no training is available. There is no doubt a lot comes from ignorance, but once we learn about biotechnology, we can talk. Genetic modification could be dangerous for the African farmers if uncontrolled since the continent is crippled with striking poverty, together with exodus of population from rural communities to the urban. There is fear and people need information. There are critics because the Africa survival is based on improved economy. Farmers can never produce enough under the economic hardship, and to turn to Monsanto Corporation in developing world is an easy way of committing economic suicide. When there is lack of food, malnutrition thrives, iron level of the population goes down with low productivity and high rate of anaemia.

URBANIZATION AND IRON DEFICIENCY ANAEMIA

Problems of malnutrition are linked to urbanization. Children live under diverse urban stressful conditions, which are beyond their control. Urbanization is seen by many as a way of improvement and civilization and where all the essentials of life are provided. There is tendency therefore, for the people to migrate to the urban areas in search of livelihood. In the urban areas, facilities are over-stretched, power supply becomes erratic, portable drinking water are scarce, and refuse dumping becomes indiscriminate
in any available open space. Overcrowding and poverty become the sum total, and these have direct bearing on the nutritional status of the children.

Urban effect is grossly seen among the Nigerian children and this affect their dietary intakes (Abidoye, 1997; Abidoye and Soro 2001). The impact of rapid urbanization and increasing poverty level on the nutritional status of the children were studied in Lagos, among 399 school children. Prevalence of protein-energy malnutrition was 42.5% among these children, 45.1% of the children were found anaemic. About 66.7% of malnourished children lived in a single room with parents economically handicapped, while, the 32.1% (128) had no access to regular supply of water. A strong relationship existed between poverty level, urbanization facilities, and refuse disposal and incidence of nutritional anaemia (p<.001, P<.005). Table 6 illustrates the effect of urbanization on the children.

Table 6: Type of house and Anaemia in the urban children

<table>
<thead>
<tr>
<th>Type of House</th>
<th>Normal PCV≥30%</th>
<th>Anaemia PCV&lt;30%</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-contained house</td>
<td>23(95.8%)</td>
<td>1 (4.2%)</td>
<td>24 (100%)</td>
</tr>
<tr>
<td>Self-contained flat</td>
<td>10(83.3%)</td>
<td>2 (16.7%)</td>
<td>12 (100%)</td>
</tr>
<tr>
<td>Brazilian face-to-face</td>
<td>29(69.1%)</td>
<td>13 (30.9%)</td>
<td>42 (100%)</td>
</tr>
<tr>
<td>Room and Parlour</td>
<td>30 (44.1%)</td>
<td>38 (55.9%)</td>
<td>68(100%)</td>
</tr>
<tr>
<td>Make-Shift</td>
<td>28 (52.8%)</td>
<td>25 (47.2%)</td>
<td>53(100%)</td>
</tr>
<tr>
<td>Huts and Thatch</td>
<td>58 (32.8%)</td>
<td>119 (67.2%)</td>
<td>177(100%)</td>
</tr>
<tr>
<td>Total</td>
<td>178</td>
<td>192</td>
<td>370</td>
</tr>
</tbody>
</table>

One hundred and nineteen (67.2%) children living in huts and hatch houses and 38 (55.9%) living in a room and parlour respectively were found to be anaemic ($X^2=40.6, P=0.000$). The study also revealed that 66.7% of these urban children lived in the single room apartment and (65.5%) of those living in modern shafts homes respectively had anaemia and 63.2% manifested malnutrition. This finding was corroborated by WHO (1989) that overcrowding due to poor housing unsanitary conditions, and poor hygiene contributed to the transmission of communicable diseases and malnutrition.

This study further showed that 74.7% of the children who defecated on the bare floor were malnourished thus corroborating the findings of Agugua (1983), who at Enugu reported high prevalence of ascaris under poor personal hygiene. Abidoye (1996) reported that as much as 81.8% of the children whose homes had no toilet facilities were anaemic and 67.1% who used pit latrines had anaemia. The results further showed that 74.8% of the children whose care givers were housemaids had clinical manifestation of malnutrition. Urbanization had direct consequences on the nutritional status of the children studied. The urban effect in Lagos showed that 37.9% of the children were malnourished with 84.9% presenting ova and cyst of intestinal parasite in the stools (Abidoye, 1993). This finding was similar to that of Crompton and Savioli (1993) which reported high prevalence of parasites in urban setting.

Urbanization has been viewed as a major factor in sharp decline of incidence of breast feeding in developing countries (Robenberg, 1989). Anthropometric assessment of these children carrying parasites in Lagos showed 38.2% had weight- for- height score of −2SD, and 40.5% had low height- for- age score indicating wasting and stunting and a rate of 51% anaemia among the 198 infants while 49.1% had parasites.
THE USE OF HARD DRUG AND NUTRITIONAL ANAEMIA

Our existing culture in Nigeria permits taking of drug without prescription. Drug abuse has nutritional implication and is an international problem. The scope and magnitude of this problem was reported among Nigerian adolescents, (Anumonye, 1980). Abidoye (1989) confirmed the worldwide serious socio-medical problem among restless group of Nigerians. The drugs often used were alcohol, caffeine, coffee, tea, cocaine, opium, heroine, Indian hemp, cigarettes (nicotine). Abidoye and Lawal (1993) studied a group of fifty consecutive drug abusers admitted in Lagos Psychiatric Hospital found significantly low level of serum protein, serum albumin and higher weight loss among those users than non-users. About 50% of the drug abusers were found anaemic (Abidoye and Lawal 1993). Majority, 94% of the abusers were males and 52% were in the mid 20 – 30 years. Low iron content was also, found among those who used cannabis + heroine and tobacco. The prevalence of usage was high compared to those users of cannabis + heroine + cocaine + tobacco. Tobacco and cocaine users had lower incidence of anaemia. There are experimental evidences also suggesting that there was decreased resistance to infection in iron deficient subjects which involved both lymphocyte and granulocyte function in the drug abusers studied by Abidoye and Lawal (1993). This finding agrees with those of Joynson Jacob Murray-Walker, Dolby (1972), MacDougall, Anderson, MacNab and Katz (1975) which suggests lower percentage of T-cell lymphocytes, impaired lymphocyte transformation, and a lower incidence of positive skin reactions to common antigens. The consequences of these harmful drugs impaired iron absorption leading to anaemia (Abidoye and Lawal, 1993).

Table 7: Drug used and the haemoglobin levels in drug users

<table>
<thead>
<tr>
<th>Drugs Abused</th>
<th>Number</th>
<th>&gt; &lt; 12gm%</th>
<th>&lt;12gm%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannabis Alone + Tobacco</td>
<td>8</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Heroin Alone</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Cannabis + Heroin + Tobacco</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Cannabis + Heroin + Cocaine + Tobacco</td>
<td>12</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Heroin + Cocaine + Tobacco</td>
<td>18</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Tobacco + Cocaine</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Alcohol + Cannabis + Tobacco</td>
<td>5</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

Anaemia was commonly found among those who used cannibals + heroin + tobacco, while the subjects who used heroin + cocaine + tobacco also had high incidence of anaemia.

CULTURE AND EFFECT OF REFINING FOOD

Our ancestral parents used chewing sticks early in the morning to clean their teeth and were able to chew food and break bones from meat they ate in their old age without deceased teeth, compared to our modern days. The traditional chewing sticks have anti-bacterial, debris and plague removal properties. This practice is abandoned for modern tooth paste and cream. Our children nowadays do not use chewing sticks early in the morning anymore and their teeth got decayed early.

The arrival and inclusion of refined carbohydrate such as cookies, chewing gums and other related refined diets were of great interest to us. A study was conducted to investigate the abandoned practice and the impact of refined carbohydrate among the children in our various schools in Nigeria. A contrasted
study of both high and low socio-economic schools in Lagos revealed high prevalence of dental caries among the children surveyed.

Dental caries was first identified in the skulls of ancient Egyptians, and pre-Columbia Peruvians, by Turner (1913). Abidoye and Koleoso, (1989) showed that high incidence of caries occurred among children of both skilled and unskilled parents in Lagos as a result of consumption of refined carbohydrates food.

Otuyemi and Adetunji (1991) showed the similarity that impoverished children belonging to the low socio-economic stratum of the society were still very much afflicted with periodontal diseases and other oral-facial infections due to protein calorie malnutrition especially in developing countries. These habits are a great deviation from the more traditional ways of eating mostly unprocessed foods with high fiber content as well as plenty of fresh fruits and vegetables.

In Nigeria today dental caries and periodontal diseases are the two major oral problems in children, Henshaw (1974); Henshaw and Adenubi (1975), Adenubi, Okoisor (1976); Sheiham and Jeboda (1981); Otuyemi and Adetunji (1991). Prevalence of these dental diseases were lower in the rural areas compared to the urban (Abidoye and Otuyemi, 1993). Anaemia was found to be prevalent among the children who consumed refined carbohydrates regularly (Abidoye, 1989).

CULTURE AND PARASITIC INFECTION: BANE OF HEALTHY ENVIRONMENT

Africans have never been environment friendly. Maintenance culture in our environment has never been our practice. We lack these cultures in the homes we live, our kitchen, our bedroom, and our total being. Therefore, we grow in this environment without paying attention to hygiene in processing and preserving food. The degree of exposure to social hygiene practices, our tradition, culture and social economic setting thus affect us adversely.

Parasitic infection have become public health problem in Nigeria. Children play on the ground both at school and at home, buy and eat food and fruits without washing before eating, thus promoting free access of parasites into the system. Adults are not free from this problems either. These parasites feed freely from nutrients available in our blood with great loss of iron to them. Epidemiological studies have shown that intestinal parasites in human population in developing countries are very high, (Crompton, 1986; Anderson, 1985; Awogun, 1984; Dura et al, 1964; Anna et al, 1985; Abidoye, 1990; and Holland and Crompton, 1987). The commonest parasites found both in urban and rural children were ascaris, hookworm and trichuris, (Holland and Walter, 1986). A higher prevalence of 42.6% observed among the 6 – 24 month olds disagreed with findings of Annan, Crompton Walter and Arnold (1985) among Ghanaian children. Studies by [Abidoye and Situ (1987), Abidoye and Achegbulu (1988), Abidoye and Agiobu (1990) and Crompton (1986), showed that these parasites were implicated in the high prevalence rate of anaemia in these countries.

The Lagos study among the adolescents in both Federal Government Schools and State Schools revealed 32.0% of Ascaris and 17.0% hookworm, (Abidoye and Darkwa,1987). The urban effect in Lagos showed that 37.9% of the children were malnourished and about 84.9% of the children had ova and cyst of intestinal parasite in the stools. Crompton and Saviol (1993) supported high prevalence of parasites in urban setting. Anthropometric assessment of these children carrying parasites in Lagos showed that 38.2% had weight- for- height score of -2SD, and 40.5% had low- height- for age ratios indicating wasting and stunting in the urban and a rate of 51% anaemia among the 198 infants surveyed in Lagos. A cross-sectional investigation among rural and urban children in Duba Degema in River State
established widespread infestation of ascaris, hookworm, trichuris and strongyloids causing high incidence of nutritional anaemia in the children, (Abidoye and Agiobu, 1990). This result agreed with Brazilian study of Dutra, De Olive, and Ra (1964) and Cerf. and Rod (1981). This finding was also supported by the findings of Andrew et al (1982) among Kenyan Children.

An estimated value of 39.2% of parasites was obtained in Lagos study by Abidoye (1995), ascaris lumbricoides and trichuris trichuria were also identified from the incidental sampling of the four contrasted socio-economic strata Abidoye et al (1990). Cancera (1983), Dutra and De Olive (1964) Crompton (1986) and Annan (1985) in studies among the Ghanaian preschool children identified low level of haemoglobin 11gm% which agreed with Abidoye and Agiobu (1990). Children tended to lose iron more than the adults through parasitic infections. Hookworm and ascaris were the major parasites associated with incidence of iron deficient anaemia, (Abidoye 1985). Similar results were also found by Topley (1968), Johnson (1982), Onadeko (1980) and Oduntan (1973).

TRADITION CULTURE AND VITAMIN A IN DIET

Over half of all under-five deaths in Nigeria have been associated with malnutrition of which vitamin A constitutes major nutritional problem among the children and mothers. The tradition of eating raw yellow palm kernel ("eyin") and cooked in form of palm oil ("epo pupa") was used as a source of vitamin A in our study. Anthropometric measurements served as good indices of the impact of treatment of Vitamin A. Supplementation through distribution of Vitamin A capsules had been found to be short-term and cost intensive. In order to reduce the prevalence of Vitamin A deficiency and promote growth in six-month old babies a study was conducted using palm oil as a means of supplementation to 47 severely malnourished children in Nigeria. The children were randomly assigned to two groups, 20 in control (C) and 27 in the experimental (E) group. Both groups had their anthropometrics measurements taken at the onset. Both the control (C) and experimental (E) were exposed to the same food treatment (Millet, Soya beans, wheat and groundnut, in composition) through the period of six weeks rehabilitation. However, the E group had 4 teaspoons of palm oil included in their diet. Results obtained showed a differential growth increase in anthropometrics measurements of experimental group whose diet was supplemented with 4 teaspoons of palm oil compared to the control group. Wt of (E) (12.5 mean/kg) (C) (9.6 mean/kg). Head circm (E) (44.9 mean/cm) (C) (12.7 mean/cm). mid-arm circm (E) (14.07 mean/cm) (C) (8.72 mean/mm) triceps skin-fold thickness (E). (9.4mean/mm) (C) (8.72 mean/mm) and chest circm for (E). 46.4 mean/cm>44.5 mean/cm respectively. Palm oil supplementation was found to be beneficial in promoting growth as well as rapid rehabilitation process in the malnourished children, (Abidoye, Akinwande and Renner, 2000). Table 8 illustrates the growth differential in children 0-6 months fed with plants protein and palm oil supplement.

34

35
Table 8: Growth differential in Vitamin A supplementation (0-6 months)

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Control Group</th>
<th>Experiment Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before treatment</td>
<td>After treatment</td>
</tr>
<tr>
<td>Mean Weight in kg</td>
<td>8.0</td>
<td>9.6</td>
</tr>
<tr>
<td>Mean Head circumference in cm</td>
<td>41.0</td>
<td>42.6</td>
</tr>
<tr>
<td>Mean Mid-arm circumference cm</td>
<td>11.0</td>
<td>12.7</td>
</tr>
<tr>
<td>Triceps skin fold thickness in mm</td>
<td>7.2</td>
<td>8.72</td>
</tr>
<tr>
<td>Mean Chest circumference cm</td>
<td>41.0</td>
<td>44.56</td>
</tr>
</tbody>
</table>

P-value = P < 0.01

The significant value for the 4 teaspoons of palm oil treatment of Vitamin A supplement, was significant at P < 0.01 and P < 0.05 respectively for six weeks of rehabilitation for Vitamin A deficiency with the addition of manifold of millet, Soya beans, wheat and groundnut composition. No significant values were obtained for the sex differences. Vitamin A in this study aided weight gain. The treatment showed that Vitamin A supplementation was effective in the children.

PROTEIN ENERGY MALNUTRITION (P.E.M)

Williams (1935) first described this in Ghana as 'Kwashiorkor', which is widely used today all over the world. Protein Energy Malnutrition P.E.M. is a range of pathological conditions arising from coincidental lack of various proportions of protein and calories in infants and young children. The prevalence of P.E.M. is high in this country at about 41.6% from our studies. Educational status, occupation, marital status, were also significantly related to malnutrition (Abidoye and Nwachie, 2000; Williams, 1935; MacI Sarren, 1926; Ransome Kuti, 1978; Laditan, 1976 and Adeokun, 1980). Evidence of malnutrition seen across this nation affected the growth, height, and weight of the children, causing underweight, wasting and stunting, (Abidoye, 1998-2002). The State of the Union for malnutrition among children was four out of every five children in the national survey conducted by Unicef (1998) and Abidoye (2002). Malnutrition is present in nearly every home in Nigeria and this has brought low level of stimulation and responsiveness in the children in schools. The results of these unmet needs, for adequate nutrition in the children have resulted to poor mental, physical, and social growth (Abidoye, 2001; and Akinwande, 2000).

Malnutrition due to infection, economic problem, ignorance, food taboo, cultural and religious beliefs, educational level, had been reported by (Abidoye and Achegbulu, 1988; Ransome Kuti, Gbajumo, and Olaniyan, 1972). Akinkugbe (1978) also reported 30% pev below normal in Igbo-Ora compared to 16% found in Benue (Abidoye and Achegbulu 1988). The 43.8% anaemia reported by Abidoye and Achegbulu (1988) was four times higher than that reported by Akinkugbe (1978).

Research showed that children left home early without breakfast and sometimes took a meal in the afternoon around the school premises. Unfortunately only few Nigerian schools provide midday meals. Majority of the day students were victims of malnutrition (Abidoye, 2002). Many children without affordable means of transportation walked few kilometres to school on empty stomachs. Their plight is further compounded with no food in the school, they lived on cookies and chewing gum all day (Abidoye, 1997) thus aggravating anaemia more. Other variables that are nationally responsible for malnutrition are the effect of food production, preservation, and processing, and uncertainty in variations of seasons. Man is unique in the animal kingdom in the way he grows, harvests, stores, and processes food. He grows by tradition or by modern techniques and uses variety of techniques such as drying, canning, pickling, addition of chemical preservatives, refrigeration, freezing,
radiation, smoking and salting for food preservation. All these including cooking do have negative effect on the bio availability of nutrients. Though cooking is universal and the process kills organism, removes undesirable compound such as trypsin inhibitor in soyabeans and cyanide in cassava. Cooking protects the consumers from parasitic, bacterial and viral infection of the gastro-intestinal tract. Excessive cooking however results in depletion and denaturing of nutrients and must be avoided.

IRON DEFICIENCY ANAEMIA AND SCHOOL PERFORMANCE

Mr Vice-Chancellor Sir, It is exceedingly difficult to design field studies, which would invariably or unequivocally decide whether human malnutrition results in permanent damage or impairment of learning and degenerative behaviour. However, progress in this area of intellectual development, would be enhanced by comprehensive field and laboratory studies with progressive monitoring and evaluation. Human malnutrition, which is associated with poor intellectual performance, is a problem in developing countries and school performance is a general assessor of intelligence and cognition.

Earlier studies by Pastides (1981) showed that iron deficiency in U.S.A. affected intellectual performance. Abidoye and Situ (1988), Abidoye and George, 1990; Abidoye and Eze (2000), investigated the effect of iron deficiency in Federal Schools such as, Kings College Lagos and Queens School Lagos and State Secondary Schools and confirmed earlier assumption that iron deficiency impaired cognitive ability. This is also reflected among the school children studied across this country that iron deficiency led to poor intellectual performance. Similarly children who did not eat good breakfast performed poorly in their schools.

Breakfast is considered very essential for providing energy and wellbeing for the day. Our study in Lagos showed that children who had breakfast had significant gains in their academic, and emotional functioning. Breakfast helped them settle down in classroom without falling asleep. Fast reaction time and maximum work output were observed from the performances of 250 children who took breakfast regularly. About 107 children who took breakfast once in a while were on the boarder line and, 89 who never took breakfast had incidence of repeated most of their classes. Chi square value (P< .05) statistical evaluation showed significant relationship between academic performance, breakfast, low haemoglobin and the general nutritional status Abidoye and George 1991), Akintoye (1991), Akinwande (2000).

The possibility that iron deficiency affected or caused abnormalities in brain function existed and it was based on students' performance (Abidoye and Odufuwa 1987, 1989, Abidoye and George1991, and Abidoye and Eze 2000). Webb and Oski (1973) clinically observed and confirmed that children with low haemoglobin were irritable, had apathy, and difficulty in concentrating. Limited experimental evidences suggest that iron deficiency may in fact affect brain metabolism. Biochemical studies in rats buttressed the findings that iron deficiency early in life caused depletion in cerebral iron and persisted long after the repletion of other tissue, and results also in lower concentration of platelets in iron deficient human subjects (Laibel, Green and Pollitt 1979). The end result of iron deficiency anaemia in children is poor cognitive (Abidoye 1997), and Latham 2000). Iron deficiency was a strong factor that influenced school performance of children (P<.001) (Abidoye and Eze (1991) while weight for age also significantly affected school performance.

SUMMARY OF THE RESEARCH

Mr Vice-Chancellor Sir, Iron deficiency is global and a national nutritional problem. It is mostly recognized nutritional deficiency. There are so many contributing factors, among which are the life style, nutritional intake, country production capacity, food insecurity, preservation processing, culture, traditional beliefs,
taboos, economy, education and parasitic infections. The mean prevalence rate of 47% of iron deficiency is very high among the pregnant women, children, adolescents and the elderly population in this country.

- Consequences of iron deficiency, the low haemoglobin level are far reaching among all ages. It affects women during pregnancy as a result of poor food consumption, culture, belief, and taboos and it limits working capacity among women who were gainfully engaged in the banks, therefore, affecting the economy.
- Infants, children and the adolescents are at special risk because of their rapid growth and development. Deficiency of micronutrients affected their head circumference and chest circumference.
- Iron deficiency impaired cognitive development in our studies. The anaemic children, and those who did usually not take breakfast did poorly in class work. They were generally apathetic and majority of those who never took breakfast repeated classes.
- Those students who were breastfed with high haemoglobin level tended to select science subjects including additional mathematics suggesting high (IQ) Intelligence Quotient.
- Culture and tradition and food are reciprocally linked and they determine our preferences. Culture and traditional practices encouraged malnutrition. Food deprivation, a form of treatment module in many African families was found to be mentally, psychologically, physiologically unhealthy and undesirable leading to anaemia and juvenile delinquency.
- Kolanuts and tannin consumption affected maternal nutrition by preventing iron absorption thus leading to Iron deficiency anaemia. Reduced head circumference and chest circumference and impaired cognitive development were observed in children whose parents took caffeine during pregnancy. Caffeine inhibits iron absorption in pregnancy.

- Drugs like heroin, cocaine, cannabis, alcohol, tobacco reduced bioavailability of iron in the blood and inhibit iron absorption in the bodies of the drug users causing a high incidence of anaemia.
- Vitamin A supplementation through the use of palm oil in children 0-6months resulted in increased weight and improved vision and growth in the children studied.
- Urbanization and environmental factors contributed to high incidence of parasitic infection such as hookworm and ascaris. This led to high prevalence of IDA among the children.
- Malnutrition rate was very high. Four out of five children left homes without breakfast.
- Nutrition in Elderly has not been encouraging either, Osteoporosis, osteomalacia, incidence of fracture, loneliness, and anaemia and other medical problems associated with aging were reported in the studies.
- There is no effective National Nutrition Policy in Nigeria to guarantee food security for Nigerian families therefore malnutrition continues to thrive.

RECOMMENDATION

- Man has gone away from the Garden of Eden and as a result of this, mankind is prone to diseases resulting from poor nutritional intake. There is need to go back to the Garden of Eden.
- Dietary revolution is needed from animal protein back to plant protein, eat less meat, less fat, less egg, enrich your life with vegetables, and fruits and drink plenty of water.
- Food deprivation a tradition and cultural practice used as treatment module for deviance and delinquency is mentally, psychologically and physiologically unhealthy. It must be discouraged.
• There is need for increased nutritional education to avoid the harmful effect of culture, taboos and tradition.

• Biotechnology if introduced to Nigerian agriculture could be suicidal to our poor economy which has corruption as a common denominator.

Government needs to put in place policy that will embrace and address food production, and preservation, pathology, population and poverty alleviation and self-reliance for all household programmes and breastfeeding.

Articulate policy on agriculture that guarantees economic growth to enhance household purchasing power for food security. Poverty alleviation programme must embrace rural and urban development in terms of agricultural production. There must be provision of access roads to transport food to the nearby markets easily.

Community farming for every state—should be sponsored by the state government and monitored by the Federal Government. Creating overall conducive atmosphere for the indigenous farmers and discourage exporting foreign farmers Organization and Community land ownership for agriculture with loan and easy payment arrangement for farmers should be in place.

Frequent nutrition surveillance, monitoring and evaluation by the Ministries of Health and Agriculture.

• Farmers should receive subsidized cheap fertilizers.

• Private sectors should assist farmers financially for heavy production.

• Policy development involving farmers themselves should be encouraged.

• Local industries need perfect processing and preservation of agricultural products.

• Mechanized farming needs to be encouraged and financed by the Government.

• Monitoring and evaluation of nutritional intervention with direct Government involvement including identification of soil suitability.

Decrease in petrol price would make food cheaper and available since the cost of food transport to market translates to high price.

Mr Vice-Chancellor Sir, a better nourished, less hungry child is likely to be more attentive and able to learn effectively. Therefore, both the Federal Government and the State should introduce a free school meal in all the schools across the nation to provide a child one balance diet daily. This should be part of poverty alleviation programme.

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ACKNOWLEDGEMENT

This inaugural lecture covers information extracted from over seventy-five research articles in both international and local journals including scientific reports delivered by me at International Conferences. My tribute goes to all my outstanding MPH Students notably Drs. (Mrs.) Situ Odufuwa, Medical Officer for the Mainland, Momoh of Port Authority, Soroh of Glaxo SmithKline Nig Plc, Tomin-West, University of Port Harcourt, Eze, University of Pretoria, South Africa, and Oduwole, of Ogun State University, Chijoke, Lewis, Lawal, Nwachie and other partners in progress. I give thanks to Almighty God who endowed me with life and good health to write this inaugural lecture. I was born into a royal family, but ran away from home in 1983 shortly after my arrival from U.S.A to avoid becoming the Oba Alalyeluwa, the Olupoti of Ipoti not because I hated the service to mankind, but, because I foresaw a situation that would prevent me from climbing the academic ladder to a greater height and service, and this inaugural lecture today, would have been impossible, hence I declined the post.

Man should never be afraid of challenges and leadership. I guess by my action, I have served humanity better. I salute all my Royal family members from Ipoti Ekiti and Omu Aran in Kwara State. You will all agree that this is a better way of serving mankind. I am indebted to my parents of blessed memory, Prince Ajibola Ibironke Abidoye and Dorcas Boluwade Abidoye who brought me to life. All, deceased with blessed memory. Grace Afolake Abidoye my late wife was a darling she stood by my side through thick and thin. Though the clock was rolled back by her departure, God brought another Grace into our lives to rescue the perishing souls. This beautiful angel stood by me to train the children. She is beautiful inside and outside, a Christian to the core, a prayer warrior, a woman of no blemish, full of love. She stood by me to conquer. She surrendered all her belongings, materials and money to train motherless children. Mr. Vice-Chancellor Sir, This woman is one out of a million. I want to recognise her Dr. (Mrs) Grace Oluymemisi Abidoye. Our children Adekunle Oladapo, Oyewale Oyedjeji, Victoria Adegoke, Olurotimi Oniyide, Oluseyi Babatope, Oludamilola Hephzibah Abidoye, got the best education both here and abroad. Today among them we have, Computer Engineer based in USA, a Medical Practitioner (Urologist) in USA, an Urban and Regional Planner, a Political Scientist and future Nigerian Ambassador in USA, another Medical Doctor, a Neuron-Surgeon in the making and the last, a Lawyer in progress. I thank God who has really blessed me and thank my children, for their understanding and their undivided love. They are all close to my heart.

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I found a friend in the College of Medicine, whose life is almost identical both in character and behaviour. He encouraged me to be what I want to be. He is Professor Amos Akinwande retired but not tired, he encouraged me to stay on and be patient and to calm down when turbulence raged. He once said in his own inaugural lecture “My job is done”.

My job tonight will not be accomplished without publicly thanking Dr. Déji Adeleke (Managing Director, Pacific Holdings and Pacific Merchant Bank and Dr. (Mrs) Veronica Adedeji, his wife of blessed memory whom God used to rescue my life from a deadly illness in 1996, otherwise this inaugural lecture would have been absolutely impossible. I dedicate this inaugural lecture to her memory and service to mankind.

I want to thank my ever smiling Vice-Chancellor, Professor Tolu Odugbemi and the Council, University of Lagos for giving me the opportunity to deliver this inaugural lecture which is the second of its kind from Department of Community Health. I thank the Provost, College of Medicine University of Lagos, Professor Elesha to whom I am the Deputy Provost. To my sister Dr. Mrs Akitoye, a friend Mr Akinkuade and the entire Academic and Administrative Staff of the College of Medicine and Department of Community Health, I say, ‘Thank you’. It is one thing to prepare a lecture and another to have an audience at delivery. Ladies and Gentlemen; I thank you for your patience. Everything that has a beginning must have an end. God bless you all and God bless Nigeria.

Mr. Vice-Chancellor Sir, the job is done. To God be all the glory now and for ever.

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