The Nutritional Status and Food Intake Pattern of Refugee Children Under Five Years
West Bank and Gaza Strip

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Declaration:

I Certify that this thesis submitted for the degree of Master is the result of my own research, except where otherwise acknowledged, and that this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signed ____________

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Date: 14 June 2005

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ABSRACT

Objective: To assess the level of and changes in nutritional status (prevalence of malnutrition and anemia), and dietary pattern of preschool refugee children in West Bank and Gaza Strip during Al–Aqsa Intifada and Israeli Invasion.

Study Significance: This study is unique in that it combines rapid indicators of malnutrition with a more detailed food consumption component to provide an overall picture of nutritional status of preschool refugee children in West Bank and Gaza Strip during Al–Aqsa Intifada.

Design: Cross – sectional study

Setting: Households in refugee camps in West bank and Gaza Strip.

Subjects: The 2002 survey participants included 273 refugee children 6-59 months of age from 97 households in the West Bank and Gaza, all of whom were weighed and measured, and from whom blood samples were drawn for analysis. In addition, 97 children 12-59 months of age from the same population participated in the 24-HDR component.

The 2006 sample included 641 refugee children 6-59 months of age from 326 households were measured for weight and height, and 326 children 12-59 of age completed a 24-HDR.

Study Tools: A scale and meter were used to measure the weight and height, 24–HDR questionnaire and food intake booklet were used to quantify the dietary intake and Hemocue machine were used for measuring hemoglobin level.

Data collection: In 2002 samples and data were collected from households in refugee camps from May to July. In 2003 data was collected from June to July.

Results: **Malnutrition**

Overall, GAM decreased slightly in the total sample population between 2002 (5.9%) and 2003 (4.5%) while GCM increased slightly from 12.1% in 2002 to 13.3% in 2003.

In the West Bank the prevalence of GAM dropped from 5.6% (2002) to 3.2% (2003) and in the Gaza Strip the prevalence fell from 6.1% (2002) to 4.8% (2003).Refugee children in Gaza Strip tend to have a higher prevalence of both GAM and GCM in 2002 and 2003 compared to refugee children in West Bank.

Results (cont.): The prevalence of GCM in Gaza Strip decreased between 2002 and 2003 (from 14.5% to 13.8%)

GCM in the West Bank, however, increased from 8.3% in 2002 to 11.2% in 2003

<u>Anemia</u>

The prevalence of anemia (Hb<11.0g/dl) and moderate anemia (<10g/dl) were, respectively 45.4% and 20.5%.

The highest rates of prevalence were observed in the younger age groups, refugee children six to twenty-four months of age

Results indicate that in 2002, 43.5% of the refugee children in the West Bank and 46.7% of the refugee children in the Gaza Strip ages 6–59 were anemic (Hb<11.0g/dl), suggesting a severe problem at that time.

<u>Dietary Intakes and Food Consumption:</u>

On average, refugee children aged 1–3 years and 4–5 years consumed low levels of energy relative to the RDA in the two samples studied in 2002 and 2003, although in general children surveyed in 2002 consumed high levels of energy, macronutrients, cholesterol and dietary fiber compared to in 2003. Carbohydrate intake was an exception

For *all* nutrients highlighted in this assessment—energy, protein, vitamins A, E, and folate, minerals iron and zinc—there was, to a greater or lesser degree, a decrease in consumption for preschool children in both the West Bank and Gaza Strip in 2002 and 2003 when compared to <80% RDA. The decreases in consumption for *all* of these nutrients, with the exception of vitamin E, were greater in Gaza than the West Bank.

Conclusions: Despite the improvement in the anthropometric indicators, the quality of food intake remarkably declined for all key macro and micronutrients studied.

In general, this population is not eating well. The presence of profound acute malnutrition and anemia is not surprising since preschool aged children show decreased energy, iron, vitamin A, and zinc intakes

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الملخص

الهدف دراسة الوضع الغذائي (فقر الدم، وسوء التغذية) والنمط الغذائي للأطفال الذين تقل أعمارهم عن خمس سنوات في المخيمات الفلسطينية في الضفة الغربية وقطاع غزة خلال فترة انتفاضة الأقصى والاجتياح الاسرائيلي.

ميزات الدراسة تتميز هذه الدراسة بجمعها بين مؤشرات سوء التغذية والنمط الغذائي المتعلق بتفصيل حول مكونات الطعام للأطفال الذين تقل أعمارهم عن خمس سنوات في المخيمات الفلسطينية في الضفة الغربية وقطاع غزة.

نوعية الدراسة تم استخدام أسلوب العينة المسحية.

مجتمع الدراسة الأطفال الذين تقل أعمارهم عن الخمس سنوات ويعيشون في المخيمات الفلسطينية في الضفة الغربية وقطاع غزة.

عينة الدراسة في العام 2002 تمت زيارة 97 وحدة سكنية وجد فيها 273 طفل تتروح أعمارهم بين الستة أشهر والخمس سنوات أجريت لهم قياسات الطول والوزن وفحص نسبة الهيموجلوبين في الدم، وتمت تعبئة استمارة النمط الغذائي لـ97 طفل فقط.

أما في العام 2003 فقد تمت زيارة 326 وحدة سكنية وجد فيها 641 طفل تتروح أعمارهم بين الستة أشهر والخمس سنوات أجريت لهم قياسات الطول والوزن ، وتمت تعبئة استمارة النمط الغذائي لـ326 طفل فقط.

أدوات الدراسة تم استخدام ميزان ومتر لقياس الوزن والطول، بينما تم قياس نسبة الهيموجلوبين في الدم بومسطة جهاز الهيمكيو. أما بخصوص قياس كمية الغذاء فقد تمت تعبئة استمارة 24 ساعة الماضية إضافة إلى كتيب مقادير الطعام.

جمع العينات تم جمع عينات الدراسة خلال شهر حزيران من العام 2002 وشهر تموز من العام 2003

النتائج <u>مؤشرات سوء التغذية:</u>

- بشكل عام لوحظ انخفاض بسيط في مؤشر سوء التغذية الحاد بين العام 2002 (5.9%) والعام 2003 (4.5%)، أما بالنسبة لمؤشر سوء التغذية المزمن فقد ارتفع من 12.1% في العام 2002 إلى 13.3% في العام 2003.
- مؤشر سوء التغذية الحاد انخفض بشكل ملحوظ في الضفة الغربية من 5.6% (2002) إلى 3.2% (2003) بينما في قطاع غزة الإنخفاض كان من 6.1%(2002) إلى 4.8% (2003).

النتائج (تابع)

- بينت نتائج الدراسة أيضاً أن ننسبة مؤشرات سوء التغذية الحادة والمزمنة كانت أعلى للأطفال في قطاع غزة منها في الضفة الغربية سواء في العام 2002 أو العام 2003.
- مؤشر سوء التغذية المزمن انخفض في القطاع من 14.5% (2002) إلى 13.8% (2003) بينما ارتفع في الضفة من 8.3% (2002) إلى 11.2% (2003).

الأنيميا:

- إن الدراسة بينت أن نسبة حدوث الأنيميا (Hb<11g/dl) هي 45.4% بينما نسبة الأنيميا المتوسطة (Hb<10g/dl) كانت 20.5%.
- أعلى معدلات للأنيميا وجدت بين مجموعات الأطفال الصغار الذين تتراوح أعمارهم ما بين ستة أشهر والأربعة وعشرون شهراً.
- نسبة حدوث الأنيميا في العام 2002 في الضفة الغربية كانت 43.5% بينما في القطاع كانت 46.7% (Hb<11g/dl).

النمط الغذائي ومكونات الطعام المأكول:

- بشكل عام وجد أن الأطفال الذين تتروام أعمارهم ما بين 1 – 5 سنوات يستهلكون كميات منخفضة من الطاقة مقارنة بالمخصصات الغذائية سواء في العام 2002 أو العام 2003، إضافة لذلك كان معدل تناول الطاقة والعناصر الغذائية الرئيسة (باستثناء الكربوهيدرات) والكلستيرول والألياف الغذائية في العام 2002 أعلى منه في العام 2003 .
- أيضاً بشكل عام أظهرت نتائج الدراسة أن الأطفال الذين تمت دراستهم في العام 2002 والعام 2003 في المخيمات الفلسطينية في الضفة والقطاع لايحصلون على كميات كافية من العناصر الغذائية من الطعام المتناول (طاقة، بروتينات، فيتامينA ، فيتامينE، حديد ، زنك) والتي تشكل <80 % من المخصصات الغذائية. كما ولوحظ أن هذا الإنخفاض في جميع العناصر الغذائية (باستثناء فيتامينE) التي تمت دراستها كان أعلى في القطاع منه في الضفة الغربية.

الخاتمة

بالرغم من التحسن الظاهر في بعض مؤشرات سوء التغذية إلا أن نوعية الطعام المتناول وكمية العناصر الغذائية التي تمت دراستها انخفضت بشكل واضح.

حيث يمكن القول وبشكل عام إن مجتمع الأطفال الذين تمت دراستهم لا يتناولون الطعام الكافي والجديد وبالتالي فليس من المستغرب ظهور سوء التغذية الحاد أوفقر الدم. لذا يجب التركيز على زيادة المخصصات الغذائية.

التمويل المالي لقد تم تمويل الدراسة من قبل معهد القدس للأبحاث الصحية والتغذية في جامعة القدس

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CHAPTER (1)
INTRODUCTION

1.1–Introduction

Nutrition is a key factor in health and well being at all stages of life. It is widely accepted that appropriate food and nutrient intakes are essential throughout the human life cycle, particularly during periods of rapid growth such as infancy and the pre-school years, and during pregnancy and lactation. In addition to food consumption, nutritional status is also directly influenced by health, economic, political, social, culture and health status (Kartasurya, 1999). The health and nutritional status of both mother and child are crucial during the first years of life when most physical and cognitive development occurs.

Maternal health and nutrition during pregnancy and lactation are key factors influencing an infant's health and nutrition status. Infants of undernourished mothers are at higher risk of complications related to fetal development and/or low-birth-weight compared to infants of well-nourished mothers (Lim and Leng, 1998), and low-birth-weight babies are at greater risk of illness within the first year of their lives than are infants that weigh over (2500 grams) (Pipes and Trahms, 1995). After birth, the mother's diet must provide sufficient nutrients to ensure that maternal stores will not be depleted and the mother will be able to produce enough milk to adequately nourish her child (William, 1993).

Nutrition in an infant's first year has long-term consequences affecting health throughout life, largely because it is during this period that growth, development, and maturation occur more rapidly than that at any other time. The adequately nourished infant is more likely to achieve normal physical and mental development (Bronner, 1997).

Although growth is relatively slower in childhood than in infancy, it remains extremely important that the diet provide appropriate kinds and amounts of nutrients. The impact of any nutritional deficiency on a child's health depends on when the deficit occurs and how long it lasts; the critical periods for development and critical nutrients required vary from one body tissue to another. For example, most brain growth, for which both protein and cholesterol are essential, occurs in the first 2 years and most tooth development, requiring calcium, phosphorus, and vitamins A, D and C, occurs in the first 6 years of life. (Peckenpaugh et al., 1995). Children's nutritional needs are greatest per unit of body size during infancy and decline with age. These needs vary among individual children of the same age as a result of differences in body size, patterns of activity, interaction of nutrients, and rates of growth (Nieman D. et al, 1990).

Nutrition studies frequently research the nutritional status of children under five years of age as they represent a high risk group and act as an indicator of the nutritional status of the population as a whole (Peckenpaugh et al., 1995). This study focuses on Palestinian children under age five living in a conflict situation known to have impacted the health and economic well-being of the population in general, including access to food and nutritional status (Abdeen et al, 2003)

1.2– Nutrition and Physical Growth

Growth may be defined as an increase in the physical size of the body as a whole or an increase in any of its parts associated with an increase in cell number or cell size. Development is defined as the acquisition of function associated with cell differentiation and maturation of individual organ systems or as a change from a lower to a more advanced stage of complexity for greater facility in functioning (Pipes and Trahms, 1995). Although several factors including heredity and environment are essential to both growth and development, without an adequate supply of nutrients, optimal growth and development to adulthood would not be possible (Peckenpaugh et al., 1995).

Weight is affected when energy intake is deficient, while linear growth is delayed when energy intake (i.e. kilocalorie consumption) is adequate but protein intake is deficient. Thus, a child’s weight is more affected by the total quantity of kilocalories consumed, while bone and lean tissue (muscle) growth, and ultimately height are affected by both the quantity and quality of the diet. Children who are undernourished are shorter and weigh less than their well-nourished peers weight. The rate of gain in weight is affected more than the rate of gain in height, but if the nutritional deficit is severe enough and continues long enough, linear growth will be retarded or may cease. Progress in physical growth is one of the criteria used to assess the nutritional status of populations and of individual children. If the child's growth is appropriate, it can be generally assumed that nutritional intake is adequate. Health problems unrelated to growth can occur, for example, anemia which may lead to poor growth. (Peckenpaugh et al., 1995).

Children from low-income families consume less food and therefore less energy and total nutrients than children from families with greater financial resources. Nutritional status studies have shown that children from lower income families are shorter and weigh less than children from more affluent families; the differences in stature are greater than the differences in weight. In fact, several studies have found that children who live under conditions of marginal food supplies are shorter yet appear fatter than those who have an abundant supply of food available (Pipes and Trahms, 1995)

1.3- Barriers to Adequate Nutrient Intake

While some barriers to adequate nutrient intake relate to an individual's health and circumstances including having the capacity to access, store and prepare food, or having a physical impairment such as a cleft palate or lack of teeth that limit one's ability to chew or digest food, other barriers are external in nature and are often beyond the control of the individual. These can include (Peckenpaugh et al., 1995):

1-Economic (inadequate money to purchase food)

2-Cultural (lack of exposure to a variety of food because of limited parental offerings or overemphasis on meat or high-fat and high-sugar foods)

3-Ecological (droughts, floods)

4-Emotional (television advertisements depicting non-nutritious foods as appealing)

5-Religious (adherence to restrictive food codes)

6-Political (food boycotts, military barriers to safely reaching sources of food)

Several of these barriers are present in the Palestinian context, particularly under the current Intifada, which began nearly two years before the 2002 survey data collection and escalated in the months prior to that survey.

1.4 -Recommendations for Infants and Children one to five Years Old

I.4.1-Infant

As described elsewhere, infants' diets are crucial to their health, development and long-term quality of life. Their diets must provide adequate nutritional intake in forms that the infants' digestive systems can manage. (Kumar-LeBlance et al., 1999)

1.4.1.1 – Diet

- Infants require energy dense foods that provide adequate supplies of fat and the micronutrients essential for normal physiologic growth, development and function and are easy to digest and metabolize.
- Breastmilk provides 40-50% of kilocalories from fat and supplies all the energy, vitamins and minerals needed to support an infant's rapid metabolism, growth and development. (William, 1993)
- Breastmilk also supports sensory and cognitive development and protects infants against both infectious and chronic diseases. (WHO-CAH, 2004)
- Children should be provided with breastmilk exclusively during the first six months of life, after which complementary foods should be added to the diet, along with continued breastfeeding. Breastmilk provides up to half of the nutrient intake an infant needs during the second half of the first year of life, and up to one-third of the child's nutritional needs during the second year of life. (WHO-CAH, 2004)

1.4.1.2– Nutrient requirements

In particular, infants require adequate amounts of iron, calcium and zinc.

- **Iron:** prevents iron deficiency anemia, a risk factor for abnormal cognitive and social development as well as consistent delays in physical development
- **Calcium:** required for the continuous bone development that is essential to normal growth
- **Zinc:** inadequate intake of zinc can compromise the child's immune function and hamper growth

1.4.1.3 – Dietary concerns

- Infants' immature digestive and excretory systems require that the diet be very limited in variety
- Substantial amounts of fiber and complex carbohydrates should be avoided as their bulking effect limits caloric intake, although gradual introduction of fruits, vegetables and grains into the diet is important

I.4.2 – Children Under five years of Age

Although after infancy children's growth and development slows considerably, children still have significant energy and fat requirements to support on-going growth and development. Their digestive systems also become mature enough to digest a variety of solid foods. Energy requirements vary among individual children regardless of their size, age and gender, but all require adequate nutrient intake to maintain growth and physical and cognitive development. (Kumar-LeBlance et al., 1999)

- Protein, vitamin and mineral intake remains critical, and the required amounts increase as children's bones, teeth and muscles continue to grow, although different nutrients are required in larger and smaller amounts at different times depending on the phase of the child's physiological and cognitive development.
- Iron and calcium remain critical, as they were during infancy.
- Fat and cholesterol intake should be reduced gradually after two years of age.
- Fiber intake should be increased gradually to an amount equaling the child's age plus 5 g to prevent excess fiber intake from reducing caloric intake and the bioavailability of certain essential nutrients.
- Fruits, vegetables and grains become increasingly essential in the diet

Recommended daily allowances (RDAs) of key nutrients have been developed to help policy-makers and program planners ensure adequate food supplies for their populations, and to inform the design of public nutrition interventions and education programs (Pipes and Trahms, 1995). RDAs such as the Recommended Energy Intake (Table 1.1) and nutrient intake (Table1.2) for children up to six years of age are not actually intended for use at the individual level.

Table (1.1): Recommended Energy Intake

Category	Age (Years)	Average Energy Allowances (Kcal)*	
		Per kg	Per day
Infants	0.0 – 0.5	108	650
	0.5 – 1.0	98	850
Children	1 – 3	102	1300
	4 – 6	90	1800

*Pipes and Trahms, 1995

Table (1.2): Nutrients Recommended for Infant and Children

Energy[1]/Nutrient intake[2] per Day	Infant		Children	
	0.0 – 6.0 months	6.0 – 12 months	1-3 Years	4-6 Years
Energy (Kcal)	650	850	1300	1800
Protein (g)	13	14	16	24
Vitamin A (µg -RE)	375	375	400	500
Vitamin E (mg α-TE)	3	4	6	7
Vitamin C (mg)	30	35	40	45
Folate (µg)	25	35	50	75
Niacin (mg NE)	5	6	9	12
Riboflavin (mg)	0.4	0.5	0.8	1.1
Thiamine (mg)	0.3	0.4	0.7	0.9
Vitamin B_{12} (µg)	0.3	0.5	0.7	1.0
Vitamin B_6 (mg)	0.3	0.6	1.0	1.1
Calcium (mg)	400	600	800	800
Phosphorus (mg)	300	500	800	800
Iron (mg)	6	10	10	10
Magnesium (mg)	40	60	80	120
Zinc (mg)	5	5	10	10

1=REA (Recommended energy Allowances)
2= RDA (Recommended Dietary Allowances) From National Academy of Sciences National Research Council:, 10th ed. Washington, DC, National Academy of Science, 1989. ((Kumar–LeBlance et al, 1999).

1.5 – Nutritional Assessment Methods

The four basic methods used in nutritional assessment are often called the *ABCD* approach:

- *A*nthropometrics
- *B*iochemical tests.
- *C*linical observations
- *D*ietary and personal histories.

No single approach directly measures individual nutritional status or determines problems and needs (William, 1993) – a combination of approaches is generally required.

1.5.1– Anthropometry

Anthropometry deals with body measurements such as size, weight, and proportion. It is use to monitor a child's growth (weight and height) relative to growth charts and other clinical standards (William, 1993). Malnourished children can experience rapid loss of weight in very short periods of time, and can regain their weight quickly through proper nutrition. Children cannot "lose" height, rather their rate of growth can slow during prolonged lack of access to adequate nutrients, particularly protein, and only a small portion of the delayed growth in height can be regained in spite of nutrition interventions. The different indices, therefore, indicate different concerns and vary in significance (William, 1993).

Growth assessment is the single measurement that best defines the health and nutritional status of children, because disturbances in health and nutrition, regardless of their etiology affect child growth. Growth assessment thus serves as a means for evaluating the health and nutritional status of children, just as it also provides an indirect measurement of well-being for the entire population. Although anthropometric measurements are not as precise as biochemical methods for assessing nutritional status, they are inexpensive, noninvasive, and easily obtained (Peckenpaugh et al., 1995).

1- Weight and Height

Independently, weight and height, common general measures of physical growth, provide only a crude index of growth without indicating details of individual variations (Williams, 1993). Anthropometric ratios comparing the two measurements, or presenting weight or height relative to age offer more useful information. *(See the Methodology section for the process by which anthropometric measurements are collected and calculated.)*

a- Weight-for-Height (Wt/Ht):

Used as an indicator of acute malnutrition, weight-for-height is an index of the weight of a child as a function of height. It indicates thinness or wasting in a child but does not detect stunting (shortness for age) which would indicate chronic malnutrition (Williams, 1993).

b- Height-for-Age index (Ht/Age):

Used as an indicator of chronic malnutrition or stunting, height-for-age is an index of height as a function of age, detecting growth retardation at a certain age. It does not, however, allow for the differentiation between two children of the same age and height, having different weights, that is, one being very thin (wasted) and the other very fat (obese) (Williams, 1993).

c- Weight-for Age Index (Wt/Age):

Weight-for-age relates the weight of a child to his/her age. It does not differentiate between a tall, thin child and a short, obese child of the same age and weight. Weight-for-age offers an overall picture of the nutritional status of a child (weight and height) relative to a standardized growth chart, but is not able to detect either wasting or stunting (Williams, 1993).

2- Body Circumferences and Skin Folds.

Measures for monitoring muscle mass growth and body composition include:

a- Triceps Skin Fold

Refers to the measurement of skin-fold thickness in the posterior of the upper arm at the midpoint, as an index of the body's fat or energy stores. A low skin-fold thickness measurement may indicate malnutrition (Williams, 1993).

b- Mid-Upper Arm Circumferences (MUAC) is a good indicator of muscle mass, and is especially efficient in detecting malnourished children at high risk of death (Williams, 1993), for example it is particularly useful for identifying and referring malnourished children to feeding programs. Although MUAC allows for a rapid assessment of nutritional status, and is strongly correlated with weight-for-height which facilitates assessment at the individual level, the reference index most frequently used to assess acute malnutrition for populations is weight-for-age (Williams, 1993).

c- Elbow Breadth: determines body frame size. It is a reliable measurement that changes little with age and is not affected by body fat stores. The elbow breadth measurement is helpful in determining desirable weight ranges, since body frame size reflects factors that influence weight, such as bone thickness, muscularity, and length of trunk in relation to total height (Williams, 1993)..

1.5.2– Biochemical Tests for Laboratory Values

Laboratory tests, for example analyses of blood or urine, can be used to determine levels of vitamins, hemoglobin, and similar substances that indicate an individual's nutritional status relative to key nutrients and the physiologic substances or processes that they impact (Williams, 1993).

1.5.3– Clinical Observation

Various clinical signs can be used to measure a child's nutritional status and growth/development; for example, a child’s posture, nervous control, condition of teeth, skin, eyes and hair can indicate possible nutrient deficiencies (Williams, 1993).

1.5.4– Diet/Food Intake Survey Methods

The assessment of the dietary intake of individuals or groups of individuals selected to represent larger sub-populations, can be approached using a number of different methods, and used to meet a number of different objectives. Care must be taken as they provide assessment results on a probabilistic level, rather than identifying individuals with inadequate intake, and they are also open to varying interpretation (WHO,1996). Other concerns include the logistics and costs of conducting surveys on the scale required to accurately and validly represent a population.

1- Objectives of Diet/Food Intake Assessments

Individual dietary surveys are most commonly undertaken to establish the existence, strength, direction and level of associations between dietary exposure and health outcomes in the individual. However, nationally representative individual dietary surveys have also been conducted to provide estimates of national nutrition status, although this seldom occurs in developing countries, for reasons of cost, expediency and logistics

(Ferro-Luzzi, 2001). Other key objectives that can potentially be met through individual dietary surveys include:

a) Assessing the adequacy of the diet to meet energy and nutrient requirements.
b) Establishing the presence of the link between a putative dietary risk factor and a given health outcome.
c) Monitoring for clinical purposes the response of the patient to manipulations of the diet.

2- Methodologies Used for Diet/Food Intake Assessments

Assessment of dietary intake relies on either retrospective reporting of intake from the recent or distant past, or prospective recording of intake over a specific period of time. Tables of food composition are used to calculate the energy and nutrient content of the consumed foods. Different circumstances and objectives call for different methods which include:

- 7-day dietary history
- 2 to 7 days weighed records
- Single or repeated 24-hour recall
- Food frequency surveys
- Chemical analysis of diets (PNC, 2001).

Many of these are particularly useful for studying special subgroups of population, e.g. pregnant women, infants, the elderly, or persons in special circumstances such as refugees or hospital patients (Ferro-Luzzi, 2001).

1.6 – Significance of the Study

Given that nutritional status depends in part on physical and economic access to sufficient amounts of safe foods that provide the necessary macro- and micro-nutrients required to sustain health and life, conflicts that disrupt a population's socio-economic stability and mobility will experience food insecurity and undernutrition. This nutritional assessment serves to provide critical information on the nutritional cost of the conflict on Palestinian infants, and children for informed decision-making and to establish a baseline of data from which to measure future improvement or decline of food security and nutrition indicators.

The onset of the *Intifada* in September 2000 and the subsequent Israeli military incursions, closure, and curfews have devastated the Palestinian economy and undermined those systems the Palestinian civilian population relies on for basic needs, including food and health. By February 2002, the median monthly income had dropped by 52%, and 58% of households in the West Bank households and 85% of households in Gaza were living below the poverty line. By the third quarter of 2002 the unemployment rate was 41.5% (West Bank, 32.4%; Gaza Strip, 64.3%).

This study is unique in that it combines rapid indicators of malnutrition with a more detailed food consumption component to provide an overall picture of nutritional status of pre-school refugee children six to fifty-nine months of age in the West Bank and Gaza Strip. To date few studies of dietary intake of refugee children in this age group have been conducted in the West Bank and Gaza. This secondary analysis of nutrition data collected from households of Palestinian refugees living in the West Bank and Gaza in 2002 and 2003 may help to identify levels of malnutrition in this vulnerable population and strategic programmatic interventions that can be directed toward improving their nutritional status.

1.7 –Purpose of the Research

This study is intended to assess the level of and changes in the nutritional status of refugee children in the West Bank and Gaza Strip during the Al Aqsa Intifada and Israeli Invasion.

1.8 – General Objectives

1- Compare the prevalence of malnutrition among preschool-age refugee children (six to fifty-nine months of age) in the West Bank and Gaza Strip in 2002 and 2003.

2- Compare the dietary intake of preschool-age refugee children (one to five years) in the West Bank and Gaza Strip in 2002 and 2003

3- Determine whether or not there is any association between malnutrition, dietary patterns and selected independent variables among preschool-age refugee children in the West Bank and Gaza Strip in 2002 and 2003

1.9– Specific Objectives:

1- To determine the prevalence of stunting and wasting among refugee children aged six to fifty-nine months in West Bank and Gaza Strip for periods 2002 and 2003.

2- To assess iron deficiency anemia by hemoglobin determination of refugee children aged six to fifty-nine months in West Bank and Gaza Strip for period 2002.

3- To assess energy and macronutrients (carbohydrate, protein and fat) intakes by refugee children aged one to five years in west bank and Gaza Strip for periods 2002 and 2003.

4- To assess micronutrients (Vit A, Vit E, Folic acid, Iron and Zinc) intakes by refugee children aged one to five years in West Bank and Gaza Strip for periods 2002 and 2003.

5- To identify the food pattern of refugee children aged one to five years in West Bank and Gaza Strip for periods 2002 and 2003.

6- To illustrate the association between nutritional status and

a-Mother's Education.

b-Father's Education and;

c- Household Income of refugee children aged six to fifty-nine months in West Bank and Gaza Strip for periods 2002 and 2003

1.10 – Null Hypothesis To Be Tested

The following hypotheses will be tested at a level of significance α=0.05.

H_0: There was no significant difference in prevalence of wasting among West Bank and Gaza Strip preschool-age refugee children in 2002 and 2003.

H_0: There was no significant difference in prevalence of stunting among West Bank and Gaza Strip preschool-age refugee children in 2002 and 2003.

H_0: There was no significant difference in levels of anemia among West Bank and Gaza Strip preschool-age refugee children in 2002.

H_0: There was no significant difference in energy intake among West Bank and Gaza Strip preschool-age refugee children in 2002 and 2003.

H_0: There was no significant difference in macronutrient (carbohydrate, protein and fat) intakes among West bank and Gaza Strip preschool-age refugee children in 2002 and 2003.

H_0: There was no significant difference in micronutrients (Vit A, Vit E, Folic acid, Iron and Zinc) intakes among West Bank and Gaza Strip preschool-age refugee children in 2002 and 2003.

1.11 – Operational Definitions

Malnutrition:

The term is used to refer to a number of diseases, each with specific cause related to one or more nutrients (for example, protein, iodine or calcium) and each characterized by cellular imbalance between the supply of nutrients and energy on the one hand, and the body's demand for them to ensure growth, maintenance, and specific functions, on the other (WHO, 1998).

Weight for Height: used as an indicator of acute malnutrition or wasting. The weight for height index expresses malnutrition evident immediately before and at the time of the survey, comparing the weight of the child with the weight of the references population for the same height. Weight for height reflects body proportion, or the harmony of growth, and is particularly sensitive to acute growth disturbances. The method of presenting the Weight for Height in Z-scores (standard deviations away from the median) is more statistically sensitive than that of expressing the weight for height in percentage of median. That is to say that for the same population of children whose weight for height is analyzed using both Z-score and the percentage of the median, a greater proportion of truly malnourished children will be found to be malnourished using the Z-score as the unit of measure. The classifications of cut off points for acute malnutrition in Z-score are presented in table (1.3) below. Global acute malnutrition (GAM) is the commonly used term defining the combined categories of moderate and severe acute malnutrition, or below -2Z score, and as such represent the populations of interest for humanitarian organizations and policy makers (Abdeen et al., 2003).

Table (1.3): Z-Score Category

Z-score	**Category**	
<–3 SD	Severe	Global
≥–3 & <–2 SD	Moderate	
≥–2 & <–1 SD	Mild	
≥–1 SD	Normal	

Height for Age: used as an indicator of chronic malnutrition or stunting. The height for age index expresses the past nutritional history (weeks to months to years) of a child rather than the current nutritional status, comparing the growth deficit for a child to the reference population of the same age. Height for age portrays performance in terms of linear growth, and essentially measures long-term growth faltering. The same classifications of Z scores and categories apply to chronic malnutrition. Thus, global chronic malnutrition (GCM) defines categories of moderate and severe chronic malnutrition (that less than -2Z scores), the population of interest for interventions (Abdeen et al., 2003).

Hemoglobin level: Anemia reflects a decrease in the oxygen carrying capacity of the blood due to a decrease in the mass of red blood cells. Hemoglobin, the oxygen carrying protein of red blood cells is the most useful indicator of anemia for population testing. Iron, folic acid, and dietary protein are necessary for hemoglobin and red blood cell production (Abdeen et al., 2003).

Iron deficiency in particular is the leading cause of anemia worldwide. Thus malnutrition or inadequate nutrition can lead to anemia and subsequent impaired learning and growth development (children), low birth weight infants, fatigue and diminished physical and mental productivity and decreased immunity from infectious diseases.

The WHO values for anemia were adopted for children (Abdeen et al., 2003).

Table (1.4) WHO Criteria for Anemia

Classification	Severe	Moderate	Mild	Normal
Hb level (gm/dl), children	<7	7-9.9	10-10.9	>11.0

CHAPTER (2)
REVIEW OF LITERATURE

In the United States, extensive surveys of nutritional status conducted in recent years have reached similar conclusion: marasmus and kwashiorkor are quite rate, but chronic undernutrition and iron deficiency are surprisingly common (Peckenpaugh et al., 1995).

The 1990 World Summit for Children singled out three key micronutrient deficiencies, namely iron, iodine, and vitamin A as being particularly common and of special concern for children and women in developing countries. Recently, enhanced knowledge of the importance of zinc for child growth and development and the prevalence of zinc deficiencies has placed zinc with the other selected micronutrients as well (UNICEF, 1998).

2.1 Malnutrition

2.1.1 Issues Related to Malnutrition in Children Worldwide

In 1995 stunting affected 22.2% (10.9 million) of pre-school age children in Near East/North Africa compared to 53.5% (89.9 million) preschool children in South Asia, 39.4% (42.6 million) in Sub-Saharan Africa, 38.3% (30.2 million) in South East Asia, 27.8% (5.6 million) in Central America and the Caribbean, and 12.9% (4.6 million) in South America. About 34.1% of preschool children in China were stunted in 1992 (Third RWNS, 2002).

The prevalence of stunting has declined globally from 48.8% in 1980 to 39.9% in 1995. However, actual numbers (excluding China) have increased over this period from about 175.8 to 183.9 million (Third RWNS, 2002).

Stunting is the nutritional indicator most consistently correlated with children's mental development, and in Third World countries stunting is usually associated with poor development in young children, and delayed neurosensory integration, low IQ and poor school achievement in older children. Thus, high rates of stunting pose alarming concerns for public health and for development at the country, regional and global levels. Studies suggest that at least part of the poor development found in stunted children is due to poor nutrition. *(Grantham–McGregor et al., Stunting and Mental Development in Children, 1996)*.

Stunting (a result of chronic malnutrition) occurs with longer exposure to poor nutritional intake compared to wasting (a result of acute, shorter-term malnutrition) and is less easy to 'repair'; however, an investigation the health and growth of children living in Soweto-Johannesburg Metropole, South Africa using anthropometric, socioeconomic, health, nutritional, and demographic data collected at birth and at 3,6,12,24,48 and 60 months found that some catch-up in growth occurred between 4 and 5 years of age, resulting in a reduction in the prevalence of *both* stunting and wasting. *(Cameron et al., Growth in Height and weight of South African Urban Infants from Birth to Five Years: The Birth to Ten Study, 1998)*

Many nutrition studies have examined the relationships between poor nutritional status of children and low 'scores' relative to key socio-economic and community development indicators (e.g.. household income, parental literacy/educational attainment, etc.).

In the U.S., research examining the relationship between household socioeconomic measures, child growth, and nutritional status in a community in eastern Kentucky with high poverty indicated relationships between parents' employment status, household economic status and children's growth and nutritional status. Children in the study population exhibited stunting (13% of girls) and overweight (33% of children) and obesity (21.4% of boys and 8.7% of girls). The relationships between the household's demographic indicators and a child's nutrition/growth status differed with the gender of the child. *(Crooks, Child Growth and Nutritional Status in a High-Poverty Community in Eastern Kentucky, 1999)*

On the other hand, a large-scale study of 3,396 Filipino children aged zero to forty-seven months compared anthropometric survey data collected in 1990 with socio-economic indicators to determine their association with nutritional status and evaluate their utility for distinguishing between malnourished and non-malnourished children at national and sub-national levels. The anthropometric data indicated 35.8% prevalence of low height for age, 12.9% prevalence of low weight-for-height, and 39.1% prevalence of low weight-for-age based on z-scores. The study found that children less than 36 months of age were most vulnerable to malnutrition, with no consistent differences in prevalence relative to gender. Income, educational attainment of the head of household, quality of housing and type of toilet (related to hygiene and exposure to diarrheal diseases and other diseases of oral-fecal transmission, which can impact nutritional absorption and growth in children) were associated with protein-energy malnutrition and were more closely associated with height-for-age z-scores compared to weight-for-height z-scores. *(Balajadia, Socio–Economic Factors Associated with Protein–Energy Malnutrition Among 0-47 Month–old Filipino Children, 1993)*

A 2002 study conducted in Papua New Guinea found that among children under five years of age living in a remote community with a limited cash economy, 68.8% were stunted and/or wasted, using a z-score cut–off value of $\leq -2SD$, indicating both acute and chronic malnutrition. Within the study population, the children of educated mothers and mothers who spoke Pidgin and/or English in addition to the local language had better z-scores. *(King et al., Nutritional Status of Children from Papua New Guinea: Association with Socioeconomic Factors, 2002)*

2.1.2 Middle East and Palestine

As previously mentioned, stunting is an issue of concern in the Middle East. Even in relatively wealthy countries, micronutrient deficiencies pose public health concerns. For example, a 1996 assessment of the iron and micronutrient status of mothers and children in the United Arab Emirates found that 35% of children had low serum ferritin levels, and a small number of children exhibited deficiencies of vitamins A and E. Low serum folate levels in the population also suggest folic acid deficiency *(Dawson et al., Current nutritional status of mothers and children in Al Ain, United Arab Emirates, 1996)***.** A broader study, with many similarities to the study presented here, examined malnutrition in pre-school age children in Alexandria, Egypt in 2001. Anthropometric measures compared to WHO-recommended cut-off points indicated that 15% of the children sampled suffered from stunting, and 3.6% showed signs of wasting. Stunting and underweight decreased as socioeconomic status increased. Older children living in non-squatter residences were more likely to exhibit wasting. *(El – Sayed et al., Malnutrition among Pre-School Children in Alexandria, Egypt, 2001)*

The State of Kuwait enjoys a high per capita income when compared with both industrialized and developing countries. A 1996 national cross-sectional survey of 1280 Kuwaiti preschool children aged 6 –59 months, which included anthropometric measurements of the children and interviews with their mothers for data on socioeconomic variables found that 11.5% of the boys and 9.9% of the girls were stunted; the prevalence of wasting was fairly similar in both sexes (10.1% - 10.9%). Obesity was more prevalent in girls (18.4%) than boys (16.1%) while anemia was more prevalent in boys (32.9%) than girls (25.8).

Several factors may contribute to the prevalence of undernutrition in Kuwaiti preschool children. The prevalence of undernutrition was modified inversely by the family income. Data show that although the prevalence of stunting was not modified by the mother's employment or education, wasting was most prevalent when the mother was illiterate or a housewife and was least prevalent in children of university-educated mothers. It is expected that employment and education are related to family income. The majority of the educated mothers were employed and therefore generated more income for their families. They also had better knowledge about the nutritional requirements of their children and had the necessary income to purchase the foods needed. *(Amine and Al-Awadi, Nutritional Status Survey of Preschool Children in Kuwait, 1996)*

A study of growth patterns among three cohorts of infants aged zero to fifteen months attending five government clinics in Gaza found no differences were found between the patterns for males and females, while infants from upper socioeconomic categories had better growth patterns. The study also found a fall-off in growth between age 12 and 15 months among all cohorts, attributable to a reduced focus on child nutrition for children over one year of age. *(Tulchinsky et al, 1994).*

Similarly, a 1991 nutritional status assessment of primary school age children in Al Jalazon Refugee Camp, West Bank, indicated that wasting and stunting (18% and 32% prevalence, respectively) were inversely associated with family wealth, which also impacted the children's diets. Anemia prevalence (18.8%) was higher among girls and was not affected by household wealth. Parents' educational attainment also affected their children's nutritional status. Interestingly, wasting and stunting were not affected by the frequency at which the child ate at the UNRWA supplementary feeding center. The author of this study concluded that children were entering school with a poor nutritional status and that no adequate interventions were applied to improve the nutritional status of children of school age. **(***Rizkallah, Nutritional Status of Primary School Children in a Refugee Camp of the West Bank, 1991)*

More recently, the 2002 nutritional assessment conducted in the West Bank and Gaza Strip, the study which supplied the data examined in this report, indicated that chronic and acute malnutrition were widespread and increasing in prevalence among children under five years of age. The findings indicated increases in chronic malnutrition among children under five years of age from 7.5% in 2000 to 30% in 2002, and increases in acute malnutrition from 2.5% in 2000 to 21% in 2002. *(Al Quds University/Johns Hopkins University/Care, Nutritional Assessment of the West Bank and Gaza Strip, 2002)* Several other nutrition surveys using random sampling methodologies were carried out in the Occupied Palestinian Territories in 2002 and 2003, but the results were not consistent. (AEI/ACH, 03/03; AQU/JHU/Care, 09/02; PCBS, 2002) For example, the PCBS survey indicates that levels of wasting and stunting have remained within the same range since 1996 with wasting at 2.8% in 1996, 1.4% in 2000 and 2.5% in 2002; and stunting at 7.7% in 1996, 8% in 2000 and 9% in 2002 (PCBS). A study by Kumar,1995 of nutritional status of 1500 children under five in the Gaza Strip only, conducted in 1995, found that 15.1% of the children in the sample were underweight, 5.7% suffered from wasting, and 14.2% suffered from stunting. This study found no gender-based differences, but did indicate some geographic differences in malnutrition prevalence. A study of infants less than 18 months of age in Gaza conducted the same year by Schoenbaum et al, 1995 indicated no gender-based differences in feeding patterns, anthropometric measures or prevalence of malnutrition, although they did find some differences in anthropometric status relative to different socioeconomic categories

2.2-Food Consumption, Dietary Intake and Nutritional Deficiencies

2.2.1 Food Consumption and Dietary Intake

The quality and quantity of foods consumed are one key determinant of nutritional status, which has implications for a broad range of health and development concerns at all ages, but particularly among infants, children and women of reproductive age (whose own nutritional status has implications for their babies). The elements of an individual's diet are influenced by personal preferences (sometimes influenced by education), physical and economic access to food, cultural and religious mores, etc. Low socio-economic and educational status, and environmental constraints such as famine or human conflict generally have negative consequences for the diets and nutritional status of individuals and of populations or sub-populations as a whole. Conversely, improving access to a high quality diet (through education, improved economic status, or an easing of external constraints) has the potential to significantly improve health status. (*James et al., Socioeconomic determinants of health: the contribution of nutrition to inequalities in health, 1997)*

A number of studies in developing and developed countries throughout the world use dietary recall methodologies to assess macro- and micronutrient intakes, often in combination with anthropometric measurements for younger children. One of the most famous of such studies is the series of *National Health and Nutrition Examination Surveys* which have examined nutritional status of several generations of Americans through use of 24-hour dietary recalls and other useful instruments which have in turn served as models for data collection for this and other studies conducted throughout the world. Data is compared to nutritional standards, RDAs, and data on key socioeconomic indicators in the same households.

For a detailed assessment of the food and nutrient intake of a well nourished healthy population Kersting et al studied a sample of (627) healthy German children and adolescents between the age of 1 and 18 years. The intake of macronutrients (protein, fat, carbohydrates) and their specific subgroups (animal protein, saturated (SFA), monounsaturated (MUFA) and polyunsaturated fatty acids (PUFA), cholesterol, added sugars, dietary fiber) were assessed from three-day weighted diet records. The younger the children the higher were values (% energy, % animal protein). The intake of fat was about 38% of the energy intake in the total sample. The percentage of energy intake of SFA was 17%, of MUFA 16%, and PUFA 5%, whereas cholesterol intake amounted to 34 mg/MJ in the total sample. The energy related intakes were lowest in the youngest groups with the exception of SFA and cholesterol. The intake of carbohydrates was about 49% of the energy intake in the total sample *(Kersting et al., Macronutrient intake of 1 –18 year old German Children and Adolescents, 1998)*

2.2.2 - Anemia

Young children are at risk of iron deficiency anemia because of rapid growth and increased iron requirements. Iron deficiency can occur due to lack of iron in the diets. If this continues, anemia results. Anemia is a manifestation of iron deficiency when it is relatively severe. **(CDC, 2001)**

The USAID-funded OMNI Project has conducted micronutrient deficiency assessments including Iron Deficiency Anemia (IDA) assessments in a range of developing countries, including Egypt, Morocco and Kenya. IDA increases the risk of poor pregnancy outcomes and contributes to prematurity, low birth weight and maternal mortality. In 1996 OMNI found a high prevalence of anemia among toddlers in Egypt, where IDA is the most severe of the country's micronutrient deficiency problems, and is primarily due to inadequate iron intake and poor bioavailability of the iron that is in the diet *(OMNI in Egypt, 1996)*. Studies in nearby Kenya in the same year found IDA in 70% of young children, as well as among pregnant women and women of reproductive age. Low iron intake and poor bioavailability due to the high phytate, fiber and tea consumption in the diet, as well as malaria and parasitic infections contribute to IDA *(OMNI in Kenya, 1996).*

Iron Deficiency Anemia (IDA) is also prevalent among young children and women in Morocco. Prevalence rates were as high as 80% in some areas. According to a Word Bank report, cereal-based diets, and high fertility levels could contribute to an IDA problem among women of reproductive age, as well as among children *(OMNI in Morocco, 1996).*

It is generally accepted by those who have studied iron deficiency, that there is an association between the condition and socio-economic status. In 1995 Rose et al. sought to determine the relevant social and economic factors associated with iron intake of preschoolers one to five years of age in the United States, based on data describing the children's diets during a three day period. Close to 57% of preschoolers consume iron at intakes below their RDA and 9% consume less than half of their RDA. Younger children from households with lower incomes and/or less schooling, and those living in the South or West were more likely to consume less than half of their RDA than others. Income was positively and significantly related to iron intake of the child, whether measured using the iron nutrient adequacy ratio (NAR) or the index of nutritional quality (INQ). Children from households who participated in the "Women, Infants and Children" (WIC) Program[1] consumed significantly more iron, whether measured by NAR or iron INQ. Children from households participating in the Food Stamp Program and children from households, whose main meal planners had a positive attitude about the importance of grains, also consumed more iron as measured by standard universal indices. Boys and girls consumed about the same amount of iron. The research found that income is

[1] WIC, the Women, Infants and Children Program provides aid to families in difficult circumstances to help ensure access to adequate amounts of nutritious foods.

positively associated with iron intake in preschoolers**.** **(***Rose et al., Socioeconomic Factors Associated With the Iron Intake of Preschoolers in the United States, 1995)*

Bashir, in his Master research conducted in 1994 assessed the prevalence of anemia among Palestine refugee infants and children aged 6-35 months and registered at UNRWA health centers in northern Jordan. The results revealed that 29.6% of children were suffering from anemia, which was particularly prevalent among children less than two years of age. The mean hemoglobin of the sample was 11.1 gm/100 ml (SD 1.1) A statistically significant relationship at 0.05 level was found between Hb level and the following variables: age of the child, weight of the child, family income and the Hb level of mother during pregnancy . No significant association was found between the hemoglobin level, and the age of weaning, sex of the child, family size and education of the mother ***(****Bashir, 1996)*

Looking at Gaza residents more broadly, including both refugees and non-refugees, a nutritional survey conducted in Gaza in 1998 in collaboration with CDC revealed that the prevalence of anemia among pre-school children was more than 50% with the highest rate of 67.7% among infants 6-11.9 months of age and that the prevalence decreased by age. These results are consistent with the results of this study *(Madi, 2001)*

2.2.3 – Vitamin Deficiencies

Despite a reasonable degree of food security and caloric adequacy in the diet of most Egyptians, micronutrient deficiencies exist at moderate levels, especially in low-income urban and rural areas of the country. In general, micronutrient deficiencies are more apparent in Upper than Lower Egypt. Vitamin A intakes of rural women and children appear to be half or less of their recommended daily requirements. Vitamin A is essential for vision and for resistance to disease; vitamin A deficiency (VAD) is the most common cause of preventable blindness in children and leads to increased morbidity and risk of mortality in children. Although Xerophthalmia (nutritional blindness) does not appear to be a public health problem in Egypt, several small studies suggest that sub-clinical (VAD) is present in some groups, including toddlers who consume an estimated 50-60% of their requirement *(OMNI in Egypt, 1996).* Large seasonal differences have been found in the intake of dietary vitamin A among lactating rural Kenya women, which may lead to short-term deficiency during part of the year. Similarly, season has shown to have an important influence on the vitamin A intake of preschoolers from low income rural households *(OMNI in Kenya, 1996)*

CHAPTER (3)
METHODS AND MATERIALS

3.1 - Introduction

In 2002 a national, cross-sectional anthropometric assessment of children ages six to fifty-nine months was undertaken by academic partners Al Quds University and the Johns Hopkins University Bloomberg School of Public Health under a US Agency for International Development (USAID) sub–grant to CARE International's Emergency Medical Assistance Project (EMAP1). A second, similar sub-grant awarded in 2003 funded a cross-sectional, quantitative assessment of both food security and nutritional indicators conducted by the original partners plus America Near East Refugee Aid (ANERA).

The researcher participated in both surveys, and herein reports on a secondary analysis of a sub-set of both datasets, i.e. the data collected on refugee children six to fifty-nine months of age in 2002 and 2003.

3.2 – Study Area and Time

Palestine comprises two geographically separate regions - the West Bank and the Gaza Strip. According to the 1997 Census, the Palestinian population totaled 2,895,683, of which 1,873,474 lived in the West Bank and 1,022,207 in Gaza Strip. The population was distributed across three types of localities, with 53.1% living in urban areas, 31.0% in rural areas, and 15.9% in refugee camps (PCBS, 2000). This study focuses on data collected from households in refugee camps in the West Bank and Gaza Strip during the months of June and July of 2002 and of 2003.

3.3 – Study Population

All children age six to fifty-nine months in each household in refugee camps in West Bank and Gaza Strip were consider respondents; however, children under 12 months of age are not included in the 24-HDR component of the study because breast-feeding intake, a significant percentage of an infant's diet, has not been quantified sufficiently for use in the 24-HDR.

3.4 – Sample Population

Sample sizes for each nutrition study were calculated based on sampling frames taken from the Palestinian Central Bureau of Statistics 1997 census data, adjusted for population growth for 2002 and 2003. Sample sizes were determined based on the need initial researchers' interest in disaggregating data at the District level. The sampling frames were stratified for urban, non-urban and refugee camp communities and the number of households chosen for each stratum was weighted in proportion to the urban, non-urban, and refugee camp population of each district. A systematic random sample of PSUs was chosen from the urban and refugee camp strata representing areas of high population density (first stage). Within each urban and camp stratum, computer-generated random samples of households were chosen. This report focuses only on data collected from households within the refugee camps. In 2002, the 97 households selected from refugee camps yielded 273 children six to fifty-nine months of age, while in 2003, the 326 households selected from refugee camps yielded 641 children in the same age group.

Table 3.1: Sampling Framework, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Year	The Assessment's Nutrition Parameters Included	Targeted Age Group	Sample collected
2002	Iron Deficiency Anemia	6 – 59 months	273
	Acute malnutrition or wasting	6 – 59 months	273
	Chronic malnutrition or stunting	6 – 59 months	273
	Food Consumption and Dietary Intake	12 – 59 months (1 – 5 years)	**97**
2003	Acute malnutrition or wasting	6 – 59 months	641
	Chronic malnutrition or stunting	6 – 59 months	641
	Food Consumption and Dietary Intake	12 – 59 months (1 – 5 years)	**326**

3.5 – Data Collection

3.5.1– Data Collector Training

During three days of training the data collectors received orientation to the questionnaire, instructions on completing the questionnaire, calibrating their equipment, and weighing and measuring the children and infants.

Data collectors who participated in the 2002 study were also trained to collect capillary blood samples from infants and children (and mothers) using the heel prick and finger prick techniques, respectively. They were also trained to calibrate and use hemocue photometers designed for field analysis of hemoglobin. During the third day of training the data collectors made household visits for practical training. A training manual was designed to provide each field worker with detailed instructions on the selection of households, selection of children within households, introduction of the 24-HDR to respondents, interviewing techniques, and recording of data in the questionnaire.

3.5.2 – Data Collection Process

Data was collected by teams of trained interviewers who visited the participants' homes from 31 May, 2002 to 31 July, 2002 and again from June 2003 to July 2003. The data collectors conducted private survey interviews with each mother using the questionnaires described below, and weighed and measured all children six to fifty-nine months of age in the household. In 2002 the data collectors also collected capillary blood samples from the participating mothers and children.

3.5.3 – Data Collection Instruments

The structured survey questionnaire developed and pre-tested by Al-Quds University consists of three components:

Section One: the household demographic questionnaire was specifically designed to gather information on household members' age, sex, family monthly income, education level and employment status of mother and father, and data on the dwelling (e.g. number of rooms). The questionnaire collected data on the following key variables:

- *Age in months*: Dates of birth were obtained from parental recall, identification cards, or vaccination cards.
- *Sex:* gender was recorded as male and female.
- *Genetic mother*: the mother or caretaker of the child was asked to confirm that she was the genetic mother of the child.
- *Household income and employment status*: In the 2002 study household income information was collected and analyzed based on a currency exchange rate of NIS 4.9 per US$1.00, and a definition of poverty in the Palestinian Territories as US$2.00 per person per day, based on the income of a family of two adults and four children. In 2003, in addition to household income, level of employment and loss of employment among anyone in the household since the beginning of the Intifada were also examined
- *Parent(s)' educational attainment*: categories identify those mothers and fathers as being either illiterate (unable to read or write) or having had some level of education, in which case "Primary " refers to having spent any amount of time in primary school, "Secondary"

having spent any amount of time in secondary school, and so on. "Diploma" includes those who have completed their secondary education but have not had any college or university courses. "College or above" includes those with any college courses as well as those with bachelor's or advanced degrees.

Section Two: the children's dietary intake questionnaire collects 24-hour dietary recall (24-HDR) information from the mother on dietary intakes of her youngest child aged 12 months or older in the household.

Section Three: Anthropometric measurements were taken for all children aged six to fifty-nine months in the sample households in refugee camps.

- *Weight:* The internationally field tested Tanita Baby/Adult Digital Scale 1582, graduated to 0.02kg for infants, with a capacity to 14kg., and 0.1kg for adults, with a capacity to 136 kg was used for weight measurements. Children were weighed barefoot, wearing only underwear.
- *Height/Length:* The heights of children twenty-four to fifty-nine months of age were measured with the child standing against a wall, feet flat on the floor, heels, buttocks, shoulders and the backs of their heads touching the wall and head positioned to face straight ahead. Heights were marked with a rigid headpiece and tape measures used to record heights to the nearest 0.1 cm. The length of children six to twenty-three months of age were measured using a *MeasureMat*, a

gauged mat with head and foot braces that minimize systematic errors. The mats were placed on a hard, flat surface and the infants were placed on their backs on the mats, with their heads touching the headpiece, and feet against the footrest, at a 90-degree angle to the mat/floor. With head, back and legs straight and flat against the mat, the infant's length was measured to the nearest 0.1cm.

- *Blood Samples:* In 2002 only, blood samples were also collected from the children. Capillary blood samples were obtained using the finger prick technique for children and heel prick for infants. Samples were analyzed with the Hemocue photometer (Hemocue AB, Angelholm, Sweden), an instrument field tested by USAID-funded Demographic and Health Surveys worldwide. Each photometer was calibrated at the start of the assessment and checked at the beginning of each day of data collection.

3.6 - Nutrition Assessment Parameters

This study focuses on five key aspects of nutrition that can be assessed with reasonable accuracy within children:

A- Iron Deficiency Anemia: the hemoglobin levels of children sampled classified relative to severity using (WHO) criteria.

B- Acute malnutrition or wasting:, the ratio of a child's weight to height (or in the case of an infant, weight for length) classified relative to severity using WHO criteria

C- Chronic malnutrition or stunting:, the ratio of a child's height for age classified relative to severity using WHO criteria.

D- Nutrient deficiencies: inadequate intake of critical macronutrients (energy and protein) and micronutrients (iron, vitamins A and E, zinc, and folic acid) based on a 24 hour dietary recall for the youngest child greater than 12 months of age in the household.

3.7 – Dietary intake (24-Hour Dietary Recall)

The 24-hour dietary recall (24-HDR) methodology is generally considered the only suitable dietary survey methodology for national surveys intended to describe the qualitative and quantitative food and nutrient intakes of the population. The methodology is based on the approach used by the United States Department of Agriculture (USDA) for their on-going Survey of Food Intakes of Individuals 1994-96 (CSFII). The original researchers received permission from USDA to use and adapt their instruments and associated booklets, which were modified specifically for the Palestinian diet by the Al Quds University

In particular, the Al-Quds University Operational Research Laboratory Health and Nutrition Project Team developed a Food Intake Booklet (FIB) with photographs of Palestinian dishes showing different, common serving sizes, volumes and weights to help survey respondents select appropriate portion sizes. Using common Middle Eastern recipes for these dishes, their nutrient compositions were calculated allowing for weight and nutrient loss in cooking. The tools and methodology were validated for the Palestinian population during the First Palestinian National Health and Nutrition Survey in 2000 (FPNHANS2000) which assessed the 24 hour dietary intakes of women 18-64 years of age (Abdeen et al, 2000).

In the 2002 and 2003 studies, data for food intake and nutritional status was compiled through the analysis of the individual dietary intake reflected in one 24-HDR of the youngest child in each household. Nutrient intakes assessed in this study included energy, macronutrients (fat, carbohydrate, protein) and micronutrients (Vitamins A and E, folic acid, iron, and zinc).

The 24-HDR interview was divided into three stages to maximize respondents' recall of foods eaten. The first stage, the "quick list" involved respondents supplying a broad description of all food and beverage items consumed in the previous 24-hour period (from 4:00 am to 4:00 am). The participants' recall of foods could occur in any order the participant chose; for example, chronologically, by meal, or by occasion.

In the next stage, a detailed description of each food and beverage item on the quick list was collected through a series of questions and prompts specific to each item. Questions for each item included: time of consumption, foods eaten in combination (hummus with olive oil, for instance), the cooking method, ingredients such as fats used in preparation, and the recipe for the food item where appropriate. When the respondent supplied a recipe the type and amount of each ingredient likely to influence the nutrient content of food (for example type of fat, milk, yogurt and /or cheese used) were ascertained. The food items and recipes described were matched to recipes from major Middle Eastern cookbooks and recipes included in the Al-Quds data collection and analysis tools. The nutrient composition of these recipes, allowing for weight and nutrient loss in cooking, could then be calculated. Where the respondent had the package of a particular food available, the product name, weight, and nutrient information were recorded. With the aid of the FIB photographs of food items in a variety of pre-weighed common portion sizes, the respondents were able to describe amounts of foods or beverages consumed by volume. The FIB also allows for conversions from the raw to the cooked form of common foods. The photographs in the FIB greatly reduce the frustration of the respondents who formerly searched for words to describe volume, size, and weight of food items.

The final stage was a review of the recall information provided, during which the data collector read aloud the foods eaten in chronological order and verified the description and amounts consumed with the respondent. Any information omitted from the recall or incorrectly entered was added or edited at this stage.

3.8 – Quality Control in the Field

A number of crucial steps were taken to ensure the quality of the data collected:

- To minimize bias in dietary reporting: respondents were not given advance notice of the food recall interview so as not too influence dietary habits and interviews were distributed evenly over the course of the week.
- Each completed questionnaire was checked by a field coordinator for quality and completeness prior to delivery of the questionnaires to the central office. Any incomplete questionnaires or questionnaires with discrepancies in the data collected were returned to the data collector for a re-visit to the household to collect or confirm the data in question.
- 10% of the households sampled were re-interviewed by the field supervisors. The field supervisors' data were compared to the original questionnaires to ensure accuracy.

- Prior to data entry a nutritionist reviewed the questionnaires to ensure the correctness and completeness of coding of foods, and to identify any irregularities in the quantities of foods reported to have been consumed.

3.9 – Data processing and analysis

Data processing and analysis was carried out using the EPI-INFO 6.0 and the Statistical Package for Social Sciences (SPSS) Windows Version 8.0 software programs.

Food and beverages from the 24-HDR data were matched to food composition data to calculate nutrient intake using the most recent SvyNet software, NutriBase 2.0. The primary source of food composition information was the SvyNet Composition Database, compiled by the USDA, which contains the composition of approximately 6,000 foods. If a direct match with information in SvyNet/Nutri Base was not available and the frequency of use was high relative to other foods, additional nutrient composition data was sought from British and Israeli databases. Experienced data entry staff keyed in the data for all questionnaires from a given cluster, and the entered data was reviewed by the researcher for any obvious errors. A printout of the data for a completed cluster was checked manually with the original questionnaires to identify any discrepancies. The data for the checked cluster was then added to the main database.

3.10 – Nutritional Standards:

The participants' food and nutrient intakes were evaluated by comparing individual 24-HDR results with the Recommended Dietary Allowances (RDA) established by the U.S. Food and Nutrition Board in 1989. The RDA represents the most widely used tool for estimating daily nutrient needs and defining nutrient deficiencies. The RDA, developed by experts who based their deliberations and decisions on the best available scientific knowledge, is approved by the Food and Nutrition Board of the U.S. National Academy of Sciences Committee on Dietary Allowances. The RDA outlines the levels of intake of essential nutrients judged to be adequate to meet the known nutritional needs of healthy persons. Intake of less than 80% of the RDA of a specific macro- or micronutrient defines deficiency in most developed countries including Israel. The RDA is set 2standard deviations above the estimated mean and so will exceed requirements of most individuals (Alpers et al., 1995). The RDA for children is based on the median for age intervals of 1-3 years and 4-5 years of age; therefore the children included in this study were stratified into age groups of one to three years and four to five years to facilitate analysis and comparison of data and results.

CHAPTER (4)
RESULTS AND DISCUSSION

4.1 – Distribution of Study sample

4.1.1– Anthropometric and Anemia Measurements

Weight and height measurements were collected from 273 children aged six to fifty-nine months selected from 97 refugee camp households visited in 2002 and from 641 children in 326 refugee camp households visited in 2003. Capillary blood samples were also collected from the children visited in 2002. The sample distribution of refugee children included in this study is closely correlated to the refugee population living in refugee camps in the West Bank and Gaza Strip, although refugee camp residents tended to be over sampled in the Gaza Strip compared to the West Bank.

Table (4.1) presents the distribution of the sample population of refugee children by region and gender (2002 and 2003). Note that 52.4% of the 2002 study sample were female, while 49.5% of the 2003 study sample were female; the male-to-female gender ratio in 2002 slightly favored girls at 0.91:1.00, while the ratio in 2003 slightly favored boys at 1.02:1.00.

Table (4.2) presents the distribution of participating refugee children aged 6-59 months by age range and gender for 2002 and 2003.

Table 4.1: Distribution of Child (6 -59) Months Respondents According to their Anthropometric Measurements by Region and Gender, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Variable		**2002**		**2003**	
		N	**%**	**N**	**%**
Region	**West Bank**	108	39.6	125	19.5
	Gaza Strip	165	60.4	516	80.5
Total		**273**	**100**	**641**	**100**
Gender	**Male**	130	47.6	324	50.5
	Female	143	52.4	317	49.5
Total		**273**	**100.0**	**641**	**100**

Table 4.2: Distribution of Child aged 6 -59 Months Respondents to Anthropometric Measurement by Age and Gender, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Age Groups (month)	**2002**						
	Male		**Female**		**Total**		**Sex ratio M/F**
	N	**%**	**N**	**%**	**N**	**%**	
6 – 11	16	12.4	13	9.1	29	10.6	1.23
12 – 17	15	11.5	18	12.6	33	12.1	0.83
18 – 23	16	12.3	21	14.7	37	13.6	0.76
24 – 35	27	20.8	25	17.5	52	19.0	1.08
36 – 47	28	21.5	31	21.6	59	21.6	0.90
48 – 59	28	21.5	35	24.5	63	23.1	0.80
Total	**130**	**100**	**143**	**100**	**273**	**100**	**0.91**
2003							
Age Groups (month)	**Male**		**Female**		**Total**		**Sex Ratio M/F**
	N	**%**	**N**	**%**	**N**	**%**	
6 – 11	37	11.4	33	10.4	70	10.9	1.12
12 – 17	36	11.1	35	11.0	71	11.1	1.03
18 – 23	33	10.2	32	10.1	65	10.1	1.03
24 – 35	79	24.4	74	23.4	153	23.9	1.07
36 – 47	72	22.2	90	28.4	162	25.3	0.80
48 – 59	67	20.7	53	16.7	120	18.7	1.26
Total	**324**	**100**	**317**	**100**	**641**	**100**	**1.02**

4.1.2 – Dietary Intake and Food Consumption

Table (4.3) presents characteristics of the refugee children in the West Bank and Gaza Strip who participated in the 24–HDR, i.e. the sub-sample that excludes the participating children who were less than 12 months of age. Of the 97 children in the 2002 sample, 44.3% (n=43) were males and 55.7% (n=54) were females; and of 326 children in the 2003 sample, 57.4% (n=187) were males and 42.6% (n=139) were females (Table 4.4 and Graph 4.1).

This sub-sample reflects a shifting gender balance similar to the larger sample of children six to fifty-nine months of age (Table 4.1). Table 4.3 also indicates, however, that while the 2002 sample was fairly evenly distributed across the West Bank and Gaza Strip (51.5% and 48.5% respectively) the geographic balance of the 2003 sample favored Gaza, with 243 (74.5%) of the children sampled living in Gaza compared to 83 (25.%) from the West Bank.

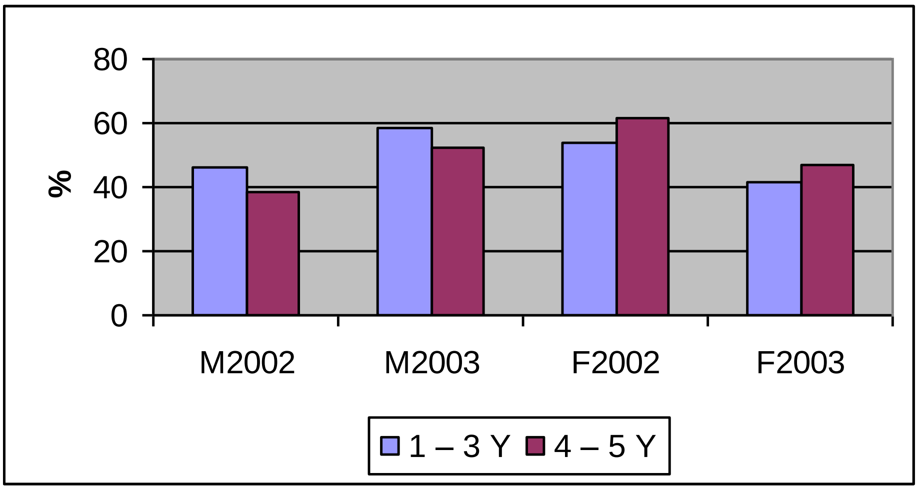
Table 4.3: Distribution of 24-HDR Child Aged (One to Five Years) Respondents by Region and Gender, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Variable		2002		2003	
		N	%	N	%
Region	**West Bank**	50	**51.5**	83	**25.5**
	Gaza Strip	47	**48.5**	243	**74.5**
Total sample		**97**	**100**	**326**	**100**
Gender	**Male**	43	**44.3**	187	**57.4**
	Female	54	**55.7**	139	**42.6**
Total Sample		**97**	**100**	**326**	**100**

Table 4.4: Distribution of 24-HDR Child Respondents Aged 1-5 Years by Age and Gender, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Age Group (Year)	**2002**					
	Male		**Female**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**
1 – 3	35	46.1	41	53.9	76	78.4
4 – 5	8	38.1	13	61.9	21	21.6
Total	**43**	**44.3**	**54**	**55.7**	**97**	**100**
2003						
Age Group (Year)						
	N	**%**	**N**	**%**	**N**	**%**
1 – 3	149	58.7	105	41.3	254	77.9
4 – 5	38	52.8	34	47.2	72	22.1
Total	**187**	**57.4**	**139**	**42.6**	**326**	**100**

Graph 4.1: Distribution of Children Aged 1-3 Years and 4-5 Years Who Responded to the 24-HDR by Age and Gender, in the West Bank and Gaza Strip, 2002 and 2003



4.2 – Malnutrition

A nutritional disorder or condition resulting from faulty or inadequate dietary intake is defined as malnutrition. It is important to understand the distinctions between acute and chronic malnutrition in order to interpret the following tables.

Acute malnutrition reflects a reversible state of undernutrition that has developed over a short period (e.g. days or weeks) prior to the study. It is to be interpreted then as a point prevalence, that is, the level of wasting at or around the time of the sampling itself.

C*hronic malnutrition*, or stunting, is an irreversible condition, and should be interpreted as a long-term indicator of undernutrition. Thus, the prevalence of chronic malnutrition may have developed over weeks to months to years, thus allowing for comparisons between 2002 and 2003.

The difference between the value for an individual and the median value of the population for the same age or height divided by the standard deviation of the population defines the Z scores, the conventional statistical measurement for acute and chronic malnutrition. The World Health Organization (WHO) has classified the severity of acute and chronic malnutrition based on U.S National Center for Health Statistics (NCHS) standards. The measure of greatest interest and the one most commonly referred to by donor and humanitarian agencies is that segment of the population falling below –2 Z scores. Those falling between –2 and –3 Z scores are classified as moderately malnourished, while those falling below –3 Z scores below the mean are considered severely malnourished. These classifications apply to both Global Acute Malnutrition (GAM), referred to as wasting, and Global Chronic Malnutrition (GCM), referred to as stunting.

The proportion of children found to be severely malnourished was low, at 2.2% of all children in 2002 and 0.6% in 2003; however given a comparison with a reference population figure of 0.13% severely malnourished, these prevalences, particularly in 2002, are of concern.

The majority of children in this study who were found to have GAM or GCM (< –2 Z scores below the mean), were in the moderate category, between –2 and –3 Z scores below the mean. The distribution of children by normal (≥ – 1 Z score), mild (≥ – 2 and < –1 Z scores), moderate (≥ – 3 and < –2 Z scores), and severe (< –3 Z scores) categories can be found in Table 4.5 for the 2002 and 2003 samples. The fact that most of the malnourished children were in the mild and moderate categories explains why one does not commonly see children with the signs of extreme malnutrition (swollen feet; visible wasting of limbs; pale, thinning hair) in the West Bank or Gaza Strip. Nonetheless, even children with mild and moderate malnutrition are at increased risk of death due to compromised system function.

Table (4.5): Distribution of Malnutrition Categories for Children Ages 6–59 Months, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Categories of Malnutrition	2002					
	West Bank		Gaza Strip		WB/GS	
	n	%	n	%	n	%
	Acute Malnutrition					
<–3SD/Severe	1	0.9	5	3.0	6	2.2
≥–3 and <–2SD/Moderate	5	4.6	5	3.0	10	3.7
≥–2 and <–1SD/Mild	10	9.3	18	10.9	28	10.3
≥–1 SD/Normal	92	85.2	137	83.0	229	83.9
Total	108	100.0	165	100.0	273	100.0
	Chronic Malnutrition					
<–3SD/Severe	3	2.8	9	5.5	12	4.4
≥–3 and <–2SD/Moderate	6	5.6	15	9.1	21	7.7
≥–2 and <–1SD/Mild	26	24.1	32	19.4	58	21.2
≥–1 SD/Normal	73	67.6	109	66.1	182	66.7
Total	108	100.0	165	100.0	273	100.0
	2003					
	Acute Malnutrition					
<–3SD/Severe	4	3.2	4	0.8	4	0.6
≥–3 and <–2SD/Moderate	10	8.0	21	4.1	25	3.9
≥–2 and <–1SD/Mild	111	88.8	91	17.6	101	15.8
≥–1 SD/Normal	125	100.0	400	77.5	511	79.7
Total	4	3.2	516	100.0	641	100.0
	Chronic Malnutrition					
<–3SD/Severe	3	2.4	16	3.1	19	3.0
≥–3 and <–2SD/Moderate	11	8.8	55	10.7	66	10.3
≥–2 and <–1SD/Mild	26	20.8	150	29.1	176	27.5
≥–1 SD/Normal	85	68.0	295	57.2	380	59.3
Total	125	100.0	516	100.0	641	100.0

2002 WB vs GS : X^2 =1.980 , Sig=0.576 GAM, df=3; X^2 =2.821 ,Sig=0.420 GCM, df=3
2003 WB vs GS : X^2 =8.700 , Sig= 0.034 GAM, df=3; X^2 =5.001, Sig=0.172 GCM, df=3

Although the prevalence of GAM is significantly above what would be expected for a normally nourished reference population, the prevalence of GAM had improved in 2003 compared to 2002. In the West Bank the prevalence dropped from 5.6% to 3.2% and in the Gaza Strip the prevalence fell from 6.1% to 4.8%. These relatively lower levels of malnutrition would not indicate a humanitarian emergency, particularly since there were no deaths due to malnutrition in the preschool age groups during the previous year; however the high prevalence rate of stunting and wasting in the survey sample populations should not be ignored.

As reported by PCBS in 2002, stunting appears to have increased among children aged 6–59 months in recent years, rising from 7.7% in 1996 to 8.0% in 2000 and 9.0% in 2002. Significantly higher levels of stunting were found among the children of the Gaza Strip during 2000 (8.9%) and 2002 (10.5%), compared to West Bank children (7.5% and 8.0% respectively) and significantly higher levels of stunting were also found among rural children in both 2000 (8.5%) and 2002 (10.9%), compared to urban children (8.1% and 8.6%) and those living in camps (6.7% and 7.0%), with camp children having the lowest levels of stunting overall.

Also as reported by PCBS in 2002, wasting peaked in 1996, affecting 2.8% of children, declined to 1.4% by 2000 to 1.4%, and rose again in 2002, reaching a level of 2.5%. No significance by locality was noted for the 1996 survey period. In 2000, urban and rural children had significantly higher levels of wasting compared to refugee camp dwellers. By 2002 wasting among children in rural areas had increased from 1.5% in 2000 to

4.6% in 2002, and wasting among children in refugee camps had increased from 1.0% in 2000 to 1.9% in 2002. (PCBS, 2002).

Tables 4.6 and 4.7 below reflect the distribution of GAM and GCM in the population of refugee Palestinian children six to fifty-nine months of age resident in the West Bank and Gaza Strip. Refugee children in Gaza tended to have a slightly higher prevalence of GAM compared to refugee children in the West Bank in both 2002 (5.6% and 6.1% respectively) and 2003 (3.2% and 4.8% respectively). The differences in GCM between the West Bank and Gaza Strip children were greater in 2002 (8.3% and 14.5%, respectively) but the differences narrowed in 2003 when GCM prevalence in the West Bank increased such that 11.2% of West Bank children were chronically malnourished compared to 13.8% in the Gaza Strip. Table 4.7 also indicates that while GAM and GCM prevalences were greater among Gaza Strip children in both 2002 and 2003, the prevalences of GAM and GCM in Gaza decreased between 2002 and 2003, as did the prevalence of GAM in the West Bank. GCM prevalence in the West Bank, however, increased from 8.3% in 2002 and to 11.2% in 2003, although the difference is not statistically significant. Overall, as shown in Table 4.7, GAM decreased slightly in the total sample population between 2002 (5.9%) and 2003 (4.5%) while GCM increased slightly from 12.1% in 2002 to 13.3% in 2003.

Table 4.6: Frequency and Prevalence of Global Acute and Chronic Malnutrition by Territory and Age Group for Children 6 – 59 Months, Refugee Camps in West Bank and Gaza 2002 and 2003

Territory	Age group (month)	N	Global Acute Malnutrition (Weight/Height) GAM		Global Chronic Malnutrition (Height/Age) GCM	
			n<-2Z	% -2Z	n<-2Z	% -2Z
Sample 2002						
West Bank	**Total**	**108**	**6**	**5.6**	**9**	**8.3**
	6 – 23	40	1	2.5	3	7.5
	24 – 59	68	5	7.4	6	8.8
Gaza Strip	**Total**	**165**	**10**	**6.1**	**24**	**14.5**
	6 – 23	59	2	3.4	12	20.3
	24 – 59	106	8	7.5	12	11.3
Sample 2003						
West Bank	**Total**	**125**	**4**	**3.2**	**14**	**11.2**
	6 – 23	34	2	5.9	5	14.7
	24 – 59	91	2	2.2	9	9.9
Gaza Strip	**Total**	**516**	**25**	**4.8**	**71**	**13.8**
	6 – 23	172	15	8.7	17	9.9
	24 – 59	344	10	2.9	54	15.7

Table 4.7: Comparisons of Malnutrition Prevalence for Children 6–59 Months of Age in Refugee Camps in the West Bank and Gaza Strip 2002 and 2003

Territory	2002	2003
West bank		
GAM	5.6	3.2
GCM	8.3	11.2
Gaza Strip		
GAM	6.1	4.8
GCM	14.5	13.8
Total		
GAM	5.9	4.5
GCM	12.1	13.3

In comparing the outcomes from the two years of sample data, although the sample sizes are quite different, several observations can be made:

- Pre-school-aged children were less likely to be acutely malnourished in both the West Bank and Gaza Strip in 2003 than were children of the same age in both regions in 2002.
- While GCM prevalence decreased in the Gaza Strip from 2002 to 2003 and was comparable to the findings of a similar study conducted in 1998, before the current Intifada, that found a GCM prevalence of 13.3% among pre-school aged children; an increase in GCM in the West Bank between 2002 and 2003 may reflect a trend that warrants further investigation.
- Acutely malnourished children will, in time, become chronically malnourished. It seems likely that timely food assistance that began in summer of 2002 prevented the acutely malnourished in Gaza Strip in 2002 from becoming chronically malnourished in 2003. It is important to note, however, that the four and five year old children included in the 2002 sample, those children most likely to have shown chronic malnourishment or stunting in 2003, would have been replaced with younger children with less exposure to malnourishment in the 2003 survey. Both of these factors are likely to have contributed to the diminished prevalence of GCM in Gaza from 2002 to 2003.

- Sustained food assistance and attention to nutrition by stakeholders and the Palestinian MOH may have kept prevalence of GAM in the Gaza Strip at a non-emergency level in 2003.
- A trend towards a greater prevalence of GCM in the West Bank is concerning and likely reflects the worsening economic condition of the West Bank and the multiple effects of the Separation Barrier, as well as the differences in focus on food assistance between the West Bank and Gaza.

Table 4.8: Frequency and Prevalence of Global Acute and Chronic Malnutrition by Gender for Children 6 – 59 Months, Refugee Camps in West Bank and Gaza 2002 and 2003

Gender	**Sample 2002**				
	N	**Global Acute Malnutrition (Weight/Height) GAM**		**Global Chronic Malnutrition (Height/Age) GCM**	
		n<-2Z	**% -2Z**	**n<-2Z**	**% -2Z**
Total	**273**	**16**	**5.9**	**33**	**12.1**
Male	130	8	6.2	20	15.4
Female	143	8	5.6	13	9.1
Sample 2003					
Total	**641**	**29**	**4.5**	**85**	**13.3**
Male	324	15	4.6	42	13.0
Female	317	14	4.4	43	13.6

2002 : X^2 = 0.039 , Sig=0.523 GAM, df=1 ; X^2 =2.54 ,Sig=0.08 GCM, df=1
2003 : X^2 =0.017 , Sig= 0.524 GAM, df= 1; X^2 =0.05, Sig=0.457, GCM , df=1

Regarding gender differences, previous studies have indicated that in general on a global basis female children tend to be at higher risk for malnutrition than male children. In Palestine, however, although the male children in the 2002 sample seemed to show a greater prevalence of GAM and GCM than did female children, the difference was not statistically significant, and in the 2003 sample the trends among males were similar to those among females. (Tables 4.8 and 4.9)

Table 4.9: Frequency and Prevalence of Global Acute and Chronic Malnutrition by Territory and Gender for Children 6–59 Month, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Territory	Age group (month)	N	Global Acute Malnutrition (Weight/Height) GAM		Global Chronic Malnutrition (Height/Age) GCM	
			n<-2Z	% -2Z	n<-2Z	% -2Z
Sample 2002						
West Bank	**Total**	**108**	**6**	**5.6**	**9**	**8.3**
	Male	50	3	6.0	6	12.0
	Female	58	3	5.2	3	5.2
Gaza Strip	**Total**	**165**	**10**	**6.1**	**24**	**14.5**
	Male	80	5	6.3	14	17.5
	Female	85	5	5.9	10	11.8
Sample 2003						
West Bank	**Total**	**125**	**4**	**3.2**	**14**	**11.2**
	Male	60	1	1.7	7	11.7
	Female	65	3	4.6	7	10.8
Gaza Strip	**Total**	**516**	**25**	**4.8**	**71**	**13.4**
	Male	264	14	5.3	35	13.3
	Female	252	11	4.4	36	14.3

Findings of this study are comparable to those reported by PCBS, which indicated that the prevalence of GAM and GCM in 2003 were 4.6% and 13.0% in males compared to 4.4% and 13.6% in females, respectively. Significant differences in stunting levels between both sexes appeared in the 2000 survey only, at 8.6% for females compared to 7.5% for males.

(PCBS, 2002) our findings were in the line of these results, although statistical difference between both genders (PCBS, 2002) were not observed

In populations with relatively high fertility rates, such as those in refugee camps, the youngest sibling of a recent infant in the family is often at risk for malnutrition. Table 4.10 compares acute and chronic malnutrition between children six to twenty-three months of age and children twenty-four to fifty-nine months of age in the sample populations. In the 2002 sample population the older children (24 – 59) months had a higher prevalence of GAM (7.5%) compared to the younger children (3.0%). However the younger age groups were more likely to be chronically malnourished, with a prevalence of GCM of 15.2% in the younger children compared to 10.3% in the older age group.

In the 2003 sample, however, the younger, six to twenty-three month old children were more likely to be acutely malnourished (8.3%) relative to the older children (2.8%). The difference is statistically significant. The older children were more likely to be classified with GCM (14.5%) compared to the younger children (10.7%); however this difference was not statistically significant.

These findings reflect the fact that the younger children are being weaned and introduced to solids foods and in general have had less time to become chronically malnourished than the older children. Nonetheless, attention should be paid to preventing the acutely malnourished infant, toddler from becoming chronically malnourished.

Table 4.10: Frequency and Prevalence of Global Acute and Chronic Malnutrition by Age Group for Children 6 – 59 months, Refugee Camps in West Bank and Gaza 2002 and 2003

Age Group (month)	Sample 2002				
	N	Global Acute Malnutrition (Weight/Height) GAM		Global Chronic Malnutrition (Height/Age) GCM	
		n<-2Z	% -2Z	n<-2Z	% -2Z
Total	**273**	**16**	**5.9**	**33**	**12.1**
6 – 23	99	3	3.1	15	15.2
24 – 59	174	13	7.5	18	10.3
Sample 2003					
Total	**641**	**29**	**4.5**	**85**	**13.3**
6 – 23	206	17	8.3	22	10.7
24 – 59	435	12	2.8	63	14.5

2002 : X^2 =3.393, Sig=.0335 GAM, df=3 ; X^2 =1.589 Sig =0.662 GCM, df=3
2003 : X^2 =9.77 , Sig=0.002 GAM, df=1; X^2 =1.76 , Sig =0.114 GCM, df=1

The researcher examined the prevalence of GAM and GCM in the sample populations relative to a range of demographic indicators and other variables that could impact nutrition, e.g. parent(s)' employment status, household income, etc. Table 4.11 shows that low income households are far more likely to have a child with moderate or severe acute or chronic malnutrition than the households above the poverty level.

Preschool age children in households with wage earners working less than 20 hours per week—the underemployed or unemployed—were statistically more likely to be both acutely and chronically malnourished than those in households with part-time or full-time employment (Table 4.11). Although level of employment and the frequency with which households used decreasing food consumption as a coping strategy were both associated with global chronic malnutrition, the presence or absence of food assistance to a household was not statistically related to whether there was an acutely or chronically malnourished child in the household.

Table 4.11: Frequency and Prevalence of Global Acute and Chronic Malnutrition by Household Income for Children 6 – 59 Months, Refugee Camps in West Bank and Gaza 2002 and 2003

Household Income	**Sample 2002**				
	N	**Global Acute Malnutrition (Weight/Height)** GAM		**Global Chronic Malnutrition (Height/Age)** GCM	
		n<-2Z	**% -2Z**	**n<-2Z**	**% -2Z**
<1800NIS	224	14	6.3	30	13.4
>1800NIS	49	2	4.1	3	6.1
Sample 2003					
Not employed	203	12	5.9	30	14.8
Employed	438	17	3.9	55	12.6
Any one lost their job since the beginning of the Intifada	291	14	4.8	39	13.4
No one lost their job since the beginning of the Intifada	350	15	4.3	46	13.1

2002 : X^2 = 1.7 , Sig=0.636 GAM, df=3 ; X^2 =2.009 ,Sig=0.570 GCM, df=3
(1)2003 : X^2 =1.195 , Sig= 0.754 GAM, df= 3; X^2 =1.166, Sig=0.761 GCM, df=3
(2)2003 : X^2 =7.325 , Sig= 0.062 GAM, df= 3; X^2 =5.190, Sig=0.158 GCM, df=3

There was an inverse relationship between the parent(s)' levels of education and the magnitude of the prevalence of both acute and chronic malnutrition (Tables 4.12& 4.13). Lack of education is linked to a general lack of knowledge regarding healthy infant and child feeding practices; however, household income is likely to be a strong confounding variable as lower income levels will correlate with lower levels of maternal education. Our results were consistent with the PCBS results of a study reported in 2002, indicating that children of mothers with higher levels of education and children from families with a high standard of living had less stunting than those with less educated mothers and a lower standard of living. (PCBS, 2002).

Table 4.12: Frequency and Prevalence of Global Acute and Chronic Malnutrition by Mother Education for Children 6 – 59 Months, Refugee Camps in West Bank and Gaza 2002 and 2003

Maternal Education	Sample 2002				
	N	Global Acute Malnutrition (Weight/Height) GAM		Global Chronic Malnutrition (Height/Age) GCM	
		n<-2Z	% -2Z	n<-2Z	% -2Z
Primary	148	13	8.8	20	13.5
Secondary	92	2	2.2	12	13.0
Undergraduate	33	1	3.0	1	3.0
Sample 2003					
Primary	112	3	2.7	23	20.5
Secondary	459	24	5.2	53	11.5
Undergraduate	70	2	2.9	9	12.9

2002: X^2 = 7.528, Sig=0.275 GAM, df=6; X^2 =4.281, Sig=0.639 GCM, df=6
2003: X^2 =2.679, Sig= 0.848 GAM, df= 6; X^2 =8.370, Sig=212 GCM, df=6

Table 4.13: Frequency and Prevalence of Global Acute and Chronic Malnutrition by Father Education for Children 6 – 59 Months, Refugee Camps in West Bank and Gaza 2002 and 2003

Maternal Education	Sample 2002				
	N	Global Acute Malnutrition (Weight/Height) GAM		Global Chronic Malnutrition (Height/Age) GCM	
		n<-2Z	% -2Z	n<-2Z	% -2Z
Primary	119	9	7.6	15	12.6
Secondary	109	5	4.6	14	12.8
Undergraduate	45	2	4.4	4	8.9
Sample 2003					
Primary	134	5	3.7	14	10.4
Secondary	388	18	4.6	58	14.9
Undergraduate	119	6	5.0	13	10.9

2002: X^2 = 7.316, Sig=0.293 GAM, df=6; X^2 =3.237, Sig=0.779 GCM, df=6
2003: X^2 =2.969, Sig= 0.813 GAM, df=6; X^2 =5.318, Sig=0.504 GCM, df=6

<u>Test of Null Hypothesis</u>

Table (4.14) provides P-values of significant association between malnutrition and location of refugee children aged 6 – 59 months in 2002 and 2003.

Table 4.14: P-values of Significant Association between malnutrition and location of Refugee children aged 6–59 Months in 2002 and 2003

Malnutrition	P- Value by location	
	2002	**2003**
Wasting	0.576	**0.034**
Stunting	0.420	0.172

Let us now test the null hypothesis

H_0: There was no significant Difference in Wasting Prevalence between West bank and Gaza Strip preschool refugee children in 2002 and 2003 $\alpha=0.05$.

The asymptotic-significance=p-value= probability value =0.576 in 2002 greater than the level of significance = $\alpha=0.05$. Therefore we accept the H_0 at $\alpha=0.05$ and conclude that prevalence of wasting and location are independent. That is the results are statistically insignificant in 2002.

Conclusion: There was no statistically a difference in wasting prevalence between West Bank and Gaza in 2002.

On the other hand, the asymptotic – significance=p-value= probability value =0.034 is less than the level of significance = $\alpha=0.05$, therefore we reject the H_0 at $\alpha=0.05$ and conclude that wasting prevalence and location were dependent in 2003. That is the results are statistically significant in 2003.

Conclusion: There was a statistically difference in wasting prevalence between West Bank and Gaza in 2003

H_0: There was no significant difference in Stunting Prevalence between West Bank and Gaza Strip preschool refugee children in 2002 and 2003 $\alpha=0.05$.

The asymptotic – significance=p-value= probability value =0.420 greater than the level of significance = $\alpha=0.05$. Therefore we accept the H_0 at $\alpha=0.05$ and conclude that stunting prevalence and location are independent. That is the results are statistically insignificant in 2002.

Conclusion: There was no statistically significant difference in stunting prevalence between West Bank and Gaza in 2002.

On the other hand, in 2003 the asymptotic – significance=p-value= probability value =0.172 greater than the level of significance = $\alpha=0.05$. Therefore we do not reject the H_0 at $\alpha=0.05$, and we conclude that stunting prevalence and location are independent. That is the results are statistically insignificant in 2002.

Conclusion: There was no statistically significant difference in stunting prevalence between West Bank and Gaza in 2002.

4.3 – Anemia

Anemia reflects a decrease in the oxygen bearing capacity of the blood due to a decrease in the mass of red blood cells. Hemoglobin, the oxygen carrying protein in red blood cells is the most useful indicator of anemia. Iron, folic acid, and dietary protein are necessary for hemoglobin and red blood cell production. Iron deficiency in particular is the leading cause of anemia worldwide. Thus, malnutrition or inadequate nutrition can lead to anemia and subsequent impaired learning and growth development, fatigue, diminished physical and mental productivity and decreased immunity from infectious diseases (Abdeen et all, 2003) Prolonged iron deficiency is associated with impaired cognitive and motor development in preschool children, even after the control for variables that may bias the results, as socioeconomic status, schooling of parents, and environmental stimulus (Brunken, 2002). The duration and severity of anemia were associated with impaired development, according to several randomized, double-masked studies (Brunken, 2002).

To compare and describe moderate and severe anemia within subgroups of the population, we used standardized hemoglobin cut-off values:

- Normal ≥11g/dl
- Mild 10.0 – 10.9 g/dl
- Severe < 7.0 g/dl

Note that for the purposes of this study we did not examine the influence of environmental factors (e.g. sanitation, prevalence of worm infestation, etc.) on anemia/hemoglobin levels. Since all of the refugee households sampled are located within UNRWA-managed camps we assume that any environmental factors are reasonably consistent throughout the sample population.

The hemoglobin distribution of children according to these categories is presented in Table 4.15.

Table 4.15: Distribution of Anemia for Children Ages 6-59 months, Refugee Camps in West Bank and Gaza Strip 2002

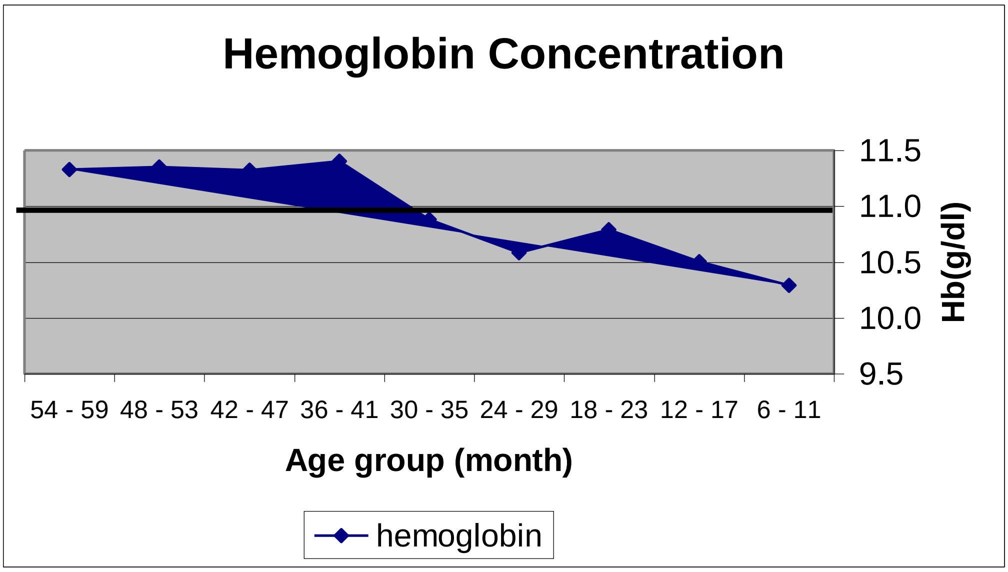
WHO category	West Bank		Gaza Strip		WB/GS	
	N	%	N	%	N	%
Hb<7 g/dl (Severe)	0.0	0.0	0.0	0.0	0.0	0.0
Hb 7 – 9.9 g/dl (moderate)	25	23.1	31	18.8	56	20.5
Hb 10 – 10.9 g/dl (Mild)	22	20.4	46	27.9	68	24.9
Hb>10.9 g/dl (Normal)	61	56.5	88	53.3	149	54.6
Total	**108**	**100.0**	**165**	**100.0**	**273**	**100.0**

X^2 = 2.201 , p- value =0.333 acute, df=2

To allow for comparisons with results of studies that used different cut-off levels, and to define the extent of anemia in the population for programmatic interventions, WHO advises determining the percentage of the population falling below the hemoglobin reference value of <11.0g/dl., which combines categories of mild, moderate and severe anemia.

Graph 4.2 shows the distribution curve for the average hemoglobin values according to age in the population sample, considering the reference curve for a non-anemic population shown in Graph (4.2). Only after two and a half years of age does the average hemoglobin concentration become higher than the WHO cut-off point for anemia (Hb<11.0g/dl). At age five, the children still had not reached an average concentration comparable to that of the reference population (Hb≥12g/dl); from age three to five years, mean Hb values ranged from 11.0-11.5g/dl.

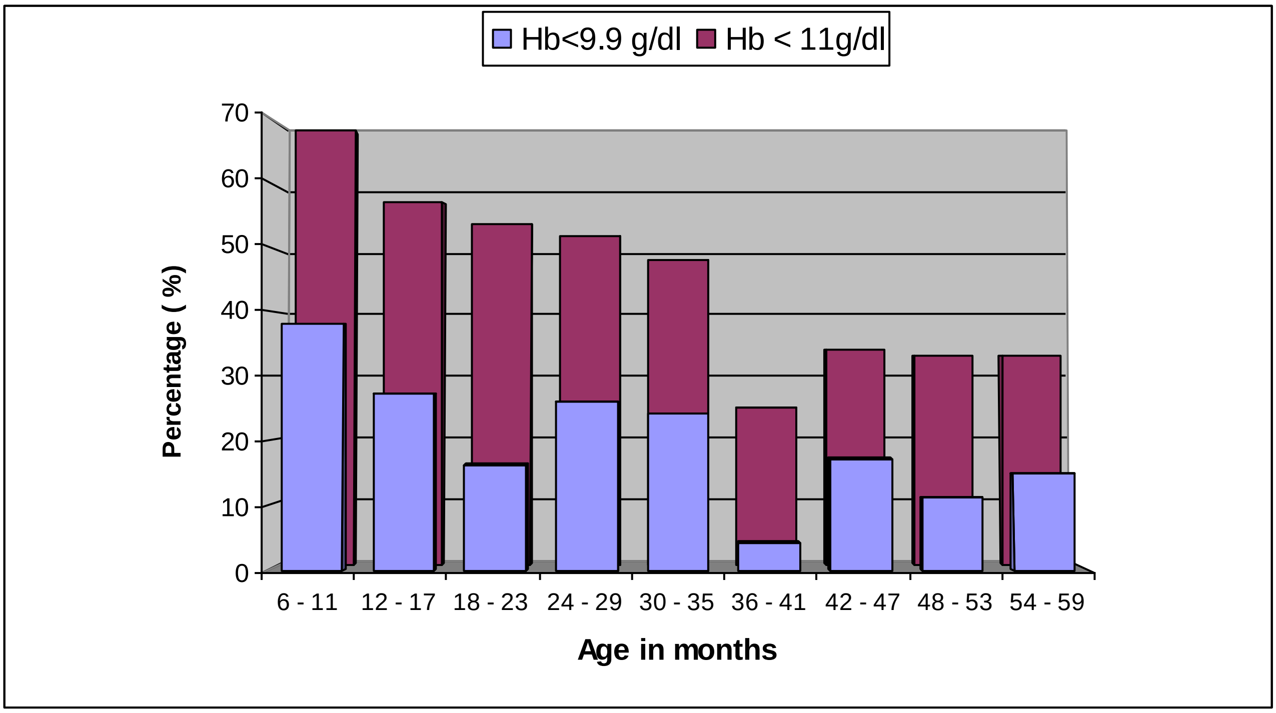
Graph 4.2: Mean Hb Values of Children 6 – 59 Months, Refugee Camps in West Bank and Gaza Strip 2002



The prevalence of anemia and more specifically, of severe and moderate anemia among different age ranges within the sample population are shown in Graph 4.3. In our population, the prevalence of anemia (mild and moderate combined) and moderate anemia were, respectively 45.4% and 20.5% (Table 4.15). Thus, one in every four anemic children was moderately anemic.

Although all age groups sampled were diagnosed with a high (>30%) prevalence of anemia, the highest rates of prevalence were observed in the younger age groups, children six to twenty-four months of age. The study results indicate similar levels of prevalence of mild, moderate and severe anemia among refugee children in the West Bank and Gaza Strip.

Graph 4.3: Prevalence of Anemia (Hb <11g/dl) and (Severe & Moderate) Anemia (Hb<9.9g/dl) according to the Age of Children (6 – 59) Months, Refugee Camps in West Bank and Gaza Strip 2002



WHO's Eastern Mediterranean Region Office classifies anemia as a severe problem if >40% of the population is anemic (Abdeen,2003). Our study results indicate that in 2002, 43.5% of the refugee children in the six to fifty-nine month old age group in the West Bank and 46.7% of the refugee children of the same age in the Gaza Strip were anemic (Hb<11.0g/dl), suggesting a severe problem at that time.

Our results are consistent with those of previous studies that used a hemoglobin of <11.0 g/dl to define anemia. Prevalence rates from these studies indicate iron deficiency anemia is endemic in the Palestinian population, and that decreases seen in 2000 may have been reversed again with the onset of the current Intifada. Study results include:

- UNRWA/CDC, 1990, West bank :57.8% (Yip et al, 1990)
- UNRWA/ CDC, 1998, Gaza Strip: 52.8% (Madi,2001)
- UNRWA, 1998, West Bank : 49.7% (Abdeen, 2003)
- UNRWA, 2000, birth Year cohort West Bank , 29.7% (Abdeen, 2002)
- UNRWA, 2001, birth Year cohort West Bank , 39.0% (Abdeen, 2002)

Let us now test the null hypothesis

H_0: There was no significant difference in Anemia Levels in Children 6– 59 Months of Age Between the West Bank and Gaza Strip in 2002 $\alpha=0.05$.

The asymptotic – significance=p-value= probability value =0.333 (Table 4.15) greater than the level of significance = $\alpha=0.05$. Therefore we do not reject the H_0 at $\alpha=0.05$. And conclude that anemia and location are independent. That is the results are statistically insignificant in 2002.

Conclusion: There was no statistically significant difference in anemia levels among preschool-age refugee children in the West Bank compared to the Gaza Strip in 2002.

Surprisingly, for moderate and severe categories (<10g/dl), the prevalence was significantly higher among children age 6–23 months 28.3% compared to children age 24–59 months 16.1%, as shown in Table 4.16. Among refugee children ages 6–23 month the prevalence of Hb <10.0g/dl varies little between the West Bank 27.5% and the Gaza strip 28.8%.

However, the prevalence of moderate and severe anemia among was significantly higher among refugee children ages 24–59 months in the West Bank 20.1% compared to similar children in the Gaza Strip 13.2%.

Table 4.16: Frequency and Prevalence of all Anemia by Territory and Age Group for children ages 6-59 months Refugee Camps in West Bank and Gaza Strip 2002

Territory	**Age group (month)**	**Number**	**Moderate & Severe Anemia (Hb)**		**Mild, Moderate & Severe Anemia (Hb)**	
			n<10gm/dl	**%<10mg/dl**	**n<11gm/dl**	**%<11mg/dl**
WB	**Total**	**108**	**25**	**23.1**	**47**	**43.5**
	6 – 23	40	11	27.5	21	52.5
	24 – 59	68	14	20.1	26	38.2
GZ	**Total**	**165**	**31**	**18.8**	**77**	**46.7**
	6 – 23	59	17	28.8	38	64.4
	24 – 59	106	14	13.2	39	36.8
Total	**Total**	**273**	**56**	**20.5**	**124**	**45.4**
	6 – 23	99	28	28.3	59	59.6
	24 – 59	174	28	16.1	65	37.4

Although we did not look for specific etiologies for infant anemia, tea consumption, maternal anemia, low dietary intake, and malnutrition are postulated to be major causes. Certainly a significant lack of dietary iron consumption plays a major role for both age groups but doesn't explain the disparity of prevalence. In fact, tea consumption increases with age for children. On the other hand, iron-rich foods such as meat are less likely to be available/accessible during conflict situations such as the situation introduced by the current Intifada. Children less than 23 months of age in the summer of 2002 had lived most or all of their lives during the conflict, as opposed to older siblings who may have had better access to iron-rich foods earlier in their lives. These issues should be highlighted during strategic planning.

The survey carried out by PCBS (2002) found that 37.9% of children aged 6–59 months were anemic, with hemoglobin levels lower than 11 gm/dl. Anemia was found to be at its highest levels 53.4% among children 12–23 months (cut off point 11gm/dl), followed by 42.2% for 6-11month olds (cut off point 10.5 gm/dl). Girls aged 12–59 months were significantly less frequently anemic than boys in the same age group (33.7% females vs. 37.3% males). Gaza Strip children aged 12–59 months were significantly more anemic than West Bank children (38.7% GS vs. 33.5% WB), and refugee camp-dwelling children were significantly more anemic than rural or urban children (40.1% anemia in the camps vs. 34.0% in rural areas and

34.2% in urban settings) (PCBS,2002). Although in general the PCBS findings showed a lower overall prevalence of anemia than the current research findings among refugee children, it is interesting that the PCBS findings indicate higher levels of anemia among refugees, perhaps helping to explain the discrepancies in results.

Table (4.17) shows no statistically significant differences in anemia prevalence based on gender; the prevalence of moderate and severe anemia (<10g/dl) among refugee children in the sample population varied little between male 22.3% and female 18.9% respondents. Lack of gender differences is consistent with a 1995 study of Gaza infants (Schoenbam et all, 1995).

Table 4.17: Frequency and prevalence of all anemia Territory and age group for children ages 6–59 Months Refugee Camps in West Bank and Gaza Strip 2002

Gender	**Number**	**Moderate & Severe Anemia (Hb)**		**Mild, Moderate & Severe Anemia (Hb)**	
		n<10gm/dl	**%<10mg/dl**	**N<11gm/dl**	**%<11mg/dl**
Male	130	29	22.3	64	49.2
Female	143	27	18.9	60	42.0

X^2 = 1.454 , p- value =0.483 acute, df=2

Table 4.18 presents the average hemoglobin concentration of the population as related to anthropometric measures. There was a tendency for anthropometric measures to decrease as hemoglobin concentration decreased; this decrease, however, was not statistically significant ($p>0.05$).

Table 4.18: Mean values (± Standard deviation) for anthropometric indicators regarding hemoglobin concentration of 273 children aged 6–59 Months, Refugee Camps in West Bank and Gaza Strip 2002

Anthropometric indicators (z-score)	**Without anemia (Hb ≥11) (n= 149)**	**With anemia (Hb <11) (n=124)**	**With severe anemia (Hb <9.9) (n=54)**	**P-Value**
Weight–Age	-0.05 ± (1.45)	-0.28±(1.20)	-0.34±(1.18)	0.145
Weight–Height	0.30±(1.52)	0.07± (1.19)	-0.05±(1.31)	0.515
Height–Age	-0.36±(1.78)	-0.45±(1.52)	-0.36±(1.30)	0.228

Table (4.19) shows the relation between a diagnosis of anemia and some of the biological variables studied, e.g. gender, age and anthropometric measures in Z-scores. Anemia was prevalent among all of the variable-defined sub-groups (rates of 30% or more) There was a statistically significant association between age and the prevalence of anemia ($P=0.47$). There was no statistically significant difference between the prevalence of anemia in children and low weight-for-age, weight-for-height or height-for-age status.

Table 4.19: Frequency of Anemia and Relationship with Some Variables studied in children (6-59) months, refugee Camps In West Bank and Gaza Strip 2002

Variables		Categories	Total N	Anemia n	Anemia %	P
Gender		Male	130	64	49.2	0.724
		Female	143	60	42.0	
Age (Months)		6–12	62	39	62.9	0.474
		18– 29	60	32	53.3	
		30–41	53	20	37.7	
		42 – 53	71	24	33.8	
		54 – 59	27	9	33.3	
Anthropometric Indictors (Z–score)	Weight– Age	< – 2 SD	19	6	31.6	0.463
		≥ – 2 SD	254	118	46.5	
	Weight–Height	< – 2 SD	16	7	43.8	0.863
		≥ – 2 SD	257	117	45.5	
	Height–Age	< – 2 SD	33	18	54.5	0.125
		≥ – 2 SD	240	106	44.2	

Finding in this study 2002 corroborate the understanding that iron deficiency anemia is the most prevalent pathology in children less than five years of age; this prevalence is 4–fold higher than the prevalence of calorie or protein malnutrition which effects 12.1% of children and is related to a previous status of malnutrition. The prevalence of anemia is six fold higher than the prevalence of low weight for age. Others have already described the elevated prevalence of anemia as a relatively more serious public health problem than malnutrition (Brunken, 2002).

While it is vital to stress the importance of breast-feeding for an appropriate period in order to avoid premature weaning, it is equally necessary to give adequate quantities of appropriate supplementary foods during the second half of the first year of life and to ensure proper food intake in the second year (Tulchinsky et al, 1994).

A number of studies have demonstrated that anemia represents a more severe form of iron deficiency, whereas milder forms have abnormal iron biochemistry values such as low serum ferritin and low transferrin saturation. It is estimated that using anemia as an indictor, the prevalence of iron deficiency would be twice the prevalence of anemia. In the Palestinian refugee camps, two thirds of the children surveyed were anemic, indicating that it is likely that most children, if not all, had some degree of iron deficiency. Late infancy and early childhood are high risk periods for iron deficiency because of an increased iron requirement related to rapid growth and diets that are relatively low in iron content. Based on discussions with UNWRA personnel and mothers of some study children by the investigators, several infant feeding practices among Palestinian refugees are likely to increase the risk of iron deficiency: These include breast-feeding after 6 months of age without iron supplementation; use of non-iron fortified cow's milk as a weaning food; early and frequent consumption of tea; and relatively infrequent consumption of meat due to its high cost. The overall higher prevalence of anemia for children in Syria, Lebanon and Gaza is likely related to the poorer socioeconomic status compared with Jordan and the West Bank. (Hassan et al, 1997)

4.4 –Dietary Intakes and food Consumption

4.4.1 - Macronutrient intakes

Mean daily intakes of energy, macronutrients, cholesterol and dietary fiber among refugee children one to five years of age in the West Bank and Gaza Strip are presented in Table 4.20. On average, children aged one to three years and four to five years consumed low levels of energy relative to the RDA in the two samples studied in 2002 and 2003, although in general children surveyed in 2002 consumed high levels of energy, macronutrients, cholesterol and dietary fiber compared to in 2003. Carbohydrate intake was an exception.

Significantly higher intakes of energy, total fat, MUFA, PUFA, Cholesterol and protein were consumed by the four to five year old age group compared to the younger age group of one to three year olds in 2002; while lower intakes of SFA, carbohydrate and dietary fiber were consumed by the older age groups (4–5) year olds compared to (1–3) year olds in 2002 . In contrast to the findings from 2002, significantly higher intakes of energy, total fat, MUFA, PUFA, cholesterol, carbohydrate and dietary fiber were consumed by the younger age group compared to the older (4-5 year old) children in 2003.

Intakes of energy and macronutrients in 2002 and 2003 respectively remained relatively constant across the age groups:

- Total fat: 37.6% and 32.8% of energy

- Carbohydrates: 50.9% and 55.7% of energy
- Protein: 13.2% and 12.5% of energy
- Cholesterol (229.0 and 182.7mg/d) and P/S ratio (0.91 and 1.057).
- Of the 37.6% and 32.8% of energy from fat, SFA contributed 11.7% and 9.0%,
- MUFA contributed 12.6% and 10.6%
- PUFA contributed 10.2% and 10.5% in 2002 and 2003, respectively.

Energy intakes were generally lower among children in the West Bank compared to children in the Gaza Strip in 2002 (1146.2 vs 1467.1Kcal); while energy intakes were higher among children in West Bank compared to in Gaza Strip in 2003 (1116.4 vs 974.9 kcal). Children in the four to five year old age group in the Gaza Strip had significantly higher energy intake compared to children in the same age group in the West Bank. Energy intake, however, was greater for females than for males; in 2002 was (1354.0 vs 1236.1 kcal) and in 2003 was (1033.7 vs 994.0 kcal), respectively.

Carbohydrate intake (% of energy) and dietary fiber intake were lower among the West Bank children compared to the Gaza Strip children, and in females compared to males in 2002 and 2003. Children in the four to five year old age group in the Gaza Strip had significantly higher carbohydrate intake in 2003, and had higher dietary fiber intake in 2002 compared to the four to five year old age group to in the West Bank.

Table 4.20: Mean Daily intakes of Energy, Macronutrients, Cholesterol and Dietary Fiber by Age for Children 1–5 Year Olds, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Energy/Nutrient	2002			2003		
	1- 3 Year (Mean ±SE)	**4 – 5 Year** (Mean ±SE)	**Total** (Mean ±SE)	**1- 3 Year** (Mean ±SE)	**4 – 5 Year** (Mean ±SE)	**Total** (Mean ±SE)
Energy (Kcal)	1289.5±77.1	1345.8±137.2	1301.7±67.0	1017.3±24.0	988.6±43.0	1010.9±20.9
Total fat (g/d)	52.5±3.4	56.7±7.5	53.4±3.1	38.0±1.3	35.7±2.1	37.5±1.1
% energy	37.7±1.2	37.1±1.8	37.6±1.0	(32.5±0.61)	33.7±1.2	32.8±0.5
SFA(g/d)	16.4±1.2	15.2±2.1	16.1±1.0	10.4±0.4	10.8±0.8	10.5±0.4
% energy	12.1±0.7	10.2±0.6	11.7±0.6	9.1±0.3	8.7±0.5	9.0±0.3
MUFA (g/d)	17.6±1.4	20.4±3.3	18.2±1.3	12.5±0.5	11.1±0.7	12.2±0.4
% energy	12.6±0.6	12.9±0.9	12.6±0.5	10.4±0.3	11.3±0.6	10.6±0.2
PUFA (g/d)	14.3±1.1	16.1±1.9	14.7±0.9	11.4±0.4	9.8±0.8	11.1±0.4
% energy	10.0±0.5	10.9±0.9	10.2±0.4	10.3±0.3	11.0±0.6	10.5±0.3
P/S ratio *	0.87	1.05	0.91	1.096	0.91	1.057
cholesterol(mg/d)	215.4±21.4	278.4±70.1	229.0±22.6	186.2±11.8	170.1±21.8	182.7±10.4
Protein(g/d)	42.0±3.2	50.0±6.4	43.7±2.9	32.1±0.9	33.0±1.6	32.3±0.8
% energy	12.8±0.5	14.5±0.8	13.2±0.4	12.4±0.2	12.7±0.3	12.5±0.2
Carbohydrates(g/d)	167.9±11.2	163.5±15.5	166.9±9.4	139.2±3.3	135.4±5.9	138.4±2.9
% energy	51.2±1.2	49.8±2.1	50.9±1.1	56.0±0.6	54.7±1.2	55.7±0.6
Dietary fiber (g/d)	13.1±12.8	12.8±1.9	13.1±1.1	10.5±1.6	7.4±0.5	9.8±1.2

Abbreviations: SFA= saturated fatty acid, MUFA= monounsaturated fatty acids,
PUFA = polyunsaturated fatty acids, P/S= ratio of polyunsaturated to saturated fatty acids
Intakes are presented as mean ± standard error.
*** Estimate based on a calculation using mean values of specific nutrients.**

Table 4.21: P-values of Significant Association between Energy, Macronutrient and Age Groups in 2002 and 2003 of Refugee Children 1–5 Years in West Bank and Gaza Strip

Energy and Macronutrients	P- Value by Age Group	
	2002	2003
Energy	0.731	0.571
Carbohydrate	0.848	0.581
Carbohydrate (%of energy)	0.585	0.341
Dietary Fiber	0.898	0.302
Protein	0.254	0.629
Protein (% of energy)	0.081	0.427
Total Fat	0.583	0.377
Total Fat (% of energy)	0.788	0.372
SFA	0.640	0.72
SFA (% of energy)	0.167	0.46
MUFA	0.365	0.18
MUFA (%of energy)	0.809	0.137
PUFA	0.419	0.079
PUFA (%of energy)	0.372	0.293
Cholesterol	0.253	0.522

There were no significant difference in energy and macronutrient intake between preschool refugee children surveyed in 2002 compared to those surveyed in 2003 (Table 4.21)

Consistent with the pattern of energy and carbohydrate intake in the West Bank and Gaza Strip, protein intake was higher in 2002 and lower in 2003 among children in the Gaza Strip compared to children in the West Bank. Children four to five years of age in the Gaza Strip, however, had significantly higher protein intakes compared to the children of the same age in the West Bank, although all children exhibited adequate intakes of protein Table (4.22).

Females had higher intakes of carbohydrate and dietary fiber compared to males in 2002 and 2003, while they had higher protein intake compared to males in 2002 only.(Table 4.23) Intakes of total fat, SFA and MUFA were higher among children in the West Bank compared to the Gaza Strip in 2002 and 2003; also, intakes among males were higher than the intakes among females. However, intakes of PUFA and cholesterol among females were higher than the intakes among males. Children in the West Bank had higher intakes of PUFA in 2002 and higher intakes of Cholesterol in 2003 compared to the intakes among children in Gaza (Tables 4.24 and 4.25).

Table 4.22: Mean Daily intakes of Energy, Carbohydrate, Dietary Fiber and Protein by Age and Area for Children 1–5 Year Olds, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Sample Year	Age group(year)	Area	Energy intake	Carbohydrate	%CHO	Dietary fiber	Protein	% Protein
2002	1 – 3	West Bank	1173.8±107.23	142.1±12.87	48.8±1.68	10.1±1.31	39.0±4.79	13.1±0.77
		Gaza Strip	1411.5±108.74	195.1±17.76	53.8±1.77	16.3±2.16	45.3±4.26	12.5±0.53
	4 – 5	West Bank	1048.6±122.39	128.7±13.29	50.5±2.53	6.9±1.17	32.7±4.0	12.8±0.95
		Gaza Strip	1672.8±216.58	201.7±24.32	49.0±3.65	19.2±2.38	69.1±9.80	16.4±1.18
	Total	West Bank	1146.2±87.65	139.1±10.43	49.2±1.42	9.4±1.06	37.5±3.84	13.0±0.63
		Gaza Strip	1467.1±97.40	196.5±14.81	52.8±1.61	17.0±1.77	50.4±4.15	13.3±0.54
2003	1 – 3	West Bank	1123.0±55.51	139.0±7.07	51.7±1.29	8.5±0.64	36.4±1.96	13.0±0.44
		Gaza Strip	988.1±26.17	139.3±3.72	57.2±0.69	11.1±2.02	30.9±0.95	12.2±0.24
	4 – 5	West Bank	1103.6±76.83	149.2±11.35	49.1±1.71	7.5±0.74	34.6±2.52	12.8±0.46
		Gaza Strip	915.4±48.01	126.6±6.23	58.3±1.42	7.3±0.67	32.0±2.09	12.7±0.44
	Total	West Bank	1116.4±44.74	142.4±6.03	51.0±1.03	8.2±0.50	35.8±0.54	13.0±0.33
		Gaza Strip	974.9±23.16	137.0±3.26	57.4±0.62	10.4±1.66	31.1±0.86	12.3±0.21

Table 4.23: Mean Daily intakes of Energy, Carbohydrate, Dietary Fiber and Protein by Age and Gender for Children 1 – 5 Year Olds, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Sample Year	Age group(year)	Area	Energy intake	Carbohydrate	%CHO	Dietary fiber	Protein	% Protein
2002	**1 – 3**	Male	1183.0±110.07	152.3±17.27	49.8±1.90	11.0±1.94	34.6±3.96	11.6±0.68
		Female	1380.4±106.82	181.2±14.57	52.4±1.64	15.0±1.69	48.3±4.73	13.8±0.60
	4 – 5	Male	1468.2±321.13	165.8±33.39	46.7±3.33	16.2±3.68	58.0±14.04	15.5±1.41
		Female	1270.5±111.56	162.0±15.63	51.7±2.74	10.7±1.86	45.1±5.91	13.9±1.04
	Total	Male	1236.1±107.11	154.8±15.22	49.2±1.66	11.9±1.73	39.0±4.29	12.3±0.65
		Female	1354.0±85.19	176.6±11.67	52.3±1.40	13.9±1.38	47.6±3.84	13.8±0.52
2003	**1 – 3**	Male	987.2±27.93	136.4±3.87	56.2±0.85	8.7±0.44	30.5±1.01	12.5±0.30
		Female	1060.0±42.15	143.3±5.75	55.7±0.90	13.1±3.80	34.3±1.50	12.2±0.29
	4 – 5	Male	1020.8±62.07	137.9±8.98	52.0±1.59	7.7±0.73	33.3±2.31	12.9±0.44
		Female	952.6±59.18	132.6±7.64	57.7±1.72	7.1±0.68	32.7±2.24	12.6±0.47
	Total	Male	994.0±25.52	136.7±3.57	55.3±0.76	8.5±0.38	31.1±0.94	12.6±0.26
		Female	1033.7±35.1	140.7±4.73	56.2±0.80	11.6±2.88	33.9±1.26	12.3±0.25

Table 4.24: Mean Daily intakes of Total Fat, Fatty acids and Cholesterol by Age and Area for Children 1 – 5 Year Olds, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Sample Year	Age group (year)	Area	Total Fat	%Fat	SFA	%SFA	MUFA	%MUFA	PUFA	%PUFA	Cholesterol
2002	1 – 3	West Bank	51.8±5.54	39.6±1.64	16.9±2.03	12.8±1.08	18.3±2.34	13.7±0.78	12.5±1.21	9.9±0.70	224.8±33.7
		Gaza Strip	53.3±3.88	35.8±1.80	15.8±1.15	11.4±0.92	16.8±1.40	11.4±0.78	16.2±1.73	10.0±0.69	205.5±26.4
	4 – 5	West Bank	46.3±8.32	38.0±2.38	12.4±1.83	10.8±0.72	16.2±3.29	12.9±1.20	14.2±2.98	11.4±1.39	206.9±102.92
		Gaza Strip	68.1±12.35	36.1±2.88	18.2±3.70	9.5±1.05	25.1±5.85	12.8±1.37	18.2±2.18	10.3±1.09	357.1±93.20
	Total	West Bank	50.6±4.67	39.2±1.37	15.9±1.65	12.3±0.86	17.8±1.95	13.5±0.66	12.9±1.14	10.3±0.63	220.9±34.10
		Gaza Strip	56.4±4.06	35.8±1.53	16.3±1.19	11.0±0.76	18.5±1.70	11.7±0.68	16.6±1.44	10.1±0.59	237.7±29.55
2003	1 – 3	West Bank	48.2±2.93	36.1±1.32	14.2±1.10	11.4±0.66	17.5±1.26	12.2±0.58	11.8±0.87	9.7±0.62	263.3±26.61
		Gaza Strip	35.2±1.3	31.6±0.67	9.4±0.44	8.5±0.32	11.1±0.49	10.0±0.27	11.3±0.52	10.5±0.31	164.9±12.8
	4 – 5	West Bank	41.9±3.61	39.4±1.72	12.9±1.48	11.2±0.56	13.0±1.28	14.1±0.95	10.3±1.48	10.9±0.81	134.0±21.95
		Gaza Strip	31.7±2.39	30.1±1.45	9.4±0.98	7.0±0.53	10.0±0.76	9.5±0.58	9.4±0.90	11.0±0.77	193.2±32.6
	Total	West Bank	46.1±2.30	37.2±1.06	13.8±0.88	11.3±0.47	16.0±0.97	12.8±0.51	11.3±0.76	10.1±0.50	219.7±20.2
		Gaza Strip	34.5±1.16	31.3±0.61	9.3±0.40	8.2±0.28	10.9±0.43	9.9±0.25	11.0±0.46	10.6±0.29	170.0±12.02

Table 4.25: Mean Daily intakes of Total Fat, Fatty acids and Cholesterol by Age and Gender for Children 1 – 5 Year Olds, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Sample Year	Age group (year)	Gender	Total Fat	%Fat	SFA	%SFA	MUFA	%MUFA	PUFA	%PUFA	Cholesterol
2002	1 – 3	Male	50.7±4.35	40.4±2.06	16.5±1.54	13.7±1.24	17.6±1.81	14.0±0.93	12.7±1.41	9.7±0.67	159.1±22.76
		Female	54.1±5.12	35.5±1.36	16.2±1.76	10.8±0.74	17.5±2.05	11.4±0.63	15.6±1.55	10.2±0.71	263.5±33.04
	4 – 5	Male	66.3±16.59	39.4±2.31	18.2±4.44	11.2±0.84	24.2±7.73	13.3±1.52	17.8±3.13	11.4±0.98	285.6±122.67
		Female	50.8±6.81	35.6±2.55	13.3±1.88	9.5±0.85	18.1±2.72	12.6±1.12	15.0±2.41	10.6±1.31	273.9±88.50
	Total	Male	53.6±4.68	40.2±1.72	16.8±1.48	13.2±1.03	18.8±2.04	13.9±0.80	13.7±1.31	10.0±0.58	182.6±29.42
		Female	53.3±4.19	35.5±1.19	15.5±1.41	10.5±0.59	17.6±1.68	11.6±0.55	15.5±1.30	10.3±0.62	266.0±32.45
2003	1 – 3	Male	36.6±1.57	32.1±0.84	9.8±0.53	9.3±0.42	12.0±0.64	10.5±0.36	11.3±0.59	9.7±0.34	177.8±15.2
		Female	40.0±2.05	33.1±0.87	11.3±0.73	8.8±0.40	13.2±0.79	10.3±0.35	11.6±0.69	11.3±0.46	198.1±18.76
	4 – 5	Male	38.2±2.95	36.2±1.63	11.4±1.17	9.4±0.58	11.8±1.03	12.8±0.85	10.0±1.11	11.02±0.75	144.1±27.16
		Female	32.9±2.9	30.9±1.75	10.0±1.23	7.8±0.69	10.4±0.93	9.5±0.64	9.5±1.15	10.9±0.86	199.3±34.65
	Total	Male	36.9±1.38	33.0±0.75	10.2±0.49	9.3±0.36	12.0±0.55	11.0±0.34	11.0±0.52	9.9±0.31	171.0±13.33
		Female	38.3±1.72	32.6±0.79	10.9±0.63	8.6±0.34	12.5±0.65	10.1±0.31	11.1±0.60	11.2±0.40	198.4±16.45

Table 4.26: P-values of Significant Association between Energy, Macronutrient and Gender in 2002 and 2003 of Refugee Children 1–5 Years in West Bank and Gaza Strip

Energy and Macronutrients	P- Value by Gender	
	2002	**2003**
Energy	0.385	0.349
Carbohydrate	0.25	0.492
Carbohydrate (% of energy)	0.165	0.461
Dietary Fiber	0.365	0.211
Protein	0.139	0.07
Protein (% of energy)	0.064	0.359
Total Fat	0.957	0.536
Total Fat (% of energy)	0.025	0.726
SFA	0.522	0.321
SFA (% of energy)	0.018	0.125
MUFA	0.653	0.511
MUFA (% of energy)	**0.02**	0.081
PUFA	0.345	0.905
PUFA (% of energy)	0.705	**0.013**
Cholesterol	0.066	0.192

In general, there were no significant differences in energy and macronutrient intakes between male and female preschool refugee children one to five years of age (Table 4.26).

Mean Daily intakes of Energy, Carbohydrate, Dietary Fiber and Protein are presented in Table (4.27) by Age, Sex and Region

Energy intake varied greatly among different age and sex groups when examined by region in 2002 and 2003. Males and females in the Gaza Strip had higher energy intakes compared to males and females in the West Bank in 2002, while they consumed less energy in 2003 compared to their counterparts in West Bank. Energy intake accounted for 822.5 Kcal for West Bank males 4–5 years old to and ranged from 1683.4 and 1656.8 Kcal for Gaza Strip males and females aged 4–5 year, respectively in 2002.

In 2003 energy intakes ranged from 888.0 Kcal for Gaza Strip females aged 4–5 year to 1138.0 and 1132.2 Kcal for West Bank females aged 1–3 and 4–5 year respectively.

Female children in Gaza Strip had the highest mean intake of carbohydrate (% of energy) in two years, while males and females children in Gaza strip had the highest dietary fiber intakes compared to their counterparts in Gaza Strip in two years. However, the variations of dietary fiber intakes among different groups studied were lower in 2003 than in 2002.

There was little variation by age, sex or region relative to the mean percentage of energy received from protein in 2003. Although in 2002 the range of protein intake from energy relative to age, sex or region varied from a low of 12.7% among females four to five years of age in the West Bank to a high of 16.2% among males four to five years of age in the Gaza Strip; in 2003 the variation was smaller, with a low of 12.0% among females one to three years of age in the Gaza Strip compared to a high of 13.4% among males one to three years of age in the West Bank.

Corresponding data for the percentage of energy from fat Total Fat, Fatty acids and Cholesterol by Age, Gender and region are shown in Table (4.28)

The percentage of energy from fat, SFA and MUFA varied by sex and region. Among the age and sex groupings examined by region, the mean percentage of energy from fat, SFA and MUFA was highest for males and females in West Bank in 2002 and 2003 than for children in Gaza Strip. In 2002 total fat intake, SFA and MUFA ranged from 29.3%, 8.0% and 10.7% of energy for Gaza Strip females aged 4–5 year olds to 42.1%, 14.4% and 15.4% for West Bank males aged 1–3 year olds, respectively. For West Bank female aged 4–5 year PUFA accounted for 11.9% of energy in 2002 and 12.1% of energy compared with 7.6% of energy for Gaza Strip females aged 4–5 year olds in 2002 and 8.9% of energy for West Bank males in 2003.

Cholesterol intake ranged from 61.6mg/d for West Bank males aged 4–5 year to 360.3mg/d for Gaza males aged 4–5 year in 2002. While in 2003 intakes of cholesterol ranged from 123.4 mg/d for West Bank males aged 4–5 year olds to 270.5mg/d for West Bank females aged 1–3 year.

Results of this study indicated that the mean energy intakes of surveyed children in all age groups were below the RDA except for the one to three year old children surveyed in 2002. Given RDAs for children 1-3 and 4-5 years of age of 1300 kcal and 1800 kcal, respectively, the children's average energy intakes were 282.7kcal, 454.2 kcal and 811.4 kcal below the RDA for 1–3 (2003), 4–5 (2002) and 4–5 (2003) year age group, respectively.

Low levels of energy reported in this study were likely due to underreporting of food intakes. According to Mertz et all and Livingstone et al (Ganji et all, 1995) the underreporting of energy intake was approximately 20% compared with measured energy requirements. When adjusted for 20% underreporting, the mean energy intakes of children one to three and four to five years old would be close to the RDA for energy. Even with such an adjustment, however, mean energy intakes among children 4–5 years old in 2003 were still far below the RDA since we consider 20% underreporting. On average, the refugee children's diet in 2002 was high in total fat, slightly higher in SFA, and adequate in PUFA intake. Although % of energy remained relatively constant relative to age, the mean % of energy from fat was 7.6 higher than recommended (30% of energy) by expert committees (Ganji et all, 1995). Intake of % of energy from SFA was 1.7 higher compared with recommended values (10% of energy is recommended). PUFA and P/S were close to recommended values. Intakes of energy from PUFA and P/S ratio were 10.2% of energy (10% of energy is recommended) and 0.91 (ratio of 1 is recommended), respectively. Mean cholesterol intakes were close to the recommended values (<300mg/d is recommended). Energy from carbohydrate was below the recommended values (50.9% of energy was observed vs 55% of energy is recommended), primarily due to higher contribution of energy from fat toward total calories.

However, in comparing findings in 2003 with those from 2002, their were clear declines in total fat, SFA intake and Cholesterol intake compared to 2002 and increase of energy from carbohydrates.

In 2003 intakes of total fat was only 2.8% higher than the recommended value. While mean intake of SFA was 9.0%, intakes of energy and mean intakes of Cholesterol was only 182.7mg/dl, reflecting deteriorations in nutritional status among refugee children since this changes occurred within one year only. Ganji et all (1995) showed in their study of American children that the American child's diet was high in total fat, SFA and cholesterol, and low in PUFA and Carbohydrate. In that study intakes of fat, SFA, PUFA and carbohydrate were 35 to 37% of energy, 13 to 14% of energy, 5.7 to 6.0% of energy, and 49 to 51% of carbohydrate, respectively. Data from CSFII 1986 and NHANESII-1990 indicated that the average % of energy from fat for children ages 1–5 years were 34% and 36%, respectively. Similar results were reported from 1977-78 NFCS, the Bogalusa Heart Study, and the Lipid Research Clinics Program Prevalence Study (Ganjii et all, 1995). Relative to the current study, the researcher’s results for 2002 are in agreement with these reports, although the Palestinian children consumed relatively high amounts of PUFA due to their high consumption olive oil.

Table 4.27: Mean Daily intakes of Energy, Carbohydrate, Dietary Fiber and Protein by Age, Gender and Area for Children 1–5 Year Olds, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Sample year	Age group (year)	Sex	Area	Energy intake	Carbohydrate	%CHO	Dietary fiber	Protein	% Protein
2002	1-3	Male	WB	1021.1±131.22	123.5±18.05	48.3±2.36	7.2±1.45	28.3±4.11	11.4±1.03
			GZ	1399.0±177.94	190.6±30.27	51.9±3.15	15.9±3.81	43.0±7.04	11.8±0.85
		Female	WB	1334.5±167.02	161.7±17.71	49.3±2.45	13.1±2.02	50.1±8.19	14.9±1.01
			GZ	1420.1±140.32	198.1±22.19	55.1±2.09	16.6±2.62	46.8±5.44	12.9±0.67
	4-5	Male	WB	822.5±496.34	106.9±65.07	51.7±0.43	5.4±3.16	26.0±14.25	13.3±1.10
			GZ	1683.4±372.85	185.5±38.60	45.0±4.29	19.9±3.76	68.7±16.23	16.2±1.79
		Female	WB	1098.8±119.61	133.5±11.67	50.3±3.12	7.3±1.31	34.2±4.11	12.7±1.16
			GZ	1656.8±64.07	226.2±19.49	55.0±5.84	18.3±2.59	69.7±7.81	16.7±1.50
	Total	Male	WB	1003.0±124.03	122.0±16.96	48.6±2.15	7.1±1.34	28.1±3.85	11.6±0.94
			GZ	1480.2±163.06	189.2±23.77	50.0±2.60	17.0±2.90	50.4±7.09	13.1±0.89
		Female	WB	1098.8±120.13	133.5±12.70	50.3±1.91	7.3±1.51	34.2±5.83	12.7±0.79
			GZ	1656.8±119.84	226.2±19.00	55.0±1.93	18.3±2.24	69.7±4.99	16.7±0.67
2003	1-3	Male	WB	1110.4±61.76	137.6±8.48	52.5±2.06	8.1±0.86	34.0±2.29	13.4±0.62
			GZ	956.1±30.79	136.0±4.37	57.1±0.91	8.8±0.50	29.7±1.12	12.3±0.34
		Female	WB	1138.0±98.52	140.7±11.97	50.7±1.40	9.1±0.98	39.4±3.27	12.5±0.63
			GZ	1035.6±46.01	144.1±6.60	52.2±1.05	14.4±4.97	32.7±1.65	12.0±0.33
	4-5	Male	WB	1090.1±92.05	145.7±14.1	49.2±2.10	7.7±0.92	34.0±3.19	12.9±0.55
			GZ	951.5±82.66	130.2±11.21	54.9±2.26	7.6±1.16	32.5±3.43	12.8±0.71
		Female	WB	1132.2±146.90	156.5±19.89	49.0±3.14	7.1±1.33	35.7±4.26	12.7±0.89
			GZ	888.0±57.46	123.9±7.07	60.8±1.68	7.1±0.80	31.6±2.66	12.5±0.66
	Total	Male	WB	1102.5±51.43	140.7±7.48	61.2±1.51	7.9±0.63	34.0±1.85	13.2±0.43
			GZ	955.5±28.77	135.2±4.06	56.8±0.84	8.7±0.46	30.1±1.07	12.4±0.31
		Female	WB	1136.5±81.09	144.9±10.17	50.2±1.30	8.6±0.81	38.4±2.64	12.6±0.51
			GZ	1000.4±38.01	139.3±5.35	58.1±0.90	12.6±3.80	32.4±1.40	12.2±0.28

Table 4.28: Mean Daily intakes of Total Fat , Fatty acids and Cholesterol by Age, Gender and Area for Children 1–5 Year Olds, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Sample Year	Age group (year)	Sex	Area	Total Fat	%Fat	SFA	%SFA	MUFA	%MUFA	PUFA	%PUFA	Cholesterol
2002	1-3	Male	WB	47.8±6.23	42.1±2.58	16.3±2.42	14.4±1.85	18.0±2.84	15.4±1.18	10.1±1.38	9.1±0.83	152.8±28.88
			GZ	54.6±5.92	38.1±3.37	16.9±1.67	12.6±1.55	17.0±1.98	12.2±1.39	16.3±2.50	10.4±1.12	167.4±37.63
		Female	WB	56.0±9.39	37.0±1.88	17.5±3.37	11.0±1.13	18.6±3.84	11.9±0.85	15.0±1.90	10.8±1.13	300.6±58.0
			GZ	52.4±5.24	34.2±1.95	15.1±1.57	10.6±0.94	16.6±1.97	10.9±0.93	16.1±2.4	9.8±0.89	231.4±35.78
	4-5	Male	WB	33.1±20.57	35.7±0.99	11.9±6.88	13.3±0.49	10.9±7.73	10.8±1.96	8.0±4.45	9.2±0.69	61.6±36.0
			GZ	77.3±19.70	40.6±2.95	20.3±5.48	10.5±0.96	28.6±9.58	14.2±1.86	21.1±2.91	12.1±1.15	360.3±153.43
		Female	WB	49.2±9.38	38.5±2.90	12.6±1.95	10.2±0.76	17.4±3.73	13.4±1.38	15.5±3.43	11.9±1.67	239.1±124.23
			GZ	54.3±8.30	29.3±3.83	15.1±4.69	8.0±2.16	19.8±3.45	10.7±1.71	14.0±2.04	7.6±1.24	352.2±79.28
	Total	Male	WB	46.5±5.88	41.5±2.37	15.9±2.26	14.3±1.68	17.4±2.66	15.0±1.12	9.9±1.29	9.1±0.75	144.5±26.92
			GZ	61.1±7.11	38.8±2.52	17.9±1.91	12.0±1.14	20.3±3.14	12.7±1.12	17.6±1.99	10.9±0.87	222.5±52.62
		Female	WB	53.9±6.97	37.5±1.55	16.0±2.39	10.8±0.68	18.2±2.83	12.4±0.73	15.2±1.66	11.2±0.92	280.9±54.97
			GZ	52.7±4.56	33.4±1.76	15.1±1.47	10.2±1.01	17.1±1.74	10.8±0.82	15.8±2.06	9.4±0.79	250.0±33.19
2003	1-3	Male	WB	48.6±3.42	34.5±1.96	14.4±1.38	11.5±0.99	17.6±1.66	11.6±0.83	11.3±1.07	8.9±0.85	257.3±34.06
			GZ	33.6±1.66	31.5±0.92	8.7±0.52	8.8±0.45	10.6±0.63	10.2±0.39	11.3±0.69	9.9±0.37	157.8±16.58
		Female	WB	47.8±5.04	37.9±1.66	14.0±1.80	11.2±0.84	17.3±1.98	12.9±0.80	12.5±1.43	10.8±0.89	270.5±42.66
			GZ	37.6±2.13	31.6±0.97	10.4±0.76	8.0±0.42	11.9±0.79	9.5±0.35	11.4±0.80	11.5±0.54	175.5±20.20
	4-5	Male	WB	42.2±4.02	39.2±2.20	12.5±1.35	11.1±0.71	12.9±1.58	14.6±1.32	9.9±1.67	10.4±0.89	123.4±26.11
			GZ	34.2±4.24	33.2±2.25	10.4±1.92	7.7±0.76	10.7±1.3	11.1±0.94	10.1±1.52	11.7±1.22	164.7±47.99
		Female	WB	41.3±7.78	39.6±2.82	13.8±3.77	11.4±0.95	13.1±2.34	13.0±0.98	11.1±3.12	12.1±1.68	156.1±41.58
			GZ	29.9±2.72	27.8±1.80	8.6±0.92	6.5±0.72	9.4±0.89	8.3±0.63	8.9±1.11	10.5±1.00	214.9±44.71
	Total	Male	WB	46.1±2.62	36.3±1.50	13.7±0.99	11.4±0.66	15.8±1.22	12.7±0.74	10.7±0.92	9.5±0.63	205.4±24.84
			GZ	33.6±1.54	31.8±0.85	8.9±0.52	8.6±0.41	10.6±0.57	10.3±0.36	11.1±0.63	10.1±0.36	158.8±15.68
		Female	WB	46.1±4.21	38.4±1.41	13.9±1.63	11.3±0.66	16.2±1.60	12.9±0.64	12.1±1.32	11.1±0.79	240.2±34.08
			GZ	35.7±1.77	30.7±0.86	10.0±0.62	7.7±0.36	11.3±0.65	9.2±0.31	10.8±0.67	11.2±0.47	184.9±18.67

4.4.2 - Macro and Micronutrient Deficiencies:

Protein and micronutrient intake presented here is referenced against the Recommended Dietary Allowances (RDA) of the U.S. Food and Nutrition Board. Energy intake presented here reflects the ***average*** needs of individuals based on resting energy expenditure and activity level for a given age. We define energy intake deficiency as less than 80% of the daily Recommended Energy Allowances (REA) for light to moderate activity, the accepted values of the USAID Food for Peace Commodities Reference Guide for preschool age children.

Carbohydrates, fats, and proteins provide an individual's dietary energy fuel and are termed macronutrients; vitamins and minerals are termed micronutrients. Table 4.29 describes the percentage of children 1–5 years of age whose dietary intake of energy falls below 80% of the REA of dietary intake for energy and below the 80% RDA level of dietary intake for protein and the micronutrients Vitamins A and E, folate, iron, and zinc. For *all* nutrients highlighted in this assessment—energy, protein, vitamins A, E, and folate, minerals iron and zinc—there was, to a greater or lesser degree, a *decrease* in consumption for preschool children in both the West Bank and Gaza Strip. The decreases in consumption for *all* of these nutrients, with the exception of vitamin E, were greater in Gaza than the West Bank.

The quality of food intake of preschool age children in 2003 compared with 2002 suffered a significant decline, with declines in daily macro and micronutrient intake being generally worse in the Gaza Strip. In fact, large percentages of the population of preschool age children from both the West Bank and Gaza Strip were eating below the level of what would be considered deficiencies of Vitamins A and E, folate, iron and zinc by the RDA.

In the 2002 sample refugee children in West Bank were more likely to be energy, protein, vitamin A, vitamin E, folate, iron and zinc deficient compared to refugee children in the Gaza Strip in both age groups, whereas in 2003 refugee children surveyed in Gaza Strip were more likely to be deficient in all of the same micro– and macronutrients except folate compared to refugee children of the same age groups in the West Bank

Table 4.29: Distribution of the Population Percentage of Refugee Children in West Banks and with Macro and Micronutrient Deficiencies, by Age 2002 and 2003

Energy/Nutrients	Age Groups (year)	% <80 RDA					
		2002			2003		
		WB	GS	Total	WB	GS	Total
Energy	1 – 3	48.7	29.7	39.5	41.8	59.3	55.5
	4 – 5	81.8	40.0	61.9	71.4	95.5	86.1
Protein(g)	1 – 3	12.8	8.1	10.5	1.8	6.0	5.1
	4 – 5	18.2	0.0	9.5	14.3	15.9	15.3
Vit A (µg RE)	1 – 3	51.3	35.1	43.4	50.9	75.4	70.1
	4 – 5	72.7	80.0	76.2	78.6	81.8	80.6
Vit E (µg α-TE)	1 – 3	30.8	27.0	28.9	41.8	39.7	40.2
	4 – 5	36.4	20.0	28.6	71.4	59.1	63.9
Folate intake (µg)	1 – 3	0.0	2.7	1.3	1.8	6.0	5.1
	4 – 5	27.3	0.0	14.3	21.4	15.9	18.1
Iron (mg)	1 – 3	76.9	54.1	65.8	80.0	85.9	84.6
	4 – 5	90.1	40.0	66.7	85.7	90.9	88.9
Zinc (mg)	1 – 3	87.2	67.6	77.6	96.4	96.0	96.1
	4 – 5	100	60.0	81.0	96.4	97.7	97.2

4.4.2.1 - Macronutrient Intake

4.4.2.1.1 – Energy:

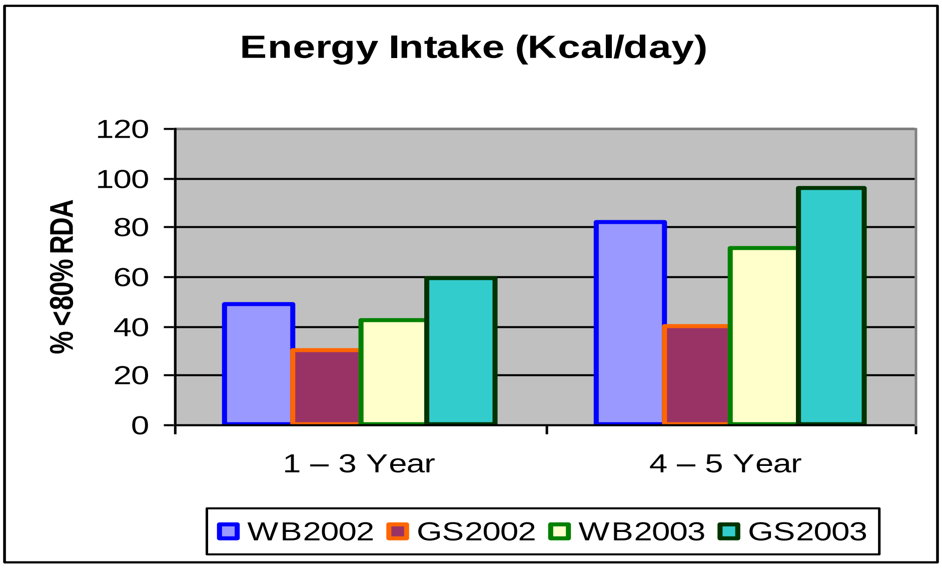
Defining standards for energy intake (described as kilocalories/day) is particularly difficult in preschool aged children since their energy balance depends on their level of activity and intake, both of which are often quite irregular in this age group. Comparing a population's energy intake with a standard should be evaluated in terms of the balance between intake and expenditure. Since energy, based on the intake of carbohydrates, fats and to a lesser degree proteins, provides the fuel for all metabolic activity, energy deficiency affects physical activity, cognitive function, awareness, and growth in general. When proteins are "burned" for energy, in states of inadequate carbohydrate and fat intake, or when dietary protein is inadequate, muscle wasting, growth retardation, and cell death occur.

For 1– 3 year olds, a median energy intake below 1,040 kcal/day (less than 80% of REA) is considered deficient; for 4–5 year olds, an intake of less than 1440 kcal/day is considered deficient. Table 4.29 shows that, in general: energy intake decreased with age in Palestinian preschool children when, ideally, it should have been *increasing* due to increased demands of physical growth and activity. Energy deficiency is more profound in the Gaza Strip than the West Bank.

In stark contrast to 2002 and any other society eating a normal diet, older children in the 2003 sample were consuming on average *fewer calories* than the younger children. Arguably this drop in daily calorie intake as children age is a marker for increasing food insecurity.

More specifically, 48.7% of 1–3 year old children and 81.8% of 4–5 year old children in the West Bank were deficient in daily energy (calorie) intake; while in the Gaza Strip, 29.7% of 1–3 year olds and 40.0% of 4–5 year olds in the 2002 sample were deficient in energy intake. Although in the 2003 sample, 41.8% of 1–3 year olds and 71.4% of 4–5 year olds in the West Bank were deficient in daily energy intake; in the Gaza Strip 59.3% of 1-3 year olds and 95.5% of 4-5 year olds were energy intake deficient, as shown in Table 4.29 and Graph 4.4.

Graph 4.4: Distribution of the Population Percentage of Refugee Children 1–5 Year Olds in West Banks and Gaza Strip with Energy Intake < 80 % of RDA in 2002 and 2003



<u>4.4.2.1.2 – Protein</u>:

Protein intake is measured in grams/day. Deficiency, defined as a daily protein intake of less than 80% of the RDA, translates to less than 12.8 grams/day for 1-3 year olds, and less than 19.2 grams for 4-5 year olds.

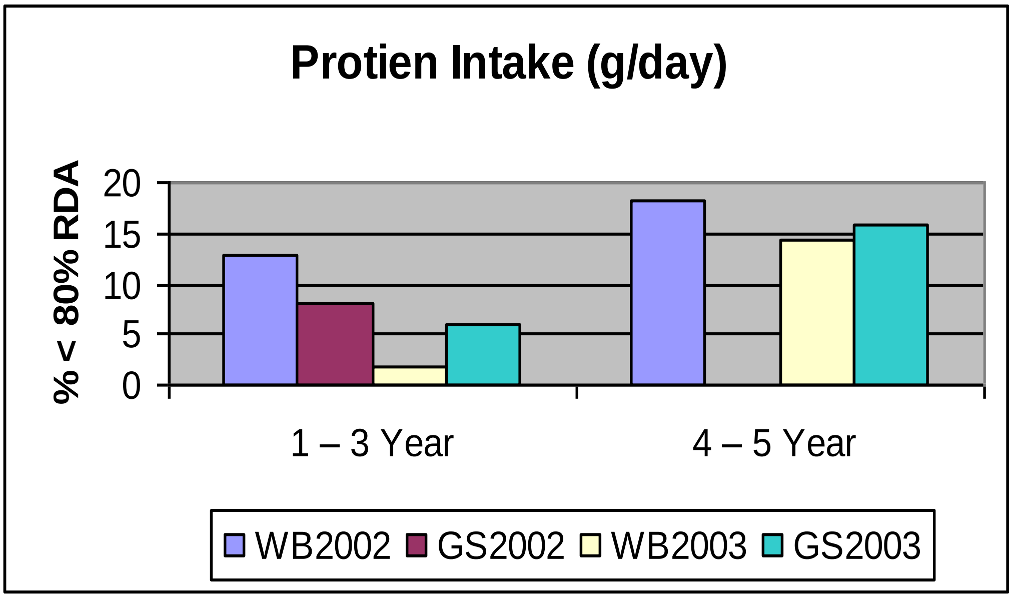
From Table 4.29:

- A greater proportion of 4-5 year olds were protein deficient relative to 1–3 year olds.
- Protein deficiency was of higher prevalence among West Bank preschool children than Gaza preschool children.

- In the West Bank, 12.8% of children one to three years old and 18.2% of children four to five years old were deficient in daily protein intake;
- In the Gaza Strip 8.1% of 1-3 year olds are protein intake deficient in the 2002 sample.

In 2003, the level of protein intake deficiency among children sampled in the West Bank decreased from 12.8% to 11.8% of children one to three years of age compared to 2002. Among the older children protein intake deficiency decreased from 18.2% in 2002 to 14.3% in 2003. However, in the Gaza Strip protein deficiency decreased from 8.1% to 6.0% among children one to three years of age, but increased to 14.3% among Gaza Strip children four to five years of age.

Graph 4.5: Distribution of the Population Percentage of Refugee Children 1–5 Year Olds in West Banks and Gaza Strip with Protein Intake < 80% of RDA in 2002 and 2003



4.4.2.2 – Micronutrient Intake

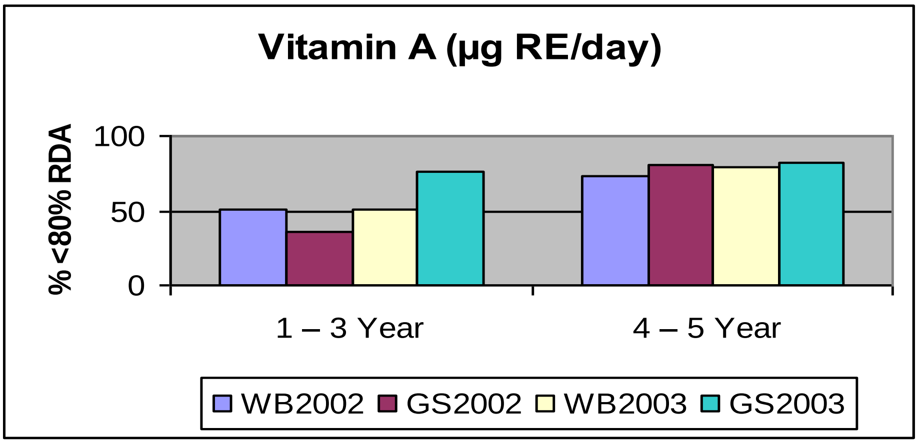
4.4.2.2.1 –Vitamin A

Vitamin A deficiency disorders (VADD) lead to impaired immune function, growth retardation, loss of appetite, night blindness and eventual permanent blindness from corneal lesions, as well as increases the risk of mortality from measles and diarrheal disease in less developed countries.

Much attention has been focused on the need for adequate documentation of vitamin A status in countries with under 5 mortality rates greater than 20 deaths/1000 live births (U5MR in the Palestinian Territories was 25/1000 births in 2002). Such documentation requires studies with serum retinol levels—this assessment simply suggests a deficiency based on a 24 hour vitamin A intake and hints at the need for vitamin A supplementation (Abdeen et al, 2004).

In the 2002 sample in the West Bank, 51.3% of 1-3 year olds and 72.7% of 4–5 year olds were deficient in daily Vitamin A intake; while in the Gaza Strip, 35.1% of 1-3 year olds and 80.0% of 4–5 year olds were vitamin A deficient. In the 2003 sample in the West Bank 50.9% of 1–3 year olds and 78.6% of 4–5 year old were deficient in daily vitamin A intake; and in the Gaza Strip 75.4% of 1–3 year olds and 81.8% of 4–5 year olds were deficient in their vitamin A intake. For both age intervals, Gaza children have a higher prevalence of vitamin A deficiency; and in general, a majority of Palestinian children are consuming vitamin A at below standard levels.

Graph 4.6: Distribution of the Population Percentage of Refugee Children 1–5 Year Olds in West Bank and Gaza Strip with Vitamin A intake < 80% of RDA in 2002 and 2003



4.4.2.2.2 –Vitamin E

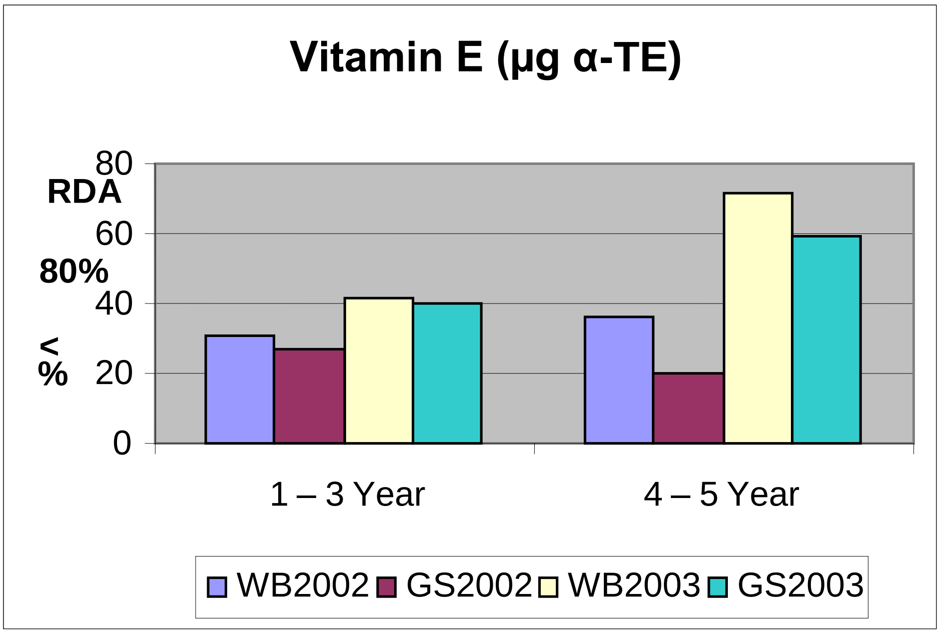
Vitamin E, as an anti-oxidant, protects cell integrity particularly in the nervous system where deficiencies can result in a number of neurologic deficits (Abdeen et al., 2004).

Vitamin E intake is measured in milligrams of alpha-tocopherol/day. Deficiency, defined as a daily protein intake less than 80% of RDA, is less than 4.8 mg α – TE/day for 1–3 year olds, less than 5.6 mg/day for 4–5 year olds.

From Table 4.29: Vitamin E intake does not increase with increasing age in 2003 further emphasizing that the 4–5 year olds are a particularly vulnerable group in terms of quality of food intake; and

Refugee children in West bank were more likely to be vitamin E deficient in both surveys. In 2002, 30.8% of 1–3 year olds in the West Bank were vitamin E deficient compared to 27.0% in the Gaza Strip, and 36.4% of 4–5 year olds in the West Bank compared to 20.0% in Gaza Strip had deficient daily vitamin E intakes in 2002. In the 2003 sample of 1–3 year olds, 41.8% in the West Bank were deficient compared to 39.7% in the Gaza Strip, and 71.4% of 4-5 year olds in the West bank compared to 59.1% in the same age group in the Gaza Strip were deficient in their daily vitamin E intakes.

Graph 4.7: Distribution of the Population Percentage of Refugee Children 1–5 Year Olds in West Banks and Gaza Strip with Vitamin E intake < 80% of RDA in 2002 and 2003

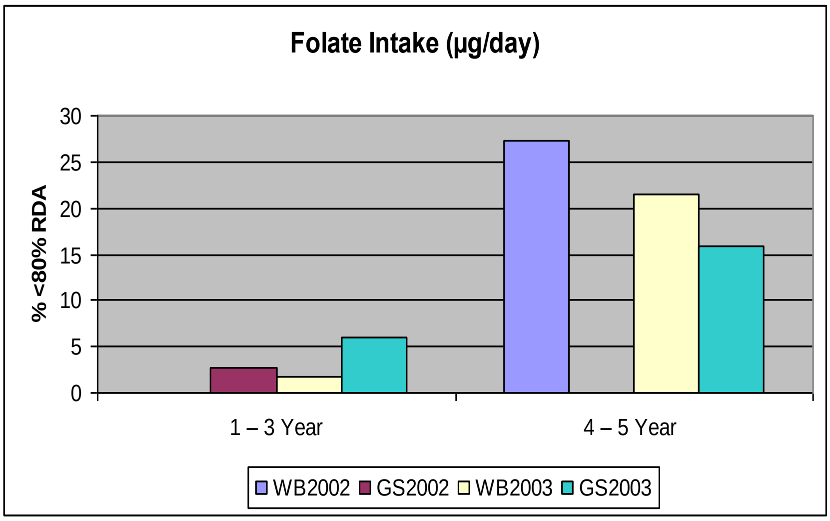


4.4.2.2.3 –Folate (Folic acid)

Iron and folate (folic acid) are essential for red blood cell development; deficiencies result in anemia and subsequent cognitive and growth delay, and in pregnant women, can lead to low birth weight and fetal neurologic abnormalities. For 1–3 year olds, a daily intake of less than 40 µg/day, and for 4–5 year olds less than 60 µg/day, constitutes a deficiency. In the West Bank, folate consumption among children decreased with age in 2002 and in 2003. In Gaza, 2.7% of children 1–3 years of age were folate intake deficient in 2002, and 6.0% of these age group were folate deficient in 2003. Among the older children ; while in 2003 children in West Bank and Gaza Strip were ate less folate with increasing age.

In West Bank in 2002 and in 2003, 27.3% of 4–5 year olds is deficient in daily Folate intake; in Gaza Strip 2.7% of 1–3 year olds is folate intake deficient in the 2002 sample. In the 2003 sample in the 1–3 year olds; 1.8% of the West Bank compared to 6.0% of the Gaza Strip and in the 4-5 year olds; 21.4% of West Bank compared to 15.9% of the Gaza Strip are deficient in daily folate intake.

Graph 4.8: Distribution of the Population Percentage of Refugee Children 1–5 Year Olds in West Banks and Gaza Strip with Folic acid intake < 80% of RDA in 2002 and 2003

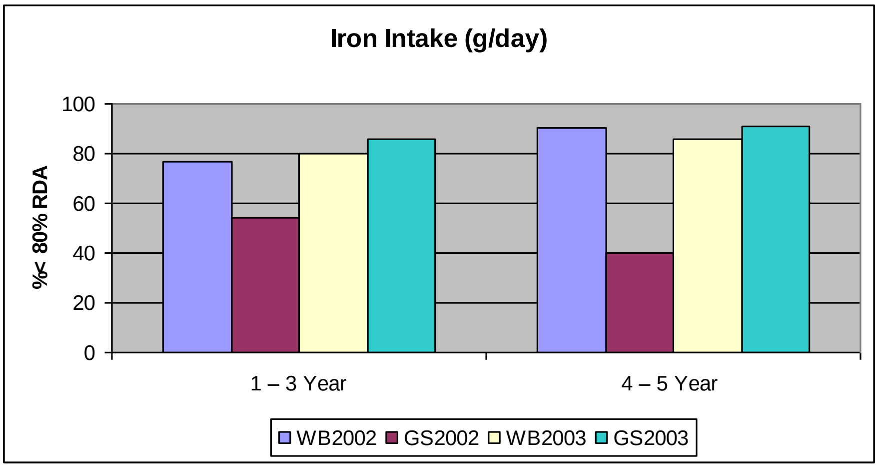


<u>4.4.2.2.4 –Iron</u>

For all children under five years of age intakes of less than 8.0 mg of iron is considered iron deficient. Suffice it to say, the vast majority of Palestinian children are iron deficient (Table 4.29) which validates the 2002 findings of 45.4% prevalence of anemia in this population.

In the West Bank 76.9% of children aged 1– 3 were deficient in 2002, and 80.0% were iron intake deficient in 2003, while 90.1% of children four to five years of age were iron intake deficient in 2002 and 85.7% were iron intake deficient in 2003. In the Gaza Strip, prevalence of iron intake deficiency increased from 54.1% to 85.9% among children one to three years of age, and increased from 40.0% to 90.9% among children four to five years of age.

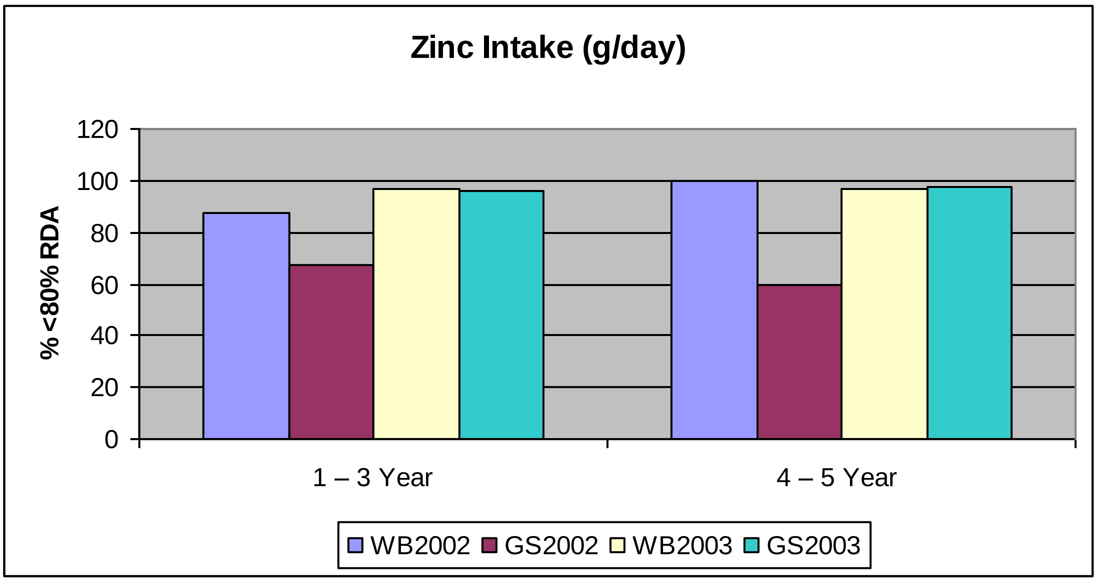
Graph 4.9: Distribution of the Population Percentage of Refugee Children 1–5 Year Olds in West Banks and Gaza Strip with Iron intake <80% of RDA in 2002 & 2003



4.4.2.2.5 – Zinc

Zinc deficiency is getting more attention from international health experts due to its association with immune dysfunction and a general decrease in host resistance, benefits that are critical in malnourished and stressed populations which are already more vulnerable to infectious diseases. Zinc is found in meat, seafood, and eggs—also sources of high protein and prohibitively expensive for most Palestinian households. In both studies, nearly all Palestinian children were found to have daily zinc intakes below the 80% RDA of 8.0 mg/day for children 1– 5 years of age (Table 4.29).

Graph 4.10: Distribution of the Population Percentage of Refugee Children 1–5 Year Olds in West Banks and Gaza Strip with Zinc intake < 80 % of RDA in 2002 and 2003



4.4.3–The Proportional Contribution of Different Food Groups

Tables 4.30 and 4.31 shows the proportional contribution of different food groups to the daily energy and nutrient intakes in 2002 and 2003. For both infants and toddlers important sources of energy, protein and carbohydrate intake were Grain products. For the infants important sources of fat were milk, milk products and vegetables, while for toddler's fats, oils and grain products were important sources of fat. For infants, milk and milk products were major sources of Vitamin A while grain products were important sources of Vitamin A for toddlers. Both infants and toddlers mainly derived their Iron and Zinc from grain products.

Graphs (4.11, 4.12, 4.13, 4.14, 4.15 and 4.16) show proportional contributions of specific food groups to the intake of energy, protein and carbohydrates in infants and toddlers, respectively. These graphs clearly demonstrate that grain products were the main food and the most important source of energy, protein and carbohydrate in infants and toddlers.

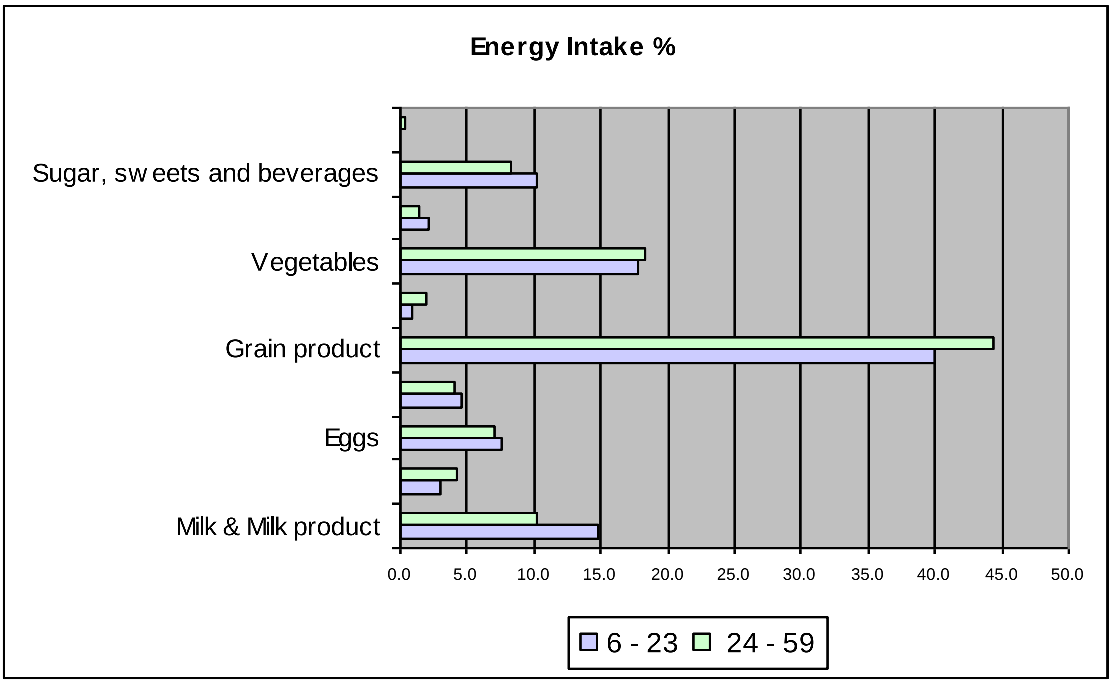
Table 4.30: The Proportional Contribution of Different Food Groups (Assessed with the 24-HDR) to the Intake of Energy and Nutrients as Baseline of a Group of Infants and Toddlers, Refugee Camps in West Banks and Gaza Strip 2003

Age Group	Food Group	Weight	Energy	Protein	Carbo	Total Fat	Vitamin A	Iron	Zinc
6 – 23 Month	Milk & Milk product	13.2	14.8	16.4	10.5	21.4	27.8	4.1	17.5
	meat, poultry, fish and mixture	1.0	3.1	10.3	0.2	4.8	12.0	5.4	10.6
	Eggs	2.6	7.6	13.7	0.4	16.6	16.8	9.5	9.7
	Dry beans and other legume	2.3	4.6	6.8	3.7	5.5	3.8	10.3	8.8
	Grain product	13.0	39.9	37.8	52.2	19.0	18.8	32.4	32.5
	Fruits	1.3	0.8	0.4	1.4	0.3	1.4	0.8	0.4
	Vegetables	9.0	17.8	11.7	15.7	24.5	9.6	26.4	14.4
	Fats and oil	2.8	2.1	1.4	0.3	9.6	1.1	1.3	0.9
	Sugar, sweets and beverages	5.4	10.3	2.4	15.3	5.8	9.4	9.0	0.3
	No alcoholic drink	51.8	0.2	0.0	0.4	0.0	0.0	1.7	5.5
24 – 29 Month	Milk & Milk product	7.4	10.3	11.8	8.2	13.6	18.5	3.6	11.8
	meat, poultry, fish and mixture	1.5	4.2	13.2	0.3	6.7	4.4	6.0	12.8
	Eggs	2.2	7.0	11.0	0.4	16.1	16.5	7.1	7.6
	Dry beans and other legume	2.5	4.1	6.1	3.7	4.4	5.6	9.3	5.7
	Grain product	15.1	44.4	41.8	56.0	24.2	36.0	33.6	37.8
	Fruits	2.5	1.9	0.9	2.9	0.8	3.0	1.8	1.2
	Vegetables	9.9	18.3	13.0	15.6	25.9	13.3	30.7	15.2
	Fats and oil	0.2	1.4	0.2	0.0	4.2	0.1	0.7	0.3
	Sugar, sweets and beverages	5.0	8.2	2.0	12.4	4.1	2.5	5.8	2.4
	No alcoholic drink	53.7	0.3	0.0	0.5	0.0	0.0	1.5	5.3

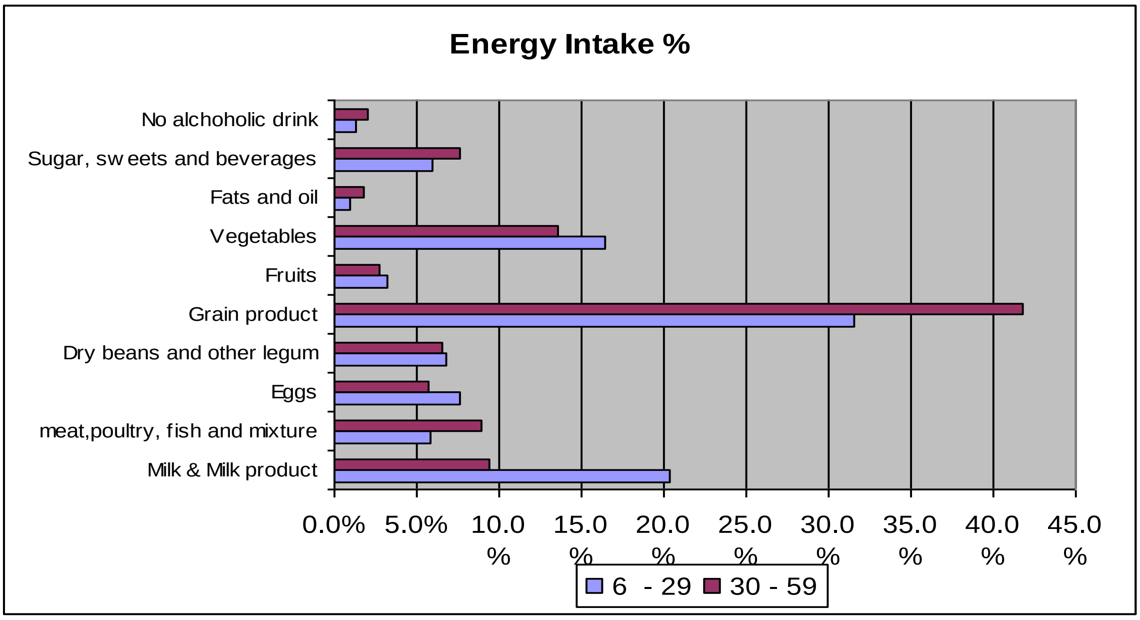
Table 4.31: The proportional contribution of different food groups (assessed with the 24-HDR) to the intake of energy and nutrients as baseline of a group of infants and toddlers, refugee Camps in West Banks and Gaza Strip 2002

Age Group	Food Group	Weight	Energy	Protein	Carbo	Total Fat	Vitamin A	Iron	Zinc
6 – 23 Month	Milk & Milk product	17.8%	20.4%	19.9%	14.5%	28.4%	35.5%	4.6%	18.5%
	meat, poultry, fish and mixture	2.5%	5.8%	15.4%	1.2%	8.3%	0.7%	8.6%	16.4%
	Eggs	2.7%	7.6%	11.4%	0.4%	15.6%	13.2%	8.7%	6.9%
	Dry beans and other legume	3.8%	6.8%	8.9%	7.3%	5.4%	2.5%	13.2%	11.7%
	Grain product	12.7%	31.5%	29.7%	41.7%	17.5%	25.3%	33.9%	27.1%
	Fruits	5.1%	3.2%	1.1%	6.3%	0.5%	5.7%	2.7%	1.0%
	Vegetables	13.7%	16.4%	11.6%	16.4%	18.7%	15.4%	22.2%	13.6%
	Fats and oil	0.1%	0.9%	0.2%	0.0%	2.4%	0.8%	0.6%	0.4%
	Sugar, sweets and beverages	3.7%	6.0%	1.5%	9.6%	3.1%	0.8%	3.7%	1.5%
	No alcoholic drink	37.8%	1.3%	0.2%	2.6%	0.1%	0.1%	1.6%	2.9%
24 – 29 Month	Milk & Milk product	7.5%	9.4%	10.9%	6.7%	12.8%	12.7%	2.8%	9.5%
	meat, poultry, fish and mixture	3.8%	8.9%	24.4%	1.1%	13.4%	41.2%	16.7%	24.5%
	Eggs	2.2%	5.7%	6.9%	1.6%	11.0%	8.2%	5.1%	4.3%
	Dry beans and other legume	3.5%	6.5%	9.8%	5.1%	7.2%	3.7%	13.9%	13.5%
	Grain product	16.9%	41.8%	33.3%	52.6%	28.4%	5.6%	33.2%	31.0%
	Fruits	4.7%	2.7%	1.5%	4.2%	1.5%	6.0%	2.5%	2.1%
	Vegetables	14.6%	13.6%	9.9%	13.3%	16.4%	17.2%	20.9%	10.1%
	Fats and oil	0.2%	1.8%	0.3%	0.1%	4.9%	0.1%	0.7%	0.6%
	Sugar, sweets and beverages	6.5%	7.6%	2.5%	11.8%	4.0%	4.9%	3.0%	1.9%
	No alcoholic drink	39.9%	2.0%	0.3%	3.6%	0.3%	0.4%	1.2%	2.5%

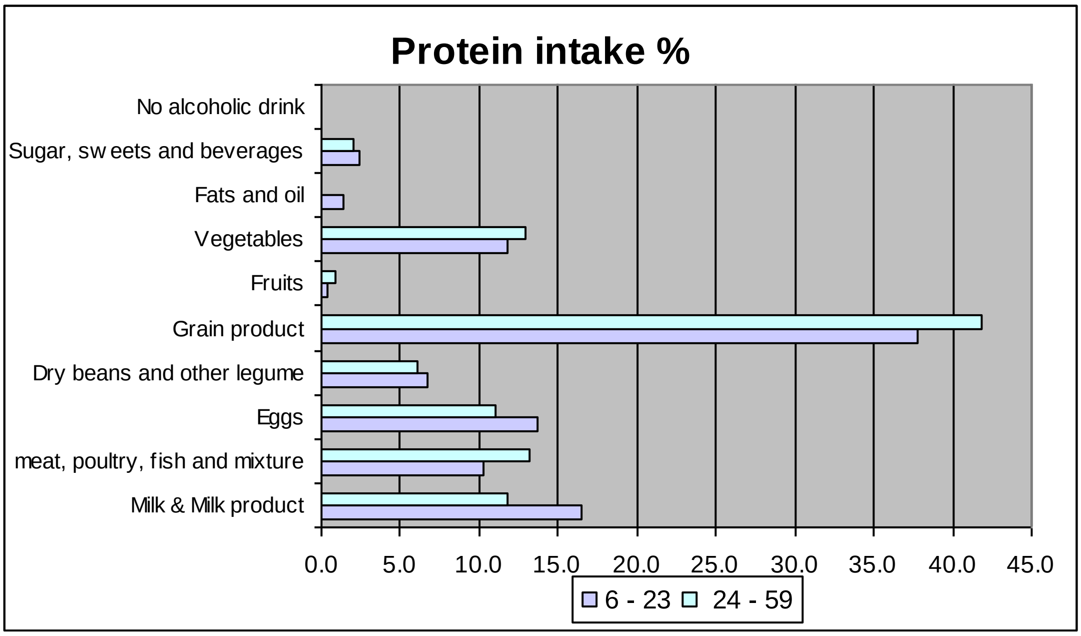
Graph 4.11: Percentage of Energy as Derived from Specific Food Groups (Assessed with 24-HDR), of a Group of Infant and Toddlers, Refugee Camps in West Bank and Gaza Strip 2003



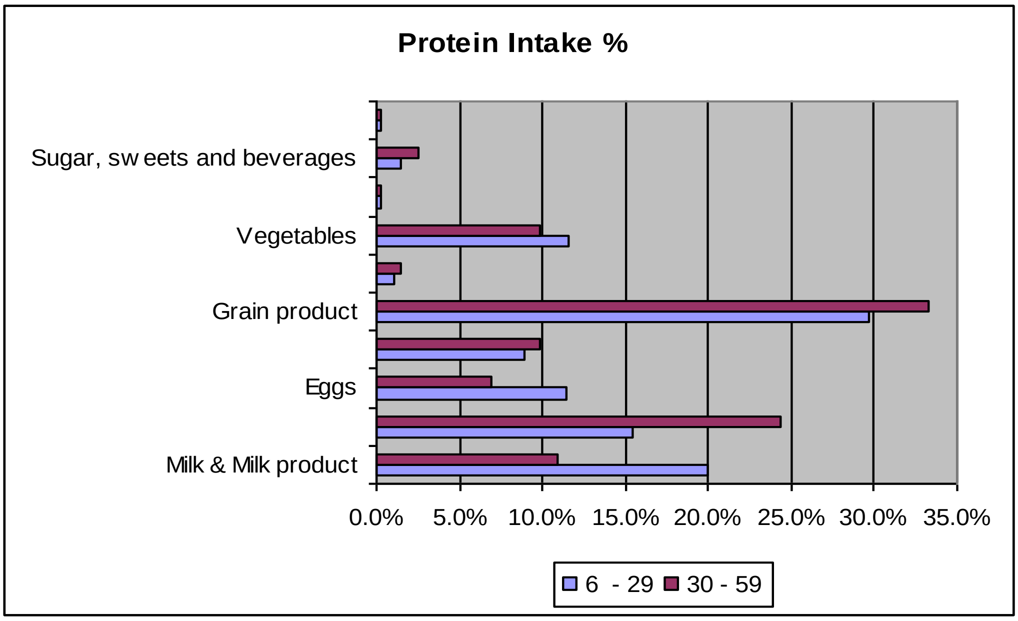
Graph 4.14: Percentage of Energy as Derived from Specific Food Groups (Assessed with 24 – HDR), of a Group of Infant and Toddlers, Refugee Camps in West Bank and Gaza Strip 2002



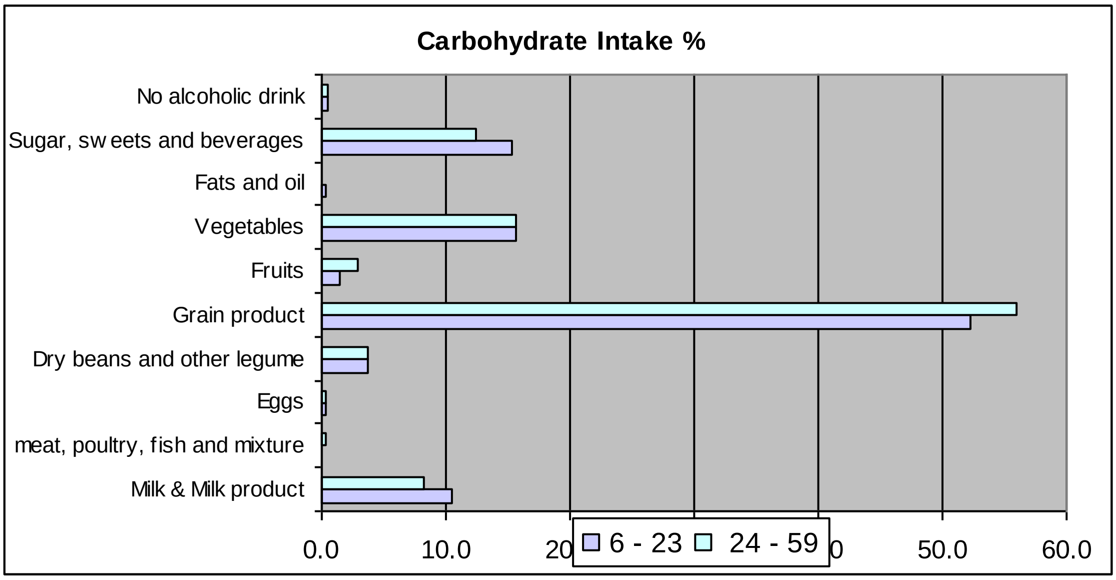
Graph 4.12: Percentage of Protein as Derived from Specific Food Groups (Assessed with 24-HDR), of a Group of Infant and Toddlers, Refugee Camps in West Bank and Gaza Strip 2003



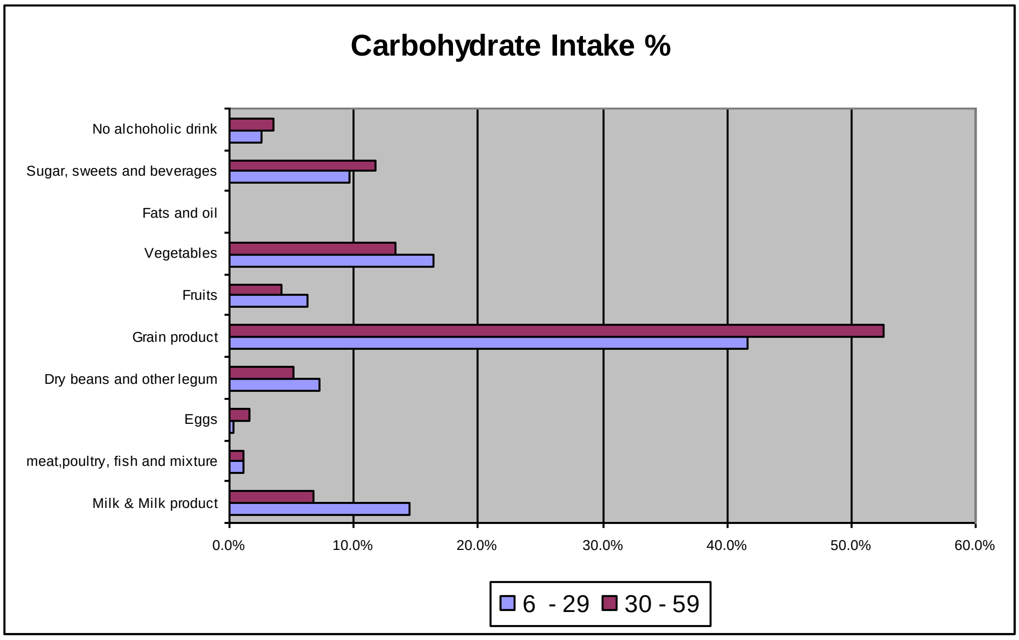
Graph 4.15 Percentage of Protein as Derived from Specific Food Groups (Assessed with 24 – HDR), of a Group of Infant and Toddlers, Refugee Camps in West Bank and Gaza Strip 2002



Graph 4.13: Percentage of Carbohydrate as Derived from Specific Food Groups (Assessed with 24-HDR), of a Group of Infant and Toddlers, Refugee Camps in West Bank and Gaza strip 2003



Graph 4.16 Percentage of Carbohydrate as Derived from Specific Food Groups (Assessed with 24 – HDR), of a Group of Infant and Toddlers , Refugee Camps in West Bank and Gaza Strip 2002



4.4.4–Test The Null Hypothesis

Let Us Now Test the Null Hypothesis of Dietary intake

Table 4.32: P-values of Significant Association between Energy, Macronutrients and Location in 2002 and 2003 for Preschool Refugee Children Aged 1– 5 Years

Energy and Macronutrients	P- Value by location	
	2002	2003
Energy	**0.016**	**0.003**
Carbohydrate	**0.002**	0.41
Carbohydrate (%of energy)	0.094	**0.00**
Dietary Fiber	**0.00**	0.446
Protein	**0.026**	**0.007**
Protein (%of energy)	0.736	0.101
Total Fat	0.353	**0.00**
Total Fat (%of energy)	0.099	**0.00**
SFA	0.842	**0.00**
SFA (%of energy)	0.252	**0.00**
MUFA	0.791	**0.00**
MUFA (%of energy)	0.051	**0.00**
PUFA	**0.042**	0.714
PUFA(%of energy)	0.83	0.435
Cholesterol	0.711	**0.037**

Table 4.33: P-values of Significant Association between Micronutrients and Location in 2002 and 2003 of Preschool Refugee Children Aged 1– 5 Years

Micronutrient	P- Value by location	
	2002	2003
Vitamin A	0.333	0.081
Vitamin E	**0.032**	0.066
Folate (Folic Acid)	0.109	0.116
Iron	**0.029**	**0.004**
Zinc	**0.051**	0.114

__Null Hypothesis to Be Tested__

H_0: There was no difference in energy intake between West Bank and Gaza Strip preschool refugee children in 2002 and 2003 α=0.05.

The asymptotic-significance=p-value= probability value =0.016 in 2002 and in 2003 (=0.003) less than the level of significance = α=0.05, therefore we reject the H_0 at α=0.05 and conclude that energy intake and location are dependent. That is the results were statistically significant in 2002 and 2003.

Conclusion: there was a statistically significant difference in energy intake in the West Bank compared to Gaza Strip in 2002 and 2003

H_0: There is no difference in macronutrient (protein, carbohydrate and fat) intakes between West bank and Gaza Strip preschool refugee children in 2002 and 2003 α=0.05.

The asymptotic – significance=p-values= probability values =0.026 (2002) and =0.007 (2003) of *protein* are less than the level of significance = α=0.05. Therefore we reject the H_0 at α=0.05 and conclude that protein intakes and location were dependent. That is the results were statistically significant in 2002 and 2003.

The asymptotic – significance=p-value= probability value =0.002 of *Carbohydrate* less than the level of significance = α=0.05. Therefore we reject the H_0 at α=0.05, and conclude that carbohydrate intake and location are dependent. That is the results were statistically significant in 2002.

However, in 2003 the asymptotic – significance=p-value= probability value =0.410 of Carbohydrate is greater than the level of significance = $\alpha=0.05$; therefore we do not reject the H_0 at $\alpha=0.05$, and we conclude that carbohydrate intake and location are independent. That is the results were statistically insignificant in 2003.

In contrast to carbohydrate intake, the asymptotic – significance=p-value= probability value =0.353 of *total fat* is greater than the level of significance = $\alpha=0.05$ in 2002; therefore we do not reject the H_0 at $\alpha=0.05$, and conclude that fat intake and location are independent. That is the results were statistically insignificant in 2002.

On the other hand, in 2003 the asymptotic – significance=p-value= probability value =0.000 of fat is less than the level of significance = $\alpha=0.05$; therefore we reject the H_0 at $\alpha=0.05$ and conclude that fat intake and location are dependent. That is the results were statistically significant in 2003.

Conclusions:

- There was statistically difference in protein intake in 2002 and 2003 between West Bank and Gaza Strip.
- There were statistically difference in carbohydrate intake in 2002 and fat intake in 2003 between West Bank and Gaza Strip.
- There were no statistically difference in carbohydrate intake in 2003 and fat intake in 2002 between West Bank and Gaza Strip

H_0: There was no difference in micronutrient (Vit A, Vit E , Folic acid, Iron and Zinc) intake between West bank and Gaza Strip preschool refugee children in 2002 and 2003α=0.05.

The asymptotic–significance=p-value= probability values of *Vitamin A* in 2002 (=0.333) and in 2003 (=0.081) were greater than the level of significance = α=0.05; therefore we do not reject the H_0 at α=0.05. and conclude that vitamin A intakes and location are independent. That is the results were statistically insignificant in 2002 and 2003.

The asymptotic – significance=p-value= probability value =0.032 of *Vitamin E* is less than the level of significance = α=0.05; therefore we reject the H_0 at α=0.05, and conclude that Vitamin E intake and location are dependent. That is the results were statistically significant in 2002.

While, in 2003 the asymptotic – significance=p-value= probability value =0.066 of *Vitamin E* is greater than the level of significance = α=0.05; therefore we do not reject the H_0 at α=0.05, and conclude that Vitamin E intake and location are independent. That is the results were statistically insignificant in 2003

The asymptotic – significance=p-value= probability values of *folic acid* in 2002 (=0.109) and in 2003 (=0.116) were greater than the level of significance = α=0.05. Therefore we do not reject the H_0 at α=0.05 and we conclude that folic acid and location are independent. That is the results were statistically insignificant in 2002 and 2003.

The asymptotic – significance=p-value= probability values of *Iron* in 2002 (=0.029) and in 2003 (=0.004) were less than the level of significance = α=0.05; therefore we reject the H_0 at α=0.05.and conclude that Iron intake and location are dependent. That is the results were statistically significant in 2002 and 2003.

The asymptotic – significance=p-value= probability value =0.051 of *Zinc* in 2002 is equal the level of significance = α=0.05; therefore we reject the H_0 at α=0.05, and conclude that Zinc intake and location are dependent. That is the results were statistically significant in 2002.

On the other hand, in 2003 the asymptotic – significance=p-value= probability value =0.114 of Zinc is greater the level of significance = α=0.05; therefore we do not reject the H_0 at α=0.05, and we conclude that Zinc intake and location are independent. That is the results were statistically insignificant in 2003.

Conclusions:

- There were no statistically significant differences in Vitamin A and Folic Acid intakes between West Bank and Gaza Strip in 2002 and 2003
- There were statistically significant differences in Vitamin E and Zinc intakes between West Bank and Gaza Strip in 2002, while there were no statistically significant difference in intakes in 2003
- There was statistically significant difference in Iron intake between West Bank and Gaza Strip in 2002 and 2003

Table 4.34: Mean Daily intakes of Energy, Carbohydrate, Dietary Fiber and Protein by Household Income for Children 1 – 5 Year Olds, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Sample Year	Household Income	Energy intake	Carbohydrate	%CHO	Dietary fiber	Protein	% Protein
2002	<1800 NIS	1356.6±76.0	175.4±11.3	50.8±1.3	13.4±1.3	44.8±3.3	13.0±0.5
	>1800 NIS	1134.9±138.6	141.2±15.4	51.3±1.8	11.9±1.8	40.7±6.1	13.7±0.8
2003	Not employed	1049.7±40.9	146.9±5.2	56.4±1.1	9.7±0.6	32.8±1.4	12.0±0.4
	Employed	986.5±26.8	133.4±3.7	55.5±0.7	10.1±2.1	32.3±1.0	12.7±0.2
	Any one lost their job since the beginning of the Intifada	1023.0±35.9	135.4±4.8	55.2±1.0	12.3±3.3	33.9±1.2	12.2±0.3
	No one lost their job since the beginning of the Intifada	994.8±28.7	139.5±4.0	56.2±0.8	8.3±0.4	31.4±1.1	12.7±0.3

Table 4.35: Mean Daily intakes of Total Fat, Fatty acids and Cholesterol by Household Income for Children 1 – 5 Year Olds, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Sample Year	Gender	Total Fat	%Fat	SFA	%SFA	MUFA	%MUFA	PUFA	%PUFA	Cholesterol
2002	<1800 NIS	55.4±3.4	37.8±1.3	16.6±1.2	11.8±0.7	18.8±1.4	12.7±0.6	15.4±1.1	10.3±0.5	231.3±21.4
	>1800 NIS	47.4±7.2	36.8±1.6	14.5±2.0	11.4±0.8	16.3±3.1	12.4±0.8	12.5±1.8	9.9±0.9	222.1±64.9
2003	Not employed	38.0±2.2	32.6±1.1	9.8±0.7	8.7±0.5	12.2±0.8	10.3±0.4	11.4±0.8	10.8±0.5	161.5±18.7
	Employed	36.9±1.3	32.8±0.7	10.6±0.5	9.1±0.3	12.1±0.5	10.6±0.3	10.8±0.5	10.5±0.3	194.9±13.8
	Any one lost their job since the beginning of the Intifada	39.4±1.8	33.5±1.0	10.7±0.6	9.5±0.4	12.6±0.7	10.9±0.4	11.4±0.7	10.4±0.4	195.3±16.6
	No one lost their job since the beginning of the Intifada	35.6±1.5	32.2±0.8	10.1±0.6	8.6±0.4	11.7±0.6	10.1±0.3	10.7±0.5	10.7±0.4	175.9±15.0

Table 4.36: Mean Daily intakes of Energy, Carbohydrate, Dietary Fiber and Protein by Maternal Education for Children 1 – 5 Year Olds, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Sample Year	Household Income	Energy intake	Carbohydrate	%CHO	Dietary fiber	Protein	% Protein
2002	Primary	1302.0±83.0	167.3±13.3	50.4±1.4	12.4±1.4	42.7±3.2	12.9±0.5
	Secondary	1361.9±131.1	172.5±15.3	51.2±2.1	14.2±1.9	47.6±6.3	13.6±0.9
	College & above	1120.0±196.1	148.2±27.5	52.7±2.8	12.8±3.5	37.3±8.2	12.8±1.2
2003	Primary	1042.0±59.8	146.0±8.3	58.0±1.5	8.6±0.7	34.1±2.2	11.7±0.4
	Secondary	978.8±26.0	133.4±3.5	55.6±0.7	8.5±0.4	31.2±0.9	12.7±0.2
	College & above	1121.5±62.5	151.0±9.2	53.6±1.4	21.0±11.6	37.8±2.6	12.1±0.6

Table 4.37: Mean Daily intakes of Total Fat, Fatty acids and Cholesterol by Maternal Education for Children 1 – 5 Year Olds, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Sample Year	Gender	Total Fat	%Fat	SFA	%SFA	MUFA	%MUFA	PUFA	%PUFA	Cholesterol
2002	Primary	53.5±3.3	38.2±1.4	15.6±1.2	11.3±0.8	18.1±1.4	12.8±0.7	15.4±1.1	11.0±0.6	218.9±28.2
	Secondary	56.2±7.0	37.0±1.8	18.0±2.2	12.3±1.1	19.5±3.0	12.5±0.9	13.8±1.7	9.0±0.7	240.6±46.2
	College & above	44.7±7.7	36.6±3.0	13.0±2.1	11.5±1.5	14.4±2.1	12.3±1.2	13.6±3.9	9.7±1.5	243.0±51.4
2003	Primary	36.6±2.9	31.4±1.5	9.9±0.9	8.6±0.7	11.7±1.0	10.2±0.6	10.8±1.1	10.0±0.7	166.4±25.9
	Secondary	36.7±1.4	32.6±0.7	10.2±0.5	8.9±0.3	11.9±0.5	10.4±0.3	10.8±0.5	10.6±0.3	186.9±13.4
	College & above	41.5±3.1	35.3±1.5	11.9±1.4	9.9±0.9	13.9±1.2	11.5±0.7	12.1±1.0	11.2±0.7	193.9±32.0

Table 4.38: Mean Daily intakes of Energy, Carbohydrate, Dietary Fiber and Protein by Father Education for Children 1 – 5 Year Olds, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Sample Year	Household Income	Energy intake	Carbohydrate	%CHO	Dietary fiber	Protein	% Protein
2002	Primary	1385.3±88.5	180.4±14.5	50.9±1.6	13.6±1.7	46.3±3.6	13.1±0.5
	Secondary	1166.7±118.2	147.5±15.1	50.6±2.0	10.8±1.5	38.8±5.4	13.2±0.8
	College & above	1329.7±174.3	167.7±20.2	51.6±1.9	15.4±2.7	45.8±7.5	13.3±0.9
2003	Primary	1030.0±47.5	145.1±6.9	58.0±1.4	9.6±0.8	33.3±1.7	11.8±0.3
	Secondary	993.4±29.2	132.9±3.9	55.1±0.8	10.7±2.4	31.9±1.0	12.8±0.3
	College & above	1021.1±53.3	144.1±7.1	55.2±1.3	8.3±0.6	33.3±2.2	12.4±0.5

Table 4.39: Mean Daily intakes of Total Fat, Fatty acids and Cholesterol by Father Education for Children 1 – 5 Year Olds, Refugee Camps in West Bank and Gaza Strip 2002 and 2003

Sample Year	Gender	Total Fat	%Fat	SFA	%SFA	MUFA	%MUFA	PUFA	%PUFA	Cholesterol
2002	Primary	55.6±3.4	37.7±1.7	17.2±1.3	12.1±1.0	18.9±1.5	12.9±0.8	15.0±1.3	9.7±0.5	206.4±23.0
	Secondary	48.8±6.0	37.8±1.6	14.3±2.1	11.1±1.0	16.0±2.4	12.2±0.7	14.3±1.5	11.3±0.9	223.9±38.2
	College & above	56.0±8.7	37.1±2.0	16.6±2.4	11.7±1.0	20.0±3.7	12.9±1.0	14.6±2.5	9.5±1.0	288.2±75.3
2003	Primary	36.1±2.3	31.5±1.4	9.5±0.8	8.1±0.5	11.4±0.9	10.1±0.6	10.6±0.9	10.7±0.6	157.2±22.8
	Secondary	38.2±1.5	33.0±0.8	10.6±0.5	9.2±0.4	12.7±0.6	10.6±0.3	11.3±0.6	10.5±0.4	204.5±14.2
	College & above	35.4±2.8	33.3±1.3	10.6±1.3	9.3±0.7	11.2±1.0	10.6±0.5	10.4±0.9	10.7±0.6	152.8±27.7

CHAPTER (5)
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This survey combines rapid indicators for malnutrition with a more detailed food consumption component to give an overall picture of the state of nutrition for refugee children aged six to fifty-nine months in the West Bank and Gaza Strip.

In general, this population is not eating well. The presence of profound acute malnutrition and anemia is not surprising since preschool aged children show decreased energy, iron, vitamin A, and zinc intakes.

A household's ability to provide food for its members—food security—is determined by physical and financial access to food, and use of coping strategies. Changes in any of these factors may adversely affect food security. With an escalation of political violence in early 2002 access to food (and other essentials) deteriorated, but from 2002 to 2003, the degree of physical access improved as households employed a variety of coping strategies to overcome the physical barriers imposed by curfews and checkpoints. The inability to physically access food has an immediate impact, and in the case of periodic curfews, and closed checkpoints and border crossings, the effect on a household's food security and nutrition is a shorter term one. That said, checkpoints, roadblocks, and curfews still indirectly affect access to food through their direct effect on the Palestinian economy, which drove some of the lack of access, and which prompted some families to cut down on consumption. Such was the case in the Palestinian Territories, particularly the West Bank, during the spring and summer of 2002.

Financial access, in the absence of food assistance, progressively worsened from 2002 to 2003 and our use of level of employment as an economic indicator illustrates on some level the degree to which Palestinian households were economically stressed. Over half of the households surveyed had experienced a decrease in monthly household income over the six months prior to the survey, and nearly half of the households had experienced a decrease in non-salary remittances. Families were experiencing a moderate degree of economic distress as evidenced by the fact that they were spending less at holidays, and inviting fewer people for iftar dinners (note that actual data collection in both 2002 and 2003 occurred prior to Ramadan, during periods when there were no fasts or feasts). The latter may be quite significant since adding extra people for dinner is not much of an additional expense. Households were also foregoing use of fuel or using alternative sources due to costs.

Financial access to food has a longer-term affect on food access than physical access simply because economic distress is not easily remedied or reversed. Thus *lack of physical access* is likely to precipitate *acute* *malnutrition*; *lack of financial access* is more likely to lead to *chronic malnutrition*. Not surprisingly then, the anthropometric findings in 2003 can readily be interpreted by the fact that food insecurity leading to malnutrition in Palestine has been more a function of economic causes than physical causes.

Some coping strategies are also likely to affect micronutrient deficiencies. The increased use of coping strategies and their eventual exhaustion over time left many households unable to afford micronutrient rich foods such as meat or fish. Predictably, our 2003 survey data indicates a disturbing decline in both macro- (energy and protein intake) and micronutrient (vitamins A, E, folate and minerals iron and zinc) intake indicators.

Using a variable of underemployment defined as less than 20 hours of employment per week for the entire household combined, we found that 38.1% of Palestinian households (35.0% in the West Bank; 45.1% in the Gaza Strip) were in this category and therefore at risk for economically driven food insecurity. Coping strategies most frequently used (not including humanitarian assistance or UNRWA food) in order of descending importance included purchasing food on credit; relying on less expensive (and less preferred, often less nutritious) foods; decreasing the amount of food consumed by the household; restricting the consumption of the adults in the household for the benefit of the children; reducing the number of meals per day; limiting portion sizes; and borrowing food or relying on friends and relatives. Gaza Strip households tended to invoke these strategies more often than West Bank households, which we believe directly relates to the greater degree of household economic distress experienced in the Gaza Strip relative to the West Bank.

Dependency on food assistance is increasing. The frequency with which households utilized coping strategies was also quantified as a variable of food insecurity and together with the underemployment variable was used to evaluate whether food assistance was well targeted. (Abdeen et al,2004).

As of August 2003, 46.8% of all Palestinian households—32.2% of West Bank and 71.8% of Gaza Strip households—were receiving food assistance from either UNRWA, WFP (through NGOs), ICRC, charitable humanitarian agencies, or some combination of these (Abdeen et al,2004). Relative to low employment status and frequency of use of coping mechanisms, a disproportionate number of West Bank households (over half with underemployment and over two-thirds with frequent use of coping mechanisms) were not receiving food assistance at the time of the surveys compared to Gaza Strip households.

In general, there was a meaningful improvement in anthropometric indicators among preschool age children between the summer of 2002 and the summer of 2003. The aggressive and timely food assistance interventions that began in mid-2002 and that have been sustained to the present have had the following effects:

- GAM, a short-term and reversible indicator, has been mitigated in the new cohort of children studied in mid-2003 for both the West Bank and Gaza Strip;
- GCM, a long-term indicator, improved in the Gaza Strip where concentrated food assistance prevented high numbers of acutely malnourished children in 2002 from becoming chronically malnourished in 2003; and
- GCM in the West Bank showed an increase, that, although not statistically significant, may indicate that the economic effects on the West Bank and the relatively less attention to food assistance paid to the West Bank compared to the Gaza Strip might take a toll on the most vulnerable.

The continuing economic decline and increase in the use of coping strategies elaborated above, however, took a toll on the quality of nutrition among Palestinian preschool age children between 2002 and 2003. Large segments of the preschool age children are eating below the 80% level of the RDAs for each of the nutrients included in this study. By definition this indicates a state of high prevalence of deficiency.

Of notable points of concern include:

- The unprecedented finding in 2003 that older children in the sample were taking in fewer calories per day than younger children, reflecting a disturbing coping strategy within households and highlighting increased levels of food insecurity compared to 2002.
- In general, there was a higher prevalence of macro- and micronutrient deficiencies among children living in Gaza compared to children in the West Bank, further evidence to support the theory that the more frequently households rely on coping strategies (as is the case in Gaza), the more likely is the presence of nutritional deficiencies.
- Since malnutrition and micronutrient deficiencies are indicators of changing trends in socioeconomic conditions, it is not surprising that the prevalence of chronic malnutrition has risen during the two years of the intifada. The conflict and its economic consequences have created a state of food insecurity in which chronic malnutrition in children and decreased macronutrient consumption the current state of food insecurity that, without economic stabilization and recovery will only worsen and place additional burdens on society.

5.2 Recommendations

Given the drastic degradation of the Palestinian economy since the onset of the current Intifada in 2000, and the accelerated pace of Israeli military activity and imposed curfews in the West Bank during that time, donor governments and the humanitarian community have come to regard the current state of Palestinian life and livelihood as an emerging crisis. In the relatively short era within which complex humanitarian emergencies have been defined, studied, and managed, the primary effects of conflict on physical and financial access to food and their subsequent effects on the public's health when that access is denied has grown significantly. The fact that nutritional issues are even a concern in a place where food is readily available in the marketplace and where the infrastructure required to grow, refrigerate, preserve, transport, and market goods exists points to a fundamental need to hold the various parties involved in the conflict accountable for ensuring physical and economic access to food for the noncombatant population as prescribed by international humanitarian law. As the Palestinian economy continues to deteriorate, however, the humanitarian community independent of the Israeli government has had to (and will likely have to) increase its response in order to prevent the specter of acute malnutrition from crossing the threshold into a state of crisis. In so doing, humanitarian agencies remain in the difficult position of maintaining a tenuous level of nutritional assistance.

This study demonstrates that tenuousness—clearly that segment of the population living under economic distress and high levels of food insecurity is in danger of becoming acutely or chronically malnourished in a relatively short period of time. This situation requires constant vigilance. In addition, the population as a whole suffers from the inability to financially access sufficient amounts of appropriate nutritious foods.

5.2.1 – General

Stakeholders—donors, national and international NGOs, and research institutions— should work within, and focus their interventions within the framework of the Palestinian National Nutritional Strategy developed in 2003 by the Palestinian Ministry of Health. Likewise, the MOH should take the lead in coordinating various donors and NGOs working in the nutrition/food security arena. This must include coordinating efforts to gather and monitor the data that should guide interventions. Aside from the more obvious benefits of coordination, particularly between large scale food assistance operations, the MOH in its role can oversee the more delicate task of ensuring that micro- as well as macronutrient deficiencies are adequately addressed.

5.2.2 – Malnutrition and Food Consumption: Prevention

The MOH should ensure the standardization of nutritional indicators and the health sector's utilization of protocols for weighing and measuring children, identifying nutritional deficiencies, and managing those deficiencies. The identification, treatment and referral of cases of acute and chronic malnutrition across the spectrum of health providers and facilities requires a uniform approach. A well-publicized strategy that includes donors, NGOs and local health providers and that ensures continuity of nutritional care between antenatal clinics, postnatal clinics, sick children clinics, primary care clinics, and social services would address the cases of undernutrition that frequently get missed. (The Al-Quds/Johns Hopkins/CARE International survey of 2002 revealed that only 60% of preschool age children have been adequately measured with anthropometric procedures, and among those who were weighed and measured, 40% of the malnourished children were not identified/recognized by the providers).

Further, a means of ensuring that clinic-based nutritional monitoring continues to occur beyond the routine clinic visits that are generally driven by the national child immunization schedule and end with the final immunization contact, which generally occurs at 15 months of age. Our data and that of the USAID vitamin A study suggest that children in the 3-5 year age range are at risk of macro and micronutrient deficiencies that are unlikely to be identified given the fact that this age group is less likely to present to health clinics for routine primary care.

The easily reversible nature of acute malnutrition makes a preventive approach preferable. This assessment would argue that in addition to anthropometric monitoring, periodic 24-hour energy intake assessments should be followed to monitor median daily kilocalorie intake within vulnerable groups over time. In the face of ongoing deterioration of the Palestinian economy and the increasing level of household food insecurity further declines in the nutritional status of young children are inevitable and should be monitored for an early and rapid response.

5.2.3 – Malnutrition and Food Consumption: Interventions

Monitoring mechanisms should ideally be in place prior to specific interventions in order to evaluate the effectiveness and cost-benefits of those interventions. Interventions should be evidence-based where possible. For instance, population-based strategies such as fortification of common foods, which though cost-effective, require significant start-up costs, should thus be supported by population studies that demonstrate the fortificant(s)' efficacy. For example, no population-based study to date has examined the benefit of iron fortification of flour in a Middle Eastern population.

Some combination of supplementation and food fortification strategies will be needed and likely should be incorporated into short and long-term plans for improving nutritional status within the Palestinian population in the West Bank and Gaza Strip. Any strategies and programs identified and implemented should focus in particular on those nutrients known to be deficient in the diet/nutritional status of Palestinians, and those population groups most at risk, e.g. children under five, adolescents, and women of reproductive age, particularly pregnant and lactating women.

.**a. Micronutrient Supplementation:** The 24-HDR clearly shows the magnitude of iron, zinc, folate, and vitamin A deficiencies among pre-school age children living in refugee camps. Traditionally, iron supplementation has suffered from compliance problems: cheaper iron solutions for children are not palatable; inadequate education by care-givers regarding the risks of anemia has prevented sustained compliance; household economic constraints and limited supplies of supplements in some areas; confusing dosing regimens; and the fact that micronutrient deficiencies or their consequences are rarely overtly obvious to the untrained individual all contribute to poor compliance leading to micronutrient deficiency..

b. Food Fortification: WHO-EMRO, donor agencies, and government agencies have looked at a variety of methods for food fortification in Middle Eastern cultures with mixed success. To be successful, food fortification needs to be technically feasible, physiologically sound, culturally appropriate, and cost-effective in the long-term. Regarding vehicles for iron fortification: Any fortified food will need some level of subsidization initially and a six to twelve month impact study to evaluate effectiveness and cost. Very few such studies have been conducted in Middle Eastern cultures, particularly among infants and preschool aged children in whom overdosing of iron or vitamin A, for example, could potentially be hazardous. Once a fortification strategy is found effective, quality assurance systems monitoring the quality of the food product itself as well as education for providers and culturally appropriate public education programs encouraging the use of the fortified food product should be undertaken. When an effective, needed fortification and an appropriate vehicle have been identified, a six month pilot study is warranted. In the case of iron supplementation for anemia prevention, a pilot study of its effectiveness using serum ferritin as an endpoint would be useful, as ferritin levels are a more sensitive indicator of iron stores and ultimately an individual's iron status. In any event, any food fortification program should focus on those nutrients shown to be inadequate in the current Palestinian diet (e.g. consumption below the RDA) among significant elements of the population.

c. Dietary Intake: Much has been made of the high prevalence of tea consumption among preschool age children and recently weaned infants.

The tannins in tea inhibit the absorption of non-heme iron, which in turn decreases the bioavailability of iron in the body. Public education efforts, aimed especially towards mothers, pregnant women and adolescent girls, should focus on encouraging greater use of foods of high nutritional quality and limited intake of tea and foods with low nutrient contents. Within the framework of health care services, exclusive breastfeeding for 6 months should be promoted and supported. Furthermore, the introduction of complementary feeding together with breastfeeding for up to two years should form the cornerstone of nutrition for young children and nutrition education for their mothers.

The factors responsible for the documented tendency for younger children to be exclusively breastfed for periods shorter than three months should be identified and addressed. In the West Bank and Gaza Strip, these goals should be achieved in close partnership with health providers and with due consideration to and respect for the choice of an informed mother regarding the feeding of her child.

Pre-school and school age children are also an important group to consider. Recently school-based food and supplementation programs, some combined with nutrition education, have been implemented in areas of the West Bank and Gaza. These warrant further monitoring and evaluation, with examination of the potential cost-benefit of scaling up of any of these programs. Such activities should be directed and coordinated by the MOH, as described above.

Work at the community level involving community health workers, community leaders, community-based organizations and community women who have been particularly successful in overcoming barriers to good nutrition for their families should be engaged in a variety of activities including:

- Monitoring household security at the community level to prompt early warning of changes in economic well-being, access to food and health care, access to food, etc.
- Monitoring phenomena such as the apparent coping strategy through which older children are limiting their food intake to benefit younger children (further investigation of this phenomena should be undertaken)
- Building public awareness of good nutrition practices and locally available high nutrient foods including fortified foods where appropriate, through mother-to-mother support groups, community activities and awareness campaigns, school-based programs, etc.

d. Public Health Infrastructure: Nutritional interventions should be implemented as part of an overall strategic framework designed to strengthen the public health infrastructure and integrating maternal and child health (MCH) care providers, community workers, academicians, and the existing network of relevant organizations including the Palestinian Ministries of Health and Education, UNRWA, international donor agencies, and NGOs. Such a task demands high profile coordination at the national level and optimally a database and mapping mechanism to identify ongoing projects, areas of need, and surveillance for events triggering potential rises in malnutrition prevalence such as diarrheal epidemics, worm infestations, recent or prolonged curfews/closures, and market disruptions. Clearly, efforts at increasing awareness of malnutrition must begin in MCH clinics where nutrition should be given as high a priority as immunization. Clinic-based interventions at the community level would have the most impact since MCH clinics ideally are well-connected to their communities. Community health workers trained specifically in nutrition could provide nutritional education and outreach and could focus on the goals of improved nutrition through household dietary intake education and successful supplementation compliance strategies. They would be in an ideal position to ensure ongoing treatment and monitoring of households with malnourished and/or anemic members.

5.2.4 – Food Insecurity: Food Assistance

The current level of food assistance is not sustainable; already we have seen evidence of donor fatigue in the unfilled appeals of UNRWA and WFP, and a sense of exasperation on the part of the international community that if it were not for their efforts, the Palestinian population would slowly starve (Abdeen et al, 2004). Given that roughly two-thirds of the Palestinian Authority's revenues come from donor governments, the Palestinian economy is quickly becoming a donor driven one. ICRC has opted to end their voucher program in the West Bank. The fact that children's daily micro -and macronutrient intake continues to fall, however, and even more alarmingly that as preschool age children age their daily calorie intake decreases argues for continued and sustained food assistance, albeit with a more targeted approach.

Certainly, this can take a number of forms:

a. Bulk Food Assistance: such assistance needs better targeting, particularly towards those identified as food insecure by economic and coping indicators. Increased attention needs to be paid to vulnerable West Bank populations as median household incomes drop and the Separation Barrier nears completion. Massive food distribution is not indicated or warranted since that would decrease prices and discourage producers.

b. Targeted Food Subsidies and Price Controls. While food baskets may ease the economic difficulty for the most food insecure, the population in general may benefit from subsidies that allow them to eat nutrient rich foods since micronutrient intake is universally deficient. Such an approach would encourage producers of meat, fish, dairy, fruits, and vegetables to keep producing knowing that a market could in fact exist for their products; this potentially could reverse the general trend of decreased agricultural production seen in 2003.

c. Job Creation Programs and Food/Cash for Work Programs While such programs certainly boost financial access to food; in order for these to succeed, the population needs to have guaranteed physical access to markets.

A food security early warning mechanism would be especially useful as closures and the Separation Barrier begins to severely limit travel between production areas and markets.

Most significantly, the issue of access to nutritional food that mitigates the risks of acute malnutrition and macro and micronutrient deficiencies ***is primarily an economic one*** and secondarily a physical one and in the context of the Israeli-Palestinian conflict ***ultimately requires a political solution.***

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Annex1: Food Security and Nutritional Assessment Household Questionnaire2003

File No. ☐☐☐☐
District:__________________ Locality:_____________________
1.Urban ☐ 2. Non – Urban ☐ 3. Camp ☐
Name of Head of Household:_______________ Phone:______________________

Name of Interviewee: __________________ Sex of Interviewee: Male ☐ Female ☐

Interviewer: _____________________ Code ☐☐
GPS: Latitude __ __ __ __ __ __ __ Longitude: __ __ __ __ __ __ __

Report of Interview
Data of Interview:____/___/_____ Day of Interview: 1 2 3 4 5 6 7
Time Started ____:___ Time Finished _____:_____
Change of Address? Yes No
If yes, what in new address:________________________

Table of Visits	Date
First Visit	___/___/_____
Second Visit	___/___/_____
Third Visit	___/___/_____

INFORMED CONSENT

Hello, my name and I am working with Al Quds University. We would very much appreciate your participation in this survey. This survey will provide important information for the Ministry of Health and international agencies to plan for food assistance. I would like to ask you about nutrition, the nutrition of your children, and how well the family is able to access food for good nutrition. I would also like to measure the weight and height of your children between 6 months to 5 years of age. The survey usually takes 30 – 45 minutes to complete. Whatever information you provide will kept strictly confidential and well not be shown to other persons.

Participation in this survey is voluntary and you can choose not to answer any individual question or all of the questions. However, we hope that will participate in this survey since we believe your views are extremely important to assist your family and village/city.

As this time, do you want to ask me anything about the survey? Y N
May I begin the interview now? Y N
Signature of interviewee::_____________________ Date: ___/___/_____
Respondents (s) agree (s) to be interviewed: Y N

Part 1: Household Demographic

1. Head of household: Male ☐ Female ☐ **If head of household is male go to question No. 3**

2. If female head of household, what is martial status?

1.Single	2.Divorced	3.Widowed	4.Married, husband not living with family

3. Refugee Status: Yes ☐ No ☐

4. Level of education (highest level achieved):

- **Head of Household**

1. Illiterate	2. Primary	3. Secondary
4. High School	5. Diploma	6. Bachelor
7. Post – graduate		

- **Mother**

1. Illiterate	2. Primary	3. Secondary
4. High School	5. Diploma	6. Bachelor
7. Post – graduate		

5- Who are the persons who reside permanently in this household?

Person #	**Name**	**Relation to Head** 1-Household Head 2- Spouse 3-Son/Daughter 4-Parent 5-Sibling 6- Grandparent 7-Grandchild 8- Son/ Daughter in Law 9- Other Relative 10- Other	**Sex:** 1-Male 2- Female	**Date of Birth** Day /Month/Year
1-				
2-				
3-				
4-				
5-				
6-				
7-				
8-				
9-				
10-				
11-				
12-				
13-				
14-				

If there are more members, please write on the back of the page

6. Are any of these members chronically ill or disabled?

1. Yes ☐ 2. No ☐

If yes, How many	Their ages			

Those disabled and aged over 15: are they able to work?

1. Yes ☐ 2. No ☐

7. Has the household changed in size over the last year?

1. Increased
   - 1 – 1 Due to birth in family ☐
   - 1 – 2 Including extended family that could not afford to live independently ☐
   - 1 – 3 Other ____________________
2. Decreased
   - 2 – 1 Death in the family ☐
   - 2 – 2 Older children move out to attend school or marry ☐
   - 2 – 3 Children sent to live with relatives to ease financial pressure on the family ☐
   - 2 – 4 Children sent to live with relatives other reasons ☐
3. Remained the same ☐

Part 2: Household Income and Spending

8. How many household members are working regularly outside the home?___

Number of Hours	Number of members
More than 35 hours per week	
20 – 34 hours per week	
Less than 20hours per week	

9. Are there people in this household who lost their jobs since 1/10/2000 i.e. since the beginning of the Intifada?

1. Yes ☐ 2. No ☐ **If no go to question no. 11**

If yes, in which sector were they mainly employed? __________________

10. Have job opportunities changed compared to last year ?

1. Yes ☐ 2. No ☐

11. For male interviewees: What is the current daily rate of payment for part – time casual labor for an average able bodied man in your area? ________ NIS

12. For Female interviewees: What is the current daily rate of payment for part – time casual labor for an average able bodied woman in your area ? ________ NIS.

13. Are any of the children less than 15 years of age working outside the home for pay?

1. Yes ☐ 2. No ☐

If yes, How many	Their ages			

14. Do you possess the following items (Count all functioning items):

Item	Number of Items
TV	
Car	
Mobile phone	
Refrigerator	

15. Do you rent for the place in which you live?

1. Yes ☐ 2. No ☐

16. Has the amount of maintenance from all sources ***abroad***, including friends, relatives, groups, zakat, between now and six months ago

1. Increased ☐
2. Decreased ☐
3. Remained the same ☐
4. Not applicable (no remittances from abroad) ☐

17. Has the amount of maintenance from all sources ***in Palestine***, including friends, relatives, groups, zakat, between now and six months ago

1. Increased ☐
2. Decreased ☐
3. Remained the same ☐
4. Not applicable (no remittances from abroad) ☐

18. Has monthly income from all work including informal and part – time jobs changed between now and six months age?

1. Increased ☐
2. Decreased ☐
3. Remained the same ☐
4. Not applicable (no income from any work) ☐

19. Has there been a change in any of your children's ability to attend school this year?

1. Yes ☐ 2. No ☐ 3.N☐(no children in school) ☐

<u>If no or NA, go to question no.21</u>

Numbers of Boys	Numbers of Girls

20. If so, was the change mainly due to:
1. School ceased operations from lack of funds ☐
2. Family lacked money for private school tuition ☐
3. Family lacked money for public school enrollment fees ☐
4. Family lacked money for school supplies ☐
5. Family moved ☐
6. Other _________________ ☐

21. During the Eiad al Adha holiday in February, 2003, did the amount you spent on edieh compared to Eid al Adha, 2002:
1. Increased ☐
2. Decreased ☐
3. Remained the same ☐
4. Not applicable (did not give edieh at euther Eid 2002 or 2003) ☐

22. During Rammadan in 2002, did the number of friends/ relatives invited to iftar to your house compared to during Rammadan 2001:
1. Increased ☐
2. Decreased ☐
3. Remained the same ☐
4. Not applicable (did not invite anyone to house for either Ramadan 2001 or 2002) ☐

23. Did you use any fuel to heat your house this winter?
1. Yes ☐ 2. No ☐

<u>If no, skip to question no.26</u>

24. Has the amount spent on heating the house this year compared to previous years for the same amount of fuel?
1. Increased ☐
2. Decreased ☐
3. Remained the same ☐
4. Not applicable (did not use fuel last winter) ☐

25. If family spent less on heating fuel this year compared to last, was this mainly because:
1. This winter was warmer than normal ☐
2. The family had less money to spend on fuel than normal ☐
3. Family members sent to other places to live ☐
4. The Family had alternative methods (wood,etc) of heating the house ☐
Alternative fuels __________________
5.Other ___________________

26. If the family has owned a car for the last six months, how, has the amount of petrol (gasoline) that you buy each month changed over the last six months?

1. Increased ☐ **If increased, skip to question no.28**
2. Decreased ☐
3. Remained the same ☐ **If same, skip to question no.28**
4. Not applicable (no car in family) ☐ **If NA, skip to question no. 28**

27. If decreased, is this due to:

1. Less money to buy petrol, unable to afford petrol ☐
2. Petrol not available for reasons other than cost ☐
3. Car not functioning ☐
4. Other___________ ☐

Part3: Food Security

28. How often does (did) the household eat a meal with some meat/chicken/fish (either fresh or frozen)

* Interviewers should not prompt respondents*

Frequency	Over the last month	Over the last 6 months
Never		
Less than once per week		
Twice per week		
Three times per week		
More than 3 times per week		

29. In general, has the amount of food the family consumes on a daily basis over the last 6 months:

1. Increased ☐
2. Decreased ☐
3. Remained the same ☐

30. Over the last six months, have you had to do any of the following in order to afford money for food?

Actions	Yes	No	NA
Forego buying medications or paying for treatments for acute or chronic illness			
Paid less or did not pay either electricity, water or gas bill			
Paid less or did not pay rent			
Buy less or did not buy clothes for children when needed			

31. In the past six months, if there have been times when you do not have enough food or money to buy food, how often has your household had to:

Coping Mechanism	Every day	3–6 times per week	1–2 times per week	<once per week	Never	NA
Generally decrease the amount of food consumed by the household						
Rely on less preferred and less expensive foods (frozen, etc)						
Borrow food, or rely on help from friends or relatives (non – agency given food)						
Begin growing food at home						
Killed farm animals you own for food						
Purchase food on credit						
Gather wild food						
Send household members to live elsewhere						
Limit portion sizes at mealtimes						
Restrict consumption of adults so children can eat						
Reduced the number of meals eaten in a day						
Skip entire days without eating						
Sold jewelry, furniture, gold or other household items to purchase food						
Sold livestock, land, vehicles, or asset used to make a living to purchase food						
Visit relatives during mealtimes						
Sell food ration from agencies						

32. If amount of food consumed in the household has decreased in the last six months for other reasons besides lack of money, is it ***mainly*** due to: (chose one)

1. Less food available in the market ☐
2. More difficulty reaching markets, due mainly to (choose one):
   - 2 – 1 Checkpoints or curfew have blocked access to the market ☐
   - 2 – 2 Lack of transportation ☐
   - 2 – 3 Market closed or infrequently open ☐
3. More people in the household to feed than usual ☐
4. Other _____________ ☐
5. Not applicable (has not decreased) ☐

☐

33. Does the household receive food/cash for food item from friends or relatives?

1. Yes ☐ 2. No ☐

If no, skip to no.36

34. What percentage of your total food budget each month comes from friends or relatives?

1. Less than 25% ☐ 2. 25 – 49 % ☐
3. 50 – 74 % ☐ 4. 75 – 100% ☐

35. How has the amount of food/cash for food from friends or relatives changed over the last six months?

1. Increased ☐ Decreased ☐ 3. Remained the same ☐

36. Does the household receive food assistance or food vouchers from any agencies?

1. Yes ☐ 2. No ☐ **If no, skip to no. 44**

37. What percentage of your total food budget each month comes from food assistance or food vouchers?

1. Less than 25% ☐ 2. 25 – 49 % ☐
3. 50 – 74 % ☐ 4. 75 – 100% ☐

38. Which agency is your main source of food assistance (direct food, ration cards or vouchers?

1. UNRWA ☐
2. PARC ☐
3. CRS ☐
4. World Vision ☐
5. Zakat Committee ☐
6. CIIF ☐
7. ICRC ☐
8. PA Ministry of Social Affairs ☐
9. Union ☐
10. Other NGOs________________ ☐
11. Other organizations (not NGOs) ☐

39. What is the content of the food basket from the agency above?

Item	Quantity

40. Do you receive food assistance from any other agencies (check all that apply)

1. UNRWA
2. PARC ☐
3. CRS ☐
4. World Vision ☐
5. Zakat Committee ☐
6. CIIF ☐
7. ICRC ☐
8. PA Ministry of Social Affairs ☐
9. Union ☐
10. Other NGOs________________ ☐
11. Other organizations (not NGOs) ☐

41. How has the amount of food or voucher amount changed over the last six months?

1. Increase d ☐ 2. Decreased ☐ 3. Remained the same ☐

42. Currently, on average, how frequency does the household receive food assistance or vouchers from each agency (check all that apply)?

Agency	> Once per month	Once per month	Once every 2 months	< once every 2 months
UNRWA				
PARC				
CRS				
World Vision				
CHF (Community, Habitat and Finance)				
ICRC				
Zakat Committee				
PA Ministry of social Affairs				
Other NGO1				
Other NGO2				
Other NGO3				
Other Non – NGO organizations 1				
Other Non – NGO organizations 2				

43. On average, how frequency did the household food assistance or vouchers from each agency six months age?

Agency	> Once per month	Once per month	Once every 2 months	< once every 2 months
UNRWA				
PARC				
CRS				
World Vision				
CHF				
ICRC				
Zakat Committee				
PA Ministry of social Affairs				
Other NGO1				
Other NGO2				
Other NGO3				
Other Non – NGO organizations 1				
Other Non – NGO organizations 2				

Part 4 Children, Ages 6 -59 months

If no children ages 6 – 59 months, skip to Part 6

44. Have any children of the household ages 6 -59 months had the following over the last 2 weeks:

Illness	Yes	No	If Yes, Name (s)
Diarrhea (3 or more watery stools in 1 day)			a b
Fever, not eating well, tired			a b
Worm infections			a b
Vomiting 3 or more times in 1 day, (not burping)			a b
Cough, respiratory illness			a b
Other health issues (specify)			a b

45. Have any children of the household ages 6–59 months had increased frequency of health problems over the last year?

1. Yes ☐ 2. No ☐ **If no, skip to no.47**

46. If health is worse, what illnesses /disease have worsened?

Illness	Yes	If Yes, Name (s)
Frequency of diarrhea episodes (3 or more watery stools in 1 day)		a b
Recurrent illness with fever		a b
Chronic worm infection		a b
Frequency of respiratory illnesses, cough		a b
Chronic medical illness		a b
Other health issues (specify)		a b

47. Were any of your children born premature or underweight at birth?

1. Yes ☐ 2. No ☐

If Yes, names	

48. Have there been any deaths of your children ages 6 – 59 months in the last year?

1. Yes ☐ 2. No ☐

Causes	Malnutrition	Accident (car, fall, violence)	Birth Defect	Infection	Respiratory problem	Other
Name(s)						
1.						
2.						
3.						
4.						
5.						

49. Did you ever breastfeed any of your children

1. Yes ☐ 2. No ☐ **<u>If no, go to question no. 59</u>**

Name of child	Current Age of child	For how many months did you breastfeed child (less than 1 month=0)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

<u>Ask the following only if infants in the household 6 – 12 months of age:</u>

<u>If none, skip to Part 5</u>

<u>If more than one child in the household is 6 – 12 months of age, use additional questionnaires. Ask regarding all infants 6 – 12 months of age. If possible, verify with the caregivers of the specific child</u>

50. Are you currently breastfeeding (NAME____________)?

1. Yes ☐ 2. No ☐

<u>If no, go to question no. 54</u>

51. How often did you breastfeed (NAME____________) last night, from sunset to sunrise?______________

52. How often did you breastfeed (NAME____________) during the day yesterday (from sunset to sunrise)?______________

53. Did You give a bottle to (NAME_______) during the last 24 hours?

1. Yes ☐ 2. No ☐ 3. NA ☐

54. At what age did you start giving the following foods to (NAME_______?

Foods	Months of Age								
	<4	5	6	7	8	9	>9	Not started	Don't Know
Liquid other than milk									
Cheese									
Semi – solids/mashed									
Solids									
Meat									
Fish									
Eggs									
Fruits									
Vegetables									
Food prepared with oils, fat									

55. What other foods or fluids did you give your child ho is breastfeeding during the last 24 hours? (Record all answer)

1. Formula ☐
2. Milk (other than breast milk) ☐
3. Tea ☐
4. Water ☐
5. Other fluids ☐
6. Vitamins or medicine in drops or syrup ☐
7. Semi – solid (mashed) or solid food ☐
8. Nothing ☐

56. How many times did (Name_________) eat solid or semisolid (mashed) food during the last 24 hours?

Number: __________

57. Was yesterday's feeding typical of the way (Name :________) is fed?

1. Yes ☐ 2. No ☐

Part 5: Nutritional Status, children 12 – 59 Months

Interviewer read: Now, I will ask some questions about the current food situation of the child. We will ask about the food consumed **Yesterday** by youngest child, ages 12 – 59 months.

24 Hour Food Intake Record (Child under 5)

Interviewer read: Now, I will ask for details about everything the **Youngest** child ate and drank yesterday.

(If asked why from 4:00-read “Previous studies show that 4:00 it is possible to distinguish between one day (24hours) to the next day (24 hours).

	What did you eat from 4:a.m yesterday ____until 4:00 a.m today” **Specify everything you ate and drank in the house and outside of the house, including sweets and snacks, tea, soft drinks, etc.** **Interviewer: Write each item in a separate row, and when the interviewee has finished continue to next question**		What time did you begin to eat/drink the ______?	**Card no. 1** **Where did you eat?** **1.at home (home cooked food)** **2.home (ready made/bought food)** **3.At School- home prepared food** **4. At school- ready made/bought food** **5.At school-cafeteria, dinning room** **6.Resturant** **7. other(Specify)**
	The Quick List	✓		**Which meal?** **1.Breakfast** **2.Morning snack** **3. Breakfast+ Lunch(Brunch)** **4.Lunch** **5.Afternoon Snack** **6.Lunch/Dinner combined** **7.Dinner** **8.Late night snack** **9.other (specify)**
A				
B				
C				
D				
E				
F				
G				
H				
I				
J				
K				
L				
M				
N				
O				
P				
Q				
R				
S				
T				

Interviewer read: there are foods and drinks which people may forget they ate or drank. Try to remember if you forgot to mention any of these foods: hot drink, cold drink, sweets, salty snacks, fruit, vegetables, bread, water, small foods given to the child outside of regular mealtimes by others.

Interviewer read: I would now like to ask you for additional details regarding the food and drinks that you mentioned. I will ask "where did the child eat" and "which meals was it ". If you remember other foods, tell me. When I ask you about the quantity the child ate or drank, you can use the examples I suggest, the dishes in your house or the information on wrapper /packet

Food /Drink description:

To the interviewer: Transfer from the quick List the item letter to column 1, the hour to colum2, and name to column 5. Mark ✓ on the Quick list in the column near the item you've copied and move to columns 3 and 4 using card .

Item	Time	Where did you eat/drink this item?	What meal was it?	Item name	Food/drink description	What quantity did you eat/drink?
1	2	3	4	5	6	7
					1	
					2	
					3	
					4	
					5	
					6	
					7	
					8	
					9	
					10	
					11	
					12	
					13	
					14	
					15	
					16	

Was the amount (Name ____________) ate yesterday similar to the amount he/she usually eats?

1. Yes, the same ☐ **If yes, skip to no. 61**
2. No, yesterday he/she ate less than usual ☐
3. No, yesterday he/she ate more than usual ☐
4. Don't Know ☐ **If don't know, skip to no. 61**

What is the main reasons (NAME ____________) ate a different amount to that he/she usually eats?

1. Illness ☐
2. Vacation, trip, travel. ☐
3. Lack of time ☐
4. Religious holiday ☐
5. Family celebration, social occasion ☐
6. Stress, boredom, depression ☐
7. Didn't feed child for health reasons ☐
8. Other, specify ☐

60. Interviewer: "I would like to measure the height/length, weight and Hemoglobin Level of all the children in the household ages 6 – 59 months. This will give me an idea of their nutritional status"

#	Person Number	Date of Birth Day /Month/Year	Height (cm)	Weight (Kg)
1-		____/____/_____		
2-		____/____/_____		
3-		____/____/_____		
4-		____/____/_____		
5-		____/____/_____		

Part 6:

61.A For the research: From your general observations about the family nutrition and the family economic situation select one answer of the following:

1. Good nutrition and good house condition ☐
2. Good nutrition and bad house condition ☐
3. Bad nutrition and good house condition ☐
4. Bad nutrition and bad house condition ☐

B. hygiene	Yes	No
1. Utensils are clean and free from dust/dust/smell		
2. There is no evidence of the presence of mousse or insects in the house		
3. Places and cans used for storing food is suitable for safe storage		
4. The household cleanliness is suitable		

Coordinator Summary

The questionnaire arrived at the Operational Research Laboratory (ORL) on ___/___ /____.
Entered by: ___________ at ____;____
Checked: ___ Needs Correction "Yes__ No___
Interviewer's corrections returned on date: ___/___ /____.
Other corrections needed Yes___ No____
Final Questionnaire entry date: __/__/___ by: _________.
Entry completed: Yes _____ No ______

Annex 2:Nutritional Assessment Household Questionnaire 2002

File No. ☐ ☐ ☐ ☐

District ______________________ Locality: ____________

Name of Head of Household_________________ Phone: _____________
Name of Interviewee: __________________
Interviewer: _____________ Code: ______________

Report of Interview
Date of Interview:_____/____/______ Day of Interview 1 2 3 4 5 6 7
Time Started ___:____ Time Finished___:____

Table of Visits	Date
First Visit	____/____/___
Second Visit	____/____/___
Third Visit	____/____/____

INFORMED CONSENT

Hello, my name is ____________________ and I am working with Al Quds University. We would very much appreciate your participation in this survey. This survey about Nutritional Status of preschool – aged children and their mothers, it will provide important information for the Ministry of Health and international agencies to plan for Heath and Nutrition Services. I would like to ask you about nutrition, the nutrition of your children. I would also like to measure the weight and height of your children between 6 months to 5 years of age. The survey usually takes 30 – 45 minutes to complete. Whatever information you provide will be kept strictly confidential and will not be shown to other persons.

Participation in this survey is voluntary and you can choose not to answer any individual question or all of questions. However, we hope that you will participate in this survey since we believe your views are extremely important.

At this time, do you want to ask me anything about the survey? Y N
May I begin the Interview now? Y N
Signature of Interviewee: _______________ Date: ___/____/____
Respondent (s) agree (s) to be interviewed: Y N

Part I: Household Demographic

1- Who are the persons who reside permanently in this household?

Person #	Name	**Relation to Head** 1-Household Head 2- Spouse 3-Son/Daughter 4-Parent 5-Sibling 6- Grandparent 7-Grandchild 8- Son/Daughter in Law 9- Other Relative 10- Other	**Sex:** 1-Male 2- Female	**Date of Birth** Day /Month/Year
1-				
2-				
3-				
4-				
5-				
6-				
7-				
8-				
9-				
10-				
11-				
12-				
13-				
14-				

2- Household Income:

1. Less than 300 JD	2. 300 – 600 JD	3. 601 – 900 JD
4. 901 – 1200 JD	5.1201 – 1800 JD	6. More than 1800 JD
7. Without work	8. Don't know	

3- Head of Household Education:

1. Illiterate	2. Primary	3. Secondary
4. Diploma	5.Bachelor	6. Post – graduate
7. Others		

4- Mother Education:

1. Illiterate	2. Primary	3. Secondary
4. Diploma	5.Bachelor	6. Post – graduate
7. Others		

Part 2: Nutritional Status, children 12 – 59 Months

Interviewer read: Now, I will ask some questions about the current food situation of the child. We will ask about the food consumed **Yesterday** by youngest child, ages 12 mos. – 59 months.

24 Hour Food Intake Record (Child under 5)

Interviewer read: Now, I will ask for details about everything the **Youngest** child ate and drank yesterday.
(If asked why from 4:00-read "Previous studies show that 4:00 it is possible to distinguish between one day (24hours) to the next day (24 hours).

	What did you eat from 4:a.m yesterday ____until 4:00 am today" **Specify everything you ate and drank in the house and outside of the house, including sweets and snacks, tea, soft drinks, etc.** **Interviewer: Write each item in a separate row, and when the interviewee has finished continue to next question**		What time did you begin to eat/drink the ______?	**Card no. 1** **Where did you eat?** **1.at home (home cooked food)** **2.home (ready made/bought food)** **3.At School- home prepared food** **4. At school- ready made/bought food** **5.At school-cafeteria, dinning room** **6.Resturant** **7. other(Specify)**
	The Quick List	✓		**Which meal?** **1.Breakfast** **2.Morning snack** **3. Breakfast+ Lunch(Brunch)** **4.Lunch** **5.Afternoon Snack** **6.Lunch/Dinner combined** **7.Dinner** **8.Late night snack** **9.other (specify)**
A				
B				
C				
D				
E				
F				
G				
H				
I				
J				
K				
L				
M				
N				
O				
P				
Q				
R				
S				
T				

Interviewer read: there are foods and drinks which people may forget they ate or drank. Try to remember if you forgot to mention any of these foods: hot drink, cold drink, sweets, salty snacks, fruit, vegetables, bread, water, small foods given to the child outside of regular mealtimes by others.

Interviewer read: I would now like to ask you for additional details regarding the food and drinks that you mentioned. I will ask "where did the child eat" and "which meals was it ". If you remember other foods, tell me. When I ask you about the quantity the child ate or drank, you can use the examples I suggest, the dishes in your house or the information on wrapper /packet

Food /Drink description:

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1	2	3	4	5	6	7
					1	
					2	
					3	
					4	
					5	
					6	
					7	
					8	
					9	
					10	
					11	
					12	
					13	
					14	
					15	
					16	

Was the amount (Name ____________) ate yesterday similar to the amount he/she usually eats?

1. Yes, the same (If Yes, skip to measurements)
2. No, yesterday he/she ate less than usual
3. No, yesterday he/she ate more than usual
4. Don't Know (If do not know, skip to measurements).

What is the main reasons (NAME _____________) ate a different amount to that he/she usually eats?

1. Illness 2. Vacation, trip, travel.
3. Lack of time 4. Religious holiday
5. Family celebration, social occasion 6. Stress, boredom, depression
7. Didn't feed child for health reasons 8. Other, specify:___________

Part 3: Nutritional Status Measurements

Interviewer: "I would like to measure the height/length, weight and Hemoglobin Level of all the children in the household ages 6 – 59 months. This will give me an idea of their nutritional status"

#	Person Number	Date of Birth Day /Month/Year	Height (cm)	Weight (Kg)	Hb Test	Wt/Ht
1-						
2-						
3-						
4-						
5-						

Coordinator Summary

The questionnaire arrived at the Operational Research Laboratory (ORL) on ___/___ /____.
Entered by: ___________ at ____;____
Checked :___ Needs Correction " Yes__ No___
Interviewer's corrections returned on date: ___/___ /____.
Other corrections needed: Yes___ No____
Final Questionnaire entry date:__/__/___ by: _________.
Entry completed : Yes _____ No ______