Nigerian Journal of Health Promotion
ISSN: 0995-3895
Vol. 10, 2017

HEPRAN

Nutrition and Food Proportion for the Maintenance of Health and Fitness of the Pregnant Mothers and Children

Echezona Ejike, Udokanma
Nnamdi Azikiwe University, Awka
udokanmaeche@gmail.com
+2348066257817
Correspondent author

Gideon O., Emeahara
Exercise Physiology Unit
Nnamdi Azikiwe University, Awka
g.emeahara@unizik.edu.ng
+2348135847979

Abstract
Pregnant mothers' and children's health has continued to be a public health problem of great concern. Nutrition has been found as a vital key in the maintenance of pregnant mothers' and children's health and fitness. Adequate nutrition is important at all stages throughout life particularly during pregnancy as pregnancy, lactation and infancy are times of heightened nutritional vulnerability. Beginning pregnancy with a healthy diet is giving the fetus the best possible nutritional advantage. This window of opportunity in ensuring good health status for children through adequate nutrition is however found not to be maximized as evidenced by the trend of malnutrition in Nigeria. The prevalence rates of stunting, wasting, under-weight, protein-energy malnutrition, iron deficiency anaemia, iodine deficiency disorders and vitamin A deficiency disorder amongst others in Nigeria especially in the northern part of the country therefore calls for prompt action in ameliorating these anomalies. Diet has poorly been planned due to the poor economic status of most families, unavailability of diverse healthy food and lack of education hence promoting malnutrition in the country. Exclusive breastfeeding which protects children from myriad of nutritional disorders and infections have also been poorly practiced. Fitness and nutrition are strongly linked in maintaining pregnant mothers' and children's health but its numerous accruing advantages for the mother and fetus notwithstanding, only very few pregnant mothers indulge adequately in exercise. This paper therefore intended to bring to light the maintenance of health and fitness of pregnant mothers and children through adequate nutrition and exercises. It was recommended that economic improvement of families, provision of adequate and fortified food, intake of micronutrient supplements, education of mothers and encouragement to indulge in exercise and exclusive breastfeeding for children amongst others would promote and maintain pregnant mothers' and children's health and fitness.
Keywords: Children, Fitness, Health, Nutrition, Pregnant Mothers.

Introduction

The concept of nutrition is double edged as relates to health and disease conditions. It can be a factor in maintenance of good health thereby preventing diseases and at the same time curative in nature, on the other hand, consumption of some nutrients can escalate the risk of certain chronic diseases. For a healthy and longer life, the concept of physical fitness cannot be written off. Physical fitness is actualized through involving in regular exercise and physical activities. Some other factors can contribute to actualizing healthy living which includes relaxation and sleep. All together, nutrition and exercise works in synergy with relaxation and sleep to maintain good health and remediate existing diseases.

Good nutrition is important at all stages throughout life particularly during pregnancy. Pregnancy, lactation and infancy are times of heightened nutritional vulnerability. However, the threat of malnutrition begins in the womb and continues throughout the life cycle. The health and nutritional status of mothers and children are intimately linked (WHO, 2003). A mother who was malnourished as a fetus, young child, or adolescent is more likely to enter pregnancy stunted and malnourished as Maziya-Dixon, Akinyele, Oguntona, Nokoe, Sanusi, and Harris (2004) reported that 12 percent of mothers are clinically undernourished. Their compromised nutritional status affects the health and nutrition of their own children. During pregnancy, there is increased nutrient demand by the body particularly folate, iron, zinc and vitamin C (Australian Government Department of Health and Ageing, 2006) due to the physiological and anatomical changes taking place in the pregnant woman. Beginning pregnancy with a healthy diet is giving the fetus the best possible nutritional advantage. This window of opportunity in ensuring good health status for children through adequate nutrition is unfortunately not maximized

which is evident in the findings of various research carried out in Nigeria. Each year about 1 million Nigerian children die before their 5th birthday (NPC & ICF International, 2013). Malnutrition contributes to nearly half of these deaths (Black, Victoria, Walker, Bhutta, Christian, Onis, Ezzati, McGregor, Katz, Martorell, & Uauy, 2013). Rates of stunting in Nigeria have stagnated for more than a decade. About 2 in 5 Nigerian children are stunted, with rates of stunting varying throughout the country (NPC & ICF International, 2013). Almost 30 percent of Nigerian children are underweight, meaning they do not weigh enough for their age. This is more than double the proportion of neighbouring Ghanaian children who are underweight (Ghana Statistical Service, Ghana Health Service, & ICF International, 2009). The percentage of children in Nigeria who are wasted, or too thin for their height, has steadily increased over the last decade, rising from 11 percent in 2003 to 18 percent in 2013 (NPC & ORC Macro, 2004). Up to 1 million Nigerian children under age 5 are affected by severe acute malnutrition (SAM) each year (Children's Investment Fund Foundation, 2014). These children have severely low weight for their height and are at risk of dying unless given urgent attention. Nearly 4 out of 5 Nigerian children do not meet the World Health Organization's recommendation for exclusive breastfeeding during the first 6 months of life (NPC & ICF International, 2013). About 70 percent of children ages 6 to 23 months are not receiving the minimum acceptable diet (NPC & ICF International, 2008).

Kuku-Shittu, Onabanjo, Fadare & Oyeyemi, (2016) in their study of child (under five) malnutrition in Kwara state found that for all children, the prevalence of stunting was 56.5 percent and severe stunting 33.6 percent, wasting was 11.4 percent, and severe wasting 6.0 percent while underweight was found in 21.1 percent and severe underweight in 11.1 percent of children. In the same vein, Save the Children UK in 2010 also stated that rates of chronic malnutrition are also extremely high in the northern states of Nigeria: 48 percent of under-fives in Daura and Zango LGAs of Kastina state are chronically malnourished (or stunted), of whom 23 percent are severely stunted, translating to approximately 40,200 under-fives in these two LGAs alone. It stated that Nigeria is home to the highest number of stunted children in the continent and ranks third globally with more than 10 million stunted children. A similar study on child nutrition in northern Nigeria assessed the nutritional status of children under five and women 15–49 years old in eight northern states (Kuku-Shittu, Onabanjo, Fadare & Oyeyemi, 2016). It found that more than 40 percent of children under five suffered from stunting across northern Nigeria. In addition, 17 percent of adolescent girls were pregnant in the surveyed areas and found to be more malnourished than older women. It was concluded that undernutrition is a major development concern. These results are alarming and require immediate and sustained responses.

On the other hand, exercise has been found to be of great benefit to the health of pregnant mothers and infants. Exercise has become an essential aspect of antenatal and postnatal care in most settings (Wadsworth, 2007). Mbada, Adebayo, Awotidebe, Faremi, Oginni, Ogundele, and Emechete (2015) stated explicitly that empirical evidence revealed the benefits of exercise to include preservation and promotion of aerobic and musculoskeletal fitness levels, improvement in posture, coordination and balance, increase in endurance and stamina, deterrence of extreme maternal weight gain, gestational glucose control, improved psychological adjustment to changes in pregnancy and postpartum, facilitation of labour and more rapid postnatal recovery. All these benefits notwithstanding, Sujindra, Bupathy, Suganya, and Praveena, (2015) in their study, found that very few of the respondents were actually practicing exercise in pregnancy. Anecdotally, the African culture also seems to play a prohibiting role in physical exercises during pregnancy by mandating confinement periods that varies across different tribes. It is against this background that this study was designed to foster optimal health and fitness of the pregnant mothers and infants through adequate nutrition and exercise.

Begum (2008) suggested that nutrition is a combination of process by which the living organism receives and utilizes the materials necessary for the maintenance of its functions and for the growth and renewal of its components. Health according to Fesh (2014) is a state of complete physical, mental, and social wellbeing of an individual and not merely the absence of disease or infirmity. Also, Udokanma and Emeahara (2016) stated that physical fitness is a general state of health and well-being or specifically the ability to perform aspects of sports or occupations. Pregnant women as used in this study are females containing developing fetus or unborn offspring within their body. Children as well are infants under the age of five.

Role of Food in Maintaining the Health of Pregnant Mothers and Children

The fact that all humans crave to live a healthy life can never be disputed. Good nutrition contributes to sound mental, physical, and social wellbeing of an individual. Nutritional requirements of individuals vary according to age, sex, physical activities, and other physiological conditions. Food is the edible stuff that provides us with nutrients. Begum (2008) defined food as any liquid or solid material which can be consumed, digested and absorbed and metabolized. Food is broadly classified as cereals, pulses, vegetable, fruits, milk, eggs, flesh foods, fats and sugars. Begum (2008) postulated that nutrients are constituents of food which help us to maintain our body function, to grow, and to protect our organs. These nutrients include proteins, fats, carbohydrates, minerals, water and vitamins. Nutrients are basically classified into macronutrients and micronutrients. Macronutrients are

those needed in a relatively large quantity. Inclusive in macronutrients are carbohydrate, protein, fat, dietary fiber and water. On the other hand, micronutrients are those nutrients needed in relatively smaller quantities in the body. Inclusive are vitamins, minerals, antioxidants and phytochemicals.

The term "Optimum Nutrition" is eating the right amounts of nutrients on a proper schedule to achieve the best performance and the longest possible lifetime in good health, assuming that external negative influences like accidents and infectious diseases can be avoided. This is the provision in a diet of all the essential nutrients required by the body in their correct proportions. Optimum or adequate nutrition is germane to maintenance of good health. There are certain signs of good nutrition as postulated by Begum (2008), they are height and weight, clear complexion, fresh and lively skin and hair, healthy pink nails, correct posture and gait, inquisitive and alert eyes, good appetite and bowel evacuation, emotional maturity and confident deeds, pleasing personality and optimism in life and overall health. If however, nutrition is not optimized, it results in malnutrition.

Malnutrition is a devastating problem in Nigeria, not only to its people, but also to its security and economy. Malnutrition refers to insufficient, excessive, or imbalanced consumption of nutrients by an organism. It is an impairment of health either from a deficiency or excess or imbalance of nutrients. In other words, malnutrition refers to both under nutrition and over nutrition. Under nutrition manifests in the form of wasting, stunting and underweight while over nutrition manifests in the form of obesity which is a risk factor for other ailments. In developed countries, the diseases of malnutrition are most often associated with nutritional imbalances or excessive consumption while in developing countries (Nigeria inclusive); malnutrition is more likely to be caused by poor access to a range of nutritious foods (under nutrition) or inadequate knowledge. The trend of malnutrition (particularly stunting, underweight and wasting) in Nigeria is hence illustrated in the figure 1 below.

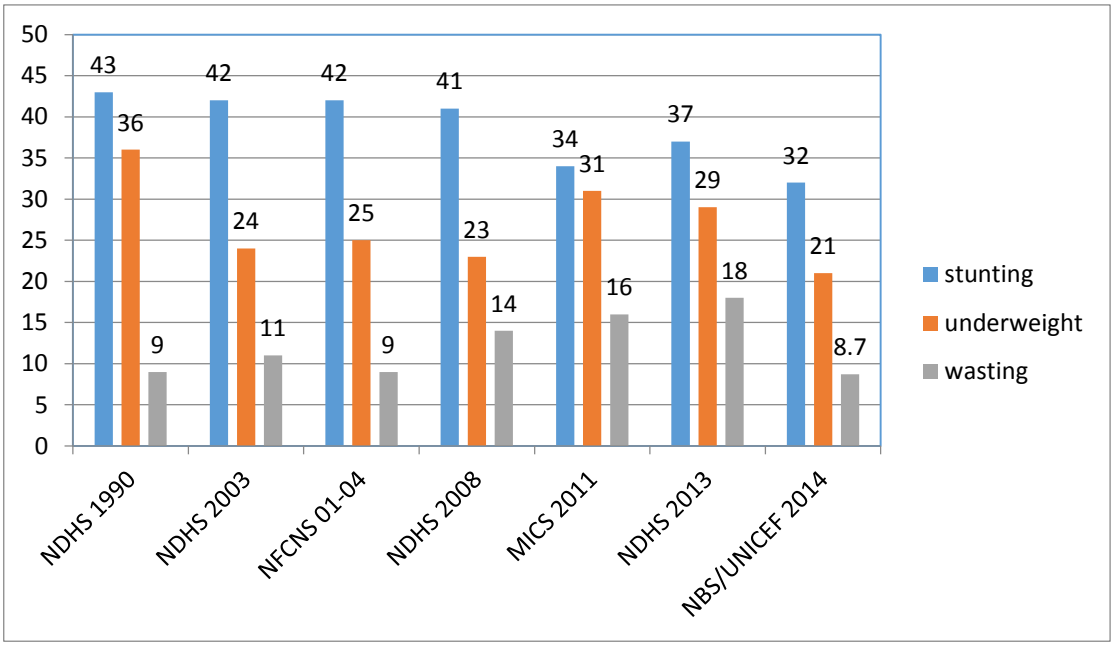

Figure 1: **Trends in nutritional status of children under five in Nigeria, 1990–2014**
Note: NDHS= Nigeria Demographic and Health Survey; NFCNS = Nigeria Food Consumption and Nutrition Survey; MICS = Multiple Indicator Cluster Survey.
Source: *NDHS 2013; NBS/UNICEF 2014.*

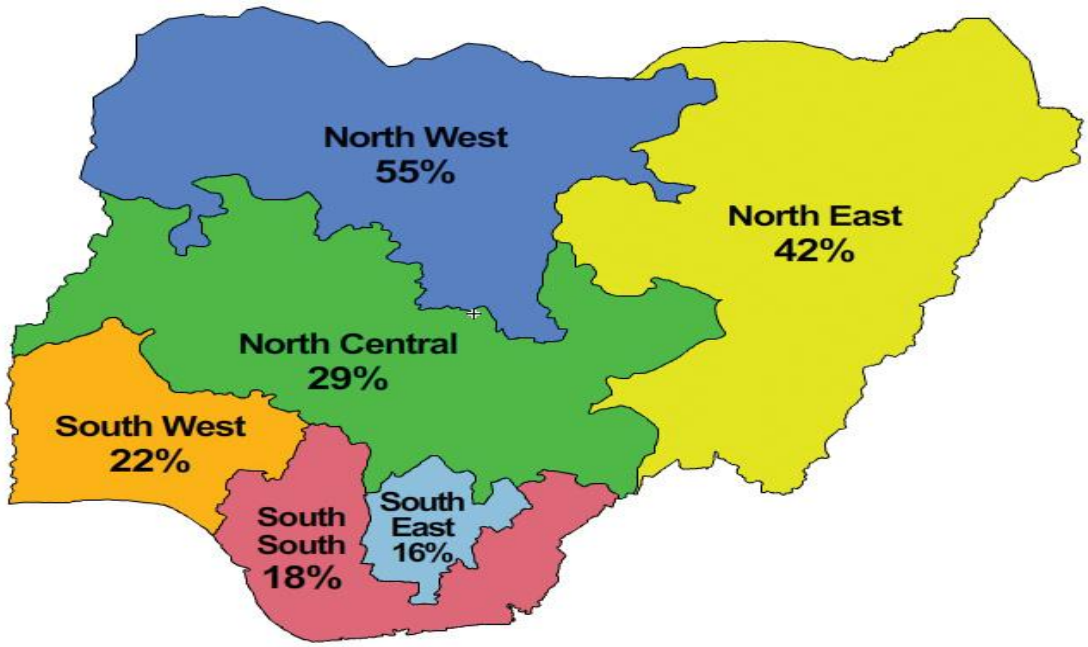

Figure 2: **Percent of Children Stunted Under Age 5 by Region, 2013**
Source: *Nigeria Demographic and Health Survey 2013: Preliminary Report, 2013*.

Stunted children under age 5 in Nigeria is seen to be at highest occurrence in the Northwest (55%) followed by Northeast (42%) and recorded least at the Southeast (16%).

We have established that beginning pregnancy with a healthy diet is giving the fetus the best possible nutritional advantage but this call for meeting the heightened nutritional demand of both macro and especially micro nutrients of the body during pregnancy and lactation. This increased nutritional demand is due to the anatomical, physiological and biochemical changes that take place in the body of pregnant women. In this state, there is an increased need for energy, protein and particularly micronutrients including iodine, iron, vitamin A, vitamin B12 and folate. Deficiency or excess of these nutrients leads to malnutrition which has negative effects in the maternal and children's health whereas adequate intake of them maintains their health. Malnutrition predisposes children to a myriad of other infections. In relation to these nutrients, Kuku-Shittu, Onabanjo, Fadare & Oyeyemi, (2016) stated that two main types of malnutrition have been identified in Nigerian children: (1) protein-energy malnutrition and (2) micronutrient malnutrition. The micronutrient deficiency indicators in Nigeria reveal that 28 percent of children under five were suffering from iron deficiency anemia (IDA), 29.5 percent from vitamin A deficiency (VAD), and 29.6 percent from iodine deficiency (Maziya-Dixon, Akinyele, Oguntona, Nokoe, Sanusi, & Harris, 2004).

Anaemia

Anaemia usually results from a nutritional deficiency of iron, folate, vitamin B12, or some other nutrients. Anaemia in pregnancy is thought to be one of the commonest problems affecting pregnant women in developing countries. In 1993, the World Bank ranked anaemia as the 8th leading cause of disease in girls and women in the developing world. In developing countries, prevalence rates in pregnant women are commonly estimated to be in the range of 40-60 percent. The greatest burden of anaemia is borne by Asia and Africa where it is estimated that 60 percent and 52 percent of women, respectively, are anaemic, and between 1 percent and 5 percent are severely anaemic (Hb <7g/dl). Anaemia also results in an increased risk of premature delivery and low birth weight. It is a serious concern for young children because it can result in impaired cognitive performance, behavioural and motor development, coordination, language development, and scholastic achievement, as well as increased morbidity from infectious diseases.

It is estimated that iron deficiency anaemia affects as many as 200 million people in the world probably making this the commonest nutritional deficiency in the world (WHO, 2000). The iron profile survey from the study of Maziya-Dixon, Akinyele, Oguntona, Nokoe, Sanusi, and Harris, (2004) showed that almost 20 percent of children were iron deficient and another 8 percent had depleted iron stores. With more than 25 percent of children under five iron-deficient, it is critical that the global community pay attention to adequate dietary intake of iron. Anemia affects 25 percent of women of reproductive age in Nigeria, and as many as 61 percent in some regions

(Kuku-Shittu, Onabanjo, Fadare & Oyeyemi, 2016). They further stated that if no action is taken, about 6,570 maternal deaths will occur annually- roughly 18 women every day. The additional demands placed on maternal iron stores by the growing fetus, placenta and the increased maternal red cell mass lead to an increased demand of iron. Requirement during first trimester is low, 0.8mg per day, but this rises considerably during the second and third trimester to a height of 6.3mg/day. The total iron requirement over the whole pregnancy is about 1000mg (WHO, 1993). To meet this demand, it is of necessity that iron fortification of staple foods should be implemented. Individuals especially females should be educated on the need to take iron supplements and most of all, consume diet rich in iron and vitamin C as vitamin C helps the body to readily absorb iron. It is recommended that iron tablets be taken daily for at least three months during pregnancy. Iron food sources include: red meat, pork, poultry, seafood, beans, dark green leafy vegetables, whole grains, nuts, dark chocolate and iron-fortified cereals, breads and pastas.

Vitamin A Deficiency

Vitamin A is a fat-soluble vitamin, essential for vision in dim light; cellular, bone and tooth growth; formation and maintenance of healthy skin, hair, and mucous membranes; reproduction; and immunity boosting. Vitamin A is so important in embryological development that without it, the fertilized egg cannot develop into a fetus (Brody, 2007). Its deficiency results in night blindness or impaired adaptation to the dark; lowered immunity to infections such as measles, diarrhea, chicken pox, and respiratory infections; anemia; poor growth; slowed bone development; blindness; and death. All these have disastrous effects on the healthy growth and intellectual performance of a child. The main health consequence of a diet that is chronically insufficient in vitamin A is a failure to meet physiologic needs, including healthy tissue growth, normal metabolism, and resistance to infection (WHO, 2009). Globally, one in three preschool-aged children and one in six pregnant women are vitamin A deficient due to inadequate dietary intake (UNICEF, 2013). Nigeria is considered one of the WHO's Category 1 countries with the highest risk of vitamin A deficiency (Humphrey, West & Sommer, 1992). Vitamin A deficiency contributes to 25 percent of infant, child, and maternal mortality in Nigeria because of reduced resistance to protein-energy malnutrition, acute respiratory infection, measles, malaria, and diarrhea (WHO, 2009; UNICEF, 2013). In pregnant women, vitamin A deficiency contributes to intra-uterine malnutrition, which leads to low birth weight or stillbirths, especially when found in combination with zinc deficiency. Furthermore, scientific evidence showed that adding vitamin A or beta-carotene to the diets of pregnant women lowers their risk of death from pregnancy by as much as 40 percent (Kuku-Shittu, Onabanjo, Fadare & Oyeyemi, 2016). Adequate consumption of vitamin A by pregnant women can be ensured by fortification of staple foods with vitamin A and encouraging pregnant mothers to take vitamin A supplements and diet rich in Vitamin A. Food sources of vitamin A include: red palm oil, fish liver oil, whole milk, beef liver, carrot, sweet potato, kale, spinach, broccoli, butter, egg, winter squash, pumpkins, mangoes, apricots, pawpaw, etc.

Iodine Deficiency

Iodine is essential for the normal growth and development of the human body. It is required for the production of thyroid hormones, which are necessary for normal brain development. Insufficient intake of iodine in the diet causes a myriad of health problems collectively known as Iodine Deficiency Disorders (IDD). The health consequences accruing to lack of sufficient iodine can lead to goiter, hypothyroidism, impaired mental and physical development, and diminished school performance. Iodine deficiency in the fetus leads to increased rates of abortion, stillbirths, congenital anomalies, cretinism, psychomotor defects, and neonatal mortality. Data from the 2001–2003 NFCNS revealed that a total of 27.5 percent of children suffered various degrees of iodine deficiency, while 46.5 percent had more than adequate levels (Maziya-Dixon, Akinyele, Oguntona, Nokoe, Sanusi, & Harris, 2004). The deficiency was severe in 4.2 percent, moderate in 8.7 percent, and mild in 14.6 percent of children. Only 26 percent of children had optimal levels of iodine. However, it is noteworthy that 16.6 percent of children had more than adequate levels, while 29.8 percent had a possible excess intake of iodine and ran the risk of adverse health consequences. More than 20 percent of the total population suffered from goiter (Kuku-Shittu, Onabanjo, Fadare & Oyeyemi, 2016), the abnormal enlargement of the thyroid gland, which is the most severe form of iodine deficiency. Endemic iodine deficiency reduces the IQ by 3.5 percent, permanently affecting intellectual development. Iodine deficiency can however, be avoided by using salt that has been fortified with iodine (iodized salt), consumption of iodine supplements and food sources rich in iodine which include: sea vegetables like kelp and hiziki, cranberries, organic yoghurt, organic navy beans, organic strawberries, potatoes, organic cheese, sea food like cod, shrimp and tuna, etc

Protein-Energy Malnutrition (PEM)

Protein Energy Malnutrition (PEM) is a range of pathological conditions arising from coincident lack in varying proportions of protein and calories, manifesting most frequently in infants or young children. The clinical

disorders present either as kwashiorkor (insufficient high quality proteins) or marasmus (deficiency of calories) or as a mixture of the two; Marasmic- Kwashiorkor. PEM is particularly serious in post-weaning and often associated with infections (Hamidu, Salami, Ekanem and Hamman, 2003). The most common diseases associated with severe PEM are respiratory infection, diarrhoea and vomiting, with high morbidity. The report also suggested that PEM has lasting effect on growth and development of children, learning ability and social adjustment. In their study of prevalence of PEM in Maiduguri, Hamidu, Salami, Ekanem and Hamman, (2003) reported that 62 percent of children underfive has marasmus, 13 percent kwashiorkor while 25 percent has marasmic-kwashiorkor. They further stated that in developing countries, approximately 65 percent of children under the age of 5 years are malnourished and 50 percent of these children die as a result of PEM. Similarly, Andy, Nwachukwu, Oyedele, Gotodok and Kumzhi (2016) in their study with children of Borgu LGA of Niger state found that the prevalence of PEM is 17.6 percent while the commonest form of PEM is marasmus (63.6%). Feeding children with balanced diet especially during weaning ensures adequate supply of the needed calorie and protein thereby preventing PEM. Also, lactating mothers should imbibe the habit of obtaining balanced diet for each meal which helps to keep them healthy and as well their infants obtain these nutrients from their breast milk. Alternatively, Andy, Nwachukwu, Oyedele, Gotodok and Kumzhi (2016) found that prevalence of PEM among children who were exclusively breastfed was low when compared with those not exclusively breastfed. Exclusive breastfeeding therefore, is pertinent to PEM prevention hence mothers should be encouraged to exclusively breastfeed their children for the first six months of life.

Breastfeeding

Breastfeeding cannot be overemphasized as relates to aspect of child nutrition. Breastfeeding practices and introduction of complementary foods are important determinants of the nutritional and health status of children, particularly those under age two. According to the Nigeria Demographic and Health Survey 2008, the first breast milk contains colostrums, which is highly nutritious and has antibodies that protect the new born from disease (NPC & ICF International, 2008); it helps clear out the baby's first sticky stools called meconium and prevents constipation. It further stated that early initiation of breastfeeding also foster bonding between mother and child. The numerous benefits of breastfeeding especially exclusive breastfeeding to the child as highlighted by Study carried out by Alenkhe, Longe and Danesi (2015) include: breast milk provides infant with significant protection against chronic diseases such as allergies and asthma, and other infectious diseases including meningitis, diarrhea, ear infection and pneumonia. Exclusively breastfed infant are not likely to develop diabetes mellitus type1 and appear to have a lower likelihood of having or developing a type 11 later in life. Breastfeeding protects against child obesity. It protects infants against Sudden Infant Death Syndrome (SIDS), allergic diseases, digestive disease and cognitive development enhancement in children. Also, breastfed infant, because of the effects of breastfeeding on the development of oral cavity and airway have a good chance of good dental health than artificially fed infant. Breastfeeding is the best for infants because it is most nutritional, very easy to digest by the baby's little stomach as well being cost effective.

The nursing mother herself is however not left out as breastfeeding is also of huge importance to her. Nigeria Demographic Health Survey states that early initiation of breastfeeding is encouraged for a number of reasons: Mothers benefit from early suckling because it stimulates breast milk production and it facilitates the realization of oxytocin which helps the contraction of the uterus and reduces post partum blood loss (NPC & ICF International, 2008). Alenkhe, Longe and Danesi (2015) also reported that breastfeeding also benefits the mother by reducing risks of developing ovarian cancer, Pre-Menopause, breast cancer, Osteoporosis and hip fractures later in life. It also helps mothers to rapidly return to their pre-pregnancy weight, increase Oxytocin-the love or bonding hormone, lowering the risk of uterine cancer, endometrial cancer later in life among others. All these benefits notwithstanding, Kuku-Shittu, Onabanjo, Fadare & Oyeyemi, (2016) in their study stated that Nigeria could be designated as a "low-rate breastfeeding country" in Africa. This entails that more needs to be done in ensuring that pregnant mothers practice breastfeeding (especially exclusive breastfeeding).

Lactation places high demands on maternal stores of energy, protein, and other nutrients. These stores need to be established, conserved, and replenished. The energy, protein, and other nutrients in breast milk come from a mother's diet or her own body stores. Women who do not get enough energy and nutrients in their diets risk maternal depletion. To prevent this, extra food must be made available to the nursing mothers. Breastfeeding also increases the mother's need for water, so it is important that she drink enough to satisfy her thirst. Maternal deficiencies of some micronutrients can affect the quality of breast milk. These deficiencies can be avoided if the mother improves her diet before, during, and between cycles of pregnancy and lactation, or takes supplements. It is therefore pertinent both to the health of mother and child that pregnant mothers even before conception should indulge the lifestyle of obtaining optimum nutrition.

Role of Food in Maintaining Fitness of Pregnant Mothers and Children

The concept of fitness has been lucidly explained but worthy of emphasis is the fact that fitness is actualized through physical activities, exercise, nutrition, hygiene and rest. These physical activities and exercises when carried out make some demand on the body system, to keep it going therefore good nutrition is indispensible. Physical activities and good nutrition are hence two inseparable concepts. Your diet must provide enough energy to fuel activity, sufficient protein to maintain muscle mass, enough micronutrients to permit utilization of the energy-yielding nutrients and cool your body. To maximize glycogen stores and optimize performance, diet providing about 6-10g of carbohydrate/kg of body weight/day is recommended for physically active pregnant mothers (Manore & Thompson, 2000). Dietary protein is not significant energy sources as they only provide 5 percent of the energy used up during exercise. They are germane to maintenance and repair of lean tissues including muscle. Intake of micronutrients is essential for energy production, oxygen delivery, protection against oxidative damage, and repair and maintenance of body structures during exercise. Manore and Thompson (2000) also stated that exercise increases the amounts of many vitamins and minerals used both in metabolisms during exercise and in tissue repair after exercise. Exercise as well may increase loss of some micronutrients like sodium through sweat. These can be recovered through consumption of nutrient dense food. These vitamins and minerals like vitamin C, vitamin E, β-carotene, and selenium also prevents oxidative damage brought about by exercise. Maternal and child health programs should therefore educate women at all stages of life on the need to adjust diet and physical activity levels to achieve and maintain a desirable weight for their own health as well as for better birth outcomes.

Mbada, Adebayo, Adeyemi, Arije, Dada, Akinwande, Awotidebe, and Alonge (2014) in highlighting the benefits of exercise to pregnant women submitted that regular physical exercise in pregnancy helps in maintenance and improvement of physical fitness and cardiovascular endurance, prevention of excessive gestational weight gain and glucose intolerance, conditioning of the muscles needed to facilitate labour, and improvement in psychological adjustment to changes in pregnancy. Furthermore, exercise in pregnancy is correlated with a decrease in many common problems of pregnancy and the stress of exercises produces certain adaptation such as healthier placenta and increased ability to deal with short decrease in oxygen. Engaging in physical activity during pregnancy supports cardio-respiratory fitness and does not increase the risk of early pregnancy loss, low-birth weight or preterm delivery (ACOG, 2009). Despite these benefits, studies have shown that most pregnant women do not exercise on a regular basis and that only 5-20 percent follows current exercise guidelines (Sujindra, Bupathy, Suganya, and Praveena, 2015). Therefore, to achieve higher rates of exercise indulgence during pregnancy, health promotion programs should target the general female population in their childbearing years because according to Sujindra, Bupathy, Suganya, and Praveena, (2015) women who are accustomed to exercising prior to pregnancy are more likely to maintain this habit and that those not physically active prior to pregnancy do not start during pregnancy.

Consequent to the foregoing, unless the health care provider identifies a medical reason that precludes physical activity, pregnant women can be encouraged to participate in at least 150 minutes of moderate-intensity aerobic activity per week, ideally spread throughout the week or 30 minutes of moderately intense exercise on most days of the week (ACOG, 2009). Women who are beginning physical activity during pregnancy can however, gradually increase amounts of moderate-intensity activity over time. Women who regularly engage in vigorous-intensity activity, high amounts of activity, or strength training do not necessarily need to reduce activity, provided they discuss with their health care provider any adjustments advisable during pregnancy. Participating in resistance training has also been shown to be a safe mode of activity for pregnant women. A variety of activities and sports appears to be safe (example: walking, swimming, riding a stationary bicycle); however, activities with a high-risk of falling or those with risk of abdominal trauma including contact or collision sports (example: horseback riding, downhill skiing, soccer, and basketball) should be avoided. Contraindications to engaging in physical activity during pregnancy include hypertension, premature rupture of the membranes, intrauterine growth retardation, preterm labour, incompetent cervix/cervical cerclage, or persistent bleeding in the second or third trimester.

Food Proportion for Maintenance of Health and Fitness of Pregnant Mothers and Children

Food preferences of a person according to Begum (2008) depend on various factors like childhood experience of food, ethnic and psychological factors, culture of the family and community, religious beliefs, health beliefs, lifestyle of the family, residential status, nutritional knowledge, peer influence, availability of foods, income, occupation, and educational status of the family. Personal convictions such as environmental consciousness or vegetarianism demand and individual preferences for taste, smell, appearance, and texture affect which foods we actually consume. Food proportion has to do with the size of serving for each meal. It also deals with the quantity of food selected from each food group to make up the meal. The quantity of food selected from each food group helps in the maintenance of health and fitness if optimized through the standard set out by the food guide pyramid. However, If these food proportions are not planned to meet the standard illustrated by the

food guide pyramid due to emotional aspects of food and eating overpowering the role of food as nourishment, eating disorders emanates which according to Begum (2008) has been categorized as; anorexia nervosa, bulimia nervosa, and eating disorders not otherwise specified (EDNOS), which include binge-eating disorder.

During pregnancy all women need more food, a varied diet, and micronutrient supplements to optimize health. When energy and other nutrient intake do not increase, the body's own reserves are used, leaving a pregnant woman weakened. Energy needs increase in the second and particularly the third trimester of pregnancy. Whatever your food preference is, varied healthy diet can be planned for pregnant mothers on a daily basis through the food guide pyramid.

The Food Guide Pyramid

A healthy and varied diet is important at all times in life, but particularly so during pregnancy. Therefore to plan this healthy and varied diet, it is crucial to understand the food guide pyramid. Manore and Thompson (2000), explains that the food pyramid provides the conceptual framework for selecting specific kinds and amounts of food to eat on a daily basis. They further noted that it is not a rigid prescription of what people must eat, rather a general guide for healthful eating that allows people to fit a variety of dietary patterns into the pyramid framework. Begum (2008) postulated that the food guide pyramid is the foundation of a healthy diet. Dietary guidelines are a set of diet and lifestyle recommendations designed to promote health and reduce the risk of chronic diseases. Food guide pyramid was developed to implement these dietary guidelines.

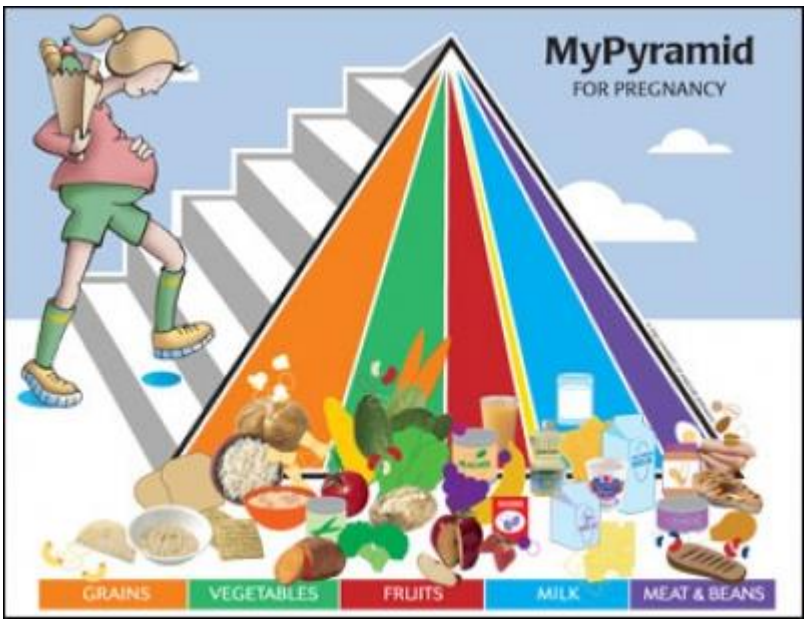

Figure 3: **The Food Guide Pyramid**
Source: Manore & Thompson (2000). *Sport Nutrition for Health and Performance.* United States: Human Kinetics.

The guidelines of the Food Pyramid established in 2005 emphasize finding a balance between food consumption and physical activity while making smart choices from every food group to get the most nutrition out of your calories. The steps of the pyramid represent physical activity, and the food groups are illustrated as colored wedges which include grains (orange), vegetables (green), fruits (red), oils (yellow), dairy products (blue), and meats and beans (purple). The width of the colored bands at the base indicates the proportions in which foods from the groups should be eaten. The proportion for each of these food groups to be taken by pregnant mothers is as follows: for each day, when it comes to grains choose any six or more types as high fiber is the best. For the vegetables and fruits, choose any five different types each day giving priority to green leafy veggies, also fruit juice counts for only one serving each day. Daily, fats and oil is needed in small amounts and preferable are monounsaturated and polyunsaturated fats, also limit fried food to one or two times a week. Daily intake of dairy products when pregnant is five portions whereas outside pregnancy, three portions is recommended. Low fat options are best except for young children. In the category of meats and beans, choose any 3 daily but outside pregnancy, 2 should be chosen. Use lean meat or trim off the fat, also eat only one portion of oily fish and one

portion of white fish each week. Water also is very pertinent in the health and fitness of a pregnant mother and child hence not fewer than 8 glasses should be taken daily.

Planning Menus with the Food Guide Pyramid

Consider these points when planning daily meal with the food pyramid;

1. The guide doesn't apply to infants under two years.
2. No one food is absolutely essential to good nutrition. Each food is deficient in at least one essential nutrient.
3. No one food provides all essential nutrients in adequate amounts.
4. Variety is a vital key which is achieved through choosing food in all the groups and consuming a variety of foods within each group.
5. The foods within a group may vary widely with respect to nutrient and energy content.

Overall, food guide pyramid incorporates the foundations of a healthy diet: variety, balance, and moderation. These foundations of a healthy diet are hence elucidated below.

Eating a Variety of Food

Variety they say is the spice of life. No single food contains all the nutrients the body needs for optimal health. Variety here therefore means choosing foods from diverse food groups- cereals, pulses, vegetable, fruits, milk, eggs, flesh foods, fats and sugars. It can also mean choosing various foods from within each food group example- different vegetables provide different nutrients. Nutrients and other food components interact positively (enhancing nutrient utilization) or negatively (inhibiting nutrient availability), variety therefore averages out these interactions (Begum, 2008). It is pertinent to note that variety should not be done only in a day or month but throughout ones longevity.

Balance your Choices

There is no such thing as a good food or a bad food but a healthy diet and unhealthy diet. Choosing a healthy diet is a balancing act. It doesn't mean giving up your favorite food but incorporating other nutrients lacking in your favorite food. When you choose a food high in fat or low in fiber, balance it with another low in fat or high in fiber. This balance enables energy intake to equal output in ones daily activities in other to keep the body weight at a healthy range.

Practice Moderation

Moderation means keeping within due bounds. It involves watching the portion sizes and passing up the super sizes. It entails no too much salt, fat, sugar, calorie, protein, alcohol, etc. It helps to maintain body weight, balance meal, enjoy a variety of foods, and prevent some chronic diseases. It can be ensured by using a smaller bowel which aids in reducing portion, sharing your restaurant meal with a friend and push back from the table before you are stuffed and go for a walk.

Conclusion

One of the strategic ways of maintaining health and fitness for pregnant mothers and children is getting control of their diet. Eating is indubitably the habit which exerts the greatest influence upon the health of individuals. And there is a reason, for the habit of eating repeats itself throughout life. Since feeding is an everyday affair, this makes nutrition a vital key to health maintenance hence the need of optimizing nutrition. Exercise in synergy with nutrition helps shed that extra weight that could cause complications during birth and maintains the health of both pregnant mothers and children.

Recommendations

The following recommendations have been made as intervention strategies to ensure maintenance of health and fitness of pregnant mothers and children through nutrition.

1. Education: women education should be prioritized if the Nation intends to make any headway in curbing malnutrition as studies have proven that the higher the education level of a woman, the higher the probability of optimizing nutrition both for herself and her family. They should as well be educated on the benefits of ensuring exclusive breastfeeding both for their health and that of their children. They should be educated on the criteria for planning healthy meal for the family incorporating variety, balance and moderation. Education of women on the need to attend antenatal clinic and establishing nutritional counselors in the clinic for nutritional advice especially on meal planning and intake of micronutrient supplements is also crucial.

2. Economy: the economic status of family goes a long way to determine their nutritional status. Families in the upper wealth quintile has been found to optimize nutrition hence women should be allowed and encouraged to work by providing job opportunities for them and even opportunities to be self employed. This is in a bid to raise the economic status of the family and hence their nutritional status.
3. Food fortification: this is germane to combating micronutrient malnutrition. Nutrition programmes of the country should be expanded especially food fortification.
4. Agriculture: in agriculture, interventions include improving the nutritional quality of crops (biofortification), investing in smallholders' agriculture for availability of local foods and developing technologies that raise productivity while safeguarding women's time for child care.
5. Maternity protection laws should be implemented to ensure at least six months of maternity leave for pregnant and lactating mothers. This is in a bid to encourage mothers to practice exclusive breastfeeding. Also, other policies related to protection of pregnant mothers should be implemented.
6. Participation in regular physical exercise which is vital to ensuring the health and fitness of pregnant mothers and children but must be done in cognizance of the individual's present state of health.

References

Alenkhe, O. A., Longe, J. S. & Danesi, R. M. (2015). Social Analysis of the Benefit of Exclusive Breastfeeding among Muslim Women in Selected Communities in Edo State, Nigeria. *American Journal of Humanities and Social Sciences, 3*(3), 38-44.

American Congress of Obstetrics and Gynecology. (2009). Committee opinion number 267: Exercise during pregnancy and the postpartum period. *Obstet Gynecol*, 99(1), 171–173.

Andy, E., Nwachukwu, O. J., Oyedele, E. A., Gotodok, K. H. & Kumzhi, R. P. (2016). Malnutrition and associated factors among underfive in a Nigerian local government area. *International Journal of Contemporary Medical Research, 3*(6), 1766-1768.

Australian Government Department of Health and Ageing. (2006). Healthy eating at various lifestages: pregnant women.www.healthyactive.gov.au/internet/healthyactive/publishing.nsf/Content/pregnant- women

Begum, R. M. (2008). *A Textbook of Foods, Nutrition and Dietetics* (3rd ed). New Delhi: Sterling Publishers Private Limited.

Black, R. E., Victoria, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., Onis, M., Ezzati, M., McGregor, S. G., Katz, J., Martorell, R. & Uauy R. (2013). "Maternal and Child Undernutrition and Overweight in Low-Income and Middle-Income Countries." *The lancet, 382* (9890), 427-451.

Brody, T. (2007). Vitamin A Deficiency. *Encyclopedia of Medicine*. Retrieved from www.findarticles.com/p/articl-mig2601/is0014/ai_2601001456.

Children's Investment Fund Foundation. (2014). "Community Management of Severe Acute Malnutrition, Nigeria," accessed at http://ciff.org/investments/community-management- severe-acute-malnutrition-nigeria/, March 2014.

Fesh, E. S. (2014). Investing in Health Promotion and Fitness/Physical activity: Bedrock for National Development in the 21st Century. *Nigerian Journal of Health promotion, 7*, 5-25.

Ghana Statistical Service, Ghana Health Service, & ICF International. (2009). *Ghana Demographic and Health Survey 2008.* Calverton: ICF International.

Gwarzo, M. Y. & Ugwa, E. A. (2013). The pattern of anaemia in northern Nigerian pregnant women. J. Med. Med. Sci., *4*(8), 319-323.

Hamidu, J. L., Salami, H. A., Ekanem, A. U. & Hamman, L. (2003) Protein-Energy Malnutrition in Maiduguri. *Nigeria African Journal of Biomedical Research, 6*, 123-127.

Humphery, J. H., West, K. P. & Sommer, A. (1992). Vitamin A deficiency and attributable mortality among under-5-years old. Bull World Health Organ, *70*(2), 225-232.

Kuku-Shittu, O., Onabanjo, O., Fadare, O. & Oyeyemi, M. (2016). *Child Malnutrition: Evidence from Kwara State.* Washington DC: IFPRI.

Manore, M. & Thompson (2000). *Sport Nutrition for Health and Performance*. United States: Human Kinetics.

Maziya-Dixon, B., Akinyele, I. O., Oguntona, E. B., Nokoe, S., Sanusi, R. A. & Harris, E. (2004). *Nigerian Food Consumption and Nutrition Survey 2001–2003, Summary.* Ibadan, Nigeria*:* International Institute of Tropical Agriculture (IITA).

Mbada, C. E., Adebayo, O. E., Adeyemi, A. B., Arije, O. O., Dada, O. O., Akinwande, O. A., Awotidebe, T. O. & Alonge, I. A. (2014). Knowledge and Attitude of Nigerian Pregnant Women towards Antenatal Exercise: A Cross-Sectional Survey. *Obstetrics and Gynecology, 1*:1-8.

Mbada, C. E., Adebayo, O. E., Awotidebe, T. O., Faremi, F. A., Oginni, M. O., Ogundele, A. O. & Emechete, A. I. (2015). *Practice and Pattern of Antenatal and Postnatal Exercise among Nigerian Women: A Cross-Sectional Study.* IJWHR, 3*(2), 93-98.*

National Bureau of Statistics (NBS)/UNICEF. (2014). *Summary Findings of National Nutrition and Health Survey.* Nigeria: National Bureau of Statistics and United Nation Children's Fund.

National Population Commission (Nigeria) & ORC Macro. (2004). *Nigeria Demographic and Health Survey, 2003*. Calverton: ORC Macro.

National Population Commission (Nigeria) & ORC Macro (2008). *Nigeria Demographic and Health Survey Preliminary Report 2008.* Calverton, Maryland: National Population Commission and ORC Macro.

National Population Commission (Nigeria) and ICF International. (2008). *Nigeria Demographic and Health Survey 2008*. Calverton: ICF International.

National Population Commission (Nigeria) & ICF International (2013) *Nigeria Demographic and Health Survey 2013: Preliminary Report.* Calverton: ICF International.

Save the Children. (2010). *Child malnutrition in Northern Nigeria: an illustrative case study.* www.savethechildren.org.uk.

Sujindra, E., Bupathy, A., Suganya, A., & Praveena, R. (2015). Knowledge, attitude, and practice of exercise during pregnancy among antenatal mothers. *Int J Educ Psychol Res, 1*(3), 234-237.

Udokanma, E. E. & Emeahara, G. O. (2016). Active lifestyle as route to physical fitness and wellness: an antidote to mortality of the aged. *Nigerian Association of Sports Science and Medicine, 17*, 293-302.

UNICEF. (2013). *Child well-being in rich countries: a comparative overview.* Florence, Italy: Innocenti Report Card 11.

Wadsworth, P. (2007). The benefits of exercise in pregnancy. *J Nurse Practitioners, 3*(5), 333-339.

Walford, R. L. (2000). *"Beyond the 120 Year Diet: How to Double Your Vital Years."* Boston, Massachusetts: Da Capo Press.

World Health Organization. (1993). *Prevention and management of severe anaemia in pregnancy.* WHO 1993. WHO/FHE/MSM/93-5.

World Health Organization. (2000). *Complementary feeding and the control of iron deficiency anaemia in the newly independent states.* Geneva: WHO.

World Health Organization. (2003). *Global strategy for infant and young child feeding.* Geneva: World Health Organisation.

World Health Organization (WHO). (2009). *"Global Prevalence of Vitamin A Deficiency in Populations at Risk 1995–2005." WHO Global Database on Vitamin A Deficiency*. Geneva: WHO.