Dissertation

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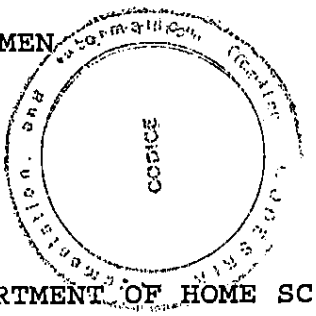
Activity pattern, anthropometric and iron status assessment of pregnant women

ACTIVITY PATTERN, ANTHROPOMETRIC AND IRON STATUS ASSESSMENT OF PREGNANT WOMEN



A RESEARCH PROJECT REPORT SUBMITTED TO DEPARTMENT OF HOME SCIENCE AND NUTRITION IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN HUMAN NUTRITION

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THIS 22nd DAY OF October, 1996

CERTIFICATION

Egbuniwe Chineze Anene, a post graduate student in the Department of Home Science and Nutrition, has satisfactorily completed the requirements for the degree of Masters of Science (M.Sc.) in Human Nutrition. The work embodied in her thesis is original and has not been submitted in part or full for any other diploma and degree of this or other University.

PROJECT SUPERVISOR

DEDICATION

- To God Almighty who made the entire programme possible and completed.

- To my beloved parents whom, as instruments of God, I owe everything to.

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ABSTRACT

Activity pattern, body mass index and iron status were studied during pregnancy. The results were obtained through questionnaire, 24-hour record of activities, height and weight measurements and biochemical analysis. A total of six hundred women were used for the study. Two hundred women each in Onitsha and Nsukka towns were used for the activity pattern study. Two hundred women were used for iron status study in Enugu town. Body mass index was found for all women in the three locations. Results of the study showed no statistical significance ($p > 0.05$) in activity pattern between the pregnant women living in Nsukka and Onitsha. Pregnant women allocated the longest time in their activity-time schedule to sleeping, which was not less than 9 hours. The time given to health care was 3.75 hours. In the third trimester, pregnant women slept longer than in the second trimester ($t = 6.04$; $p < 0.001$). Leisure time was higher in the third trimester than the second ($t = 2.57$; $p < 0.05$). Time given to housecare was lower in the third trimester than in the second ($t = 3.33$; $p > 0.001$). However, time for shopping and food preparation was not different ($p > 0.05$) between the two trimesters. Pregnant housewives allocated more time to sleeping and leisure than other occupational groups, and less time to economic activities. Total household activities was performed more on weekends than weekdays ($f = 22.47$; $p < 0.001$).

Bathing/dressing time and social activities were higher among pregnant women with no children than those of subsequent pregnancies ($t = 4.18$; $p < 0.001$, respectively). Pregnant women with no children spent a lower time in total household activities than those with children above 2 years of age. Pregnant women with no househelp spent more time on housecare and food preparation than those living with househelp. Sleeping and leisure times were higher among pregnant women living with househelp than those living without househelp ($t = 4.90$; $p < 0.001$). Anthropometric assessment showed that only 16%, 5.5% and 16% of the pregnant women in Enugu, Onitsha and Nsukka, respectively, had low BMI values (18.5 - 20) and none had chronic energy deficiency. All pregnant women (100%) and most control women (50%) were anaemic (<11 g/dl). About 35% of the pregnant women were positive to malaria parasite test.

CHAPTER ONE

INTRODUCTION

Many physiological changes occur in pregnancy. These changes are of several different types, including formation of fetus, its growth and placenta to provide nutrition. The fetal stage of life is possibly the most important as regards adequate nutrition (Durnin, 1991). The uterus and breast enlarge considerably. There are marked increases in body fluids and blood volume. Over and above these changes the mothers lay down extra store of fat. The fat is available as a reserve store of energy mainly for the purpose of lactation.

For satisfactory weight gain and to cover the energy cost of pregnancy, the FAO/WHO (1985) recommended an average extra energy of 285 kcal daily throughout pregnancy for an active woman or 200 kcal where women reduce their activity. A daily iron intake of 14-28 mg has been recommended too (FAO/WHO, 1970).

The question of mother's excessive energy output in developing countries especially during pregnancy has been a major issue in the world. Women worldwide are known for their never ending character towards work. They rise early and retire late (Mang, 1989).

In Africa, chronic energy deficiency is much more prevalent

(Popkin, 1980). The roles of women as wives and mothers, in addition to bearing and rearing of children, cleaning the house and yard. Women grow crops, buy, trade, preserve, process, cook food and care for extended family and community. These often include long hours of carrying firewood and water. (Ritche, 1977) outlined the involvement of women in the home and community as follows: Domestic production 50%, food processing 100%, animal husbandry 50%, brewing 90%, marketing 60%, supplying of water 90%, supply of fuel 80%, bearing children and early education 100%, caring for extended family 100%, house repairs 50% and community work 70%.

Okeke (1988) found women in Opi and Odegeri Edda communities in Enugu state of Nigeria to spend most of their time on meal preparation, farming and petty trading. They have less time for voluntary activities. She observed that as a result of women's work burden they were sometimes too tired on their return home to prepare evening meal. Poor women are expected to play the central role in child care and food processing even when their economic roles also require extensive time and/or physical energy (Mc Guire and Popkin, 1990).

Currently, an acute food crisis prevails in Africa. The cause is severe drought in 1992, coupled with ongoing civil unrest in some countries which further depresses food availability from an already low level (FAO/WHO, 1992). Malnutrition still exists in

countries with adequate aggregate food supply, an inadequate food supply clearly indicates that there will be even higher prevalence of malnutritional problems (FAO/WHO, 1992). Women at all stages of their life seem the most neglected group in most developing countries. Their nutritional intake is low, grossly inadequate and cause serious impairment of gestational performance (Okeke, 1988; Charanjeek, 1988; Nnanyelugo, *et. al.*, 1985).

As a result of the observed high energy expenditure, chronically low dietary intakes and high nutrient demand of pregnancy, women in low income group spend a large proportion of their reproductive years under nutritional stress. This leads to maternal depletion syndrome, coupled with its adverse effects on subsequent maternal and child health outcomes (Jelliffe and Maddocks, 1964).

Many studies were geared towards investigating the life style of women and suggesting practical ways to improve nutritional status. The improvement of their nutritional status is essential in developing countries where women contribute in numerous ways in the determination of the nutritional status of the households (FAO/WHO, 1992).

Malnourished mothers suffer depletion whose signs include Protein-energy malnutrition (PEM), iron deficiency anaemia, iodine deficiency goitre and osteomalacia (Rinehart *et. al.*, 1984).

Investigations in different parts of the third world have indicated high rates of anaemia among pregnant women (Shah, 1981). For many years, the World Health Organization (WHO) has recognized the importance in public health of nutritional anaemia. It has supported activities geared towards greater knowledge of the problem and methods for its control (Baker and Demaeyer, 1977). Iron deficiency is the most common of the widespread nutritional anaemia in Africa (Hercberg, *et. al.*, 1987). In West Africa alone, 22-100% of pregnant women were anaemic with a mean of 45% in 1980 and the estimated prevalence was 11.3 out of 17.9 cases (DeMaeyer and Tegman, 1985). Poor nutritional status of the mother cannot be over-emphasized . This is because it has serious implications on the mother as well as on the new born (Shah, 1981). Chronic maternal anaemia can result in death of the newborn or the mother (INACG, 1989). Even mild anaemia has been shown to be associated with an increased risk of premature delivery (INACG, 1981).

Variables such as depletion of maternal energy reserves is well associated with low birth weight (FAO/WHO, 1992). Low birth weight is associated with prenatal mortality rate and impaired physical growth. Low birth weight survivals sometimes rank low in their mental development and have less ability to function economically and socially (Shah, 1981).

The future health of mankind as a whole depends to a greater

extent on maternal nutritional status.

1.1 Statement of Problems

Data on nutrient intakes of pregnant women in Nigeria show low energy intake (Nnanyelugo *et. al.*, 1992; Okeke, 1988). An iron intake of 65% of FAO requirement during pregnancy was also observed (Nnanyelugo *et. al.*, 1992). These studies show nutrient intakes to be inadequate to meet pregnancy physiological requirements.

Activity pattern studies in Nigeria is scarce. However, Nzekwe (1992) found that most women, both in rural and urban areas, engage in paid employment and take major part in other household activities. Low weight gain as a result of poor nutrition and high activity pattern during pregnancy among women living in developing countries has been recorded (Durnin, 1991; Lawrence *et. al.*, 1987; Prentice, 1979). These studies also showed high rate of low birth weight babies in their different populations. Iron deficiency anaemia is prevalent in Africa (Herberg *et. al.*, 1987; DeMaeyer, 1989). The causative factors include pregnancy, dietary practice and pathological blood loss due to parasites and infection.

In Nigeria, Isah *et. al.* (1985) found from biochemical measurement testing that irrespective of social class or maternal age, pregnant women in the Guinea savanna of Nigeria require supplementary iron. Okafor *et. al.* (1985), studying anaemic

pregnant women in a Nigerian community, found that 97% of iron deficient pregnant women have no stainable iron in the bone marrow. This was thought to be due to poor nutrition, cooking habit and impaired iron absorption. Flaming *et. al.* (1986) recommended antimalarial prophylaxis to prevent anaemia in pregnancy among Hausa women living in Zaria, Nigeria.

Nigeria is a third world country. Like other countries of its kind, poverty and hunger are widespread due to inflations, poor income, market price fluctuations and changes in the time when civil servants are paid. These may greatly influence the food intake and activity pattern of its citizens. These may, because of the physiological state of a pregnant woman, subject her own health and that of her unborn child to nutritional imbalance.

Nutritional imbalance during pregnancy is a crucial issue and its realization should be of prime importance. Iron status, anthropometric assessment and activity/time allocation study among pregnant women will help determine their degree of malnutrition. It will also give clues to how pregnancy is affected by factors in a given social and economic situation.

1.2 Objectives of study

Generally the study aims at determining activity pattern of pregnant women in a developing country. It also aims at determining

the extent of malnutrition among pregnant women. It would then suggest intervention methods or measures of alleviating the problems.

The specific objectives of the study are:

1. To determine the activity pattern and time allocation to various activities by pregnant women;
2. To determine socio-economic factors which affect rest and leisure of pregnant women;
3. To assess anthropometric measurements using the Body Mass Index (BMI) of pregnant women;
4. To measure iron status and identify frequency of intake of foods which may affect iron status in pregnancy; and
5. To investigate the degree of parasitic infection (malaria) among the pregnant women.

CHAPTER TWO

LITERATURE REVIEW

2.1 Body Fat/Weight Gain in Pregnancy

One of the primary determinants of growth is the energy available to the organism (Lucas, 1989). Energy requirement of an individual is energy intake in form of food that will balance expenditure (FAO/WHO/UNU, 1985). Energy intake must therefore, be balanced with the level of activity, otherwise malnutrition occurs.

Nutritional anthropometry is concerned with measurements of physical dimensions and the gross composition of the body at different age levels and degrees of nutrition (Jelliffe, 1966). Growth retardation may be the first response of the body towards nutritional deficiencies and appearances of clinical signs the final stage. Weight increase during pregnancy has been identified as being a useful tool in assessing the nutritional status of pregnant women (Gueri *et. al.*, 1982).

Well nourished European women gain 3.5 kg body fat during pregnancy, most of which is deposited during the second trimester (Hytteen, 1980). These fat stores then serve to protect the foetus from adverse effects caused by any food shortage experienced by the mother during the third trimester when foetal growth is maximal (Lawrence *et. al.*, 1987).

Lawrence (1985) and Durnin (1987) recorded low weight gain among pregnant women from developing countries. In rural Gambia, pregnant women eating their customary poor diet had a net gain of 3 kg between 0 and 35 weeks gestation. This value represents an average total gain of perhaps 7.4 kg. This value is substantially less than 12.5 kg reported for healthy women (Hytteen, 1980).

The end result of pregnancy, the newborn, depends for its growth in utero on the nutrients transferred from the mother, not only during pregnancy but before it (Simpson *et. al.*, 1975). It is clearly desirable to have a generous fat reserve during pregnancy. This is because it is associated with satisfactory infant weight (FAO/WHO/UNU, 1985). Of estimated 22 million babies born each year with low birth weights (2,500 g or lower) 21 million are born in developing areas of whom 16 million are described as small for date. This indicates foetal growth retardation (Petross-Barvazian *et. al.*, 1978). Langhoff-roos *et. al.*, (1987) also recorded a correlation between lean body mass and infant birth weight. It showed a relationship between maternal birth weight and pregnancy weight.

Weight gain in pregnancy could have much greater functional significance for poorly nourished women in developing countries. This is not only because they may begin pregnancy with depleted adipose tissue stores but also because they are more likely to

experience periodic and severe food shortages (Lawrence *et. al.*, 1987). Body weight and height are two simple anthropometric measurements fundamental to physical description of an individual or population (Nogan, 1992). The body mass index (BMI) has become the index of choice for assessing fatness and energy stores. It is better correlated with stature than other weight:height indices.

Three grades of BMI have been suggested to define chronic energy deficiency (CED) (Ferro-Luzzi *et. al.*, 1992). Chronic energy deficiency can be mild (17.0 - 18.4), moderate (16.0 - 16.9) or severe (<16.0). In CED women pregnancy promoted weight gain of the women to the detriment of the fetus. Low maternal BMI in early pregnancy is associated with a lower birth weight (Kusin, 1994; Allen *et. al.*, 1994). The body mass index therefore influences pregnancy outcome.

2.2 Health implications of maternal workload

The overall level of active work of low income women is tremendous. In general, studies find women in low income countries to have much less leisure time than men. They manage most home activities and are active in economic work (Popkin, 1980). Women work long days and evening at such routine tasks as field work, grain processing, food preparation and storage, fetching of water and firewood, trade, wage employment and child care (Women and

Health, 1986).

The pattern of activity and the total burden of women's responsibilities have great effects on health. Women's work burdens are important for a number of reasons. These include the effects on women's protein and energy requirements and child bearing. These contribute to women's overall weakness and susceptibility to disease (Women and Health, 1986). Briend (1979) observed that heavy workload during pregnancy contributed to low birth weight. Tafari (1980) found that on a diet of 1600 cal (6.72 kj) per day, women subjected to a heavy workload didn't gain weight during pregnancy. They had small children. Physical activity does affect maternal accretion and foetal growth by different mechanisms. These are energy restriction and redistribution of blood flow (Langhoff-Ross *et. al.*, 1987).

2.3 Activity pattern of pregnant women

The activity pattern of pregnant women in various populations have been studied (Roberts *et. al.*, 1982; Forsum *et. al.*, 1992; Panter-Brick, 1992). In most countries no differences in activity schedule between pregnant and no-pregnant women were recorded. In Napal, Panter-Brick (1992) found pregnant women to expend the same working speed when travelling with co-workers even in their third trimester of pregnancy. He concluded that Napali women didn't

modify their outdoor activities at times when these are essential for subsistence. Jimenez *et. al.* (1979) found that the most common single pattern of work activity during pregnancy is the continuation of full duties until onset of labour.

Studies though reveal that it is not generally accepted that women should rest more during pregnancy but they nonetheless become less active to achieve a substantial saving of initial energy expenditure (Lawrence *et. al.*, 1987; Roberts *et. al.*, 1982). Forsum *et. al.* (1992) found that physical activity decreased during early pregnancy in Swedish women. Durnin (1991) also recorded comparatively small reductions in physical activity among women in Scotland and Holland.

Women in developing countries are more active than those living in industrialized countries. This is because they have less time and energy saving assets (Mc Guire and Popkin, 1990).

2.4 Activity-time allocation of women

Time forms the framework in which various activities take place). Okeke *et. al.* (1986) mentioned time as a major resource at the disposal of the homemaker. She carefully plans and uses it to achieve best results in the home. She distributes the (24 hours) among all the activities she has to perform.

Women divide their day among three major types of activities.

These are market production, household production and investment restorative activities (i.e. sleep, learning and fostering social ties) (Mc Guire and Popkin, 1990). When women increased market or occupational work loss of leisure time and domestic work are the main changes in their time allocation patterns. They try to nurture the infant or pre-school and concurrently play a key role in family economics of life (Popkin, 1980).

2.5.0 Factors that affect activity pattern and time allocation of women

2.5.1 Occupation

Since the mid 1920's much attention has been given to the role of gender allocation of roles and responsibilities between men and women in economic and social changes.As the analytical framework shifted from welfare or equity to economic efficiency, it became apparent that women's exclusion from development policies and programmes was counter productive. Women now constitute one quarter of industrial workers and 40% of agricultural and service workers (Mc Guire and Popkin, 1990).

Women use personal income for family welfare, especially food and health care while men use theirs for status and entertainment (Piwoz and Viteri, 1984). The deteriorating economic conditions

have thus led to the increasing pressure in the labour market. Majority of women of reproductive age in industrialized and less developed countries alike face the need at the same point in their lives to combine economically productive work with bringing up their children (Leslie, 1987). In Latin America, Oppong (1985) reported that the fastest growing and most dynamic sector of the labour force is the female population between the ages of 25 and 44, especially women in their 30's. This is the peak time for bearing and rearing children. Sivard (1985) reported an increase from 28% in 1950 to 32% in 1985 of women's enrollment into paid labour force in developing countries.

Maternal employment means decreased time available to spend for household production. This may be why some women choose occupations compatible with their domestic chores (Okeke, 1988). Studies report that women with jobs outside the home have problems related to household tasks. Tucher (1988) observed that women spend 7 hours a day in household production, 1.5 hours on work and income generation, 6.5 hours on leisure and social activities and 9 hours on sleep. However, with women employed outside the home (i.e. those who spend an average of 8 hours work a day) a significant decrease was found in time spent on other activities. They spend 4.5 hours less on home production, 1.5 hours less on leisure and social activities and an hour less on sleeping. Nzekwe (1992) found none

of the working women in her study to spend less than 8 hours on income generating related activities of which the self employed women allocated the highest amount of time (10.25 hours). The exceptions were the unemployed women who spent 2.75 hours on income generating activities. Nzekwe (1992) also found none of her respondents in various occupations to spend not less than 7 hours in sleep with a little time (1.35 hours) spent on voluntary activities.

2.5.2 Urban/rural influences on occupation

Mothers living in semi-urban areas may spend less time on occupational activity because their work places may be within reach and as such they spend less time on buses. Women living in urban areas may be employed in different parts where they live. Heavy traffic may also contribute to time spent due to occupational activity. Engle (1989) defined a typical day for a mother working outside home as to start by 5.00 am to feed her children, prepare and leave food for lunch, and board a bus to work place by 6.30 am. She might arrive at the factory by 7.30 am and works until 5.00 pm. She spends half an hour for lunch. She arrives home at 6.00 or 6.30 pm depending on availability of bus and the traffic condition.

2.5.3 House work and family members

A significant portion of women's high work load relates to unpaid household production (King *et. al.*, 1983; Goldschimat-clemont, 1987). Women however allocate more time to occupational activity than to household activities (Nzekwe, 1992).

Women usually live in families with parents, in-laws, husband or just their own children. As a result of this they must balance their own needs and desires against those of higher status household members, children, guest and so forth (McGuire and Popkin, 1990). Ages, occupation of family members, size and location of house have been observed to influence maternal time allocation and activity pattern (Okeke, 1988). The ability of the other household members or ability of the mother to purchase surrogate care, especially during early periods of child development will influence mother time allocation (Okeke, 1988).

Women almost everywhere prepare family meals. They largely determine cleanliness of utensils and storage containers. Women generally bear major responsibilities for household hygiene and refuse disposal (Women and Health, 1986). Time and physical burdens due to water needs generally increase during the dry season. The task of obtaining water, carrying, queuing-up, putting a bucket and pumping are exhausting as well as time consuming. Physical burdens such as these may damage a woman's spine and pelvis, aggravate a prolapsed uterus and complicate childbirth (Mc Guire and Popkin,

1990).

2.5.4 Urban/Rural Influences

Khare (1979) reported that time spent on household activities such as cooking and fuel acquisition will be reduced depending on social circumstances. Rural women spend more time on household activities like fetching water and firewood (which they trek many kilometers to collect), pounding grain or food with mortar and pestle in food preparation, processing and preservation (Uyanga, 1980), while urban women's source of water supply is from taps and water tankers and source of fuel is kerosine or gas. Urban women also own time saving devices such as cookers and refrigerators. It is not surprising that rural women allocate more time to household care than urban women (Popkin, 1980).

2.5.5. Agriculture

In many parts of the world women dominate in agriculture. As labourers for hire and on the family farm, women play a major role in food production (Women and Health, 1986). Women are the primary labourers in small farms, where they contribute two third or more of all work hours. Food production as well as processing and often marketing are essentially female responsibilities (Mc Guire and Popkin, 1990). Women nearly everywhere participate in preparation

of fields, sowing of seeds, irrigation, weeding, harvesting, husking, grinding, sifting, sales and other tasks. In the third world where subsistence agriculture is the norm, women are not farmers' wives. They are farmers. African women farmers put in 60% to 80% of Agricultural field work. They work more than 16 hours a day during planting season. They often are expected to raise the crops that not only feed the family but also provide cash for their husband who hold legal or traditional rights to the land (Women and Health, 1986).

Throughout the world, employed women apart from their paid-work also contribute to the household food supply through kitchen gardens which provide vegetables, tubers and seasonal dietary supplements (Mc Guire and Popkin, 1986).

2.6 Stages of iron deficiency anaemia

Nutritional anaemia is defined as a condition in which the haemoglobin content of the blood is lower than normal. This is attributed to a deficiency in one or more essential nutrients regardless of the cause of such deficiency (WHO, 1968). Nutritional anaemias are important nutritional problems affecting large population groups in most developing countries (DeMaeyer, 1981). Although many nutrients and cofactors are involved in the maintenance of a normal haemoglobin concentration, the most common

nutritional anaemia from the public health view point is iron deficiency (INACG, 1977; DeMaeyers, 1981).

There are three identifiable stages of iron deficiency. The first is referred to as iron deficiency stores. In this stage iron reserves are essentially absent although there is sufficient iron for erythropoiesis. This can be identified by the absence of stainable iron in the bone marrow or by serum ferritin level of below 12 μg liter^{-1} (INACG, 1985). The second stage is known as the iron deficiency erythropoiesis. Here there is a curtailment in iron supply for erythropoiesis. The third and final stage of iron lack is iron deficiency anaemia. At this stage there is enough fall in circulating haemoglobin to be recognized as anaemia. The haemoglobin or hematocrit measurements are used to define iron deficiency anaemia.

2.7 Pregnancy and iron status

Iron is essential for life. As a constituent of heme, it is present in haemoglobin, myoglobin and a variety of enzymes. As with all essential nutrients, adequate amounts of iron must be absorbed to maintain optimum body concentrations. This amount needed depends on the amount lost from the body and that needed for growth and pregnancy (INACG, 1977). The concentration of haemoglobin tends to be lower during pregnancy than at other times because the plasma

volume increases about 50% and the circulating red cells by 20%. The resulting fall in haemoglobin concentration maybe about 2 g per 100 ml of blood (Shah, 1981). Iron needs increase significantly in pregnancy because of growth of foetus and placenta and expansion of blood volume (SCN News, 1990).

The haemoglobin carries the body's oxygen. Low concentration means that muscle cells receive less oxygen. This means that anaemic pregnant women have less energy, tire easily and are apt to catch infections. Anaemic pregnant women are less tolerant of blood loss at delivery. Added stress from labour, spontaneous abortion or other major complications result in maternal death. Intrauterine growth retardation, low birth weight and increased prenatal mortality are associated with maternal anaemia (INACG, 1989). Women often enter pregnancy with inadequate iron stores and thus the increased demand associated with pregnancy result in anaemia.

2.8 Iron status of pregnant women in developing countries

DeMaeyer (1981) found pregnant women in developing countries to have higher rates of anaemia than women in developed countries. He explained that they are more vulnerable to anaemia because they often have inadequate iron stores at the beginning of pregnancy and because their diet is unable to meet iron requirements. Parasitic infections further increases women's iron requirements in some

developing countries. At the same time, vegetarianism, some food taboos and some food practices can lower their iron uptake. Low vitamin C intakes and high intakes of other substances decrease iron absorption. Layrisse, *et. al.* (1990) hypothesized that total diets consumed by low socio-economic population of several countries in Asia and Africa as low-bioavailability diet which are monotonous consisting mainly of cereals, legumes and tubers. These foods are high in phytate in relation to iron content. Meat and ascorbic acid are usually below 50 g and 30 g, respectively. This explains the high prevalence of iron deficiency anaemia.

2.9 Factors that affect iron status

2.9.1 Bioavailability of iron

The amount of iron contained in even the most inadequate diet is considerably more than man's nutritional requirement (INACG, 1981). The explanation for deficiency lies in the poor bio-availability of much of the iron in present day's diets. The prevalence of iron deficiency in any population is a function of the bio-availability of the iron in the average diet (INACG, 1981). The varying requirements for iron determine which members of the population are affected. Our digestive systems are well adapted to absorption of heme iron in meat, poultry and fish. It is the iron in rice, wheat, maize and other vegetable staples which are poorly

absorbed. Much of the iron deficiency in the world is ascribed to the virtual disappearance of meat from the diet of a large proportion of the world's population (INACG, 1981). Ascorbic acid and meat have been found to be a major enhancers of non-heme iron absorption. Other substances such as carbonates, oxalates, phosphates, phytates and tea have been shown to inhibit iron absorption (INACG, 1981; Layrisee *et. al.*, 1990).

2.9.2 Parasitic infection

In countries where malaria is endemic, anaemia often results (De Maeyer, 1989; Hercberg *et. al.*, 1987). Malaria parasite causes haemolysis which causes anaemia. Studies have found malaria prevalence among adults with severe iron deficiency anaemia (Tomkin and Watson, 1989).

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study areas

This study was conducted in three towns in both Anambra and Enugu states (Onitsha, Nsukka and Enugu). The activity pattern, together with time allocation study, was conducted in Nsukka and Onitsha. The iron status study was conducted in Enugu alone. anthropometric assessment was performed on all the pregnant women in all the three towns.

3.2 Selection of study area

Nsukka is situated in the north of Enugu state. It is a semi - urban area of hilly savannah. Approximately, it lies on latitude 06° 52′ North and longitude 09° 23′ East. The temperature ranges from minimum of 21°C to maximum of 35°C (Hagger, 1975). It is a university town where most of its population are civil servants and villagers.

Onitsha is located in the western part of Anambra state at the right bank of the river Niger. It is situated at latitude 6° 9′ N and longitude 06° 45′ E. There are three main rivers in Onitsha, viz: Niger, Idemili and Nkisi. Onitsha has an average temperature

of 26.4°C (Ezenwaji, 1970). It is an urban town and the biggest commercial town in Eastern Nigeria. It also houses the biggest market in West Africa. It is populated mostly by traders, business men and civil servants.

Enugu, the capital of Enugu state of Nigeria, is located at latitude 06° 27'N and longitude 07° 9'E. The temperature ranges from 25°C - 29°C (Ibeziako, 1985). It is an urban town populated mostly by civil servants and businessmen.

These towns have two seasons, the wet and dry seasons. The wet season starts in April and ends in October while the dry season starts in October and lasts till March. They have an annual average rainfall of between 1,500 mm and 2,000 mm (Hagger, 1975; Ezenwaji, 1970; Ibeziako, 1985). These towns fall within the southern root-crop economy characterized by the cultivation of yam, cassava, cocoyam, plantain and banana. Grains and pulses are subsidiary. Food crop husbandry so dominates the agricultural landscape of these towns that animals seldom come into the picture (Ofomata, 1978). In Onitsha, because of overpopulation and the commercial activities of the town, agricultural activity seldom exists (except for fishing). Food-stuff are brought into the town from nearby villages and towns.

Nsukka and Onitsha towns were chosen for the activity and time allocation study in order to determine the differences in activity

between these two areas. Enugu was chosen for the iron status assessment because of accessibility to the University of Nigeria teaching Hospital which is located there. The hospital also attracts large population of pregnant women from different parts of eastern Nigeria.

3.3 Sampling

The activity pattern questionnaires were distributed to all pregnant women who attended antenatal clinic in Bishop Shanahan hospital, Nsukka and General hospital Onitsha on "7" big clinic days each. A total of 200 correctly filled questionnaires were recovered from each town. Twelve women in each location were used for the 24-hour record of activities.

The iron status questionnaire was distributed among all pregnant women who attended clinic in the University of Nigeria Teaching Hospital, Enugu. Blood samples of all the women were also collected on "5" big clinic days. A total of 200 correctly filled questionnaires with their matching blood samples were then analyzed. The control samples were obtained from 10 non-pregnant women in the same area and with the same background.

3.4 Data collection

3.4.1 Questionnaire

Two questionnaires were designed. One was on the activity and time allocation pattern and the other on iron status. These two structured questionnaires were validated, tested and then used for the study. The questionnaire on activity and time allocation pattern study sought information on :

1. Background of the subject,
2. Anthropometric measurements,
3. Activity / time allocation pattern, and
4. Health status

The other questionnaire on iron status study had information on:

1. Background information on the subject,
2. Anthropometric measurements,
3. Packed cell volume (PCV),
4. Haemoglobin values (HB),
5. Dietary pattern, and
6. Health status

3.4.2 Anthropometric measurements

Anthropometric measurements were taken from all respondents.

3.4.2.1 Height

A portable novitose height measure (cms weight limited, London) was used to measure all heights. The respondents were measured without shoes on a flat floor. Heads were erect and hands hung at their sides in a natural manner. The measurement was taken to the nearest 0.1 cm.

3.4.2.2 Weight

The weights of all respondents were taken using a portable multipurpose weighing scale (CMS weight limited). They were weighed with minimum clothing, the measurement was taken to the nearest 0.1 kg. The formula:

$$\frac{wt}{ht^{-2}}$$

was used to determine their Body Mass Index (Keys *et. al.*, 1972).

3.4.3 Activity pattern

3.4.3.1 Twenty-four record of activities

A record of activity was taken from a sub-sample of 12 pregnant women in each location where the activity and time allocation pattern was studied. This was done intensively for 2

days. For each pregnant woman one weekday and a weekend day were used for the study days.

The recording was done by the pregnant woman. This was done in order to get a correct estimate of the activity pattern of the respondents since the presence of a researcher altered their activity pattern greatly as those women were not used to being watched.

The researcher, with the help of a local research assistant trained the pregnant women on how to keep records of their various activities over 24 hours on each study day. At the end of each 2-day record for each pregnant woman the researcher and her assistant went through the record of activities to ensure that it was correctly recorded.

3.4.4 Iron status

3.4.4.1 Determination of Iron status

Blood samples from the 200 pregnant women were obtained through venipuncture, since in the case of haemoglobin the results from venous blood samples are more reproducible than those of capillary blood (INACG, 1984) during the 5 "big clinic days". Each sample drawn was immediately added into a bottle containing EDTA (an anticoagulant) and was mixed carefully. The reading was after 4 - 6 hours of collection and was analyzed using two methods:

Haemoglobin and hematocrit or packed cell volume (PCV) measurement.

3.4.4.2 Haemoglobin determination

This was determined using cyanomethemoglobin technique. The advantage is that it measures all forms of circulating haemoglobin (except sulfhaemoglobin) as it entails dilution (INACG, 1985).

3.4.4.2.1 Procedure

a) The blood sample was slowly drawn into a pipette designed to contain .02 ml and filled to 3 mm beyond the mark using a capillary action.

b) The outside of the distal portion of the pipette was wiped with a damp gauze. The amount of blood in the pipette was then adjusted to the mark (i.e. 0.02 ml). This was done by touching the pipette tip with tissue paper.

c) The pipette was placed into a test tube containing 5.0 ml of reagent (cyanomethylglobin solution), so that the tip of the pipette was below the surface of the solution. Slowly, the blood was expelled and the pipette rinsed several times with the solution on top of the tube.

d) The tube was caped and mixed several times. The diluted haemoglobin solution was left to stand for 5 minutes. The

content was measured using a colorimeter covering the range of 550 nm.

e) The absorbance of the haemoglobin solution (Aunk) was measured. A standard of known haemoglobin content (Astd) was provided by St. Anthony Laboratory, Nsukka.

f) The haemoglobin content of each blood sample was calculated using the formula below:

$$Haemoglobin\ unknown\ (g\ dl^{-1}) = \frac{Aunk}{Astd}\ x\ haemoglobin\ standard\ g^{-1}$$

3.4.4.3 Packed cell volume

This is a measure of ratio of volume occupied by red cells to the volume of whole blood sample of a capillary or venous blood (INACG, 1985). The PCV provides a convenient and rapid measure of the degree of anaemia. From the nutritional point, it provides information comparable to the haemoglobin concentration.

3.4.4.3.1. Procedure

a) The 200 hematocrit tubes were filled without over-filling with venous blood samples collected.

b) The outside of the tubes were cleaned and one end of the tubes sealed.

c) The filled sealed capillary tubes were then placed in a

centrifuge with the sealed end towards the periphery. Their positions and numbers were recorded.

d) They were removed and read off immediately using a PCV reading device.

e) The PCV was expressed in percentages.

3.4.4.4 Malaria parasite determination

3.4.4.4.1 Procedure

a) A film was made of each blood sample collected.

b) Each was stained with Giemsa stain and was later placed under the microscope.

c) Each film slide was then checked for malaria parasite.

3.5 LIMITATIONS

3.5.1 Activity pattern and time allocation studies

Activity pattern and time allocation studies are difficult to conduct in the field. The accuracy of the study depends on motivation, diligence and educational level of the individual studied. The accuracy of record may decline as the length of time for keeping record increases. High refusal rate due to inconveniences and cultural setting, results in small sample size which will not give accurate data representing the population. It may also be subjected to much bias and is costly as incentives were

demanded by subjects.

Human activities are continuous and difficult to separate under various headings. For example time studies systematically underestimate child care because it is usually simultaneous with other house-hold activities. Only prolonged, exclusive attention to children of adequate duration and intensity could be recorded as child-care. Women often view child-care as a residual or leisure activity (McGuire and Popkin, 1990).

3.5.2 Anthropometric assessment

Anthropometric assessment has been widely used to distinguish people who are "normal" from those who are "malnourished" in order to select those in need of priority attention. This is only valid when based on an appropriate reference group. The appropriate reference group must be of he same age, sex, socio-economic standard and ethnic group as the study population (Nnanyelugo *et. al.*, 1992). In general foreign standards do not meet the criteria of adequacy of reference standard. As there may be unsuspected genetic differences in the growth potentials between reference population and the surveyed group.

3.5.3 Biochemical assessment

Biochemical assessment is one of the parameters for the assessment of nutritional status. This type of nutritional assessment is difficult in developing countries where laboratory testing is organizationally and financially difficult (Demayer, 1989). Difficulties in specimen and body fluid collection (due to superstitious beliefs and inconveniences), storage and transport together with the expense of laboratory facilities suggest that cost effectiveness in terms of information acquired will always be inadequate (Nnanyelugo *et. al.*, 1992). However, in cases such as iron status, biochemical assessment is used. A single criterion of haemoglobin (HB) and packed cell volume (PVC) values was used. It is simple to perform, need small volume of blood and define major liability.

It has become apparent from subsequent studies that the most reliable approach to characterizing iron deficiency in a population is to use a combination of laboratory measurements (INACG, 1985).

3.6 Statistical Analysis

3.6.1 Questionnaire

Data from questionnaires were analyzed using frequencies and percentages.

3.6.2 Anthropometric measurements

Data on anthropometric assessment were analyzed using Body Mass Index (BMI). Classification used was based on that by Ferro-Luzzi et. al. (1992):

18.4	Chronic Energy Deficiency (CED)
18.5 - 20	Low
21 - 25	Normal
26 - 30	Over weight
> 30	Obese

3.6.3. 24-hour record of activities

This was analyzed using the SPSS computer software. It was done using analysis of variance (ANOVA) technique and mean differences were separated using the least significant difference (LSD) procedure. Correlation analysis was used to study relationships between parameters.

3.6.4. Iron studies

Haemoglobin values of less than 11 g/dl was diagnosed as iron deficient (INACG, 1981). The corresponding packed cell volume of 37.67% (calculated using the constant of 14.6 g/dl (Hb) = 50% (PCV)) was also diagnosed as anaemia. The haemoglobin/packed cell volume value ranges were as follows:

5.0 - 6.9 gl/dl / 17 - 24% = Range 1 (R1)

7.0 - 8.9 gl/dl / 25 - 30% = Range 2 (R2)

9.0 - 10.9 gl/dl / 31 - 37% = Range 3 (R3)

11.0 - 12.9 gl/dl / 38 - 44% = Range 4 (R4)

13.0 - 14.9 gl/dl / 45 - 51% = Range 5 (R5)

CHAPTER FOUR

RESULTS

4.1. Background information

4.1.1 Personal characteristics Table 1 shows the personal characteristics of pregnant women. Low rate of teenage pregnancy was encountered in all the three locations (1 person in Enugu, 2 in Onitsha and 4 in Nsukka) The highest percentage of pregnant women was between the age range of 25-30 years in Enugu and Onitsha (45%; 52.5%). Nsukka had its highest percentage between the age range of 19-24 years (44.5%). Late pregnancies (31 -36 years) were observed more in the cities (26% Enugu, 19.5% Onitsha) than in the sub-urban (8% Nsukka).

Pregnant women visited the hospital more frequently in the third trimester (76.5% Onitsha, 78.5% Nsukka) than in the first and second trimesters. In Enugu a higher per centage of pregnant women (49.5%) visited the clinic in their second trimester. No record of pregnant women visiting the clinic in the first trimester was made in Onitsha and Nsukka. Very few (13%) was made in Enugu.

Majority of the study population had between 1 and 3 children in all locations (35% Enugu, 63.5% Onitsha, 54.5% Nsukka). Very few had 7 and above children (2.5% in Enugu, 4.5% Onitsha, 3.5%

Nsukka).

4.1.2. Socio-economic characteristics

There was a low level of illiteracy among the study populations which was higher in Onitsha (2% Enugu, 2% Nsukka, 14% Onitsha). The same was also found for the husbands to pregnant women (1.5% Enugu, 1% Nsukka, 8% Onitsha). The most common level of education in all the three locations was secondary education (50% Enugu, 54% Nsukka, 46% Onitsha). This was also found among pregnant women's husbands (37.5% Enugu, 36% Nsukka and 40% Onitsha). Occupation of respondents and their husbands followed the same trend of educational qualifications. Civil servants were more in Nsukka (46%) and Enugu (41%) than Onitsha (29.5%). The same was found for their husbands (49% Enugu, 48% Nsukka, 31.5% Onitsha). Farming and trading were found more common than farming alone. Agricultural activities were common among women (16.5% Onitsha, 17% Nsukka, 1% Enugu) than among men (1% onitsha, 4% Nsukka, 0.5% Enugu). Trading was common among pregnant women (48%) and their husbands (46%) who live in Onitsha than in the other two locations (30% in Enugu, 31.5% in Nsukka for women , and 19% in Enugu, 21.5% in Nsukka for their husbands). These are summarized in Table 2.

Table 1. PERSONAL CHARACTERISTICS OF PREGNANT WOMEN

Characteristics	Response from towns					
	Onitsha		Nsukka		Enugu*	
	No	%	No	%	No	%
Age (years)						
< 19	2	1	4	2	1	0.5
19-24	51	25.5	89	44.5	53	26.5
25-30	105	52.5	85	42.5	90	45.0
31-36	39	19.5	16	8	52	26.0
37-42	2	1	4	2	3	1.5
>43	1	0.5	2	1	1	0.5
Total	200	100	200	100	200	100
Gestational age						
First trimester	-	-	-	-	26	13
Second trimester	47	23.5	43	21.5	99	49.5
Third trimester	153	76.5	157	78.5	75	37.5
Total	200	100	200	100	200	100
Number of children						
No child yet	49	24.5	65	32.5	70	35
1-3 children	127	63.5	109	54.5	89	44.5
4-6 children	15	7.5	19	9.5	36	18
7-9 children	9	4.5	7	3.5	5	2.5
>10 children	-	-	-	-	-	-
Total	200	100	200	100	200	100

* Enugu respondents only were used for iron status study.

Table 2. SOCIOECONOMIC CHARACTERISTICS OF PREGNANT WOMEN

	Response from towns					
	Onitsha		Nsukka		Enugu*	
	No	%	No	%	No	%
Educational qualification of husband						
No education	16	8	2	1	3	1.5
Primary education	73	36.5	59	29.5	60	30
Secondary education	80	40	72	36	75	37.5
Tertiary education	31	15.5	67	33.5	62	31
Total	200	100	200	100	200	100
Educational level of the pregnant woman						
No education	28	14	4	2	4	2
Primary education	52	26	40	20	50	25
Secondary education	92	46	108	54	100	50
Tertiary education	28	14	48	24	46	23
Total	200	100	200	100	200	100
Occupation of husband to pregnant women						
Civil servant	63	31.5	96	48	99	49.5
Artisan	19	9.5	20	10	61	30.5
Trading	92	46	43	21.5	38	19
Farming and trading	-	-	2	1	1	0.5
Farmer	2	1	6	3	1	0.5
Company worker	24	12	33	16.5	-	-
Total	200	100	200	100	200	100
Occupation of pregnant women						
Civil servant	59	29.5	92	46	82	41
Trading	96	48	63	31.5	60	30
Student or housewife	12	6	11	5.5	55	27.5
Farming and trading	28	14	30	15	-	-
Farmer	5	2.5	4	2	2	1
Company worker	-	-	-	-	1	0.5
Total	200	100	200	100	200	100

* Enugu respondents only were used for iron status study.

able 3. HOUSE HOLD CHARACTERISTICS OF PREGNANT WOMEN

	Response from towns					
	Onitsha		Nsukka		Enugu*	
	No	%	No	%	No	%
ge of last child						
None yet	49	24.5	65	32.5	70	35
1-3 years	125	62.5	115	57.5	110	55
4-6 years	26	13	20	10	20	10
7 and above	-	-	-	-	-	-
Total	200	100	200	100	200	100
No. of household members						
1-3	61	30.5	46	23		
4-6	101	50.5	65	32.5		
7-9	26	13	35	17.5		
>10	12	6	54	27		
Total	200	100	200	100		
Religion						
Christianity	200	100	198	99		
Islam	-	-	2	1		
Traditional religion	-	-	-	-		
Total	200	100	200	100		

4.1.3 House hold characteristics

The most common birth interval found among pregnant women was between 1 and 3 years (55% Enugu, 62.5% Onitsha, 57.5% Nsukka). Few women (10% Enugu, 13% Onitsha, 10.5% Nsukka) had their last child between 4 and 6 years previously and were pregnant again during the time of the study in the towns studied.

Other background information got only for pregnant women on activity pattern and time allocation study showed majority to be christians (100% Onitsha and 99% Nsukka). None of the women was practising traditional religion. This affected the family set-up. Results show that most pregnant women came from monogamous family system (95.5% Onitsha, 92% Nsukka).

Most families had between 4-6 members in the two towns (50.5% Onitsha, 32.5% Nsukka). Families with ten or more household members (>10) was recorded in the Nsukka population (25%) as against Onitsha population (6%). (These are recorded in Table 3).

4.2 TIME ALLOCATION AND ACTIVITY PATTERN OF PREGNANT WOMEN IN SUB-URBAN AND URBAN POPULATIONS

4.2.1. Twenty-four hour activity pattern of pregnant women:

The activity and time allocation to various activities by pregnant women in the two towns are shown in Table 4. Similar time

llocations and activity patterns were observed among pregnant omen living in Onitsha and Nsukka. The largest time allocation was :o sleeping (9.27 hours) in Onitsha and (9.19 hours) in Nsukka.

Time spent on main occupation was lower than that for sleeping. In Onitsha 4.61 hours and in Nsukka 4.37 hours were spent on main occupation. However, when those with no occupational activities were removed, average occupational time came to 7.21 hours for the two towns (Appendix 2).

Food preparation took a mean of 2.14 hours in Onitsha and 2.34 hours in Nsukka. The next appreciable time was spent on conversation and leisure activities. This cost the women in both towns 1.64 hours and 1.45 hours.

Other activities such as house care took 1.07 hours in Onitsha and 1.41 hours in Nsukka women. Child care took 1.09 hours in Onitsha and 0.53 hours in Nsukka. When adjusted to remove women in their first pregnancy, child care came to a mean of 1.59 hours for both towns (appendix 3).

Shopping took 0.71 and 0.65 hours of the pregnant women in Onitsha and Nsukka, respectively. Non-work activities such as eating cost them 0.83 and 0.75 hours daily in Onitsha and Nsukka, respectively.

Table 4. ACTIVITY PATTERN AND TIME SPENT ON SPECIFIC ACTIVITIES BY PREGNANT WOMEN LIVING IN ONITSHA AND NSUKKA TOWNS

Activities	Time spent	
	Onitsha	Nsukka
Occupational:		
Main occupation	4.61 ± 0.83	4.37 ± 0.78
Gardening	0.00 ± 0.00	0.17 ± 0.13
Petty trading/food hawking	0.31 ± 0.22	0.92 ± 0.37
Apprenticeship	0.38 ± 0.21	0.28 ± 0.19
Household:		
House care	1.07 ± 0.16	1.41 ± 0.17
Food preparation	2.14 ± 0.16	2.34 ± 0.44
Bathing and dressing	0.67 ± 0.02	0.63 ± 0.03
Child care	1.09 ± 0.23	0.53 ± 0.17
Shopping	0.71 ± 0.21	0.65 ± 0.18
Non-working:		
Eating	0.83 ± 0.04	0.75 ± 0.02
Sleeping/resting	9.27 ± 0.13	9.19 ± 0.16
Conversation and leisure	1.64 ± 0.24	1.45 ± 0.20
Health care	0.43 ± 0.25	0.35 ± 0.24
Social:		
Visiting, strolling or ceremony attendance	0.53 ± 0.21	0.65 ± 0.20
Religious activity	0.20 ± 0.04	0.23 ± 0.06
Total	24	24

Attendance at ante-natal clinic was observed as an important ctivity in the pregnant women's time budget. When adjusted to emove those who did not visit the clinic on survey days. Antenatal are was found to take 3.75 hours from pregnant women's daily ctivities (Table 4a).

Religious activities took the least time in the time schedule f pregnant women (0.20 and 0.23 hour in the two towns). Time spent n social activities like visiting, strolling or ceremony ttendance was higher than the time spent on religious activities. regnant women in both towns allocated 0.5 hour and 0.65 hour to t, respectively.

Few pregnant women still found time to engage in activities uch as petty trading/food hawking, gardening, professional private ractice and apprenticeship. Gardening was not practised in Onitsha own at all. The number of hours put into the activities by the regnant women is better seen when altered to remove non-articipating women. This is shown in Table 4a. Pregnant women pent 1.00 hour on gardening, 3.61 hours on petty trading / food awking. Apprenticeship took 3.19 hours.

When time allocated to various activities was merged into four road headings (Non-work, occupational, household and social) ithout removing nonparticipating subjects, non-work activities

Table 4a. TIME SPENT ON SOME ACTIVITIES, REMOVING NONPARTICIPATING PREGNANT WOMEN

Activities	Mean time (hours)
Gardening	1.00 ± 0.71
Petty trading/food hawking	3.61 ± 2.22
Apprenticeship	3.19 ± 0.14
Antenatal clinic	3.75 ± 1.00

Table 5. TIME ALLOCATION OF PREGNANT WOMEN

Activities	Time spent (hours)	
	Onitsha	Nsukka
Non-work	12.17 ± 0.17	11.74 ± 0.16
Occupational	5.30 ± 0.32	5.74 ± 0.37
House hold	5.68 ± 0.16	5.56 ± 0.20
Social	0.70 ± 0.13	0.88 ± 0.13
Total	24	24

occupied the highest in the pregnant women's time budget, while social activities took the least time (Table 5).

4.2.2. Time of day allocated to sleep/rest and participation of pregnant women for different household duties.

Most pregnant women allocate the hours between 9 pm and 7 am to sleep (Table 6). In both towns most women (100% in Onitsha and 95% in Nsukka) sleep from 9 pm. All (100%) continue to sleep till 7 am (80% in Onitsha and 75% in Nsukka). Only 30.5% in Onitsha and 33.5% in Nsukka) mothers, respectively, take siesta.

Fig. 1 shows the participation of pregnant women in household duties. Time allocation to household duties by Nsukka and Onitsha mothers were similar. Most pregnant women participate in cooking and shopping in both towns. More women participated in gardening in Nsukka than in Onitsha.

Fig. 2 shows the participation of pregnant women and other household members at different household duties. In most households in both towns women alone did the cooking (86.5%) and shopping (76.5). Other members of the family participated more in shopping (16.5%) than in cooking (5%).

Table 6. HOURS OF THE DAY ALLOCATED TO SLEEP/REST BY THE PREGNANT WOMEN

Town	Sleeping hours of pregnant women									
	6am - 7 am		Siesta		8pm - 9pm		9pm - 10pm		After 10 pm	
	No.	%	No.	%	No.	%	No.	%	No.	%
Onitsha	160	80	61	30.5	45	22.5	155	77.5	200	100
Nsukka	155	75	67	33.5	117	58.5	83	42.5	200	100

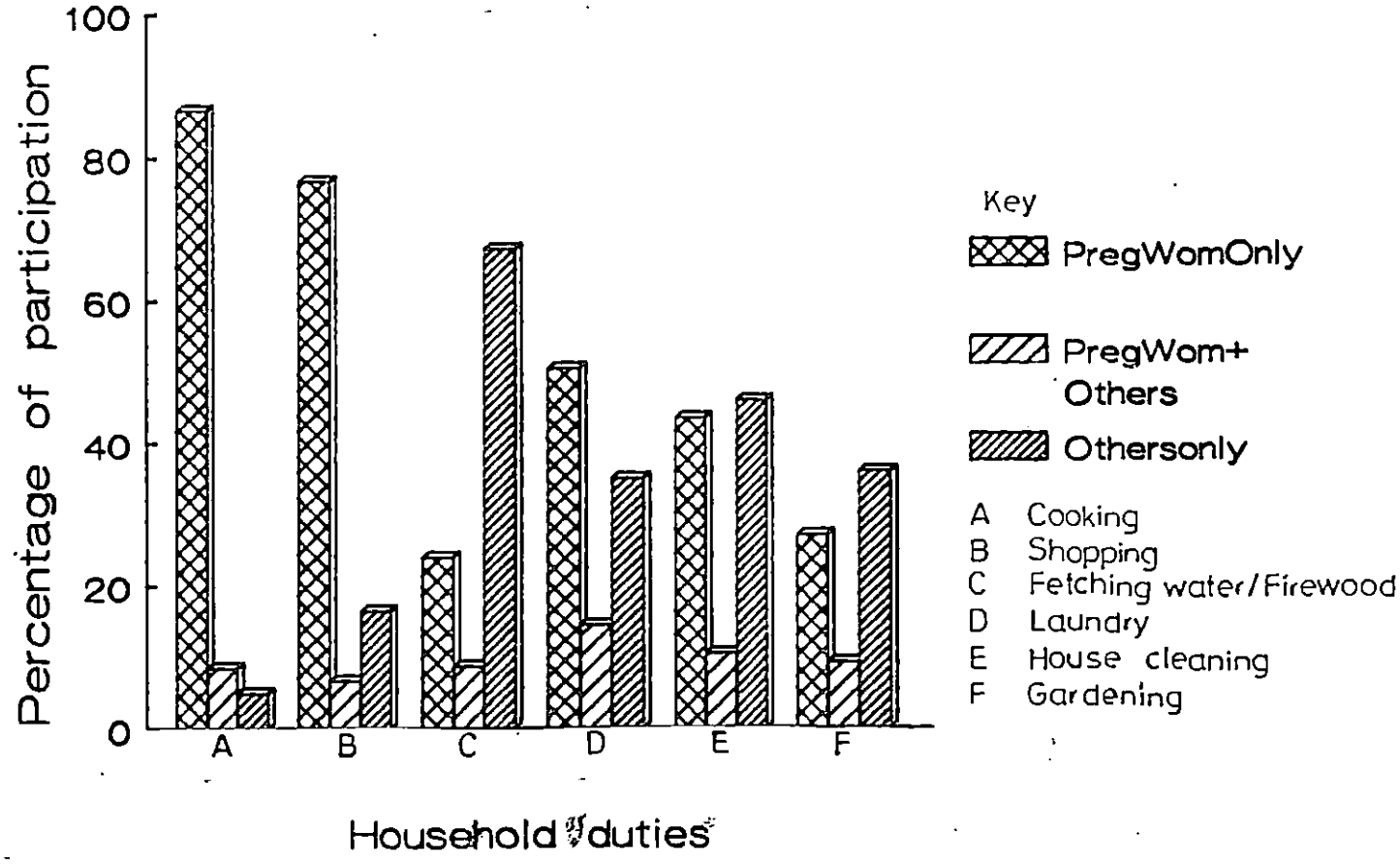


Fig.1: Degree of participation of all in household duties (%)

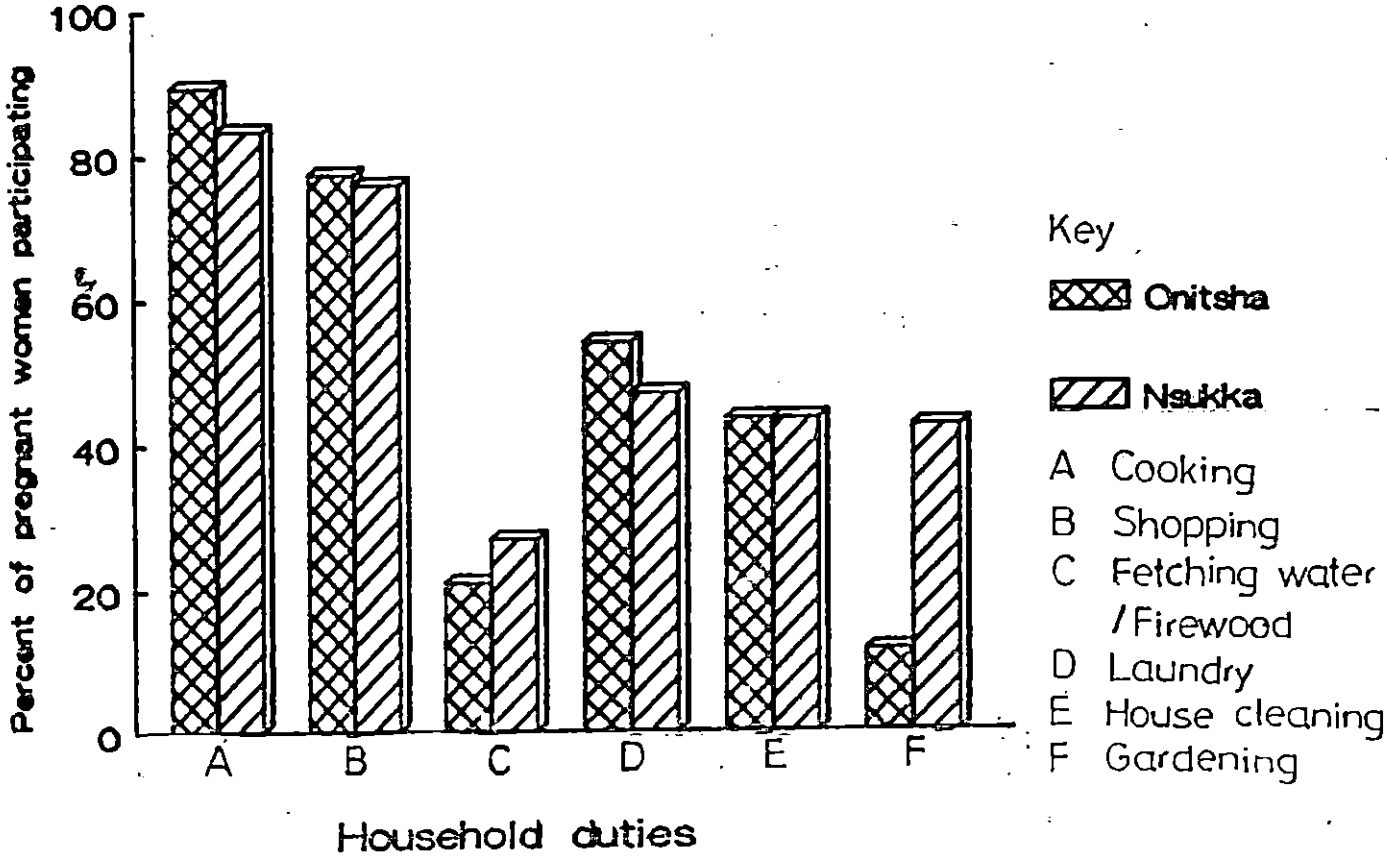


Fig. 2: Participation of pregnant women in household duties (%)

Pregnant women also participated with other members of the family in other household duties such as laundry (50.5%), cleaning the house (43.5%) and keeping home gardens (27%). Fetching water/firewood was the only activity which was performed more by other members of the family alone (67.27%) than by pregnant women (24%).

4.2.3. Frequency of participation in social activities by pregnant women.

The frequency of women's participation in social gatherings such as visitations, ceremony attendance and women's social or religious gatherings was investigated and shown in Table 7.

It was found that pregnant women in the two towns go for social gatherings. Some women (48.75%) go occasionally while others (45.25%) go frequently for those outings. Pregnant women living in Nsukka (53%) go for social gathering more than those living in Onitsha (37.5%). Social activity did not influence time allocated to rest and leisure in both towns (Appendix 4). However, visiting/strolling or ceremony attendance correlated negatively ($r = -0.44$, $P = 0.1$) with household activities.

Table 7. FREQUENCY OF PARTICIPATION IN SOCIAL ACTIVITIES BY PREGNANT WOMEN

FREQUENCY	Onitsha		Nsukka		Mean	
	No	%	No	%	No	%
Frequently	75	37.5	106	53	90.5	45.25
Occasionally	110	55	85	42.5	97.5	48.75
Rarely	10	5	9	4.5	9.5	4.75
Never	5	2.5	-	-	2.5	1.25
Total	200	100	200	100	200	100

4.2.4. Activity pattern of pregnant women in different pregnancy trimesters.

Women in the 2nd trimester spent 1.60 hours on house care activities, while in the 3rd trimester they spent 0.88 hours; and the difference between the two was statistically significant ($t = 3.33$; $p < 0.05$). Eating activity was found to take significantly less time in the third trimester than in the second trimester ($t = 3.48$; $p = 0.01$). In the second trimester they spent 0.72 hours and in the 3rd trimester 0.86 hours.

Sleeping time (hours) was also statistically different ($t = 6.04$; $p = 0.00$) between the two trimesters. Pregnant women in their third trimester slept more (9.69 hours) than those in their second trimester (8.77 hours). Time spent on leisure activities was also higher in the third trimester (1.92 hours) than in the second trimester (1.17 hours) ($t = 2.57$; $p = 0.05$). Time on non-work activities as a whole was found therefore, to be higher in the third trimester than in the second trimester ($f = 25.097$; $p = 0.001$). (This is shown in Table 8). Sitting activity was observed to be regular in the third trimester than in the second trimester.

Table 8. ACTIVITY PATTERN OF PREGNANT WOMEN IN SECOND AND THIRD TRIMESTERS

Activities	Trimesters Mean time (hours) 2nd trimester	3rd trimester	Level of significance
Total economic	7.32 ± 0.43	6.40 ± 0.48	N.S.
House care	1.60 ± 0.019	0.88 ± 0.10	**
Food preparation	2.42 ± 0.24	2.06 ± 0.13	N.S.
Bathing & dressing	0.60 ± 0.02	0.69 ± 0.13	N.S.
Child care	1.18 ± 0.24	0.45 ± 0.13	N.S.
Shopping	0.81 ± 0.21	0.55 ± 0.17	N.S.
Total household	6.61 ± 0.72	4.63 ± 0.66	N.S.
Eating	0.72 ± 0.023	0.86 ± 0.03	**
Sleeping	8.77 ± 0.11	9.69 ± 0.11	***
Conversation/leisure	1.17 ± 0.159	1.92 ± 0.25	*
Total Non-work	10.66 ± 0.28	12.47 ± 0.39	***
Visiting/strolling & ceremony attendance	0.34 ± 0.20	0.81 ± 0.21	N.S.
Religious	0.23 ± 0.05	0.21 ± 0.05	N.S.
Total social	0.57 ± 0.25	1.02 ± 0.26	N.S.

N.S. = not significant
* = significant at $P < 0.05$
** = significant at $P < 0.01$
*** = significant at $P < 0.001$

te 9. TIME ALLOCATION AND ACTIVITY PATTERN OF PREGNANT WOMEN IN DIFFERENT OCCUPATIONS

ivities	Occupations and mean time (hours) Teacher	Trader	Housewife	Other civil servants	Hospital workers	Signif-icance
n occupation	7.00 ± 0.39	6.07 ± 0.51	3.75 ± 0.28	7.11 ± 0.78	8.07 ± 0.28	*
al economic time	7.39 ± 0.78	7.79 ± 0.51	4.44 ± 0.59	8.06 ± 0.08	8.07 ± 0.79	*
se care	1.41 ± 0.26	1.04 ± 0.32	0.97 ± 0.51	1.31 ± 0.88	1.36 ± 0.30	N.S.
d preparation	2.53 ± 0.20	1.80 ± 0.22	2.20 ± 0.28	2.37 ± 0.13	2.11 ± 0.20	*
hing & dressing	0.69 ± 0.04	0.56 ± 0.03	0.68 ± 0.05	0.65 ± 0.03	0.65 ± 0.03	*
ld care	0.76 ± 0.35	0.90 ± 0.29	1.05 ± 0.45	0.84 ± 0.30	0.54 ± 0.21	N.S.
pping	1.10 ± 0.32	0.26 ± 0.10	0.50 ± 0.35	0.82 ± 0.31	0.44 ± 0.23	N.S.
al household	6.49 ± 1.03	4.56 ± 0.80	5.40 ± 0.81	5.99 ± 0.77	5.10 ± 0.44	N.S.
ing	0.79 ± 0.03	0.80 ± 0.07	0.83 ± 0.70	0.77 ± 0.05	0.79 ± 0.40	N.S.
eping	9.32 ± 0.22	9.11 ± 0.26	9.51 ± 0.70	9.39 ± 0.19	8.70 ± 0.24	*
versation/ isure	1.82 ± 0.33	1.01 ± 0.12	2.14 ± 0.39	1.71 ± 0.38	0.84 ± 0.10	*
al non-work	11.93 ± 0.52	10.92 ± 0.36	12.48 ± 0.56	11.87 ± 0.52	10.33 ± 0.22	*
iting/strolling						
emony attendance	0.85 ± 0.34	0.25 ± 0.14	0.93 ± 0.57	0.62 ± 0.26	0.06 ± 0.06	N.S.
igious	0.35 ± 0.10	0.17 ± 0.08	0.09 ± 0.24	0.18 ± 0.05	0.26 ± 0.09	N.S.
al Social	1.20 ± 0.43	0.42 ± 0.18	1.02 ± 0.57	0.80 ± 0.30	0.32 ± 0.10	N.S.

= not significant
= significant at $P < 0.05$
= significant at $P < 0.01$

4.3. SOCIO-ECONOMIC FACTORS THAT AFFECT ACTIVITY PATTERN OF PREGNANT WOMEN.

4.3.1. Occupation.

Table 9 shows the time spent by pregnant women of different occupational groups on various activities. The highest time allocated to main occupation (8.07 hours) was observed among hospital workers. This time includes time spent going to and from work, working hours and time spent on private practice. Civil servants spent 7.11 hours while teachers and traders spent 7.00 hours and 6.07 hours, respectively. Housewives spent the least time (3.75 hours). This was statistically lower than the time spent by the other groups ($f = 19.66$; $p < 0.05$). The main economic time given by civil servants (7.11 hours) was also statistically higher than that given by traders (6.07 hours, $f = 19.66$; $p < 0.05$).

Food preparation time was lowest among traders (1.80 hours) and highest among teachers (2.53 hours). This was found to be statistically different ($f = 1.856$; $p < 0.05$). Bathing and dressing time was lowest with traders and highest among teachers.

Total non-work activities time was lowest among hospital workers (10.33 hours) and was different from all others except that for traders (10.92 hours). Sleeping as a single non-work activity was lowest among hospital workers (8.7 hours) and was statistically

lower ($f = 1.867$; $p < 0.05$) than the time spent by housewives (9.51 hours) and civil servants (9.39 hours) in the same activity. Housewives spent the highest time on leisure activities (2.14 hours) which was different ($f = 2.57$; $p < 0.05$) from the time spent by hospital workers (0.84 hours) and traders (1.01 hours).

Table 10 shows that when occupational activities increased, time allocated to non-work activities decreased ($r = -0.5$; $p = 0.01$). When activities were separated, sleeping and leisure activities were negatively correlated to occupation ($r = -0.53$ and $r = -0.48$, respectively.

The decisions of working mothers when asked if they would go on maternity leave is shown in Table 11. Only 22.5% and 30.5% in Onitsha and Nsukka opted to go for maternity leave.

4.3.2. Household activities

House work reduced resting period of the pregnant women. This is shown in Table 10. A negative correlation which was highly significant existed between household activities and non-work activities, showing that as the women did more house work, resting period was reduced ($r = 0.55$; $p = 0.001$).

Table 10. CORRELATIONAL ANALYSIS OF NON-WORK ACTIVITIES AGAINST OCCUPATIONAL ACTIVITIES AND HOUSEHOLD ACTIVITIES

	Non-work activities (r = correlation value)			
Activities	Total non-work	Eating	Sleeping	Conversation/leisure
Total economic time	-0.499*			
Main occupation	-0.372NS			
Total household	-0.599**			
House care		-0.155NS	-0.147NS	-0.184NS
Food preparation		-0.153NS	0.008NS	-0.005NS
Bath &dress		0.405*	0.528**	0.406*
Child care		0.183NS	-0.223NS	-0.093NS
Shopping		-0.022NS	0.338*	0.324NS

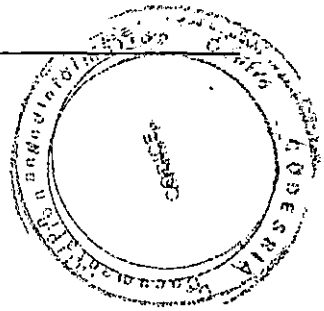
NS = not significant

* = significant at P = 0.05

** = significant at P = 0.01

Table 11. Maternal decision to go or not to go for maternity leave before delivery.

	Maternity leave				
	No		Yes		
Town	No	%	No	%	Total
Onitsha	155	77.5	45	22.5	200
Nsukka	139	69.5	61	30.5	200



4.3.3 Day of the week

More work was done generally during weekends than on week days. This is shown in Table 12. The main occupational activities were performed more on week days (6.48 hours) than weekends (2.50 hours, $f = 16.62$; $p < 0.05$). However, for hospital workers and traders, no difference in occupational time between the two days was observed.

Household activities were performed more during weekends (7.07 hours) than weekdays (4.18 hours, $f = 22.02$; $p < 0.001$). Sleeping time was statistically different ($f = 12.10$; $p < 0.001$) between the two days. Pregnant women had more sleep during weekends (9.54 hours) than weekdays (8.91 hours).

Other activities such as eating, conversation/leisure and social activities were not significantly different.

4.3.4. Walking frequency of pregnant women

This may affect energy expenditure of pregnant women. As shown in Table 13, more pregnant women walk occasionally to their work place in Onitsha (52.5%), while in Nsukka more women did so frequently (47.5%). Walking to market was frequent in Nsukka (43.5%) but occasional in Onitsha (50.5%). Pregnant women also went for social activities frequently in Nsukka (50%) but majority went occasionally (50.5%) in Onitsha.

Table 12. DIFFERENCE IN ACTIVITY PATTERN DURING WEEKDAYS AND WEEKENDS

Activities	Mean time (hours Weekdays	Weekends	Level of significance
Main occupation	6.48 ± 0.64	2.50 ± 0.74	**
Total economic time	7.36 ± 0.38	6.00 ± 0.53	NS
House care	0.78 ± 0.11	1.71 ± 0.16	***
Food preparation	1.90 ± 0.11	2.58 ± 0.12	***
Bathing and dressing	0.60 ± 0.02	0.69 ± 0.02	NS
Child care	0.76 ± 0.20	0.87 ± 0.22	NS
Shopping	0.14 ± 0.06	1.22 ± 0.21	***
Total household	4.18 ± 0.29	7.07 ± 0.53	***
Eating	0.77 ± 0.03	0.81 ± 0.03	NS
Sleeping	8.91 ± 0.11	9.54 ± 0.14	***
Conversation/leisure	1.46 ± 0.16	1.63 ± 0.26	NS
Total non-work	11.14 ± 0.25	11.98 ± 0.37	NS
Visiting/strolling	0.22 ± 0.07	0.93 ± 0.27	NS
Religious	0.19 ± 0.09	0.25 ± 0.06	NS
Total social	0.41 ± 0.08	1.18 ± 0.30	NS

N.S. = not significant

* = significant at $P < 0.05$

** = significant at $P < 0.01$

*** = significant at $P < 0.001$

Table 13. WALKING FREQUENCY OF PREGNANT WOMEN

Destination	Town	Frequently		Occasionally		Rarely		Never		Total	
		No	%	No	%	No	%	No	%	No	%
Work place											
	Onitsha	70	35	105	52.5	3	1.5	22	11	200	100
	Nsukka	95	47.5	70	3.5	25	12.5	10	5	200	100
	Mean	82.5	41.3	87.5	43.75	14	7.0	16.0	8		
Market											
	Onitsha	66	33	101	50.5	24	12	9	4.5	200	100
	Nsukka	87	43.5	89	44.5	13	6.5	11	5.5	200	100
	Mean	76.5	38.3	95	47.5	18.5	9.25	10	5.0		
Social activities											
	Onitsha	75	37.5	111	55.5	9.0	4.5	5	2.5	200	100
	Nsukka	100	50	85	42.5	15	7.5	-	-	200	100
	Mean	87.5	43.75	98	49	12	6	2.5	1.3		

4.3.5. Household members

Pregnant women in their first pregnancy were considered to have fewer family members than those on subsequent pregnancies. Table 14 shows the differences in activity pattern of pregnant women in their first pregnancy and those of subsequent pregnancies.

More family members reduced bathing and dressing time ($t = 4.18$; $p < 0.001$). Pregnant women of subsequent pregnancies took less time 0.58 hour, while those on their first pregnancy took 0.71 hour. Social activities were affected by large family members ($f = 12.34$; $p < 0.001$). Visiting/strolling and ceremony attendance was particularly affected. Pregnant women with more family members put in less time (0.12 hour) than those on their first pregnancy (1.03 hours). Other activities were not statistically different from each other for the two groups.

Table 14. ACTIVITY PATTERN AND TIME ALLOCATION OF PREGNANT WOMEN ON THEIR FIRST PREGNANCY AND THOSE OF SUBSEQUENT PREGNANCIES

Activities	Mean time (hours) First pregnancy	Subsequent pregnancies	Level of significance
Total economic time	6.66 ± 0.54	7.05 ± 0.39	NS
House care	1.26 ± 0.16	1.22 ± 0.18	NS
Food preparation	2.18 ± 0.10	2.30 ± 0.16	NS
Bath & dress	0.71 ± 0.03	0.58 ± 0.02	***
Child care	0.00 ± 0.00	1.63 ± 0.84	NS
Shopping	0.73 ± 0.20	0.63 ± 0.19	NS
Total household	4.88 ± 0.40	6.34 ± 0.58	NS
Eating	0.82 ± 0.03	0.77 ± 0.03	NS
Sleeping	9.32 ± 0.17	9.14 ± 0.12	NS
Conversation/leisure	1.85 ± 0.25	1.24 ± 0.16	NS
Total non-work	11.99 ± 0.39	11.15 ± 0.22	NS
Visiting/strolling or ceremony attendance	1.03 ± 0.26	0.12 ± 0.05	***
Religious	0.30 ± 0.06	0.14 ± 0.03	NS
Total social	1.33 ± 0.29	0.26 ± 0.07	**

NS = not significant
** = significant at $P < 0.01$
*** = significant at $P < 0.001$

4.3.6. Child care

Table 15 shows the effect of child care on activity pattern of pregnant women. Women whose last child were under 2 years were compared with those whose last children were above 2 years and those on their first pregnancy.

The women whose last child were more than 2 years allocated a higher time (6.82 hours) to household activities than those with their last child less than 2 years (5.03 hours). It was found to be statistically different ($f = 2.81$; $p < 0.05$).

Time given to non-work activities was significantly greater ($f = 3.24$; $p < 0.05$). among pregnant women on their first pregnancy (11.98 hours) and those whose children were above 2 years (10.51 hours).

Pregnant women on their first pregnancy spent more time on visiting / strolling or ceremony attendance than the rest of the group ($f = 5.92$: $p < 0.05$). They spent more time on religious activities ($f = 2.81$; $p < 0.05$) than pregnant women whose children are above 2 years. Child care was higher with pregnant women with children less than 2 years. However, it was not statistically different from those whose children are more than 2 years. Early sleeping/rest and leisure were not also significant when analyzed separately.

Table 15. TIME SPENT BY PREGNANT WOMEN ON DIFFERENT ACTIVITIES AS REGARD CHILD CARE

Activities	Mean time (hours) Last child < 2yrs	Last child > 2yrs	No child	Level of significance
Total economic time	7.03 ± 0.62	7.07 ± 0.47	6.66 ± 0.54	NS
Housecare	0.97 ± 0.22	1.58 ± 0.27	1.26 ± 0.16	NS
Food preparation	2.00 ± 0.23	2.73 ± 0.15	2.18 ± 0.10	NS
Bathing & dressing	0.60 ± 0.03	0.56 ± 0.01	0.71 ± 0.02	*
Child care	1.78 ± 0.18	1.40 ± 0.32	0.00 ± 0.00	*
Shopping	0.68 ± 0.26	0.55 ± 0.27	0.73 ± 0.21	NS
Total on household	5.03 ± 0.75	6.82 ± 0.92	4.88 ± 0.40	*
Eating	0.79 ± 0.05	0.74 ± 0.02	0.81 ± 0.03	NS
Sleeping	9.27 ± 0.05	8.95 ± 0.17	9.32 ± 0.17	NS
Conversation/ leisure	1.53 ± 0.24	0.82 ± 0.07	1.85 ± 0.25	NS
Total time on non-work	11.59 ± 0.31	10.51 ± 0.22	11.98 ± 0.39	*
Visiting/strolling or ceremony attendance	0.08 ± 0.05	0.17 ± 0.11	1.03 ± 0.29	*
Religious	0.17 ± 0.04	0.10 ± 0.02	0.29 ± 0.06	*
Total time for social	0.25 ± 0.11	0.27 ± 0.10	1.32 ± 0.29	NS

NS = not significant
** = significant at P < 0.01
*** = significant at P < 0.001

Table 16. TIME ALLOCATION OF PREGNANT WOMEN LIVING WITH OR WITHOUT HOUSE HELP

Activity	Mean time (hours) Living with househelp	Without househelp	Level of significance
Total economic time	6.83 ± 0.42	6.96 ± 0.44	NS
House care	1.03 ± 0.12	1.93 ± 0.21	*
Food preparation	2.10 ± 0.10	2.72 ± 0.14	*
Bathing and dressing	0.67 ± 0.02	0.56 ± 0.02	***
Child care	0.70 ± 0.16	1.20 ± 0.16	NS
Shopping	0.73 ± 0.16	0.52 ± 0.25	NS
Total house hold	5.23 ± 0.39	6.93 ± 0.78	NS
Eating	0.81 ± 0.03	0.72 ± 0.02	**
Conversation/leisure	1.77 ± 0.19	0.81 ± 0.07	***
Sleeping	9.44 ± 0.11	8.52 ± 0.14	***
Total non- work related	12.02 ± 0.26	10.05 ± 0.13	NS
Visiting/strolling or ceremony attendance	0.75 ± 0.18	0.00	*
Religious activities	0.25 ± 0.15	0.12 ± 0.01	NS
Total social	1.00 ± 0.20	0.12 ± 0.01	NS

N.S. = not significant
* = significant at P < 0.05
** = significant at P < 0.01
*** = significant at P < 0.001

4.3.7. Househelp

The presence of househelp lowered the time allocation to house care by pregnant women ($f = 3.57$: $p < 0.05$). (This is shown in Table 16). Food preparation time was also statistically reduced ($t = 3.49$, $p < 0.05$) if pregnant women had househelp. Time allocation to bathing and dressing was lower among pregnant women living without househelp ($t = 4.24$; $p < 0.001$).

Time for sleeping or rest and leisure activities were higher ($t = 5.40$; $p = 0.001$) in those living without househelp. Time allocated to visiting/strolling or ceremony attendance was higher in pregnant women living with househelp ($F = 4.98$, $P < 0.05$) than those living without househelp.

4.4. ANTHROPOMETRIC ASSESSMENT OF PREGNANT WOMEN

Tables 17a and 17b show the anthropometric assessment of pregnant women. None of the pregnant women was classified under chronic energy deficiency. Results from the three trimester show majority of expectant mothers to be normal according to Body Mass Index measurements (BMI) (56.5% Enugu, 59.0%, Onitsha; 60% Nsukka). Very few women (7.7%) had low BMI value. A higher percentage of low BMI was recorded in Enugu and Nsukka in the second trimester (12.2% Enugu, 16.3% Nsukka) and third trimester (24% Enugu, 16% Nsukka). Onitsha had the highest very overweight pregnant women (> 30BMI, 12%).

Table 17a ANTHROPOMETRIC ASSESSMENT OF PREGNANT WOMEN

	Enugu		Onitsha		Nsukka	
*Type of assessment	No	%	No	%	No	%
Body mass index (BMI)						
< 18.4 (CED)						
18.5 - 20 (low)	32	16.0	11	5.5	32	16
21 - 25 (normal)	113	56.5	118	59	120	60.0
26 - 30 (overweight)	40	20.0	47	23.5	39	19.5
> 30 (obese)	15	7.5	24	12	9	4.5
Total	200	100	200	100	200	100

* Ferro Luzzi et. al., 1992.

Table 17b BODY MASS INDEX (BMI) BY TRIMESTER

BMI	First trimester						Second trimester						Third trimester					
Categories	Enugu		Onitsha		Nsukka		Enugu		Onitsha		Nsukka		Enugu		Onitsha		Nsukka	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
< 16.4 (CED)																		
18.5 - 20 (low)	2	7.7	-	-	-	-	12	12.2	4	8.5	7	16.3	18	24	7	4.6	25	16
21 - 25 (normal)	17	65.4	-	-	-	-	64	64.6	25	53.2	25	58.1	32	42.7	93	60.8	95	60.5
26 - 30 (overweight)	6	23.1	-	-	-	-	14	14.1	5	10.1	8	18.6	20	26.7	42	27.5	31	19.2
>30 (obese II)	1	3.8	-	-	-	-	9	9.1	13	27.7	3	7	5	6.7	11	7.2	6	3.8
Sub-total	26	100	-	-	-	-	99	100	47	100	43	100	75	100	153	100	157	100

4.5. IRON STATUS OF PREGNANT WOMEN

4.5.1. Haemoglobin (Hb) and packed cell volume (PCV) of pregnant women.

Fig 3 shows the iron status of pregnant women. Nine percent (9%) of pregnant women had very low Hb 5-6 g/dl / PCV 17-24 % (RI) Most of the pregnant women (76.5%) fell between Hb 7.0-8.9 g/dl/PCV 25-30% (R2) and are anaemic having a midpoint Hb value of 7.9 g/dl. Eighty six percent (86%) of the women had the corresponding PCV value 27.29%. Few pregnant women fell between 9-10.9 g/dl / PCV 31-37% (R3), which is a higher blood value but still anaemic for pregnant women. Fourteen percent (14.5%) of the pregnant women fell under R3 Hb value while 8.5% fell under R3 PCV value (Appendix 7).

4.5.2. Haemoglobin (Hb) and packed cell volume (PCV) of control women

Most control (60%) were in the range of Hb 9-10.9 g/dl / PCV 31-37% (R3) as shown in Fig 4. Others, 30% of the control women had Hb value 11-12.9 g/dl / PCV 38.67-44% (R4) which contains the cut off point value for non-pregnant females.

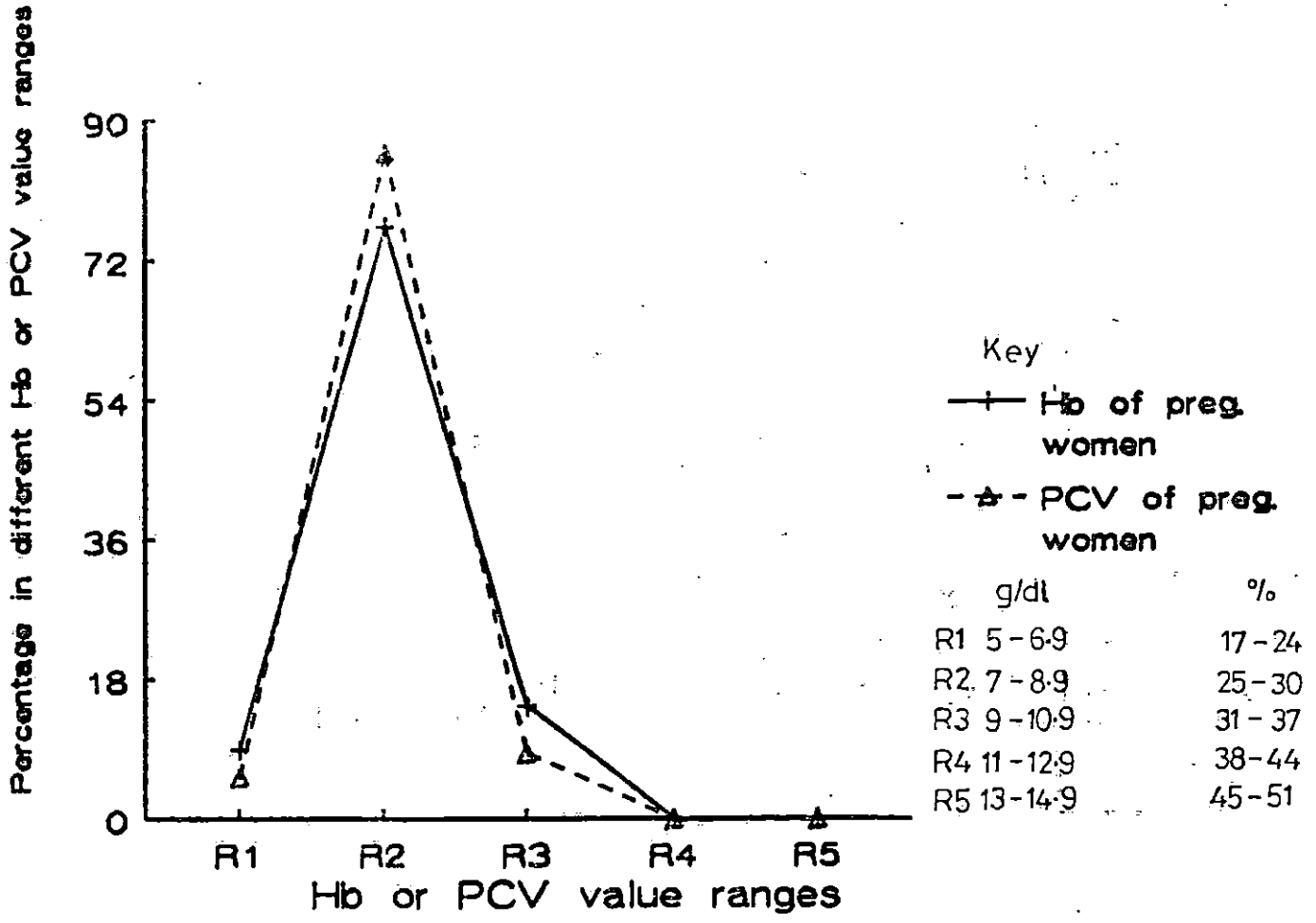


Fig. 3: The ranges (R) of the haemoglobin (Hb) and corresponding PCV values of pregnant women

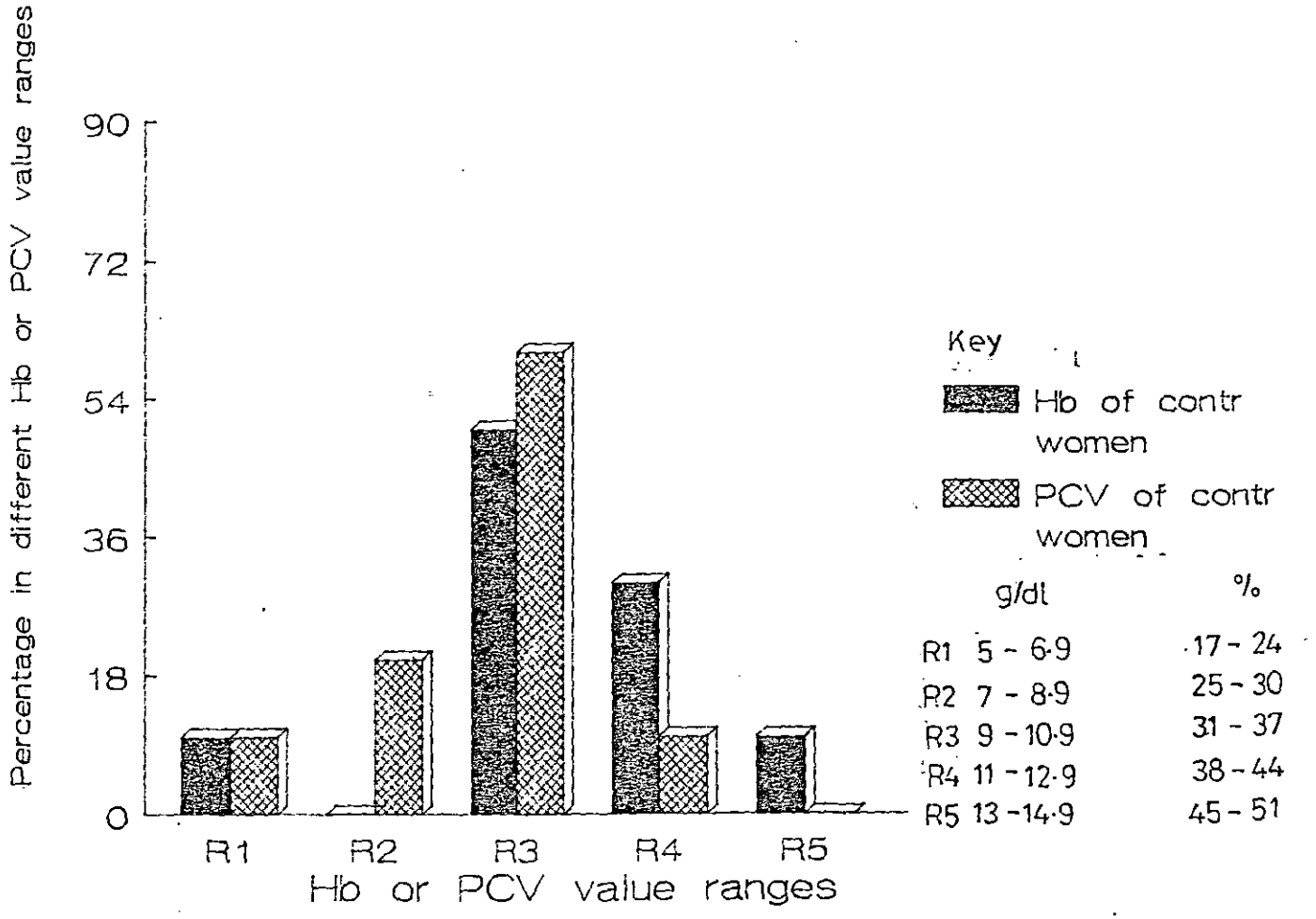


Fig. 4 : Non-pregnant women in different ranges (R) of haemoglobin (Hb) and corresponding PCV values.

A few control women (10%) fell under Hb 13-14.9 g/dl / PCV 45-51% (R5) which is a much higher value. However, no control woman fell under that group for PCV value.

4.5.3. Differences in Haemoglobin (Hb) values of pregnant women with that of control women.

None of the pregnant women in this study reached the cut off point for anaemia (11 g/dl). Most (76.5%) pregnant women were between Hb range of 7-8.9 g/dl. On the contrary, 30% of control women were within their own cut off range (13-14.9 g/dl). This is shown in Fig. 5.

Table 18 showed that 35% of the pregnant women had malaria parasite while 65% had no malaria parasite. Ninety percent (%) of the control women had no malaria parasite.

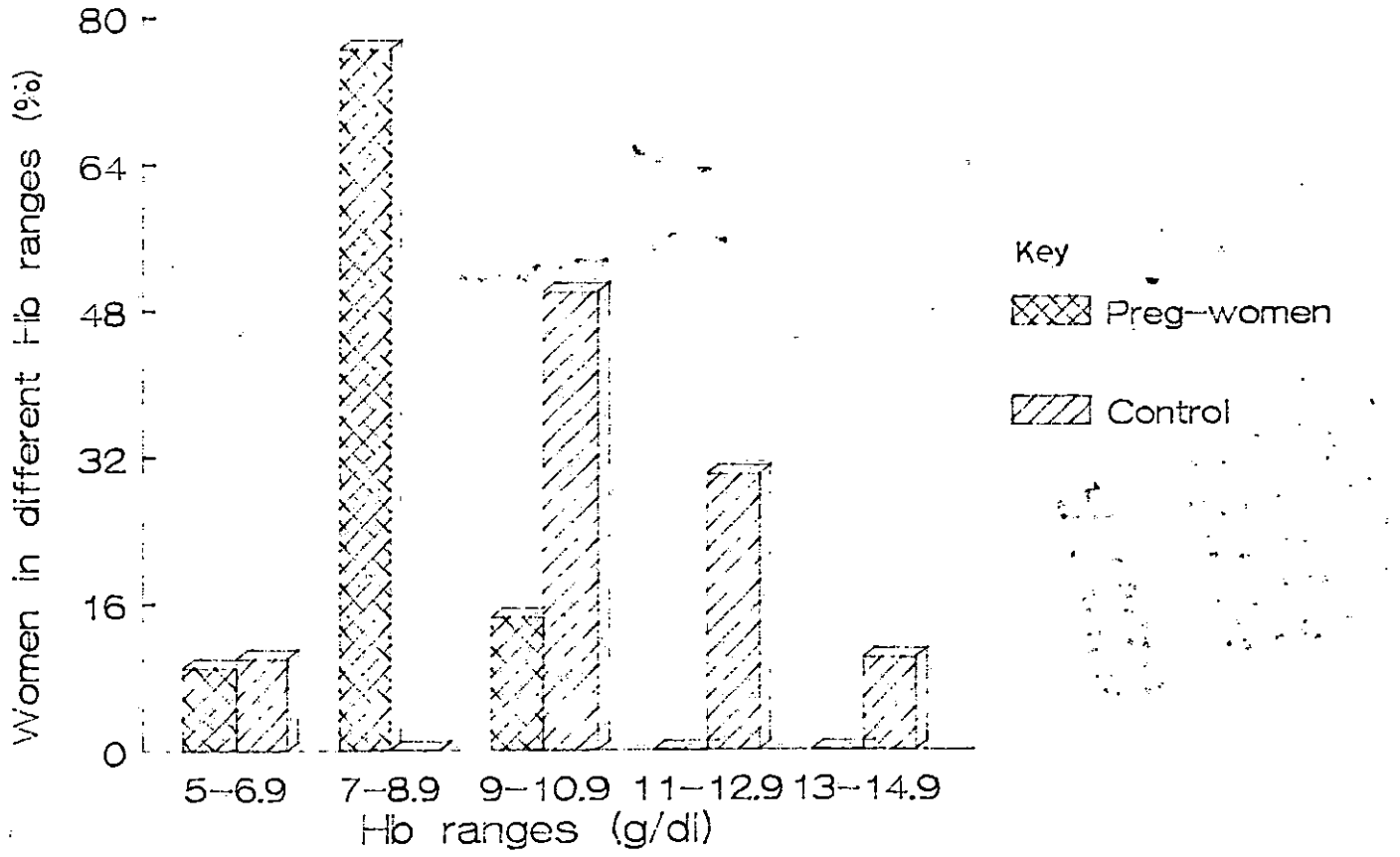


Fig 5: Pregnant women and control in different Hb ranges

Table 18. Incidence of malaria parasite

	Pregnant women		Control women	
Malaria parasite	No	%	No	%
+ ve	70	35	1	10
-ve	130	65	9	90
Total	200	100	10	100

4.5.4. Haemoglobin values of pregnant women in the different trimesters of pregnancy

The Hb value of pregnant women in different trimesters is shown in Fig. 6. Few of the women studied in their first trimester were not found with the very low Hb of between 5 and 6.9 g/dl. The highest Hb value was found more among pregnant women in their first trimester (18.2%) than the other 2 groups. Second trimester had 14.1% pregnant women and 13.3% was found for third trimester.

4.6. FACTORS THAT MAY INFLUENCE IRON STATUS OF PREGNANT WOMEN

4.6.1. Food intake

Table 19 shows food intake of pregnant women. They ate cereals moderately (4-5 times per week) (49.5%). While legumes were eaten frequently (2-3 times per week) (37%). Meat, in the opinion of the respondents, is moderately eaten 4-5 times per week (49.5%). Fish was frequently eaten (2-3 times per week) (50.5%). Vegetables and fruits were also consumed frequently (2-3 times per week) (48.5%) and daily (47.5%).

Majority of the pregnant women also stated that they rarely take tea (37.5%) in their diet. Control women also stated identical intakes (Table 20).

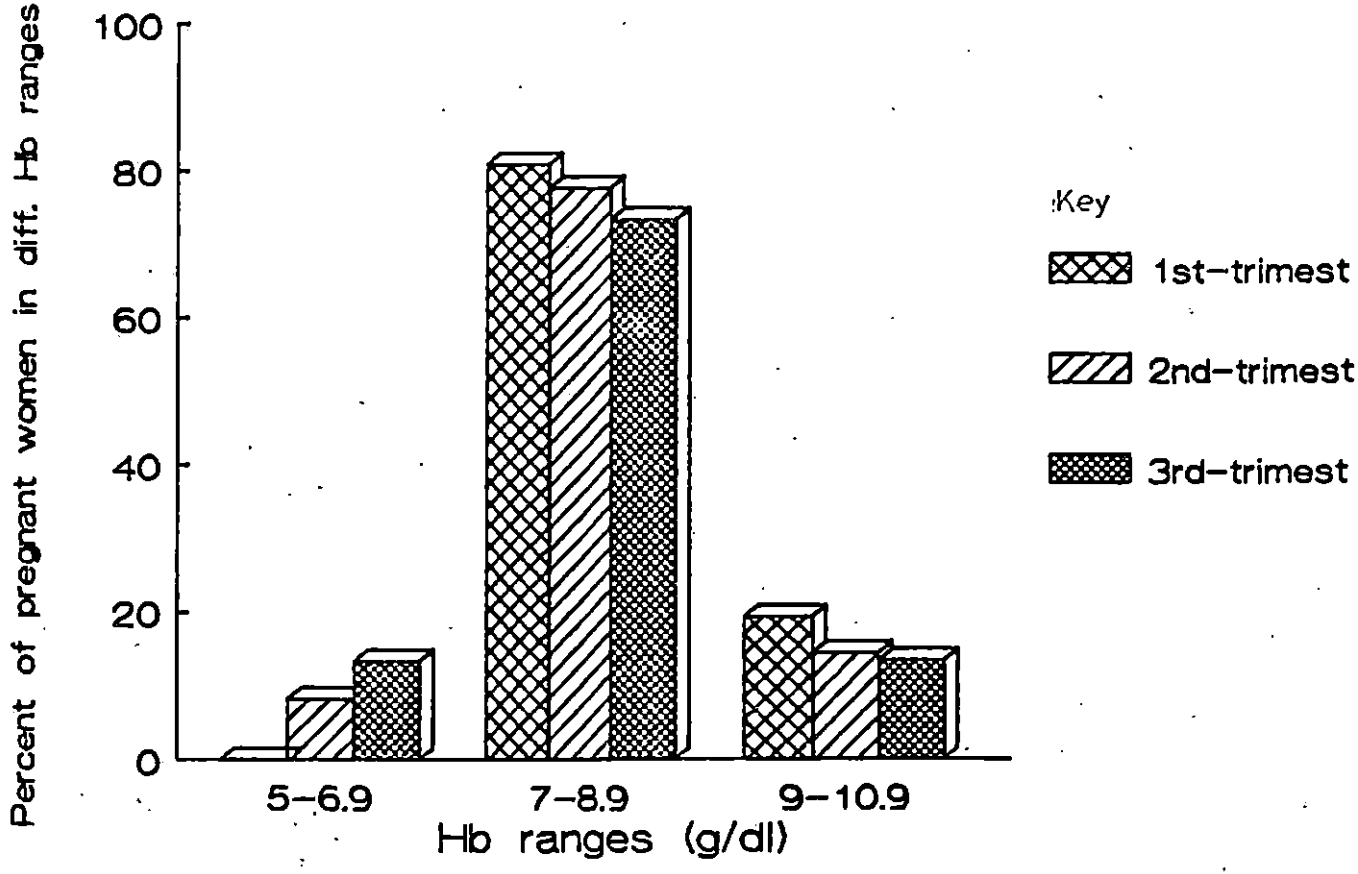


Fig 6: Pregnant women within different ranges of Hb at three pregnancy stages (%)

able 19. DIETARY INTAKE OF PREGNANT WOMEN

equency	No of responses towards different food intake													
	Cereals		Legumes		Meat		Fish		Vegetable		Fruits		Tea	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
ry frequently (Daily)	6	3	22	11	22	11	101	50.5	70	35	95	47.5	-	-
requently (2-3 times/wk)	69	34.5	74	37	42	21	55	27.5	97	48.5	38	19	21	10.5
oderately (4-5 times/wk)	99	49.5	73	36.5	99	49	23	11.5	26	13	47	23.5	23	11.5
ccasionally (Once/wk)	29	13	18	9	29	14.5	16	8	7	3.5	15	7.5	39	19.5
arely (Once/month)	-	-	13	6.5	7	3.5	4	2	-	-	5	2.5	75	37.5
ever	-	-	-	-	1	0.5	1	0.5	-	-	-	-	42	21.5

Table 20. DIETARY INTAKE OF NON PREGNANT WOMEN (CONTROL)

Frequency (%)	Cereals	Legumes	Meat	Fish	Vegetables	Fruits
Very frequently (Daily)	110	30	10	20	10	-	-
Frequently (2-3 times/wk)	50	50	30	80	50	-	-
Moderately (4-5 times/wk)	30	20	50	-	40	30	10
Occasionally (Once/wk)	10	-	10	-	-	70	20
Rarely (Once/month)	-	-	-	-	-	-	70
Never	-	-	-	-	-	-	-

6.2. Malaria parasite

Most pregnant women tested negative for malaria parasite ;5%). Only 35%tested positive for malaria parasite.

.7. Health status of pregnant women

.7.1. Incidence of clinical features among pregnant women

Few pregnant women 2.5%, 1% and 0.5% in Nsukka, Enugu and nitsha had oedema, respectively.

CHAPTER FIVE

DISCUSSION

5.1. BACKGROUND INFORMATION OF PREGNANT WOMEN;

The high degree of literacy in Nsukka and Enugu is understandable. This is because the presence of the University creates awareness for educational benefits. Enugu also houses many universities as well as other higher institutions. It is also the citadel of civil servants in Enugu State. Low degree of risk due to teenage pregnancy and late pregnancy may be encountered in the study populations. This can be attributed to education which was high in all the study locations. The Federal Office of Statistics (1981) stated that the higher the education the higher the expected income. If we agree with this statement then the level of education and occupation of the study populations shows that they do not belong to the elite of the towns.

The higher percentage of pregnant women against their husbands who are engaged in farming agrees with other studies (Mc Guire and Popkin, 1990; Women and Health, 1986), who observed that agricultural activities were performed more by women than men. The existence of farmers in Onitsha population during the questionnaire distribution can be attributed to the fact that women from the

surrounding towns visit Onitsha urban for antenatal check-up.

Birth interval was however, close among pregnant women. The reason given was to give birth at a fast rate so as to stop pregnancy early. This practice depletes maternal nutritional status. Evidence shows that it depletes maternal energy reserves (Shah, 1981) and iron reserves (WHO, 1968).

Majority of the household run monogamous family system and maintain small household members instead of the traditional polygamous family and extended family system. This can be attributed to christianity, education and urbanization which is widespread among the study population. It can also be attributed to the awareness created by family planning programmes going on in the country, which was instigated by economic crisis going on in the country.

5.2 TIME ALLOCATION AND ACTIVITY PATTERN OF PREGNANT WOMEN IN SUB URBAN AND URBAN POPULATIONS

5.2.1. Twenty-four hour activity-time pattern of the pregnant women.

This study shows that there is not much difference between the activity pattern of pregnant women living in Onitsha (city) and Nsukka (sub-urban town). The higher amounts of time given to sleep

in this study agree with the findings of Durnin (1991) who studying pregnant women living in developed country found sleeping to take up the highest time in their activity pattern. Durnin (1991) found sleeping to take between 9 and 10 hours among the pregnant women.

Time given to housework was, however, higher in the study group than was found among pregnant women in industrialized countries recorded in the study by Durnin (1991). Time spent on activities such as occupation, food preparation, shopping and child care recorded in this study were similar to those recorded by other studies (Mc Guire and Popkin, 1990; Rubin, 1990 and Nzekwe, 1992) who observed women in the non-pregnant state. It appears that women do not alter the time given to the daily performance of these duties even in pregnancy. This study showed that women use off main occupation time for other economic activities. Okeke (1988) also recorded similar findings.

5.2.2. Time of the day allocated to sleep and participation of pregnant women for different household duties

The results obtained from questionnaire and that of 24-hour activity are similar, as regards the large amounts of time allocated to sleep by the pregnant women. On the participation of women in household duties, Mc Guire and Popkin (1980) and Rubin,

1990) studying pregnant and non-pregnant women alike found that when women's activities were disintegrated, the largest and most invariant category relates to food preparation. They found women spending at least two hours a day on food preparation for themselves and their families. These findings also apply to this study population. Pregnant women were also responsible for purchasing food as well. They decide what kinds of food to buy at what amounts and of what quality.

This study does not agree with Women and Health (1986), who found pregnant women active participants in fetching water and firewood. This can be attributed to the culture which attributes these chores as those left for children and wards. However, in their absence women do participate and this is also reflected in Fig. 2.

5.2.3 Frequency of participation in social activities by pregnant women

The lower participation of Onitsha women in social activities can be attributed to urbanization and lower level of extended family system. It was also found that household activities lowered time spent visiting. Time spent on social activities was less than that for other activities. Other studies (Mc Guire and Popkin, 1990, Nzekwe, 1992) also recorded similar low values.

5.2.4. Activity pattern of pregnant women in different pregnancy trimesters.

The lower time given to house hold activities and the higher time given to non-work activities in the third trimester agree with the observations by Lawrence et al (1987) who found that in the Gambia, it is not accepted that women should rest more during pregnancy. But they, never-the-less, became less active to achieve a substantial saving in total energy expenditure. Durnin (1987) also found Gambian women in their third trimester to spend more time on personal activities such as resting and leisure and less time on social activities, working in the field and travel. Heini et al (1991), too studying Gambian women, found the value of energy expenditure per kilogramme body weight to be lower during pregnancy, in particular during the third trimester. This reduction as pregnancy advances was hypothesized to be due to a decrease in spontaneous physical activity in free-living conditions.

5.3. SOCIO-ECONOMIC FACTORS THAT AFFECT ACTIVITY PATTERN OF PREGNANT WOMEN.

5.3.1. Occupation and total economic time occupations

In line with other studies (Nzekwe, 1992), housewives spent the least time on economic activities. The high time observed among

hospital workers may be due to the fact that they use off office time for their private practice. Civil servants studied here include cleaners, clerks and messengers. They also use off office hours for other economic activities such as petty trading or food hawking. The lower economic time found among traders in contrast to the findings of Nzekwe (1992) can be attributed to the fact that since these women own their own businesses they unnoticeably modify their activities to suit their physiological needs.

No statistical difference due to occupation was found between the women for activities such as child care and social activities. Although time spent by housewives was higher than that of other occupational groups. Results also show that housewives may have rested more during pregnancy than any other occupational group since increase in economic time decreased time on non-work activities. This finding is also similar to that of Jimenze and Newton (1979). They found the most common single pattern of work activity during pregnancy was that of continuing full duties until onset of labour.

5.3.2. Other identified factors.

Household activities reduced time given to rest and leisure of pregnant women. This has been observed elsewhere (Women and Health, 1986). Although more work seems to be done during weekends,

sleeping and leisure activities were not affected. Pregnant women slept longer and had longer leisure during weekends.

Walking may affect the energy expenditure of the pregnant women since they walked regularly. Walking was more prevalent in Nsukka than in Onitsha. This may be attributed to urbanization and the more availability of motorists in Onitsha. Durnin (1987) found that although women save some energy through efficiency and reduction of pace in walking, there is no saving in total energy expenditure because of the heavier body weight. Energy expenditure therefore goes as expected.

More number of family members didn't affect pregnant women's rest as expected. It instead made allowance for more time to be spent on social activities. It also decreased time allocated to bathing and dressing by pregnant women. Child care increased time allocation to household activities by pregnant women. It also decreased time allocated to non-work activities by pregnant women. The lack of child care however, gave room for social activities as seen in the data for pregnant women on their first pregnancy.

The absence of househelp is another factor that may affect rest and sleep of pregnant women. Nzekwe (1992) and McGuire and Popkin (1990), studying pregnant and non-pregnant women alike, found similar results. More time was spent on housework which includes food preparation in the absence of househelp. As a result

time spent on sleeping/rest, leisure and even bathing and dressing time was lowered. Pregnant women who live without househelp also had no time for social activities. Fortunately however, most pregnant women live with househelps (75%). (This is shown in Appendix 5).

5.4 ANTHROPOMETRIC ASSESSMENT OF PREGNANT WOMEN

This study observed that most pregnant women enroll for antenatal check-up from their second trimester of pregnancy. This observation seems common in most developing countries (Lawrence et al, 1987; Cole et al, 1989; Allen et al, 1994; Stewart and Whiteford, 1987). This practice may affect pregnancy outcome through delayed medical management of pregnancy. Very few women however, enrolled for antenatal check-up early in Enugu. This could be attributed to increased medical awareness of the population produced by the presence of university teaching hospital.

The absence of chronic energy deficiency in this study agrees with that of Allen et al (1994) which recorded no pregnant women in the Egyptian or American samples of their study to have a BMI of lower than 18 and only two Kenyan women in the same study to have a low BMI of lower than 18 in spite of the drought which occurred in Kenya during the survey period. Heini et al (1991), also in their study of Gambian women alone found none to be deficient as the population had an average body mass of >20.0. This study

bserved with other studies (Adair, et al, 1983; Adair, 1984; urnin, 1987, Lawrence et al (1987) that undeveloped populations eem to be well adapted to marginal nutrient intakes so that ndividuals are able to maintain energy balance in the long term luring pregnancy. A pregnant woman can therefore maintain energy alance on surprisingly low energy intakes.

Prentice (1984), using infant outcomes admitted however, that it was not always compatible with an optimum quality of life of the infant. The possibilities of having low birth weight infants in this study population is therefore not ruled out. Evidence shows that low birth weight infants were born to women who had a BMI of >21, while very overweight women (BMI >29) produced the highest birth weight infants (Allen et al, 1994). Lower BMI measurements were recorded in the first and third trimesters as compared with the second trimester. Adair et al (1983) also found pregnant women in her study to reach their maximum weight measurements in the second trimester.

A progression in body weight measurements between the towns was observed. This was not surprising. Other studies (FAO/WHO, 1992) recorded higher degree of food intake in cities of developing countries. Lower degree of physical activities in the same area has also been observed (Uyanga, 1980; Popkin, 1980). Pregnant women in Onitsha showed better anthropometric measurements than Enugu and

Nsukka. Nnanyelugo and Ngwu (1985) showed zonal differences in the five geographical divisions of the former Anambra State. These differences were found to conform with the agricultural activities in each region and food consumption patterns. Addo et al (1988) also observed protein intake to be high among coastal swamp populations because of their consumption of sea foods. A lower degree of malnutrition was observed among children from the coastal swamp in the rain forest areas (Nnanyelugo et al, 1985).

Pregnant women in Onitsha therefore, have the advantage of living on the bank of river Niger. They gain better nutrition from the availability of crops and fish. It is also part of the culture for women to look plump. This study also found (though not statistically different) slight increases in the level of activities in Nsukka population than in the Onitsha population. This can be attributed to the socio-cultural influences and lack of amenities which exists in sub urban towns.

5.5. IRON STATUS OF PREGNANT WOMEN:

Results from this iron status study show that there is good correlation between Hb and PCV values of pregnant and control sample. Incidence of anaemia was more among pregnant women than control women. This also reflects in the lower Hb found in pregnant women in their second and third trimesters than those in their

first trimester. A very low Hb was observed in both pregnant and control groups. This can also be attributed to malaria parasite which was observed within the population groups.

This finding is in accordance with other studies of pregnant women in the developing world (Demayer, 1981) and in Nigeria (Okafor et al, 1985, Oluboyede et al, 1980). Recently also Ngwu (1992) studying nutritional status of cassava producers and consumers in Edo State. All recorded low Hb values among the population.

5.6. FACTORS THAT MAY INFLUENCE IRON STATUS OF PREGNANT WOMEN;

Food intake as well as malaria parasite may have contributed to anaemia in pregnant women. Those with low Hb level were also positive to malaria test.

One can infer that although fish and meat were taken by the respondents, the quantity taken may have been small as is found in other studies in Nigeria (Ngwu, 1992; Nnanyelugo et al, 1992).

Fruits and vegetables were also taken by respondents but the vitamin C content might have been lost through handling, processing or cooking methods (Baker and De Maeyer, 1977). Ngwu (1992) found inadequate supplies of vitamin C in the diets of her study population in Nigeria.

It can be suggested that economic and cultural background surrounding the food of respondents may have contributed more to anaemia than parasitic infection (malaria).

CHAPTER SIX

SUMMARY AND CONCLUSION

6.1. Summary

The activity pattern, anthropometric measurements and iron status of pregnant women living in Nsukka, Enugu and Onitsha urban areas were investigated. Six hundred mothers were used for the study. Questionnaire, 24-hour activity pattern, Body mass index and biochemical analysis were used for collection of data.

The major findings of this study were:

1. Not much differences in activity pattern was found between pregnant women living in Onitsha and Nsukka.
2. Pregnant women slept and had leisure more than in non-pregnant state of other studies (Nzekwe, 1992). However, no changes in the time allocation between pregnant women in this study and those of Nzekwe (1992), were found for activities such as occupation, food preparation, shopping, child care and social activities.
3. Food preparation and shopping were the household activities which pregnant women performed regularly even in pregnancy.
4. Time allocation to social activity by pregnant women was the smallest in their time schedule. Although they attended

social meetings regularly, social activity did not reduce time allocation to rest and leisure.

5. In the third trimester of pregnancy, women spent more time in eating, sleeping/resting and having leisure. Frequent sitting was also observed.
6. Occupational activities decreased rest and leisure of pregnant women. Housewives seemed to have rested more than any other occupational group. Time allocated by the trader or self-employed was not higher than that of other occupational groups in pregnancy. Post patum rest (maternity leave) was uncommon among the study population.
7. Household activities and weekdays reduced rest and leisure of pregnant women. Walking may also affect energy expenditure of pregnant women since they walked often especially in Nsukka town.
8. Large number of family members did not affect rest of pregnant women but it lowered bathing and dressing time among pregnant women.
9. Child care affected time given to non-work activities through the increase in time given to household activities. The absence of child care gave room to social activities.
10. The absence of house help decreased time allocation to rest and leisure of pregnant women.

11. Anthropometric assessment showed that none of the pregnant women were chronically energy deficient. However, low weight babies might still be expected.
12. Pregnant women in Onitsha had higher BMI measurements than those living in Enugu and Nsukka.
13. Pregnant women in their second trimester had higher BMI than those in their first or third trimester.
14. All pregnant women were anaemic. Majority of control women were also anaemic.
15. Malaria parasite may have contributed to anaemia among the pregnant women.

6.1.2. Conclusion

Few women from the total population could be said to be malnourished and none was classified as having Chronic Energy Deficiency.

Energy storage on a constant low intake must be balanced by decreased expenditure. According to Durnin (1987), this decrease can occur in four ways:

1. Decrease in basal metabolic rate (BMR)

   In Nigeria, Cole et al (1989), studying the BMR of pregnant women found a decrease comparable to those of other African countries (Lawrence, 1987).

2. Decrease in diet-induced thermogenesis (DIT).

The contribution of this source is negligible (Durnin, 1987).

3. Reduction in energy cost of physical activities due to efficiency.

   This source again is canceled out because of the increase in body weight (Durnin, 1987).

4. Changes in behaviour and activity pattern leading to an overall decrease in physical activity.

   This has been described as a major determinant of any changes in energy expenditure (Durnin, 1987).

This study observed that time allocated to physical activities by pregnant women was reduced. These changes were found to be greater among pregnant women in their third trimester, which is when energy expenditure is greater due to factors which include increase in body weight and BMR (Adair et al, 1983). The higher body weight of pregnant women in Onitsha shows also the contribution of food intake in pregnancy. Socio-economic factors identified which help to intensify activity pattern in pregnancy include occupation, working days, absence of househelp, walking, household activities and child care.

High incidence of anaemia (which was not largely due to malaria parasite) was found among the study population. However, clinical features such as oedema and goitre were not widespread

among the study population.

6.1.3. Contribution of research to knowledge.

1. This study provided most importantly that even in economic crisis (as is presently the case in Nigeria), majority of the pregnant women studied put on the weight necessary for pregnancy (with reference to their BMI).
2. In the pregnant women's opinion, they do not become less active in pregnancy. However, this study has revealed a decrease in time allocated to physical activities especially in the third trimester.
3. This study also demonstrated iron deficiency anaemia (Hb < 11 g/dl) to be prevalent among pregnant women in the eastern part of Nigeria.
4. Oedema and goitre were shown in this study to be low among the study population from clinical signs observations.

6.1.4. Recommendations

On the basis of the findings of this study, recommendations are now made with the aim of providing possible means of improving the health standard of pregnant women.

1. Policies and programmes that enhance women's educational and economic opportunities should be formed and implemented. These will help mothers to purchase nutritionally adequate food items for better nutrition of themselves and their

unborn children.

2. Meat which contains heme-iron and is a non-heme-iron absorption enhancer is of primary importance. High market prices of food items are barriers to the consumption of necessary food items. Government or their agencies should device means of reducing prices of food items. This will help necessary but expensive food items to be at the reach of poor pregnant women.
3. Nutrition education programmes in health care centres and hospitals should be intensified, especially in the area of importance of iron in nutrition and its absorption mechanisms. This will help pregnant women understand and take necessary steps (such as preserving vitamin C content of foods) to better their iron status.
4. Screening for malaria parasite should be performed on pregnant women routinely in health centres and hospitals. Distribution of antimalarial prophylaxis as suggested by Fleming (1987) should be implemented in order to further reduce the risk of anaemia in pregnancy.
5. Pregnant women should also be encouraged to enroll early for antenatal check-up. This will enhance proper management of the pregnancy.

6. Together with Durnin (1987), the study recommends that changes in behaviour and in the pattern of physical activity during pregnancy should not be regarded as socially undesirable.

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APPENDIX Ia

ACTIVITY PATTERN AND TIME ALLOCATION STUDY
QUESTIONNAIRE ONE

INSTRUCTION: Kindly provide answers to the following questions. All information supplied will be treated confidentially and is strictly for research purpose only.

SECTION I ANTHROPOMETRIC DATA

1. Case number /_____/ Date _____
2. Location: Onitsha /_____/ Nsukka /_____/
3. Height _____ Weight_____

SECTION 2 DEMOGRAPHIC DATA

4. Age _____ Religion _____ Family type _____ (Monogamous/polygamous)
5. Age of pregnancy _____
6. How many children do you have _____
7. State age of last child _____

8. What is your level of education?

Education	None	Primary	Secondary/ Commercial	Tertiary
Husband				
Respondent				

9. Tick (\/) under your occupation and that of your husband.

Occupation	Civil servant	Company job	Trading	Farming & trading	Farming only	Any other
Husband						
Occupation	Civil servant	Company job	Trading	Farming & trading	Farming only	Any other
Respondent						

SECTION 3 ACTIVITY PATTERN

10. Who carries out the following household chores?

Chores	Not carried out	Respondents only	Respondents & others	Others only
Cooking				
Shopping				
Fetching water /fire wood				
Laundering				
House cleaning				
Maintain kitchen				
Garden				

11. What hours of the day do you spend indoors?
    4 am - 8 am /____/ 8 am - 11 am /____/
    11 am - 3 pm /____/ 3 pm - 7 pm /____/
    7 pm - 11 pm /____/ 11 pm - 4 am /____/
12. At what time in the morning do you wake up? _____
13. Do you take siesta? Yes /____/ No /____/
14. At what time do you go to sleep?
    Between 8 and 9 pm /____/
    Between 9 and 10 pm /____/
    After 10 pm /____/
    Any other, state _____
15 Do you go for visits/meetings/church activities frequently /____/ occasionally /____/ or rarely /____/?
16. How often do you work?

Destination	Frequently	Occasionally	Rarely	Never
Work place				
Market				
Social activities				

17. Would you take postpartum leave from your occupation?
    Yes /____/ No /____/

SECTION 4 CLINICAL SIGNS

Oedema _____ Skin rash _____ Goitre _____

IRON STATUS STUDY

QUESTIONNAIRE TWO

INSTRUCTION: Please fill the answer to these questions correctly. all answers will be treated confidentially and is strictly for research purpose only.

SECTION I: DEMOGRAPHIC DATA

Name .....

1. Age /____/ Height /____/
   Weight /____/
2. Age of pregnancy /____/
3. How many children do you have? _____
4. State age of last child? _____
5. What is your level of education?

Education	None	Primary	Secondary/commercial	tertiary
Husband				
Respondent				

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6. Tick (\/) under your occupation and that of your husband.

	Occupation					
	Civil servant	Company job	Trading	Farming & trading	Farming only	Any other state
Husband						
Respondent						

SECTION 2: DIETARY PATTERN

7. Frequency of consumption table

	Daily (very frequently)	Alternate days (frequently)	1-2 times/week (moderately)	Occasionally/seasonally	Rarely	Never
Low bioavailability						
Cereals						
Legumes						
High bioavailability						
Meat						
Fish						
Enhancers						
Fruits						
Vegetables						
Inhibitors						
Tea						

SECTION 3 : CLINICAL SIGNS

Oedema _____ Skin rash _____ Goitre _____

Appendix Ib

24-hours activity Pattern Date /_____/

Case No. /_____/ Occupation /_____/ Town /_____/

Pregnancy stage /_____/

Pregnancy status: First Pregnancy /___/ Subsequent pregnancy /___/

Last child < 2 yrs /___/ Last child < 2 yrs. /_____/

Lives with househelp /_____/ Lives without househelp /_____/

Table of Activities

Activities	Time (hrs.)

Appendix 2

Time (hrs.) spent on main occupation in Onitsha and Nsukka

Town	Count	Mean time	Std. Error	F-Ratio	Probability
Onitsha	16	7.38	_+ 0.46	0.35	0.56
Nsukka	16	7.04	_+ 0.35		
Total	32	7.21	_+ 0.2843		

Appendix 3.

Effect of pregnancy interval on time (hrs.) spent on child care by pregnant women

Group	Count	Mean time	Std. Error
Mothers with children under 2yrs	14	1.78	_+ 0.18
Mothers with children above 2yrs	10	1.40	_+ 0.32
Total	24	1.59	_+ 1.46

Appendix 4.

Correlations (r) among various aspects of the daily activities

Variables	Variable					
	Visiting/ strolling/ ceremony attendance	Religious activity	Main occup-ation	Merged occup-ation	House-hold	Non-work activity
Social activity	0.76**	0.40	0.25	0.15	0.38	0.37
Visiting/ strolling/ ceremony attendance	1.00	-0.12	0.16	0.18	-0.44*	0.41
Religious activity	-0.12	1.00	0.30	0.25	-0.12	-0.05

* = significant at 0.05

** = significant at 0.01

Appendix 5.

Number of households living with househelp.

	Number	%
Households living with househelp	18	75
Households living without househelp	6	25
Total	24	100

Appendix 6.

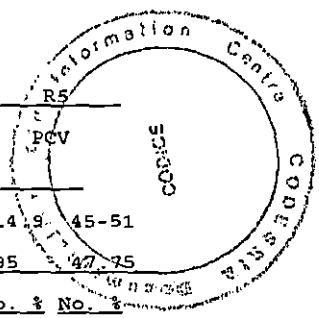
Degree of participation in household chores by pregnant women

Duty (chores)		Not carried out	Pregnant women only		Pregnant and others		Only other members of household	
		Onitsha	Nsukka	Onitsha	Nsukka	Onitsha	Nsukka	
Cooking	No.		175	167	12	22	9	11
	%		89.5	83.5	6.0	11	9.5	5.5
Mean % (Onitsha & Nsukka)			86.5		8.5		7.5	
Shopping	No.		155	152	12	15	33	33
	%		77.5	76.0	6.0	7.5	16.5	16.5
Mean % (Onitsh & Nsukka)			76.75		6.75		16.50	
Fetching water	No.		42	54	19	16	139	130
	%		21.0	27.0	9.5	8.0	69.5	65.0
Mean % (Onitsh & Nsukka)			24.0		8.75		67.75	
Laundry	No.		108	94	28	30	64	76
	%		54	47	14	15	32	38
Mean % (Onitsha & Nsukka			50.5		14.5		35.0	
House cleaning	No.		87	87	16	26	97	87
	%		43.5	43.5	8.0	13.0	48.5	43.5
Mean % (Onitsha & Nsukka)			43.5		10.5		46.0	
Keeping home garden	No.	115	23	85	7	30	59	85
	%	55.5	11.5	42.5	3.5	15.0	29.5	42.5
Mean % (Onitsha & Nsukka)			27.0		9.25		36.0	

Appendix 7.

Haemoglobin values (g/dl) with it's Packed Cell Volume. (%).

Results from venipuncture blood measurements



	R1		R2		R3		R4		R5	
	HB	PCV	HB	PCV	HB	PCV	HB	PVC	HB	PCV
	5-6.9	17-24	7-8.9	25-30	9-10.9	31-37	11-12.9	38-44	13-14.9	45-51
Mid-point	5.95	20.38	7.95	27.22	9.95	34.07	11.95	40.93	13.95	47.75
	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %
Pregnant	18 9	11 5.5	153 76.5	172 86	29 14.5	17 8.5	0 0	0 0	0 0	0 0
Control	1 10	1 10	0 0	2 20	5 50	6 60	3 30	1 10	1 10	0 0

Appendix 8.

Haemoglobin values according to trimester

	5.0 - 6.9		7.0 - 8.9		9.0 - 10.0		Total	
Trimester	No.	%	No.	%	No.	%	No.	%
First	0	0	21	80.8	5	19.2	21	100
Second	8	8.1	76	76.8	15	15.1	99	100
Third	10	13.3	56	73.3	10	13.3	75	100
Total							200	100