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Effect of Birth Interval and Family Size On The Child Nutritional Status

Thesis Submitted For Fulfillment
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To My Family

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List of Abbreviations

WHO : World Health Organization.

FAO : Food and Agricultural Organization.

PEM : Protein - Energy Malnutrition.

DES : Dietary Energy Malnutrition.

FBS : Food Balance Sheets.

LAM : Lactational Amenorrhea.

U5MR : Under five child mortality rates.

UNICEF : United Nation Children Fund.

LBW : Low birth weight.

NBW : Normal birth weight.

IDD : Iodine deficiency disorders.

CAMPAS : Central Agency for Public Mobilization and Statistics.

Wt / age : Weight for age.

Ht / age : Height for age.

Wt / Ht : Weight for height.

IMR : Infant mortality rate.

EDHS : Egypt Demographic and Health Survey.

DNA : Deoxyribonucleic acid.

RNA : Ribonucleic acid.

NRC : National Research Center.

UNFPA : United Nation Fund for Population Activities.

ICPD : International Conference on Population and Development.

CRSP : Collaborative Research Support Program.
Final Report on Food Intake and Function.

List of Abbreviations (cont.)

IUD : Intrauterine Device.

UNU : United Nation University.

ACC / SCN : Administrative Commitee
on Coordination United Nation.

EFS : Egypt Fertility Survey.

NPC : National Population Council.

MCH : Mother - Childhood Center.

ARI : Acute Respiratory Infection.

MAC : Midarm circumference

TSF : Triceps Skinfold.

BMI : Body Mass Index.

AIDS : Aquired immunodeficiency syndrome.

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INTRODUCTION

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The spacing, timing and number of births a woman has, are crucial determinants of her own health and of her children's chances of survival. It has been recognized, at least in developing countries, that short birth intervals have a negative effect on the well being of the mother and of the baby displaced by the new pregnancy (Balldin et al., 1986). The only way nutrients can reach the developing fetus in the uterus is through the placenta to support the new life. So if the mother's stores are inadequate early in pregnancy, when the placenta is developing, then the fetus will develop poorly (Whitney et al., 1990). Therefore, the more numerous and closely spaced pregnancies in a woman's child bearing cycle, the more her nutritional reserves become depleted. Births too close together can produce what is termed the "maternal depletion syndrome" resulting from the lack of time for the mother's body to recover adequately from her last pregnancy (Winhuist et al., 1992). So infants born of malnourished mothers are more likely to be at greater risk of birth defects and to suffer retarded mental and physical development (Nafis, 1980). Lieberman et al., (1989) found that babies born during 9 - 12 months birth interval are at greater risk of low birth weight and / or perinatal mortality than babies born after a longer birth interval. Short birth interval contributes to malnutrition in young infants by putting an early end to breast feeding (UN, 1991). Studies in a number of countries have found higher death rates among children weaned early, especially those weaned because the mother was pregnant or has just given birth to another infant (Miller, 1991).

AIM OF THE WORK

The more numerous and closely spaced pregnancies, the more the mother's nutritional reserves become depleted and the greater the risk to the health of both mother and child.

So the aim of this work is to study the effect of birth interval and family size on the nutritional status of children less than 2 years in Egypt.

REVIEW

Review of Literature

* The magnitude and trends of nutrition problems.
  - on the global level.
  - in Egypt.

* Mother - Infant relationship.
  - prepregnancy.
  - pregnancy.
  - lactation.

* Assessment of the nutritional status of the infant.

* Family planning, birth control and spacing.
  - on the global level.
  - in Egypt.

* Effect of birth interval and family size on the nutritional status of the infant.

THE MAGNITIDE AND TRENDS OF NUTRITION PROBLEMS

Hunger and malnutrition remain the most devasting problems facing the majority of the world's poor. Inspite of general improvements in food supplies, health conditions and in the availability of educational and social services throughout the world, malnutrition in its various forms persists in virtually all countries. (FAO and WHO, 1992).

Adequate nutrition is essential for normal growth and development. In developing countries, malnutrition is a major cause of morbidity and , in many cases, is an underlying factor in mortality, especially among infants and young children. Malnutrition affects physical performance, learning, behaviour, and psychosocial development, all of which are reflected in the physical and intellectual retardation of present and future generations. Malnutrition is a multifaceted problem with complex underlying factors. (UNICEF, 1986).

The factors most directly influencing nutrition can be grouped under the broad categories of food, health and care (FAO and WHO, 1992).

I. Food and Nutrition

Nutritional well being is influenced by the nutrient content of foods consumed in relation to requirements.

Requirements are determined by various factors such as age, sex, body size, physical activity, growth, pregnancy and lactation, infections and the deficiency of nutrient utilization (Berg, 1981).

II. Health and Nutrition

Various infections - notably diarrheal and respiratory diseases, measles, malaria, intestinal parasites and AIDS show a major impact on the nutritional status. The interaction of infection and inadequate food consumption in chilren leads to a vicious circle, the malnutrition infection complex. Poorly nourished persons are more susceptible to many infections and their infections are often more severe and prolonged. (Scrimshaw et al., 1968).

Infections themselves deteriorate the nutritional status through impairement of appetite and food intake and increased metabolic demands and nutrient losses (Pollit, 1990).

This general interaction of nutrition and infection has been recognized and it is widely accepted that individuals become debililated as a result of malnutrition and are especially susceptible to developing infections which may become particularly extensive and serious. Conversely it has been widely accepted that certain infections have profound influence on nutritional status, mediated by changes in dietary intake, absorption, nutritional requirements (especially for energy and protein) and loss of endogenous nutrients (Tomkin and Watson, 1989).

III. Care and Nutrition

Care and sound feeding practices are an essential element of good nutrition and health. Breast feeding is among the most elementary and consequential of care giving activities (ACC/ SCN, 1992).

The next critical activity complex is the weaning process which takes place between 6 and 24 months. Infants are exposed to the greatest nutritional risks in the form of food contamination, more infrequent feeding and loss of maternal security during this time. The education level of mothers alone is positively related to better nutritional status of children and to lower infant mortality. (Mcguire and Popkin, 1990).

A wide range of household and demographic factors are related to child malnutrition, such as the nature of housing and water supply, birth order and birth interval, the mother's age, age of weaning and the presence or abscence of siblings. Frequent births can deplete a woman's nutritional stores. If the nutrient intakes of the pregnant women are limited, the fetus needs are met first. Furthermore, a large number of small children in the home can have negative effects on the children (FAO and WHO, 1992).

Scope and Dimension of Nutrition Problems on The Global Level.

Although it is impossible to measure accurately the total number of malnourished individuals, latest data indicate that about 20 percent of the developing world's population, over 780 million individuals, suffer from insufficient food intake, and over 192 million children are suffering from protein - energy malnutrition (PEM). Approximately 2000 millions, are also affected by various micronutrient deficienties. (FAO and WHO 1992).

Dietary energy supply (DES)

A widely used indicator of aggregate food and nutrition situations is dietary energy supply (DES). This in an estimate of the average daily per caput energy available for human consumption in the total food supply during a given period. DES figures are produced by FAO based on food balance sheets (FBS), which track the supply and utilization of food within countries. FBSs examine each nation's food situation and provides information about a country's average per caput dietary energy supply which indicates the amount of food available for human consumption in the country (ACC / CSN, 1987).

According to FAO estimates, average per caput food supplies in the developing countries increased in the 1980s although of a slower rate than in the 1970s. The problem is particularly serious in sub-Saharan Africa where food supplies are at critical level.

An acute food crisis prevails in much of southern and eastern Africa in 1992, coupled with on-going civil unrest in some countries further depresses food availability from an already unacceptably low level. Grouping countries above or below a selected cut - off point, in this case 2600 kcal, can be used to highlight the disparity of available food supplies among countries. By 1989 - 1990; 41 developing countries (populations of over one million) had in excess of 2600 kcal available per person while 15 countries had in excess of 3000 kcal available. For developed countries only three had less than 3000 kcal available. During the period 1988 to 1990, there were about eleven countries with per caput DES less than 2000 kcal per person. It is not possible for a population to meet its energy needs from such a limited supply (FAO, 1992).

Per caput DES by region and economic groups :

Region or Economic Group	kcal / person / day		
	1969 - 71	1979 - 81	1988 - 90
World	2430	2580	2700
Developed countries	3190	3290	3400
North America	3230	3330	3600
Europe	3240	3370	3450
Former USSR	3320	3370	3380
Developing countries	2120	2330	2470
Africa	2140	2180	2200
Asia and the Pacific	2040	2250	2450
Latin America	2500	2690	2690
Near East	2420	2810	2920
Least developed countries	2030	2060	2070

FAO, 1992

Chronic dietary energy deficiency

FAO has developed a methodology which estimates the number and proportion of the population that over a period of a year does not have access to enough food to meet their energy needs. This proportion of the population may be referred as being chronically undernourished (FAO, 1985).

For the developing regions as a whole, there has been a constant decline in the past 20 years in the proportion and the absolute number of people chronically undernourished. In 1969 - 1971 approximately 941 million people were chronically undernourished, compared to 786 million in 1988 - 1990. This represents a drop in the proportion of the population chronically undernourished from 36 to 20 percent in these countries (FAO and WHO, 1992).

However, this global improvement has not been evenly matchd in each of the developing regions. In Africa, the proportion of the population chronically undernourished has remained practically unchanged since the 1970s, but due to the region's annual population growth rate of approximately 3 percent, the number of people affected has increased dramatically, rising from 101 million people in 1969 - 1971 to 128 million in 1979 - 1981 and to 168 million in 1988 - 1990 (FAO, 1985).

The rate of improvement slowed down in both Latin America and the Caribbean and the Near East during the 1980s. In the Asia and the

Pacific region, however, there has been continued improvement in the last 20 years with the proportion of the population affected declining over that period from 40 percent to 19 percent (WHO, 1992).

Protein-Energy Malnutrition

The term protein-energy malnutrion (PEM), has been used to describe a range of disorders primarly characterized by growth failure or retardation in children. Other terms have been used as well such as failure to thrive and infant multideficiency syndromes. Extreme clinical forms of PEM are called marasmus and kwashiorkor. The immediate causes of PEM, which frequently occur together, include inadequate dietary intake and infectious diseases. Infants and young children are the most severely affected by PEM because of their high energy and protein needs relative of body weight and their particular vulnerability to infection (FAO and WHO, 1992).

Anthropometric measurements which are used to estimate body mass and growth failure, often in association with age, permit the development of certain indices reflecting individual or population characteristics. "Wasted" or thin, "stunted" or short or "obese" are terms which describe the nutritional status of individuals.

According to recent analysis, there has been a decline in the prevalence of underweight status among children. When figures of Africa, Asia, the Near East and the Americas are combined, the percentage of children classified as underweight is reduced from 47.5 percent to 40.8 percent for the period from 1975 to 1990.

In Asia, there were 155 million underweight children in 1990, representing 44 percent of children under five years of age. In Africa, there were nearly 20 milllion underweight children in 1975. This number grew more than 27 million by 1990 and is expected to increase to 36 million by the 2005. In the Americas, the number of underweight children was reduced from nearly 8 million in 1975 to 6.8 million by 1990, representing a decline from 12 percent to 9 percent (UNICEF, 1991).

Infant and child mortalities.

Infant mortality rates are strongly influenced by nutritional factors such as foetal undernutrition, stemming from maternal undernutrition or infections, toxaemia of pregnancy and maternal anaemia. There is increasing evidence that the mother's nutritional status has a pervasive influence of infant nutrition and survival.

Under five child mortality rates (U5MR) are often more available than the 12 to 23 months or one to four years mortality rates, and they are currently used as indicators by WHO and UNICEF. In countries where the prevalence of infectious and parasitic diseases is high, about half of all deaths occur before five years of age and one third of these deaths occur after the first year of life.

In the least developed countries nearly 200 out of every 1000 infants born alive, die before reaching age of five, compared with less than 20 deaths per 1000 live birth in developed countries. The U5MR for the remaining group of developing countries is about 120 per 1000 live births (WHO, 1992).

Low birth weight (LBW)

Low birth weight is a major health problem in developing countries and is associated with both neonatal and post neonatal mortality. For international comparisons, WHO defines LBW as less than 2500 grams.

LBW is associated with prematurity (a gestational age below 37 weeks) and intrauterine growth retardation below the 10^{th} percentile of the reference standard for birth weight and gestational age. WHO estimates that globally 17.4 percent of newborn babies have LBW; 6.5 percent in developed countries and 18.8 percent in developing countries. Analysis by regions reveals very high rates in South Central Asian (33.5 percent) and in Sub-Saharan Africa (15 percent) (Kramer, 1987).

Micronutrient Deficiencies :

Iodine deficiency disorders (IDD)

Iodine deficiency disorders (IDD) are currently a significant public health problem in 118 countries. An estimated 1571 million people world wide live in iodine - deficient environments and are thus at risk of IDD; 20 million of these are believed to be significantly mentally handicapped as a result. A large proportion of the severely deficient are women in their reproductive years whose babies are at high risk of irreversible mental retardation, unless they receive adequate amounts of iodine (WHO, 1994).

Vitamin A deficiency (VAD)

There are at least 190 million children living in areas where consumption of foods containing vitamin A is low, 40 million of these children are deficient in vitamin A, as shown biochemically, and 13 million have some clinical eye signs of deficiency. Every year, a quarter to half a million become blind, partially or totally from VAD. But apart of this, many more children are at risk because VAD impairs resistance to infection. They live in 37 countries, half of which are in Africa. The great majority of the children at risk of VAD live in South and Southeast Asia. VAD causes night blindness and eventual blinding xerophthalmia. It also contributes to decreased physical growth and impaired resistance to infection with consequent increased mortality in young children (FAO and WHO, 1992).

Iron Deficiency:

Iron deficiency affects over 2000 million people living in all countries. The people most affected by iron deficiency are women and children of preschool age often more than 50 percent are anaemic. The populations most affected are in Africa and South Asia (Levin II, 1986).

Anamia in infants and children is associated with retarded growth and development of cognitive disabilities and low resistance to infections. Maternal anaemia predisposes women to haemorrhage and infections prior to, during or after childbirth and as many as 20 percent of maternal deaths are principally due to iron deficiency. Maternal anaemia also leads to intrauterine growth retardation, low birth weight, and increased rates of perinatal mortality (Gillespie et al., 1991).

Other micronutrient deficiencies

Several other micronutrient deficiencies occur under special circumstances, generally because the quantity of the micronutrient is inadequate in the diet (FAO and WHO, 1992).

Vitamin B1 deficiency

It may be acute or chronic and affects adults as well as infants. This deficiency is found among people whose main food is highly polishd rice. Lack of this nutrient causes beriberi. It occurs particularly in Asia and among refugee populations and prisoners. Beriberi has both cardiac and neurological manifestetions (WHO, 1992).

Niacin or Tryptophan deficiency:

It can cause pellagra. This is classically characterized by diarrhea, dermatitis and dimentia. This deficiency occurs among people who are almost wholly dependant on maize or sorghum and still occasionally seen among populations in remote areas in Asia or Africa (FAO, 1992).

Vitamin C (Ascorbic acid) deficiency (Scurvy)

It may affect adults, children or infants. It occurs especially among persons who lack access to fresh fruits or vegetabeles. The manifestations of vitamin C deficiency include bleeding gums, internal haemorrahges especially subperiosteal, and anaemia (ACC, SCN, 1989).

Rickets

It is still a problem in some countries, where there is little vitamin D in the diet and inadquate exposure to sunlight, chiefly in infancy. Rickets occurs mainly in Northern Africa, the Near East, Southern and East Asia (WHO, 1992).

Floride

Necessary for proper development of tooth structure and resistance to caries, is insufficient in the soil and water in areas of most countries. Low flouride levels in drinking water increase the risk of developing dental caries. In other areas, excessive intake of flouride can occur leading to dental mottling and skeletal deformites (WHO, 1992).

Zinc and Selenuim

Are two essential trace elements whose deficiencies are known to present substantial health problems in large population groups. Zinc deficiency exacerbates growth retardation and diarrhea in malnourished populations and impairs the immune system.

Selinium deficiency is associated with Keshan disease, a cardiomyopathy affecting mainly children and women and Kashin Beck disease an endemic osteoarthropathy affecting children, mainly in China and Soviet-central Asia (WHO, 1992).

Deficiencies of Molybdenum, Copper and Chromium

Have been described, but their public health problem is not well defined (FAO and WHO, 1992).

The Nature and Dimension of Nutrition and Diet Related Problems in Egypt

Egypt was among the first group of countries to respond to the recommendation made by the League of Nations in 1939 to involve governments in nutritional activities (Galal and Amin, 1984).

Malnutrition and undernutrition and their consequences are a serious problem in Egypt and they are the major cause of mortality among children. Infectious diseases especially diarrhea and respiratory tract infections are predisposing factors to develop undernutrition (Country paper, 1991).

Chronic dietary energy deficiency and protein energy malnutrition PEM.

Several nutritional status assessment studies have been conducted in Egypt. On a national level, the first National Nutrition Survey 1978, showed that the prevalence of undernutrition whether wasting and stunting was more pronounced in rural areas than in urban areas. Infants and children between 6 and 23 months were most severely affected by acute undernutrition or wasting, while the 12 - 47 months age group showed the highest prevalence of chronic undernutrition or stunting.

In 1986, Nutrition Institute conducted another follow up survey on

1020 preschool children in subsample representing 34 sites previously surveyed in 1978. It revealed that the prevalence of acute undernutrition was much higher among preschool children of 1986 than those of 1978, while there was no change in prevalence of chronic undernutrition in both surveys.

In 1987, the Nutrition Collaborative Research Support Program (CRSP) Galal et al. 1987, revealed that, there was an improvement and increase in length for age and weight for age of toddlers, relative to the standard. Weight for height showed a slight and steady increase over the year.

In 1988, the Health Profile of Egypt, showed that the prevalence of undernutrition whether acute or chronic is higher in 1988 than in 1978.

So, it can be concluded that undernutrition is prevalent in Egypt, particularly in rural and underprivileged urban areas. The mean height and weight of Egyptian infants during the first six months of life is similar to that of infants in the United States, which denotes that stunting begins during late infancy due to higher nutritional needs and the start of weaning (Country paper, 1991).

Nutrition Institue and UNICEF 1995 found that according to Wt / age Z score, there are 16.8% of preschool children underweight. The highest prevalence of underweight are in Upper Egypt, Canal and

Lower Egypt areas, the lowest percent of underweight are in Metropolitan and watal areas.
According to Ht / age Z score stunting (< - 2 S.D.) is prevalent among preschool children (21.6%).

The prevalence of stunting is lowest in Lower Egypt.
According to Wt / Ht Z score indicators, about 9.7% of studied children are wasted and the highestprevalence is in Upper Egypt.

Low birth weight and low birth weight for gestational age

Unfortunately birth weight, the simplest and most widely used index of fetal growth, is currently unavailable in Egypt since the great majority of deliveries occur at home. Galal et al. 1983, studied 1000 mother - baby pairs within 24 hours postpartum for estimation of the trend and incidence of small for date infants in Giza governorate. The study showed that the nutritional status of mothers affected significantly the birth weight. Thus maternal nutrition deficiencies are incremented to be major cause to the poor intrauterine growth of the babies.

Micronutrient deficiencies

Anaemia

Anaemia is the most common nutritional problem among Egyptian women and children. Anamia makes children weak, compromises the immune system, fatiguing easily and impacts on intellectual performance. In Egypt, anaemia of childhood reaches its peak between 12 and

23 months, a critical period in child's intellectual and physical development (CAMPAS and UNICEF, 1988).

The prevalence of anaemia in 1974 was reported in an epidemiological study, showed that, hemoglobin concentrations of less than 11g / 100 ml were observed in 90 percent of 4 to 6 months infants. The incidence was higher in boys than girls, higher in the fourth and subsequent births, than among first to third births. Also it is higher among artificially-fed than breast-fed infants and higher among infants of anaemic mothers than among infants of non-anaemic mothers (Abdel Fattah et al., 1974).

Shaheen 1979, also observed more anaemia in infants born to anaemic than non-anaemic mothers. The study revealed that 50 percent of the infants were diagnosed anaemic (Hb less than 11g / 100ml) from non-anaemic mothers and 62.5 percent from anaemic mothers.

In 1986, Nutrition Institute conducted another follow up survey on preschool children in the same sites previously serveyed in 1978 and the results showed that the prevalence of anaemia in 1986 went up among all age groups (Nutrition Institute, 1980).

Prevalence of anaemia amounts to 25.2% of total studies children in 1995. Thus prevalence is less than that obtained from the 1978 National Nutrition Survey which showed anaemia prevalence of 38%. Total urban areas show higher prevalence of anaemia than rural areas (Nutrition Institute and UNICEF, 1995).

Hussein (1983), in a study about the functional consequences of iron deficincy in Bortos Village, Giza governorate, reported that the highest prevalence of anaemia was among preschool children (33 percent) and among females more than 20 years (28.6 percent).

The prevalence of anaemia in mothers is highest in rural populations, particularly in large villages, followed by rural upper Egypt and rural lower Egypt. The prevalence is generally lowest in urban population (National Survey, 1978).

The prevalence in pregnant women was 22.1 percent and lactating 25.3 percent. This is reflecting the stress of breast feeding and pregnancy placed up on the mother's iron stores and the consequent increased iron requirements needed. Prolonged breast feeding without adequate dietary iron replacement leads to severe anaemia (Nutrition Status Survey I, 1978).

Said and Abdou (1978), assessing the nutritional status of various population groups of the Aswan governorate, showed that anaemia was prevalent in 20 percent of men and women in Aswan region.

Rickets

A nutritional status survey on preschool children found that the prevalence of rickets varied from 11 - 14 percent (Galal and Ezzat, 1984).

In the National Nutrition Survey 1978, interviewers checked for six clinical signs commonly associated with vitamin D deficiency. These signs were craniotabes, frontal bossing, rackitic rosary or deformed chest, enlarged wrist, double maleoli and leg deformity and open fontanelle. Craniotabes was not observed in any child, frontal bossing in 3 percent, rachitic rosary or deformed chest in 1 percent, abnormally enlarged epiphysis of either wrists amounted to 0.5 percent of the sample children. Bilateral bowing of legs was 2.3 percent in the 12 - 23 months old group and decreased to 1.9 percent in the 60 - 71 month old group. Among children 18 monthes or older, 1.7 percent had an open anterior fontanelle, of these 93 percent were 24.35 months of age. But only 1.2 percent of the children sampled had more than one of these signs.

Iodine deficiency disorders (I.D.D)

The ancient Egyptians have known the clinical picture of goitre as tumours of the neck.

Abdou and Youssef (1966) reported the prevalence of goitre among all age groups of both sexes in all localities of both Dakhla and Kharga Oasis. They also noticed high prevalence of goitre among several members of the same family. Fewer incidence were reported among school children of Cairo governorate (boys 1.7% and girls 17.8%).

Recently in 1991 a rapid assessment of nutrition survey was carried out on a national level to define the precise extent and magnitude of the problem in Egypt. The overall prevelance rate was 6.7%, females suffered more than males (8.6% and 4.6%) respectively.

The highest prevalence rate of I.D.D was observed in the New-Valley (38%) followed by Sohag governorate (14.8%). The prevalence in 7 other governorates is more than 5% and thus considered a public health problem. The lowest prevalence rate was noted in Menofia governorate (0.3%). No signigicant difference was observed between urban and rural schools (6.1% and 6.9 respectively) (Country Paper, 1991).

Vitamin A deficiency (VAD)

In Egypt, there is no available recent data determining whether Vitamin A deficiency is a public health problem or not?. According to the ARE National Nutrition Survey (1978) only four out of nearly to 10,000 preschool children were found to have Bitot' spots and vitamin A deficiency was thus not considered a public health problem in Egypt (prevalence less than 0.5% which is the cut-off point of considering vitamin A deficiency a public health problem) (UNICEF, 1994).

In a study conducted in an urban slum in Cairo, on preschool children suffering from diarrhea, Khalifa et al., (1989) found that the prevalence of vitamin A deficiency, based on eye signs and response to Rose-Bengal eye stain 1%, was 19.7%, both sexes were affected to the same degree and without an age influence. About 75% of the studied subjects were found to receive less than 60% of the RDA of vitamin A.

Mortality rates

Egypt has achieved a tremendous improvements in mortality levels during the last decade. There is a substantial decrease in motality for almost all age groups particularly for those under 5 years old and for both sexes for 1976 to 1986. (CAPMAS, 1976 - 1987).

Neonatal and Postnatal mortality

The level of neonatal death rate reached 12.7 per thousand live births and post-neonatal death rate accounted for 30.6 per thousand live births in 1988 (CAPMAS, 1988). It is noticed, that there is remarkable decreases particularly among post neonatal rates during the period of 10 years from 1978 - 1988), while the decrease in neonatal mortality are minor because it is highly affected by underregistration (CAPMAS, 1989).

Infant mortality rates (I.M.R.)

It decreased from 87% in 1976 to 43% in 1988. The cause of death among infants and young children in Egypt showed that, while the leading cause of death during the period 1983 - 1986 among infants was diarrheal diseases, the acute respiratory infection diseases become the leading cause of death in 1987 (Country paper, 1991).

Deaths of diarrheal diseases reflected a decline of about 40 percent among infants and 30 percent among young children aged 1 - 4 years between 1983 and 1988. The acute respiratory infection diseases increase the proportion of deaths of 18% among infants. The complications due to pregnancy or delivery also showed an increase of about 12.5% between 1983 - 1988 (CAPMAS and UNICEF, 1988).

Maternal mortality rate

The maternal mortality ratio accounted for 54 deaths per 100,000 live births in 1988 while in 1980 it was 94 death per 100,000 live births, accounting for a decrease of about 42 percent from 1980 - 1988 (CAPMAS, 1989).

With respect to maternal mortality variations among governorates of Egypt indicates that although Cairo and Alexandria are enjoying the best health and socio - economic conditions in Egypt, they reflected higher ratios of maternal mortality than those existing in some other governorates of lower and Upper Egypt and even more than those of some Frontier Governorates as Red Sea and New Valley.
This phenomenon may be due to underregistration or mis-registration among female deaths in the reproductive age groups (Soliman, 1990).

Malnutrition - Infection complex

This complex remains the most prevalent public health problem in the world today (Tomkin and Watson, 1989).

The mechanisms by which infections can be harmful to the nutritional status include :

* reduced food and water intake due to anorexia
* diminished absorption and utilization of ingested food
* increased nutrient and water losses
* increased metabolic demands and therefore higher nutritional requirements
* alteration of metabolic pathways
* international reduction or complete withholding of food (Akre, 1980)

Environmental sanitation and health behaviour of care takers are important contributing factors to the incidence of infections. In Egypt, percentage of population covered by safe water supply was 100 in urban and 49 in rural area during 1982 improved to 100 and 90 in 1987. Percentage of population covered by adequate sanitary facilities (sewage disposal mainly) was 95 in urban areas and 42 rural areas during 1982 and improved to 100 and 65 during 1987, (WHO / EMRO, 1989).

The morbidity load in Egypt particularly in preschool children is indicated mainly by diarrhea and respiratory infection as proved by Ministry of Health statistics as well as many research studies (Country paper, 1991).

The findings through ARE National Nutritional Status Survey of 1978, showed that the highest prevalences of acute illness were seen in infants and children under two years of age in both rural and urban areas. The differences in prevalence of acute illness between general urban children and the less priviledged urban and rural children may be a result of differences in availability of public health services and the health awareness of the mothers.

Within a comprehensive study in infant and young child feeding and weaning practices in 6 governorates representing Egypt, the role of infection in causation of malnutrition in urban areas of Egypt with special references to diarrheal disease was investigated.
Diarrhea was the cause of morbidity in 37.7 percent of cases in Cairo and 24.7 percent of cases in Alexandria. However, respiratory infections were more prevalent in Alexandria than Cairo affecting 36.4 and 29.4 percent of children respectively (Moussa et al., 1983).
The same informations in a rural community was obtained through another longitudinal study. Gastroenteritis and respiratory infections constituted 37.9 percent and 31.8 percent of all illness of the infants respectively (Galal et al., 1987).

Through the Demographic and Health Survey by Egypt National Population Council, prevalence of diarrhea episodes was studied on children under five years of age representing Egypt. Children under 2 years of age were twice as likely to have had an episode of diarrhea than children age two and above, which might be due to aquired immunity due to longer exposure (EDHS, 1988).

MOTHER - INFANT RELATIONSHIP

Although nutritional status of the infant and mother - infant interaction appear to be unrelated topics, they share an important common ground, the feeding environment. This interaction is influenced by current and past nutritional status, medical and developmental factors to each mother - infant pair (Britton, 1993).

Safe motherhood implies a healthy mother delivering a healthy child. Safe motherhood can be divided into prepregnancy or the patient seeking pregnancy, the antenatal care and childbirth and puerperium (El Katsha, 1988).

Prepregnancy

The patient seeking pregnancy is examined for any condition which would require treatment before the occurrence of pregnancy. Medical conditions, such as severe anaemia, tuberculosis, epilepsy, uncontrolled or badly controlled diabetes mellitus, venereal diseases or thyroid disturbances, heart disease, renal disease should be investigated and treated. Surgical conditions such as ovarian tumours, cervical polypi, vaginal septae, septic foci should be corrected. Treatment of these conditions before the onset of pregnancy removes the risk of complications to the mother and fetus during pregnancy (Fayad, 1988).

A normal weight woman who enters prgnancy well nourished and then maintain good nutritional health throughout pregnancy and lactation has markedly improved her potential of experiencing a favourable outcome (Chez, 1993).

In the early weeks of pregnancy, before many women are even aware that they are pregnant, significant developmental changes occur that depend on a woman's nutrient intake and nutrient stores. A woman who eats a variety of nutrient - dense foods prior to pregnancy estiblishes eating habits that will optimally nourish the growing fetus and herself. (Whitney et al., 1990)

Appropriate weight for height prior to pregnancy also benefits pregnancy outcome. Women who enter pregnancy 10 percent or more below or 20 percent or more above standard weight for height and age, face a greater risk than normal - weight women of impaired pregnancy outcome (Mitchell and Lerner, 1989).

Babies born during a hunger period were shorter and 10 percent lighter than babies born to mothers whose diets were adequate throughout pregnancy. This indicates the protective effect that a good diet before pregnancy can exert during the course of pregnancy (Guthrie, 1989).

A major reason why the mother's prepregnancy nutrition is so crucial to a healthy pregnancy is that it determines whether she will be able to grow a healthy placenta during the first month of gestation. The only way the fetus receives nutrients and oxygen is accross the placenta and the mother's blood picks up waste material to be excreted via the kidney. The placenta must develop normally if the developing fetus is to attain full genetic potential (Hackmann, 1983).

If the mother's nutrient stores are inadequate during placental development, then no matter how well she eats later, the fetus will not receive optimum nourishment. The infant will be low-birth weight baby, with all of the attendant health consequences (Whitney et al., 1990).

Maternal prepregnancy weight was found to be a strong predictor of birth weight (Galal et al., 1987, 1992).

Mothers of LBW infants were younger in age than mothers of NBW and throughout pregnancy their body weight was significantly less than mothers of NBW infants. Neither matrenal energy intake, nor intakes of total animal or plant protein from 3 - 9 months of gestation were significantly correlated with birth weight.
Maternal weight prior to pregnancy and weight gains in pregnancy were clearly the most important variables which are associated with low birth weight (CRSP, 1987; 1992).

That's why the preconceptional nutritional status of future mothers is vitally important to mother and child (Fleck, 1981).

Pregnancy

The fundamental requirement of a species is the ability to reproduce. The female body is designed to reproduce, toward that end the physiological and biochemical aspects of a woman's life are appropriately modified to accomodate and support a pregnancy when it occurs (Public Health Service, 1989).

The developing fetus is parasitic on the mother for all nourishment. This nourishment is obtained primarly from the mother's blood, which comes in sufficiently close contact with fetal circulation system in the placenta that required nutrients can be transferred. During the latter part of gestation some nutrients are available to the fetus through the amniotic fluid. Nutrients may be provided from the mother's immediate diet, from her stores of nutrients or from synthesis in the placenta (Guthrie, 1983).

Maternal malnutrition has been found to interfere with normal placental growth and function. This is reflected by lower placental weight, smaller placental size, and reduced Deoxyribonucleic acid (DNA) content. Affected placentas also have a reduced peripheral villous mass and villous surface (Williams and Worthington-Roberts, 1992).

Considerable evidence shows that placentas of poorly nourished mothers contain fewer and smaller cells than those of well nourished mothers. This reduction in the number of cells reduced the ability of the placenta to synthesize substances needed by the fetus, to facilitate the flow of needed nutrients and to inhibit the passage of potentially harmful substances (Bowering et al., 1980).

Intrautrine nutrition is especially important in the development of the central nervous system and the kidneys, whose growth occurs to a large extent in the latter part of pregnancy. Nutritional deficits encountered prenatally cannot be wholly reversed by adequate postnatal nutrition (Higgins, 1976).

Adequate nutrition during pregnancy has the potential for greater long-term health impact than at any other time. Infants who are well nourished in utero have an enhanced chance of entering life in good physical and mental health (Worthington Roberts and Williams, 1989).

Fetal malnutrition may result from maternal malnutrition as well as placental insufficiency. The direct determinants of intrauterine growth retardation included maternal height less than 62 inches (155 cm), low prepregnant weight, low maternal weight gain, cigarette smoking, alcohol consumption, and general maternal morbidity. Indirect determinants include parity, rate, maternal age and socioeconomic status (Kramer, 1987).

Physiological stages of pregnancy

Pregnancy can be divided into three main phases, each with unique nutritional consideration : implantation, organogenesis and growth (Guthrie, 1989).

Implantation

The first two weeks of gestation is a period of implantation, during which the fertilized ovum becomes embedded in the wall of the uterus. As this time, the embryo is nourished through the outer layers of the fertilized egg from secretion, known as uterine milk, of the uterine glands. About one third of conceptions fail to survive this period (Nichols and Nichols, 1983).

Organogenesis

The next 6 weeks are known as the period of organogenesis or embryogenesis. During this time, the developing fetal tissue, known as embryo, begins to differentiate into functional units that later becomes organs, such as heart, lungs, and liver. Skeletal development also begins during this time. Nourishment is obtained from the blood and degenerating cells in the space between the embryo and the wall of the uterus. The presence of specific nutrients is crucial for the continued growth of a normal fetus, with different tissues requiring different nutrients at various times (Worthington - Robert, 1987).

During organogenesis, the possibility of a nutritional adequacy with its potential hazards to the fetus is high because this critical period occurs at an early stage in pregnancy, before a woman may know she is pregnant, or have sought medical and nutritional advice. In addition, many women experience nausea during early pregnancy, which depresses appetite and food intake and often reduces the nutrients available for absorption to a critically low level. Under such conditions, the expected mother who has had good dietary habits before conception has an advantage over her less well - fed counterpart, who may have entered pregnancy with minimal nutrient reserves (Guthrie, 1983).

Growth

The remaining 7 months of pregnancy are known as the growth period. During this time, the differentiated tissues are nourished through the placenta and continue to grow until they reach a functional size capable of supporting life outside the world. Some nutrients are available in the amniotic fluid that the infant swallows in the latter part of pregnancy. The need for nutrients of this time is high both in quantity and quality. A deficiency will usually result only in prematurity or a smaller infant, rather than in the serious congenital problems as caused by a nutrient deficiency during organogenesis (Guthrie, 1989).

Growth occurs in three phases. During the first known as hyperplasia there is rapid increase in the number of cells. This cell replication requires folic acid and vitamin B12, both of which play a role in the synthesis of the nucleic acid (DNA and RNA) that must be produced each time a cell divides. In the next phase, cell proliferation continues along with hypertrophy, or cell growth, which needs the availability of amino acids and vitamin B6, both of which are essential for the protein synthesis. In the final phase, cells divide more slowly, and growth is primarily the result of hypertrophy. The age at which a particular tissue reaches mature size varies from the first year of life for the brain to several years for the liver. A reduced number of cells caused by inadequate diet, can seldom by reversed by an adequate diet at a later time. Thus the nutritional effects on cell number are often permanant, whereas those on cell size are reversible (Sandstead et al., 1981).

The Placenta

Early in the growth stage, the placenta develops and begins to play its role of transporting nourishment for the fetus. It is the tissue through which the nutrient and oxygen used for fetal growth are transferred from the maternal blood to the fetus and through which fetal waste is excreted. In the placenta maternal and fetal circulatory systems come in close contact with one another allowing nutrients to pass from one to the other. For some nutrients such as folacin, iron, vitamin C and B12, the placenta allowes the passage of sufficient amounts to meet the demand of the growing fetus even at the expense of maternal reserves. For other nutrients such as thiamin, riboflavin, vitamin B6 and D, it allow the maternal and fetal tissue to compete for the nutrients. The placenta becomes the regulator of fetal nutrition. Nutritional failure may be the result of an inadequate supply of blood to the placenta due to low level of nutrient in maternal blood (Bowering et al., 1980).

Rate of growth of the fetus

The rate of fetal growth is relatively slow in the first half of pregnancy. At a gestational age of 25 weeks the growth increment is only 6 g per day. By 34 weeks, it is estimated at 40 g per day. During the first trimester growth is almost entirely in maternal tissue, during the second trimester, gain is in both fetal and maternal tissue and in the third trimester in the fetal tissue. The relatively slow development of the human fetus means that nutritional deficiencies must prevail over a long period of time if they are to have a significant effect on fetal development (Guthrie, 1983).

Physiological adjustments of pregnancy

During pregnancy, many physiological, biochemical and hormonal changes occur that influence the need for nutrients and the efficiency with which the body uses them. By the third month, total blood plasma volume is known to increase about 33% above normal levels. This increase provides more blood to circulate through the placenta to carry nutrients to the fetus and carry waste products away from the fetus to the maternal kidneys. The increase in the rate at which blood filters through the kidney, increases the ability of the mother to excrete waste products that could impair fetal development. Any loss of needed nutrient is prevented by an increase in ability of the kidney to reabsorb nutrients from the filtered blood. To add in the circulation this larger amount of blood, the capacity of the heart to pump fluid is also in-

creased by one third. In addition to the increased fluid within the circulatory system, intracellular water increases further. The total increase of body water may be as much as 20 percent (Guthrie, 1989).
This haemodilution, which occurs as blood volume increases results in decreasing hemoglobin and plasma proteins, as well as per unit volume concentration of red blood cells and many nutrients (Leader et al., 1981).

The decrease in gastric motility and intestinal tone slow the passage of food through the gastrointestinal tract and enhances the absorption of nutrient. The increase in basal metabolic rate reflects the energy cost of the increased work of the kidney and heart. The decrease in the secretion of hydrochloric acid reduces gastric acidity and depresses calcium and iron absorption. Among hormonal changes associated with pregnancy that have nutritional implications are increased secretion of aldosterone by the adrenal gland; growth hormone by the pituitary gland; thyroxin, which regulates metabolism by the thyroid; and parathormone which control calcuim, phosphorus and magnesium metabolism. In addition there is increased uptake of iodine by the thyroid gland. Increases in the hormones progesterone and estrogen from maternal and placental sources ensure a normal course of pregnancy (Guthrie, 1983).

Nutritional needs during pregnancy

At term, a normal pregnant woman will have accumulated tissues and fluids sufficient for the development of a fetus of appropriate weight for the gestational age. The end result includes a 3.500 g fetus, a 650 g placenta, 800 ml of amniotic fluid, a 970 g uterus, 400 g breasts and an increase in circulating blood volume of 1.200 ml. Retention of approximately 1.700 ml extravascular volume also occur. The normal weight pregnant woman also stores fat. The total weight gain of a woman, who does not have generalized edema is approximately 13 kg (Hytten and Chamberlain, 1980).

The nutrients enter into all of the major metabolic processes involving the production of energy, synthesis of cells, maintenance of their structure and function, and the regulation of body processes (Williams et al., 1992).

The Food and Nutrition Board of the National Research council of USA is well aware of the problems of determining nutrient requirements during pregnancy and considers them when setting dietary allowances and making recommendations about the need for supplementation. Recommended Dietary Allowances are based on the best available evidence from metabolic balance studies and from indirect estimates (RDA, 1989).

Dietary energy required during pregnancy

During pregnancy, two factors determine energy requirements :

1 - changes in the mother's usual physical activity, 2 - increase in her basal metabolism to support the work required for growth of the fetus and the accessory tissues. The cumulative energy cost of pregnancy has been estimated 80,000 kilocalories (Durnin, 1987).

Food and Nutrition Board adds 300 extra calories per day for the pregnant woman. Actually an extra 150 calories per day during the first trimester, and 350 calories per day during the last two trimesters, would better distribute the fuel when it is needed (Lawrence et al., 1984).

Table (1) shows : Energy cost of pregnancy.

Energy Cost of Pregnancy	Kcal
Fat stores	36,000
Maintenance metabolism and tissue synthesis	36,000
or :	
1st trimester allowances (150 kcal / d)	14,000
2nd & 3rd trimester allowances (350 Kcal / d)	65,300
	79,300

(Whitehead, 1988)

Protein requirements during pregnancy

Calories alone are not sufficient to support growth of a baby. Approximately two pounds (around 925 gm) of protein are deposited in the fetus and accessory tissues of the woman. The additional daily requirements is 30 gm of protein (Nieman et al., 1990).

The need for protein follows the growth rate. Only about an extra 0.6 gm of protein is used each day for new tissue synthesis in the first month of pregnancy, but by 30 weeks gestation, protein is being used at a rate of 6.1 g per day. If this is added to the normal maintenance needs of the reference woman, 18.6 to 24 g of protein per day are required. Protein utilization from a mixed diet is about 70% and also depends on kilocaloric intake. Because of these consideration, RDAs for proteins are set much higher than calculated requirements (RDA, 1989).

However the National Research Council allows 50 g of protein a day for the nonpregnant reference woman with an extra 10 g per day starting in the second month of pregnancy (Worthington - Roberts, 1992).

Vitamins

All expert committees on dietary allowances have advised a substantial increase in the intake of most vitamins and minerals during pregnancy and lactation (Whitehead, 1988).

Vitamin A :

Both vitamin A and carotene cross the placenta and fetal storage of vitamin A accounts for the recommendation that pregnant women consume an extra 1,000 IU of this vitamin daily which can be readily provided by dietary sources (Worthington - Roberts et al., 1989).

The NRC recommends during pregnancy a further 200 μg of retinol per day (NRC, 1989).

Vitamin D :

Vitamin D has been appreciated for its positive effects on calcium balance during pregnancy. Observations in Great Britain indicate, that the peak season for neonatal hypocalcaemia coincides with the time of least sunlight (Roberts et al., 1973) & (Wardlaw et al., 1994).

In addition, serum vitamin D levels are often low in such infants, suggesting that some cases of neonatal hypocalcaemia and enamel hypoplasia may relate to maternal vitamin D deficiency and subsequent limitation in placental transport of vitamin D to the fetus. The NRC recommends 5 μg / day for pregnant women from exogenous sources (Delvin, 1986).

Vitamin E

Requirments for vitamin E are believed to increase somewhat during pregnancy and the NRC also recommends an extra 2 mg of vitamin E for pregnancy and 3 mg for lactation (NRC, 1986).

Vitamin K

Data are insufficient to establish a standard for vitamin K during pregnancy. It was assumed that 70 - 140 μg / d recommended for adults plus the coming from vitamin K synthesized by gut bacteria should assure adequate amount. The newborn is profected against any risk of vitamin K deficiency that 0.5 - 1 mg of vitamin K should administered intramuscularly immediately after birth (Whitehead, 1988).

Vitamin C

Vitamin C deficiency has not been shown to affect the course or outcome of pregnancy, but it has been reported low plasma vitamin C in association with premature rapture of membranes and preeclampsia (Food and Nutrition Board, 1990).

An extra 10 mg of vitamin C a day is recommended for pregnant women (Worthington - Roberts, 1992).

Thiamin, Riboflavin, and Niacin :

Since thiamine, riboflavin and niacin are all part of the reactions, that produce energy in the body, requirements are related to caloric intake. Since kilocaloric allowances increase during pregnancy, the allowances for thiamin, riboflavin and niacin automatically increase also.

An increase of 0.4 mg of thiamin is necessary for pregnancy. For riboflavin an extra of 0.2 mg / day increase is recommended for pregnancy. But the niacin status of pregnant women has been inadequately investigated (William et al., 1992).

Vitamin B6 or Pyridoxine

NRC suggests an extra 0.6 mg per day for pregnancy. Vitamin B6 is concerned with amino-acid metabolism and protein synthsis. Its requirements increase in pregnancy because of the greater need for non-essential amino-acids in growth (Ejderjamm and Hamfelt, 1980).

Folate

The B-complex vitamin folate is required for cell division to proceed. If this vitamin is lacking, detrimental effects are especially great in body tissues, that have high turnover rates. One of the first signs of folate deficiency is megaloblastic anaemia, caused by production of abnormal red blood cells. Anaemia is associated with increased risk of adverse pregnancy and outcome (Dansky, 1987).

Folic acid is the only vitamin for which the recommendd increment is greater for pregnancy than for lactation, because of the major role of this vitamin in the synthsis of purine and pyrimidine bases of the nucleic acid. The NRC 1989 gives 400 μg / day for pregnancy and only 280 μg / day for lactation.

Vitamin B12

Vitamin B12. or cyanocobalamine is also an important contributer to the process of cell division. Its deficiency can therefore lead to the development of megaloblastic anaemia. But its deficiency is rare; high risk women include those who choose a strict vegetarian diet. Such woment need Vitamin B12 supplement of 2 μg / day (Worthington-Roberts, 1992).

Minerals

Iron

During pregnancy, iron is neded for the manufacture of hemoglobin in both maternal and fetal red blood cells. The fetus accumulates most of its iron in the last trimester. During pregnancy, the fetus acts as a true parasite. It assures its own production of hemoglobin by drawing iron from the mother. Maternal iron deficiency, therefore, does usually result in an infant who is anaemic at birth (Luke et al., 1993).

Levels of supplementation of 30 mg per day result in normal hemoglobin and hematocrite values for the mother and child at delivery. Iron supplementation should be continued for two to three months after delivery, if necessary to replenish the mother's stores (Nieman et al., 1990).

Calcium

Calcium represents a major requirement during pregnancy. The fetus aquires most of its calcium in the last trimester, when skeletal growth is maximum and teeth are being formed. The fetus draws 13 mg per hour of calcium from maternal blood supply or 250 - 300 mg per day (Villar and Belizan, 1986).

Approximately 30 g of calcium are found in the full term infant. The current RDA standard for calcium during pregnancy is 1200 mg daily, a level 400 mg higher than recommended for the nonpregnant women (Mitchel, 1982).

Phosphorus

The RDA standard for phosphorus is the same as that of calcium, 800 mg with an extra 400 mg during pregnancy (RDA, 1989).

Magnesium

It is much like calcium and phosphorus in that most of it is stored in the bones. The biochemically active amounts are concentrated in nerve and nuclear cells. Deficiency of magnesium produces neuromuscular dysfunction characterized by tremors and conculsions. The RDA standard is based on estimates of the amounts accumulated by the mother and the fetus (Worthington - Roberts, 1992).

Zinc

Zinc has an active role in metabolism as it is a component of insulin, and a part of carbonic anbydrase enzyme system that maintain acid base balance and act in synthesis of DNA and RNA which gives it a very important role in reproduction. Evidence from human populations suggests that the malformation rate and other poor pregnancy outcomes may be higher in populations where zinc deficiency has been recognized. Zink is a known constituent of a number of important metalloenzymes and a necessary cofactor for other enzymes. Zink deficiency in rats leads to development of congenital malformation (Meadows, 1981).

Iodine

Maternal iodine deficiency leads to cretinism of the offspring.

Fluoride

The role of fluoride in prenatal development is poorly understood at present.

Sodium

Glomerular filtration increases markedly to clean up the increased maternal blood volume. An additional filtered sodium is seen during pregnancy. The increased fluid retained during pregnancy actually increases the body's demand for sodium.

Neontal hyponatraemia has been observed in offspring of women who unduly restricted sodium intake before delivery. No less than 2 to 3 g of sodium should be consumed daily (Lelong - Tissier, 1977).

Other trace elements

Chromium, manganese, copper, selenium, molybdenum, nickel and silicon have all been shown to be needed by the body. Limited knowledge of requirements makes it impossible to establish RDA standard for the majority of these minerals (Worthington - Roberts, 1992).

Table (2) : Daily Nutrient Allowances for prgnancy

Nutrient	Nonpregnant	pregnant
Energy (kcal)	2100	2400
Protein (g)	46	60
Retinol (μg)	800	1000
Vit. D (μg)	5	10
Vit. E (mg)	8	10
Vit. C (mg)	60	70
Riboflavin (mg)	1.3	1.5
Nicotinic acid(mg)	15	17
B6 (μg)	1.6	2.2
B12 (μg)	2	2.2
Folate (mg)	180	400
Thiamine (mg)	1.1	1.5
Calcium (mg)	800	1200
Iron (mg)	15	30
Zinc (mg)	12	15

(RDA, 1989)

Lactation

Maternal - Infant Bonding is the strongest human bond, when two major facts are considered : the infant's early growth is within the mother's body, and his survival after birth depends on her care (Lawrence, 1985).

The impact of early mother - infant interaction and breastfeeding on the duration of breastfeeding has been reported; breast feeding mothers who were permitted early contact but not early breastfeeding were compared with mothers without early contact who also breastfed. The mothers with early contact were observed to nurse 50% longer than the others (Sosa, 1976).

Breatfeeding is the infant feeding regimen recommended by the World Health Organization, all major national and international agencies and groups concerned with maternal and infant nutrition. The American Academy of Pediatrics recommends that the infants be breast fed exclusively for the first 4 to 6 months. Their endorsement is based on the decreased morbidity in breast-fed compared with formula-fed infants, on the substantial compositional differences between human milk and commercial formula, and on the psychological and behavioural benefits to mother and child (Weinsier et al., 1993).

Physiology of lactation

The female breast is a delicate organ consisting of glandular, connective and fatty tissues. The milk producing glands in the breast are called alveoli. Milk ducts lead from the alveoli to reservoirs near the nipples. The nipples contain 15 - 25 openings from which milk flows. Surrounding the nipples is an area of darker coloured skin known as the areola. Small pimplelike glands on the surface of the areola are called Montgomery's glands. They enlarge during lactation and secrete a lubricating substance that helps protection of the nipple (Nieman et al., 1990).

Early in pregnancy the breasts begin to incresase in size in preparation for lactation. As pregnancy progresses, estrogens and progesterones (hormones produced by the placenta) stimulate development of the breast tissue. All mother breasts contain about the same amount of glandular tissue; therefore, breast size has nothing to do with the ability to produce milk or to succeed at nursing. Progesterone stimulates the mammary gland so that it is capable of producing milk, and estrogen causes the ducts to grow and become branched (Greecher, 1986).

After childbirth, the breasts begin to change again due to the expulsion of the placenta and the consequent reduction in the hormones produced. The hormone prolactin then stimulates the production of milk in the alveoli. Finally, the "let - down" reflex is triggered by the baby's suckling. It is controlled by the hormone oxytocin, which causes tiny muscles in the cells surrounding the ducts to contract, moving milk from the alveoli toward the nipple. Suckling causes additional prolactin to be released, therefore, the baby not only pets the immediate gratification of milk but also "places an order" for a future meal (Weigley, 1988).

Milk synthesis then occurs as an infant suckles. The more the infant suckles, the more milk is produced. Milk production close0.ly parallels infant demand. In this way, even twins can be nursed. Demand is the driving force for milk production. Most protein found in human milk is synthesized by breast tissue. Some proteins also enter the milk directly from the mother's bloodstream. These proteins include immune factors and enzymes. Fats in human milk come from the mother's diet, and some are also synthesized by breast tissue. The simple sugar galactose is synthesized in the breast, while glucose enters from the mother's bloodstream. Together these sugars form lactase, the main carbohydrate in human milk (Wardlaw et al., 1992).

Factors affecting the volume and composition of breast milk

Maternal nutritional status

Since pregnancy, and even more lactation, impose increased requirements for energy and protein, one might expect that if a mother starts her reproductive cycle with marginal nutritional status, it will be aggravated with each successive pregnancy. Merchant and Martorell 1988 concluded tentatively that maternal nutritional depletion does occur as a result of a demanding reproductive history (Waterlow et al., 1992).

In a longitudinal study of Brown and Akhtar 1986 in Bangladesh, they concluded that despite of their remarkable good lactational capacity, the mother's milk production was limited to some extent by their nutritional status and may therefore be further increased with nutritional improvement.

Parity

Another factor that has been examined is maternal parity. Prentice (1985) found that parity had no effect on the volume of breast milk below a parity of 9. However the milk of primiparae has a higher fat concentration than that of multiparae. In the Gambia, the fat content of milk from mothers of parity 3 was only 82 percent of that of milk from primiparae.

Infand demand

Ounsted and Sleigh (1975) obseved that small - for - dates babies consumed more milk per kg body weight than large - for - dates babies and gained weight much faster. They concluded that there is a powerful self - regulatory control of the infant's intake and even within a feed the baby regulates its intake in response to the increasing fat content of the milk.

Prentrice and Paul (1986) made a detailed statistical analysis of maternal and infant factors affecting milk intake. They inclines to the view that a baby's appetite and activity in suckling are determined by its requirements and that the correlation between milk intake and weight velosity is caused by fast growing babies. Demanding and receiving more milk rather than babies of good lactators are growing faster.

Human milk has been found to contain a factor that inhibits the synthesis of milk components in mammary gland, especially casin and lactose.

An increased frequency of breast feeding leads to a more effective removal of this locally active inhibitor (Prentice et al., 1989).

Breast feeding is sometimes as frequent as 18 - 20 times daily but measurements of milk volume varied in accuracy because of interference with emotionally labile let - down reflexes and certain inconvienences of the mother (CRSP, 1987).

Nutritional needs of the mother during lactation

The nutritive demands on the mother during lactation far exceed those of pregnancy, although she may cease to feel the responsibility of eating for two. A normally developing infant doubles its birth weight accumulated in 9 months of pregnancy in 4 months of life - evidence of the demands that the breast - fed infant makes on the mother. Milk secreted in one month represents more kilocalories than the net energy cost of pregnancy 80,000 compared to 1,810,500 kcal. Fortunately some energy and many nutrients are stored during pregnancy (Guthrie, 1986).

In general, the total energy, protein, fat and carbohydrate content of mother's milk is relatively constant. If energy or protein is lacking, there will be a reduction in milk volume rather than in milk quality. At very low protein intakes the proportion of casein may be reduced. Although the total amount of fat in breast milk is not influenced by the mother's diet, the composition of the milk fat reflects the composition of the mother's diet. For some nutrients such as calcium and iron, the mother whose diet has been adequate before and during pregnancy has stores that can be used to maintain the quality of the milk if her post-partum intake fails to provide enough of the nutrients. The quality of the milk is relatively independent of the mother's intake of these nutrients, as long as reserves last. For vitamin A, however, the content in human milk reflects the diet of the mother, even though these may be reserves in the liver (Guthrie, 1986).

Energy

Energy requirements for lactation are proportional to the quantity of milk produced. The average energy content of human milk from well - nourished mothers is about 70 kcal / 100 ml (WHO, 1985).

The efficiency with which maternal energy is converted to milk energy is assumed to be approximately 80%. Average milk secretion is 850 ml / day. Thus energy should be 750 kcal / day (Sadurkis et al., 1988).

Energy allowances during lactation may be met by extra fat stores during pregnancy. These fat stores can theoretically provide about 200 kcal / day. Accordingly, and additional average allowances of 550 kcal/ day is recommended throughout lactation (RDA, 1989).

Of course as the infant grows, the demand for milk increases. Calories must also be reduced when breast feeding is supplemented by solid food, formula or weaned (Nieman et al., 1990).

Protein

In addition to extra calories, breast - feeding requires approximately 20 g of additional protein.

Riboflavin

Milk is one of the most dependable source of riboflavin in the adult diet. The human milk provides this vitamin for the infant. The nursing mother should increase her daily intake to 0.5 mg above normal as part of it is used for milk production (Nutrition review, 1982).

Vitamin C

The amount of vitamin C in human milk is higher than in cow's milk. The recommended intake is 100 mg of vitamin C for the mother (RDA, 1989).

Vitamin B6

The amount of vitamin B6 in human milk responds very rapidly to changes in the mother's intake. Maternal intakes of 2.1 mg which are difficult to achieve from dietary sources alone, result in milk with a vitamin B6 content that is considered optimal for normal infant growth (Food and Nutrition board, 1990).

Folate

The high incidence of folacin - deficient megaloblastic anaemia in lactating women suggests that lactation drains maternal reserves. This problem is complicated by the fact that folacin deficiency is the most prevalent nutritional problem during pregnancy, with the result that many women enter lactation with practically no reserve (RDA, 1989).

Vitamin B12

The ingestion of vitamin B12 is reflected in an increase in the vitamin in human milk from 1 to 6 days later (Worthington - Roberts, 1989).

Vitamin A

Although most infants have a fair reserve of vitamin A stored in their liver at the time of birth, human milk provides both vitamin A and related carotenoids. An intake of 1300 μg of vitamin A allows production of milk which is sufficient to meet the needs of the infant (RDA, 1989).

Vitamin D

Vitamin D is needed to protect the infant against rickets. Because relatively fat - soluble vitamin D is transferred to the mother's milk (1 I.U. / d), breast - fed infants must receive protection through exposure to sunlight and from a dietary supplement. A daily intake of 400 I.U. (10 μg / day) of vitamin D is considered adequate for lactating women (Wardlaw et al., 1994).

Vitamin K

Although the amount of vitamin K in breast milk is not sufficient to provide for the needs of the infant, it can be increased by the addition of vitamin K to the mother's diet. However, vitamin K given to the mother is not transferred to her milk until the fourth day postpartum. which is too late to give the infant protection against postnatal hemorrhages during the critical first few days fo life. Therefore breast fed infants are given a supplement of natural vitamin K either orally or by injection immediately after birth (Guthrie, 1986).

Calcium

Calcium needs are elevated during lactation; a prudent recommendation is that lactating women consume 1200 mg of calcium from dietary sources daily (Weinsier et al., 1993).

Trace elements

Because trace elements cannot be synthesized, any that appear in breast must be provided by the mother. Iodine, which is needed to prevent goitre, is transferred efficiently and in adequate amounts, but flourine, with is effective in enhancing resistance to tooth decay. not. Sodium appears in human milk in response to the mother's intake (Lawrence, 1989).

Table (3) Recommended dietary allowances for the lactating woman 23 - 50 years

Nutrient	Amount
Energy	2.500 kcal
Protein	64 g
Vitamin A	1300 I.U.
Vit. D	10 µg (400 I.U.)
Vit. E	11 mg
Ascorbic acid	95 mg
Folate	280 µg
Niacin	20 mg
Riboflavin	1.8 mg
Thiamine	1.6 mg
Vitamin B_6	2.1 mg
Vitamin B_{12}	2.6 µg
Calcium	1.2 mg
Phosphorus	1.2 mg
Iodine	200 µg
Iron	15 mg
Magnesium	355 mg
Zinc	19 mg

RDA , 1989.

Breast Milk

Human milk is composed of lactose, proteins, fats, vitamins, minerals and others constituents. Human milk varies in composition. If an infant is deliverd prematurely, the preterm milk of the mother is richer in proteins and lipids than if the baby is full term. "Preterm milk" also contains taurine and cysteine, which may be essential amino acids for the premature infant (Brady, 1982).

During the first few days after birth, a liquid called colostrum is produced by the mother's breast. This type of milk is produced few days before birth through the week or so after birth. It is yellowish and thick. Colostrum contains immune factors that protect the infant from some diseases. These immune factors compensate for the infant's immature immune system in its first few months of life. They are one reason that breast - fed infants have fewer respiratory and intestinal infections than formula - fed infants (Lawrence, 1989).

Colostrum has potent laxative properties that help the baby pass meconium. One compound in colostrum, the lactobacillus bifidus factor, encourages the growth of beneficial lactobacillus bifidus bacteria. These bacteria limit the growth of potentially toxic bacteria in the intestine, such as Escherichia coli, and promote the intestinal health of the breast- fed infant (Wardlaw et al., 1992).

Human milk composition gradually changes until several days after delivery, when it achieves the normal composition of mature milk. Human milk is thin, almost watery in appearance. Its nutritional qualities are impressive, especially the quality of protein. Its main protein lactalbumin, forms a soft, slight curd in the infant's stomach easing digestion. The other protein bind iron, reducing the growth of iron requiring bacteria. Many of these types of bacteria cause diarrhea.

Still other proteins offer the important immune protection already noted (Worthington - Roberts, 1989).

Human milk changes in fat composition during each feed. The consistency of milk released initially (about 60% of the volume) resembles that of skimmed milk. The next amount (about 35% of the total volume) has a greater fat proportion, similar to whole milk. Finally the hindmilk (about 5% of the total), is essentially like cream, and is usually released 10 to 20 minutes into the feeding. Babies need to nurse long enough to get the kcalories in the rich hindmilk in order to be satisfied between feedings and grow well (Wardlaw et al., 1992).

Advantages of Breast feeding

Human milk is tailored to meet infant nutrient needs for the first 4 to 6 months of life. The possible exceptions are fluoride, iron, and vitamin D. Infant supplements can supply this. Regular sun exposure for the infant can supply needed vitamin D. Although formula feeding can satisfy the infant, mother and rest of the family, breast feeding offers many physiological and practical advantages. Maternal status after delivery is improved by hormones released during breast-feeding. Blood loss is controlled and uterine involution is accelerated by the suckling, which induces release of oxytoxin in the days after delivery. During the period of exclusively breast-feeding, ovulation is suppressed, that is why it can be used as a safe and effective contraceptive method. Breast-feeding provides more than 98% protection in the first six months postpartum. Prolonged amenorrhoea also permits the mother to recover her iron stores, which enhances her immune and nutritional status as well as the prospects for providing adequate nutrition for any future fetus (WHO, 1989).

Lactating women exhibit reduced responses to stress compared with those in nonlactating mothers. The perceived stress reduction may be modulated by the action of hormones released during breast-feeding and may be of notable benefit in the development of the mother - infant relationship (Weinsier, 1993).

Human milk is the ideal nutrient source for infants, it provides immunologic protection and various growth factors expected to enhance related functional capabilities. The responsiveness of the immunologic complex in human milk to environmental stimuli and the modulation of milk composition in apparent synchrony with development are additional charactristics that make human milk uniquely suited to the needs of the human infant (Cunningham et al., 1991).

Breast milk contains both soluble immunoglobulins and a variety of immunologically active cells, the most important of the immunoglobulins are lactoferrin and Ig A, but a variety of other components such as lysozyme, complement and lactoperoxidase may be functionally important although present in much smaller amounts. The concentrations in colostrum are very high. Breast milk contains a wide range of antibodies, with activities against rotavirus and bacterial enterotoxins, antibodies that block attachement of bacteria to the intestinal mucosa and antibodies to food proteins. The milk also contains relatively large numbers of cells, mainly macrophages and lymphocytes. The latter poduce lymphokynes and other growth factors which stimulates proliferation and differentiation in lymphoid tissue and its capacity to react to antigens (Stephens, 1986). The cells in breats milk may therefore play an important role in the infant's transition from passive to active immunity (Waterlow, 1992).

Breast-feeding reduces the general risk of infections to the infant especially respiratory and intestinal infection. Breast-fed infants also have fewer ear infections because they do not sleep with the bottle in the mouth as bottle-fed infants often do. While an infant sleeps with a bottle in its mouth, milk pools there, back up through the throat, and eventually settles in the ears, creating a growth media for bacteria. Tooth decay because of night-time bottles is also likely (Wardlaw et al., 1992).

Breast-feeding also reduces the chances of allergies especially in allergy prone infants. Cow's milk contains a number of potentially allergy - causing proteins that are missing from human milk. Infants tolerate human milk better than they do formulas. Formulas must sometimes be switched several times until caregiver find one the infant thrives on (Worthington - Roberts, 1989).

In addition to that, breast feeding frees the mother form the time and expense involved in buying and preparing formula and washing bottles. Breast milk is ready to feed and sterile. This allows the mother to spend more time with her baby (Lawrence, 1989).

Breast feeding is therefore a universal "natural imperative" ensuring infant survival and health (WHO, 1989).

ASSESSMENT OF NUTRITIONAL STATUS OF INFANT

Accurate assessment of a child's nutritional status is an important element of pediatric care. Its goals are to determine if a child is, or may become malnourished, to acertain the risks of nutrition - related complications; and to provide guidelines for short and long term therapy (Figueroa - Colon, 1993).

Successful nutritional assessment is predicated on an awareness of nutritional deficiencies secondary to other processes : disease states that precipitate specific nutrient depletion, drug, radiation or surgical therapies with detrimental nutritional effects, inborn errors of metabolism involving nutrient utilization; the varied results of intervention with oral or parenteral nutritional support regimens (Solomons, 1985).

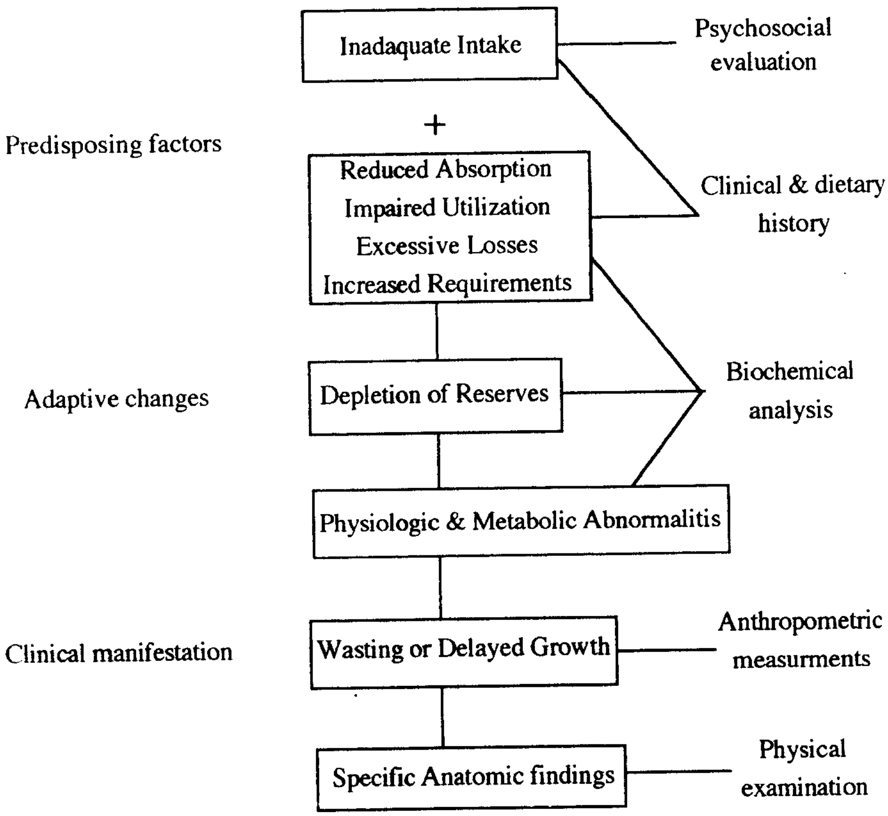
In addition, sensitivity to nutritional needs may mitigate the problem of increased morbidity, as well as possible mortality, in patients subsisting on marginal levels of nutrition (Apelgren et al., 1982).

While easily recognizable clinical signs and symptoms appear only in the advanced stages of nutritional depletion, nutritional status can be satisfactory assessed earlier by dietary history combined with a physical and psychosocial examination. When a child is determined to be at risk of becoming nutritionally depleted, precipitating factors such as inadequate intake, reduced absorption, excessive losses, impaired utilization or increased requirements must be established (Herbert, 1973).

Although monitoring intake is important in the nutritional management of a child at risk of becoming malnourished, other elements play a key role in successful therapy (Kerr et al., 1982).

As a child's nutrient supply decreases and / or demand increases, the organism undergoes a series of adaptive changes, designed mainly to protect more vital functions. Tissue stores and available pools are first utilized and depleted before significant alterations in other systems arise. As these adaptive changes begin failing, however, physiologic and metabolic abnormalities follow clinical manifestations become evident. The terminal stage is reached when growth and development are impaired and vital functions become compromised. At this stage, the diagnosis is clinically evident, and the laboratory has little role in diagnosis laboratory assessment may, however, be very useful in assessing prognosis and effective monitoring (Benjamin, 1989).

Levels of nutritional assessment in relationship
to the natural history of disease



Psychosocial History

When growth is significantly delayed, and / or medical examination has indicated a child at risk, the psychosocial history is an important element in assessing or eliminating the possibility of environmental influences on intake. Factors to discern are inadequte income to purchase food, inadequate facilities for preparing or storing food, religious / cultural beliefs related to food intake, such as extreme vegetarianism and a parental lack of knowledge about nutritional needs. Other factors may be the number of people living with the child, alcohol or drug use in the home, child abuse in which food is withheld as punishment or psychological problems that may result in under-or overeating (Figueroa-Colon, 1993).

Medical and Dietary History

Nutritional evaluation should include a complete medical and food intake history. Primary malnutrition, essentially the result of inadequate intake, may result from aberrations in the maternal - child relationship, lack of parental education, poverty, restricted allergy diets, and extremes of food faddism. Secondary malnutrition may be a consequence of congenital malformations, infectious disease, trauma, malignancy and its treatment or any chronic disorder involving a major organ system such as the liver, kidney, lung, heart or gastrointestinal tract (Solomons, 1985).

Dietary Intake History

Methods of collecting dietary intake data include 24-hr recall, food diary and food frequency and observed intake. A 24-hr recall involves having the subject recall everything consumed during the preceeding 24-hr period. The food diary requires the subject to weigh or measure and record everything consumed during a 3- to 7- day period. In the food frequency method, the subject is asked how often and in what quantities specific foods are consumed (Graham, 1982).

In this method, it is important to request information about consumption of fats, oils, sugar and other sweets since, although they are calorically dense and nutritionally poor, they are often overlooked. Although the methods described are considered valid for determining mean nutrient intakes in population groups, their accuracy in determining individual dietary intake is vulnerable to such factors as the respondent's memory and cooperativeness, as well as the skill of the interviewer (Acheson et al., 1980).

The goal of intake observation is to accurately calculate caloric intake by careful weighing and measuring the food served against that left uneaten. Subjects must be monitored to assure that no other foods have been consumed and that all food noted as eaten was consumed by the subject, not given or thrown away (Queen et al., 1983).

Recommended Dietary Allowances RDA

RDA are the nutritional standards against which diets being studied are usually compared. They compromise a list of levels of nutrient intake adequte to meet the known nutritional needs of practically all healthy persons, as defined by the Committee on Dietary Allowances of the Food and Nutrition Board. These are recommendations for average daily amounts within population groups and should not be confused within population groups and should not be confused with requirements for an individual with specific needs (RDA, 1989).

Physical examination

Once the patient's clinical and dietary history is known, the next step in nutritional assessment is a complete physical examination with a careful evaluation for signs of nutritional depletion as seen in table (4) (Suskind & Suskind, 1993).

Anthropometric Measurements

The National Center for Health Statistics growth charts have become an important tool for pediatricians interested in assessing a patient's growth against an expected norm. They provide age related standards for weight, height and / or growth velocity, the most useful anthropometric measurements to assess nutritional status of children (Cooper and Heird, 1982).

Anthropometric indices have been used extensively to assess the nutritional status of children in developing countries. An early classification, by Gomez et al. 1956, is based on weight - for - age criteria. Children weighing between 90% and 75% of the norm for a particular age are designated as having first degree (mild) malnutrition, those weighing between 75% and 60% are second degree (moderate); less than 60% is classified as third degree (severe) malnutrition.

Jelliffe 1966 designated four levels of malnutrition : weights between 90% and 80%, 80% and 70%, 70% and 60% and less than 60% of the age -related norm.

Weight - for age, however, fails to consider the effect of difference in height. A classification system based on the concepts of height - for - age and weight - for - height was developed by Waterlow, 1973. Height for age, which is age - dependent, serves as an indicator of the chronicity of undernutriton.
Weight - for - height, on the other hand, is age independant and is an indicator of the state of acute undernutrition.

Waterlow's concepts are appropriate because a child with energy deficiency presents first with failure to gain weight. During the adaptive process, the child begins to use fat and muscle mass as an energy source. The term of this state of short - term, or early, malnutrition, in which there is weight loss but during which linear growth is not yet affected, is wasting. The result of a prolonged deficiency state that causes obvious retardation in linear growth is stunting. The short status associated with many chronic pediatric diseases is a manifestation of chronic undernutrition (Suskind and Suskind, 1993).

Based on Waterlow's classification, children are either normal, stunted, i.e. height deficit for age; wasted i.e. weight deficit for height; or both stunted and wasted (Waterlow, 1972).

Table(4) : Selected clinical findings associated with nutritional deficiencies.

Organ	Finding	Nutritional deficiency to be considered
General.	Underweight, short stature	Calories.
	Overweight	(Excess calories).
	Edematous, decreased activity level	Protein.
Subcutaneous tissue.	Decreased fat fold	Calories.
	Increased fat fold	(Exess Calories).
	Edema	Protein, thiamin, vitamin E in preemies.
Skin (face).	Moon face, diffuse depigmentation.	Protein.
	Nasolabial seborrheic dermatitis	Riboflavin, niacin, pyridoxine
Mucous membranes.	Pale	Anemia.
Hair.	Lack of curl, dull, altered texture, thin or sparse, depigmented, easily plucked.	Protein.
	Hair loss.	Zinc, boitin, essential fatty acids
	Coiled, corkscrew-like.	Vitamin A, ascorbic acid.
Lips.	Angular stomatitis.	Riboflavin.
	Cheilosis.	B-complex vitamins.
Gums.	Swollen, bleeding.	Ascorbic acid.
	Reddened gingiva.	(Excess vitamin A).
Teeth.	Caries.	Fluoride.
	Mottled, pitted enamel.	(Excess fluoride).
Tongue	Smooth, pale, atrophic.	Anemia.
	Red, painful, denuded, edema.	Niacin, riboflavin, vitamin B_{12}
Nails	Spoon-shaped, koilonychia.	Iron.
Muscles.	Decreased muscle mass (wasting).	Protein, calories.
	Tender calves.	Thiamin.
Neurologic.	Ophthalmoplegia, foot drop.	Thiamin, vitamin E.
	Ataxia, sensory loss, motor weakness.	Vitamin B_{12}, vitamin E.
	Psychomotor change, mental confusion and irritability.	Protein.
	Loss of vibaratory sense deep tendon reflexes.	Thiamin, vitamin B_{12}.
	Sensory loss, motor weakness	/Thiamin.
	Peripheral neuropathy.	Pyridoxine.
Skin (general).	Generalized dermatitis.	Zinc, biotin, essential fatty acids.
	Symmetrical dermatitis of skin exposed to sunlight, thickened pressure points, trauma.	Niacin.
	Follicular hyperkeratosis.	Vitamin A.
	Petechiae, purpura, ecchymosis perifollicular hemorrhage.	Ascorbic acid, vitamin K.
	Scrotal, vulval dermatitis.	Riboflavin.
Eyes.	Dry (xerosis) conjunctiva, keratomalacia.	Vitamin A.
	Bitot' spots	
	Circumcorneal injection	Riboflavin.
	Photophobia.	Zinc.
	Conjunctival pallor.	Anemia.
Skeletal.	Costochondral beading (rachitic rosary), pigeon chest, Harrison's groove, knock-kneed or bowed legs, craniotabes. frontal and parietal bossing, persistently open anterior fontanel.	Vitamin D.
	Epiphyseal enlargement.	Vitamin D, ascorbic acid.
	Bone tenderness, hemorrhages, frog-leg position.	Ascorbic acid.
Gastrointestinal	Hepatomegaly (fatty infilration).	Protein.
Cardiovascular	Tachycardia, cardiomegaly, congestive heart failure.	Thiamin.
	Cardiomyopathy.	Selenium.
Endocrine	Hypothyroidism, goiter.	Iodine.
	Glucose intolerance	Chromium.
	Hypogonadism, delayed puberty.	Zinc.
Other	Altered taste.	Zinc.
	Delayed wound healing.	Zinc, Ascorbic acid
	Parotid enlargement.	Protein.

Compiled from several sources.
Suskind and Suskind, 1993.

Stunting is graded by comparing actual height to the 50 th percentile for a given age. Heights, greater than 95% of the norm - grade 0, 95% - 90% - grade 1, 90% to 85% - grade 2, less than 85% - grade 3. Wasting is defined similarly against the 50 th percentile for weight / height : weights greater than 90% of the standard - grade 0; 90% to 80% - grade1; 80% to 70% - grade2; less than 70% - grade 3. Without knowing which centile the infant has previously been followed it is impossible to characterize him at this point. The latest WHO, (1986) working group report on the subject confirms this by stating assessment of an individual from a single measurement is inevitably insensitive because of a wide range of intra-individual variation. On a global basis, the WHO Weekly Epidemiological Record Percentage of children wasted (less than 2 SD of reference weight / height) and stunted (less than 2 SD of reference height / age) are reported (McLaren et al., 1991).

Midarm circumference

There are several other important parameters used for screening and preliminary assessment. Included among these is the midarm circumference. It varies very little between 1 and 4 years of age. Its classification system uses 80%, 70% and 60% of the standard to distinguish mild, moderate and severe malnutrition (Jelliffe and Jelliffe, 1969).

All standards for midarm circumference appear to correlate closely with both weight for age and weight for height (Trowbridge and Stachling, 1980).

Skin-fold measurements

The frequent use of skin fold measurement to estimate body fatness is the result of the assumption that the subcutaneous fat mantle reflects the total amount of body and that the selected measurement sites represent the average thickness of the entire mantle.

Separate studies have shown that only 42% of the total body fat of a full - term neonate and 32% in a female adult reside in subcutaneous compartment. In addition measurement of the skin fold is impossible in an edemetous or obese individuals. Measurement of skin fold is useful and recommended for longitudinal assessment of a patient's response to nutritional therapy (Figueroa - Colon, 1993).

Biochemical Assessment

Accurate assessment of nutritional status is dependent on appropriate biochemical testing combined with thorough clinical and dietary histories, physical findings and anthropometric measurements. Tests should be chosen with regard to availability, cost, value, specificity and sensitivity (Walker and Watkins, 1985) (table 5).

Functional (biophysical) tests

These tend to become positive shortly after biochemical, and before histological changes manifest themselves. Few are available at present, although there is every indication that they will assume increasing importance in the future. The best known are these that reveal impaired rod function due to vitamin A deficiency - dark adaptometry, rod scotometry and electroretinography. Only older children can grant the cooperation required (McLaren et al., 1991).

Histological changes

Some epithelial and mucous tissue are readily accessible and can be sampled noninvasively. Morphological changes in the roots of hair from head are quite different in marasmus and kwashiorkor and are both different from normal. However this appear not to occur early but consistently enough to detect early stages of PEM.

Conjunctival impression cytology is now coming into general use as a method for detecting subclinical vitamin A deficiency. Gentle application of cellulos acetate to the bulbar conjunctiva provides a sheet of superficial cells that can be examined for presence of goblet cells, mucous lakes or keratinization (McLaren et al., 1991).

Table(5) : Biochemical tests for nutritional assessment of minerals and vitamins

Nutrient	Initial Screening	Nutrient evaluation	Special tests
Calcium		Serum calcium, bone x-rays.	Bone densitometry, calcium balance, serum parathyroid hormone
Phosphorus		Serum phosphorus.	
Magnesium		Serum magnesium.	
Iron	Hemoglobin, hematocrit, RBCindices, RBC morphology.	Serum iron, ferritin, iron-binding capacity, transferrin saturation.	Bone marrow iron, free RBC protoporphyrin, iron isotope studies.
Zinc		Serum zinc.	RBC zinc, WBC zinc, salivary zinc, hair zinc, zinc isotope turnover.
Copper.		Serum copper, serum ceruloplasmin.	RBC copper, 24-hr urine copper, hair copper, RBC superoxide dismutase, radiocopper turnover.
Iodine		Serum thyroxine, serum thyroid stimulation hormone.	
Selenium.		RBC selenium, RBC glutathione peroxidase.	
Vitamins.			
A		Serum retinol, serum carotene	Serum retinol-binding protein, dark adaptation test.
D		Serum 25-hydroxy-D, serum calcium, serum phosphorus, serum alkaline phosphatase, bone x-rays.	Serum 1,25-dihydroxy-D, serum vitamin D2, serum parathyroid hormone.
E		Serum tocopherol.	RBC hemolysis test, tocopherol transport capacity.
K		Prothrombin time.	Clotting time, serum vitamin K.
Thiamine (B1).		RBC transketolase activity.	24 -hr urine thiamin, thiamin pyrophosphate stimulation test.
Riboflavin (B2)		RBC glutathione reductase activity	24-hr urine riboflavin, blood pyruvate
Niacin (B3).		Whole blood NAD.	24-hr urine methylnicotinamide, urine 2-pyridone.
Pyridoxine (B6)		Serum pyridoxine, serum pyridoxal phosphate.	RBC glutamate-oxaloacetate transaminase or RBC glutamate-pyruvate transaminase index urine pyridoxine, urine 4-pyridoxic acid, tryptophan load test.
C		Serum ascorbate.	WBCascorbate, blood ascorbate, tyrosine load test.
B12	Hemoglobin, RBC indices, RBC morphology	Serum vitamin B12.	Urine methylmalonic acid, RBC vitamin B12 Schilling test
Folate	Hemoglobin	Serum folate.	RBC folate, urine formiminoglutamic acid.
Pantothenic acid			Serum pantothenate, 24-hr urine pantothenate
Biotin			Plasma or RBC biotin, 24-hr urine biotin.

NAD, nicotinamide-adenine dinucleotide
(Figueroa - Colon, 1993).

FAMILY PLANNING AND BIRTH INTERVAL

Fertility refers to the reproductive performance of a population, which is affected by social, cultural, economic, psychological and even institutional determinants. Reproductive health is not simply the absence of illness affecting the reproductive process, but implies the ability and choice to have children and freedom to determine their number, spacing and timing. Family planning and safe motherhood are essential components (Pacific Island Populations, 1994).

Women's right to self determination is rapidly becoming recognized as one of the keys to development. Improving the education, health, living and working conditions of the women is far more than a humanitarian consideration, it is one of the best investments a country can make. Raising the status of women is essential not only to slowing population growth, but to promoting a country's economic and social progress (UNFPA, 90).

If women are to realize their full potential in their productive and community roles, they must be guaranteed their reproductive rights and must be able to manage their reproductive role. The ability to decide freely and in an informed manner the number and spacing of one's children is the first step in enabling women to exercise other choices (Sadik, 1994).

Family planning plays a central role in reproduction health care because it allows women to plan for healthy reproductive lives. By exercising control over the number and spacing of the children they bear, women can ensure that pregnancy does not undermine their health, especially when they face other compounding problems such as insufficient nutrition, infections or emotional instability (Wambui, 1994).

Family planning is disirable, however, for reasons other than simply its direct impact on fertility. It is singularly important to reproduce health and rights. The World Population Plan of Action, adapted by the Bucharest conference in 1974, defined family planning as a basic human right maintaning that : "All couples and individuals have the basic right to decide freely and responsibly the number and spacing of their children and to have the information, education and means to do so, the responsibility of couples and individuals in the exercise of this right takes into account the needs of their living and future children, and their responsibilities toward the community (Sadik, 1980).

Women and men have the fundamental right to decide if, when and with whom they want to have children and how many. Moreover, every individual nust have the freedom to decide when, with whom and how to experience her / his sexuality regardless of nationality, class, race, age, religion, handicap or state of health. These reproductive rights are fundamental human rights (ICPD, 1994).

Even though an estimated 94% of the world's population lives in countries with policies that favour family planning, five out of every six couples of reproductive age do not use adequate measures of fertility regulation. Nonetheless, important advances have been made in family planning over the past 3 decades. At the end of the 1960s, only four major countries in Africa and two in Latin America had official family planning policies. By the beginning of the 1980s, more than 80% of Africa's people and more than 90% of those in Latin America lived in countries that supported family planning programs (Nortman, 1982).

Even though family planning and the control of human fertility influence heath and quality of human life throughout the world as they never have before, the benefits from family planning services have yet to be fully realized (Last and Wallace, 1992).

Approximately half of all women in the developing world do not have access family planning. In Africa, more than three quarters of those who said they did not want any more children were not practicing contraception, in Asia the figure was more than half and in Latin America just under half (UNFPA, 1990).

Contraceptive use in developing countries has expanded dramatically since 1960, but the total number of women not using any form of contraception has hardly declined at all, due to the enormous expansion in the number of women in the reproductive age group (Steven et al., 1994).

It is estimated that 500,000 women die of maternity related causes and 15 million children under the age of 4 are lost every year. Family planning is an effective inexpensive way to reduce these hazards, by helping women bear their children during the healthiest times for both mother and child. One study based on World Fertility Survey data estimated that maternal deaths could be reduced by almost one third per year on average. This could be accomplished simply by avoiding births to women who desire no more children but are not now using any family planning method (Fayad, 1988).

The fate of women in developing countries is also marked by the high incidence of teen - age pregnancy and early marriage. Half of the women in Africa in one survey were found to have had at least one birth before the age of 20. The proportion in Latin America was 38 percent and in Asia 36 percent. Early pregnancy also contributes to a high incidence of school drop-outs. Teen - age girls need family planning informations and programmes. Raising the legal age of marriage may also help (UNFPA, 1990).

Education of girls is the key intervention in the empowerment of women. It can release them from the oppressive hold of traditions. It is also a key factor in reducing fertility levels and infant mortality rates and in improving the overall wellbeing of the family (Sadik, 1994).

Raising the economic, legal and social status of women influences fertility decisions in several ways, including an increased value on women's non-maternal roles, decreased preference for sons, and women's enhanced ability to take advantage of family planning options (Speth, 1994).

Birth Interval

When considering the health of a mother and her children, one of the most important factors is the length of time between their births. This interval between births is called the birth interval (Balldin et al., 1986).

The length of birth interval is determined by its three components.

1 - The postpartum infecundable interval

Immediately after birth, a woman experiences an infecundable period during which the normal pattern of ovulation and menstruation is absent. The duration of this interval segment is primarily a function of breast feeding behaviour.

2 - The waiting time

To conception, also calld the fecundable or ovulatory interval, from the first post partum ovulation to conception. The length of this interval is inversely related to the use and effectiveness of contraception.

3 - A full - term pregnancy

Because the duration of pregnancies ending in a live birth varies little, it is convenient to assume this birth interval segment to have a constant duration of 9 months (Bongaarts and Potter, 1983).

A short birth interval around one year, means a mother is nearly always pregnant and will give birth to many children. A longer birth interval of 2 - 3 years is better. Child spacing is a new term that is being used to indicate this need for spacing of children, or births, with longer birth interval (Balldin et al., 1986).

Table (6) : Three major components of the interval between conception

	Major Components	Factors that Shorten the Interval	Interventions that Lenghts the Interval
Conception	Pregnancy	Interruption of pregnancy or premature delivery.	Adequate nutrition enhance favorable outcome. Improved socioeconomic status. Better medical care.
Delivery	Anovulatory period and amenorrhea	Perinatal death. Absence or curtailment of breast-feeding.	Breast-feeding may delay return of ovulation. Birth control can replace failure to practice traditional postpartum (lactation) abstinence. Nutrition education in breast-feeding. Better medical care.
Return of ovulation	Ovulating and menstruating (at risk for pregnancy)	Failure of modern birth control Failure of postpartum abstinence. Infant death may motivate conception	Birth control. Better medical care.

Modified from Subcommittee on Nutrition and Fertility. Food and Nutrition Board, Natonal Research Council, National Academy of Sciences : Nutrition and fertility interrelationshiops : implication for policy and action, Washington, D.C., 1975, U.S. Government Printing Office.

Worthington. Roberts et al.
Nutrition in pregnancy and lactation, 1985.

In the meantime, spacing births at last two years apart can give children a better start. For example, one benefit of a longer birth interval is that mothers can breastfeed their children for a longer time. In turn, breast feeding - which temporarily tends to reduce fertility - can be used to acheive healthy birth spacing (Fayad, 1988).

Spacing births at least two years apart can help to ensure that each baby is born healthy and strong, because a mother's body need two years to recover fully from pregnancy and childbirth (UNESCO, 1989)

Table (6) shows factors affecting birth interval and interventions that lengthen the interval.

Consequences of closely spaced births to the mother.

Pregnancy places considerable physical stress on a woman. Expectant mothers are more susceptible than other women to iron and vitamin deficiencies and to inadequate nutrition because of the increased demands of pregnancy. Such deficiencies are aggravated when a woman experiences frequent childbearing, since her system does not have sufficient time to replenish itself. The continuous cycle of pregnancy and breast feeding is particularly damaging to those whose nutritional status is marginal. Studies have indicated that in many areas of the developing countries women gain little or no weight during pregnancy and often loose weight during lactation (CRSP, 1987; 1992).

This is supported by CRSP 1987, 1992, which showed that mean body weight gain during the last 6 months of pregnancy was lower than the average weight gain reported for pregnant women in developd countries. Also there was no evident change in any of the parameters of mean body weight of lactating women. Only little increase in TSF suggested small gain in body fat during the 6 - months period of lactation. Maternal malnutrition and anaemia, conditions usually associated with frequent pregnancies, attenuate resistance to infectious diseases and increase the probability of complications or even death during child birth (Sadik, 1980).

The risk of maternal death also increases with high parity (number of live births), the WHO has determined that the probability of death to mothers increases sharply and steadily after the third birth. Clearly, the effective practice of family planning facilitates the spacing of births and in doing so, contributes to better health levels within the household (Balldin et al., 1986).

Family planning services and methods

Since family planning makes it possible to control a number of factors definitely known to affect maternal and child health, length of birth interval, age at maternity and family size - its stands to reason that all necessary steps should be taken to assure every woman access to effective family planning. Yet analysis of recent data from the World Fertility Survey indicates that there is still a considerable gap between the proportion of women who know of at least one contraceptive method and those who know where to obtain family planning services and those who actually use them. Such gaps need first, to increase the information to women about the availability and benefits of family planning; second, to broaden and simplify access to services that are responsive to women's preference; and finally to assure the medical backup necessery to deal with any complications that might arise (Sadik, 1980).

Family planning services may be provided through hospitals, clinics, individual health professionals, or commercial facilities such as drug stores. The services may include temporary contraception or permanent surgical sterilization. In considering services and methods of fertility control, both service providers and individuals needing service are influenced by the characteristics of service provider, facilities, effectiveness, prevalence, popularity, risk and scientific evidence for the safe use of each approach to limiting fertility (Last and Wallace, 1992).

Methods of family planning

Contraception

In the mid - 1930s, several states began to provide limited contraceptive counseling and services for poor women. In 1960 a program have been created to help poor to have the same access to effective contraceptive methods as the affluent (Dryfoos, 1988).

Oral contraception

The Pill is a popular, highly effective, and for most women a safe method of contraception, It is most popular for women less than 25 years old and it is a highly effective method for temporary contraception. Oral contraceptive users are less likely to be hospitalized for pelvic inflammatory disease, ectopic pregnancy, benign breast disease, and functional ovarian cyst, They are also less likely to have iron deficiency anaemia (Peterson and Lee, 1988).

But the Pill is not without risk. Oral contraceptive use has been clearly associated with an increased risk of myocardial infarction, venous thrombosis and stroke (Lee et al., 1989).

Intrauterine Device (IUD)

It is an effective safe method of birth control for most women. In China it is the most popular form of contraception. IUD is highly effective with method failure rates of about 3% per year. Unlike oral contraceptions, IUDs have no documented noncontraception health benefits. Women who do become pregnant althouth using IUDs, have a greater risk of ectopic pregnancy and of spontaneous septic abortion. In particular, IUDs have been associated with an increased risk of pelvic inflammatory disease (Lee et al., 1988).

Traditional Methods

The condom, vaginal diaphragm, and spermicidal creams, foams, gellies and suppositories are the traditional contraception methods. Failure rates will be largly influenced by user determinants. The condom is the most effective when used consistently and correctly. The estimated user - failure rate for condoms in the first year is 12%. The diaphragm and vaginal spermicides have a 1.5 to 2 times greater risk of unintended pregnancy relative to condom (Mosher and Pratt, 1990).

The role of condoms for prevention of human immuno deficiency virus and other sexually transmitted diseases has likely led to increase the prevalence of its use. Condoms were used by approximately 3.6 million couples in the United States in 1982; this number increased to 5.1 million in 1988 (Tyler and Peterson, 1992).

The risks associated with use of traditional contraceptions include the risk of unintended pregnancy. Otherwise the complaints are minor as vaginal irritation and greater risk of urinary tract infections (Lee et al., 1989).

Rhythm and Fertility awareness

This is a natural family planning method which depends largely on user determinants, such as motivation and skill. No adverse health effects are associated with this method, only unintended pregnancy occur more frequently than with other methods (Mosher and Pratt, 1990).

Other approaches

Two additional methods, postcoital contraception and injectable hormones are not frequently used in the United States. For post coital contraception a certain pill is taken within 3 days of unprotected intercourse followed by two additional tablets taken 12 hours later. Clinical studies indicate that this regiment is highly effective (Yuzpe et al., 1982).

The injectable hormones has been used extensively around the world. Norplant, is a subdermal implant system of six silastic rods impregnanted with a progestin which is continuously and slowly released. It is highly effective for 5 years after which it should be removed and replaced if desired. Its most common side effect is irregular menstrual bleeding (Liskin et al., 1987).

Breast Feeding

Breast feeding is vital for child survival and family planning. Breast feeding saves lives and substantially contributes to increasing the birth interval in many countries throughout the world (WHO, 1989). It is clear, however, that in order to breastfeed successfully, most mothers need accurate and timely information, an adequate support system and encouragement. Family planning and child survival programs, including nutrition, diarrheal disease control, immunization, growth monitoring and other primary health care interventions, afford valuable opportunities for breast feeding support and promotion (Labbok et al., 1990).

The effect of breastfeeding on fertility is well known. In 1988, the Bellagio Consensus Conference proposed guidelines that become the basis for a method of family planning called the lactational amenorrhea method (LAM). The principle of LAM is that a woman who continues to fully or nearly fully breastfeed her infant and who remains amenorrhoeic during the first 6 months postpartum is protected from pregnancy during that time. Perez et al. 1992 found that LAM with its high acceptance and efficacy, is a viable method of family planning and can safely serve as an introductory method for breastfeeding women. When the mother supplements her infant's diet, or when her menses return or at six months post partum which ever comes first, she must begin a complementary method of family planning.

Lactational amenorrhea is a well-recognized phenomenon and has frequently been presented as "nature's way of ensuring an adequate time interval between the birth of one baby and the next". Lactational amenorrhea is a variable component, however, and its duration is influenced by a number of factors, notably dietary status and the specific hormonal response of individual women, especially with respect to prolactin (UNU, 1993).

Short (1984) described breast feeding a nature's contraceptive and is asserted that on a worldwide scale, more births are prevented by breast feeding than by any other method of contraception.. Breast feeding exclusively for four to six months from birth is of well-known importance for infant's nutrition. Breast feeding delays the return of fertility in mother, thus contributing to longer birth intervals. Birth spacing allows continuation of breast feeding for the child's benefit and has other advantages to mother and child. Better nutrition promotes infant and child survival, which in turn tends to increase birth intervals. All these processes benefit the health and well - being of the mother and child.

Breast feeding provides more than 98% protection from another pregnancy in the first six months post-partum, if the mother is full or nearly fully breast feeding (UN, 1991).

Short et al. (1991) research on a well nourished group of Australian women breast feeding their babies showed that the probability of becoming pregnant over the 24 month period was only 13%.

Rosner and Schulman (1990), support the theory that unrestricted breast feeding acts as a natural contraceptive should be made available to those interested in naturally spacing their children. Pediatricians advising feeding schedules, introduction of formula supplements and solid foods, and early cessation of night feeding should warn the mothers of possible results of these practices.

Lactation delays the resumption of fertility by physiological mechanisms. Suckling at the breast affects hormone secretion that maintains the production of milk (prolactin) which depresses the hormone levels necessary for fertility (inhibiting ovulation and producing amenorrhea). The frequency of suckling is important, (day and night) increasing milk synthesis and secretion and decreasing chances of fertility. The six month period after birth is crucial both for mother and infant, and illustrates the closeness of the mother's and infant's need (Berg and Brems, 1989).

Breast feeding causes an uncertain period of lactational amenorrhea which could be explained by secretion of prolactin and its effect on the function of the hypothalamus, pituitary gland or ovary. The pituitary hormones prolactin is secreted at high levels in response to suckling stimulus (Glosier et al., 1984).

The basal level is markedly elevated during the first 3 months of lactation and then decreases with time. The surges of prolactin continue to occur, peaking or 30 minutes after suckling. There is evidence that night feeding can also be a factor in maintaining elevated prolactin levels (Tyler, 1983).

Nipple stimulation is thought to cause the neural receptor in the hypothalamus to inhibit the release of dopamine, which is the inhibiting factor in the release of prolactin by the pituitary gland. Thus the inhibitory control by the hypothalamus is blocked and a prolactin surge occurs (Chao, 1987).

High prolactin levels during lactation appear to depress the secretion of FSH and LH by the pituitary gland. This depression may be due to the lack of dopamine. The lack of this neurotransmitter depress the release of gonadotropin - releasing hormone which is needed to stimulate the pituitary to release FSH and LH. Also suckling stimulates B-endorphin release which has been shown to inhibit gonadotropin-releasing hormone release (Rosner and Schulman, 1990).

Prolactin may also have a direct effect on the ovary by making it unresponsive to LH and other hormones. Prolactin suppresses luteal function thus decreasing secretion of estrogen by ovaries (Tyler, 1983).

The duration and frequency as well as the timing of feedings all have an effect on the amount of prolactin secreted. Night feeding may be an important factor in long-term lactational amenorrhea. There is normally a return of LH pulses during sleep in the first few weeks postpartum in nonlactating women. Night feedings may delay the return of these LH pulses.

The combined interaction of all these mechanisms probably results in lactational amenorrhea and infertility in most women (Liu and Park, 1988).

Another factor claimed to influence the length of lactational amenorrhea is the nutritional status of the mother. Women in developed countries, on an optimal plane of nutrition achieve prolonged periods of lactational amenorrhea. World Bank analysis has pointed to the significant effect of breast feeding in reducing the total possible number of births to a great majority of the couples in developing countries who do not use modern contraceptives (World Bank, 1984).

Projections by Family Health International show that a 25% reduction in breast feeding duration in five African countries would increase total fertility rates by 12% breast feeding , thus in additions to its nutritional and health values needs to be promoted and supported as a child spacing strategy. Longer birth interval will reduce total number of children per woman as well as benefiting both mothers and their children (UN, 1991).

Sterilization

Surgical sterilization is estimated to be the most prevalent form of contraception in the world today. Globally more than 100 million couples are using this form of birth control. China, India and the United States have the highest estimated numbers of sterilized couples (Mosher and Pratt, 1990).

a. Female sterilization

The prevalence of tubal sterilization in United States increased dramatically during the 1970s. Published estimates of the efficacy of tubal sterilization techniques are limited by methodological problems, including each of large numbers of sterilized women with long-term follow up. The likelihood of sterilization failure will almost certainly depend on certain physician and patient characteristics as well as the method of tubal occlusion : electro coagulation failures are more likely to result in ectopic gestation than methods of mechanical occulsion (Destefano et al., 1982).

The long-term safety and acceptability of tubal sterilization are less completely studied, but recently published reports are mostly reassuring, although a longer period of follow up will be needed (Vessey et al., 1983).

b. Male sterilization

More than 40 million men are currently using vasectomy for contraception world wide, most of these men live in the United States, United Kingdom, China and India (Gallen et al., 1986).

Failure rates of vasectomy are less than 1%. Vasectomy is a minor surgical procedure that usually takes 5 to 20 minutes to perform. During the procedure the vas deferens is isolated and then occluded, using either ligation, coagulation or clip application. Ligation is the most widely used approach. Although as many as 50% of men may experience minor complications such as swelling of scrotal tissue, bruising, and pain, these generally subside without treatment within 1 to 2 weeks after vasectomy. Hematoma formation and infection may occur but is generally not serious. Formation of sperm granulomas at the surgical site is another complication, but most granulomas are small and asymptomatic. But their presence may complicate any future attempt at reversing sterlization (Liskin et al., 1983).

Family planning cannot succeed in isolation from advances in education, health and nutrition. About half the women in the developing world cannot read and thus cannot participate fully in economic, social community and family life. Education and smaller families goes together. Poorly educated women in Brazil, for instance, have an average of 6.5 children each, those with secondary education only 2.5. In Liberia, women who have been to secondary school are 10 times more likely to take advantage of family planning facilities than those who have not been to school at all (UNFPA, 1990).

Increased education - for both boys and girls - shifts the preferences for large families, since smaller families can invest more per child in education.

Education also affects child survival. Each additional year of maternal education reduces child mortality by 7 - 9 percent. Families are also more likely to invest resources per child if they are confident that each child will survive.

Education on reproductive health and family planning, is an essential component of any program for preventing unintended pregnancies. A WHO meeting on this subject declared that appropriate education on reproductive health for the general public has the highest priority because of its importance in prevention and its potential influence on the largest number of people possible (Magarick and Burkman, 1988).

Men must also share a responsibility for family planning. In the developings world, men are usually the decision-makers in areas such as contraceptive use and reproductive behavior, and may make decisions about family planning and contraception on behalf of their partners. Information and services addressed specifically to men will lead to men taking a more active role in family planning (Sadik, 1994).

Furthermore, additional data regarding the health consequences of family planning would provide a more knowledgeable basis of assessing and subsequently influencing programs family planning statistics should therefore be expanded to include family health status (Sadik, 1980).

Meeting the needs of women and improving their status leads to a reduction in maternal and infant / child mortality and an increase in the practice of family planning. In turn as their welfare is enhanced, women are able to take a more active role in promoting the well-being of their families and the prosperity of their communities and nations (UNFPA, 1994).

Ingredients of family planning success

Widespread recognition and acceptance by governments, especially ministries of health and / or national family planning coordinating agenceis.

Commitment by governments to make such informational and services available to all sectors of society.

Flexibility and sensitvity of governments with regard to the need for different family planning strategies to local needs and conditions.

Ability of governments to obtain international donar support for family planning and to co-ordinate international donar agencies.

Allocating national and donar resources to concrete programmes which enpower women - from education, literacy and skills development programmes for school dropouts to the full involvement of women in all aspects of development (Parsons, 1994).

Family Planning and Fertility in Egypt

The Egypt Demographic and Health Survey (EDHS) documents the significant progress that has been made in 1980s in addressing the population problem in Egypt.

Fertility levels have declined steadily over the decade. At current rate, women will have an average of 4.4 births by their 45^{th} birthday. This total fertility rate presents a decline of 15 percent from the level of 5.2 births per woman recorded in the Egypt Fertility survey at the beginning of this decade (Sayed et al., 1988).

At current fertility levels, a rural woman may expect to have an average of 4.9 children, two children more than a woman residing in an urban area. Fertility rates are much higher in rural Upper Egypt (6.0 birth per woman) than in rural Lower Egypt (4.1 births per woman) (EL Zanaty et al., 1992).

However the result of the 1992 Egypt Demographic and Health Survey (EDHS) stated that the fertility rate has fallen to 3.9 birth per woman from a level of more than 5 births in 1980 (EL Zanaty et al., 1992).

The imaginative mix of family planning and community development that characterizes the Egyptian Population Development Program has not yet appreciably reduced fertility levels in rural areas, but the impact has been noticeable on family planning knowledge, attitude and practice.

Regional disparities were found to be very large, both prior to introduction of the program and in terms of program effect. Attitudes are especially conservative and knowledge most deficient in Upper Egypt, even when educational and occupational levels are held constant (Stycos et al., 1982).

However, the fertility decline has taken place in the context of increasing use of contraception. The EDHS (1988) found that 38 percent of married women are currently using family planning and increase of 60 percent over the rate of 24 percent recorded in the 1980 Egypt Fertlity Survey EFS. Equally encouraging the dramatic use of IUD use since the middle of the decade. The percentage of currently married women relying on IUD doubled in the four-year period between the Egypt Contraceptive Prevalence Survey and the EDHS, increasing from 8 percent in 1984 to the current level of 16 percent.

The pill continues to be widely used, according to the EDHS, 15 percent of currently married women are using the pill. Use of other modern methods remains limited, and few women rely on the traditional methods (Sayed et al., 1985).

However, the 1992 EDHS indicate that 47% of currently married women are currently using family planning in Egypt.

Almost all users rely on modern methods; 28% of married women are using IUD, 13% rely on pills, and 4% are using other modern methods, principally the condom (2%) and female sterilization (1%). Less than 3 percent are using a traditional method (EL Zanaty et al., 1992).

Widespread knowledge and approval of family planning

Widespread knowledge and approval of family planning are supportive for further fertility reduction. Nearly all currently married women (98 percent) know at least one contraceptive method. Efforts to broadcast family planning information through mass media, particularly television, appear to be successful in reaching women, two third of currently married women reported watching at television broadcast about family planning in the month before the survey. Among women knowing about family planning, 87 percent approve the use of contraception and 70 percent believe their husbands approves. Almost half of married women not currently using family planning indicate they plan to adapt a method in the future (NPC, 1986).

Overall, the percentage of evermarried women, knowing any method increased from 90 percent in 1980 to almost 100 percent in 1992. Considering individual methods, the largest increase is observed in the knowledge of injection; only 16 percent had heard about injection in 1980 compared to 81 percent in 1992. There also has been a significant increase in knowledge in the case of condom, vaginal methods, female sterilization and IUD. The smallest increase is in the pill knowledge, which was already high in 1989 (89 percent) (EL Zanaty et al., 1992).

Childbearing attitude

Child-bearing attitude of Egyptian women are supportive of further fertility decline. Three of five women want no more children, and among those who want another child, nearly half of them are interested in delaying the next birth at least two years. According to fecund married women, more than half of their husbands also desire no more children. The average ideal family size is 2.9 children is well below the current fertility rate and more than one third of ever married women prefer a two-child family (Hallouda et al., 1983).

Access to family planning services

Egyptian women are knowledgable about family planning services providers. 96 percent of currently married woment are able to name a source where contraceptive services are available. Both the public and private sector continue to be important in the provision of family planning services. Current users of the pill obtain their supply currently from private doctors and government facilities. Nearly 20 percent of IUD users purchase the IUD at a pharmacy before having it inserted (Statistic Yearbook, 1986).

The EDHS (1992) results indicate that family planning methods are easily accessible to users. Overall, 58 percent of current users of modern family planning methods live less than 30 minutes from the place where they obtain their method.

Cost also does not seem to be a major barrier to the use of family planning (El Zanaty et al., 1992).

Other fertility determinants

In addition to the increased use of contraception, changes in marriage pattern are contributing to declining fertility. Women who marry at an early age tend to bear children sooner and give birth to more children than women who delay marriage. The EDHS results show that the median age at first marriage has been increased steadily from 17.4 years to 19.5 years (EL Zanaty et al., 1992).

Also,by extending the period of natural infecundily following birth, breast feeding also plays an important role in protecting women from a subsequent pregnancy. An average, women breast feed for 19.1 months. As a result, the return of menstruation and , thus risk of another. pregnancy, are delayed on average for 8 months following birth (Sayed et al., 1988).

EFFECT OF BIRTH INTERVAL AND FAMILY SIZE ON THE NUTRITIONAL STATUS OF THE INFANT

Population growth has vital consequences for nutrition ranging for instance from more mouths to feed from finite resources to environmental degradation from intensive and inappropriate land use to meet nutritional needs. The food-people-resources balance, now and in the future, is a critical determinant of the quality of life. At the same time, programmes in family planning, health and nutrition are widely pursued to improve maternal and child health (UN, 1991).

A mother who gives births to many children close together is unable to maintain good health for either herself or her children. An important part of providing children with a good start in life and adequate nutrition after birth is the spacig of birth approximately 2 - 3 years apart. MCH clinics should educate mothers on the importance of child spacing and also provide them with the means to accomplish this (Balldin et al., 1986).

Short birth intervals are equally undisirable from the standpoint of the newborn as well as of the young children in the houshold. Rates of Infant Mortality (deaths in the first year) and the incidence of still births decline with the length of the birth interval. Data from Punjab show an infant mortality rate of 206 deaths per 1000 infants for a birth interval of 11 months or less, compared with 132 per 1000 for an interval of 24 - 35 months and 108 for a birth interval of 48 months or older (Sadik, 1980).

Ferraz et al. (1988), stated that birth to conception interval of six months or less are associated with an increased risk of intrauterine growth retardation, and this may in part account for the increased risk of neonatal mortality with short birth interval. In addition, there is indirect evidence to suggest that the deleterious effects of short birth interval on fetal growth may be mediated through low maternal body weight.

Evidence from the World Fertility Survey, conducted in 41 countries between 1972 and 1984, shows how effective birth spacing can be. On the average, babies born less than two years after their next oldest brother or sister are twice as likely to die as babies born after at least a two-year interval (Fayad, 1988).

Even babies born to women in high risk categories are more likely to die during their first year, even if the mother survives. One study of four Asian countries estimated that if all birhts occured women in low-risk categories, infant mortality would decline, on average, by 12 percent (Fayad, 1988).

Another study showed that mothers characterized by pregnancies occuring at the extreme of the reproductive age and by short birth intervals have higher rates of infant loss (Serenius et al., 1988).

The birth weight of an infant - a factor highly dependent on the mother's nutritional status - is also a key determinant of perinatal mortality (death just before or within one week of birth) and of immediate and long-range morbidity. Research has demonstrated that, even when different socioeconomic status is taken into account, short birth intervals between pregnancies are consistently related to low birth weight (Sadik, 1980).

If a woman becomes pregnant before she is fully recovered from bearing a previous child, there is a higher chance that her new baby will be born to early and too light in weight. Low birth weight babies are less likely to grow well, more likely to fall ill, and four times more likely to die in the first year of life than babies of normal weight (UNICEF, 1990).

An association between small for gestational age at term and interpregnancy interval was examined in a hospital cohort of multiparous women. The greatest risk of small for gestetional age was found in women with the shortest birth intervals. Women whose interpregnancy interval was 18 or fewer months remained at twice the risk of giving birth to a term small for gastational age infant when compard with women whose interpregnancy intervals was 24 - 36 months (Lieberman et al., 1989).

A study in Egypt showed that as birth interval increases, the mean birth weight, length, and head circumference show higher gain during pregnancy in comparison to shorter birth intervals (El Mougi et al, 1988).

Data from Hungary, Sweden and the United States showed that prematurity accounts for the greatest share of the excess risks associated with closely spaced births and infants conceived within a few months of the preceeding birth remain at higher than average risk of low birth weight, preterm birth and neonatal death (Miller, 1991).

Klebanoff 1988, concluded that a short interpregnancy interval is primarily a marker of a woman who is otherwise at high risk and that modification of this interval alone may be unlikely to have a major impact on low birth weight.

A delay of two years or more before the mother becomes pregnant again is important for the baby's welfare, and indeed survival. One of the earliest observations of malnutrition was kwashiorkor as the disease of the displaced child-displaced by a new pregnancy. Short birth intervals have often since then been related to malnutrition. Nonetheless, anything that prevents too short birth intervals will benefit the youngest child, including family planning programmes directly, and as an additonal indirect result of breast feeding (UN, 1991).

A study in Egypt showed that as birth interval increases, body weight increases and curtailment of breast feeding is expected with shorter birth interval. This will lead to an increased incidence of malnutrition. Body length is also shown to be influenced by the duration of birth interval. Highest length and weight are in children following birth intervals of 3 - 4 years (El Behairy et al., 1980).

Another study in Addis Ababa in Ethiopia showed that the length of last birth interval and to a lesser degree maternal age appear to have significant effects on all three nutritional status indices (Groenwold and Tilahun, 1990).

A study was undertaken to assess the impact of anaemia on pregnancy outcome of mothers in rural areas in Pakistan showed that the weight for age of the infants from anaemic mothers where also significantly lower as compared to their counterparts from the non-anaemic mothers (Paracha et al., 1993).

As pregnancy places considerable physical stress on a woman, expected mothers are more susceplible than other women to iron and vitamin deficienceis and to inadequate nutrition. Such deficiencies are aggravated when a woman experiences frequent childbearing, since her system does not have sufficient time to replenish itself (Sadik, 1980).

Since birth weight is a strong predictor of nutritional status in

young children, its effect is likely to be mediated through malnutriton. Very young children are at the highest risk of diarrhea and dehydration among infants because of their smaller body size. The greater risk of dehydration among children born after a short birth interval can be explained in the following ways :
firstly, short birth intervals are associated with low birth weight and malnutrition (Huttly, 1991). Secondly, mothers with more than one small child may be less to cope adequately with an episode of diarrhea or even less likely to recognize it; and thirdly, specific pathogens may be more likely to be present in housholds with several young children also more likely to cause dehydration. The association between dehydration and the number of under 5 year-olds accords also with the above mentioned findings for birth spacing (Victoria et al., 1992).

Another study in Delhi surveyed children under 5 years of age. Morbidity was reocrded for two weeks. Birth interval less than two years and malnutrition were most frequent risk factors (Singh et al, 1990).

High parity and the resulting increase in family size have negative implications for the health prospects of the entire household; studies of individual families over time have found that the prevalence of infectious gastroenteritis and respiratory diseases is directly related to family size. In 1974, WHO evaluation of the nutritional status of preschool children in Colombia revealed that children from families with five or more children showed evidence of growth retardation compared to children from a matched group of families with four or fewer children (Sadik, 1980).

Large houshold size is widely regarded as a risk factor for malnutrition in developing countries, particularly for infants and young children. Children from larger households are significantly shorter and consume diets of poorer quality as assessd by intake of foods from animal sources (Pelto et al., 1991).

Again, children born too close together do not usually develop as well, physically and mentally, as children born at least 2 years apart. One of the greatest threats to the health and growth of a child under the age of two is the birth of a new baby. Breast feeding stops too suddenly and the mother has less time to prepare the special foods a young child needs. Also, she may be not able to give the older child the care and attention he or she needs. As result, a child often fails to grow and develop properly (UNICEF, 1990).

This is also supported by (Ramachandran, 1991) who stated that inadequate child spacing also mean the difference between adequate care of the preceeding child, including its continued breast feeding, and early abrupt weaning from the breast due to a new pregnancy and hence the deprivation of maternal attention.

Short intervals between pregnancies are consistently related not only to low birth weights but also to neurological retardation, and in later years to poor performance on intelligence tests (Nafis, 1980).

Another recent study in the U.K. has shown that a long birth interval correlates positively with performance at school (Morley and Woodland, 1985).

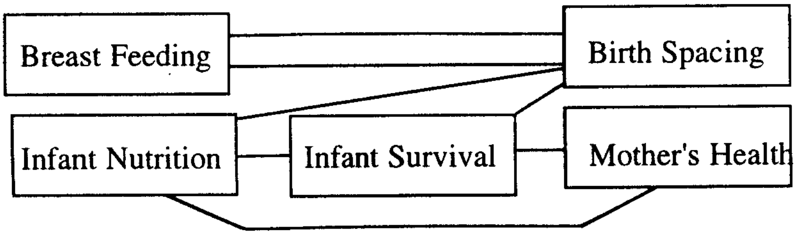
During pregnancy and for the first 1 - 2 years after birth, the child's brain and neurological system as well as other parts of the body are growing very rapidly. If he does not have adequate nutrition, this development may by permenantly damaged, so that he can never be as bright or as strong and healthy as he should be. This is also true for a child's personality, which is being found in these early years. If he does not have sufficient love and emotional support from his parents, he may never develop the emotional maturity and stability he should have (Balldin et al., 1986).

Child spacing benefits child nutrition

A delay of two years or more before the mother becomes pregnant again is important for the baby's welfare and indeed survival. Short birth intervals have often been related to malnutrition. They are also related to infant and child mortality. On the other hand the link of nutrition to survival or mortality, is clear. The effect of child mortality on birth spacing can act in several ways. As the death of a breastfed infant will tend to lead biologically to resumption of fertility and decisions may be made to replace the child as soon as possible, perhaps before the mother has recoverd from the previous pregnancy. Promoting infant and child nutrition and survival can gradually establish more motivation for longer birth intervals, hence acceptance of family planning (UN, 1991).

Breast feeding directly contributes to increased birth intervals by tending to reduce the resumption of fertility in the mother. This is more pronounced with exlusively breast feeding. It is related to lactational amenorrhoea and has led to new recommendations for decisions by individuals on family planning (Bongaarts and Potler, 1983).

Spacing reproductive events is necessary for maternal recovery. Repeated reproductive cycles have been referred to as maternal depletion syndrome which includes osteomalacia, goitre, anaemia, edema and inadequate pregnancy weight gain as well as low infant birth weight (Winhuist et al., 1992).



Interaction of breast feeding, birth spacing and nutriton (UN. 1991).

Integrating Nutrition and Family Planning activities

The benefits of breast feeding and family planning programs mean that they will be more successful if they are integrated. Both nutritional support and birth spacing have impact on mortality reduction and nutritional status improvements. Breast feeding is now recognizd as a child survival strategy. Keeping a child alive is associated with preventing another birth. Family planning programs should take into account the local breast feeding pattern and beliefs in order to promote and support breast feeding, to achieve its maximum fertility inhibiting effect (U.N., 1991).

SUBJECTS & METHODS

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Research Hypothesis

The research hypothesis was based to study the effect of birth interval and family size on the nutritional status of infants and children less than two years in Egypt.

Study Design

The study is a cross sectional study for women in the child bearing period (15 - 44 years) of different physiololgical conditions and their children whose ages are less than two years from low socioeconomic class.

Sample Selection

The study subjects included 350 children from birth till two years of age and their mothers whom were randomly recruited from mothers attending.

- Outpatient clinic of the Nutrition Institute.
- Pediatric outpatient clinic of Ain Shams University.
- Obstetric and gynacologic clinic of Ain Shams University.
- Mother-childhood (MCH) centers in Kasr el Eini and Old Cairo.

The study was carried out during the period of 1st Juli 1992 to 31st of March 1994.

Data Collection Technique

An interviewing questionnaire was used to collect the required data about the effect of birth interval and family size on the nutritional status of the children.

Two questionnaire sheets were used

1. For the mother and family (Annex I, II, III, IV).
2. For the child (Annex II, V, VI,VII, VIII)

Data collection was followed by coding, scoring and statistical analysis of the collected data.

All studied mothers were subjected to the following :

1. Personal data (Annex I).
2. Determination of physiological status of the mother (Annex I).
3. Determination of birth intervals and family size (Annex I).
4. Determination of social status of the family (Annex III).
5. Determination of economic status of the family (Annex IV).
6. Assessment of the nutritional status of the mother (Annex II).

1. Personal data

name, age in years, address.

2. Physiological Status of The Mothers (Annex I) :

1. Pregnant 100.
2. Lactating 100.
3. Nonpregnant and nonlactating 100.
4. Pregnant and lactating 50.

(It was very diffficult to find pregnant and lactating mothers because of the false beliefs to stop lactation when they become pregnant)

3. Birth Interval and Family Size

- Total number of living children, live births, still births, abortions, twins, and children who died.
- Interval between first and last birth (in years).
- Interval between each birth and succeeding one (in months).
- Interval between the studied child (last one) and the previous one (in months).
- Duration of marriage (in years).
- Family size.

4. Social Status of Family (Annex III)

Social status of the family as judged by father and mother education and occupation.

The data were coded, scored and were used to classify the families into low, middle and high social classes. (Park and Park, 1979).

This included the following :

- Educational level of mother and father :

The state of education was scored according to the following classification:

- Illitrate.
- Primary education certificate.
- Preparatory education certificate
- Secondary education certificate
- University education certificate

- Occupation of father and mother :

The occupation of father and mother was assessed according to the following classification.

- No occupation.
- Unskilled worker.
- Skilled worker.
- Semiprofession.
- Profession.

5. Economic Status of the Family (Annex IV)

- This is assessed accoring to the available electrical instruments, type of housing, number of rooms, crowding index, floor, roof and walls.
- Presence or absence of electricity, kitchen and toilet.
- Source of water supply and the cooking facilities.

The economic status of the family is then scored into low, middle and high.

6. Assessment of the nutritional status of the mother using (Annex I)

1. Body weight measurement :

by using the platform type scale. Mothers were weighed bare footed with light clothes for which corrections was made.(Jelliffe, 1966 & Jelliffe et al, 1989).

2. Height measurement :

was taken using the vertical measuring board for adults. The subject stood bare footed on a flat platform, with feet parallel and with heels, buttocks, shoulders and back of head touching the upright surface. The head was held comfortabely erect, with the lower border of the orbit in the same horizontal plane with the external ear (Frankfurt plane).

The arms are hanging at the sides in natural manner. The headpiece was gently lowered, crushing the hair and making contact with the top of the head.

Height was recorded to the nearest centimeter (Jelliffe, 1966 & Jelliffe et al, 1989).

3. Body mass index (BMI).

was calculated from height and weight of the nonpregnant mothers and classification of obesity was done defined y ranges of Quetlet'Index (QI) (Garrow, 1981).

The ratio of weight in kilogram to square of height in meter (W/H^2) is calculated for each woman to determine BMI value.

Women were categorized according to the BMI into :

Normal weight	(grade 0)	QI = 20 - 24.9
Overweight	(grade I)	QI = 25 - 29.9
Obese	(grade II)	QI = 30 - 40
Very obese	(grade III)	QI > 40.

4. Percent weight for height

Percent standard weight for height for each nonpregnant woman was calculated using weight for height tables (Jelliffe, 1966).

Underweight	> 90	(1)
Normal	90 - 110	(2)
Overweight	110 - 120	(3)
Obese	> 120	(4)

5. Clinical examination for deficiency signs was done for mothers to assess their nutritional status (Jelliffe, 1966) (Annex II).

6. Hemoglobin determination

Using Drabkin's cyanide solution as diluent (5 ml Drabkin's solution + 20 μ blood) and the level is estimated using a photometric colorometer and known heamoglobin standard (Drabkin, 1949).

A cut off point of 11.0% gm hemoglobin concentration was taken for pregnant women and a cut off point of 12.0% gm hemoglobin concentration was taken for non pregnant women (WHO, 1985).

All studied children were subjected to the following :

1. Personal data (Annex V).
2. Feeding pattern including pattern of food intake within the last 24 hours (Annex V, VI).
3. Morbidity record during the month before examination and at the time of examination (Annex VII).
4. Nutritional status of the studied child (Annex II).

1. Personal data of the children (Annex V).

Name, age (in months), sex and birth order.

2. Feeding pattern (Annex V)

- Colostrum.
- Breast feeding (exclusively or not).
- Formula feeding.
- Breast and formula feeding.
- Breast feeding and supplementary food.
- Formula and supplementary food.
- Breast and formula and supplementary food.
- Weaned completely.
- Pattern of food intake in previous 24 hours (24 hours recall) (Annex VI)

A detailed investigation about the type, time, frequency and amount of food intake within 24 hours of the previous day were asked.

Accurate recording of the amount of consumed food is also recorded.

Nutrient analysis was done from the nutritional food composition tables of the Nutrition Institute and the results were compared with Recommended daily allowances of WHO (1985).

3. Morbidity record (Annex VII)

Was done by asking for

Fever

Diarrhea.

Acute respiratory infection during the month before examination and at the time of examination the child was examined for presence of

- fever more than 37°c
- Diarrhea more than 3 loose or watery stool / 24 hour (NCDDP, 1991).

  duration, colour, blood, mucous, vomiting and assessment of dehydration if present.
- Acute respiratory infection (ARI) duration and classification according to age (less or more than 2 months - 5 years) (Child Survival Project, 1990).

4. Assessment of the nutritional status of the child (Annex VIII)

1. Anthropometric measurements.

- Weight.

  Beam balance scale was used for weighing, which measures up to 16 kg. with increment of 100 g.

  The balance was used on a firm, nontilted surface and cheked before used. Children were weighed nude.

• Length (for infant and children less than 2 years).

Supine length "crown-heel" length was taken. It was measured to the nearest 0.5 cms without feet or head covers using a graduated wooden measure with a fixed transverse perpendicular piece which is made to touch the head firmly and another movable one which touches both heels. The infant was laid on the board, the head is positioned firmly against the fixed head piece, a gentle traction applied to the ankles, the knee extended and the feet fixed at right angles to the legs. The sliding foot piece is moved to obtain firm contact with the heel. It was always assured that the body was straight with no arched back, and with the feet straight in contact with the movable piece (Jelliffe, 1966 & Jelliffe et al, 1989).

Weight and length measurements were taken, from which we calculated weight for age, length for age and weight for length, using standards (WHO, 1983) and Z score.

Indicators are :

Weight for age :	Median ± 2 S.D	Normal
	> + 2 S.D	Overweight + obese.
	< - 2 S.D	Underweight.
Length for age :	Median ± 2 S.D	Normal
	< -2 S.D	Short (stunted)
	> +2 S.D	Tall.

Weight for length :	Median ± 2 S.D	Normal
	< -2 S.D	Wasting.
	> +2 S.D	Overweight + Obese.

3. Triceps skin fold

As the fat in this region is not uniform in thickness, the site is carefully selected, half way down the arm, between the tip of the acromion process of the scapula and the top of the olecranon process of the ulna.

The measurement was made with the arm hanging relaxed at the side. The skin fold parallel to the long axis was picked up between the thumb and forefinger of the left hand, clean away from the underlying muscle, and measured at this point.

The instrument pinch area 20 - 40 mm^2, should read 0.1 mm accuracy and exert a constant pressure (10 g / mm^2) through the whole range of skin fold thickness (Jelliffe, 1966).

4. Midarm circumference

Measurement of the midarm cirumference appear to be most useful in practice as an index of caloric reserves. The region is easily accessible, even with a young child sitting infront of the examiner on his mother's lap.

Age (months)	Triceps Skinfold (mm)									
	Standard		90% stand.		80% stand.		70% stand.		60% stand.	
	M	F	M	F	M	F	M	F	M	F
Birth	6	6.5	5.4	5.9	4.8	5.2	4.2	4.6	3.6	3.9
6	10	10	9.0	9.0	8.0	8.0	7.0	7.0	6.0	6.0
12	10.3	10.2	9.3	9.2	8.2	8.2	7.2	7.1	6.2	6.1
18	10.3	10.2	9.3	9.2	8.2	8.2	7.2	7.1	6.2	6.1
24	10.0	10.1	9.0	9.1	8.0	8.1	7.0	7.1	6.0	6.1

The measures were compared to standard and assessed for the nutritional status (Jelliffe, 1966).

The midarm circumference was measured to the nearst 0.1 cm with a flexible steel or fibre glass tape, which was placed gently, around the limb to avoid compression of the soft tissue. In young infants it is necessary to use a glass-fibre tape.

The left arm was measured, while hanging freely, at its midpoint which is selected in the same way as for the triceps skinfold. (Jelliffe, 1966 and Jelliffe et al, 1989).

2. Clinical examination for any deficiency signs was done for all infants and children to assess their nutritional status (Annex II).

3. Hemoglobin determination (Annex VIII).

using Drabkin's cyanide solution as diluent (5 ml Drabkin's solution + 20 u blood) and the level is estimated using a photometric colorometer and known hemoglobin standard. A cut off point of 11.0 gm% hemoglobin concentration was taken. (WHO, 1985).

Age (months)	Midarm circumference (cm)									
	Standard		90% stand.		80% stand.		70% stand.		60% stand.	
	M	F	M	F	M	F	M	F	M	F
1	11.5	11.1	10.3	10	9.2	8.9	8	7.8	6.9	6.7
2	12.5	12	11.2	10.8	10	9.6	8.7	8.4	7.5	7.2
3	12.7	13.3	11.4	12	10.2	10.6	8.9	9.3	7.6	8.0
4	14.6	13.5	13.2	12.1	11.7	10.8	10.2	9.4	8.8	8.1
5	14.7	13.9	13.2	12.5	11.7	11.1	10.3	9.7	8.8	8.3
6	14.5	14.3	13.1	12.9	11.6	11.5	10.2	10	8.7	8.6
7	15	14.5	13.5	13.2	12	11.7	10.5	10.2	9	8.8
8	15.5	15	14	13.5	12.4	12	10.9	10.5	9.3	9
9	15.8	15.3	14.2	13.7	12.6	12.2	11	10.7	9.5	9.2
10	15.8	15.4	14.2	13.8	12.6	12.3	11.1	10.8	9.5	9.2
11	15.8	15.5	14.3	14	12.7	12.4	11.1	10.9	9.5	9.3
12	16	15.6	14.4	14	12.8	12.5	11.2	10.9	9.6	9.4
15	16.1	15.7	14.5	14.1	12.9	12.5	11.3	11	9.7	9.4
18	15.7	16.1	14.1	14.5	12.5	12.9	11	11.3	9.4	9.7
21	16.2	15.9	14.6	14.3	13	12.7	11.4	11.1	9.7	9.6
24	16.3	15.9	14.7	14.4	13	12.8	11.4	11.2	9.8	9.6

The measures were compared to standard and assessement of nutritional status was done. (Jelliffe, 1966)

Principles :

Blood hemoglobin is oxidized to methemoglobin under the influence of potassium ferricyanide and potassium cyanide which is converted to cyanomethemoglobin.

Blood samples were taken by pin prick for hemoglobin 20 μl well mixed blood was transfered to 5 ml Drabkin's solution. The mixture was measured using the spectro photometer against blank solution of Drabkin reagent. The concentration of hemoglobin was calculated after measuring the optimal density of a known concentration of hemoglobin.

Statistical Methods:

The data collected were filed on an IBM - PC computer which was used to get the statistical summary of results, to execute the statistical tests and to represent graphically some of the important findings in the study. Details of the formulae used by the computer for statistical analysis of results are given in standard statistical books (Armitage, 1971).

Descriptive Statistics:

Qualitative variables were presented as percentages from their corresponding groups or from the total together with the count of observations

Comparison of Percentages:

Qualitative variables expressed as percentages were compared in different groups using the Chi - square test. The test compares the frequencies in different groups to theoretical values under the null hypothesis. The same test was used for comparison of 2 or more groups. The Fisher's exact formula was used with small frequencies to avoid false significance.

Level of Significance:

For all the statistical tests done, the threshold of signifance is fixed at the 5% level (P-value). A P-value > 0.05 indicates nonsignificant result and the P-value <= 0.05 indicates a significant result. The smaller the P-value obtained, the more significant is the result, the P-value being the probability of error of the conclusion, i.e. the probability of seeing a given difference by chance. When the role of chance falls below 5%, it may be neglected and the difference may be considered a true significant difference.

RESULTS

RESULTS

Profile of the mothers.

Tab. (7) : Frequency and percent distribution of mothers by age and physiological status.

Age in Years	Physiological status								Total	
	Preg.		Lact.		Non preg Non lact.		Preg. Lact.			
	No	%	No	%	No	%	No	%	No	%
< 20	0	0	0	0	0	0	1	2	1	0.3
20 -	74	74	70	70	68	68	35	70	247	70.6
30 -	25	25	29	29	30	30	14	28	98	28
40 +	1	1	1	1	2	2	0	0	4	1.1
Total	100	100	100	100	100	100	50	100	350	100

Table 7 : shows that,

most of the mothers in general lie in the age group between 20 to less than 30 years (70.6%).

This table demonstrates the lack of statistical significant difference regarding the age distribution of mothers considered in the study regarding their physiological status.

Tab. (8) : Ouantitative analysis of different maternal parameters.

Parameters	Physiological status								P Value					
	I Preg.		II Lact.		III Non preg Non lact.		IV Preg. Lact.		I V II	I V III	I V IV	II V III	II V IV	III V IV
	M	S.D	M	S.D	M	S.D	M	S.D						
Age (in years)	27.8	4.5	26.7	4.5	27.7	4.7	27.3	3.9	0.1	0.5	0.3	0.1	0.2	0.3
Weight (in kgms)	70.1	12.9	63.5	10.8	66.2	5.2	68.1	5.1	< 0.05	< 0.05	0.1	0.1	0.2	0.5
Height (in cm)	159.5	6.1	155.7	5.1	156.2	5.2	158.1	5.1	< 0.05	< 0.05	0.1	0.2	< 0.05	< 0.05
Hb	10.0	0.7	10.8	1.1	11.1	1.2	9.9	0.8	< 0.05	< 0.05	0.2	0.1	< 0.05	< 0.05

< 0.05 significant.
> 0.05 nonsignificant

Table 8 : shows that,

all mothers of the different groups are of comparable age. It shows as well, that weight, height and heamoglobin of group I is not different from that of group IV i.e., no extraload by lactation in addition to pregnancy. Heamoglobin concentration is evidently lower most in pregnant lactating mothers followed by pregnant mothers, then comes the lactating and lastly the best group of nonpregnant nonlactating.

Nutritional status of mothers

The nutritional status of nonpregnant mothers was assessed by Body Mass Index (BMI) and percentage weight / height.

Tab. (9) : Frequency & percent distribution of mothers by BMI & physiological status.

BMI	Non preg. Non lact.		Lactating		Total	
	No	%	No	%	No	%
0 Normal	39	39	55	55	94	47
1 Overweight	37	37	34	34	71	35.5
2 Obese	22	22	10	10	32	16
3 Very obese	2	2	1	1	3	1.5
Total	100	100	100	100	200	100

Table 9 : shows that according to BMI 47% of the mothers were normal, 35.5% were overweight, 16% were obese and 1.5% were very obese.

Tab. (10) : Frequency & percent distribution of mothers by % Wt. / Ht. and physiological status.

% Wt. / Ht.		Grade	Non preg. Non lact.		Lactating		Total	
			No	%	No	%	No	%
Underweight	< 90	1	6	6	4	4	10	5
Normal	90 -	2	33	33	27	27	60	30
Overweight	110 -	3	18	18	16	16	34	17
obese	> 120	4	43	43	53	53	96	48
Total			100	100	100	100	200	100

While according to % weight for height in table (10) the underweight mothers were 5%, the normal were 30%, the overweight 17% and obese 48%.

Tab. (11) : Prevalence of anaemia among mothers.

Anaemia	**Non preg Non lact.**		**Lactating**		**Subtotal**		**Preg.**		**preg. lact.**		**Subtotal**		**Total mothers**	
	No	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**	**No**	**%**
Anaemic	69	69	75	75	144	72	90	90	46	92	136	90.7	280	80
Nonanaemic	31	31	25	25	56	28	10	10	4	8	14	9.3	70	20
Total	100	100	100	100	200	100	100	100	50	100	150	100	350	100

Prevalence of anaemia among all mothers was 80%. However among nonpregnant, nonlactating was 69% and among lactating was 75% with a mean of Hb value of 10.9 gm.%.

Anaemia among pregnants was 90% and pregnant and lactating was 92% with a mean Hb conc. of 9.9 gm.%.

Tab. (12) : Frequency & percent distribution of mothers by deficiency signs seen.

Deficiency signs	No	%
Pale conjunctiva	196	56
Angular stomatitis	68	19.4
Cheilosis	15	4.3
Swollen bleeding gums.	3	0.9

Table (12) shows deficiency signs seen among mothers. It is noted that 56% show pale conjunctiva, 19.4% angular stomatitis and 4.3% cheilosis and 0.9% swollen bleeding gums.

Data about Birth Interval and Family Size

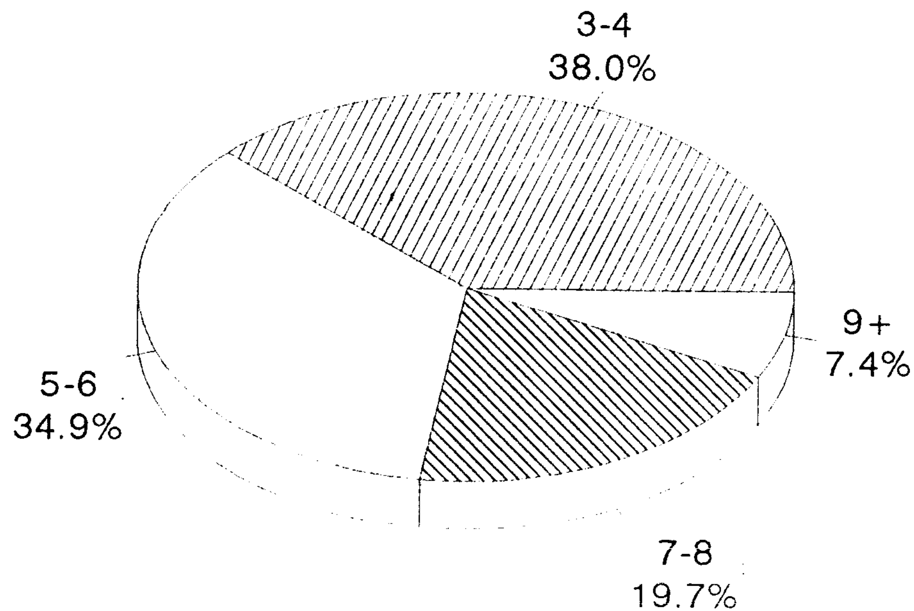
Tab. (13) : Frequency & percent distribution of family size.

Family Size	No	%
3 -	133	38
5 -	122	34.9
7 -	69	19.7
≥ 9 -	26	7.5
Total	350	100

The mean family size in the study was 5.4 person / family ± 1.9 S.D.

Table (13) and fig. (1) show that : 133 families representing 38% of the sample size consisted of 3 - 4 persons, 122 families (34.9%) consisted of 5 - 6 persons, 69 families (19.7%) consisted of 7 - 8 persons and 26 families (7.5%) consisted of 9 persons or more.

Fig.(1):DISTRIBUTION OF CHILDREN BY FAMILY SIZE



Number = 350

Tab. (14) : Frequency & percent distribution of families by number of children and type of births.

		No	%
No of living children / family	1	60	17.1
	2	95	27.1
	3	68	19.4
	4	45	12.9
	≥ 5	82	23.5
Total		350	100
No of live births / family	1	60	17.1
	2	90	25.7
	3	65	18.6
	4	41	11.7
	5	94	26.9
Total		350	100
No of still births / family	1	12	3.4
	2	1	0.3
Total		13	3.7
No of abortions	1	53	15.1
	2	20	5.2
	3	6	1.2
Total		79	22.5
No of children died / family	1	25	7.1
	2	6	1.7
	3	4	1.1
	≥ 4	2	0.6
Total		37	10.5
No of twins / family	1	14	4

In table (14) :

The duration of marriage showed a mean of 7.5 years. The mean number of living children per family was 3.1. 60 families had 1 child representing (17.1%) of the sample size. 95 families had 2 children (27.1%), 68 families had 3 (19.4%) 45 families had 4 (12.9) and 82 had five children or more representing 23.5% of the sample size.

The mean number of live births was 3.3 children. 12 families had 1 still birth and 1 family had 2 still births. 53 families had history of 1 abortion, 20 families had 2 and six had 3 abortions.

Table (14) also shows that 25 families had a history of death of 1 child, 6 families had 2, 4 families had 3 and 2 families had a history of death of 4 or more children.

Also 14 families had twins.

Birth Interval Data

Tab. (15) : Mean birth intervals between each birth & succeeding one.

Birth Interval in months	No. of children	Mean	S. D.	Range
first B.I.	207	25.2	12.6	12 - 84
second B.I.	136	25.2	13.7	11 - 70
third B.I.	100	29.1	17.6	12 - 132
fourth B.I.	51	25.9	13.5	12 - 72
fifth B.I.	23	26.3	14	11 - 54
six B.I.	11	29.4	12.6	11 - 60
seventh B.I.	5	13.8	3.4	12 - 20
eighth B.I.	1	14	0	0

The mean birth between the first and last child was 4.7 years.

However table (15) shows that each birth and succeeding one ranged from 25 - 30 months till the 7th child, while it was 14 months after that.

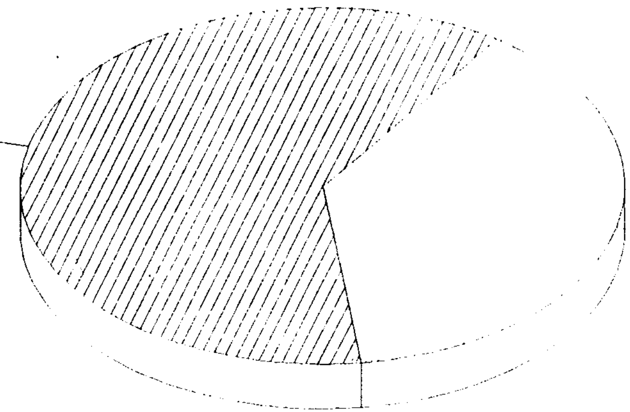
Tab. (16) : Percent distribution of children by birth interval before the last child.

Birth interval (in months)	No. of children	%
≤ 24	216	61.7
> 24 -	134	38.3
Total	350	100

Table (16) and fig. (2) : shows that the birth interval between the last born child and the previous one was 24 months or less for 216 children of the studied children.

Birth interval of mor than 24 months or more represented 38.3% of cases.

Fig.(2):DISTRIBUTION OF CHILDREN ACCORDING TO BIRTH INTERVAL



Number = 350

Social and Economic Status of The Families

Tab. (17) : Frequency & percent distribution of families by social status.

Social status of family	No.	%
Low	288	65.1
Middle	107	30.6
High	15	4.3
Total	350	100

Most of the families were of low social status. Table (17) shows that 65.1% of families were of low social status, 30.6% were of middle and only 4.3% were of high social status.

Tab. (18) : Frequency and percent distribution of families by economic status.

Economic status of family	**No.**	**%**
Low	69	19.7
Middle	229	65.4
High	52	14.9
Total	350	100

Table 18 shows that most of the families were of middle economic status. 19.7 of families were of low economic status, 65% belonged to middle and 14.9% belonged to high economic status families.

Profile of the children

Tab. (19) : Frequency & percent distribution of children by age.

Age in months	No	%
< 6	64	18.3
6 -	79	22.6
12 -	85	24.3
18 - 24	122	34.9
Total	.350	100

Table 19 shows that, the children in study were from both sexes, 52.3% males & 47.7% were females. The age of the studied children ranges between 1 month and 24 months with a mean of 13.3 months. 64 children representing 18.3% were less than 6 months. 79 children were from 6 to less than 12 months (22.6%). 85 children were from 12 to less than 18 months old (24.3%) and 123 were from 18 - 24 months representing 34.9% of the sample size.

Tab. (20) : Percent distribution of children according to birth order.

Birth Order	No	%
first child.	64	18.3
second child.	92	26.3
third child.	70	20.0
fourth child.	44	12.6
fifth child.	49	14.0
six child.	20	5.7
seventh child.	8	2.3
eighth child.	3	0.9

Table (20) shows that according to birth order, 18.3% of the children were the first child, 26.3% the second 20% the third, 12.6% the fourth, 14% the fifth, and less than 10% were of higher birth order.

Nutritional Status of children

Tab. (21) : Mean anthropometric measuements of children.

	Mean	S. D.	Range
Age (months)	13.3	7.2	1 - 24
Weight (kg)	8.1	2.7	2 - 17
Lenght (cm)	71.8	10.8	43.5 - 93
MAC (cm)	12.5	1.7	7 - 19
T.S.F. (mm)	6.9	1.8	2 - 11

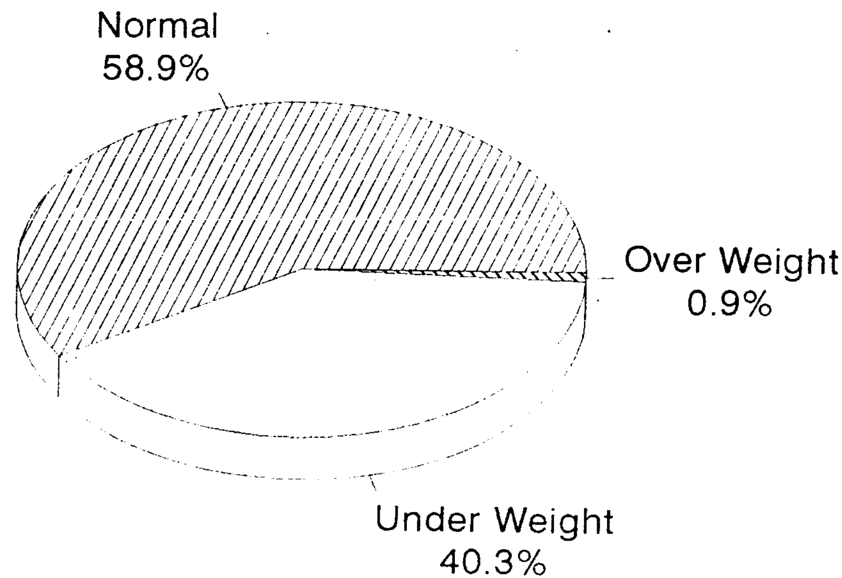
Table 21 shows that, the mean age of the children was 13.3, and their mean weight was 8.1 kg., their mean lenght 71.8 cm, midarm circumference (MAC) 12.5 cm and triceps skin fold (TSF) 6.9 mm.

Tab. (22) : Frequency & percent distribution of children according to their weight for age as compared to the reference median value.

Categories of Z - score	No	%
1. Median ± 2 S.D. (Normal).	206	58.9
2. Below median < - 2 S.D. (Underweight)	141	40.3
3. Above median > + 2 S.D. (Overweight)	3	0.9
Total	350	100

Table (22) and fig. (3) show that, 58.9% were normal weight / age, 40.3 were underweight and 0.9% were over weight. (WHO, 1983).

Fig.(3):DISTRIBUTION OF CHILDREN ACCORDING TO THEIR WEIGHT FOR AGE AS COMPARED TO THE MEDIAN REFERENCE VALUE



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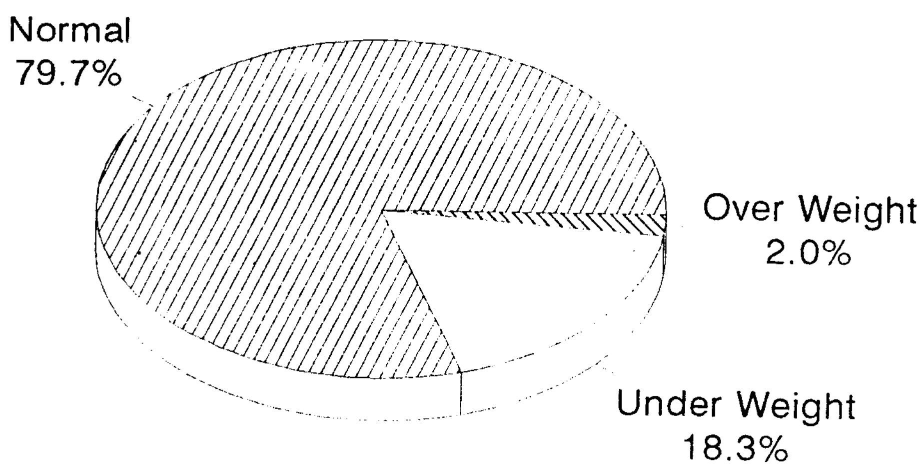
Tab. (23) : Frequency & percent distribution of children according to their weight for length as compared to the reference median value.

Categories of Z - score	No	%
1. Median ± 2 S.D. (Normal).	279	79.9
2. Below median < - 2 S.D. (Wasted)	64	18.3
3. Above median > + 2 S.D. (Overweight)	7	2.0
Total	350	100

According to weight / length, 79.7 were normal, 18.3% were wasted and 2% were overweight as seen in table (22) and fig. (4).

Fig.(4):DISTRIBUTION OF CHILDREN ACCORDING TO THEIR WEIGHT FOR LENGTH AS COMPARED TO THE MEDIAN REFERENCE VALUE



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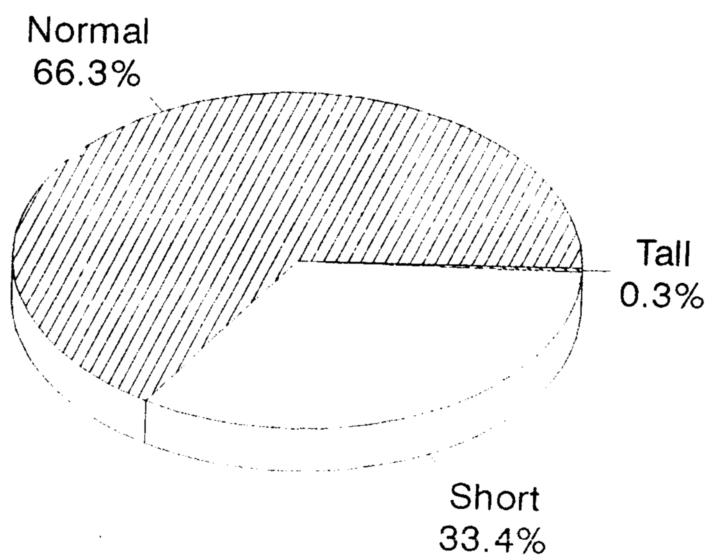
Tab. (24) : Frequency & percent distribution of children according to their length for age as compared to the reference median value.

Categories of	No	%
1. Median ± 2 S.D. (Normal).	232	66.3
2. Below median < - 2 S.D. Short (stunted)	117	33.4
3. Above median > + 2 S.D. (tall)	1	0.3
Total	350	100

Table (24) and fig. (5) show that 66.3% were normal length / age, 33.4 were short (stunted) and 0.3% were tall.

Fig.(5):DISTRIBUTION OF CHILDREN ACCORDING TO THEIR LENGTH FOR AGE AS COMPARED TO THE MEDIAN REFERENCE VALUE



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Tab. (25) : Frequency & percent distribution of children according to their MAC / age.

MAC / age		No	%
< 60% Standard	severe	5	10.8
60% Standard		33	
70% moderate		95	27.2
80% mild		158	45.2
90%	normal	47	16.8
Standard		12	
Total		350	100

Tab. (26): Frequency & percent distribution of children according to their TSF/age.

Categories of		No	%
< 60% Standard	severe	56	39.2
60% Standard		81	
70% Standard moderde		95	27.2
80% Standard mild		80	22.7
90% Standard	normal	28	109
Standard		10	
Total		350	100

Nutritional status was also assessed by Midarm circumference (MAC) for age and triceps skinfold (TSF) for age.

For MAC, 16.8% were normal for age, 45.2% showed mild malnutrition, 27.2% moderate and 10.8% severe malnutrition. But for TSF, 10.9% were normal / age, 22.7% showed mild, 27.2% moderate and 39.2 severe malnutrition as in Table (25) and (26).

Tab. (27) : Prevalence of anaemia in children.

Prevalence of anaemia		**No**	**%**
Hb < 11 gm %	anaemic	255	72.9
Hb ≥ 11 gm %	nonanaemic	95	27.1
Total		350	100

Table 27 shows that, prevalence of anaemia among children was in 72.9% of the cases with a mean heamoglobain (Hb) concentration of 10.5 ± 4.5 S. D.

Tab. (28) : Percent distribution of children by deficiency signs seen.

Deficiency signs	No	%
hair dyspigmentation.	21	6
easy pluckable hair.	24	6.9
sparesness of hair.	34	9.7
moonface.	32	9.1
odema (bileteral).	9	2.6
angular stomatitis.	80	22.9
cheilosis.	10	2.9
pale conjunctiva.	169	48.3

Deficiency signs in children is represented in table (28). Few children 6% had hair dispigmentation, 6.9% easy pluckable hair and 9.7% sparesness of hair. Moon face was seen in 9.1% of case, bilateral odema of lower limbs in 2.6%. Angular stomatitis was seen in 22.9 and cheilosis in 2.9% of cases, 48.3% of cases had pale conjunctiva.

Tab. (29) : Frequency & percent distribution of children by presence of rickets

	No	%
No Rickets	255	72.9
Rachitic	95	27.1
Total	350	100

Rickets was also diagnosed when 3 or more signs of rickets were seen in the same child. 18.3% of all cases were rachitic by clinical manifestations.

Morbidity record of the children :

Tab. (30) : Frequency and percent distribution of children by type of illness.

Type of illness	Current at exam.		Previous attack	
	No	%	No	%
Fever	188	53.7	103	29.4
Diarrhea	71	20.3	99	28.3
ARI	128	36.7	96	27.4

Pattern of diarrhea of children :

Tab. (31) :

		Current		Previous attach	
		No	%	No	%
Colour	brown.	4	5.6	1	1
	green	44	62.5	60	60.6
	yellow.	23	32.4	38	38.4
With blood		3	4.2	8	8.1
With mucous.		51	71.8	72	72.7
With vomiting.		26	36.6	47	47.5
With dehydration.		24	33.8	32	32.3

Assessment of dehydration at examination :

Tab. (32) :

Degree of dehydration	No	%
Some	22	31
Severe	2	2.8
Total	24	33.8

Classification of ARI during examination according to age :

Tab. (33) :

Classification	< 2 months		Classification	≥ 2 months	
	No	%		No	%
Very severe.	0	0	Very severe.	0	0
Severe.	0	0	Severe.	4	3.1
Cough or cold.	6	4.7	Pneumonia.	21	16.4
			Cough or Cold	97	75.8
Total	6	4.7	Total	122	95.3

Morbidity record of the children.

Morbidity record was taken concerning fever, diarrhea and acute respiratory infection (ARI), at examination and during the last month.

Table (30) shows that **at examination :**

53.7% of the children had fever.

20.3% had diarrhea lasting for a mean of 4 days and a mean of 5 times per day, 31% of them had some dehydration of whom 2.8% had severe dehydration (Table 32),

36.7% of the children (128) suffered from acute respiratory infection (ARI) lasting for a mean of 4.2 days (Table 33).

According to WHO classification of ARI.

Children less than 2 months of age 0% had very severe ARI.
0% had severe ARI.
4.7% had cough or cold.

children more than 2 months of age 0% had very severe ARI.
3.1% had severe ARI.
16.4% had pneumonia.
75.8% had cough or cold.

(Child Survival Project, 1990)

Table (30) shows that **morbidity during the last month :**

29.4% of the children had fever with a mean duration of 3.4 days.

28.3% of the children had diarrhea lasted for a mean of 5.4% days and a mean of 5.7 motions per day . 32.3% of them had dehydration (Table 31),

27.4% of children suffered from acute respiratory infection with a mean of 5.4 days (Table 33).

Feeding Pattern of Children :

- Colostrum :

Tab. (34) : Percent distribution of children by colostrum feeding.

	No	%
Infants took colostrum.	330	94.3
No colostrum	20	5.7
Total	350	100

In table (34) 94.3% of infants took colostrum with a mean of 8.2 feed / day.

Tab. (35) : Percent distribution of children by time starting colostrum feeding.

When start colostrum after birth.	No	%
1/2 hour	14	4.2
1 hour	62	18.8
1 - 6 hours	111	33.6
> 6 hours	54	16.4
> 1 day	89	27
Total	330	100

4.2% of infants started colostrum 1/2 hour after labour, 18.8% after 1 hour, 33.6% at 1 - 6 hours, 16.4% after 6 hours and 27% after 1 day as seen in table (35).

Tab. (36) : Percent distribution of feeding pattern of children according to age.

Type of feeding	< 6 months		6 - months		12 - months		18 - 24 months		Total	
	No	%	No	%	No	%	No	%	No	%
Breast only	28	8	0	0	0	0	0	0	28	8
Breast + formula	3	0.9	5	1.4	6	1.7	1	0.3	15	4.3
Breast + supplementary	9	2.5	37	10.6	41	11.7	15	4.3	102	29.1
Breast + formula + suppl.	2	0.5	1	0.3	1	0.3	1	0.3	5	1.4
Formula only.	13	3.7	14	4	7	2	3	0.9	37	10.6
Formula + supplementary.	0	0	7	1.1	0	0	0	0	7	2
Weaned completely.	6	1.7	18	5.2	29	8.3	103	29.4	156	44.6
Total	61	17.4	82	23.4	84	24	123	35.1	350	100

Tab. (37) :

Percent distribution of children according to fluids taken in addition to breast feeding.

Item	No	%
herbes decoction only	145	68.7
sugary gluids	60	28.4
calma baby	1	0.5
herbes + sugary fluids	5	2.4
Total	211	100

- Exclusive breast feeding :

Tab. (38) : Percent distribution of children by exclusive breast feeding.

	No	%
Exclusively breast fed.	139	39.7
Not exclusively breast fed.	211	60.3
Total	350	100

Table (38) : shows that 39.7% of all infants were exclusively breast fed for a duration range between 7 - 90 days with a mean of 42.4 days.

Those who were not exclusively breast fed (60.3%), 68.7% of them took herbal decoction beside breast feeding, 28.4% were given sugary fluids, 0.5% were given calma baby and 2.4% were given herbal decoction and sugary fluids table (37).

150 of children were still breast fed representing 42.6 of the sample, 28 of whom were still exclusively breast fed.

Practices of breast feeding :

Tab. (39) : Frequency & percent distribution of infants and children according to practices of breast feeding.

	No	%
Rhythmicity of breast feeding.		
day + night	337	96.3
day only.	12	3.4
night only.	1	0.3
Total	350	100
Interval between each feed.		
1 hour.	21	6
2 hours.	141	40.3
3 - 4 hours.	135	38.5
> 4 hours.	53	15.2
Total	350	100
1 or 2 breasts / feed.		
1 breast / feed.	49	14
2 breasts / feed.	301	86
Total	350	100

Table 39 shows that, the mean number of breast feeding per day was 9 and the mean duration of each feed was 11 minutes. The interval between each feed was 1 hour in 6% of infants, 2 hours in 40.1%, 3 - 4 hour in 38.7 and more than 4 hours in 15.2% of all infants.

96.3% were breast fed day and night, 3.4% during day only and 0.3% during night only

14% of the infants were fed from 1 breast and 86% were fed from both breasts.

Breast feeding was stopped at a mean of 42.3 weeks.

Breast + formula feeding :

was seen in 15 cases representing 2.3% of the whole sample (Table 36).

Formula was introduced in breast fed infants starting at age of 4-24 weeks with a mean of 10 weeks.

Breast + supplementary food :

was seen in 29.1% of cases.

Supplementary food was started in breast fed infant at a mean of 18 weeks. (Table 36).

The mean number of breast feeding was 5.5 feed / day and mean number of supplementary was 2 times / day.

Breast + formula + supplementary :

was seen in 5 cases representing 1.4% of the sample (Table 36).

Formula feeding only :

The formula fed infants were 37 cases respresenting 10.6% of the sample (Table 36).

Those infants started formula feeding at a mean of 7.9 weeks with a mean number of 4.7 feed / day.

Formula and supplementary food :

was seen in 7 cases representing 2% of the sample.(Table 36).

Weaned completely :

Those who were weaned completely were 156 cases representing 44.6% of all cases. (Table 36).

Food intake :

Tab. (40) : Distribution of infants and children by their daily nutrient intake as percent of Recommended dietary allowances (RDA).

% RDA	Energy Kcal.		Protein g		Calcum g		Iron mg	
	No	%	No	%	No	%	No	%
> 50	186	53.1	125	35.7	214	61.1	288	82.3
50 -	102	29.2	169	48.3	55	15.7	46	13.1
75 +	62	17.7	56	16	81	23.2	16	4.6
Total	350	100	350	100	350	100	350	100

Table 40 shows relatively high deficient intake of energy protein, calcium and iron. Deficiency is higher for iron than calcium, followed by energy and lastly protein.

This is manifested by the results showing that 82.3%, 61.1%, 53.1% and 35.7% of the children took less than 50% RDA of iron, calcuim, energy and protein respectively.

Tab. (41) : Distribution of infants and children by their daily energy intake as precent of RDA according to age.

Age of children	**≥ 100% RDA of Energy Intake**			
	No	**%**	**No**	**%**
> 3 months.	23	100	15	65.2
4 - 5 months.	41	100	13	31.7
6 - 7 months.	37	100	5	13.5
8 - 24 months.	249	100	3	1.2
Total	350	100	36	10.3

Table 41 shows that the older the infants, the less their intake of RDA of energy.

Study of some determinants of nutritional status of cildren less than 2 years in relation with birth interval and family size

Tab. (42) : Relation between the physiological status of the mother and weight for age of the children.

Physiological status of mother	Weight / age of children						Total	
	> + 2 S.D.		M ± 2 S.D.		< - 2 S.D.			
	No	%	No	%	No	%	No	%
Pregnant.	1	1	63	63	36	36	100	100
Lactating.	1	1	67	67	32	32	100	100
Non Preg. - Non Lact.	1	0	54	54	45	45	100	100
Preg + lact.	0	0	22	44	28	56	50	100
Total	3	0.9	206	58.9	141	40.3	350	100

CHi square = 22.7 **P < 0.05.**

The nutritional status of the children, indicated by weight for age was worst when their mothers were pregnant and lactating; 56% of children had weight for age below - 2 S.D. and was coparatively best, when their mothers were only lactating; 32% of children had weight for age < - 2 S.D.

Tab. (43) : Relation between the physiological status of the mothers and anaemia of the children.

Physiological status of mothers	Non anaemic children		Anaemic children		Total	
	No	%	No	%	No	%
Pregnant.	23	23	77	77	100	100
Non preg. - Non lact.	39	39	61	61	100	100
Lactating.	25	25	75	75	100	100
Preg. + Lact.	8	16	42	84	50	100
Total	95	27.1	255	72.9	350	100

Chi square = 11.3 **$P < 0.01$**

Table (43) shows that the physiological status of mothers significantly affects the nutritional status of children regarding anaemia. ($P < 0.05$).

Results show that prevalence of anaemia (Hb < 11 gm%) was highest among children whose mothers were both pregnant and lactating (84%) and was lowest when mothers were non pregnant nonlactating.

Tab. (44) : Relation between BMI of non pregnant mothers and nutritional status of children. (weight / age and anaemia)

BMI	Total		Weight / age of children					
			> + 2 S.D.		M ± 2 S.D.		< - 2 S.D.	
	No	%	No	%	No	%	No	%
0	94	100	0	0	56	59.6	38	40.4
1	71	100	1	1.4	40	56.3	30	42.3
2	32	100	1	3.1	24	75	7	21.9
3	3	100	0	0	1	33.3	2	66.7
Total	200	100	2	1	121	60.5	77	38.5

Chi square = 14.5 **P = 0.3**

Tab. (45) :

BMI	Total		Anaemia status of children			
			Non anaemic		Anaemic	
	No	%	No	%	No	%
0	94	100	32	34	62	66
1	71	100	24	33.8	47	66.2
2	32	100	8	25	24	75
3	3	100	0	0	3	100
Total	200	100	64	32	136	68

Chi square = 2.4 **P = 0.5**

Table (44) , (45) shows no statistically significant difference between nutritional status of nonpregnant mothers (by BMI) and nutritional status of children (weight / age and aneamia) P > 0.05.

Tab. (46) : Relation between anaemia of mothers and weight for age of children.

Anaemia status of mothers			**Weight / age of children**					
			> + 2 S.D.		**M ± 2 S.D.**		**< - 2 S.D.**	
	No	**%**	**No**	**%**	**No**	**%**	**No**	**%**
Nonanaemic	70	100	0	0	66	94.3	4	5.2
Anaemic	280	100	3	1	140	50	137	49
Total	350	100	3	0.9	206	58.9	141	40.3

Chi square = 45.4 **P < 0.01**

Table (46) reveals that anaemia of mothers affects the nutritional status of children regarding weight for age. Anaemic mothers who were representing 80% of the sample had 49% of children below - 2 S.D. weight for age, while the respective figure for nonanaemic mothers was only 5.7%.

The relation is significant. P < 0.01

Tab. (47) : Relation between anaemia of mothers and anaemia of children.

Status of anaemia of mothers			Anaemia of children			
			Non anaemic		Anaemic	
	No	%	No	%	No	%
Nonanaemic	70	100	60	85.7	10	14.3
Anaemic	280	100	35	12.5	245	87.5
Total	350	100	95	27.1	255	72.9

Chi square = 27.1 **P < 0.01**

Table (47) reveals that anaemic mothers were 280 represting 80% of the sample had anaemic children representing 87.5%, while anaemic children of nonanaemic mothers were only 14.3.

The relation is significant. P < 0.01

Tab. (48) : Relation between social status of the family and weight for age of children.

Social status of family			Weight / age of children					
			> + 2 S.D.		M ± 2 S.D.		< - 2 S.D.	
	No	%	No	%	No	%	No	%
Low	228	100	1	0.4	97	42.5	130	57.1
Middle	107	100	1	0.9	95	88.8	11	10.3
High	15	100	1	6.7	14	93.3	0	0
Total	350	100	3	0.9	206	58.9	141	40.3

Chi square = 88.1 **P < 0.01**

Table (48) shows that 57.1% of children belonging of families of low social status were below - 2 S.D. weight for age, while in high social status families, none of their children were under weight. This relation is highly significant P < 0.01.

Tab. (49) : Relation between social status of family and anaemia of children.

Social status of family			Anaemia of children			
			Nonanaemic		Anaemic	
	No	%	No	%	No	%
Low	228	100	15	6.6	213	93.4
Middle	107	100	70	65.4	37	34.6
High	15	100	10	66.4	5	33.3
Total	350	100	95	27.1	255	72.9

Chi square = 139.8 **P < 0.05**

Table (49) shows that 93.4% of children of low social status families were anaemic, while 34.6% of children of middle social status families were anaemic, while only 33.6% of children of high social status were anaemic.

The relation is highly significant (P < 0.001).

Tab. (50) : Relation between the economic status of the family and Wt / age of children.

Economic status of family			Weight / age					
			> + 2 S.D.		M ± 2 S.D.		< - 2 S.D.	
	No	%	No	%	No	%	No	%
Low	69	100	1	1.5	21	30.4	47	68.1
Middle	229	100	1	0.4	137	59.8	91	39.8
High	52	100	1	1.9	48	92.3	3	5.8
Total	350	100	3	0.9	206	58.9	141	40.3

Chi square = 54.9 **P < 0.01**

Table (50) shows that 68.1% of children of low economic status family were below - 2 S.D. weight for age, 39.8% of children of middle economic status were below - 2 S.D. weight for age and only 5.8% of children of high economic status were below - 2 S.D. weight for age.

There is high statistic significant diffrence (P < 0.01) between the three groups.

Tab. (51) : Relation between economic status of family and anaemia of children.

Economic status of family			Anaemia status of children			
			Nonanaemic		Anaemic	
	No	%	No	%	No	%
Low	69	100	2	2.9	67	97.1
Middle	229	100	55	24	174	76
High	52	100	38	73	14	27
Total	350	100	95	27.1	255	72.9

Chi square = 77.1 **P < 0.01**

Table (51) shows that 97.1% of the children belonging to low economic status families were anaemic, while 76% of children of middle economic status families were anaemic and 27% of high economic status families were anaemic.

This relation is highly significant (P < 0.01).

Tab. (52) : Relation between anaemia of children and family size, number of living children, birth order and birth interval.

Presenc or absence of anaemia	Total No 350	Family size		No of living children per family		Birth order		Birth interval (months)	
	No	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
No anaemia.	95	4	1.1	1.9	1	1.8	1.6	24	23
Anaemia	255	6	1	3.6	1.7	3.5	1	20	13
T. test.		- 9.4		- 9.4		9.6		2	
P.		0.00004		0.0000		0.00005		0.02	

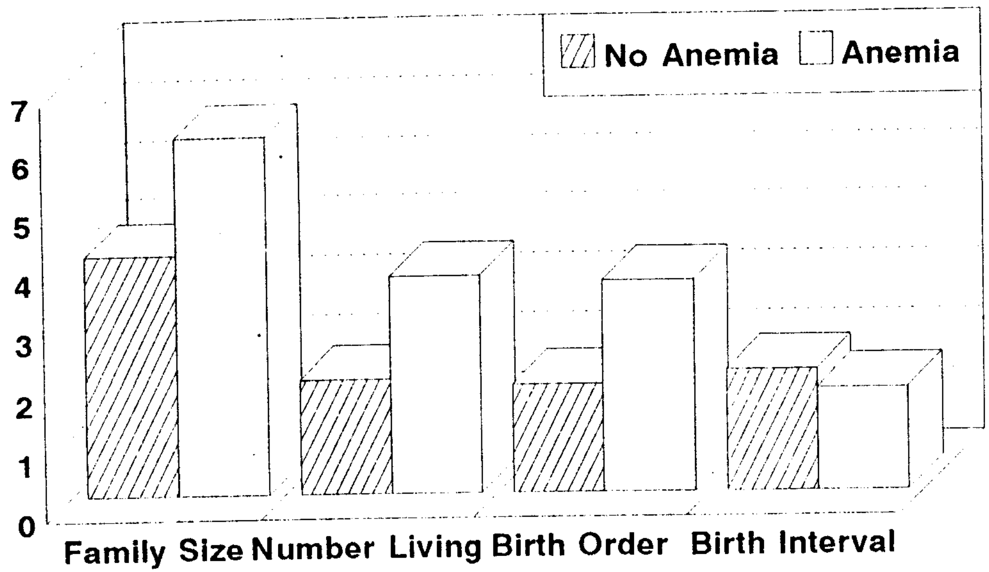
Table (52) and fig. (6) shows that anaemic children belonged to families with a mean of 6 persons per family, while nonanaemic belonged to families of a mean of 4 persons per family.

Anaemic children belonged to families with a mean of 3.6 living children per family and had a mean birth order of 3.5 and a mean birth interval of 20 months.

Nonanaemic children belonged to families with a mean of 1.9 living children per family, and had a mean birth order of 1.8 and a mean birth interval of 24 months.

The statistic difference is significant.

Fig.(6):RELATION BETWEEN ANEMIA AND FAMILY SIZE, LIVING SIBLINGS, BIRTH ORDER AND BIRTH INTERVAL IN YEARS



Number = 350

Tab. (53) : Relation between number of living children and weight for age of children.

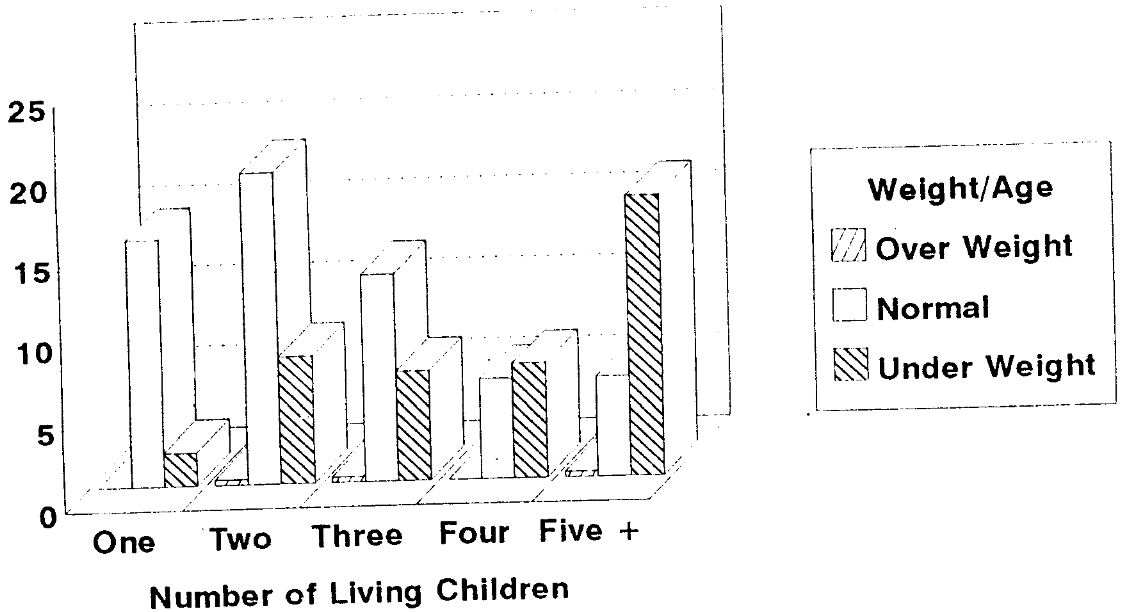
No of living children			Weight / age					
			> + 2 S.D.		M ± 2 S.D.		< - 2 S.D.	
	No	%	No	%	No	%	No	%
1 -	60	100	0	0	53	88.3	7	11.7
2 -	95	100	1	1	67	70.6	27	28.4
3 -	68	100	1	1.5	44	64.7	23	33.8
4 -	45	100	0	0	21	46.7	24	53.3
≥ 5	82	100	1	1.2	21	25.6	60	73.2
Total	350	100	3	0.9	206	58.9	141	40.3

Chi square = 99.8 **P < 0.05**

Table (53) and fig. (7) shows that the majority of children (73.2) belonging to families with 5 or more living children were < - 2 S.D. weight for age.

This relation is significant. The less the number of living children per family the less was the number of underweight children.

Fig.(7):RELATION BETWEEN NUMBER OF LIVING CHILDREN AND WEIGHT FOR AGE OF CHILDREN



Number = 350

Tab. (54) : Relation between family size and weight for age of children.

Family size			Weight / age					
			> + 2 S.D.		M ± 2 S.D.		< - 2 S.D.	
	No	%	No	%	No	%	No	%
3 -	123	100	1	0.8	109	81.9	23	17.3
5 -	122	100	1	0.8	68	55.7	53	43.5
7 -	69	100	1	1.5	21	30.4	47	68.1
≥ 9	26	100	0	0	8	30.8	18	69.2
Total	350	100	3	0.9	206	58.9	141	40.3

Chi square = 98.1 **P < 0.001**

Table (54) shows that 69.2% of children belonging to families with 9 or more persons per family were below - 2 S.D. weight for age. While those belonging to families with less than 5 persons per family, only 17.3 % were < - 2 S.D. weight for age.

The statistical difference is highly significant.

Tab. (55) : Relation between birth order of the children and their weight for age.

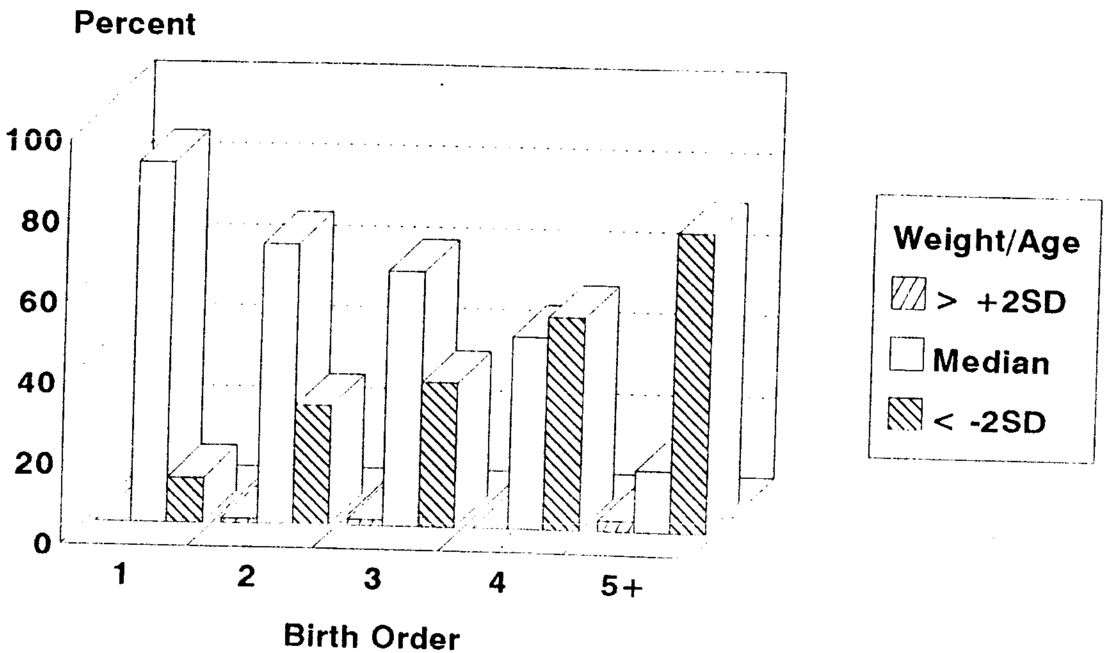
Birth order			Weight / age					
			> + 2 S.D.		M ± 2 S.D.		< - 2 S.D.	
	No	%	No	%	No	%	No	%
1	64	100	0	0	57	89	7	11
2	92	100	1	1.1	64	69.6	27	29.3
3	70	100	1	1.4	44	62.9	25	35.7
4	44	100	0	0	21	47.7	23	52.3
5	49	100	1	2	12	24.5	36	73.5
6	20	100	0	0	8	40	12	60
7	8	100	0	0	0	0	8	100
8	3	100	0	0	0	0	3	100
Total	350	100	3	0.9	206	58.9	141	40.3

Chi square = 90.6 **P < 0.001**

Table (55) and fig. (8) shows that children with birth order 1, only 11% of them were below - 2 S.D. weight for age; and the more the birth order, the more were the number of children below - 2 S.D.

This relation is highly significant (P < 0.001).

Fig.(8)RELATION BETWEEN WEIGHT/AGE AND BIRTH ORDER OF THE CHILD



Tab. (56) : Relation between birth interval of children and their weight for age.

Birth interval (months)			Weight / age					
			> + 2 S.D.		M ± 2 S.D.		< - 2 S.D.	
	No	%	No	%	No	%	No	%
< 24 months	216	100	0	0	88	40.7	128	59.3
≥ 24 months	134	100	3	2.2	118	88.1	13	9.7
Total	350	100	3	0.9	206	58.9	141	40.3

Chi square = 98.1 **P < 0.001**

Table (56) shows that 59.3% of children with birth interval less than 24 months were below - 2 S.D. while only 9.7% of children with birth interval more than 24 months were below - 2 S.D. weight for age.

The statistical difference is significants.

Tab. (57) : Relation between morbidity (during the last month) and weight for age of children.

Morbidity during the last month			Weight / age						Ch²	P
			> + 2 S.D.		M ± 2 S.D.		< - 2 S.D.			
	No	%	No	%	No	%	No	%		
Fever	103	100	0	0	59	57.3	44	42.7	2.6	0.6
Diarrhea	99	100	0	0	53	53.5	46	46.5	5.7	0.2
ARI	96	100	1	1.1	51	53.1	44	45.8	5.3	0.3

Table (57) shows that children who suffered from fever during the last month before examination, 57.3% were normal weight for age and 42.7% wer below - 2 S.D. weight for age. Those who had diarrhea, 53.5% were normal weight for age and 46.5% below - 2 S.D. weight for age. Also those suffered from acute respiratory infection, 1.1% were above + 2 S.D, 53.1% were normal weight for age and 45.8% below - 2 S.D.

There was no statistic significant difference between the three groups.

Tab. (58) : Relation between morbidity (during the last month) and anaemia of children.

Morbidity during the last month			status of anaemia of children				Chi²	P
			Nonanaemic		Anaemic			
	No	%	No	%	No	%		
Fever	103	100	16	15.5	87	84.5	without continiuty	< 0.0001
Diarrhea	99	100	12	12.1	87	87.9	without continiuty	< 0.0001
ARI	96	100	20	20.8	76	79.2	without continiuty	0.09

Table (58) shows that most of the children who suffered from fever & diarrhea during the last month before examination were anaemic representing 85.5% and 87.9% respectively and only 15.5% and 12.1% were nonanaemic. So, this relation is significant.

However, there was no significant difference between anaemic and nonanaemic children regarding acute respiratory infection (P=0.09).

Tab. (59) : Relation between morbidity during examination and weight for age of children.

Morbidty during examination			Weight / age						X^2	P
			> + 2 S.D.		M ± 2 S.D.		< - 2 S.D.			
	No	%	No	%	No	%	No	%		
Fever	188	100	2	1.1	107	56.9	79	42	7.9	0.2
Diarrhea	71	100	0	0	33	46.5	38	53.5	9.4	0.05
Dehydration	24	100	0	0	8	33.3	16	66.7	6	0.04
ARI	128	100	2	1.6	66	51.6	60	46.8	5.7	0.2

Table (59) shows that nearly half of the children who were complaining of diarrhea at examination were below - 2 S.D. weight for age representing (53.5%).

Also those who had dehydration, 66.7% of them were below - 2 S.D. weight for age.

So this relation is significant.

However, there was no significant difference between those who suffered from fever or acute respiratory infection and those who did not suffer regarding their weight for age.

Tab. (60) : Relation between morbidity (during examination) and anaemia of children.

Morbidity during the last month			Prevalence of anaemia of children				Chi^2	P
			Nonanaemic		Anaemic			
	No	%	No	%	No	%		
Fever	188	100	92	48.9	96	51.1	2.9	< 0.0001
Diarrhea	71	100	10	14.1	61	85.9	without continiuty	< 0.0005
Dehydration	24	100	1	4.2	23	95.8	without continiuty	0.09
ARI	128	100	30	23.4	98	76.6	without continiuty	0.2

Table (60) reveals thaat nearly half of the children who suffered from fever at examination were anaemic representing 51.1%. Also those who had diarrhea, 85.9 of them were anaemic.

So, there was a significant difference between both groups. However, there was no statisfical significant difference between anaemic or nonanaemic children regarding dehydration or acute respiratory infection (P 0.09 & 0.2 respectively).

Feeding Pattern

Tab. (61) : Relation between children who were colostrum fed and those who were not colostrum fed and their weight for age.

Colostrum	Total		Weight / age					
			> + 2 S.D.		M ± 2 S.D.		< - 2 S.D.	
	No	%	No	%	No	%	No	%
Colostrum fed	330	100	3	0.9	196	59.4	131	39.7
Noncolostrum fed	20	100	0	0	10	50	10	50
Total	350	100	3	0.9	206	58.9	141	40.3

Chi square = 45.4 **P = 0.5**

Table (61) shows that 94.3% of the children were colostrum fed. 59.4% of them were normal weight for age.

50% of those who were not colostrum fed were normal weight for age. So, there was no statistic significant difference between both groups.

Tab. (62) : Relation between children who took colostrum and those who did not take colostrum and presence or obsence of anaemia.

Colostrum	**Total**		**Anaemia status of children**			
			Non anaemic		**Anaemic**	
	No	**%**	**No**	**%**	**No**	**%**
Colostrum fed	330	100	89	27	241	73
Noncolostrum fed	20	100	6	30	14	70
Total	350	100	95	27.1	255	72.9

Chi square = without continuity **P = 0.7**

Table (62) reveals no statistical significant difference in the status of anaemia between those who were been colostrum fed and those who were not.

Tab. (63) : Relation between start of colostrum feeding and weight for age of children

When start colostrum after birth	Total		Weight / age					
			> + 2 S.D.		M ± 2 S.D.		< - 2 S.D.	
	No	%	No	%	No	%	No	%
1/2 hour	14	100	0	0	8	57.1	6	42.9
1 hour	62	100	0	0	43	69.4	19	30.6
1 - 6 hours	111	100	1	0.9	70	63.1	40	36
> 6 hours	54	100	0	0	32	59.3	22	40.7
> 1 day	89	100	2	2.2	43	48.3	44	49.5
Total	330	100	3	0.9	196	59.4	131	39.7

Chi square = 13 **P = 0.6**

Table (63) shows that most of the children were normal weight for age and there was no statistical difference regarding when did they start colostrum.

Tab. (64) : Relation between when start colostrum feeding and anaemia of children.

When start colostrum after birth	Total		Anaemia status of children			
			Non anaemic		Anaemic	
	No	%	No	%	No	%
1/2 hour	14	100	5	35.7	9	64.3
1 hour	62	100	23	37.1	39	62.9
1 - 6 hours	111	100	36	32.4	75	67.6
> 6 hours	54	100	11	20.4	43	79.6
> 1 day	89	100	14	15.7	75	84.3
Total	330	100	89	27	241	73

Chi square = 12.3 **P = 0.01**

Table (64) shows that the later the infant had been started colostrum feeding the more were the number of anaemic children.

The relation is significant (P = 0.01)

Tab. (65) : Relation between feeding pattern and weight for age of children.

Type of feeding			Weight / age of children							
			> + 2 S.D.		M± 2 S.D		< - 2 S.D.		Ch[2]	P
	No	%	No	%	No	%	No	%		
Exclusively breat feeding	139	100	1	0.7	92	66.2	46	33.1	5.8	0.2
Breast + formula	15	100	0	0	6	40	9	60	6.7	0.2
Breast + supplementary	102	100	0	0	55	53.9	47	46.1	4.1	0.3
Breast + formula + suppl.	5	100	0	0	3	60	2	40	4.7	0.3
Formula only	37	100	1	2.8	18	48.6	18	48.6	10.9	0.02
Formula + supplementary	7	100	0	0	6	85.7	1	14.3	2.3	0.7
Weaned completely	156	100	1	0.6	99	63.5	56	35.9	9.9	0.04

Tab. (66) : Relation between feeding pattern and anaemia of children.

Type of feeding			Status of anaemia of children					
			Non anaemic		anaemic		Ch^2	P
	No	%	No	%	No	%		
Exclusively Breat feeding	139	100	50	36	89	64	without continiuty	< 0.001
Breast + formula	15	100	4	26.7	11	73.3	without continiuty	0.9
Breast + supplementary	102	100	26	25.5	76	74.5	without continiuty	0.6
Breast + formula + suppl.	5	100	1	20	4	80	without continiuty	0.7
Formula only	37	100	14	37.8	23	62.2	without continiuty	0.1
Formula + supplementary	7	100	2	28.6	5	71.4	without continiuty	0.9
Weaned completely	156	100	34	21.8	122	78.2	without continiuty	0.04

Tab. (67) : Relation between exclusively breast feeding and anaemia of children.

Type of feeding			Anaemia status of children			
	Total		Non anaemic		Anaemic	
	No	%	No	%	No	%
Exclusively breast feeding.	139	100	50	36	89	64
Nonexclusively breast feeding.	211	100	45	21.3	166	78.7
Total	350	100	95	27.1	255	72.9

Chi square = without continuity **P < 0.001**

Tables (65), (66) and (67) :

- show that most of the children who were exclusivly breast fed were normal weight for age representing 66.2% . This relation is not significant.

  But 64% of them were anaemic and this relation is significant. (P< 0.001). in compareson with 78.7% who were not exclusively breast fed.

- In breast & formula,

  breast & supplementary,

  breast & formula & supplementary,

  formula & supplementarey,

  fed children, there was no statistic relation between the type of feeding and their weight for age or their anaemic status.

- In formula fed children, 48.6% were below - 2 S.D. weight for age. This relation is significant (P = 0.02).

- In completely weaned children, 35.9% of them were below -2 S.D. and 78.2% were anaemic.

  This relation is significant (P = 0.04).

Tab. (68) : Relation between anaemia of mothers and birth interval and family size.

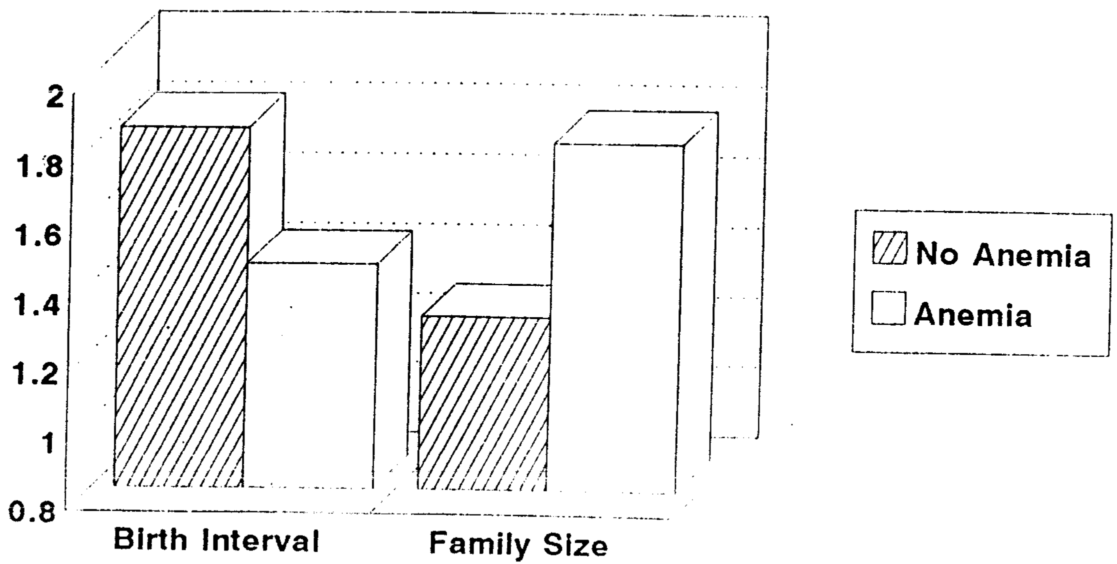
Status of anaemia of mothers	No of mother 350		Birth Interval		P	T	Family size		P	T
	No	%	Mean	S.D.			Mean	S.D.		
Anaemia	280	80	17.4	22.6	0.01	-2	5.8	1.8	0.0001	-8
No anaemia.	70	20	22.1	14.5			3.8	1.3		

Table (68) and fig. (9) shows that the mean birth interval of children was shorter among anaemic mothers (17.4 months) than non anaemic mothers (22.1 months).

Also, the mean family size was 5.8 persons per family among anaemic mothers but was 3.8 persons per family among nonanaemic mothers.

There is a significant difference between both groups.

Fig.(9):RELATION BETWEEN ANEMIA OF THE MOTHER AND BIRTH INTERVAL (IN YEARS) AND FAMILY SIZE



Number = 350

Tab. (69) : Relation between social status and birth interval and family size.

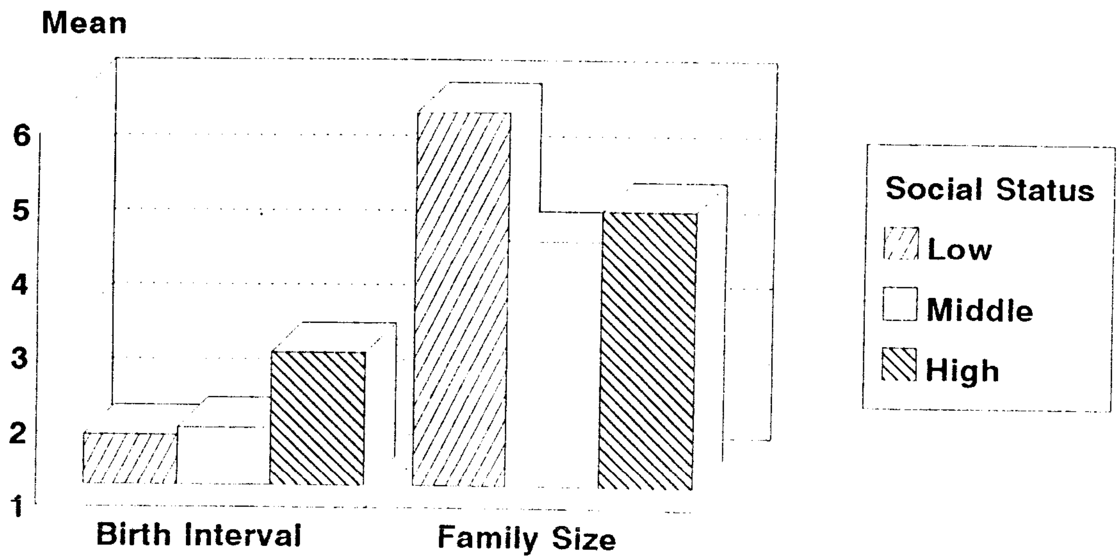
Social status	Total no. 350	Mean Birth interval	P	Mean Family size	P
Low	288	20.2	< 0.001	6	< 0.001
Middle	107	21.4		4.3	
High	15	33.5		4.7	

Table (69) and fig (10) shows that in low social class families, the mean birth interval was 20.2 months, in middle social class familie was 21.4 and in hight social class was 33.5 months.

Regarding the family size, in low social class, the mean family size was 6 persons per family, in middle and high was 4.3 and 4.7 respectively.

There was highly significant difference between the different groups.

Fig.(10):RELATION BETWEEN SOCIAL STATUS AND BIRTH INTERVAL (IN YEARS) AND FAMILY SIZE



Number = 350

Tab. (70) : Relation between economic status of the family and family size

Economic status	Total		Family size							
			3 -		5 -		7 -		≥ 9	
	No	%	No	%	No	%	No	%	No	%
Low	69	100	11	15.9	20	29.1	27	39.1	11	15.9
Middle	229	100	88	38.4	89	38.9	37	16.2	15	6.5
High	52	100	34	65.4	13	25	5	9.6	0	0
Total	350	100	133	38	122	34.9	69	19.7	26	7.4

Chi square = 67 **P = < 0.001**

Table (70) and fig. (11) reveals that the lower the economic status the more was the family size.

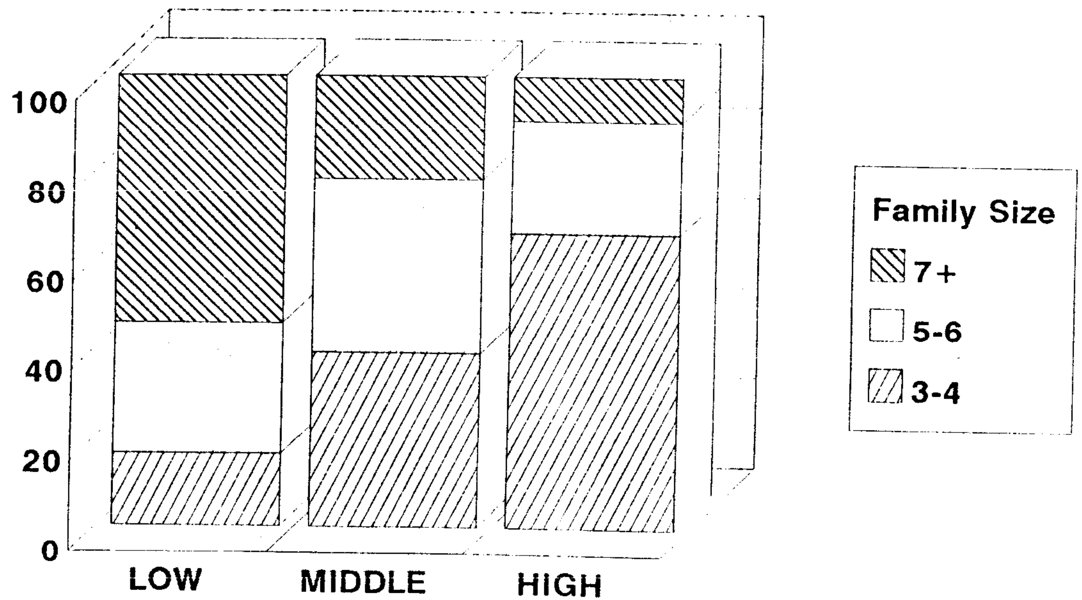
In low economic status families 11 out of 69 families were composed of 9 or more persons per family representing 15.9%.

In middle economic status, 15 out of 229 families were composed of 9 or more persons per family representing 6.5%.

In high economic status, there was no families composed of 9 or more persons per family.

So there is highly significant difference between the different groups ($P < 0.001$).

Fig.(11):RELATION BETWEEN ECONOMIC STATUS AND FAMILY SIZE



Number = 350

Tab. (71) : Relation between economic status of family and birth interval

Economic status	**Total no. 350**	**% 100**	**Mean Birth interval (in months)**
Low	69	19.7	21
Middle	229	65.4	22.4
High	52	14.9	24.5

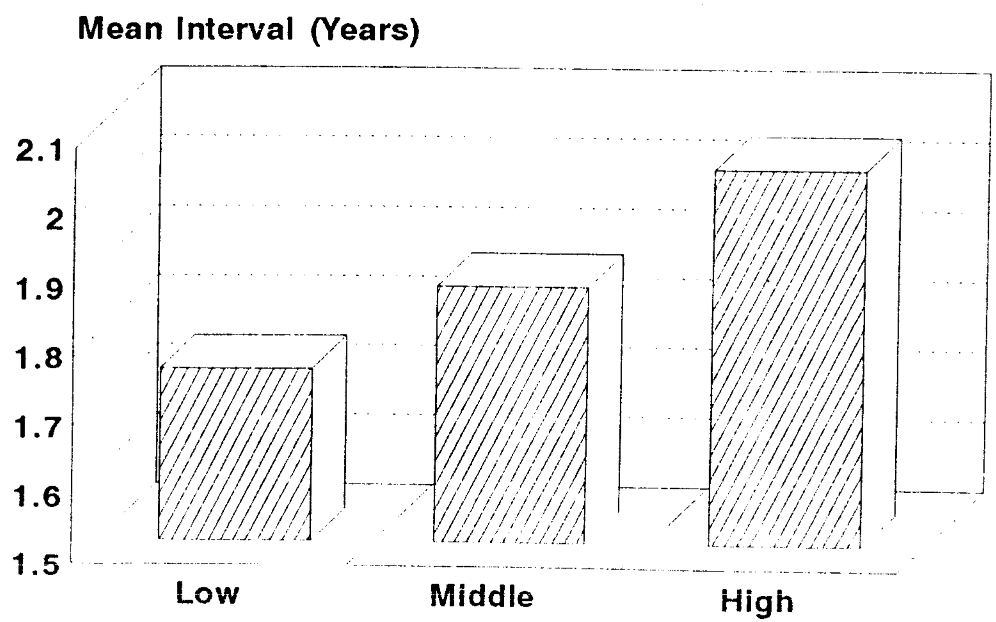
P < 0.0001

Table (71) and fig. (12) shows that, in low economic status families, the mean birth interval was 21 months, in middle 22.4 months and in high economic status, 24.5 months.

The better the economic status, the longer was the birth interval.

There is highly statistic significant difference between the different groups.

Fig.(12):RELATION BETWEEN ECONOMIC STATUS OF FAMILY AND BIRTH INTERVAL (YEARS)



Number = 350

Tab. (72) : Relation between BMI of nonpregnant mothers and birth interval and family size.

BMI	Total no. of mothers 200	Mean Birth interval	P	Mean Family size	P
0	94	21.9	0.3	5.3	0.4
1	71	21.3		5.4	
2	32	28.7		5.5	
3	3	22.3		7.3	

Table (72) reveals that there was no statistical significant difference between the means of birth interval and means of family size regarding the BMI of nonpregnant mothers.

Morbidity

Tab. (73) : Relation between morbidity (fever + diarrhea + acute respiratory infection) during the last month and birth interval and family size.

Morbidity	Number	Birth interval				Family size			
		Mean	S.D	P	T	Mean	S.D	P	T
Fever	103	22.9	17.7	0.1	- 1	5.5	2	0.3	5
No fever	247	20.4	16			5.4	1.9		
Total	350								
Diarrhea	99	20.8	16.9	0.4	0.2	5.5	2.1	0.4	- 3
No Diarrhea	251	21.3	16.5			5.4	1.8		
Total	350								
ARI	96	23.5	17.3	0.06	- 1	5.7	1.9	0.06	- 1
No ARI	254	20.3	16.2			5.3	1.9		
Total	350								

Table (73) reveals that all the tested morbidities during the last month before examination was not affected by birth interval or family size.

Morbidity

Tab. (74) : Relation between morbidity (fever + diarrhea + ARI) at examination and birth interval and family size.

Morbidity	Number	Birth interval				Family size			
		Mean	S.D	T	P	Mean	S.D	T	P
Fever	188	16	16.6	2.7	0.003	5.4	1.8	0.6	0.3
No fever	162	20.7	15.7			5.5	2		
Diarrhea	71	20	16	0.7	0.2	5	1.9	1.8	0.03
No Diarrhea	279	21.5	16.9			5.5	2		
ARI	128	19.5	17.3	1.4	0.08	5.6	2	0.8	0.2
No ARI	22	22.1	16.1			5.4	1.9		

Table (74) shows that those children who had fever had shorter birth interval than those who did not suffer from fever at examination. Fever had no effect on family size.

While those who suffered from diarrhea at examination belonged to larger family size than who did not suffer from diarrhea.

Tab. (75) : Relation between dehydration and birth interval and family size (at examination)

Presence or absence of Dehydration	Number	Birth interval				Family size			
		Mean	S.D	T	P	Mean	S.D	T	P
Dehydration	24	16.2	10.7	1.5	0.06	5.4	1.9	0.3	0.06
No Dehydration	47	22	16.9			5.2	1.6		

Table (75) revals that there was no significant relation between children who suffered from dehydration and their birth intervals and family size.

Feeding Pattern

Tab. (76) : Relation between children who took colostrum and their birth intervals and family size.

Colostrum	Total No. 350	Birth interval				Family size			
		Mean	S.D	T	P	Mean	S.D	T	P
Colostrum fed	330	21.6	16.7	- 1	0.02	5.4	1.8	1.2	0.1
Non colostrum fed	20	14	12			5.9	2.6		

P > 0.05

Table (76) shows that children who were colostrum fed had a longer mean birth interval (16.7 months) than those who were not colostrum fed (12 months).

There is a statistical significant difference between both groups. Concerning family size, there is no significant difference between both groups. .

Tab. (77) : Relation between exclusively breast feeding of infants and their birth intervals and family size.

Exclusively breast feeding	Total No. 350	Birth interval				Family size			
		Mean	S.D	T	P	Mean	S.D	T	P
Exclusively breast fed	139	21.4	18.3	- 0.2	0.4	5.1	1.8	2.5	< .0001
Not exclusively breast fed	221	20.9	15.4			5.6	1.9		

Table (77) reveals that children who were exclusively breast fed had a smaller mean family size (5.1 persons per family) than those who were not exclusively breast fed (5.6 persons per family). There is a statistic significant difference between both groups.

However, there is no statistical significant difference between both groups regarding birth interval.

Tab. (78) : Relation between energy and nutrient intake and family size.

Energy and nutrient Intake	**Family Size r - value**
Energy (kcal).	0.006
Animal Protein.	- 0.03
Plant Protein.	0.2
Animal fat.	- 0.1
Plant fat.	0.09
Carbohydrates.	0.09
Calcium.	- 0.06

r - value
Critical value > + 0.08

Table (78) shows that the more the family size, the less was the energy intake, the less animal protein, more plant protein less animal fat, more plant fat and carbohydrates and less calcium intake.

Tab. (79) : Relation between food intake and weight for age of children.

Food Item	% RDA	Total		Z score weight for age						Ch²	P
				> + 2 S.D.		M		< - 2 S.D.			
		No	%	No	%	No	%	No	%		
Energy	< 50	186	100	3	1.6	107	57.5	76	40.9	4.2	0.4
	50 -	102	100	0	0	58	56.9	44	43.1		
	≥ 75	62	100	0	0	41	66.1	21	33.9		
Total		350	100	3	0.9	206	58.9	141	40.3		
Protein	< 50	125	100	2	1.6	72	57.6	51	40.8	4.2	0.4
	50 -	169	100	0	0	99	58.6	70	41.4		
	≥ 75	56	100	1	1.8	35	62.5	20	35.7		
Total		350	100	3	0.9	206	58.9	141	40.3		
Calcium	< 50	214	100	3	1.4	122	57	89	41.6	8.7	0.07
	50 -	55	100	0	0	27	49.1	28	50.9		
	≥ 75	81	100	0	0	57	70.4	24	29.6		
Total		350	100	3	0.9	206	58.9	141	40.3		
Iron	< 50	288	100	3	1	162	56.3	123	42.7	5	0.3
	50 -	46	100	0	0	32	69.6	14	30.4		
	≥ 75	16	100	0	0	12	75	4	25		
Total		350	100	3	0.9	206	58.9	141	40.3		

Table (79) :

- shows that children who took less than 75% of their RDA in Energy, 41.6% of them were below - 2 S.D. weight for age, while those who took 75% or more of RDA only 33.9% were below - 2 S.D. weight for age.
- Regarding Protein, 39.2% of children who took less than 75% of RDA were below - 2 S.D. weight for age, while 41.4% of children who took 75% or more of RDA, were below - 2 S.D. weight for age.
- In case of calcium, 43.5% of children who took less than 75% of RDA were below - 2 S.D. weight for age, and only 29.6% of those who took 75% or more of RDA were below - 2 S.D.
- Regarding Iron, 41% of children who took less than 75% of RDA were below - 2 S.D. weight for age and only 25% of those who took 75% or more of RDA were below - 2 S.D.

The relation is not significant.

Tab. (80) : Effect of birth interval size on the nutritional status of children less than 2 years with consideration of intervening variables.

Birth Interval

Intervening variables	Total No. of children	Prevalence of underweight among children – Birth Interval – ≤ 24 months: Normal Wt / age + over-weight No	%	Underwt No	%	Total No	%	> 24 months: Normal Wt / age + over-weight No	%	Underwt No	%	Total No	%	χ^2	P
Age of mothers															
< 20	1	1	100	0	0	1	100	0	0	0	0	0	0	0	0
20 -	247	91	52.3	83	47.7	174	100	66	90.5	7	9.5	73	100	32.3	< 0.001
30 -	98	14	24.1	44	75.9	58	100	35	87.2	5	12.8	40	100	38	< 0.001
40 +	4	0	0	2	100	2	100	2	100	0	0	2	100	4	0.04
Total	350	106	45.1	129	54.9	235	100	103	89.6	12	10.4	115	100		
Physiological status of mothers															
Preg.	100	36	51.4	34	48.6	70	100	28	93.3	2	6.7	30	100	16	< 0.0001
Lact.	100	33	53.2	29	46.8	62	100	35	92.1	3	7.9	38	100	16.4	< 0.0001
Nonpreg. nonlact.	100	24	38.7	38	61.3	62	100	31	81.6	7	18.4	38	100	17.5	< 0.0001
Preg. + Lact.	50	13	31.7	28	68.3	41	100	9	100	0	0	9	100	14	< 0.0001
Total	350	106	45.1	129	54.9	235	100	103	89.6	12	10.4	115	100		
Maternal BMI															
0	94	55	88.7	7	11.3	62	100	27	84.4	5	15.6	32	100	0.4	0.5
1	71	19	43.2	25	56.8	44	100	22	81.5	5	18.5	27	100	10.1	< 0.0001
2	32	9	56.2	7	43.8	16	100	16	100	0	0	16	100	9	< 0.0001
3	3	0	0	2	100	2	100	1	100	0	0	1	100	3	0.08
Total	200	83	70.2	41	29.8	124	100	66	86.8	10	13.2	76	100		

Intervening variables	Total No. of children	Prevalence of underweight among children												χ^2	P
		Birth Interval													
		≤ 24 months						> 24 months							
		Normal Wt / age + over-weight		Underwt		Total		Normal Wt / age + over-weight		Underwt		Total			
		No	%	No	%	No	%	No	%	No	%	No	%		
Anaemia Status of mothers															
No anaemia	70	38	90.5	4	9.5	42	100	28	100	0	0	28	100	2.8	0.09
Anaemia	280	68	35.2	125	64.8	193	100	75	86.2	12	13.8	87	100	62.4	< 0.0001
Total	350	106	45.1	129	54.9	235	100	103	89.6	12	10.4	115	100		
Social status of family															
Low	228	52	30.6	118	69.4	170	100	46	79.3	12	20.7	58	100	41.9	< 0.001
Middle	107	48	81.4	11	18.6	59	100	48	100	0	0	48	100	10	< 0.001
High	15	6	100	0	0	6	100	9	100	0	0	9	100	0	
Total	350	106	45.1	129	54.9	235	100	103	89.6	12	10.4	115	100		
Economic status of family															
Low	69	8	15.4	44	84.6	52	100	14	82.4	3	17.6	17	100	26.5	< 0.001
Middle	229	77	48.4	82	51.6	159	100	61	87.1	9	12.9	70	100	30.4	< 0.001
High	52	21	87.5	3	12.5	24	100	28	100	0	0	28	100	3.7	0.05
Total	350	106	45.1	129	54.9	235	100	103	89.6	12	10.4	115	100		
No. of living children															
≤ 5	316	104	49.1	108	50.9	212	100	95	91.3	9	8.7	104	100	53.5	< 0.0001
> 5	34	2	8.7	21	91.3	23	100	8	72.7	3	27.3	11	100	14.7	< 0.0001
Total	350	106	45.1	129	54.9	235	100	103	89.6	12	10.4	115	100		
Birth order															
≤ 5	319	104	48.8	109	51.2	213	100	97	91.5	9	8.5	106	100	55.3	< 0.0001
> 5	31	2	9.1	20	90.9	22	100	6	66.7	3	33.3	9	100	11.1	< 0.0001
Total	350	106	45.1	129	54.9	235	100	103	89.6	12	10.4	115	100		
Anaemia status of children															
No anaemia	95	42	97.7	1	2.3	43	100	52	100	0	0	52	100	1.2	0.3
Anaemia	255	64	33.3	128	66.7	192	100	51	81.0	12	19	63	100	43.4	< 0.001
Total	350	106	45.1	129	54.9	235	100	103	89.6	12	10.4	115	100		

Family Size

Intervening variables	Total No. of children	Prevalence of underweight among children												χ^2	P
		Family Size													
		≤ 5 / family						> 5 / family							
		Normal Wt / age + over-weight		Underwt		Total		Normal Wt / age + over-weight		Underwt		Total			
		No	%	No	%	No	%	No	%	No	%	No	%		
Age of mothers															
< 20	1	1	100	0	0	1	100	0	0	0	0	0	0	0	0
20 -	247	137	75.7	44	24.3	181	100	20	30.3	46	69.7	66	100	43	< 0.001
30 -	98	16	84.2	3	15.8	19	100	33	41.8	46	58.2	79	100	11	< 0.001
40 +	4	0	0	0	0	0	0	2	50	2	50	4	100	0	0
Total	350	154	76.6	47	23.4	201	100	55	36.9	94	63.1	149	100		
Physiological status of mothers															
Preg.	100	47	81.1	11	18.9	58	100	17	40.5	25	59.5	42	100	17.4	< 0.001
Lact.	100	51	82.3	11	17.7	62	100	17	44.7	21	55.3	38	100	15.2	< 0.001
Nonpreg. nonlact.	100	40	71.4	16	28.6	56	100	15	34.1	29	65.9	44	100	13.9	< 0.001
Preg. + Lact.	50	16	64	9	36	25	100	6	24	19	76	25	100	32.5	< 0.001
Total	350	154	76.6	47	23.4	201	100	55	36.9	94	63.1	149	100		
Maternal BMI															
0	94	44	74.6	15	25.4	59	100	12	34.3	23	65.7	35	100	14.8	< 0.001
1	71	32	76.2	10	23.8	42	100	9	31.1	20	68.9	29	100	14.3	< 0.001
2	32	14	87.5	2	12.5	16	100	11	68.7	5	31.3	16	100	1.6	0.2
3	3	0	0	0	0	0	0	1	33.3	2	66.7	3	100	0	0
Total	200	90	76.9	27	23.1	117	100	33	39.8	50	60.2	83	100		

Intervening variables	Total No. of children	Prevalence of underweight among children												χ^2	P
		Family Size													
		≤ 5 / famile						> 5 / family							
		Normal Wt / age + over-weight		Underwt		Total		Normal Wt / age + over-weight		Underwt		Total			
		No	%	No	%	No	%	No	%	No	%	No	%		
Anaemia status of mothers															
No anaemia	70	62	95.4	3	4.6	65	100	4	80	1	20	5	100	2	0.2
Anaemia	280	92	67.6	44	32.4	136	100	51	35.4	93	64.6	144	100	29.1	< 0.001
Total	350	154	76.6	47	23.4	201	100	55	36.9	94	63.1	149	100		
Social status of family															
Low	228	59	59.6	40	40.4	99	100	39	30.3	90	69.7	129	100	19.7	< 0.0001
Middle	107	83	92.2	7	7.8	90	100	13	76.5	4	23.5	17	100	3.8	0.04
High	15	12	100	0	0	12	100	3	100	0	0	3	100	0	0
Total	350	154	76.6	47	23.4	201	100	55	36.9	94	63.1	149	100		
Economic status of family															
Low	69	10	38.5	16	61.5	26	100	12	27.9	31	72.1	43	100	0.8	0.4
Middle	229	100	77.5	29	22.5	129	100	37	37	63	63	100	100	38.5	< 0.001
High	52	44	95.7	2	4.3	46	100	6	100	0	0	6	100	0.3	0.6
Total	350	154	76.6	47	23.4	201	100	55	36.9	94	63.1	149	100		
No. of living children															
≤ 5	316	154	76.6	47	23.4	201	100	45	93.9	70	6.1	115	100	43.2	< 0.0001
> 5	34	0	0	0	0	0	100	10	29.4	24	70.6	34	100	0	0
Total	350	154	76.6	47	23.4	201	100	55	36.9	94	63.1	149	100		
Birth order															
≤ 5	319	154	76.6	47	23.4	201	100	47	39.8	71	60.2	118	100	43.2	< 0.0001
> 5	31	0	0	0	0	0	100	8	25.8	23	74.2	31	100	0	< 0.0001
Total	350	154	76.6	47	23.4	201	100	55	36.9	94	63.1	149	100		
Anaemia status of children															
No anaemia	95	90	100	0	0	90	100	4	80	1	20	5	100	18.2	
Anaemia	255	64	57.7	47	42.3	111	100	51	35.4	93	64.6	144	100	12.5	
Total	350	154	76.6	47	23.4	201	100	55	36.9	94	63.1	149	100		

Table (80) and figures (13 - 26) :

- shows that with consideration of the intervening variables prevalence of underweight was found more in children with birth interval 24 months or less, than in children with more than 24 months. Also prevalence of underweight was found more in families, where their family size was 5 or more persons per family than those with less than 5 persons per family.

The relations are signigicant.

Fig.(13):EFFECT OF BIRTH INTERVAL ON THE NUTRITIONAL STATUS OF CHILDREN (Wt/Age) IN RELATION TO ANAEMIA STATUS OF MOTHERS

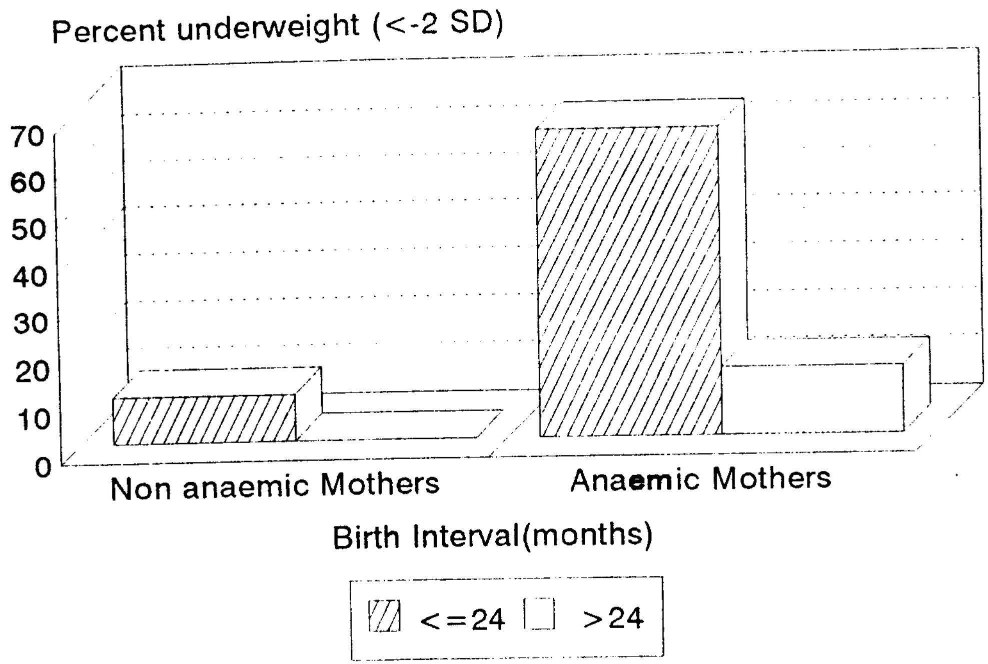


Fig.(14):EFFECT OF BIRTH INTERVAL ON THE NUTRITIONAL STATUS OF CHILDREN (Wt/Age) IN RELATION TO ANAEMIA STATUS OF CHILDREN

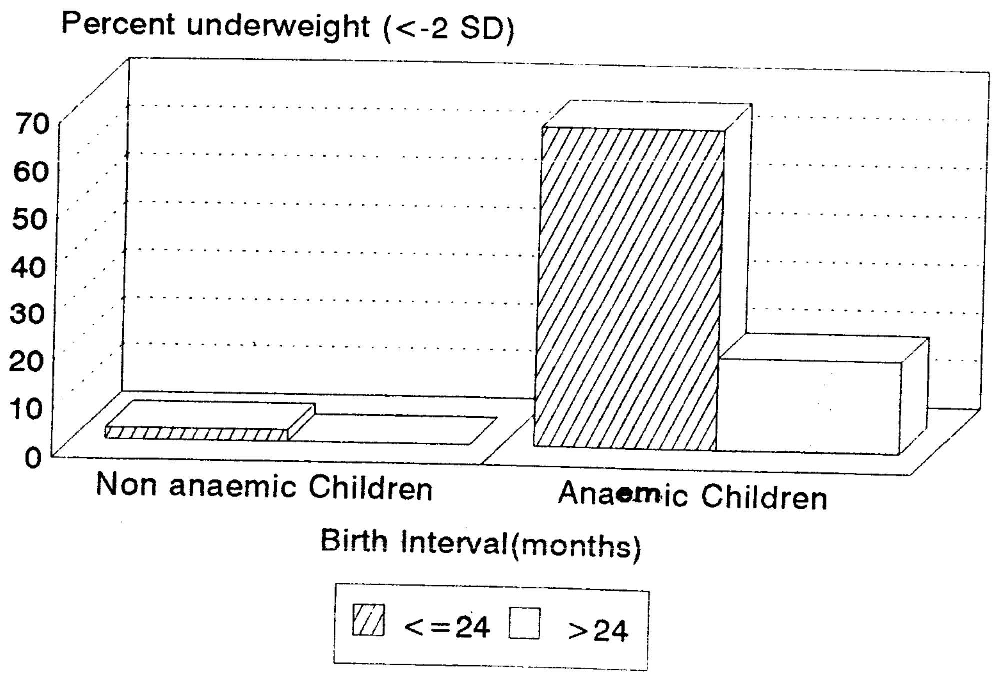


Fig.(15):EFFECT OF BIRTH INTERVAL ON THE NUTRITIONAL STATUS OF CHILDREN (Wt/Age) IN RELATION TO NO OF LIVING CHILDREN/FAMILY

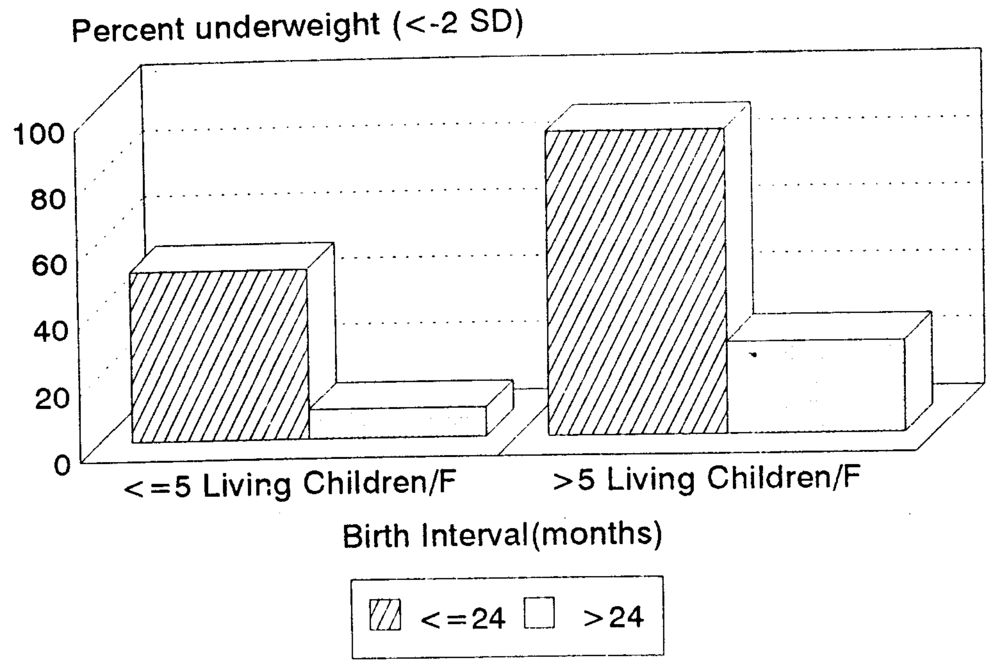


Fig.(16):EFFECT OF BIRTH INTERVAL ON THE NUTRITIONAL STATUS OF CHILDREN (Wt/Age) IN RELATION TO AGE OF MOTHERS

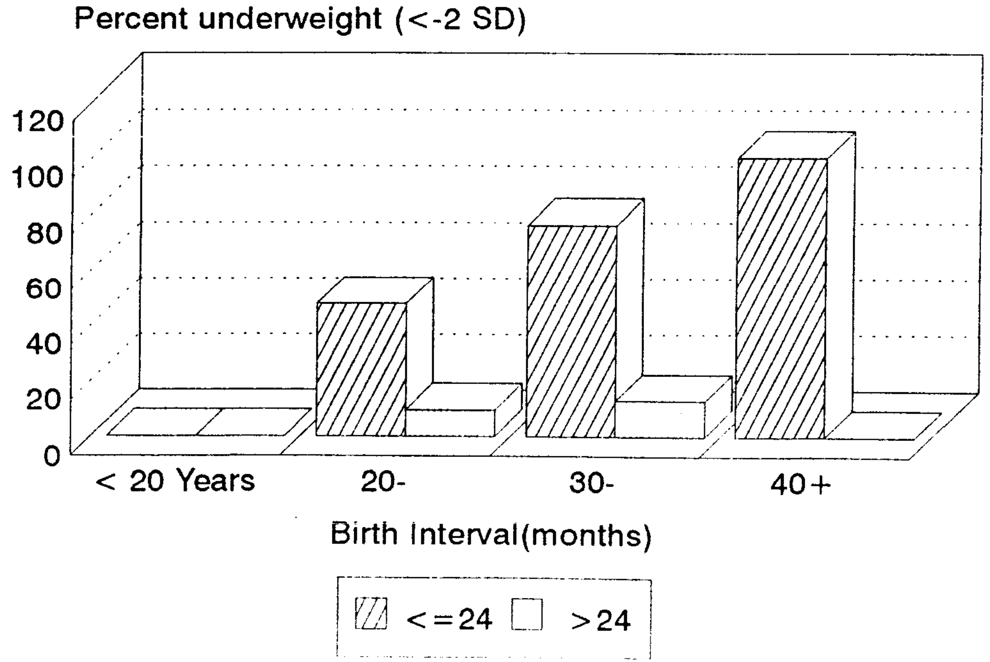


Fig.(17):EFFECT OF BIRTH INTERVAL ON THE NUTRITIONAL STATUS OF CHILDREN (Wt/Age) IN RELATION TO PHYSIOLOGICAL STATUS OF MOTHERS

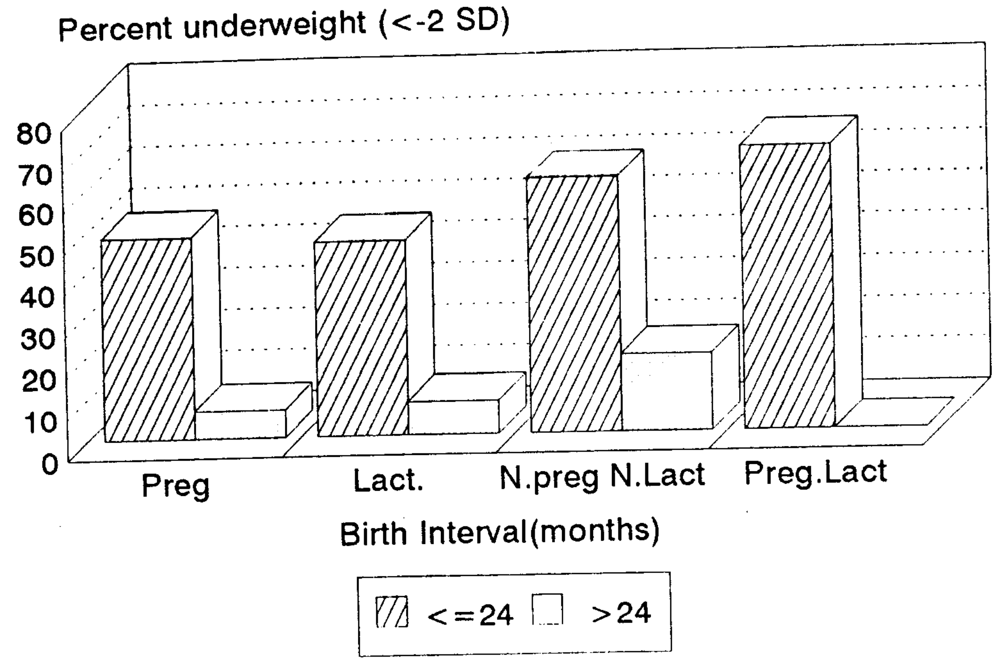


Fig.(18):EFFECT OF BIRTH INTERVAL ON THE NUTRITIONAL STATUS OF CHILDREN (Wt/Age) IN RELATION TO SOCIAL STATUS OF FAMILY

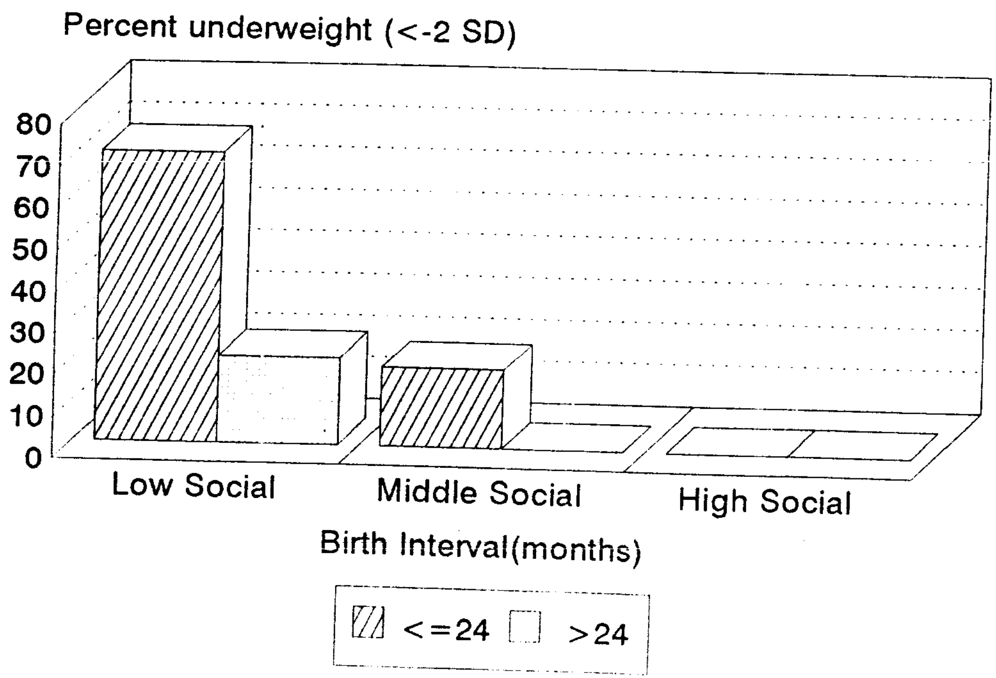


Fig.(19):EFFECT OF BIRTH INTERVAL ON THE NUTRITIONAL STATUS OF CHILDREN (Wt/Age) IN RELATION TO ECONOMIC STATUS OF FAMILY

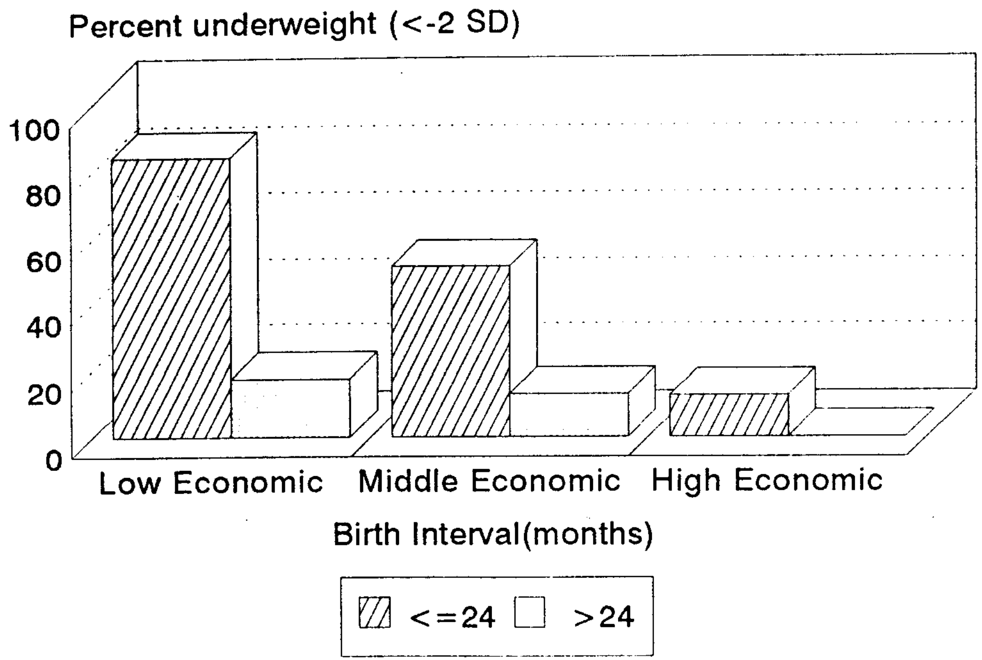


Fig.(20):EFFECT OF BIRTH INTERVAL ON THE NUTRITIONAL STATUS OF CHILDREN (Wt/Age) IN RELATION TO BIRTH ORDER

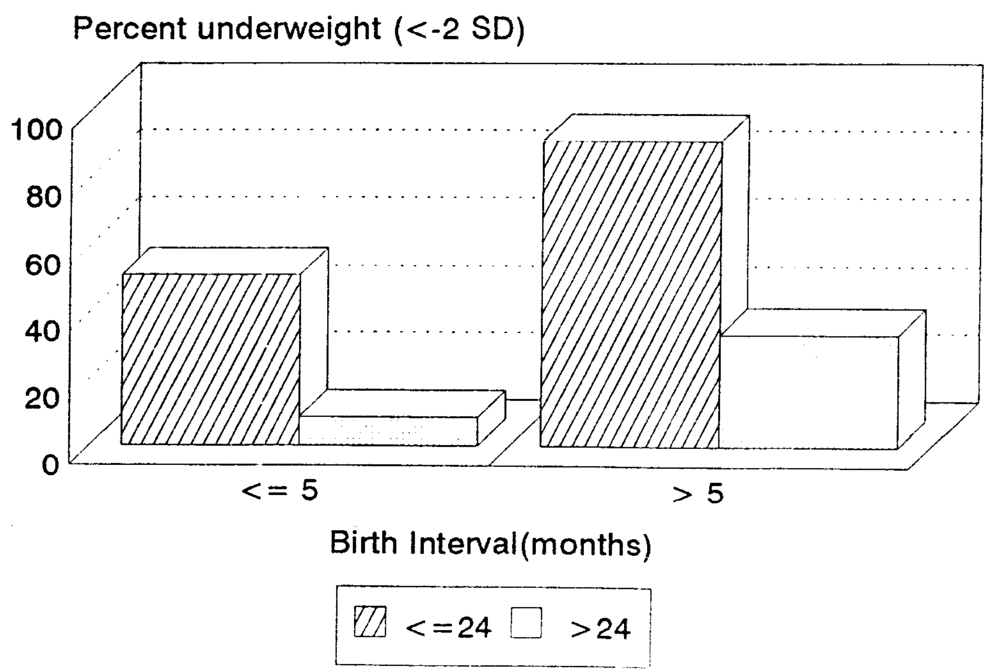


Fig.(21):EFFECT OF FAMILY SIZE ON THE NUTRITIONAL STATUS OF CHILDREN (Wt/Age) IN RELATION TO ANAEMIA STATUS OF MOTHERS

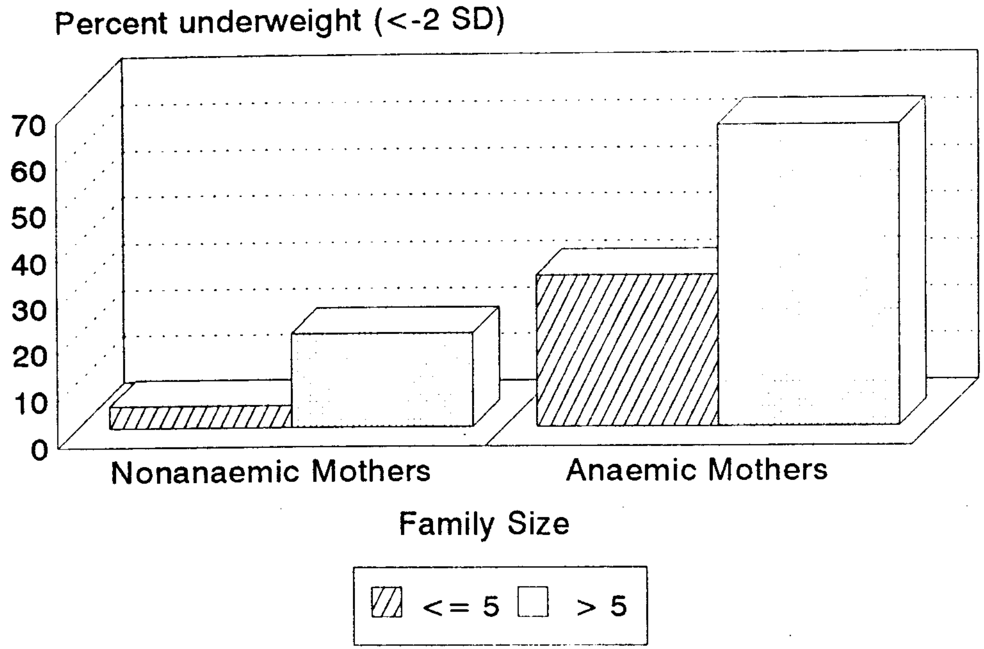


Fig.(22):EFFECT OF FAMILY SIZE ON THE NUTRITIONAL STATUS OF CHILDREN (Wt/Age) IN RELATION TO ANAEMIA STATUS OF CHILDREN

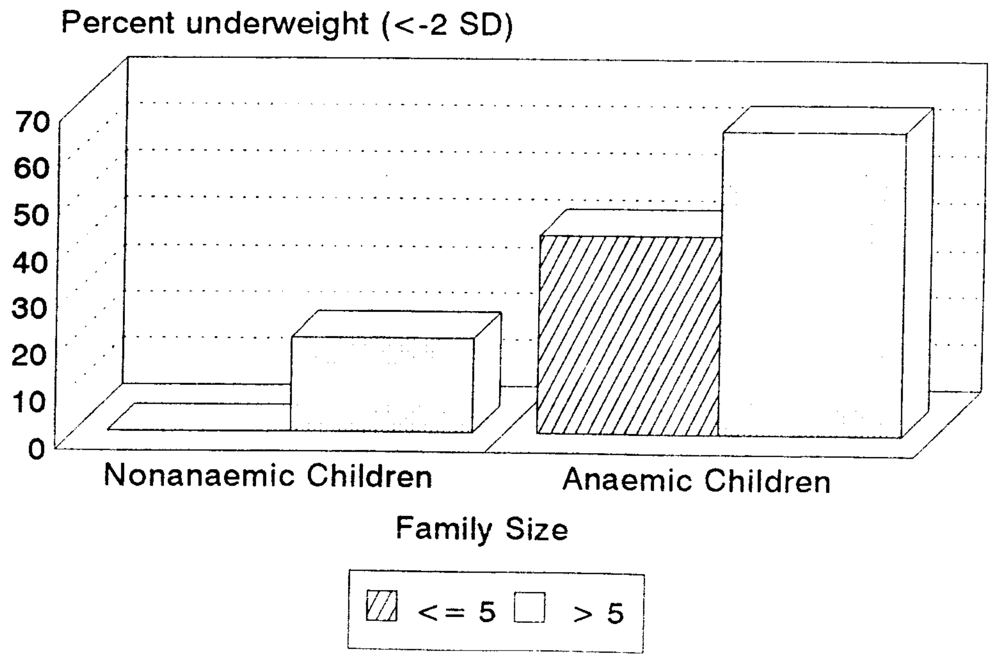


Fig.(23):EFFECT OF FAMILY SIZE ON THE NUTRITIONAL STATUS OF CHILDREN (Wt/Age) IN RELATION TO PHYSIOLOGICAL STATUS OF MOTHERS

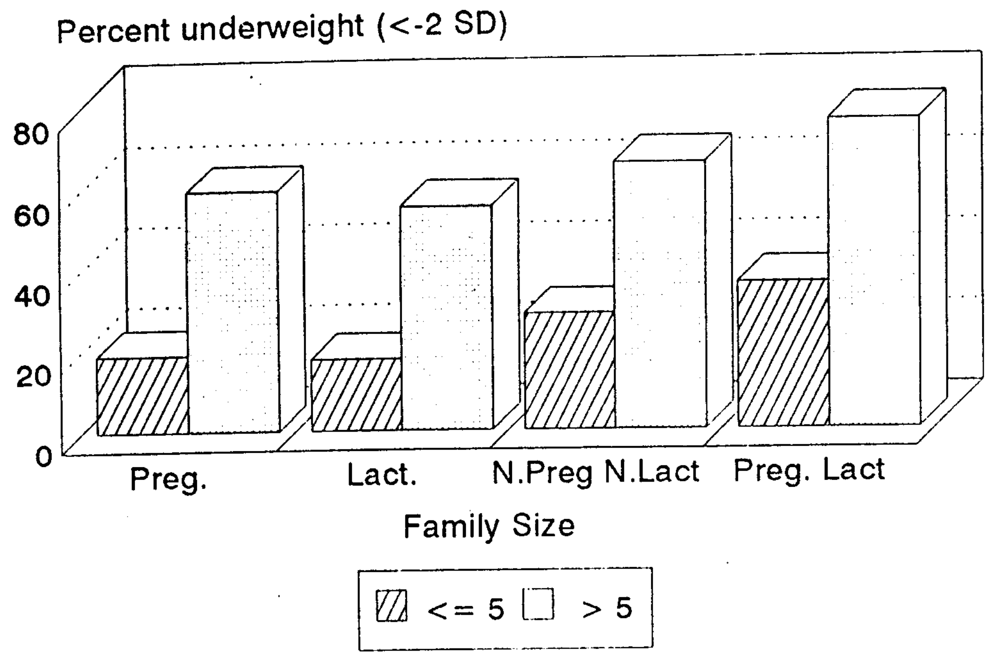


Fig.(24):EFFECT OF FAMILY SIZE ON THE NUTRITIONAL STATUS OF CHILDREN (Wt/Age) IN RELATION TO SOCIAL STATUS OF FAMILY

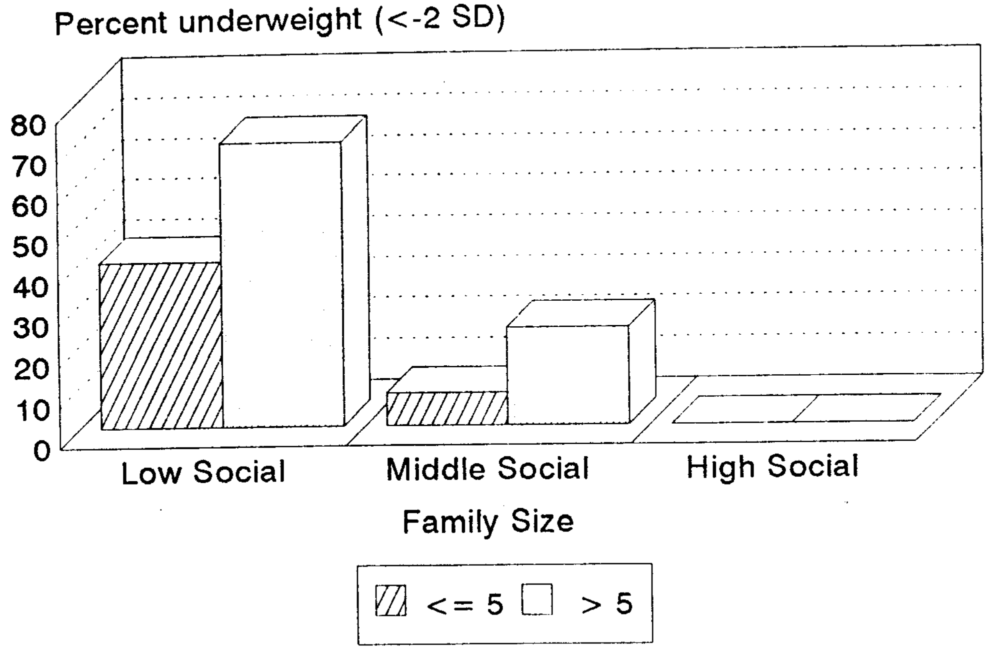


Fig.(25):EFFECT OF FAMILY SIZE ON THE NUTRITIONAL STATUS OF CHILDREN (Wt/Age) IN RELATION TO ECONOMIC STATUS OF FAMILY

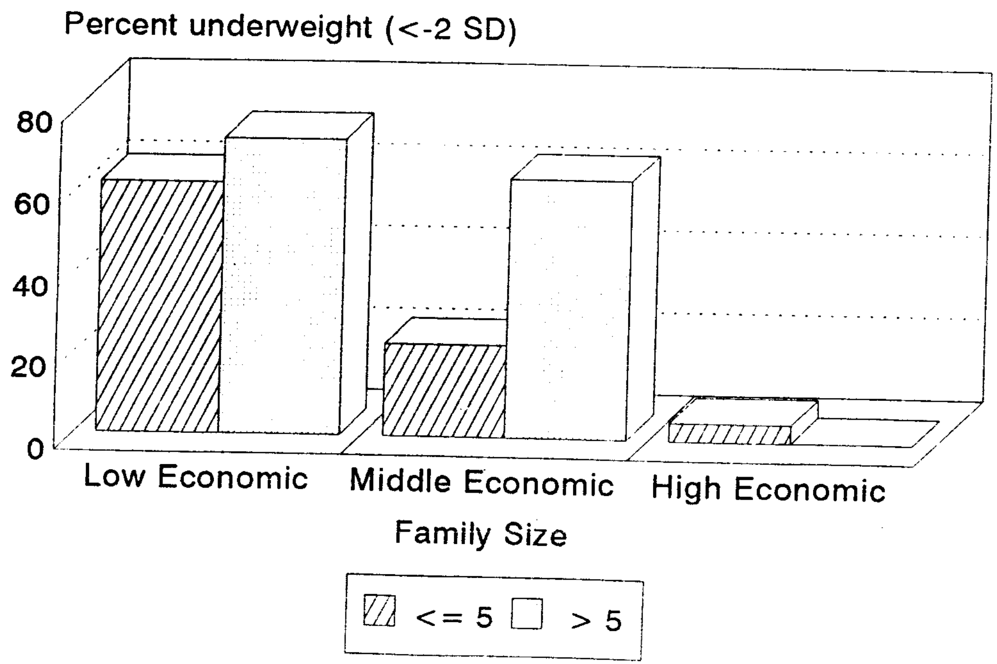
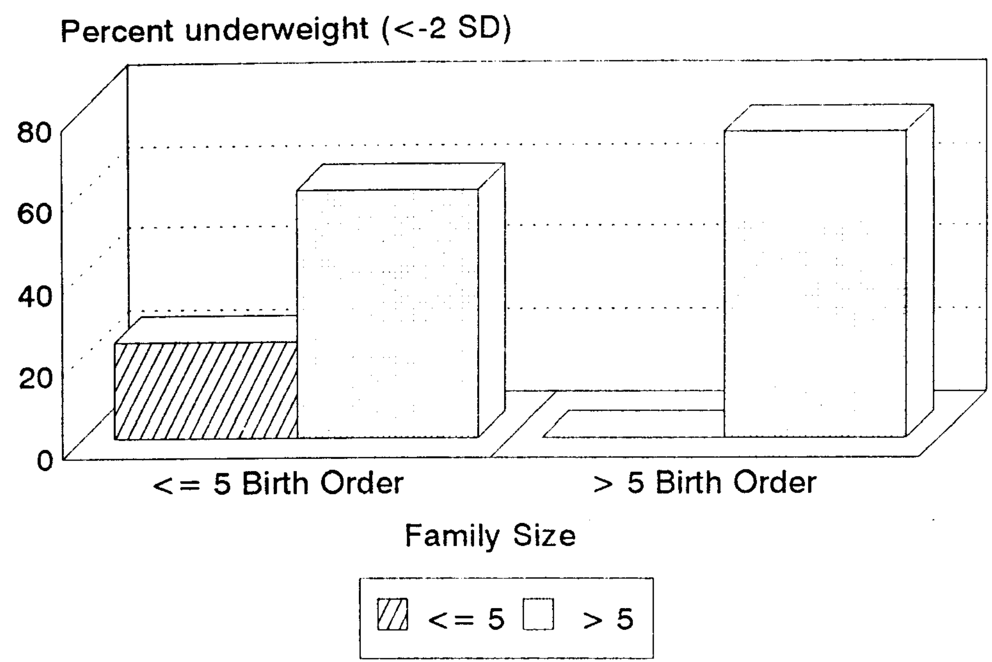


Fig.(26):EFFECT OF FAMILY SIZE ON THE NUTRITIONAL STATUS OF CHILDREN (Wt/Age) IN RELATION TO BIRTH ORDER



DISCUSSION

DISCUSSION

The most significant benefits of the practice of family planning is its positive influence on the health of women and their children, and thus on the well being of the entire family. In the very broad sense, family planning contributes to family health - to the mental and social well - being of mothers, fathers and their children - by enabling couples to achieve the reproductive goals and therefore a sort of control over the pattern and direction of their lives. In the narrow sense, the time interval between successive pregnancies and childbirths, the age of woman at childbearing, and the number of children in the family are crucial factors in maternal and child mortality and morbidity. (EDHS, 1988).

Family planning helps to eliminate the maternal health hazards associated with frequent closely spaced pregnancies, and births (Sadik, 1980).

This study was done at different outpatient clinics in Cairo, namely Nutrition Institute, Pediatric and obstetric clinics of Ain Shams University, and Maternal and Child Health (MCH), centers.

Basic status of mothers :

The sample included 350 mother of different physiological status and their children less than 2 years of age. Mother's age ranged between 18 and 44 years with a mean of 27.3 years ± 4.5 S.D.

The majority of the mothers lied in the group between 20 - 30 years representing 70.6% of the sample, of whom 29.9% were pregnant, 28.3% were lactating, 27.5% were nonpregnant, nonlactating and 14.2% pregnant and lactating.

The weight of the mothers ranged between 40 and 110 kg with a mean of 66.2 kg and their height ranged between 142 - 178 cm with a mean of 157.3 cm.

The nutritional status of nonpregnant mothers was assessed by the Body Mass Index "BMI" and the results showed that 47% were normal, 35.5% overweight 16% obese and 1.5% very obese. This demonstrates the magnitude of the problem of obesity and overweight among the Egyptian women.

Studies on anthropometric measurements of women in developing countries are fewer than dietary studies.

Although women in some countries have weights far below the WHO reference women of 55 kilograms, the women's weight appear to be adequate than their dietary intakes.

Low weight for height was less common among women than men, although women consumed a smaller percentage of their recommended intakes than men. The explanation for this apparent contradiction may be that women's energy expenditure is lower than men's (UN, 1990).

On the contrary of the anthropometric measurements, heamoglobin concentrations of mothers ranged between 8 - 13 gm%. The worst group was those who were pregnant and lactating, as 92% of the mothers were anaemic and had the least hemoglobin concentration (mean 9.9 gm%). This value of hemoglobin is considered low in comparison to the cut off point of WHO which is 11 gm%.

This supported by Abdou et al. 1968, who conducted a study at the MCH centers in Cairo and found that anaemia (i.e. hemoglobin less than 10% gm.) was found in 90% of pregnant women and 70% of nursing women.

This reflects the stress of breast feeding and pregnancy place up on the mothers iron stores and the consequent increased iron requirements needed (Country paper, 1991).

Basic data of children :

The age of the children ranged between 1 month and 24 months with a mean age of 13.3 months. Their weights ranged between 2 - 17kg with a mean of 8.1 kg, their heights ranged between 43.5 - 93 with a mean of 71.8 cm, their midarm circumferences "MAC" ranged between 7 - 19 cm with a mean of 12.5 cm and their triceps skinfolds TSF ranged between 2 - 11 mm with a mean of 6.9 mm.

The nutritional status of children was assessed by weight for age and weight for length for acute malnutrition and length for age for chronic malnutrition.

The results showed that, 40.3% of the children were underweight regarding their weight for age, 18.3% were wasted regarding weight for length and 33.4% were short regarding length for age as compared with the WHO standard 1983.

According to recent analysis, the percentage of children classified as underweight is reduced from 47.5% to 40.8% for the period from 1975 - 1990. In Asia, 44% of children were underweight and in Americas 9% (UNICEF, 1991).

Several nutritional status assessment studies have been conducted in Egypt. On a national level, the first National Nutrition Survey 1978, showed that the prevalence of undernutrition whether wasting or stunting was more pronounced in rural areas than in urban areas. Infants and children between 6 and 23 months were most severely affected by acute undernutrition or wasting, while the 12 - 47 months age group showed the highest prevalence of chronic undernutrition or stunting.

In 1986, Nutrition Institute conducted another follow up survey on 1020 preschool children in subsample representing 34 sites previously surveyed in 1978. It revealed that the prevalence of acute undernutrition was much higher among preschool children of 1986 than those of 1978, while there was no change in prevalence of chronic undernutrition in both surveys (Hussein et al., 1986).

In 1987, the Nutrition Collaborative Research Support Program (CRSP) Galal et al. 1987, revealed that, there was an improvement and increase in length for age and weight for age of toddlers, relative to the standard. Weight for height showed a slight and steady increase over the year.

In 1988, the Health Profile of Egypt, showed that the prevalence of undernutrition whether acute or chronic is higher in 1988 than in 1978.

In 1995 a survey done by Nutrition Institute and UNICEF showed that, according to weight / age Z score, there are 16.8% of preschool aged children underweight. The highest percentage of underweight are in Upper Egypt, Canal and Lower Egypt areas, the lowest percentage are in Metropolitan and Coastal areas. According to heighr / age Z score, stunting is prevalent among preschool children in Egypt (21.6%), and is lowest in LowerEgypt.

Regarding weight / height Z score indicator, about 9.7% of studied children are wasted. Highest prevalence of wasting is in Upper Egypt.

This work also showed that, 72.9% of the children were anaemic with a mean heamoglobin concentration of 10.5 gm% as compared to WHO 1985. Levin II 1986, stated that iron deficiency anaemia affects over 2000 million people living in all countries. The people most affected are women and children of preschool age, often more than 50% are anaemic.

In Egypt, anaemia of childhood reaches its peak between 12 and 23 months, a critical period in the child's intellectual and physical development (CAMPAS and UNICEF, 1988),

The prevalence of anaemia in 1974 was reported in an epidemiological study, showed that, hemoglobin concentrations of less than 11g / 100 ml were observed in 90 percent of 4 to 6 months infants. The incidence was higher in boys than girls, higher in the fourth and subsequent births, than among first to third births. Also it is higher among artificially - fed than breast - fed infants and higher among infants of anaemic mothers than among infants of non - anaemic mothers (Abdel Fattah et al., 1974).

In 1986, the Nutrition Institute in his follow up survey on preschool children in same sites previously surveyed in 1978 showed that the prevalence of anaemia in 1986 went up among all age group (26.8% versus 14.8%) (Hussein et al., 1988).

Hussein (1983), in a study about the functional consequences of iron deficiency in Bortos Village, Giza, governorate, reported that the highest prevalence of anaemia was among preschool children (33 per-cent).

However prevalence of anaemia in (1995) amounts to 25.2% of to-tal studied children in different governorates in Egypt. This prevalence is less than that obtained from the 1978 National nutrition Survey.

Total urban areas show higher prevalence of anaemia than rural areas (Nutrition Institute and UNICEF, 1995).

Impact of nutritional status of mothers on the nutritional status of infants.

The results showed that the nutritional status of children was affected by the physiological status of mothers. The worst nutritional status of children was found in those whose mothers were pregnant and lactating as 56% of their children were below - 2 S.D. weight for age (underweight) and 84% of them were anaemic. Among pregnant and lactating women, 92% were anaemic. This is agreed by Sadik 1980, who stated that as pregnancy places considerable physical stress on a woman, those mothers are more susceptible than other women to iron and vitamin deficiencies and to unadequate nutrition.

Also the nutritive demands on the mothers during lactation far exceed those of pregnancy, although she may cease to feel the responsibility of eating for two. A normally developing infant doubles his birth weight accumulated in 9 months of pregnancy in 4 months of life - evidence of the demands placed by the breast - fed infants on their mothers. Milk secreted in one month represents more kilocalories than the net energy cost of pregnancy. Fortunetely some energy and many nutrients are stored during pregnancy as demonstrated by Guthrie 1986.

That's why nutritional deficiencies are aggravated when a woman experiences frequent childbearing, since her system does not have sufficient time to replenish itself (Sadik, 1980).

So if a mothers starts her reproductive cycle with marginal nutritional status, it will be aggravated with each successive pregnancy which has its effect on the outcome of pregnancy as stated by Waterlow et al., 1992.

This is also supported by Ramachandran 1991, who showed that the nutritional consequences of conception during lactation prolongs postpartum amenorrhea and provides protection against pregnancy in the first few months of lactation. However with increased duration of lactation, the contraceptive effect waves off.

About 1/3 of all pregnancies occur in lactating women not using contraceptives. Irrespective of the duration of lactation and period of gestation, women who continued lactation during pregnancy had lower body weight than their nonlactating pregnant counterparts. Infants born to mothers who conceived within 6 months of lactation had lower birth weight and higher infant mortality rate (UN, 1992).

Considering anaemia among mothers in this study, 80% of the mothers were anaemic. The worst group of mothers were pregnant and lactating as 92% of them were anaemic, followed by pregnant 90% then lactating 75% and the least were the nonpregnant nonlactating 69%.

A study undertaken to assess the impact of anaemia on pregnancy outcome of mothers in rural areas in Pakistan showed that the weight for age of the infants of anaemic mothers was also significanly lower compared to their counterparts from nonanaemic mothers (Paracha et al., 1993).

The study also showed that, children of anaemic mothers suffered more from anaemia than children from nonanaemic mothers, 87.5% of anaemic children belonged to anaemic mothers, while anaemic children from nonanaemic mothers were only 14.3%. Among children of anamic mother, 49% were underweight.

In a study conducted of MCH centers in Cairo by Abdou et al. 1968, supported the results of the study which showed that anaemia was the major nutritional deficiency disease observed among mothers &

their children. Anaemia was found in 90% of pregnant women and 70% of nursing women and 80% of their children under 2 years of age.

This was also supported by Shaheen 1979, who stated that anaemia was more in infants born to anaemic than in nonanaemic mothers, as 50% of the infants were diagnosed anaemic from nonanaemic mothers and 62.5% from anaemic mothers.

So conception during lactation has an adverse effect on maternal and infant nutrition; birth weight and infant survival.

Ensuring adequate contraceptive care at an appriopriate time to lactating women might therefore constitute an important non-nutritional intervention in reducing the magnitude of maternal and infant undernutrition among poorer segments of the population in developing countries (UN, 1992).

Regarding the nonpregnant groups of mothers, the Body Mass Index "BMI" was used to assess their nutritional status.The results showed that, most of them were normal (37%), 38% were overweight and 21.5% were obese. Hence the nutritional status of their children regarding weight for age was within normal. There is no comparable data available in the literature.

Social and economic status of the family

Regarding the social and economic status of the families, most of them belonged to low social status (65.1), and 19.7% belonged to low economic status families.

In low social status families where mothers and fathers were illitrate or having no permanent job or work as unskilled workers, 57.1 of their children were underweight, and 93.1 of them were anaemic. Also those of low economic status, 68% were underweight and 97.1% were anaemic. The results also showed that the lower the social and economic status of the family whom the child belonged, the shorter, was his birth interval and bigger was his family size.

These results are supported by Tekce 1989, who correlated between the health of the child and the social structures of daily life.

Household income and maternal education are more important for growth beyond infancy. Tekce 1989 found that there is an association between presence of piped water and sewer connections in the home or the building and the significantly better weight status of infants. The household which have water supply and sewage disposal are 3 times more likely to use soap than others.

This agrees with McGuire and Popkin 1990 who stated that the educational level of the mothers is positively related to better nutritional status of children. First the education of women is likely to result in improvement in their health. Secondly, higher levels of education are also related to lower fertility and smaller families.

Tekce 1989, also found that despite the limited schooling experience of mothers, the young children of educated mothers satisfied better weight than those of undereducated.

This picture was so significant when children grew beyond infancy. The risk of diarrheal disease remains lower among young children of educated mothers. The children of educated mothers had 25% less diarrhea than children of uneducated mothers controlling for the level of incomes and the presence of piped water availability and sanitary facilities.

Another study conducted by Galal and Amin 1984 supports these results as it revealed a strong correlation between socioeconomic group of child's family and his nutritional status. More than half of the children from upper socio - economic families (58.9%) were found to have a high nutritional index, where as the majority of middle class children (85.1%) were found to have a middle nutritional index and approximately 60% of the lower class had low nutritional indices.

Birth Interval :

Regarding the birth interval, the results of the work showed that the mean birth interval between the first and the last child was 4.7 years and mean duration of marriage was 7.5 years. Of the studied children, 61.7% had a birth interval 2 years or less. 59.3% of those, were underweight, while those with birth interval more than 2 years or more only 9.7% of them were undrweight. So the longer the birth interval, the better was the nutritional status of the children regarding their weight for age.

It is evident that anaemic children had a shorter birth interval (mean 20 months) than nonanaemic children (mean 24 months). This is supported by Balldin et al. 1986 who stated that, a mother who gives births to many children close together is unable to maintain good health in either herself or her children. An important part of providing children with a good start in life and adequate nutrition after birth is the spacing of each birth approximately 2 - 3 years

Again, a delay of two years or more before the mother becomes pregnant again is important for the beby's welfare, and indeed survival. One of the earliest observations of malnutrition was Kwashirkor as the disease of the displaced child - displaced by a new pregnancy. Short birth intervals have often since then been related to malnutrition. Nonetheless, anything that prevents too short birth intervals will benefit the youngest child, including family planning programmes directly, and as an additional indirect result of breast feeding (UN. 1991).

A study in Egypt showed that as birth interval increases, body weight increases and curtailment of breast feeding is expected with shorter birth interval. This will lead to an increased incidence of malnutrition. Highest length and weight are in children following birth intervals of 3 - 4 years (El Behairy et al., 1980).

Another study in Addis Ababa in Etiopia showed that the length of last closed birth interval and to a lesser degree maternal age appear to have significant effect on all three nutritional status indices (Groenwold and Tilahun, 1990).

Breast feeding provides one link between nutrition and family planning with mutually beneficial effects at the level of the individual mother and child. Exclusively breast feeding for 4 - 6 months is advised. Lactational amenorrhea, prolonged by breast feeding, is of great benefit through increasing birth intervals (UN, 1992).

Regarding morbidity and birth interval, results showed that children suffered from fever, diarrhea and ARI had shorter mean birth intervals 16, 20 and 19.5 months in comparison to those who did not suffer (20.7m 21.5 and 22.1 months respectively).

This is supported by Singn 1990 who stated that, morbidity was recorded for two weeks in Delhi, and the study surveyed children under 5 years of age. Birth interval less than two years and malnutrition were most frequent risk factors.

Since birth weight is a strong predictor of nutritional status in young children, its effect is likely to be mediated through malnutrition.

The greater risk of dehydration among children born after a short birth interval can be explained by the associated low birth weight and malnutrition (Huttly, 1991),

So a delay of two years or more, before the mother becomes pregnant again is important for the baby's welfare. Short birth intervals have often been related to malnutrition. Promoting infant and child nutrition and survival can gradually establish more motivation for longer birth intervals (U.N., 1991),

A longer birth interval usually results in smaller families and these fewer children will be stronger and brighter with better chances of surviving and succeeding in their lives as stated by Balldin et al. 1986.

Regarding the relation between birth interval and socio economic status of the family, the results showed that the lower was the socio-economic status of the family, the shorter was the birth interval and the worse was the nutritional status of the children assessed by weight for age and heamoglobin concentration.

This agrees with McGuire and Popkin 1990 who stated that the education level of mothers alone is positively related to better nutritional status of children.

Education of women is likely to result in improvements in health. Higher levels of female education are also related to lower fertility (Pacific Island Population, 1994).

This is also supported by Chartbook 1994, showing that education affects other important aspects of women's lives. Educated women usually marry later than those with little education. In Turkey, the difference in average age at first marriage between illitrate women and those educated beyond primarry school is more than three years. More educated women also tend to have fewer births because of their higher levels of contraceptive use.

So education of girls is perhaps the key intervention in the empowering of women. It can release them from the oppressive hold of traditions. It is also a key factor in reducing fertility levels and infant mortality rates and in improving the overall well-being of the family (Nafis, 1994).

Family size :

The mean family size, in this work was 5.4 persons per family. The results showed that the nutritional status of the children was affected by the family size. Prevalence of anaemia was seen more in children belonging to large families (6 persons / family) while nonanaemic children belonged to smaller families (4 persons / family) ($P < 0.001$).

More underweight children (69.2%) assessed by weight for age were seen in big families (9 or more persons / family), while only 17.3% of underweight children belonged to smaller families (3 - 4 persons / family).

The same results were seen regarding the number of living children, the more were the number of living children the more were the number of anaemic (mean 3.6) and the underweight children (73.2%) in families with 5 or more living children.

These results agreed with Sadik 1980, who stated that high parity and the resulting increase in family size have negative implications for the health prospects of the entire household.

This is also supported by Pelto et al. 1991, who stated that, large houshold size is widely regarded as a risk factor for malnutrition in developing countries, particularly for infants and children.

Later birth order children were more malnourished than earlier birth order children. Those who were anaemic had a mean birth order of 3.5 while nonanaemic had a mean birth order of 1.8. Also all children of birth order 8, were underweight, while of children with birth order 1, only 11% were underweight.

This is supported by FAO and WHO 1992 who stated that birth order among other demographic factors is greatly related to child malnutrition, age of weaning and the presence or absence of siblings, so that a large number of small children in the home can have negative effects on the children.

In 1974, Abdel Fattah et al., reported the results of an epidemiological study of iron deficiency anaemia in infancy. The incidence of low heamoglobin was higher in the fourth and subsequent births than among first to third births. This supports the results of the thesis.

In 1974, WHO evaluation of the nutritional status of preschool children in Colombia, revealed that children from families with five or more children showed an evidence of growth retardation compared to children from a matched group of families with four or fewer children (Sadik, 1980).

Children of large families are more liable to infection as seen in the study, as diarrhea was found more in children belonging to large family size ($P = 0.03$) who had a mean family size of 5.5 persons per family while those who did not suffer from diarrhea had a mean family size of 5 persons / family.

This is supported by Nafis 1994, who stated that studies of individual families over time have found that the prevalence of infections gastroenterities is directly related to family size.

This was supported by Huttly 1991 that mothers with more than one small child may be less able to cope adequately with an episode of diarrhea. Also, specific pathogens may be present in households with several young children and are more likely to cause dehydration.

The results showed that the lower the social and economic status of the families, the more were their family size. This could be explained by, the fact that large family had illitrate mothers and fathers who do not work or have a simple job and have bad housing conditions. Most of those families their children were underweight (57.1%) & (68.1%) and anaemic (93.4%) & (97.1%).

Family planning cannot succeed in isolation from advances in education, health and nutrition. About half of the women in the developing countries cannot read or write and thus cannot participate fully in economic, social community and family live. Education and smaller families goes together. Poorly educated women in Brazil, for instance, have an average of 6.5 children each, those with secondary education 2.5 only. In Liberia, women who have been to secondary school are 10 times more likely to take advantage of family planning facilities than those who have not been sent to school at all (UNFPA, 1990).

Also, food intake was affected by the family size, the more the family size, the less was the energy intake, the animal protein and animal fat and calcium, the more was the carbohydrates and plant protein and plant fat consumed by the children.

This is supported by Hoffman 1984, who stated that as the number of children in the family increases, the percepita expenditure on food decreases.

Feeding Pattern :

Studying the feeding pattern of the children, starting with colostrum, the study showed that most of the children were colostrum fed (94.3%). However it showed that the later the infant started colostrum feeding, the more were the number of anaemic children. This could be due to the beneficial effect of colostrum. Colostrum is a high density low - volume feed. It contains less lactose, fat & water soluble vitamins and more protein and minerals than mature milk (WHO, 1989(b).

Those children who were colostrum fed, had a longer birth interval than those who were not colostrum fed. This could be due to the impact of longer birth interval on nutritional status of mothers rendering their colostrum available and ready for early suckling.

Study the pattern of neonatal feeding revealed that 39.7% of the infants were exclusively breast fed for a mean duration of 42.4 days. Those who were not exclusively breat fed took herbal decoctions and sugary fluids.

WHO 1991, anounced results of surveys showing that exclusive breast feeding i.e. giving the infant no other fluids or food other than breast milk is very infrequent practice. Even in countries where infants are traditionally breast - fed over a long period, such as Indonesia, Kenya, Peru and Philippines, supplementary fluids are given already in the first few weeks of life. In Peru, it was shown that although 99% of infants were breast fed in the first month of life, 83% of them received water and herbal teas (such as camomile and caraway, in addition to breast milk. Water and / or herbal teas are offered to young infants from the first week of life, in the belief that they will relieve pain e.g. colic (WHO, 1991).

Out of children who were exclusively breast fed, 64% were anaemic later at time of examination but this percentage is less than those who were not exclusively breast fed (78.7%). This is supported by WHO 1992 which stated that iron deficiency anaemia is less in infants fed only breast milk during the first 6 - 8 months of life. The higher the acidity of the gastrointestional tract and the presence of appropriate levels of zinc and copper, the more is the transfer factor lactoferrin which prevents iron from being available to intestinal bacteria. Up to 70% of breast milk iron is absorbed, compared with 30% in cow's milk and only 10% in the diet of the breast milk substitutes. Early introduction of other foods in the diet of breast - fed infant can alter this picture (Saarinen & Sllmes, 1979).

Regarding the length of birth interval between both groups there was no big difference, however in exclusively breast fed children the mean birth interval was a little more 21.4 months as compared to the other group (20.9 months. This might be due to the very short period of exclusive breast feeding in our series (42.4 days) compared by 4 - 6 months of WHO. This is explained by WHO 1991, that the intake of supplementary fluids is associated with increased risk of diarrhea and shortening of the duration of breast feeding. Several studies showed that these fluids are not actually needed by healthy infants during the first semester of life, if they are exclusively breast fed. Young infants who receive these supplementary fluids have a lower intake of breast milk than if they are exclusively breast fed and are more likely to be breast - fed for shorter period.

Concerning the family size, those who were exclusively breast fed belonged to smaller families (mean family size 5.1) as compared to those who were not exclusivly breast fed (mean family size 5.9) although statiscally nonsignificant. This could be explained by exclusively breast feeding prolong the period of lactational amenorrhea (LAM) which is one of the natural methods of contraception. However the lack of significant difference might be due shorter period of exclusively breast feeding . This is supported by Perez et al. 1992 that LAM with its high acceptance and efficacy, is a reliable method of family planning and can safely serve as an introductory method for breast feeding women. When the mother supplements her infant's diet or when her menses return or at six months postpartum, which ever comes first, she must begin a complementary method of family planning.

Also Short 1984 described breast feeding as natural contraceptive method and is asserted that on a worldwide scale, more births are prevented by breast feeding than by any other method of contraception. Longer birth interval will reduce total number of children per woman (UN, 1991).

Regarding practices of breast feeding, 150 children were still breast fed with a mean number of 9 feeds / day. Most of them were fed with an interval between 2 - 4 hours and were nursed from both breasts and fed day & night.

Breast feeding was stopped at a mean of 42.3 weeks. Similar results were found in a study done be UNICEF 1994 in Cairo University hospitals which revealed that feeding pattern was practiced by the majority of mothers (85.9%) and night feeding was practiced regularly in 46 - 64% of cases.

Formula was started in breast fed infant at a mean of 10 weeks & supplementary feeding was started at a mean of 18 weeks.

This is supported by El Zanaty et al. 1992, who stated that breast feeding practices and timing of the introduction of supplementary foods are important determinats of the health and nutritional status of infants and young children. Almost all young children in Egypt are breast fed for some time. The mean duration of breast feeding (19.1 months) is moderately long. However, supplemental foods and liquids are introduced comparatively early; the mean duration for which a child receives breast milk only is 1.8 months. By extending the period of natural infecundity following birth, breast feeding plays an important role in protecting women from subsequent pregnancy (EDHS, 1988).

The duration and frequency of suckling as well as the timing of feeding and length of time, all have and effect on the amount of prolactin secreted. Night feeding is an important factor in long term lactational amenorrhea. Variability in the duration may be due to individual sensitivities by each woman (Lui and Park, 1988).

Ojofeitini 1982 found a positive correlation between the duration of lactational amenorrhea and durations and frequency of breast feeding.

Prema et al 1979 showed also positive correlation between duration of lactation and interpregnancy interval.

10.6% of all children were formula fed only. They started formuls feeding at a mean of 7.9 weeks. Nearly half of them were underweight and 62.2% were anaemic.

This could be explained, formula fed infants are more liable to gastrointestinal disorders more than breast fed infants. This is due to the protection offered by breast feeding is most evident in early life and continues in proportion to the frequency and duration of breast feeding. At birth, colonization of the intestines with microorganisms, the toxins produced by the microorganisms and the ingestion of macromolecular antigens, all three can cause pathological reactions if permitted to penetrate the intestinal barrier. The immune substances and growth factors in colostrum and breast milk protect the intestinal mucosa against penetration (Walker, 1985).

Also among developing countries, the fertility protected from lactational amenorrhea is being lost because of reduced breast feeding and increased fromula feeding (Rosner & Schulman, 1990).

Concerning the completely weaned children they were 156 children, of whom 35.9% were underweight and 78.2% were anaemic. During the weaning period the young child's diet changes from milk alone to one based on the regular family meals. Thus there is most often a combination of infection and dietary inadequacy often leading to PEM which characterizes the weaning period (Moussa, 1990).

This is explained by several factors that interact during this period. The levels of antibodies derived from the mother are fading and the protection from breast milk starts to decrease due to decreasing amounts of breast milk . The child starts to move around and thus becomes more exposed to infection than before. The weaning foods given traditionally usually have low energy density meaning that the child will not have a possibility to eat sufficient amounts to satisfy his energy and nutrient needs. Also in many circumstances, the weaning foods are prepared, stored and fed in unhygienic way (Moussa et al., 1988).

This supports the results of this work, which found in the analysis of the 24 hour recall that 65.2% of the children till 3 months of age could obtain their RDA in energy.
However the respective percentage at 4 - 5 months of age was 31.7%, at 6 - 7 months was 13.5%, and at 8 - 24 months of age only 1.2% could obtain the RDA in energy. The more the family size, the less was the energy intake, animal protein, animal fat and calcuim and the more was the consumption in plant protein, plant fat and carbohydrates.

This is supported by Moussa et al. 1988 who stated that in infants and young children less than 24 months, cereals mostly wheat and rice home prepared are mostly used in Egypt, as well as starch pudding, legumes and sugar are consumed by Egyptian children.

Also, one of the main factors which cause inadequacy of child diets is that it is mostly part of the family diet which is mostly vegetarian with high amount of dietary fibres. Also gruels specially prepared for the child from cereals and legumes become bulky and of high viscosity by cooking and the mother resorts to more dilution to keep it semisolid with resulting lowering of energy and nutrient density (Moussa, 1990).

Country paper 1991, also stated that in low socioeconomic groups of the population, the contribution of the child's diet (less than 2 years of age) to satisfy his recommended dietary allowances of energy and protein "% RDA" based on recommendations of WHO / FAO / UNU

(1985), was compared with percent RDA percaput in the same child per family. The study revealed that 53.8% & 31.8% of children do not satisfy RDA for energy and protein respectively. This shows that energy inadequacy is even a more serious problem than protein inadequacy. This group suffering from poverty will partially benefit from nutrition education stressing how to prepare balanced recipes from cheap available resources. Nutrition education will have full benefit as food is available at the household but the mother is unaware of the child needs.

SUMMARY
and
CONCLUSION

SUMMARY

The study involved mothers in the childbearing period, of different physiological status and their children less than two years of age to show the effect of birth interval and family size on the child nutritional status.

The mothers were examined regarding the following parameters :

- Anthropometric measurements including height and weight, heamoglobin concentration and any vitamin deficiency sign for assessment of their nutritional status.
- Social and economic data of the family.
- Data about birth interval and family size.

The children were examined regarding the following parameters :

- Anthropometric measurements including length, weight, midarm circumference, triceps skinfold, heamoglobin concentration and any vitamin deficiency sign for assessment of their nutritional status.
- Morbidity record.
- Feeding pattern.

The results of the study showed that :

• The nutritional status of the children was affected by the physiological status of their mothers especially those, whose mothers were pregnant and lactating. 56% of their children were underweight and 84% of them anaemic.

- Anaemic mothers represented 80% of the sample. 87.5% of their children were anaemic, and 48.9% were underweight.

  Those children had a shorter birth interval and belonged to bigger families than those whose mothers were not anaemic.

- Children of low social and low economic status families, had also shorter birth intervals and belonged to bigger families than those of middle or high social & economic status families.

  More than half of them were underweight and most of them were anaemic.

  The nutritional status of the children was affected by the length of **birth interval** and the **family size.**

- Anaemic children had shorter birth interval (20 months) than nonanaemic (24 monthes) and belonged to large family size (6 p / family) had a mean birth order of 3.5 and a mean number of living children of 3.6, while nonanaemic children belonged to smaller family size (4 persons / family), a mean birth order of 1.8 and a mean number of living children of 1.9

- Underweight children with shorter birth interval less than 24 months, belonged to larger family size (5 persons or more / family) had a bigger birth order and a big number of living children.

Regarding **the morbidity of the children** (fever, diarrhea and ARI).

- During the last month :

Of those who had fever, 42.7% were anaemic and of those who had diarrhea 84.5% were anaemic.

However at examination of those who had diarrhea, 53.5% were underweight and 85.9% were anaemic.

Dehydration was found among 33.8%, of the examined children having diarrhea of whom 66.7% were underweight and 95.8% were anaemic.

Also of those who had fever, 51% were anaemic.

All children who suffered from fever, diarrhea or ARI had a shorter birth interval and bigger family size than those who were not ill.

Regarding the feeding pattern :

- Colostrum

The children who were colostrum fed had a longer birth interval (21.6 months) and belonged to smaller families (5.4 persons / family) than those who were not colostrum fed (their mean birth interval was 14 months and mean family size was (5.9 persons / family)

Also, the later the children started colostrum feeding, the more were the number of anaemic children (after half an hour, 64.3% were anaemic, while after 1 day, 84.3% were anaemic)

- Exclusively breast feeding.

Of the sample studied 39.7% of the children were exclusively breast fed, of whom 64% were anaemic , while 78.7% of those who were not exclusively breast fed were anaemic, and also they belonged to larger family size. However regarding the weight for age there was no difference between both groups.

Formula feeding :

Out of the sample, 10.6% of the children were formula fed, 4.3% were formula and breast fed, and 2% were formula and supplement fed. 48.6 of the formula fed were underweight.

- Weaned children

Among the sample studied 44.6% of the children were weaned, of whom 35.9% were underweight and 78.2% were anaemic.

- Food intake

Only 17.7% of the children got 75% or more of their RDA in energy, 16%.in proteins, 23.2% of calcuim and 4.6% of iron.

As the child grows, he got less energy intake. 65.2% of the children less than three months got their RDA of energy while the respective figure for children between 8 and 24 months was 1.2%.

Also the results showed that the larger the family size, the less was the energy intake, animal protein, animal fat and calcium intake and the more was the plant protein and plant fat and carbohydrate intake.

So, we can conclude that short birth interval and increased family size among other social, ecologic, demographic and dietetic factors negatively affect the nutritional status of the Egyptian infants either directly or indirectly by their effect on the nutritional status of their mothers.

CONCLUSION

- Spacing pregnancies at least two years apart drastically reduces the dangers of childbearing.
- Women need more food during pregnancy and lactation.
- Having more than four children increases the health risks of pregnancy and childbirth.
- Breast milk alone is the best possible food and drink for a baby in the first four - to - six months of life.
- Babies should start to breast feed as soon as possible after birth.
- Frequent suckling is needed to produce enough breastmilk for the baby's need.
- Bottle - feeding can lead to serious illness and death.
- Breastfeeding should continue well into the second year of a child's life (Lactational Ammenorrhea LAM).
- Family planning gives couples the choice of when to begin having chidren, how many to have, how far apart to have them, and when to stop.

RECOMMENDATIONS

RECOMMENDATIONS

In many households, the principal providers of care are women. Therefore, the capacity to provide care at the houshold level largely depends on the health of the mother, her education, her time and energy, the control she has over the resources of the household and the ability to use them effectively. Thus, in order to ensure appropriate care at the household level, several types of actions are needed.

Actions needs to be taken to increase maternal education and literacy as education and beliefs influence the skills and knowledge needed for successful child care practices.

Promotion mother's physical and mental health by providing access to health and related services, including general health, prenatal, obstetric and family planning services.

Promotive health and nutritions services should start at early childhood and continue during adolensence, premarital and preconceptional phases of adulthood.

Dietary guidelines for mothers during pregnancy and lactation needs popularization.

Encourraging parents to space pregnancies over adequate time periods.

A mother's body needs two years to recover fully from pregnancy and childbirth.

Spacing births at least two years apart can help to ensure that each baby is born healthy and strong.

One of the greatest threats to the health and growth of a child under the age of two is the birth of a new bay, as breast feding stops suddenly.

The babies should start breast feeding as soon as possible after birth. Frequent suckling is needed to produce enough breast milk for the baby's need.

Breast milk alone is the best possible food and drink for a baby in the first four - to - six months, and should continue well into the second year of a child's life.

A woman should not have too many children as after the fourth child, there is increased health risks of pregnancy and childbirth.

So, family planning gives the couples the choice of when to begin having children, how many to have, how far apart to have them, and when to stop. In addition, improved litracy and increased education of the father especially on the value of family planning is very important.

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ANNEXES

Effect of Birth Interval and Family Size on The Child Nutritional Status

(Annex I)

Mother's Sheet

I. D. | | | |　　Date | | | | | | | |
D　M　Y

Name : ....　　Address : ....

العنوان : .... الإسم :

Age in years | | |　　السن بالسنين :

Physiological Status | | |　............ الحالة الإجتماعية :

1. Pregnant　(month of pregnancy) ☐
2. Lactating　Period of lactation (in months). ☐
3. Nonpregnant - Nonlactating. ☐
4. Pregnant & Lactating.
   (a) month of pregnancy. ☐
   (b) period of lactation (in months). ☐

Birth Interval and Family Size

Family Size: ☐☐ عدد أفراد الأسرة :

Total no. of living children ☐☐ عدد الأطفال الأحياء :

Total no. of :

live births : ☐☐ عدد الأطفال الذين ولدوا أحياء :

still births : ☐☐ عدد الذين توفوا وقت الولادة :

abortions : ☐☐ عدد مرات السقط :

Total no. of children who died: ☐☐ عدد الأطفال الذين توفوا :

Interval between 1st and last birth (in years) ☐☐

الفترة بين أول وآخر طفل :

Interval between each birth and succeeding one (in months) :

☐☐ ☐☐ ☐☐ ☐☐ ☐☐ الفترة بين كل طفل والذي يليه :

Interval between the studied child and the previous one (in months) ☐☐

الفترة بين آخر طفل والذي قبله بالشهور :

Duration of present marriage (in years) : ☐☐ عدد سنين الزواج :

Twins : ☐☐ عدد التوائم

Nutritional Status of The Mother

1. Anthropometry : المقاييس :

Weight in kgms : ☐☐☐ ☐ الوزن بالكجم :

Height in cms : ☐☐☐ ☐ الطول بالسم :

Weight assessment : تقييم الوزن :

1. BMI : Body Mass Index for nonpregnant ☐
   Weight / Height^2 (kgms / m^2)

	grades
20 - 24.9	0
25 - 29.9	1
30 - 39.9	2
40 & over	3

2. % weight for height ☐

	Code
< 90	1
90 - 110	2
110 - 120	3
≥ 120	4

Casses below BMI 20 and below 90%. Wt / Ht will be calculated individually and categorized according to results.

2. Lab. investigation : التحاليل المعملية :

Hb : ☐☐ ☐ نسبة الهيموجلوبين بالجم ٪

1. anaemic ☐ 2. nonanaemic ☐

Pregnant : anaemic < 11 gms %. الحوامل :
Nonanaemic ≥ 11 gms %.

Nonpregnant : anaemic < 12 gms %. غير الحوامل :
Nonanaemic ≥ 12 gms %.

3. Clinical examination for deficiency signs (Jelliffe, 1966) :
(Annex II)

+ ve signs

مظاهر سوء التغذية : ....

(Annex II)

Clinical examination for deficiency signs (Jelliffe, 1966)

1. **Hair**
   Dyspigmentation
   Easy plucable
   Sparseness

2. **Face**
   Moon face

3. **Eye**
   Bitot spots.
   Conjunctional xerosis
   Pale conjunctiona.

4. **Mouth**
   Angular stomatites
   Cheilosis
   Glossitis
   Swollen, bleeding gums

5. **Thyroid gland**
   goitre

6. **Skin**
   Oedema (bilateral)
   Follicular hyperkeratosis
   Pellagrous dermatosis

7. **Skeleton**
   Epiphyseal enlargement (wrist)
   Rickety Rosary
   Persistant open anterior fontanelle
   Harrison sulcus
   Bossing of the skull
   Bow legs
   Knock knee.

(Annex III)

Social Status of The Family

(Park and Park, 1979)

الحالة الإجتماعية للأسرة

1. Educational level : التعليم :

illitrate	1	Father	☐
primary	2		
preparatory	4	Mother	☐
secondary	5		
university	7		

2. Occupation : الوظيفة :

no occupation	1	Father	☐
unskilled worker	2		
skilled worker	4	Mother	☐
semiprofession	5		
profession	7		

Scoring : ☐ (Education of father + occupation of father + education of mother + occupation of mother)

1. low : < 8
2. middle : 9 - 18
3. high : 19 - 28

(Annex IV)

Economic status of the family

1. Housing :	(١) نوع السكن :
0 part of appartment.	صفر - جزء من شقة.
1 appartment.	١ ـــ شقة مستقلة.
2 house.	٢ ـــ جزء من شقة
2. Crowding Index	(٢) عدد الأفراد بالنسبة لعدد الحجرات :
0 > 5 Persons / room.	صفر أكثر من ٥ أفراد / حجرة.
1 5 Persons / room.	١ ٥ أفراد / حجرة.
2 4 Persons / room.	٢ ٤ أفراد / حجرة.
3 3 Persons / room.	٣ ٣ أفراد / حجرة.
4 2 Persons / room.	٤ فردين / حجرة.
5 1 Persons / room.	٥ فرد / حجرة.
6 < 1 Persons / room.	٦ أقل من فرد / حجرة.
3. Floor :	(٣) أرضية السكن
0 mud.	صفر طين
1 cement.	١ أسمنت
2 mocket + stone.	٢ بلاط أو موكيت
3 wood.	٣ خشب أو باركيه
4. Roof and Walls.	(٤) السقف والجدران :
0 wood.	صفر خشب
1 طوب ني.	١ طوب ني
2 mixed	٢ مشترك
3 مسلح.	٣ مسلح.

5. Electricity ☐ ☐ (٥)الكهرباء

0 No — صفر لا
1 Yes — ١ نعم

6. Water supply ☐ ☐ (٦) مصدر المياه :

0 canal — صفر ترعة
1 well — ١ بئر
2 pump — ٢ طلمبة.
3 tap outside — ٣ حنفية خارج المنزل.
4 tap inside house. — ٤ حنفية بالمنزل.

3. Cooking facilities : ☐ ☐ (٧) إمكانيات الخبز والطهي :

0 — صفر فرن بلدي
1 kerosine gas. — ١ وابور جاز
2 gas cooker. — ٢ بوتاجاز
3 electric cooker. — ٣ فرن كهربائي

8. Separate kitchen : ☐ ☐ (٨) وجود مطبخ مستقل :

0 No — صفر لا.
1 Yes — ١ نعم.

9. Bathroom : ☐ ☐ (٩) وجود حمام مستقل :

0 No — صفر لا.
1 Yes — ١ نعم.

10. Fridge	0 No 1 Yes	صفر لا. ١ نعم.	(١٠) ثلاجة :
11. Deep Freeze	0 No 1 Yes	صفر لا. ١ نعم.	(١١) ديب فريزر :
12. Washing mashine	0 No 1 Yes 2 Automatic	صفر لا. ١ عادية. ٢ أوتوماتيك	(١٢) غسالة :
13. Aircondition	0 No 1 Yes	صفر لا. ١ نعم.	(١٣) تكييف :
14. Fan	0 No 1 Yes	صفر لا. ١ نعم.	(١٤) مروحة كهرباء :
15. Hoover :	0 No 1 Yes	صفر لا. ١ نعم.	(١٥) مكنسة كهرباء :
16. T.V.	0 No 1 Non coloured 2 coloured.	صفر لا. ١ أبيض واسود. ٢ ألوان.	(١٦) تليفزيون :
17. Mixer :	0 No 1 Yes	صفر لا. ١ نعم.	(١٧) خلاط كهربائي :
18. Video :	0 No 1 Yes	صفر لا. ١ نعم.	(١٨) فيديو :
19. Car :	0 No 1 Yes	صفر لا. ١ نعم.	(١٩) سيارة :

Scoring :

1. Low	0 - 12
2. Middle	13 - 24
3. High	25 - 36

(Annex V)

Infant Sheet

I. D. [ ][ ][ ]

Name : الإسم :

Birth Date [ ][ ] [ ][ ] [ ][ ] تاريخ الميلاد :
D M Y

Age (in months) [ ][ ] السن بالشهور :

Sex [ ] 1 - Male 2 - Female الجنس :

Birth order [ ][ ] الترتيب :

Feeding Pattern

A - Colostrum (WHO, 1990) : لبن السرسوب

1. Did your child take the colostrum [ ] هل أرضعت طفلك لبن السرسوب

1 - Yes 2 - No

2. When did he get the colostrum [ ] متى بدأت في إرضاع طفل لبن السرسوب

1. 1/2 hour.
2. 1 hour.
3. 1 - 6 hours.
4. > 6 hours.
5. 1 day.

3. How many times / day did your child get the colostrum [ ][ ]

كم مرة في اليوم كان طفلك يرضع لبن السرسوب:

B - Breast Feeding : لبن الأم :

1. Was the child exclusively breast fed: ☐

هل رضع الطفل لبن الأم فقط دون أي سوائل أخرى :

1 - Yes   2 - No

2. If yes a : for how long (in days). ☐☐

b : times / day. ☐☐

إذا كانت الإجابة بنعم : لمدة كام يوم وعدد مرات الرضاعة في اليوم.

3. If no a : when did you start to give your child other fluids in days. ☐☐

b : what are these fluids in details ....

c. times / day. ☐☐

إذا كانت الإجابة بلا : أ. متى بدأت إرضاع الطفل سوائل أخرى.

ب. ما هي هذه السوائل بالتفصيل.

ج. عدد مرات السوائل في اليوم.

4. For how long do you breast feed your child / feed (in min) ☐☐

مدة رضاعة الطفل في كل وجبة بالدقائق :

5. One or two breasts / feed. ☐ هل يرضع من ثدي واحد أم أثنين :

1 - one   2 - two

6. Interval between each feed and the other (in hours) ☐

الفترة بين كل رضاعة وأخرى :

1. 1 hour.
2. 2 hours.
3. 3 - 4 hours.
4. > hours.

7. Is the child fed day & night : ☐ هل يرضع الطفل ليلاً ونهاراً

1. day & night.
2. day only.
3. night only.

8. Is the child till now breast fed. ☐

1 - Yes 2 - No

هل مازال الطفل يرضع.

امتي أوقفتي الرضاعة) عند أي سن أوقفت الرضاعة :

C. Formula Feeding : لبن البودرة :

1. Is the child formula fed only: ☐ هل يرضع الطفل لبن صناعي فقط :

1 - Yes 2 - No

2. At what age did he start (in weeks) : ☐

متى بدأت في إرضاع الطفل اللبن الصناعي :

3. Type : .... نوع اللبن :

4. Conc : .... التركيز :

5. Times / day. ☐☐ عدد مرات الرضاعة في اليوم :

D. Breast + Formula : ثدي الأم + لبن صناعي :

1. At what age did he start formula (in weeks) : ☐

متى بدأت اللبن الصناعي :

2. Times / day of breast feeding : ☐☐ عدد مرات الرضاعة الطبيعية في اليوم:

3. Times / day of formula feeding ☐☐ عدد مرات اللبن الصناعي في اليوم:

E. Breast + Supplementary : ثدي الأم + غذاء إضافي

1. At what age did he start supplementary (in weeks) : ☐☐

متى بدأت في إعطاء الطفل غذاء إضافي :

2. Times / day of breast feeding : ☐☐ عدد مرات الرضاعة الطبيعية في اليوم :

3. Times / day of supplementary food ☐☐ عدد مرات اللبن الصناعي في اليوم:

F. Formula + Supplementary food: ☐

1 - Yes 2 - No لبن صناعي + غذاء إضافي

G.Breast + Formula + Supplementary : ☐

1 - Yes 2 - No

ثدي الأم + لبن صناعي + غذاء إضافي

H. Weaned completely : ☐

1 - Yes 2 - No الفطام :

(Annex VI)

Food Intake "24 hour Recall"

Food / Bevarage consumed	Food Item code	Amount consumed (gm)

(Annex VII)

Morbidity Record : الحالة المرضية

During the last month (history) before examination خلال الشهر الأخير:

1. Fever : ☐ إرتفاع في درجة الحرارة :

   1 - Yes 2 - No

   • temp. ☐☐ ☐

   • for how long (in days). ☐☐ لمدة كام يوم :

2. Diarrhea : ☐ إسهال :

   1 - Yes 2 - No

   • for how long (acute or persistent) (in days) ☐☐ المــدة

   • times / day. ☐☐ عدد المرات في اليوم

   • colour.

   • blood ☐

   • mucous. ☐

   • fever. ☐

   • vomiting. ☐

   • dehydration. ☐

   • history of maternal drug intake ☐

3. Acute respiratory infection : الجهاز التنفسي :

   • cough. 1 - Yes 2 - No ☐

   • for how long in days. ☐☐

   • fever. 1 - Yes 2 - No ☐

During Examination : | خلال الكشف :

1.Temp. : ☐☐ ☐ | درجة الحرارة :

2. Diarrhea : (3 or more loose or watery stools / 24 h ☐ | إسهال :

1 - Yes 2 - No

- for how long (in days) ☐☐ | مدة الإسهال
- times / day. ☐ | عدد المرات / يوم
- colour. | اللون
- blood | به دم
- mucous. ☐ | به مخاط
- vomiting. ☐ | مصحوب بترجيع
- dehydration. ☐ | مصحوب بجفاف

To assess Dehyaration (Degree) ☐ | تقييم الجفاف :

		A	B	C
Look at :	Condition	Well, alert	Restless, irritable	lethargic, floppy or unconscious
	Eye	Normal	Sunken	Very sunken, dry
	Tears	Present	Absent	Absent
	Mouth & tongue	Moist	Dry	Very dry
	Thirst	Drinks normally not thirsty	Thirsty, drink eagerly	Drinks poorly or not able to drink
Feel :	Skin pinch	Goes back quickly	Goes back slowly	Goes back very slowly
Decide		No dehydration	Some	Severe

WHO, UNICEF, 1991.

3. Acute respiratory infection : الجهاز التنفسي :

- cough. 1 - Yes 2 - No ☐ كحة :
- for how long (in days). ☐☐ مدة الكحة
- Classification. ☐☐ تقسيم إصابة الجهاز التنفسي

(A) Age less than 2 months ☐	(B) Age 2 months - 5 years ☐
1 - Very severe disease • Stopped feeding well • Convulsions. • Abnormally sleepy or difficult to wake. • Stridor in calm child. • Wheezing. • Fever or low grade body temp.	1 - Very severe disease • Not able to drink • Convulsions • Abnormally sleepy or difficult to wake. • Stridor in calm child • Severe malnutrition
2 - Severe Pneumonia • Severe chest indrawing or fast breathing (>60 / min)	2 - Sever Pneumonia • Chest indrawing 3 - Pneumonia • No chest indrawing fast breathing > 50 / min (up to 12 mo.) > 40 / min (12 mo. - 5 y.)
3- Cough or cold (No Pneumonia) • No severe chest indrawing & no fast breathing (< 60 / min)	4- Cough or cold (No Pneumonia) • No severe chest indrawing & no fast breathing.

Child Survival Project, 1990

Annex VIII

Nutritional Status of The Infant

تقييم الحالة الغذائية للطفل

1. Anthropometric measures : المقاييس :

(Measuring Changes in Nutritional status, WHO, 1983)

Age (in months)	☐☐	السن بالشهور :
Weight (in kgms)	☐☐☐ ☐	الوزن بالكجم :
Height (in cms)	☐☐☐ ☐	الطول بالسم :
Midarm circumference (in cm)	☐☐ ☐	محيط منتصف الذراع :
Triceps skinfold thickness.	☐☐ ☐	سمك الجلد :

Weight for age (modified Gomez classification)

% ☐ (S.D.) ☐

(1)	> 120	obese	(1)	± 2 S.D.	Normal
(2)	120 - 110	overweight.	(2)	< - 2 S.D.	Underweight
(3)	110 - 90	Normal.	(3)	> + 2 S.D.	Overweight & obese.
(4)	90 - 75	mild underweight.			
(5)	75 - 60	moderate underweight.			
(6)	< 60	severe underweight			

Length for age

	% ☐		(S.D.) ☐
(1) ≥ 90	Normal	(1) ± 2 S.D.	Normal
(2) 85 - 90	Moderate stunting.	(2) < -2 S.D.	Short (stunted)
(3) < 85	Severe stunting.	(3) > +2 S.D.	Tall

Weight for length

	% ☐	(S.D.) ☐
(1) 80 - 120	Normal	(1) ± 2 S.D.
(2) < 80	Wasting	(2) < -2 S.D.
(3) > 120	Overweight & obese	(3) > +2 S.D.

Midarm circumference for age

% ☐ of standard.

Triceps skinfold thickness for age

% ☐ of standard.

2. Lab. investigation : التحاليل المعملية :

Hb : ☐☐ ☐ نسبة الهيموجلوبين بالجم ٪

1. anaemic ☐ 2. nonanaemic ☐

anaemic < 11 gms %.
Nonanaemic ≥ 11 gms %.

3. Clinical examination for any deficiency signs (Jellife, 1966) **:**
(Annex II)

+ ve signs

مظاهر سوء التغذية : ....

ARABIC SUMMARY

الملخص العربى

إن تباعد أو تقارب فترات الحمل وعدد مرات الحمل لأى سيدة له تأثير أساسى على صحتها وصحة طفلها.

وقد وجد وخاصة فى الدول النامية أن الفترات القصيرة بين كل حمل وآخر لها تأثير سلبى على حالة الأم والطفل الصحية والغذائية.

وقد شمل البحث أمهات فى حالات فيسيولوجية مختلفة وأطفالهم دون سن الثانية وذلك لإظهار مدى تأثير الفترة بين كل حمل وآخر وعدد أفراد الأسرة على الحالة الغذائية والصحية للطفل.

وقد تم تقييم الحالة الصحية للأم عن طريق :

الوزن بالنسبة للطول وعلامات سوء التغذية وتحديد نسبة الهيموجلوبين.

وقد تم أيضاً تقييم الحالة الاجتماعية والاقتصادية للأسرة.

وتقييم الحالة الصحية والغذائية للطفل عن طريق :

الوزن بالنسبة للسن والطول والوزن بالنسبة للطول وعلامات سوء التغذية ونسبة الهيموجلوبين. كذلك النمط الغذائى للطفل والحالة المرضية للطفل خلال الشهر السابق وعند الكشف عليه.

وقد تم تحليل البيانات إحصائيا وقد أظهرت النتائج التالية :

- إن الحالة الغذائية والصحية للطفل قد تأثرت بالحالة الفيسيولوجية للأم حيث ظهر أن الأطفال الذين أمهاتهم حوامل ومرضعات كانت حالتهم الصحية والغذائية سيئة، ٥٦٪ من هؤلاء الأطفال كان وزنهم أقل من الطبيعى و٨٤٪ كانوا يعانون من الأنيميا.
- كما أن الحالة الغذائية والصحية للأطفال الذين يعانى أمهاتهم من الأنيميا كانت سيئة

وقد وجد أن هؤلاء الأطفال ينتمون إلى أسر كبيرة العدد وأن الفترة بين ولادتهم وبين ولادة الطفل السابق لهم كانت أقصر من الأطفال الذين لم يكونوا مصابين بالأنيميا.

- الأطفال الذين ينتمون إلى أسر ذات حالة اقتصادية واجتماعية سيئة كانوا ينتمون إلى أسر كبيرة العدد وأن الفترة بين ولادتهم وبين ولادة الطفل السابق كانت قصيرة.

- وقد كان للفترة القصيرة بين كل حمل وكثرة عدد أفراد الأسرة تأثيراً سيئاً على الحالة الصحية والغذائية للطفل. فالأطفال الذين كانوا يعانون من سوء التغذية كانت الفترة بين ولادتهم وولادة الطفل السابق قصيرة وكانوا ينتمون إلى أسر ذات عدد كبير وكان ترتيبهم كبير بالنسبة لأخواتهم وعدد الأطفال فى الأسر كبير.

أما بالنسبة للحالة المرضية للأطفال فقد وجد أن الأطفال الذين كانوا يعانون من الحرارة والإسهال والتهاب الجهاز التنفسى خلال الكشف أو خلال الشهر السابق للكشف كانوا أيضاً ينتمون إلى عائلات ذات عدد كبير وأن فترة ما بين ولادتهم وولادة الطفل السابق كانت أقصر من الذين لم يعانون من أى مرض.

أما عن النمط الغذائى للطفل فقد وجد أن الأطفال الذين قد تناولوا لبن السرسوب كانوا ينتمون إلى أسر ذات عدد صغير وكانت الفترة بين ولادتهم وولادة الطفل السابق كانت أطول من الذين لم يتنالوا لبن السرسوب.

كما وجد أنه كلما بدأ الطفل الرضاعة الطبيعية بعد الولادة مباشرة كلما قل عدد الأطفال المصابون بالأنيميا.

أما بالنسبة للرضاعة الطبيعية المطلقة فقد وجد أن هؤلاء الأطفال كانوا أقل إصابة بالأنيميا من الأطفال الذين كانوا يتناولون سوائل أخرى من سوائل سكرية أو نشوية بجانب الرضاعة الطبيعة. كما أن هؤلاء الأطفال كانوا ينتمون إلى أسر ذات عدد كبير.

أما الأطفال الذين كانوا يتناولون ألبان صناعية فقد وجد أن تقريبا نصف عددهم كان وزنهم قليل بالنسبة للسن.

الأطفال الذين تم فطامهم وجد أن ٣٥,٩٪ منهم كانوا يعانون من نقص الوزن ٧٨,٢٪ منهم كانوا مصابين بالأنيميا.

كما أظهرت نتائج التحليل الغذائى أن أغلب الأطفال لم يحصلوا على احتياجاتهم اليومية من الغذاء وكلما كبر عمر الطفل كلما قل عدد السعرات التى يتناولها فى اليوم وكذلك كلما زاد عدد الأسرة كلما قلت كمية الطاقة والبروتين والدهون الحيوانية والكالسيوم وزادت كمية الكربوهيدرات والبروتين والدهون النباتية المتناولة.

ومن هنا وجد أن قصر الفترة بين كل حمل وزيادة عدد الأفراد فى الأسرة لها تأثير سلبى على الحالة الصحية والغذائية للأم والطفل.

مستخلص الرسالة

اسم الباحث : مى كامل مطر

عنوان الرسالة : تأثير عدد أفراد الاسرة والفترة بين كل حمل وآخر على الحالة الصحية والغذائية للطفل .

جهة البحث : معهد الدراسات العليا للطفولة

– أن البحث قد شمل أمهات في حالات فيسيولوجية متخلفة وأطفالهم دون سن الثانية وذلك لإظهار مدى تأثير الفترة بين كل حمل وآخر وعدد أفراد الاسرة على الحالة الصحية والغذائية للطفل .

– وقد تم تقيم الحالة الصحية للأمهات عن طريق قياس الوزن والطول وعلامات سوء التغذية وتحديد نسبة الهيموجلوبين أما الاطفال فقد تم تقييم حالتهم الصحية عن طريق قياس الوزن والطول ومحيط الذراع وسمك الجلد كذلك من علامات سوء التغذية وتحديد نسبة الهيموجلوبين .

– وقد اثبت النتائج أن قصر الفترة بين كل حمل وآخر وزيادة عدد أفراد الاسرة لهما تأثير سلبي على صحة الام والطفل معا .

- فقد وجد أن حالة الام الصحية كانت اسوأ عند الامهات اللائى كانوا حواسل ومرضعات في نفس الوقت ، حيث أن ٩٢٪ منهن كانوا يعانوا من الانيميا (فقر الدم) .

- كذلك الاطفال فقد وجد الحالة الصحية والغذائية للطفل كانت اسوأ في الاطفال الذين ولدوا بعد فترة قصيرة من ولادة الطفل السابق لهم وكذلك الذين كان ترتيبهم كبير بالنسبة لاخواتهم أو كانوا ينتمون إلي اسرة كبيرة العدد .

- كما وجد أن اغلب الاطفال لم يأخذوا احتياجاتهم اليومية للغذاء وكلما كبر عمر الطفل كلما منت عدد السعرات التى يتناولها في اليوم .

- وكذلك كلما زاد عدد أفراد الاسرة قل عدد السعرات البروتينات والدهون الحيوانية المتناولة.

- ومن هنا وجد أن قصر الفترة بين كل حمل وآخر وزيادة عدد الاطفال في الاسرة لها تأثير سلبي على الحالة الصحية والغذائية للطفل

الكلمات المفتاحية

- الفترة بين كل حمل وآخر

- عدد أفراد الاسرة

- الحالة الصحية للام

- الحالة الصحية والغذائية للطفل

- الحالة الاقتصادية والاجتماعية

"جامعة عين شمس"

الكليـــة:

شكـــــــر

اشكـــر السـادة الأسـاتذة الـذين قامـوا بالأشـــراف

وهـــم :

١) أ.د. [illegible] عبد الحميد [illegible] ......
٢) أ.د. محمد محمود [illegible] ....
٣) أ.د. [illegible]
٤) أ.د. [illegible] عبد المجيد ......

ثـم الأشخـاص الذيـن تعـاونوا معـى فـى البحـث

وهـــم :

١) د. [illegible] قسم الأطفال - جامعة عين شمس
٢) أ.د. [illegible] أستاذ الإحصاء [illegible] جامعة القاهرة
٣) ....

وكـذلك الهيئـات الأتيـة :

١) [illegible] ....
٢) قسم الأطفال - جامعة عين شمس
٣) ....

"جامعة عين شمس"

الكليـــة:

صفحـــة العنـــــوان

أســـم الطالـــب : مى كامل عبد الجليل مطر

الدرجـــة العلميـــة : دكتوراه العلوم

القسم التابع لـــه : الدراسات الطبية

أســـم الكليـــة : معهد الدراسات العليا للطفولة

الجامعـــة : عين شمس

سنـــة التخـــرج : ١٩٩٦

سنـــة المنـــح : ١٩٩٦

شـــروط عامـــه

يوضع شعـار الجامعـة علـى الغـلاف الخارجـى.

" جامعة عين شمس"
الكليـــة:

رسالـــة ~~ماجســـــتير~~/ دكتـــــوراه

أسم الطــــالب:....محمد كامل محمد الجبلي مصطفى..........................
عنوان الرسالة: تأثير عمل الأطفال والعزلة بين كل منهما وأثر على الحالة الصحية والغذائية للطفل

أســـم الدرجـــــة : (~~ماجستيــــر~~ / دكتــــــوراه)

لجنــــة الإشـــــرا ف

١- الاسم/ أ.د. جيلان عبد الحميد عثمان ٢- الوظيفة/ أستاذ ورئيس قسم الأطفال جامعة عين شمس
١- الاسم/ أ.د. محمد محمود حسن ٢- الوظيفة/ أستاذ التغذية - معهد التغذية
١- الاسم/ أ.د. وفاء دعبس ٢- الوظيفة/ أستاذ التغذية - المدير السابق لمعهد التغذية
الاسم/ أ.د. فايزة يوسف عبد المجيد الوظيفة/ أستاذ علم النفس - معهد الدراسات العليا للطفولة

تاريخ البحـــث : ٢١ / ٢ / ١٩٩١

الدراســـــات العليـــــا

ختــــم الإجـــازة : أجيزت الرسالـــــة بتــاريخ ٢٦ / ٦ / ١٩٩٦
/ ١٩٩

عميد المعهد لشئون ...
موافقة مجلس الكلية موافقة مجلس الجامعة
٤ / ٨ / ١٩٩٦ / / ١٩٩

جامعة عين شمس
معهد الدراسات العليا للطفولة

تأثير عدد الأطفال والفترة بين كل حمل وآخر على الحالة الصحية والغذائية للطفل

خطة بحث رسالة دكتوراه الفلسفة

مقدمة من الطبيبة
مى كامل مطر
ماجستير طب الأطفال (القصر العينى)

تحت إشراف

أ.د. جيلان عبد الحميد عثمان
رئيس قسم الأطفال
جامعة عين شمس

أ.د. محمد عمرو حسين
أستاذ التغذية
معهد التغذية

أ.د. فايزة يوسف
أستاذ علم النفس
عميد معهد الدراسات العليا للطفولة
د/ فايزة يوسف

أ.د. وفاء موسى
المدير السابق
لمعهد التغذية