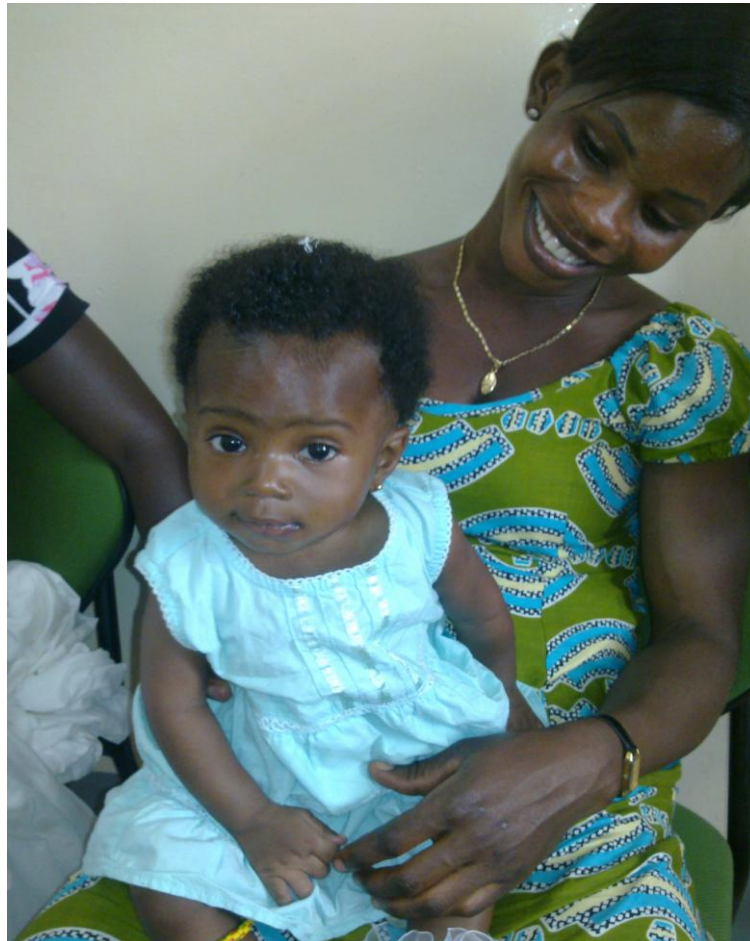


**Nutrition Status of Ghanaian Women with
Young Children-dietary Intake,
Anthropometric and Life Style Data**



For the degree of

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Statutory declaration

This is to declare that I have prepared following thesis entirely by myself using only the sources mentioned. This thesis – or any variation thereof - has never been submitted to any examination authority.

Maria Adam Nyangasa, Author

Date

GHANA



For my grandmothers,

Maria Juma Tagalile & Mariam Mangwa'nde

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LIST OF ABBREVIATIONS AND ACRONYMS

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AIDS	Acquired Immune Deficiency Syndrome
BMI	Body Mass Index
BNI	Bernhard Nocht Institute
CDS	Child Development Study
CDU	Center de Sante Urbain
CED	Chronic Energy Deficiency
CMD	Common Maternal Disorder
DBP	Diastolic Blood Pressure
DDS	Dietary Diversity Scores
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organization
FFQ	Food Frequency Questionnaire
GHDS	Ghana Health Demographic Survey
HC	Hip Circumference
HIV	Human Immune Virus
IDDS	Individual Dietary Diversity Score
IDF	International Diabetes Federation
IOTF	International Obesity Taskforce
KATH	Komfo Anokye Teaching Hospital
KNUST	Kwame Nkrumah University of Science and Technology
MDGs	Millennium Development Goals
PEM	Protein Energy Malnutrition
SBP	Systolic Blood Pressure
SPSS	Statistical Package for Social Science
UAC	Upper Arm Circumference
WC	Waist Circumference
WHO	World Health Organization
WHODAS	World Health Organization Disability Assessment Schedule
WHR	Waist to Hip Ratio

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EXECUTIVE SUMMARY

Proper nutrition and health status of nursing mothers is very important for both the mother and her child. When grain or tuber based staple foods dominate and diets lack vegetables, fruits, and animal source foods, risk for a variety of micronutrient deficiencies is high. Those most likely to suffer from deficiencies include infants and young children, and adolescent girls and women of reproductive age. This study describes the nutritional status of Ghanaian nursing mothers with a special focus on their dietary habits, quality of their diets, anthropometric data, physical activity and life style data such as food supplements used during and after pregnancy and smoking history. Additionally, we determined the associations between the women's dietary habits, socio-demographic data, anthropometry and life style data. So far, very few studies on nutritional status of women in Ghana exist, and no studies have been found on nutritional assessment of lactating mothers in Ghana.

This study was conducted at Komfo Anokye Teaching Hospital (KATH) in Kumasi; the nutritional assessment lasted from October-December 2011. A random sample of 75 women from 300 women participants of the Child Development Study (CDS) was included. Different methods, including interviews were used to collect data on dietary habits using 24 hour recalls, food frequency questionnaires and dietary diversity score, level of physical activity, life style behaviours and information of socio economic status of the women. Furthermore, anthropometric measurements data such as weight, height, waist circumference (WC), hip circumference (HC), mid-upper arm circumference (MUAC) and blood pressure were measured. A well trained fieldworker who spoke both the native language Twi and English assisted in the interviews and anthropometric data collection. Data quality was ensured by quality checks at data entry, double entry and data cleaning. Reliability check of the questionnaire was controlled by means of a pilot study. The data obtained were analysed using Statistical Package for Social Science (SPSS) Version 17.0 for Microsoft, where means, standard deviations, percentiles and frequency distributions were generated.

We interviewed 75 nursing mothers, their age ranged from 19-40 years with a mean of 30.4 (standard deviation (SD) 4.6), all the women had a height over 1.45m with a mean of 1.59m (SD 0.59). The mean Body Mass Index (BMI) of the women was 27.5 (SD 3.9) which fell under overweight category of 25.0-29.9. There was no specific BMI cut-off points found for lactating mothers or mothers with less than 6 months old babies, therefore, a general cut-off point recommended by World Health Organization (WHO) for women was used in this study. Overall,

our result showed a significant proportion of the women were either overweight (44%) or obese (28%), under-nutrition was less of a concern in this study group. None of the women were undernourished. The high prevalence of overweight and obesity in this study could be explained by the finding that women in this study did not engage themselves much into physical activity, only a third of the women reported of engaging into physical activity either leisure or occupational physical activity for 3-7 hours a week and 8% of the women did not carry out any heavy activity that lasted at least 30 minutes. Furthermore, we can state that, our study population is going through transition from traditional Ghanaian high fibre, high carbohydrate's intake to a non traditional Ghanaian meal, which has increased fat, added sugar intakes, lower unrefined carbohydrates and increased intake of animal protein sources. These eating patterns are reflected by the high prevalence of overweight and obesity.

More than half of the women in the study showed WC and WHR above the threshold values recommended by WHO for non-pregnant and non-lactating women, which is above 88cm and 0.85cm respectively, this indicates that, more than 50% of these women are at a greater risk of Cardiovascular diseases (CVDs) morbidity and mortality. However, 70.3% of the women in this study whose WHR was above the threshold showed a BMI of over $25\text{kg}/\text{m}^2$, being overweight and obese. However, the body structure of the women has to be taken into consideration since they had just given birth and were still at a recovery stage from pregnancy. Therefore, WC, HC and WHR might have overestimated the risk which could probably be less than reported. Likewise BMI, MUAC did not report any woman being under nourished, the mean MUAC was 30.8cm ranging from 23-38.5cm. In our study the prevalence of hypertension showed that only 10.7% of the women were at a higher risk of being hypertensive, the majority of the women had their blood pressure under normal values.

The study used two methods in assessing the dietary patterns and dietary quality of the women, namely Food Frequency Questionnaire (FFQ) and a Dietary Diversity Score (DDS). The women in the study consumed their meals three times a day, and more than a third of them (n=28) prepared all the three meals at home. Breakfast and lunch were the two main meals purchased from the food vendors. The most frequently consumed food items on a daily basis were the starchy staples (yam, plantain and cassava), cereals (maize, rice and bread), animal products (red meat, fish and eggs); pepper, onion and tomato were consumed daily by all the women. Fats and oils were very common, more than 80% of the women consumed palm oil in their households and about 60% of them used refined vegetable oil. Margarine, was common especially during breakfast, this may have probably contributed to the higher fat and saturated fat intakes among these women.

The nutritional quality of the diets of the women was diverse, with a mean DDS of 7.17, indicating that, the women consumed at least 50% of the food items in the 14-food group. Both FFQ and DDS described the diets of the Ghanaian women in our study to be rich in carbohydrates. The reason could be that most of the products like maize and cassava are also available as flour and can be stored for long, thus available all year through. Starchy roots, cereals and white tubers supplied almost half of the dietary energy in our study group. Vegetables (except Vitamin A rich vegetables) were consumed by all the women in the study in a daily basis. All other fruits (except Vitamin A rich fruits) were consumed daily by only 34.7% of the women in the study. FFQ and DDS both showed higher protein consumption from animal products, DDS reported that more than 90% of the women consumed fish daily and more than 50% of the women consumed “flesh meat” “legumes, nuts and seeds” and “milk and products”.

In terms of micronutrients and trace mineral intake, the highest percentage contribution of vitamin A intake in this group was from “fats and oils” food group, were more than 80% of the women used palm oil (major source of pro-vitamin A) as the main fat in their households. “Vitamin A rich vegetables and tubers” contributed to more than 50% of the vitamin A intake and “dark green leafy vegetables” and “vitamin A rich fruits” contributed only little to vitamin A intake. Due to the large quantities of grains consumed, the “starchy staples” and “cereals” food groups probably provided the majority of iron and other micronutrients like zinc and vitamin B6 in the women’s diet. Other iron rich products (listed in the 14- food group) was consumed by very few women, only 6.7% women consumed organ meat (iron rich), this could be due to high price of these products and traditional rituals where women are not allowed to eat some parts of animals e.g. liver and gizzards from chicken.

Dietary data from this study indicate that, in Ghana the nutrition transition is underway. This is illustrated by the high prevalence of overweight and obesity and the changes in the diet from traditional staples. Women in this study illustrated that, their diets are probably deficient in some micronutrients yet high in fat and saturated fats. Women who were educated, with at least a secondary level of education and salary workers were more likely to be over nourished than their counterparts who had low education level and not working or housewives. Marital status in this study did not show any significant relation with overweight or obesity, as more than 90% of the women were married. Although the results from our study sample cannot be generalized to the whole population of Kumasi, there is no reason to think the findings would be different for women of reproductive age in a similar setting in Kumasi, and with similar dietary patterns.

EXECUTIVE SUMMARY

More attention should be paid to nutritional guidance among Ghanaian lactating women, especially with regards to less educated women. Dietary patterns may be useful for risk group identification and they may offer framework for further research concerning diet and health outcomes among lactating mothers and their children. Furthermore, more research is needed to investigate WC, WHR and BMI cut-off points for lactating, non pregnant African women.

INTRODUCTION

Adequate nutrition is one of the pillars of Public Health (1). The World Health Organization (WHO) defines Nutrition as: Intake of food considered in relation to the body's dietary needs. "Good nutrition is defined as: "an adequate well balanced diet combined with regular physical activity which is a corner stone of good health" (2). Adequate and proportionate intake of essential macro- and micro nutrients is very important to prevent infections, cardiovascular diseases (CVDs) and contagious diseases. The role played by nutrition in the prevention of disease and the preservation of good health conditions is being brought to the public attention now more than ever.

Diet and nutrition are important factors in the promotion and maintenance of good health throughout the entire life course. Their role as determinants and risk factors of chronic Non-Communicable Diseases (NCDs) is well established and therefore occupies a prominent position in prevention activities (3). Moreover, the burden of chronic diseases is rapidly increasing worldwide. NCDs causes more than half of deaths in adults aged 15–59 in all regions except South Asia and Sub-Saharan Africa, where infectious diseases, including HIV/AIDS, result in one-third and two-thirds of deaths, respectively (4). It has been calculated that, in 2001, chronic diseases contributed approximately 60% of the 56.5 million total reported deaths in the world and approximately 46% of the global burden of disease (3). However, NCDs are also becoming a significant burden in Sub-Saharan Africa (5). The Global Burden of Disease Study showed that 20% of deaths in Sub-Saharan Africa were caused by NCDs (4) with the top 10 conditions in terms of disability and mortality in low- and low-middle-income countries. CVDs, cancer and injuries rank consistently as the top three conditions in these countries (6, 7)

It has been reported that, in Ghana the prevalence of lifestyle diseases such as stroke, hypertension, type 2 diabetes, and other CVDs are on the increase and are now among the top ten in-patient cause of death (8). On the other hand, the nutritional situation in Africa is characterised by high rates of malnutrition. Malnutrition is described as a number of diseases related to deficiency or excess intake of one or more nutrients (9) and in its various forms exists and persists in all countries of Africa; however, the extent tends to vary depending on the level of development of the country (10). Malnutrition affects over a billion people worldwide, to the less visible micronutrient deficiencies, such as vitamin A, iron and zinc.

Malnutrition is a major concern in African countries and continues to be a major public health problem throughout the developing world. (11, 12). Nearly 30% of humanity are currently suffering from one or more of the multiple forms of malnutrition (13). The tragic consequences of malnutrition include death, disability, stunted mental and physical growth, and as a result, retarded national socioeconomic development. Some 60% of the 10.9 million deaths each year among children under five years in the developing world are associated with malnutrition (12). The most common public health nutritional problems affecting a large population in Africa are protein energy deficiency (PED), iron deficiency anemia (IDA), iodine deficiency disorders (IDD) and vitamin A deficiency (VAD) (14, 15). Some other nutritional problems that affect a small section of the population but are increasing at an alarming rate are obesity and its associated diseases such as CVDs, cancer, and diabetes (14).

West Africa has experienced very little progress in reducing child malnutrition in the past 20 years, approximately, one third of children under 5 years of age are stunted and 5-15% are wasted (16). The worst situation is found in Niger where nearly half of the population is undernourished, affecting both children and adults (16). Among the Sub-Saharan African countries surveyed in 2003, the percentage of children under five years who are underweight ranges from 13 to 47%. With 38% of children under 5 years being underweight, Burkina Faso is the third highest of the Sub-Saharan countries surveyed (17).

The Ghana Demographic and Health Survey (GDHS) of (2003) reports that, 29% of children aged 0-59 months are chronically malnourished, this means, they are too short for their age, or stunted. However, the proportion of children under 5 who are stunted decreased from 35% in 2003 to 28% in 2008. Acute malnutrition affected 7% of children in Ghana, which is manifested by wasting, results in a child being too thin for his or her height (18). Compared to GDHS (2008), the proportion of children who are wasted has also decreased over the past 15 years to 9%, with no marked change over the past five years. The proportion of underweight children in 2003 decreased from 22% (this is 11 times the level expected in a healthy, well-nourished population) to 14% in 2008. In 2003, only 3% of children under 5 were overweight, which were within normal expectations in a healthy, well nourished population (15). However, the percentage of children who are overweight has increased steadily over the past 20 years from less than 1 % in 1998 to 5% in 2008 (16).

Malnutrition in women results in reduced productivity, increased susceptibility to infections, slow recovery from illness, and increased risks of adverse pregnancy outcomes (19). Nine percent of mothers of children under 5 years in Ghana are undernourished. The highest level

of maternal under-nutrition in Ghana is in the Upper East region (22 %) and the lowest level is in Greater Accra (4 %). Twenty-four percent of mothers of children under 5 years are overweight with the highest level of maternal over-nutrition in Greater Accra (58%) and the lowest level in the Upper West region (4%). Overweight appears to be a more serious concern than underweight among women in Ghana (18). In Ghana, the under-nutrition rate and Chronic Energy Deficiency (CED) for mothers of children under 5 is 5% in Greater Accra and 6% in towns, and 12% in the countryside. The over-nutrition rate for mothers of children under 5 is lowest in the countryside (12%) and highest in the large city areas (41%) (18).

1.1. Transition

The nutritional transition is defined as the changes in dietary patterns and nutrient intakes when populations adopt different lifestyles during economic and social development, urbanization and acculturation (20, 21). Actual nutritional transition in Africa is characterized by changes in diet and activity patterns that lead to increased weight, rates of overweight and obesity, these are associated with other diet-related disorders including hypertension, diabetic type 2, stroke and CVD (22-24). The factors leading to the transition are primarily economic and, in addition to the health outcomes, are also associated with demographic and cultural changes.

In terms of diet, there is a shift away from traditional foods, such as grains and starchy roots, high in complex carbohydrates and fiber and low in fat, toward staples, such as rice and wheat, increased fat, including animal fat, and refined sugar consumption, higher dietary density, and greater dietary diversity (25). The rapid rate of this transition and its impact on health in middle-income, developing nations has drawn significant attention (22, 26, 27). In these countries, disability and death rates due to chronic diseases have accelerated over the last two decades. Africa's chronic disease burden has been strongly attributed to changing behavioural practices such as sedentary lifestyles and diets high in saturated fat, salt and sugar, which are linked to diet-related disorders mentioned earlier (28-31). While standards of living have improved and the access to services has increased, there have also been significant negative consequences in terms of inappropriate dietary patterns and decreased physical activity especially among the poor (32).

Increasing urbanization also has consequences for the dietary patterns and lifestyles of individuals. Moreover, rapid changes in diets and lifestyles resulting from industrialization,

urbanization, economic development and market globalization, have accelerated during the last decade and are having a significant impact on the health and nutritional status of populations (6). Therefore, experts foresee that, Africa faces an urgent but 'neglected epidemic' of chronic disease (29, 30)

Obesity is one major risk factor for NCDs and is also linked to urbanization, modernization, growing affluence and changing lifestyles (sedentary occupations). Research in Ghana indicates that the prevalence of obesity is increasing especially among women (33). The rising prevalence of obesity in Ghana is worrying because epidemiological studies have consistently shown an increased risk of morbidity, disability and mortality with obesity (34). Ghana like many other African countries is undergoing an epidemiological and nutritional transition characterised by increasing prevalence of NCDs and co-existence of communicable diseases resulting in the double burden of diseases (28, 35). Based on results from a nationally representative survey (World Health Survey 2003), Tagoe 2010 (36) reports that in Ghana, about 18% of the respondents indicated they had been diagnosed with one or more NCDs with 45% of them currently receiving treatment.

1.2. Nutrition Assessment

Research on the role of diet in disease prevention is strongly linked to conduct of precise dietary assessment in populations. Food assessment studies of rural communities in developing countries is very important on the fact that, large portion of food consumed in such communities is home-produced or purchased locally, therefore, diets are usually monotonous because they are defined by what kind of foods are available in the home or local markets and their prices. Also, health care, educational facilities and other services are limited or nonexistent in some areas; dietary intake data can be used to document particular situations for which programs and services to improve conditions can be developed, introduced and evaluated (37).

To assess effectively the food and diet perceptions of a group, dietary researchers must know the groups attitudes towards questioning; sufficient knowledge about the society being studied, their local foods, the methods used to prepare them, eating patterns and how to ask the right question about their dietary intake (FAO 1992).

The main difficulty in conducting dietary assessment surveys in rural communities and developing countries is that one has to be very sensitive to local customs, including food

behaviours associated with religious, ethnic and local beliefs and practices. Moreover, the correct interpretation of data collected from the dietary studies depends on the availability of up to date database, such as food-composition tables, which are lacking for many countries and those that do exist may be outdated. In addition, most have incomplete data. There is a need for a development of new composition tables and computer databases appropriate for use in various African countries and regions (37).

In Ghana there are not many studies describing dietary intake of the population, especially not for adults. However, this assessment is an important issue not only for the determination of the link to the raising problems of chronic diseases in the Developing World, but also for determining new dietary habits in modern Africa. This knowledge is valuable and necessary to develop nutrition and health programs in the country.

REVIEW

2.1. Health Situation in Ghana

2.1.1. Diseases

According to the first WHO Global Status Report on NCDs, 36.1 million people died in 2008 from conditions such as heart disease, strokes, chronic lung diseases, cancers and diabetes. Nearly 80% of these deaths occurred in low- and middle-income countries (WHO report, 2008). Ghana, like many African countries, faces a double burden of disease. In addition to the impact of communicable diseases, there is a growing epidemic of NCDs (38). By 2003 at least four conditions - stroke, hypertension, diabetes and cancer - had become one of the top ten causes of death in at least each regional health facility in Ghana. (39).

However, the pattern of the incidence of diseases in the Ghanaian population has not shown any appreciable change. Malaria continues to top the list of diseases managed at the out-patient departments of hospitals and clinics (44%), followed by upper respiratory tract infections (7.2%), diarrhea diseases (4.3%), skin diseases (4.1%) and hypertension (2.7%). The major causes of morbidity and mortality in Ghana are preventable or communicable diseases such as malaria, tuberculosis and HIV/AIDS (40). Malaria continues to be a major public health concern. It is one of the leading causes of morbidity and mortality, especially among young children and pregnant women in Ghana (41).

2008 Ghana DHS reported that, 2% of Ghanaian women are severely anemic, the prevalence of anemia is higher among pregnant (70 %) and breastfeeding (62%) women than among those who are neither pregnant nor breastfeeding (57%) (19) .

2.1.2. Physical activity and health

Physical inactivity has been identified as the fourth leading risk factor for global mortality (6% of deaths globally). Levels of physical inactivity are rising in many countries and are estimated as being the principal cause for approximately 21–25% of breast and colon cancer burden, 27% of diabetes and approximately 30% of ischemic heart disease burden (42). WHO recommends that, adults aged 18–64, should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate- and vigorous-intensity activity (43) .

A study by Amoah A. et.al (38) reported that, Ghanaians appear to be taking exercises less regularly, in the past, people walked long distances to work or to school. He adds that, the environment in Ghana is not only non-conducive for walking but also dangerous for pedestrians. Also, there are very few pathways and parks in Ghanaian cities for jogging and for running and that most work places and communities in Ghana do not have recreational and sporting facilities to encourage regular leisure-time physical activity (38).

The 2008, GDHS reports that Ghanaian women of age between 45-49 years and currently employed, married women and women from the rural areas were more likely to engage in vigorous physical activity three or more times a week than any other group of women. 37% of women from the rural areas engaged in physical activity three or more days a week compared to 24% of women from the urban area (19) this could be due to lack of transportation means.

2.2. Nutrition situation in Ghana

Ghana has made steady progress towards achieving some of the Millennium Development Goals (MDGs) including eradication of extreme poverty and hunger; achieve universal education, 28% eradication of under 5 child mortality and a slow decline on some of the other MDGs. However, the nutrition, health, and mortality situation of young children and women in Ghana, as well as persistent regional disparities still need to be addressed (44).

The health and nutritional status of children in Ghana has improved over the past two decades, and Ghana stands out among West African countries in terms of child health. Still, major challenges remain (45). Infant and under-five mortality rates remain high in Ghana. In 2006, the infant mortality rate was 71 deaths per 1000 live births and under-five mortality rate was 111 deaths per 1000 live births (46). Anthropometric indicators of nutritional status show that malnutrition is still prevalent among young Ghanaian children (46, 47).

In Ghana, among adult women, the prevalence of overweight and obesity is high, especially among those living in urban areas, while under nutrition persists, particularly in the Upper East Region (44). There has been a change in trend of Ghanaian women's nutritional status between GDHS 2003 and 2008. In 2003 a quarter of the women of childbearing age were overweight or obese, with a prevalence of 35% in urban areas and 16% in rural area (46). In 2008 GDHS, overweight was two times higher in urban areas than in rural areas with an

increase of 40% and 20% respectively, the increase could be related to diet changes and more sedentary life style of the predominantly urban population (19).

Looking at trends over the past five years, most of the nutritional status indicators for women have remained stable; however, the proportion of women who are overweight or obese has increased, from 25% in 2003 to 30% in 2008 (19). Also, it has been observed that over-nutrition is now a major problem in Accra Metropolitan area, with the prevalence of overweight and obesity being 23% and 14% respectively, and the prevalence in females was nearly four times that in males (38).

2.2.1. Women's educational status and socio economic status

Education is one of the most important resources that enable women to provide appropriate care for their children, which is an important determinant of children's growth and development (48). Women who receive even a minimal education are generally more aware than those who have no education of how to utilize available resources for the improvement of their own nutritional status and that of their children and rest of the family.

Some other authors have shown that the higher the educational status of the woman the lower the proportion of undernourished women (39) and vice versa. Studies in Philippines, Libya, Uganda and Ethiopia (44-47) have also proved a decreased incidence of malnutrition among young children with an increase in the level of mother's education. The 2003 Ghana DHS report showed, under nutrition was higher among women with no education (11%) than those with at least a primary or secondary school education (7%) (18).

On the other hand, the proportion of Ghanaian women who are overweight or obese increase with level of education and wealth quintiles while the percentage of thin women in Ghana tends to decrease as woman's level of education increases, and as wealth quintile increases (19). The 2003 Ghana DHS report, determined that, over-nutrition was highest among women with at least a secondary school education (34%) and lowest among those with no education (13%) (18). Also a study by Amoah et al. (49) confirmed that, the participants with tertiary education had the highest prevalence of obesity compared with less literate and illiterate participants.

Furthermore, several studies have shown a link between social economic and demographic factors with women's nutritional status. Marital status of the women is associated with household headship and other social & economic status of the women that affects their nutritional status. A study in Ethiopia showed that women's malnutrition is significantly

associated with marital status. Compared to married women malnutrition is higher among unmarried rural and divorced or separated urban women (50). Other studies, reported that the prevalence of obesity was higher among married women compared to unmarried women (51). Women's age and parity are important factors that affect maternal depletion, especially in high fertility countries (50). DHS surveys conducted in Burkina Faso, Ghana, Malawi, Namibia, Niger, Senegal, and Zambia show a greater proportion of mothers aged 15-19 and 40-49 years that exhibit CED (50). A local study in Ethiopia also showed that women in the youngest age group (15-19) and women in the oldest age group surveyed (45-49) are most affected by under-nutrition (50).

The 2008 Ghana DHS reported that the proportion of overweight or obese women is positively correlated with women's age; the proportion increases from 10% among women age 15-19 to 44% for the age group 40-49 years.

2.3. Food situation

2.3.1. Food consumption of Ghanaian women

The two main food groups consumed in Ghana are cereals, starchy roots and plantain. The major staples are rice, yam, maize, cocoyam, cassava, plantain, millet and sorghum. They are accompanied by thick well seasoned sauces, the most popular being okra, groundnut, palm nut and palava sauce (made from cocoyam leaves and melon seeds). Generally, three meals are consumed daily, each one comprising one main course.

The Ghanaian diet varies according to regions and between the urban and rural sector. In the north, millet, yam and sorghum are the main staples while in the South and West, cassava, maize, plantain and cocoyam are common. In the dry South-Eastern region the most common staples are maize and cassava (44).

The 2008 Ghana DHS showed that, 88% of the main foods consumed by mothers in Ghana were meat, fish, shellfish, poultry, and eggs; 86% foods made from grains, 65% from "roots and tubers" and fruits and vegetables that are not rich in vitamin A, and 61% vitamin A-rich fruits and vegetables. Foods cooked with oil, fat, or butter are consumed by about half of these women (52%), while foods made from legumes (26%) and 27% of other solid or semi-solid foods are consumed by about one of four women (19).

Other findings indicate that women in urban areas (28%) are more likely to drink milk than those in rural areas (11%). At the regional level, the percentage of women drinking milk is highest in the Greater Accra region (37%) and lowest in the Upper West and Volta regions (8 and 9%, respectively). Twenty-one percent of women drink tea or coffee, and 16 percent drink other liquids (19).

Christmas and Ramadan are the main religious celebrations in Ghana, during which meat is consumed, in particular chicken, goat and lamb (44).

2.3.2. Food security

Food security is defined as, “A situation that exists when people, at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (44). Throughout Ghana, poverty is the main limitation to food access and fluctuations in prices are a major constraint. Adequate access to meat and fish is restricted to the medium and high income groups. The situation is aggravated by growing and poorly managed urbanization, with the development of slums and the spread of unemployment.

Food security in Ghana continues to be threatened by high food prices, inflation and low household income, persistent high levels of unemployment and additional negative effects from variation in domestic productions (46). Therefore, food insecurity persists, mainly due to unstable production, insufficient purchasing power and problems of physical access due to a lack of road infrastructure in the northern part of Ghana and the rural coastal regions (44). Also about 20-30% of the food production is lost due to the poor traditional post harvest management of food crops (119). Losses of this magnitude have a rising effect on prices which in turn restrict access to food at the household level.

2.4. Psychosocial conditions of the mothers

Poverty and associated health, nutrition, and social factors prevent at least 200 million children in developing countries from attaining their developmental potential (52). A strong maternal-infant (or caregiver-infant) bond provided through psychosocial stimulation is essential for positive child development. The formation of this bond at the beginning of life is an essential step that sets the stage for cognitive, emotional, and social development later in life (53-55).

Researches from developed countries have identified three aspects of parenting that are consistently related to young children's cognitive and social-emotional competence. These are cognitive stimulation, caregiver sensitivity and responsiveness to the child, and caregiver affect (emotional warmth or rejection of child) (56). The effect of these factors is sensitive to contextual factors such as poverty, cultural values and practices (57). In addition; there is strong evidence that impaired growth is associated with delayed mental development, poor school performance, and reduced intellectual capacity (58, 59). Socioeconomic status is linked to health status. Poverty increases young children's exposure to psychosocial risks that affect development through changes in brain structure and function, and behavioural changes. The literature has shown that children born into poverty face various risks for their physical and mental development ranging from malnutrition to severe psychosocial impairment (60).

Depression and anxiety are common among women during pregnancy and the postnatal period in low-income countries, with recorded prevalence of depression as high as 35% (61), collectively termed as maternal common mental disorder (CMD). There are studies that have shown an association between maternal CMD and child growth. Adewuya and Harpham et al (62, 63), found that infants of mothers depressed at 6-weeks postpartum were more likely to be underweight and stunted at 3 and 6 months of age. More research is needed in Africa to investigate the mental health status of mothers and a link to the child growth.

AIM OF THE STUDY

The main aim of this study was to assess the diets of Ghanaian nursing mothers and determine types of meals consumed and describe food consumption patterns. Furthermore, the study also looked at the women's physical activity level and anthropometric data and relates them to the women's Nutritional status.

MAIN OBJECTIVE:

- To assess dietary habits of Ghanaian women with young children from the Child Development Study (CDS).

SPECIFIC OBJECTIVE

- To describe food consumption patterns, and types of meals through the Food Frequency Questionnaire (FFQ).
- To describe dietary intake of the women through Dietary Diversity score (DDS).
- To relate dietary habits and anthropometric data of these women, to their socio-economic data and their mental status.

SUBJECTS AND METHODS

4.1. Study Area

The study was conducted from October to December 2010 in Kumasi, situated in the Ashanti region in Southern Central Ghana. Kumasi is the second-largest city in Ghana covering an area of 254km² with a population of 1,634,900 (64) .

The largest ethnic group is the Ashanti, but other ethnic groups are growing in size. Kumasi features a tropical wet climate, with relatively constant temperatures throughout the course of the year. The city has two different rainy seasons, a longer one from March through July and a shorter rainy season from September to November.

The main economic activity is agriculture, with food crops like corn, yams, cassava, and other root crops. There is also some cattle breeding. The leading export commodities of the country are cocoa, gold, and timber. In recent times, the economy has diversified to include exports of non-traditional commodities such as pineapples, bananas, yams, and cashew nuts (40).

4.2. Sampling

This study was conducted at Komfo Anokye Teaching Hospital (KATH) located in the centre of Kumasi. The geographical location of the Hospital, the road network of the country and commercial nature of Kumasi make the hospital accessible to all the areas that share boundaries with Ashanti Region and others that are further away. As such, referrals are received from all the northern regions, Brong Ahafo, Central, Western, Eastern and parts of the Volta Regions (65).

This nutritional assessment was part of the Child Development Study (CDS) which is a 2 years prospective birth cohort in Ghana at KATH and Côte d'Ivoire at the Centre de Santé Urbain à base communautaire d'Abobo, in Abidjan (CSU-Abobo) with 600 children. CDS looks at the influence of infectious diseases on physical and mental development in young African children, aiming at assessing the impact of gastrointestinal and systemic infectious diseases on developmental outcome in Western-African children. Moreover, symptoms indicative for acute or chronic infections with high prevalence in the tropics, such as diarrhoea, anaemia, and fever are assessed with respect to the influence on childhood development.

75 mothers from CDS in Ghana were recruited to participate in the Nutrition-Study, when they came to CDS scheduled and unscheduled visits at the hospital. Also from the CDS-

contact list which contained their telephone numbers and addresses, the women were called and asked if they wanted to participate in the CDS-Nutrition study. The mothers were explained the whole procedure by a well trained field worker and myself.

4.3. Ethics

The protocol of the study was approved by the Ethical Committee of KATH and Kwame Nkrumah University of Science and Technology (KNUST). The objectives and principles of the Nutrition study were explained to all the women by a trained fieldworker in their local language Twi. All the women who agreed to participate in the study signed an informed consent.

4.4. Dietary assessment

A semi structured questionnaire was developed from standard instruments and from the Ghana Demographic and Health Survey report 2008 (40), pretested and used to conduct the dietary assessment. The questionnaire consisted of anthropometric data, 24-hour recall, a Food Frequency Questionnaire (FFQ), and lifestyle data like physical activities, smoking history and supplement intake during and after pregnancy.

4.4.1. 24h-recall

Each woman who participated in the study was asked to recall all food items consumed in the previous 24 hours, including beverages and snacks, regardless where the meal was prepared. As most of the women cooked the meals themselves they had a very good ability to remember foods and estimate portion size. They were asked to give a complete list of all the items used in preparation of the meal consumed; the estimate of the quantity of food consumed was noted. Foods consumed out of the house and bought from the street vendors were also documented and portion size was estimated according to standard selling portion sizes in Kumasi.

Weekend 24 hour recalls were recorded and noted down for any distinctions. For absolute accuracy of the food quantity or exact portion sizes consumed by the women, a list of all important food and some standard meals from a cafeteria was prepared by weighing the food before starting the survey.

4.4.2. Food Frequency Questionnaire

A food frequency questionnaire (FFQ) is used to determine the frequency of consumption of certain foods. The food frequency provides qualitative data on types and frequency of foods or food groups. The questionnaire must contain enough foods that are good sources of the

nutrient of interest in order to discriminate between low and high consumers. The FFQ can examine current diet or diet in the recent or remote past.

In our study a FFQ containing a list of 55 food items which were divided into 6-food groups that was developed on the basis of a FFQ by Nti C (66) and the GHS 2008 (19). The food groups included starchy roots and plantains, cereals and cereal products, animal products, legumes, fats and oils and fruits and vegetables. The questionnaire contained a series of frequencies such as "never, daily, weekly, monthly, occasionally and yearly". Women were asked the frequency in which they ate each food on the supplied list under each food group.

4.4.3. Dietary diversity score

To measure nutritional quality of the women's diet, an Individual Dietary Diversity Score (IDDS) was calculated based on a 14-food groups classification recommended by FAO (67), like other authors (67-69) we could not find an internationally acknowledged and recommended for DDS.

For the scoring of this IDD, 14-groups cereals, vitamin A rich vegetables and tubers, white tubers and roots, dark green leafy vegetables, other vegetables, vitamin A rich fruits, other fruits, organ meat (iron-rich), flesh meats, eggs, fish, legumes, nuts and seeds, milk and milk products, and oils and fats were used according to FAO (44). These categories show dietary diversity across the main groups.

Dietary Diversity scores are created by summing either the number of individual foods or food groups consumed over a reference period. The Dietary Diversity scores described in this study consists of a simple count of food groups that the mothers in the study consumed over the past 24 hours.

4.4.4. Anthropometric data and blood pressure

Anthropometric measurements were performed using the standardized procedures recommended by WHO (70). The women were weighed on a digital weighing scale with a capacity of up to 150kg. The scale was placed on a horizontal surface; the women were weighed without shoes and with a minimum of clothing.

The height was measured in centimetres using a non stretch measuring tape that was taped vertically to a hard flat wall surface with the base at the floor level. The women were measured while standing without shoes on a horizontal surface against the wall with their

heels together, body stretched upwards with buttocks and shoulders touching the wall to which the measuring tape was attached.

The body mass index (BMI) was calculated as (weight/height² (kg/m²)) and used to assess the women's body fat. Chronic energy deficiency and overweight/obesity were determined using BMI cut-offs of < 18.5 and ≥ 25.0 respectively (71).

Hip, waist and upper arm circumferences were measured using a non stretch measuring tape according to standard procedures as recommended by WHO (72) . Women's blood pressure was also measured using a gold standard device, mercury Sphygmomanometer. To avoid errors a standard procedure was followed as recommended (73). Each woman was asked to remove all clothing that covers the location of cuff placement. Measurements were made while the mother was comfortably seated on a chair with legs uncrossed, and the back and arm supported, such that the middle of the cuff on the upper arm is at the level of the right atrium. The blood pressure was measured in both arms, and the first reading recorded, before that the mother was instructed to relax as much as possible and not to talk during the measurement procedure.

4.5. Other information

A separate questionnaire was used to determine in a different way, women's weekly consumption of fruits and vegetables, their daily intake of water which was recorded in glasses or bottles consumed per day, and information on fats and oils mostly used in their households was recorded separately.

For assessment of physical activity the women were asked how often they engaged themselves to sports or any heavy activity that lasted at least thirty minutes in a week. Information on sleeping hours per night, weekly naps was also recorded. Lifestyle data like smoking, any illness during pregnancy, medication intake and supplements intake during pregnancy were asked. Women were asked if they had taken any medication during or after pregnancy, this included medication for diarrhoea, malaria and for any other illness.

Additional information was taken from the CDS in order to associate with nutritional information of each woman in the study. This information included marital status, ethnicity, religion, occupation, educational level, and psychological assessment data on their stress or anxiety level.

4.6. Psychological assessment

Impairment of parental mental health severely interferes with children's health in all domains of development (74). Among adult mental disorders, depression is the most prevalent, affecting women twice as often as men (life time prevalence: 21%), predominately in their reproductive years (75). The CDS aims at determining the prevalence of mental health impairment (ante- and depression, perceived disability) of the participating mothers. The psychological assessment was conducted in the margin of CDS at the KATH in Kumasi, when the mothers came for their three months visits. The mothers were interviewed individually in a quiet room by a well trained psychologist who spoke both English and the local language (Twi).

In this study the questionnaires look at symptoms associated with maternal mental health impairment which was divided into three categories, depression (PHQ-9), anxiety (GAD-7) and perceived disability- is a degree of functional impairment which was developed from the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0). The psychological assessment was done from July 2010 to October 2010.

On depression–Patient Health Questionnaire (PHQ-9) and anxiety questionnaire (GAD-7) the mothers were asked to think about their last 2 weeks and problems that might have made it difficult for them to do their work, take care of things at home or get along with other people. The questionnaire contained a list of nine and seven items (possible problems) for PHQ-9 and GAD-7 respectively, which were ranked into four scores i.e. 0= not at all, 1=several days, 2=more than half the days and 3=nearly every day. The cut-off score for PHQ-9 > 9 and cut-off score for GAD-7 > 8 which was graded into scoring points with the lowest being no depression/anxiety, mild depression/anxiety (not clinically relevant), moderate depression / anxiety , moderately severe depression/anxiety and severe depression/anxiety (clinically relevant) .

Perceived disability questionnaire was adapted from WHO Disability Assessment Schedule version 2.0 (76), which was developed to better understand difficulties people may have due to their health conditions. CDS used the interviewer administered questionnaire with 12 items (S1-S12) on page 5 of WHODAS 2.0 (77), the questionnaire was divided into four sections, section 1-face sheet, section 2 -Demographic and background information, section 3-Preamble and section 4-core questions. On core questions, the women were questioned on the level of difficulty encountered in the last 30 days looking at emotional, physical, financial and psychological difficulties which were ranked from none, mild, moderate, severe and extreme.

Mothers with pathological scores in one or more of the psychological questionnaires are referred for psychological treatment within the CDS-study.

4.7. Data Analysis

Initial data entry was performed using Microsoft Excel 2007. Data quality was ensured by quality checks at data entry level by double entry control and by further cleaning of the data. Data management including data collected from the 24h-recall was converted into nutrient intake by using food composition database (data not presented) , computation of the DDS from the 24 hour dietary recall was performed with Microsoft excel 2007 and Statistical Package for Social Science (SPSS) version 17.0. Data from FFQ was used to describe the food composition patterns of the women.

RESULTS

5.1. Basic and Anthropometric data

The women of this study were between the age of 19 and 40 and with a height between 1.48-1.73m (table 1). The mean BMI of the women was 27.5, with 28% of the women being obese, 44% overweight and 21% with normal weight and none of the women were underweight. The mean mid-upper arm circumference (MUAC) of the women was 30.8 ± 3.5 ranging between 23.0-38.5cm.

We determined that 29 % of the women had a waist circumference (WC) of < 88 cm and 46% greater than 88cm. Out of 75 women in the study, 26.7% (n=20) had a WHR of < 0.85 cm and 73.3% (n=55) with WHR of > 0.85 cm of which 70.37% were overweight and obese.

The prevalence of hypertension, systolic blood pressure (SBP) ≥ 160 mmHg and diastolic blood pressure (DBP) ≥ 100 mmHg was 4% and 7% respectively. Out of 75 women, 7% women were classified with stage 1 hypertension with SBP $\geq 140/90$ mmHg and 2.7% were diagnosed with hypertension stage 2 with BP $\geq 160/95$ mmHg. More than 50% of the women in the study showed normal blood pressure with BP $\leq 120/80$ mmHg with a mean SBP of 123mmHg and mean DSP of 78.3mmHg.

Table 1 Anthropometric data of the women

	n	Mean	SD	Median	Min-Max
Age (year)	75	30.4	4.57	31.00	19-40
≤ 30	37	26.59	2.47	27.00	19-30
>30	38	34.05	2.78	34.00	31-40
Height (m)	75	1.59	0.59	1.59	1.48-1.7
Weight (kg)	75	70.1	10.6	70.2	45.1-90.3
BMI (kg/m ²)	75	27.5	3.98	27.1	19.1-37.9
Normal weight (NW)	21	23.09	1.73	23.7	19.1-24.9
Overweight (OW)	32	27.18	1.38	27.1	25.2-29.7
Obese (OB)	22	32.58	2.21	32.1	30.1-37.9

Circumference (cm)					
Mid-Upper arm (MUAC)*	75	30.8	3.5	31.0	23.0-38.5
Waist (WC)**	75	93.3	9.5	92.0	77.0-116.0
< 88cm	24	32.0			
≥88cm	51	68.0			
Hip (HC)	75	105.4	7.9	105.0	89.0-124.0
Waist/Hip (WHR)***	75	0.88	0.66	0.87	0.76-1.09
<0.85	19	25.3			
≥0.85	56	74.7			
Blood Pressure (BP)					
Sys.	75	123.3	17.25	120.0	90.0-187.0
Diast.	75	78.3	12.79	77.0	55.0-110.0

* Bruce Cogil, Anthropometric Indicators Measurement Guide, FANTA 2003

**http://www.who.int/nutrition/topics/5_population_nutrient/en/index5.html

***Obesity: preventing and managing the global epidemic. Report of WHO consultation, 2000

5.2. Socio-demographic characteristics of the women

Out of all the women who participated in the study, 92.0 % (n= 69) of them were married with 85.9 % having at least basic education. A majority of them (35.1%, n=26) had tertiary education level, while only 4% (n=3) of the women were not educated. (*Table 2*)

Most of the women engaged themselves into petty trading, a third of the women was employed in fixed-salary based jobs and another 17.6% of them was self employed mostly carrying out handwork like hairdressing, farming, dressmaking, poetry etc. Some of the women without work explained that they had to stop their jobs after delivery.

Ghana is ethnically a diverse country, thus Ghanaian culture is a mixture of all its ethnic groups. The predominant ethnic group in our study was Akan (91.6%); Ewe (4.2%) and the rest (4.2%) belonged to different ethnic groups like Brong Ahafo, Havsa and Upper Westerners. In Ghana, Christianity is the main religion in the Southern part, in our study 96% of the women were Christians and 4% Muslims.

Table 2. Socio-demographic characteristics of the women in the study

	n	Percentage
Marital status	75	
Married	69	92.0
Single	3	4.0
Cohabitation	3	4.0
Education level	75	
None	3	4.0
Basic level	27	36.5
Secondary level	19	24.3
Tertiary level	26	35.1
Occupation	75	
Housewife	11	14.7
Trader	27	37.3
Salary worker	23	30.7
Others	13	17.6
Ethnic group	72	
Akan	66	91.6
Ewe	3	4.2
Others	3	4.2
Religion	75	
Christianity	72	96.0
Islam	3	4.0

5.3. Behaviors of the women in the study

More than a third of the women in the study slept between 7-8 hours a night and one third of the mothers reported less than 7 hours sleep per night. Afternoon naps were not very common among the mothers; more than half of them had less than or an hour nap per week and more than a third of the mothers had more than 3 hours nap a week.

Twelve percent of the women had diarrhea during pregnancy but only 5.3% took medication for it. More than 50% of the women took prophylaxis for malaria prevention during pregnancy still 41.9% of the women had malaria/fever during their pregnancy. Three quarter of the women took folic acid supplements (folate, vitamin B9) during pregnancy, other

supplements like iron (Fersolate), Pregnacare and Multivitamin was commonly used by these women. More than half of the women in the study had physical demanding occupational activities and long hours of domestic tasks. Averagely most women spent about 3 hours a week for physical activities; only 8% reported to take no part in any physical activity. None of the women in the study had any history of smoking; the women were not questioned about their drinking habits because they were lactating.

According to the depression and anxiety cut offs, three quarter of the 75 women of this study had No to mild anxiety and likewise for depression. Only one case, had a moderately severe depression which was clinically treated, with 12.5% (n=9) having a moderate depression. Unlike depression, there was no case of moderately severe case of anxiety in any of the women.

Table 3. Behaviors of the women in the study

	n	Percentage
Sleeping hours per night (hours)	74	
<7	25	33.8
≥ 7 and ≤ 8	26	35.1
>8	23	31.1
Naps per week (hours)	73	
≥ 1	38	50.7
>1 and ≤ 3	7	9.6
>3	28	38.4
Medication during pregnancy		
Malaria/Fever	31	41.9
Malaria prevention	39	54.9
Diarrhea	4	5.3
Other	27	37.0
Diarrhea during pregnancy	75	
Yes	9	12.0
No	66	88.0
Supplements		
Pregnacare ³	23	31.5
Folic Acid	66	90.4
Fersolate ⁴	42	57.5

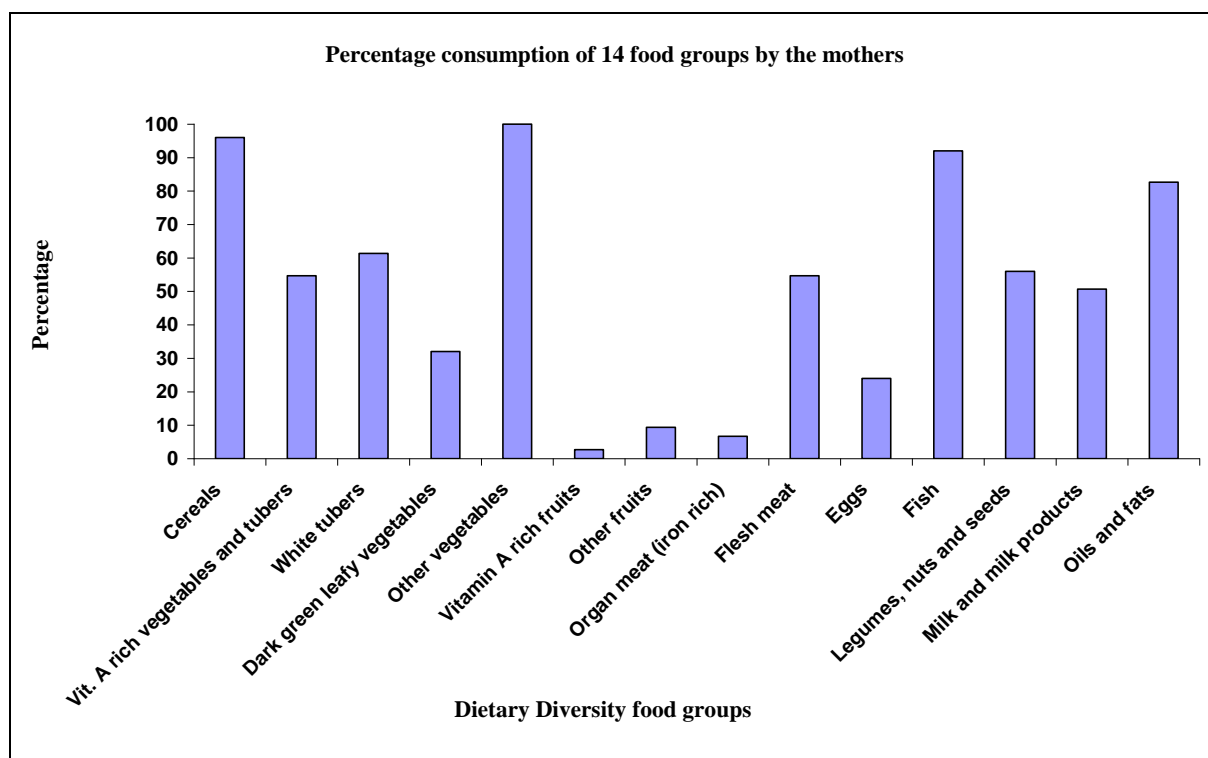
Other	49	66.2
Physical Activity	75	
No activity	6	8.0
Sedentary	4	5.3
Moderate	61	81.3
Active	4	5.3
Physical activity per week (minutes)	74	
≤ 3	41	55.4
>3 and ≤ 7	23	31.1
>7	10	13.5
Anxiety grade	72	
No or mild anxiety	54	75.0
Moderate anxiety	18	25.0
Depression grade	72	
No depression	42	58.3
Mild depression	20	27.8
Moderate depression	9	12.5
Moderately severe depression	1	1.4

5.4. Dietary Diversity Data

The DDS ranged from 4 to 11, over 14 possible groups with a mean of 7.17. Considering the diet within each category of the diversity score, the women in the study mostly consumed the food groups of ‘other vegetables’ (100%), ‘cereals and fish’ with 96% and 92% respectively, and ‘oils and fats’ being consumed by 83% of the women (*Figure 1*).

Sixty-one percent of the women consumed the food group ‘white tubers’; 51% ‘milk and milk products’, 55% of the women consumed the food groups ‘flesh meat’, and ‘vitamin A rich vegetables and tubers’ and 56% consumed ‘legumes, seeds and nuts’ Other food groups that were occasionally consumed by the women was ‘dark green leafy vegetables’ with 32% and ‘eggs’ with only 24%. Very few women (7%) consumed organ meat’ (iron rich) and 9% consumed ‘other fruits’ and ‘vitamin A rich fruits’ was poorly consumed with only 3%.

Figure 1 .Dietary diversity score



5.5. Meal frequency

Information on meal frequency, type of meals consumed, and meals skipped per day are presented in *Table 4*. The majority of the women (61.3%) consumed three meals a day; 24% of the women skipped one of the meals, mostly lunch. In terms of meals cooked at home for consumption, more than two-thirds of the women prepared all their meals at home. Breakfast and lunch were the two main meals purchased from food vendors, with supper being the least purchased meal by most women.

Most women drank water between and during their meals, the mean quantity of water per day was 3082ml and ranging from 1000ml-6000ml. More than half of the women drank up to 3Liters of water a day, with only 14.7% having drunk more than 4Liters per day. The water was measured as sold in Ghana, in their respective bottle sizes (500ml, 100ml and 1500ml) and in 500ml sachets.

Table 4a. Meal frequency

	n	Percentage
Meal frequency (day)	75	
Twice	17	22.7
Thrice	46	61.3
Four times	12	16.0
Meals cooked at home		
Breakfast	54	72.0
Lunch	51	68.0
Supper	63	84.0
Meals purchased from Vendors	39	
Breakfast	19	25.3
Lunch	13	17.3
Supper	7	9.3
Skipped meals (day)		
Breakfast	2	2.7
Lunch	11	14.7
Supper	5	6.7

Table 4b. Percentage distribution of water intake per day

	n	Mean / %	SD	Median	Min-Max
Water intake (L/day)	75	3082.5	1110.1	3000	1000-6000
≥1	1	1.3			
1.1-3	39	52			
3.1-4	21	28			
<4.1	14	18.7			

5.6 Food Frequency Questionnaire

Table 5a describes consumption patterns of 4 food groups namely, starchy roots and plantains, cereals and cereal products, animal products and legumes. The main starchy staples consumed are plantain, cassava and yam, with plantain being the most frequently consumed followed by cassava. A third of the women consume plantain on a daily basis, while 14.7% and 5.3% consumed cassava and yam respectively. Sweet potato, cocoyam and white potatoes were consumed on a yearly basis by very few women.

Almost three quarters of the women consumed maize on a weekly basis, the second most daily consumed in the cereals and grains food group was bread and rice with 37.3% and 28% respectively. On a weekly basis rice was consumed by a third of the women. A third of the women did not include millet in their diets, while biscuits were consumed as a snack at least twice a week by most women.

More than half of the women consumed fish daily as their main source of animal protein. Red meat and milk were highly consumed after fish on a daily basis by most women with poultry and eggs being consumed at least 2-3 times a week. Snails and sea food (i.e. crabs, lobsters and shrimps) were not consumed at all by 40% and 48% of the women respectively.

Most legumes were consumed on a weekly basis. More than 50% of the women consumed palm nut, Agushie (melon seeds) and beans weekly. Soya bean and Bambara beans were consumed occasionally.

Table 5a. Food Frequency Table of staples, animal products and legumes

Commodity	% Response				
	Never	Daily	Weekly	Monthly	Yearly
Starchy roots and Plantain					
Cassava	5.3	14.7	73.3	5.3	1.3
Yam	2.7	5.3	84.0	5.3	2.7
Plantain	1.3	22.7	73.3	2.7	0.0
Cocoyam	57.3	0.0	8.0	8.0	26.7
Sweet potatoes	80.0	0.0	4.0	8.0	8.0
White potatoes	73.0	0.0	6.8	8.1	12.2
Cereals and cereal products					
Maize	0.0	24.0	73.3	1.3	1.3
Millet	33.3	12.0	36.0	10.7	8.0

Rice	0.0	28.0	69.0	2.7	0
Bread	2.7	37.3	52.0	6.7	1.3
Biscuits	17.3	4.0	46.7	21.3	10.7
Animal products					
Red meat	5.3	33.3	54.7	5.3	1.3
Fish	0.0	54.7	44.0	1.3	0.0
Poultry	8.0	1.3	49.3	34.7	6.7
Sea food	48.0	1.3	49.3	34.7	6.7
Eggs	4.0	9.3	77.3	6.7	2.7
Milk	8.0	36.0	48.0	6.7	1.3
Snails	40.0	0.0	13.0	24.0	22.7
Legumes					
Palm nut	9.3	4.0	58.7	18.7	9.3
Agushie	25.3	1.3	52.0	13.3	6.7
Beans	16.0	4.0	56.0	18.7	5.3
Soy beans	66.7	6.7	14.7	8.0	4.0
Bambara	70.7	1.3	20.0	2.7	5.3
Tiger nuts	80.8	0.0	5.8	9.6	3.8
Neri seeds	100.0	0.0	0.0	0.0	0.0

5.7. Food frequency for fruits, vegetables and fats and oils

Most fruits in Kumasi are seasonal; thus consumption of some fruits is high only when in season. Most consumed fruits at a weekly basis were bananas, apples, watermelon and oranges. Avocados were least consumed followed by tangerines and grapes. However, most vegetables were available throughout the year. Onions, tomatoes and pepper were mostly consumed on a daily basis by all the women in the study. Similarly, leafy vegetables (mostly kontomire, ayoyo), carrots, garden eggs and okra were highly consumed on a weekly basis for stews and soups. Green beans and cabbage was occasionally consumed with only 5.8% and 2.8% respectively.

Both FFQ (*Table 5b*) and a separate question on the consumption of oil in the households (*table 5c*), have shown that, palm oil and refined vegetable oil were most frequently consumed on a weekly basis by more than 50% of the women and their households. About 42.7% women consumed margarine, while only 12.5% consumed butter. Both FFQ and

household consumption questionnaire showed an occasional use of soya bean oil. Almost all the women in the study did not cook with coconut oil, palm kernel oil or groundnut oil which had a 1.3% yearly response.

Table 5b. Frequency table for fruits & vegetables and, fats & oils

Commodity	% Response				
	Never	Daily	Weekly	Monthly	Yearly
Fruits					
Oranges	10.7	13.3	62.7	9.3	4.0
Mango	25.3	0.0	2.7	1.3	70.7
Pineapple	14.7	6.7	41.3	25.3	12.0
Pawpaw	22.7	5.3	45.3	18.7	8.0
Banana	8.0	17.3	60.0	10.7	4.0
Watermelon	8.0	13.3	66.7	8.0	4.0
Grapes	54.7	2.7	21.3	10.7	10.7
Coconut	24.0	2.7	33.3	25.3	14.7
Pear	3.8	9.6	32.7	13.5	40.4
Avocado	90.4	0.0	3.8	1.9	3.8
Apples	0.0	5.9	63.2	17.6	13.2
Tangerine	71.7	1.9	18.9	3.8	3.8
Vegetables					
Onion	0	100	0	0	0
Tomato	0	100	0	0	0
Pepper	0	100	0	0	0
Leafy vegetables	0	13.3	80.0	4.0	2.7
Okra	4.0	10.7	66.7	18.7	0
Garden eggs	1.3	22.7	69.3	6.7	0
Carrots	9.6	7.7	71.2	11.5	0
Green beans	21.2	5.8	55.8	13.5	3.8
Cabbage	11.5	2.8	57.7	23.1	3.8
Fats and Oils					
Palm oil	1.3	10.7	81.3	4.0	2.7
Groundnut oil	93.3	0	4.0	2.7	0
Palm kernel oil	94.7	0	4.0	0	1.3

RESULTS

Coconut oil	97.3	0	1.3	1.3	0
Refined vegetable oil	12.0	14.7	66.7	6.7	0
Butter	87.5	0	12.5	0	0
Margarine	29.3	9.3	42.7	16.0	2.7
Shear butter	94.1	2.0	0	2.0	2.0
Soya bean oil	68.6	11.8	17.6	2.0	0

Table 5c .Percentage distribution of oils used in the households

Type of oil used	Frequency	Percentage
Palm oil	50	66.7
Vegetable oil	48	64.0
Soya bean oil	17	22.7
Coconut oil	1	1.3
Groundnut oil	1	1.3

DISCUSSION

6.1. Nutritional status of the women

There are very few studies that carried out assessment of the nutritional status of lactating Ghanaian women in Ghana. The present study shows that obesity of these women is quite high and reaffirms what a few other authors have observed in Ghana (66, 78, 79). The prevalence of overweight and obesity in this study for Ghanaian lactating women of 18 to 40 years was 27.2% and 32.6% respectively which compares well with the level found in two other studies in different areas in Ghana (33, 34). These high rates are also in accordance with the commonness of overweight and obesity according to BMI among urban residents of other developing countries (80, 81). Bibliographical data (82, 83) already report that, as much as 20-50% of the urban population of African countries are either overweight or obese. A study conducted by Abubakari et al. (80) on prevalence and time trends of obesity among West African adults reported that, up to 77% of African women in the Diaspora are either overweight or obese, making them the most obese group compared to all other ethnic groups. Another study (84), 519 women in the capital of Cameroon, Yaoundé indicated an even higher prevalence of overweight (50.3%) and obesity (20.5%) compared to four other studies urban Cameroon (82, 85) and Accra (34, 49). The reasons for the high prevalence of overweight and obesity are not clearly determined. However, increases in the intake of fat and sugar as well as sedentary lifestyles among the urban-African population have been linked to urbanization and westernization. Studies in Gambia and Senegal reported cultural perceptions regarding overweight and obesity among Africans, it is believed that, being overweight or obese is associated with prestige, happiness and good healthy living (34, 86). And in higher income, this cultural standard is more available for the population. In some cases it is also an indicator of beauty for women reports Abubakari (80).

In our study the mean BMI 27.5 which is higher than that reported from GDHS (2008) for the women in whole of Ghana (mean BMI=23.6). The likely explanation of higher BMI among the women in the study is probably their diets, sedentary life style and other obesity contributors like advanced technology and transportation that reduce the need for daily physical activity in urban settings. In urban Kumasi, people are richer than the rural areas; therefore, many of them possess cars and can afford fast food which is mostly full of fats and sugars. Thus, the prevalence of overweight and obesity is much lower in the Northern part of Ghana and the rural areas in general (87). Unlike the urban areas, the rural area has negative

effects of urbanization on populations especially women, this is possibly understood by higher energy expenditure in rural women since they are generally household's food providers; women tend to work harder on their farms compared to those in urban settings (87). Other studies from Cameroon, Mali, Nigeria and Senegal have reported BMI data of women of the same age group as our study to be 24.7, 20.5, 21.4 and 20.5 respectively. On the other hand, a study from Ethiopia with the same population group reported even lower BMI of 18.7, which is already defined as thinness or acute under nutrition. Therefore, in Ethiopia, underweight is more serious concern than overweight and obesity among women. The low BMI value in Ethiopian women may be related to low agricultural productivity because of shortage of land and livestock products (88) other possible factors to low nutritional status of these women is due to protracted war frequently occurring in the region of Tigray (Northern Ethiopia) which also has lots of impact on the food security (89). A different pattern was observed among South African women with higher prevalence of overweight and obesity, which may be attributed by rapid changes in dietary intake, urbanisation, changes in physical activity levels and leisure activities. IOTF (2002) reported the mean BMI for South Africa and Zimbabwe to be 26.4kg/m^2 and 22.1kg/m^2 respectively.

The WHR is being used frequently to estimate possible relative increases in abdominal fat in order to identify individuals at risk of developing non-insulin dependent diabetes mellitus, dyslipidemias, arterial hypertension and coronary artery disease (90-93). Recently, it has been reported that, WC alone could replace WHR and BMI as a single risk factor for all-cause mortality (94). In any case, more research is needed to investigate the cut-offs for African ethnic groups, there is insufficient evidence for recommending specific cut-offs for Sub-Saharan Africans. Okosun et al. 2000 reported on WC cut-off points for Africans that, from his analysis recommendation for women from Cameroon and Nigeria was 81.5cm and 71.5cm respectively (95). In this study the WC cut-off point from WHO (72) of over 88cm was used, more than half of the women in the study had higher WC values and therefore, showed increased risk factors for CVDs and other forms of chronic diseases. South Africa uses the International Diabetes Federation (IDF) WC recommendation which is ($\text{WC} > 80\text{cm}$) and other authors have reported using the WC for European ($\text{WC} > 80\text{cm}$) for Sub-Saharan Africa until more specific data for Africans is available. Another study from Tunisia used cut-off points for WC for obesity, diabetes and CVD of 85cm for both men and women (96).

Furthermore, the present results from our study indicate that 73.3% of the women have a WHR over 0.85cm which is the general WHO cut-off point for women (97). Nevertheless, in

these women we have to take into consideration that they are lactating and they just gave birth and are still in recovery stage from pregnancy, thus would show higher WHR and WC. So far, there are no WHR value recommendations for lactating mothers. In the general adult population, WHR values of < 1.00 for men and < 0.85 for women are considered desirable (98), and individuals with values above these are at greater risk for CVD morbidity and mortality. Again, new WHR thresholds for African population are needed as their physical structures are different especially in women. A study by Rush et al. (99) reported that, black women from South Africa have less body abdominal adipose tissue compared to Europeans and other studies have confirmed that African women have less visceral adipose tissue or percentage of body fat than white women (100, 101). From these facts, there is a need for a WHR cut-off for African population which would probably be higher than that used for Caucasians.

However, 70.37% of the women in this study whose WHR was above the threshold were overweight and obese. Other authors (102, 103) describe that BMI, WHR and WC as measures of obesity are correlated with hypertension. In the same line, our study showed an increase of hypertension among the women with elevated levels of BMI, WHR and WC which confirms that, they are at greater risk of CVDs. The overall prevalence of hypertension in this study was not so high with 10.7%. This prevalence is also similar to a study conducted in rural Ghana (104) but lower than in other studies (105-107) conducted in rural and urban areas of Ghana. Other studies have shown that, the prevalence of hypertension in Sub-Saharan Africa is significantly higher in the urban population compared to the rural population (79). In East Africa, higher values have been observed. A study of adults residing in Tanzania under 54 years, showed a prevalence of 38.8% in rural and 52.3% in urban populations (108). The prevalence of hypertension in a study in Cameroon was 18.7% in an urban setting compared to 8.8% for women a rural setting (109). Recent evidence suggests that BP levels and hypertension rates in Ghana are among the highest in Africa (110) and the consistently growing prevalence is still difficult to explain. The prevalence of hypertension in this study is less probably due to the fact that, these women move more than most mothers especially in the first month of the child.

In both clinical practice and epidemiology, BMI is the most used indicator to determine both the individual and collective general nutritional status. This index is considered to be positively correlated with certain health and longevity indicators such as smoking, physical inactivity, obesity, maternal educational level, low birth weights and poverty (19). Kumasi,

like other urban areas in Africa, has sustainable access to improved drinking water sources and improved sanitation. The availability of and accessibility to improved drinking water may to a large extent minimise the prevalence of water-borne diseases, furthermore, the source of drinking water is important because potentially fatal diseases like diarrhoea, typhoid and cholera are common in Ghana (19). Social economic factors like education, occupation and marital status probably play a major role on the high overweight/obesity prevalence of the women in our study; however none of the factors were significantly associated with anthropometric measures as reported by other several authors. This is probably due to the relatively low number of women studied. But exhaustive nutritional studies are cost, and personnel intensive and also logistically difficult to carry out in large populations. In this study it was noted that, women with relatively higher BMI values had at least secondary education and higher compared to those with BMI of less than 25. In other studies there has been found a statistical significance relation between obesity with married women and occupation mostly explained by sedentary habits of the women (78). One third of the women in the study had salary jobs, and therefore, stable income and food security which maybe one reason for more overweight. Due to better income, many families in Ghana now own a car, so they are more likely to drive than walk. Other known factors that could contribute to the level of nutritional vulnerability are food intake, environmental, family life, food security, economic life and psychosocial situation. Olayiwola (111) reported that, access to water supply, electricity and fuel are noteworthy to nutritional status of a population as they affect cooking and feeding.

6.2. Food consumption

We assessed the dietary habits and characterized differences in the meal patterns and food intakes among the mothers. Food consumption of each woman was studied using FFQ and DDS during the end of the rainy season and beginning of the dry season from October-December. The usual meal pattern of the women was a three meal a day pattern (61.3%), and furthermore, snacking was common among the mother (17.3%), while 24.1% skipped a meal or two per day. Lunch was the most skipped meal due to busy schedule of the mother's activities. Similar patterns have been observed by women in Kenya and South Africa. The majority of the women 72% indicated that they prepare and have breakfast at home, 68% of them prepare and have lunch at home and most of them (84%) also cook and have their dinner at home. The most popular foods and beverages consumed almost daily at breakfast by the

mothers are Milo drink and kooko (porridge) which produced in Ghana and very affordable. The women rarely drunk tea in the morning, almost all the women accompanied their Milo drink or *kooko* (porridge) with bread and margarine. In Ghana, food vendors are very common especially in urban areas; in this study more than a third of the women purchase food from food vendors. Like two other studies (66, 112) our study reported breakfast and lunch to be the two main meals purchased from the streets and supper being the most cooked at home.

Food frequency questionnaires are generally considered to be the most appropriate method for assessing diet in the context of epidemiologic studies (113). Besides offering practical advantages over more expensive and time-consuming methods, such as 24-hour diet recalls and food records, FFQs can provide better assessments of usual intake over a longer period of time, such as weeks or months, rather than a single day. Furthermore over the past two decades, FFQ have become a well-accepted method for quantitative assessment of usual nutrient intake (114). In this study we used 55 food items which are most important within the Ghanaian diets, the food items were categorised into 6 food groups which were considered to be optimal number of items that could provide an accurate picture of dietary habits without becoming a burden to the women in the study.

Our FFQ data show that, the diets of these mothers with young children are mainly derived from staple food (cereals) and animal products. All the food consumed weekly were high in starch, cereals, legume, animal products and fats and oils; but also, lots of rice and bread were frequently consumed in their diets. Vegetables were consumed daily by all the women in the study, and fruits were consumed less frequently by 34.7% of the women daily. This indicates that, Ghanaian mother's diets consist predominantly of staples and traditional meals, commonly traditional soups like palm nut soup (*Abenkwan*), groundnut soup (*Hkatenkwan*) and kontomire soup (*Palava sauce*), always accompanied by *fufu*, *kenkey* or *banku* and traditional Ghanaian carbohydrates like yam, cassava and plantain. Similarly dietary patterns have been observed among other minority nationalities in West Africa. Compared with other findings in Ghana, we observed higher animal products consumption per day, probably due to better income of the respondents.

In this study, food rich in carbohydrates was among the most frequently consumed among the women. This is in accordance with many other dietary studies conducted in West African countries like Nigeria, Mali, Togo, Guinea, Benin, Senegal and Ivory Coast, which have reported a significant percentage of households having an intake of diets high in carbohydrates. Carbohydrate rich food is a good energy source and represent the main part of

the household budget for food in Ghana (19). Foods like cassava and maize flour which is used for making porridge and most forms of fufu are cheap and available all year through. The Ghanaian diet largely relies on cereals (maize, rice), starchy roots (cassava, yams) and starchy fruits (plantain). In our study cereals was highly consumed on a daily basis by 65.3% of the women followed by starchy roots and tubers, more than half of the women consumed starch at least 3-4 times a week. FAO (44) reported that, in Ghana starchy roots and cereals still supply almost three quarters of the dietary energy and diversity of the diet remains low.

High intake of proteins from the women in this study is due to high intake of animal products especially meat, fish, poultry, milk and eggs. In Kumasi, fish is available in all forms; dried, smoked or salted and are all available at an affordable price. The meat mostly consumed in this study is goat meat, which is used nearly in every traditional soup. In our study 80% of the women consumed animal products including fish at a daily basis; this may entail a high intake and/or bioavailability of micronutrients in the diet especially vitamin B, iron and calcium. Results from our study are however, different from the FAO Ghana report, where only a small share of protein supplied is from animal products (44). Another study in A study on “Adolescent’s food habits and nutritional status in urban and rural areas in Cameroon”, reported a lower intake of protein, adding that meat and fish is very expensive, in addition the fact that meat cannot be stored due to lack of refrigerator, that’s why it is not frequently consumed (*unpublished*). Other food rich in vitamin A, B1, B2, and B12 are highly consumed by the women in this study, a third of the women in the study consumed milk products daily and about half the women consumed eggs and margarine on a weekly basis; however, very few of the women consumed butter, since it is expensive, not always available and also is not part of the food habits of Ghanaian people.

The high intake of fat among the mothers in the study may be due to the frequent use of palm oil. Many of the traditional sauces and dishes in Ghana contain large amounts of palm oil, as the basic fat used in their kitchen. More than 80 % of the women in our study used palm oil as the main source of fat and about 66% of them used refined vegetable oil. However the result obtained from this study, does not account for the whole part of Ghana, the (*GDHS 2008*) reports higher intake of palm oil in rural areas, where six in ten households use palm oil compared to one in five in urban areas. The trend is also different in the Upper East and Upper West region of Ghana, where more than 77% of household use shear butter for cooking. Similar results were obtained when these women were asked about the type of oil commonly used in their households. More than half of the women use palm oil and refined

vegetable oil on a regular basis. A different trend was observed in Cameroon, where fat intake was more associated with the wealth of the household, those from the lower Social Economic Status (SES) consumed less fats and oils compared to those from high SES explains Léonie Nzefa Dapi (*not published*). Palm oil which is the main source of fat may not always be affordable to the households with low SES due to lack of money. Other types of fats and oils consumed by the women in our study were soya bean oil (17.6%), and 4% palm kernel oil and groundnut oil.

Furthermore, we determined DDS according to FAO (67). There is no DDS scores advised for African population. In our study, the mean DDS of the women from the 14 food groups was 7.17, which means that half of the women in the study consumed at least 7 out of 14 food groups. A study by (115) used DDS to show relationship between different food groups and nutrient adequacy. Several other studies (116, 117) showed that dietary diversity scores could be a good indicator of nutrient adequacy. In the present study, we used the DDS to assess the quality of diet of the women in the study. The results of the present study showed that a higher percentage (74.7%) of women had a high intake of vitamin A products, more than half of the women consumed vitamin A rich vegetables and tubers, and a third of them consumed dark green leafy vegetables which are rich in vitamin A, this could be explained by the fact that lots of Ghanaian traditional dishes comprise of green vegetables like kontomire (cocoyam leaves) and vitamin A rich vegetables like carrots which are mostly used in *jollof rice*. On the other hand only 2, 7% of the women consumed vitamin A rich fruits, this could be due to seasonal changes especially for mangoes and pawpaw, and another explanation could be due to high costs of fruits and the fact that in Ghana, fruits are not considered as a replacement of a meal. As we do not know the exact vitamin A intake, it does not confirm the adequacy of the vitamin on the recommendation value. It has been reported that lots of vitamins are being lost during inappropriate cooking or drying of vegetables on the sun (118).

Our results show that all the women in the study consumed vegetables (other than vitamin A rich vegetables) and more than half of them consumed white tubers, fish, flesh meat and legumes, nuts and seeds. Rice/ fufu dishes with groundnut soup, tomato or vegetable sauces are very common in Ghana. Furthermore, meat and fish are often added to the typical Ghanaian dishes or consumed as snacks (fried fish or kebab). In fact, the food groups other vegetables, fats/oils and legumes, which are rich in micronutrients or energy, were highly consumed by the women. Like in Burkina Faso, Mali and other parts of West Africa, Ghanaian meal is rich in grains and almost all the women in the study consumed grains. Iron

rich food such as organ meat (liver, kidney, heart) was consumed by very few mothers (6.7%), this could be due to high prices of these foods, there are also traditional beliefs that women are not allowed to eat some parts of animal. Eggs were consumed by 24%, like vitamin A intake, these values does not confirm the iron intake of the mothers, having higher percentage of cereals is one of the indication that the women in our study consume adequate but not enough iron rich products.

6.3. Psycho assessment

In this study we could not find any association between the mental health status of the women and neither their nutritional status or any of the anthropometric data. One other author (120) reported that, reduced dietary intakes are associated with high perceived stress among lactating mothers in Ghana. Probably the number of women enrolled for this study was not high enough to detect such a correlation. Further research on nursing mother's diets with larger, representative samples, will provide a more complete understanding of the associations among maternal nutritional status and mental health.

CONCLUSION AND IMPLICATIONS FOR FUTURE STUDIES

The findings of the present study suggest that healthy food choices are important for nursing mothers and their children. In this study we discovered that the women lack relevant micronutrients like iron which is necessary for fighting anaemia since the prevalence is already high in Ghanaian women. Three main dietary patterns were identified in our study group providing a meaningful interpretation of the women's dietary habits. The present results strengthen the assumption that less educated, married and women with salary jobs are at risk of being overweight, obese and hypertensive, which was contributed from an unbalanced or inadequate diet. Less educated women in particular should be a special target group for nutrition education, with emphasis on well-planned balanced meals and more precise advice on micronutrient intake, supplementation if possible. This is important for our study mothers for successful breastfeeding, and for the prevention of obesity in later life, among both mothers and their children. Nutrition education on healthy eating before, during and after pregnancy should be more effectively taken into account in nutrition policy planning and implementation. The rising incidence of obesity and anaemia in this study group is alarming.

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APPENDIX

Appendix 1: Questionnaire used in the study.

Appendix II: Common food products as sold in Ghanaian markets

Appendix III: Ghanaian food recipe

QUESTIONNAIRE USED IN THE STUDY

Nutritional status of Ghanaian women with young children – dietary intake, physical activity, life style data (CDS-Nutrition)

Examining investigator	
Examination date (dd.mm.yyyy)	
Date of birth (dd.mm.yyyy)	
Age at recruitment	
Written informed consent signed?	O Yes O No
Weight (kg)	
Height (cm)	
Waist circumference (cm)	
Hip circumference (cm)	
Mid upper arm circumference (cm)	
Blood pressure (mmHg)	

24 hr-Recall

- All meals including fruits and vegetables

Write down exactly the measures or recipes, if you need more space use spare sheets

What did you eat for breakfast?

When did you eat next?

What did you eat for Lunch?

Did you eat any snack in between meals?

What did you eat for dinner?

Did you eat anything else after dinner?

Did you drink anything in between /during meals? If yes

a) What did you drink?

b) How many glasses? 10 glasses 9-5 glasses <4 glasses none

How many bottles? 3 bottles 2 bottles <1 bottle none

a) In a typical week, on how many days do you eat fruits, for example mangoes, paw paw, banana, orange, avocados, tomatoes, passion fruit, etc?

b) On a day when you eat fruits, how many servings do you eat on average?

a) In a typical week, on how many days do you eat vegetables, for example carrots, cabbage, dark green leafy vegetables (e.g. kontomire), pumpkin, squash, etc?

b) On a day when you eat vegetables, how many servings do you eat on average?

What type of oil does your household mainly use for cooking?

(45.1% in urban and 62.3% rural use Palm oil: evidence that consumption of palm oil contributes to an increased risk of cardiovascular diseases)

Food Frequency tables

Food group	Never	Daily	Weekly (___/7)	Monthly (___/31)	Occasionally (___/per ___)	Yearly (___/12)
Starchy roots and plantains						
• cassava						
• yam						
• plantain						
• cocoyam						
• sweet potato						
• white potato						
Cereals and cereal products						
• maize						
• millet						
• rice						
• bread						
• biscuits						
Animal products						
• red meat						
• fish						
• poultry						
• seafood						
• eggs						
• milk						
• snail						
Legumes						
• groundnut						
• palm nut						
• Agushie (melon seeds)						
• Cowpea(black-eyed peas)						
• soybeans						
• Bambara (beans)						
• Tiger nuts						
• Neri (seeds)						
Fats and oil						
• palm oil						
• groundnut oil						
• palm kernel oil						
• coconut oil						
• refined vegetable oil						
• margarine						
• shear butter						
• soya bean oil						
Fruits and vegetable						
• orange						
• mango						
• pineapple						
• pawpaw						
• banana						
• watermelon						

APPENDIX-I

• grapes						
• coconut						
• Pear						
• Avocado						
• Apples						
• Tangerine						
• onions						
• tomatoes						
• pepper						
• leafy vegetables						
• okra						
• garden eggs						
• Carrots						
• Green beans						
• Cabbage						

Physical activity, resting hours,

In the past 7 days, on how many days did you do vigorous physical activity that lasted for at least 15 minutes each time?"

Vigorous physical activity: Activities you do at work, as part of your house and yard work, to get from place to place in your spare time, exercise or sport, activities that make you breathe much harder than normally and may include heavy lifting, digging, jogging, or fast bicycling

How many hours do you rest a day, including naps and sleep both during the day and night?

Smoking

Do you smoke? Cigarettes or other form of tobacco?

How many per day?

Did you smoke?

Medication

Do/did you take?

- Medicine during pregnancy?
- For fever: anti-malarial medication and antibiotics?
- For diarrhea: antimotility drugs?
- Malaria control during pregnancy; Intermittent Preventive Treatment (IPT)?

Supplements

Do you take normally,

- Iron supplements during pregnancy?
- Zinc supplements?
- Vitamin A supplements?
- Other supplements?

COMMON FOOD PRODUCTS AS SOLD IN GHANAIAN MARKETS



Salted fish



Fresh Salmon



Groundnut paste



Palm oil



Kontomire bundle
(cocoyam leaves),



Okra

COMMON GHANAIAN RECIPES

1. Breakfast

1. Kooko(porridge)

- 2cups Maize ,millet or rice
- 2tsp. Sugar
- 1 cup Milk
- ½ cup Water

2. Omelette with bread and tea

- 2 Eggs
- Salt
- Oil or butter
- ½ Maggie

- ½ Pepper
- ½ Onions
- 1 tin Sardine (optional)
- 2-4 slices Normal white bread
- Tea with or without condensed milk

3. Milo drink

- 2-4 table spoons Milo powder
- 1 glass/cup of warm milk or warm water

2. Main dishes (Lunch/Dinner)

1. Omotuo (rice balls) with groundnut soup

Omotuo for 4-6 people

- 500g Rice
- 350g dry fish
- 2 onions
- 3 pepper
- butter
- Water
- Salt

Groundnut stew

(NKATENKWAN)/Nkatebe for 6 people

- 3 Tablespoons vegetable oil
- 125g dry meat
- 1 chicken
- ½ Tablespoons Ginger, Shredded
- 2 whole Onion, Minced

- 3 cloves Garlic, Minced
- 4 crushed chillies
- 6 Crushed Tomatoes
- 4 cups beef Broth
- 250g Peanut Butter
- 2 cups smoked fish/beef

2. Fufu with palm nut soup (Abenkwan) with meat

Fufu

- 6 cups of water
- 1 kg Pounded Cassava and plantain

Palm nut soup for 4 people

- 2 onions, chopped
- 2 chilly pepper, crushed,
- 4 tomato, chopped
- 24 okras

- 500g meat
- 100g dry meat
- 3 garlic
- 2 cups Palm nut paste

3. Jollof rice

- 1 Whole chicken or 500g beef
- 2 cans stewed tomatoes
- 2 cups water
- 2 tsp salt
- 1/4 tsp pepper
- 1 cup uncooked regular rice
- 1/4 to 1/2 tsp ground red pepper [or more to taste]
- 8 oz green beans
- 2 onions, cut into 1/2-inch slices

4. Banku with okra soup and beef

Banku

- 4 cups Fermented corn dough
- Water

Okra soup for 6 people

- 24 Okras
- 6 Tomatoes
- 3 Onions
- 150g dry meat
- 2 crushed chillies
- 250g beef
- Pinch of salt

5. Acheke with hot sauce with tilapia fish

Acheke *hot sauce*

- | | |
|-----------|------------------|
| • Cassava | • 3-5 hot pepper |
| • Salt | • Salt |
| • Water | • Ginger |
| • oil | • Garlic |
| | • Tomatoes |
| | • onions |

Fish

- Whole tilapias
- 2 Large peppers.
- 3 Large white onions.
- 1 Teaspoonful of ginger and garlic.
- 3 Spoonfuls of groundnut
- Half teaspoonful of cayenne, black, or white pepper.

6. Waakye with meat sauce/fish

Waakye (rice cooked with black beans sauce)

- 500g Rice
- 200g Beans
- Salt
- Oil
- Water
- 2 chillies
- 1 tsp. mixed Spices
- 1 tsp. Baking powder

Meat stew/fish stew

- 2 Onions
- 6 Tomatoes

- 2 chillies
- 2 crushed Garlic
- 1 tsp. crushed Ginger
- 3 Maggie cubes
- 1kg Beef or 500g fish (fried or raw)

7. Fried ripe (yellow) plantain with Tilapia and hot sauce.

Fried plantains see nr.5 for Tilapia and hot sauce recipes

- Ripe(yellow)plantains
- Cooking oil
- Salt

8. Fufu with light soup

- 5-8 garden eggs
- ½ kg beef or fish
- 1 onions
- 4-6 tomatoes
- ½ tsp salt
- pepper
- 4 tsp. cooking oil
- 1-2 Maggie cubes
- 1 tsp. Garlic or ginger

9. Fish and beans stew with Kenkey for 4-6 people.

Kenkey

- 8 cups maize flour
- 6 cups water

Fish and beans stew

- 400g Kidney beans

- 4 tomatoes
- 1 onion
- 1 onion bunch
- 2 EL tomato paste
- Palm oil
- 250g smoked fish

10. Beans soup /Aduankwan

- 150g white beans
- 100g dry fish
- 500g smoked mackerel
- 125g fried kasseler
- 4 tomatoes
- 2 crushed onions
- 2 crushed chillies
- 3 crushed garlic
- 4 EL tomato paste

11. Spinach soup /Ntohuro

- 500g spinach
- 3 crabs
- 125g dry meat
- 2 tomatoes
- 200g mushrooms
- 2 eggplants
- 6 okras
- 3 crushed onions
- 3 crushed garlic
- 2 crushed chilies
- 6 smoked snails
- 1 maggie

3. Snacks

1. Kelewele

- 6 Plantain
- 1 tsp. Ginger
- ½ tsp. Salt
- ½ tsp. Hot chilli
- Cooking oil

2. Gari biscuits

- 5 cassavas
- 3 eggs
- ½ cup milk
- ¾ cup sugar
- 1 teaspoon nutmeg
- 1 Tablespoon flour

3. Groundnut sweets

- 1¼ cups sugar
- 1 Tablespoon butter
- 2 cups roasted peanuts

4. Gari ‘soakings’

- 1 cup Gari (Cassava)
- ½ cup Milk
- 1 tsp Sugar
- Handful Groundnuts

5. Oto

- 2 cups mashed yams, cocoyams or mashed white potatoes
- 2 Tablespoons onions, grated
- ¾ cup palm oil or vegetable oil
- 1 ripe tomato (optional)
- 6 hard-boiled eggs
- Salt
- Pepper

6. Plantain crisps

- 3 unripe Plantains
- Oil
- Salt