

**Public Health / School of Public Health**

**Deanship of Graduate Studies**

**Description of the Nutritional Status of  
Childbearing Women and Children under five among  
Palestinian Bedouins in the Jordan Valley**

**By**

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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 institute

**Signed : Dr. Khaled Al-Rai**

**Date : 5<sup>th</sup> June, 2005**

# **Dedication**

To all people dealing with human health,  
interested in development of  
our Palestinian population

To all of my Colleagues

To my wife , my children and to all  
my brothers and sisters with love and respect.

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# Abstract

## **Background:**

Nutritional Status refers to the state of health, produced by the balance between requirement and intake of nutrients. All deviations from adequate nutrition, including undernutrition and overnutrition known as Malnutrition . Morbidity and mortality during the first three years of life are a major health problem in developing countries and are recognized to be influenced by the nutritional status Puffer et al., 1973; Pelletier et al., 1993; WHO 1995; Pinstруп-Andersen, 1999).

Undernutrition is widely prevalent in all areas of the world, however the extent and depth of undernutrition is predominant in developing world , where about 800 million people do not have access to sufficient food. The major causes of undernutrition in developing countries are lack of money to buy food as well as insufficiency of food production. Moreover, it is widely accepted that income growth helps improve both food demand and nutritional outcomes . Worldwide anemia (which is one form of malnutrition) is considered as a commune public health problem , it is an endemic problem for all classes of the population. Anemia affects 2.2 billion individuals in the world, half of them are estimated to have iron deficiency(WHO – 1991). Anemia still affects over 50% of pregnant women and up to 60% of pre-school children (UNICEF ESARO, 1998).

On the other hand, malnutrition arises from excess of food and can cause overweight & obesity which represent a risk factors for many chronic diseases. The WHO reported that obesity has become a pandemic, and it is today's principal neglected public health problem.

In the Palestinian Territories (WB and GS) two recent nutritional surveys (PCBS and JHU / AQU, 2002) were conducted and outlined the presence of severe malnutrition among Palestinian population at large. However, malnutrition in the Bedouin community was not addressed specifically in either of these studies. The Palestinian Bedouin community in the Jordan Valley who are living under the same circumstances, and also deprived of almost all essential services, are expected to suffer more severe nutritional problems.

**Aim:**

Therefore , the study aims to assess and explore the nutritional and health status of the Palestinian Bedouins in Jordan Valley in comparison with their neighbors Refugees who have available health services.

**Objectives:**

(1) To outline and clarify the magnitude of malnutrition and nutritional related problems among Bedouin living in Jordan Valley by comparison with Refugees living in the same area. (2) To determine the proportion of anemia among non-pregnant women (15 – 49 years) by measuring blood hemoglobin. (3) To determine the proportion of malnutrition (undernutrition or overnutrition) among non-pregnant women (15-49 years) as determined by Body Mass Index ( BMI). (4) To determine the proportion of the undernourishment spectrum among children aged 0-59 months determined by stunting, wasting and underweight. (5) To investigate the possible variables associated with malnutrition among Bedouins. (6) To establish a baseline document to assist in future evaluation and monitoring of the nutritional status (NS) of Bedouins in the Jordan Valley .

**Methods:**

The study included 608 women of whom 310 were Bedouins and 298 were refugees in the reproductive age (15-49 years). Ninety four women were pregnant and were excluded from the analysis. Among remainder 514 non-pregnant women 258 (50.2 %) Bedouins and 256 (49.8% ) refugees. Also, a total number of 594 children under 5 years were involved, of whom 309 (52 %) were Bedouins and 285 (48 %) were Refugees.

During field visits the study questionnaire was completed by in face to face interviews of the participating women, anthropometric measures (weight and height) were taken for women and children, venous blood samples were collected only from women for Hb determination using a Cell Counter. The fieldwork started between November 2001 and February 2002, it was interrupted (due to the severe political situation ) and then was completed between October 2002 and November 2002. The computer software SPSS was used for data entry and analysis.

**Results:**

The mean weight ( $60.83 \text{ Kg} \pm 13.83$ ) and mean height ( $1.55 \text{ m} \pm 0.55$ ) for the 251 Bedouin women were significantly lower ( $P < 0.05$ ) than the mean weight ( $69.83 \text{ Kg} \pm 17.22$ ) and mean height ( $1.58 \text{ m} \pm 0.58$ ) for the 256 refugees. Furthermore, the mean BMI of Bedouin women ( $25.15 \text{ Kg} / \text{m}^2 \pm 5.79$ ) was significantly lower ( $P < 0.05$ ) than the BMI of refugees ( $27.74 \text{ Kg} / \text{m}^2 \pm 6.53$ ). According to their BMI, the 514 non-pregnant women were classified into underweight (4.5 %), normal weight (44 %), overweight (26 %) and obese (25 %). The percent of underweight among Bedouins (6%) was twice that among refugees (3 %). On the contrary, the percentage of obesity among refugees (32 %) was almost twice the percentage among Bedouins (18 %). Furthermore, the percentage of overweight and obesity combined was among Bedouins (41%) much lower than among Refugees (62 %).

The mean hemoglobin ( $11.85 \pm 1.32$ ) for the 256 Bedouins was equal to mean hemoglobin ( $11.84 \pm 1.21$ ) for the 255 refugees. According to the level of hemoglobin, 45% of all non-pregnant women (45 % of the Bedouins and 46% of the Refugees) were anemic ( $\text{Hb} < 12 \text{ g\%}$ ). Mild anemia was demonstrated in 82 % of anemic Bedouins and 83 % of anemic refugee women. Moderate anemia was found in 16% of anemic Bedouins and 17 % of anemic refugee women. However, severe anemia was seen only in 2 % of anemic Bedouins.

The mean weight for the Bedouin children ( $11.66 \text{ Kg} \pm 3.44$ ) was not significantly different ( $P > 0.05$ ) from the mean weight ( $12.19 \pm 3.97$ ) for the 258 Refugees. Similarly, the mean height ( $83.43 \text{ cm} \pm 14.29$ ) for the Bedouin children was not significantly different ( $P > 0.05$ ) from the mean height ( $85.17 \text{ cm} \pm 14.79$ ) for Refugees.

Among all children, stunting was found to be the most prevalent form of malnutrition. About 19.4 % of the 594 children were stunted, 6.9 % were underweight and 3 % were wasted. The percentage of stunting among Bedouins (21 %) was higher than among refugees (17 %). Similarly, underweight among Bedouins (7.7 %) was higher than among Refugees (5.9 %). On the other hand, wasting among Bedouins (2.3 %) was lower than among refugees (3.8 %).

Stunting was slightly higher among girls than boys in all children (20% vs 18%), in Bedouins (22% vs 21%) and in refugees (19% vs 15% respectively).

**Conclusion:**

This study shed some light on the nutritional status of Bedouin women and children. It showed that anemia is a severe problem of non-pregnant Bedouin women in reproductive age. Unexpectedly, it also demonstrated that overweight and obesity are remarkably high among these women despite their lifestyle. Furthermore, stunting among Bedouin children under 5 was relatively high. This indicates that actions towards improving women and child nutrition should always be integrated.

The researcher concludes that Bedouin community in the Jordan Valley deserves more attention from health providers to improve their nutritional status. It also calls upon health researchers to deeply investigate the underlying causes of malnutrition in the Bedouin community in the Jordan Valley.

## الخلاصة

إن الحالة الغذائية تشير إلى الحالة الصحية الناجمة عن وجود التوازن ما بين المطلوب والمأخوذ فعلاً من المواد الغذائية . إن الخروج عن ذلك سواء كان بالزيادة أو النقصان يؤدي إلى ما يعرف بسوء التغذية . إن انتشار الأمراض والوفيات لدى الأطفال دون سن الثالثة في الدول النامية هي من اعظم المشاكل الصحية المرتبطة بالوضع الغذائي . ومن المعروف أن نقص التغذية منتشر في جميع دول العالم ولكنه بشكل كبير في الدول النامية حيث أن هنالك أكثر من 800 مليون شخص يعانون من نقص في احتياجاتهم الغذائية والسبب الرئيسي يعود إلى الفقر والذي يحول دون شراء المواد الغذائية ، هذا إلى جانب قلة الإنتاج الغذائي حيث انه من المعروف أن زيادة الدخل يساعد على تحسين الوضع الغذائي بشكل عام .

يعتبر فقر الدم ( والذي يعد أحد مظاهر سوء التغذية ) مشكلة عالمية ومن المشاكل الصحية العامة في جميع شرائح المجتمع، حيث انه منتشر بشكل كبير في دول العالم إذ أن هناك حوالي 2.2 بليون شخص يعانون منه ، مع العلم بان نصفهم يعانون من نقص في الحديد على أقل تقدير . ولقد دلت الدراسات على انه أكثر من 50% من النساء الحوامل وحوالي 60% من الأطفال ما قبل المدرسة ما زالوا يعانون من فقر الدم .

بالمقابل فان سوء التغذية الناجم عن الزيادة في الغذاء قد يؤدي إلى الزيادة في الوزن . أو حتى إلى السمنة ، والتي تشكل عامل خطر لكثير من الأمراض المزمنة . وبناء على ما نشرته منظمة الصحة العالمية، فان السمنة قد أصبحت منتشرة على مستوى عالمي وهي تشكل اليوم واحدة من أهم مشاكل الصحة العامة المهمة .

إن الدراسات التي أجريت حديثاً ( 2002 ) من قبل الجهاز المركزي للإحصاء الفلسطيني، وجامعة القدس بالاشتراك مع جامعة جونز هوبكنز في الأراضي الفلسطينية ( الضفة الغربية و قطاع غزة ) دلت على وجود مشكلة غذائية لدى الشعب الفلسطيني بشكل عام ، ولكن المشكلة الغذائية وسوء التغذية لدى المجتمع البدوي لم يتم التطرق لها بشكل خاص في أي من هذه الدراسات. بما أن المجتمع البدوي الفلسطيني الذي يقطن في وادي الأردن ويعيش أفراده في ظل نفس الظروف المحيطة بالشعب الفلسطيني عامة، بالإضافة إلى النقص الشديد في الخدمات الأساسية المقدمة له، فانه من المتوقع أن تكون الحالة الغذائية لهذا المجتمع أسوأ مما لدى بقية الشعب الفلسطيني .

ترمي هذه الدراسة إلى الكشف عن الوضع الغذائي والصحي لدى السكان البدو الفلسطينيين في وادي الأردن ، بالمقارنة مع جيرانهم اللاجئين والذين يتمتعون بتوفر الخدمات الصحية عن طريق وكالة الغوث بشكل خاص . إن من الأهداف العامة لهذه الدراسة هو توضيح حجم المشكلة الغذائية ، والمشاكل المتعلقة بها لدى السكان البدو في وادي الأردن مقارنة بجيرانهم اللاجئين الذين يسكنون في نفس المنطقة ، هذا بالإضافة إلى معرفة نسبة الدم لدى النساء في سن الإنجاب من خلال قياس نسبة الهيموغلوبين ، ومعرفة نسبة سوء التغذية ( بالزيادة أو النقصان ) لدى هؤلاء النساء . كما أن من أهدافها هو معرفة نسبة الأطفال دون الخامسة الذين يعانون من سوء التغذية لدى السكان البدو وبالتالي إيجاد وثيقة أساسية للعمل من اجل تقييم ومراقبة الوضع الغذائي لدى السكان البدو في وادي الأردن .

الدراسة ضمت (608) امرأة من بينهم (310) امرأة بدوية و (298) امرأة لاجئة في سن الإنجاب (15-49 عاماً) . كان من بين هؤلاء (94) حامل استثنائيين من التحليل . أما من بين البقية (514 امرأة) هناك 258 (50.2%) امرأة بدوية و256 (49.8%) امرأة من اللاجئين .  
الدراسة شملت كذلك (594) طفل دون الخامسة، من بينهم 309 (52%) طفلاً بدوياً ، و 285 (48%) طفلاً من اللاجئين .

خلال الزيارة الميدانية تم تعبئة البيانات الخاصة بالدراسة من خلال المقابلات الشخصية مع المشاركين ، وقياس الطول والوزن لكل من الأمهات والأطفال ، هذا بالإضافة إلى أخذ عينات من دم النساء المشاركات لفحص تركيز الهيموغلوبين باستعمال جهاز (Cell Counter) .  
الدراسة بدأت في شهر تشرين أول عام 2001 وحتى شباط 2002، حيث انقطعت الدراسة بعد ذلك بسبب الاغلاقات الشديدة وقد أكملت في الفترة ما بين شهر تشرين أول وحتى نهاية تشرين ثاني 2002 .  
وقد تم استعمال البرنامج الاحصائي (SPSS) لادخال وتحليل البيانات .

اظهرت نتائج البحث بان معدل الأوزان كان (60.83 كغم) ومعدل الأطوال (1.55 م) لدى النساء البدويات والتي تدل وبشكل إحصائي على أنها أقل من معدل الأوزان (69.83 كغم) والأطوال (1.58) متر لدى النساء اللاجئات . كذلك كان مؤشر الوزن (BMI) فانه لدى نساء البدو (25.15) أقل وبشكل إحصائي مما لدى اللاجئات (27.74) . بناءً على مؤشر الوزن (BMI) تم تصنيف جميع النساء المشاركات في الدراسة من غير الحوامل إلى أربع فئات : الفئة الأولى وتشمل اللواتي يعانين من نقص في الوزن، وتشكل ما نسبة (4.5%) من مجموع النساء المشاركات. الفئة الثانية وتشمل اللواتي أوزانهن طبيعية وتشكل 44% . الفئة الثالثة، وتشمل اللواتي يعانين من زيادة في الوزن وتشكل ما نسبته 26% . الفئة الرابعة وتشمل اللواتي يعانين من السمنة وتشكل ما نسبته 25% .

أن نسبة اللواتي يعانين من نقص في الوزن بين النساء البدويات (6%) كانت ضعف النسبة بين النساء اللاجئات (3%)، في حين أن اللواتي يعانين من السمنة من بين النساء اللاجئات (32%) بلغت تقريباً مثلي النسبة بين النساء البدويات (18%) . أما نسبة اللواتي يعانين من زيادة الوزن والسمنة معاً، فقد كانت أقل بكثير بين النساء البدويات (41%) مقارنة بالنساء اللاجئات (62%) .

دلت النتائج على أن معدل تركيز الهيموغلوبين كان (11.85غم) لدى نساء البدو ومساوياً لما كان لدى النساء اللاجئات (11.84غم) . وقد أظهرت النتائج أن نسبة فقر الدم لدى النساء بشكل عام كانت 45% ، (45% لدى البدو و 46% لدى اللاجئيين) . وأن (82%) من حالات فقر الدم بين البدو و (83%) من حالات فقر الدم بين اللاجئيين هي من النوع البسيط . أما فقر الدم المتوسط الشدة، فقد شكل ما نسبة (16%) من الحالات بين نساء البدو و (17%) من الحالات بين نساء اللاجئيين . وشكل فقر الدم الشديد ما نسبته (2%) من جميع الحالات، وهذا النوع من فقر الدم كان موجوداً فقط لدى البدو .

لقد دلت نتائج الدراسة حول الأطفال بان معدل أوزان الأطفال البدو كان (11.66كم) ولا يختلف كثيراً عن معدله لدى الأطفال اللاجئيين (12.19 كغم) . كذلك كان معدل متوسط الأطوال (83.43سم) لدى الأطفال البدو و (85.17 سم) لدى الأطفال اللاجئيين .

أما بالنسبة لمؤشرات سوء التغذية لدى الأطفال ، فقد أظهرت النتائج بان نسبة التقزم كانت الأعلى (19.4%) مقارنة بنسبة نقص الوزن (6.9%) وبنسبة التتحف (3%) . ولقد كان واضحاً بان نسبة

التقرزم لدى الأطفال البدو ( 21%) أعلى منها لدى الأطفال اللاجئيين ( 17%) ، وكذلك نقص الوزن (7.7%) لدى البدو كان أعلى منها ( 5.9%) لدى اللاجئيين . في حين أن التنحف كانت نسبته أعلى لدى اللاجئيين (3.8%) منه لدى البدو ( 2.3%) . أما فيما يتعلق باختلاف جنس الأطفال فقد أظهرت الدراسة بان نسبة التقرزم لدى جميع البنات (20%) أعلى بقليل مما هو لدى جميع الأولاد ( 18%)، حيث بلغت هذه النسبة (22%) لدى البنات البدويات مقابل ( 21%) لدى الأولاد البدو، في حين بلغت هذه النسبة ( 19%) لدى البنات اللاجئات مقابل (15%) لدى الأولاد اللاجئيين.

وفي الختام فان هذه الدراسة قد ألفت بعض الضوء حول الوضع الغذائي لدى السكان البدو نساء وأطفالا ، وقد أظهرت بان فقر الدم يشكل نسبة عالية ومشكلة خطيرة لدى النساء غير الحوامل في سن الإنجاب. كذلك فقد بينت هذه الدراسة ومن غير المتوقع بان نسبة الزيادة في الوزن والسمنة كانت عالية جدا وبشكل واضح لدى تلك الفئة من النساء بالرغم من طبيعة حياتهن . كما أنها قد أظهرت بان نسبة التقرزم لدى الأطفال دون الخامسة كانت عالية نسبيا.

وبناء على ما تقدم من نتائج البحث فان هناك حاجة ماسة ودائمة لاتخاذ الخطوات اللازمة لتحسين

الوضع الغذائي لكل من الأطفال والنساء .

كما ان المجتمع البدوي بخصوصيته يستحق عناية اكثر من قبل مقدمي الرعاية الصحية لتحسين وضعهم الصحي والغذائي كما انه يستحق تعمق الباحثين في دراسة الأسباب الحقيقية لسوء التغذية لدى السكان البدو في واد الأردن .

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## List of abbreviations

- PCBS ..... Palestinian Central Bureau of Statistics
- UNRWA..... United Nation Relief and Work Agency For Palestinian  
Refugees in the Middle East
- NGO ..... Nongovernmental Organization
- JV ..... Jordan Valley
- WB ..... West Bank
- GS ..... Gaza strip
- BMI ..... Body Mass Index
- Wt ..... Weight
- Ht ..... Height
- Kg ..... Kilogram
- M<sup>2</sup> ..... Meter Squar
- CBC ..... Cell Blood Count
- Hb ..... Hemoglobin
- MCV ..... Mean corpuscular Volume
- MCH ..... Mean Corpuscular Hemoglobin
- MCHC ..... Mean Corpuscular Hemoglobin Concentration
- WHO ..... World Health Organization.
- NHANES ..... National Health and Survey.
- SD ..... Standard Deviation (SD)
- USDA ..... United States Department of Agriculture's.
- USAID ..... United States of America
- LBW ..... Low Birth Weight.
- NS ..... Nutritional Status
- ARIJ ..... Applied Research Institute-Jerusalem
- ICDDR ..... International Center of Diarrhea Disease Research
- NCHS ..... National Center for Health Statistics
- EMRO ..... Eastern Mediterranean Region Office
- IUD ..... Intra-Uterine Contraceptive Device.
- M / F ..... Male / Female

**Public Health / School of Public Health**  
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**Description of the Nutritional Status of  
Childbearing Women and Children under five among  
Palestinian Bedouins in the Jordan Valley**

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# Chapter 1

## Introduction

### 1.1 General Background

Food is essential for good health. It provides energy and nutrients required for building body tissues. At the global level, there is enough food for everyone, but in fact many people do not have access to sufficient food and don't get enough of the right food to eat. About 800 million people (one-sixth of the developing world's population) don't have access to sufficient food to lead healthy and productive lives. Of these food-insecure people, 280 million live in South Asia, 240 million in East Asia, 180 million in Sub-Saharan Africa, and the rest in Latin America, Middle East, and North Africa (FAO, 1999).

It is important that food should be taken adequately and in balance to face body needs. Adequate food is essential for growth and development during the human life cycle, especially in the period of rapid growth such as in infancy, preschool age, adolescence and in child-bearing age for women (Martorell and Scrimshaw 1995; Pinstруп-Andersen, 1999).

In developing countries, where the population is large, growth rate is high and rapid, their needs grow rapidly and is greater than the degree of development. Such conditions make food consumption not adequately nor regularly taken during the year. For instance, in 1999 the Ethiopian Ministry of Economic Development and Cooperation reported that 50 % of the Ethiopian population is living below the poverty line and cannot meet its daily minimum nutritional requirement of 2200 calories (MOPED, 1999). In these countries children face circumstances that are different from those faced in developed countries, where there is a high standard of living, and where food is available permanently all the time. Indeed, several studies concluded that high morbidity and mortality during the first three years of life are major health problems in developing countries and are recognized to be influenced by the nutritional status (Puffer et al., 1973; Pelletier et al., 1993; WHO 1995; Pinstруп-Andersen, 1999).

Food consumption affects the nutritional status of the population. Beck (1985) defined Nutritional Status (NS) as the state of health, produced by the balance

between requirement and intake of nutrients. So for a healthy community and well developed generation, balanced food is on the top of their requirement.

Malnutrition refers to all deviations from adequate nutrition, including undernutrition and overnutrition resulting from inadequacy, or excess of food relative to need, respectively. Malnutrition (undernutrition) is widely prevalent in all areas of the world, however the extent and depth of malnutrition is predominant in developing world, where about 800 million people do not have access to sufficient food (FAO, 1999). Malnutrition arises from deficiencies of specific nutrients or from diets based on wrong kinds or proportions of foods. Goiter, scurvy, anemia and xerophthalmia are forms of malnutrition caused by inadequate intake of iodine, vitamin C, iron, and vitamin A, respectively.

Two types of malnutrition (under nutrition) were identified by Rudman, 1977,(as cited in Abdelnour, 1991, pag.8) : The first one is due to inadequate supply of food that contain the essential elements for growth and development which was considered to be primary malnutrition. The second type was due to illness or medical treatment and was considered to be secondary in origin. The major causes of malnutrition (under nutrition) in developing countries are lack of money to buy food (Deinard et al., 1986; Connolly, 1985), as well as insufficiency of food production (Aubert, 1986). Increasing food availability contributes to reduced poverty and malnutrition (Haddad et al., 1997). Moreover, it is widely accepted that income growth helps improve both food demand and nutritional outcomes (Alderman et al., 2000).

Worldwide anemia, one form of malnutrition, is considered as a common public health problem, it is an endemic problem for all classes of the population ( *WHO, 1991*). However iron deficiency is the predominant cause of anemia (Gillespie & Johnston, 1998).

Various authors have defined anemia differently. Thus, it is defined as a state in which the quantity and quality of circulating red cells are reduced bellow the normal level (De Maeyer and Adiels- Tegman, 1985), or as a condition of low circulating hemoglobin with serious and even life-threatening consequences (Gillespie, 1998).

Also it was defined in a statistical sense, as a state in which an individual's hemoglobin concentration fallen below a threshold lying at two standard deviations

below the median for a healthy population of the same age, sex, and stage of pregnancy (WHO/UNICEF/UNU 1997) as shown in Table 1/1.

**Table 1.1 Hemoglobin (Hb) and hematocrit (Hct) levels below which anemia is judged to be present.\***

Group/age/physiologic status	Critical level	
	Hemoglobin (g/dL)	Hematocrit (%)
Children		
6 months to 5 years	11.0	33
5-11 years	11.5	34
12-13 years	12.0	36
Men	13.0	39
Women		
Nonpregnant	12.0	36
Pregnant women	11.0	33
Severe anemia	7.0	—
Very severe (life threatening)	4.0	—

- Source: WHO/UNICEF/UNU (1997), adapted from WHO (1968).

Anemia can be classified according to red cell morphology and by pathphysiologic mechanism \*<sup>1</sup>.

- **Morphological classifications** include those based on size (MCV, mean corpuscular volume), and coloration by hemoglobin (MCHC, mean corpuscular hemoglobin concentration)\*<sup>2</sup>.

According to the *size of the red cell* anemia could be normocytic if the RBCsize is normal (MCV 80-100 fL), macrocytic if the size is above normal (MCV > 100 fL), or microcytic if the size is below normal (MCV < 80 fL) , while according to the coloration by hemoglobin, hemoglobin content can be normal (normochromic) or (hypochromic) with low content of hemoglobin. (Robert et al., 1998).

- **Mechanisms (Pathphysiology) of anemia** include\*<sup>3</sup> :

- ❖ Anemia due to blood loss (post hemorrhagic anemia), loss of red blood cells due to massive or prolonged bleeding.

\*<sup>1</sup> Available: <http://www.mcl.tulane.edu/classware/pathology/Krause/Anemias/Anemias.html>.

\*<sup>2</sup> Available: <http://www.mcl.tulane.edu/classware/pathology/Krause/Anemias/Anemias.html>.

\*<sup>3</sup> Available : <http://www.healthsquare.com/mc/fgmc9005.htm>

- ❖ Anemia due to increased red cell destruction (hemolytic anemia) premature destruction of red blood cells.
- ❖ Anemia due to decreased RBC production includes :
  - Aplastic anemia: Decreased production of blood cells due to declining function in the bone marrow, where the cells are manufactured
  - Anemia due to micronutrient deficiencies such as :
    - **Iron - deficiency anemia:** Reduced production of red blood cells due to a shortage of iron which is the commonest form.
    - **Pernicious anemia:** Disruption of red blood cell production due to inadequate absorption of vitamin B<sub>12</sub>
    - **Folic acid deficiency :** A shortage of red blood cells due to lack of folic acid in the diet .

On the other hand, malnutrition arises from excess of food can cause overweight and obesity which represent risk factors for many chronic diseases such as diabetes, cardiovascular diseases, hypertension, stroke, and cancer ( Kushner, 1993; Must et.al.,1992; WHO, 1998a ).

WHO reported that obesity has become a pandemic, and it is today's principal neglected public health problem (WHO, 1998a), and should attract the attention of health professionals.

## 1.2 Assessment of the nutritional status

In any community, assessment of nutritional status can give the information needed for the detection and control of nutritional related disease, also it helps for further planning specially for policy makers. There are two possible ways to assess the adequacy of food and nutrition and to detect the presence of inadequacy in food intake among individuals or population groups: the first measures nutritional intake, and the second assesses nutritional status.

The nutritional status can be assessed by any of the four types of studies (Shah, 1981):

- 1- Anthropometric measurements (the study of human body measurement on a comparative bases).
- 2- Biochemical indicator such as Hb, MCV, serum ferritin etc.

- 3- Clinical indicator.
- 4- Dietary intake indicator

### 1.2.1 Anthropometric measurements

Nutritional anthropometry has been defined as "measurements of the variations of the physical dimensions and the gross composition of the human body at different age levels and degrees of nutrition " (Jelliffe, 1966). Anthropometric measurements is often the most practical field technique for the quantitative assessment of nutritional status and as approach, it is the most commonly used (WHO Working Group, 1986). Nutritional anthropometry has several advantages (Gibson, 1990). The methods are precise and accurate when standardized techniques are used. Use simple, safe and non-invasive techniques. The required equipment are inexpensive, portable and durable, and can be made or purchased locally. Relatively unskilled personnel can perform measurement procedures. The information is generated on past nutritional history, and can be used to quantify the degree of undernutrition (or overnutrition) and provide a continuum of assessment from under to over nutrition. These methods are suitable for large sample sizes such as representative population samples; can be used to monitor and evaluate changes in nutritional status over time, seasons, generations, etc. Moreover, the methods can be adopted to develop screening tests in situations such as nutrition emergencies to identify those at high risk.

Nutritional anthropometry, however, suffer from certain limitations. They are relatively insensitive to detect changes in nutritional status following inadequacy of food over short periods of time. They can not distinguish the effect of specific nutrient deficiencies (e.g. zinc deficiency) that affect growth in children from that due to inadequacy of food in general. Furthermore, these methods can not pinpoint the principal cause of undernutrition, as the poor nutritional status may be the result of factors such as repeated insults owing to infections and poor care in children. Additionally, the relative higher costs and organization required to obtain representative and quality data for the purpose of estimating numbers of undernourished ( Gibson , 1990).

Tow types of measurements were described :

**Stature** (standing height, or recumbent length which is used in children up to 24 months age). and **Weight** that reflects the current and long term status. Weight-for-

age, which is influenced by height, and represents the longer term status; while Weight-for-height, reflects the current nutrition status, and body composition. These measurements are used for the nutritional assessments of the children according to their age and sex. . (Cogill, 2003)

Body mass index (**BMI**) has been recommended for determining adult's nutritional status , but also it has been recommended by the Centers of Disease Control (CDC) to be an appropriate screening method for childhood obesity . (Strauss , 2002). The BMI or Quételet's index is calculated by dividing the weight (in kilograms) by the square of the height (in meters) [ $BMI=Wt(kg)/Ht(m^2)$ ].

BMI shows a consistently high correlation with body weight based on several different studies in different population groups. (Micozzi et al., 1986; Khosla and Lowe, 1967). Also by comparing BMI with estimations of body fat stores, obtained through reliable methods such as densitometry, it has been shown that the BMI correlates well with body fat (Norgan and Ferro-Luzzi, 1982).

Relationship between BMI and body fat varies by gender and age. Women are “fatter” at the same BMI as compared to men. Older people are “fatter” at same BMI as compared to younger people.

An analysis indicates that fatness or energy stores derived from BMI measures may vary in different population groups and between sexes.( Norgan , 1990)

#### **1.2.1.1. Assessment of the nutritional status in childhood**

Anthropometric indicators are constructed using data on children's age, height and weight. Three key anthropometric measures calculated from the age, height, and weight data, are *weight-for-height*, *height-for-age* and *weight-for-age*. These measures are expressed in the form of Z-scores, which compare a child's weight and height with those of a similar child from a reference healthy population. The World Health Organization (WHO) recommends the US National Center for Health Statistics (NCHS) population as a reference for international use (WHO Working Group 1986). This reference population, which has been in use since 1977, however has been found to have some technical and biological drawbacks, thus driving the WHO to conduct a multi-country study geared towards developing new reference values (de Onis M – WHO, 2000 ).

Following conventional cut-off points, malnutrition in its various forms is operationally defined as follows:

**Stunting:** or (*shortness*), height-for-age that is less than the international reference value by more than two standard deviations.

**Wasting:** or (*Thinness*), weight-for-height less than the international reference value by more than two standard deviations.

**Underweight:** or (*Lightness*), weight-for-age that is more than two standard deviations below the international reference value.

Stunting is less sensitive to temporary food shortages and thus, is the most reliable indicator of long-standing malnutrition in childhood (Svedberg, 1987). Wasting on the other hand, reflects acute malnutrition. Low weight-for-age (underweight) is difficult to interpret, as it cannot discriminate between temporary and permanent malnutrition. However, in populations where the rate of wasting is low, underweight can be interpreted in the same way as height-for-age (Skoufias, 1998). Stunting and wasting are, thus the preferred measures of child nutritional status, since they can distinguish between long-standing and short-run malnutrition (WHO Working Group 1986). Furthermore, anthropometric indicators (stunting, wasting and underweight) can be adopted as an affordable and acceptable means to assess the impact of interventions and programs "(FAO, 2001).

#### **1.2.1.2. Assessment of the nutritional status in adolescence and in adulthood**

The BMI is considered to be the most suitable, objective anthropometric indicator of nutritional status of the adult. BMI can be used for the purpose of nutritional surveillance and for monitoring the effectiveness of intervention programmes, and it also allows for interregional and intercountry comparisons over seasons, years or decades (FAO, 1994). Pregnant women, however, are excluded from this indicator because during pregnancy increase of BMI reflects the increase of fetal and placental tissues and fluid retained in the body.

This indicator has similar advantages over weight-for-height in children in that it reflects the degree of severity of undernutrition and also can be used to assess overnutrition in adults, by enabling the classification of over-weight and obese individuals in a population (FAO, 1994).

According to National Institutes of Health (NIH), BMI is classified in different categories :

- Underweight  $\leq 18.5$

- Normal weight between 18.5 and 24.9
- Overweight between 25 and 29.9
- Obesity  $\geq 30$  or greater

### 1.2.2 Biochemical indicator

This indicator can detect subclinical or marginal deficiencies or imbalances in individuals, also it can enhance or support dietary, anthropometric, or other kinds of data related to nutritional status (Shah, 1981) .

Biochemical assessment can be done by different types of measurements. Direct measurements of nutrients or their metabolites in blood or urine (e.g. serum vitamin A, B<sub>12</sub> level). Assessment of enzyme activity before and after addition of a nutrient *in vitro* (glutathione reductase to assess riboflavin deficiency) . In addition, *in vivo* response to nutrient supplementation (e.g. hemoglobin response to iron supplement) and finally indirect measures of body stores (e.g. isotopic tracers).

Hemoglobin ( Hb ) is taken as a biochemical indicator to determine the prevalence of anemia among population (WHO/UNICEF/UNU, 1997). Hemoglobin is a primary component of red blood cells, where its production is dependent on iron. Iron deficiency anemia develops when there is an inadequate intake of bioavailable dietary iron. According to hemoglobin (Hb) concentration, anemia is classified as mild, moderate, severe, and very severe.

### 1.2.3. Clinical models (Clinical indicator)

This type of indicator is used in the purpose of detection of signs and symptoms of malnutrition by using clinical signs in skin, hair, eyes, mouth, bones etc . This type of measurements require trained personnel.

According to Tomkins and Watson (1989), malnutrition can decrease the capacity of the immune system of the human body, predispose the person to infections and contributes to the negative downward spiral of undernutrition and infection, where undernutrition increases both susceptibility to, and the severity of, infection. In adults, until recently the use of clinical models to assess nutritional status appears to have been restricted to the nutritional assessment of surgical patients (Baker, 1982). Since 1992, similar assessments have been made amongst severely undernourished adult inpatients in several therapeutic feeding centers during different famines. A model

using three clinical signs: apparent dehydration, oedema and inability to stand have proved useful in predicting prognosis among adult patients (Collins et al., 2000).

Clinical Assessment has several limitations. Deficiency usually severe before signs are evident, this is besides that signs may be caused by non-nutritional factors and some signs are not specific but relate to several nutrients. However there is large inter-observer variability (Collins et al., 2000).

#### **1.2.4. Dietary intake indicator (dietary assessment)**

This indicator can be evaluated by different methods which could be used separately or combined, including: -

- 1- 24 – Hour recall, which is not useful to go farther back
- 2- Food diary (Food record) –that requires literacy and interest.
- 3- Food frequency used as a screening tool and can be quite accurate with consistent diets.
- 4- Diet history- often 24 recall, usual eating pattern and food frequency.

Dietary assessment is used for identifying the household food consumption, which has a normal daily, weekly or seasonal variation.

Data collection could be influenced by variety of factors such as : Cooperation, memory of the subject, skills of the interviewer , that should be taken in consideration to avoid bias in reporting . Reactions can cause bias; need to be aware of body language, position, cultural norms. Also it is need to know how precise you should be while using the data.

Adequacy of food composition tables has also several limitations. These tables are not practical to analyze samples for each study, where nutrient content varies with variety, maturity, method of harvesting, soil, climate, processing, cooking, storage. Also variety of bioavailability of nutrients in meals. All these points should be taken in consideration while assessing food intake.

### **1.3 Determinants of malnutrition**

Variety of conditions can cause or aggravate Malnutrition. A hierarchical model of the causes of undernutrition emphasizes the importance of repeated infectious episodes and poor care and neglect as determinants of undernutrition, in addition to the lack of adequate food (UNICEF, 1998). Some evidence in developing countries

indicate that malnourished women and children are affected by a variety of factors (determinants) that could play an important role in determining their nutritional status. Some of these factors acts on child nutritional status, others on mothers, and some may act on both. These factors include: environment, socioeconomic status, age, sex and infant weaning, genetic, birth order, birth interval of the child, maternal nutrition, educational and employment status of women, age and marital status of women, source of water and availability of toilet facility(Woldemariam, 2002; SRI LANKA, 2003 ).

### 1.3.1 Environmental factors

Environmental factors are relative factors that contribute to the development of malnutrition (Stunkard ,1990). Environmental factors include :

**Area of residency:** A comparative study on maternal nutritional status (Loaiza, 1997; Teller and Yimar, 2000) showed that rural women are more likely to suffer from chronic energy deficiency than women in urban areas. Levels of stunting among rural children are significantly higher than urban children (Sommerfelt et al., 1994; Yimer, 2000). The prevalence of obesity (BMI  $\geq$  30) was found to be higher among urban population than rural (Abdul-Rahim, 2003).

Unfavorable health environment caused by *inadequate water and poor sanitation* (unsafe water supply and absence of suitable sewage system and private toilets ) , they will increase the probability of infectious diseases and expose a population to illness and thus become predispose to certain types of malnutrition (UNICEF, 1990; Engle, 1992). Child stature was found to be associated with unprotected water source and non-availability of latrine (Sommerfelt et al., 1994; Getaneh et al., 1998) .

**Family size** plays a role in getting enough and adequate food for every one of the family members and can affect their nutritional status. Kumar (1995) observed that larger households had higher rates of stunting and wasting. Number of siblings appear to have a negative effect, on the state of wasting as well as stunting, in infants and small children (SRI LANKA, 2003 ).

Also the presence of a certain *disease*, such as diarrheas ,which affects the gastro-intestinal tract and can disturb absorption of essential nutrients and aggravate malnutrition. Sommerfelt et al., 1994 indicated that stunting was highest among children with recent diarrhea. Also (SRI LANKA, 2003) reported that diarrhea is an

illness which has a negative effect on growth and development in early childhood years.

Areas with **conflict** are more exposed to malnutrition. It is known that the presence of civil conflict in a region, increases vulnerability to food insecurity and the population will experience malnutrition that can aggravate and accelerate a serious irreversible growth developmental and delays disorder (*Messer, et al., 1998*). Recent information from the Food and Agriculture Organization of the United Nations vividly demonstrates that the incidence of undernourishment food insecurity is highest in countries with a high incidence of civil conflict. (ACC/SCN and IFPRI, 2000).

### **1.3.2 Socioeconomic status**

Economic status of a household is an indicator of access to adequate food supplies, use of health services, availability of improved water sources, and sanitation facilities, which are prime determinants of child and maternal nutritional status (UNICEF, 1990). Income is the most commonly used measure of socio-economic status (Alberts, 1997). Several studies (Connolly, 1985; Ekeh, 1985; Deinard et al., 1986) showed that in the third world countries the main cause of malnutrition is not the availability of food but the lack of money to buy food. Poverty reduction would be a necessary contributor to any significant improvement in nutritional status (World Bank, 1997). Moreover, income growth may help improve both food demand and nutritional outcomes (Alderman et al., 2000). Garcia & Alderman (1989) showed that in households having incomes at the lowest quintile, both males and females had lower BMIs than those belonging to the highest quintile income groups. Increasing income seems effective in reducing food insecurity and malnutrition (Subramanian and Deaton, 1996; Bouis and Haddad, 1992; Behrman and Deolalikar, 1987). Studies showed that women from low economic status households were the most affected by malnutrition, the prevalence of chronic energy deficiency (CED) is higher among women of lower economic status (Loaiza, 1997; Teller and Yimar, 2000).

The economic status of a household is one of the most important determinants of nutritional status specially in childhood (UNICEF, 1990). Comparative studies on child nutrition in more than 15 countries (Sommerfelt et al., 1994; Getaneh et al., 1998; Genebo et al., 1999; Yimer, 2000), showed that the higher the level of economic status of the household, the lower the level of child stunting.

### **1.3.3 Age , sex , and infant weaning**

Age , sex , and infant weaning sometimes play a key role in growth retardation. Growth development, changing stature and growth velocity are to be sensitive to nutritional deprivation. Stunting (a cumulative indicator of growth retardation ) in children is positively associated with age (Anderson, 1995; Aschalew, 2000; SRI LANKA, 2003). Teller and Yimar (2000) showed that women in the youngest age group (15-19) and women in the oldest age group surveyed (45-49) are the most affected by undernutrition . Also (Genebo et al., 1999; Samson and Lakech, 2000; Yimer, 2000), shown an increase in malnutrition with increase in the age of the child. It was reported that BMI was positively associated with age in both men and women and with urban residence in women.

The BMI was also found to be greater among the employees who had a higher educational or socio-economic status as well as among those who were older (Rao, 1977).

Sex of a child could contribute to child nutritional status. (Dennison et al., 1995) reported that girls may be more exposed than boys to inadequate intakes because of dieting, lower energy intake and social discrimination. Also (Giacamon, 1985; Abdel Nour, 1991), reported that the rate of malnutrition (undernurtition) was higher in females than in males .

Caring practices that include breastfeeding and complementary feeding is one of the of underlying factors for malnutrition ( UNICEF, 1992). Children's nutritional status is also more sensitive to factors such as feeding/weaning practices, care, and exposure to infection at specific ages. For instance, *Kumar* (1995), observed that children in weaning age who were given bread with tea had higher rates of stunting than infants given other kinds of weaning food.

Some studies show that breast feeding is a protective against obesity (Gillman, 2001) and others find no effect (Parsons, 2003).

### **1.3.4 Birth order**

Parents seem to give less attention to older children when they give birth to a new child who needs more attention and care. Stunting was shown to be rare in birth order 2-3 (Sommerfelt et al., 1994), and higher birth order (5+) was positively associated with child malnutrition (Jeyaseelan, 1997).

### **1.3.5. Birth interval of the child**

Closely spaced pregnancies are often associated with the mother having little time to regain lost fat and nutrient stores (ACC/SCN, 1990). Studies in developing countries showed that children born after a short birth interval (less than 24 months) have higher levels of stunting (Sommerfelt et al., 1994; GSS and MI, 1999).

### **1.3.6. Maternal nutrition**

The presence of an intergenerational link between maternal and child nutrition were established. Poor nutrition often spans generations, it starts in utero (influences fetal growth and birth weight) and extends well into adolescent and adult life (ACC/SCN and IFPRI, 2000). Also a stunted woman, has increasing chance that her children will be born with low birth weight. (ACC/SCN and IFPRI, 2000).

### **1.3.7. Educational status of women**

It's known that education is one of the most important resources that acts largely through greater knowledge, improved care giving practices and enable women to provide appropriate care for their children, which is an important determinant of children's growth and development (Cebu Study Team 1991; Ruel et al. 1992; Engle and Menon, 1996, Ricci and Becker 1996; Ruel et al. 1999). Education is one of the most important resources that enables women to provide appropriate care for their children. It is also an important determinant of children's growth and development (Engle and Menon, 1996). Also *Kumar(1995)* noted that fathers and mothers education have a positive relationship with nutritional status of their children.

Education may enable women to make independent decisions, to be accepted by other household members, and to have greater access to household resources that are important to nutritional status (ACC/SCN, 1990). The higher the level of education, the lower the proportion of undernourished women (Loaiza, 1997, and (Teller and Yimar, 2000). Furthermore, parents education seems to have an influence over the health status of the whole family members. (Rizkallah, 1991) observed that the educational level of parents and in particular of mothers influences the nutritional status and feed pattern of themselves and of their children. Also, it was reported that BMI was negatively associated with educational level in women (Abdul-Rahim, 2003).

### **1.3.8. Employment status of women**

Women's employment may enhance the household's accessibility to income, (Woldemariam, 2002), but it may have a negative effects on the nutritional status of children, as it reduces a mother's time for childcare. Some studies (Popkin, 1980; Abbi et al., 1991) reported that mothers of the most malnourished children work outside their home, whereas others argued that there is no association between maternal employment and children's nutritional status (Leslie, 1988).

### **1.3.9. Marital status of women**

It was reported that malnutrition is higher among unmarried rural and divorced/separated urban women compared to married ones (Teller and Yimar, 2000).

### **1.3.10 Determinants of Obesity**

The causes of obesity in childhood are multifactorial. Certainly a decrease in physical activity is a major factor. Sedentary activities such as television viewing, telephone talking, hand-held game playing, and computer activities contribute to excessive gains in body weight (Strauss, 2002).

Eating patterns is the other factor contributing to childhood obesity. Jahns et al, (2001) evaluated snacking behavior in children and adolescents over the past two decades and showed that the frequency of snacks during the day, plus the total quantity of food, contribute in childhood obesity.

Other shifts in dietary patterns over the years include increases in soft drink consumption, the frequency of "eating out" (meals out of the home), the size of portions when eating out ("super sizing"), and overall food availability were found to contribute in childhood obesity (Cavadini, 2000).

It was reported that BMI was negatively associated with smoking and physical activity in men (Abdul-Rahim, 2003).

Several diseases can cause obesity, including diseases of the endocrine and central nervous systems as well as specific congenital syndromes (e.g., Prader-Willi syndrome), [Stunkard, 1986]. Fewer than 5% of obese children have an underlying disease that causes obesity; most simply have an imbalance between energy expenditure and intake( Merritt, 1982) .

#### **1.4 Statement of the Problem , significance and study aim**

In Palestine ( WB and GS ) both socioeconomic and political factors determine adequacy of nutrition and household food security. The population density is high, family size is large, family income is usually inadequate and very limited, and the cost of living is very high. Conflict in the area is continuous and endless and is characterized by the dreadful Israeli actions against the Palestinian population, such as: prolonged curfews, closures of areas, numerous check points, fighting in civilian areas , house demolitions, destruction of agricultural lands and crops. The outcome of these actions is manifold including loss of personal freedom, humiliation, detention or killing of the main breadwinner to the family, multiple injuries and disabilities and finally unemployment (Peter Hansen, UNRWA, Comment article, Tribune, 7 Feb. 2002). All these conditions may serve as obstacles in providing adequate nutrition to all members of the family, and may make household food insecure. so family members became unable to obtain enough food were 63.4% of the surveyed households in the Palestinian Territory have faced difficulties in getting sufficient food supplies during the Intifada (PCBS-Nutrition Survey-2002). Eventually, this life disturbing situation may make undernutrition as the trend for the majority of the Palestinian population .

The young Palestinian community, where about 47% are bellow 15 years ( PCBS, 1997), encounters different circumstances than other communities. Available studies indicate that there is an increase in the prevalence of malnutrition and anemia among Palestinian children (Jabra, 1984; Abdelnour, 1991; Hassan Sullivan Yip, 1997 ) .

Public health nutrition, that aims to prevent nutritional problems in the Palestinian community, is underemphasized. A comprehensive national food and nutritional planning and policy is needed to face the community needs for a healthy and well developed generation .

In Palestine ( WB and GS ) two nutritional surveys were recently conducted in order to understand and evaluate the nutritional status of the Palestinian population and to explore the risk factors and determinants of malnutrition. These studies have outlined in some degree the magnitude of malnutrition among the population in the WB and GS in general.

Palestinian Bedouins, who are living under the same circumstances as the population at large, suffer from additional problems, such as deteriorated sanitary conditions,

unsafe water supplies, lack of sewage system, low educational level, absence of electricity. These living are expected to influence, negatively, the nutritional status of the Bedouin community and hence make the vulnerable to nutrition-related diseases .

Studies of the Bedouin community in the Jordan Valley are very limited, and a few reports were published about the nutritional status of this community (Giacomon, 1988).

Therefore, this study aimed to describe specifically the nutritional status of the Bedouin community in JV, as compared to the nutritional status of Refugees who are supposed to have better health services.

## **1.5 Objectives**

### **1.5.1. General objectives**

- To outline and clarify the magnitude of malnutrition and nutritional related problems among Bedouins living in JV by comparison with Refugees living in the same area.
- To determine the proportion of anemia among non-pregnant women (15 – 49 years) by measuring blood hemoglobin.
- To determine the proportion of malnutrition (undernutrition or overnutrition) among non-pregnant women (15-49 years) as determined by Body Mass Index ( BMI).
- To determine the proportion of malnutrition (undernourishment) among children aged 0-59 months determined by stunting, wasting and underweight.
- To investigate the possible variables associated with malnutrition among Bedouins.

### **1.5.2. Specific objectives**

The specific objectives of the study were:

- To describe the association between anemia in non-pregnant Bedouin and refugee women and demographic, socioeconomic and woman's health-related variables.

- To determine the relationship between overweight, including obesity, among non pregnant Bedouin and refugee women (15-49 years) and demographic, socioeconomic and woman's health-related variables
- To describe the relationship between stunting among Bedouin and refugee children under 5 and different variables such as gender, age, birth weight, birth order, breastfeeding, weaning and gestational age.
- To identify the relationship of stunting among Bedouin and refugee children with mother-related variables such as: mother's age; family income, mother education; father education and family size.

## Chapter 2

### Literature Review

#### 2.1 Malnutrition

Deviations from adequate nutrition (inadequacy, or excess) are known as malnutrition.

##### 2.1.1 Malnutrition and economic growth

Researchers have derived conservative estimates of the forgone gross domestic product (GDP) as a result of iron deficiency alone in childhood and iron, iodine, and protein-energy malnutrition in adults (Horton, 1999). A more conservative estimate made in 1990 showed an economic loss to the world as a whole of \$8.7 billion (Pinstrup-Andersen et al., 1993). In Pakistan the annual losses are over 5 percent of GDP. In Bangladesh, the cost of iron deficiency in children alone is nearly 2 percent of GDP. According to World Bank estimates, the elimination of child malnutrition in India would increase its national income by \$28 billion. This is more than India's current combined expenditures for nutrition, health, and education (FAO, 2000b).

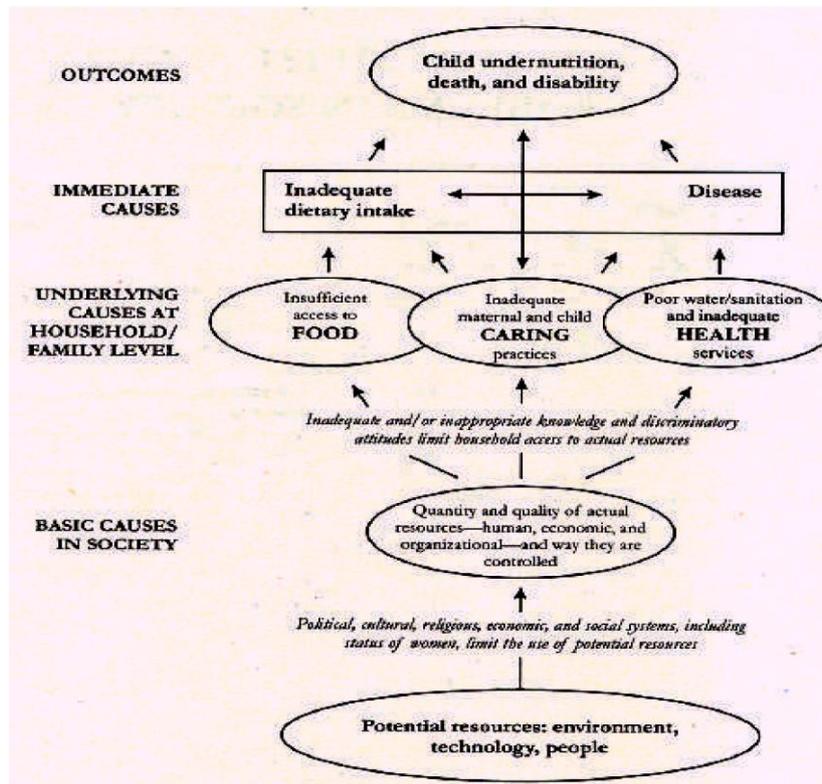
##### 2.1.2 Conceptual Framework of Malnutrition

The causes of malnutrition are complex. Various determinants of malnutrition act at different levels in society. The food-health-care conceptual framework is a widely used analytical tool portraying causal factors and their interactions at three main levels: immediate, underlying, and basic (Figure 1.1 ).

The synergistic interaction between the two *immediate causes* (inadequate dietary intake and disease) accounts for much of the child malnutrition and mortality (ACC/SCN and IFPRI, 2000).

**Food-health-care** are considered the three pillars of nutritional security (UNICEF, 1992). These three groups of underlying factors namely: household food insecurity, inadequate maternal and child care, and poor health services and an unhealthy environment, contribute to inadequate dietary intake and infectious disease (immediate factors). These underlying causes are, in turn, underpinned by basic causes in society that relate to the amount, control, and use of resources (social and economical structure).

Figure 1.1 Causes of child undernutrition<sup>4</sup>



**Food** : refers to food security at the household level. Sustainable access to safe food of sufficient quality and quantity, and paying attention to energy, being important. Household food security depends on having financial, physical and social access. While food is important; but it is not the only factor.

**Health** : includes access to health services as well as a hygienic and sanitary environment and access to safe water.

**Care** : refers to a process-taking place between a caregiver and the receiver of care. Caring practices include: care for women, breastfeeding and complementary feeding, home health practices, hygiene practices, psycho-social care, and food preparation.

What determines adequate household food security, care and health? This brings us to the next level of causality, that of basic causes.

**Basic causes** : This is a group of factors that relate to resources, their control and use. *Resources* include human, economic, and organizational resource. Embedded in *human resources* which is also influenced by education include: skills, motivation, will power, knowledge, experience, time, and commitment, etc. Examples of

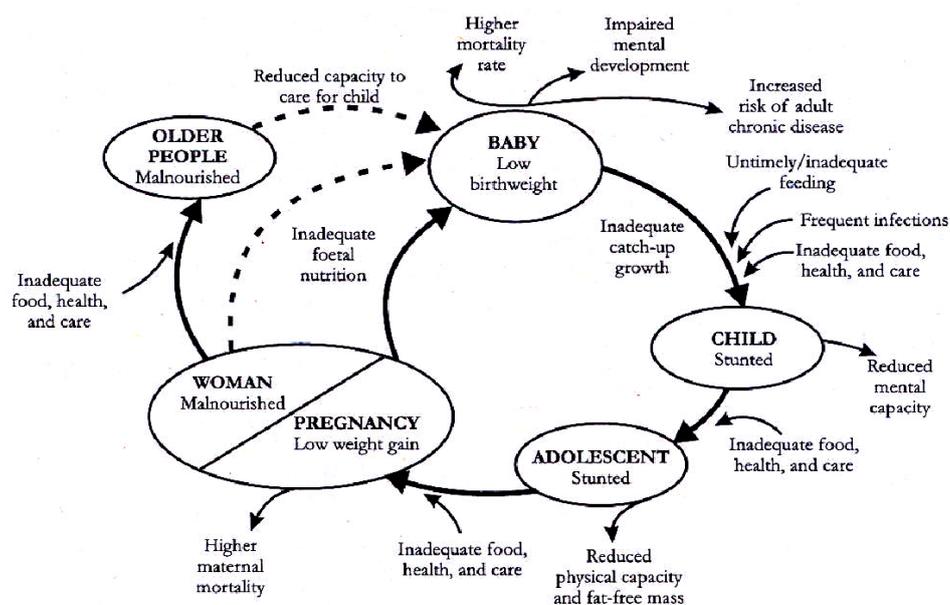
<sup>4</sup> Source: ACC/SCN and IFPRI (2000)

*economic resources* are: land, natural resources, means of production, technology, income, credit, etc. *Organizational resources* encompass formal and non-formal organizations like family and extended family, clan, community based organizations, NGOs, administrative structures and institutions (UNICEF ,1997). Basic causes also include patterns of relationships and capacities to act on the problem, and the potential resources of the community and other levels of society.

### 2.1.3 Nutrition throughout the life cycle

Nutrition challenges continue throughout the life cycle (i.e. infants, children, adolescents, adults and elderly). Poor nutrition often starts *in utero* and extends, particularly for girls and women, well into adolescent and adult life. It also spans generations ( ACC/SCN and IFPRI , 2000). As illustrated in Figure 1, undernutrition that occurs during childhood, adolescence, and pregnancy has an additive negative impact on the birth weight of infants. However the low-birth weight infants who have suffered intrauterine growth retardation as fetuses are born undernourished and are at a far higher risk of dying in the neonatal period or later infancy. If they survive, they are unlikely to significantly catch up on this lost growth later and are more likely to experience a variety of developmental deficits. A low-birth weight infant is thus more likely to be underweight or stunted in early life. (ACC/SCN and IFPRI , 2000).

**Figure 1.2 Nutrition throughout the life cycle<sup>5</sup>**



<sup>5</sup>Source: ACC/SCN and IFPRI (2000). Fourth Report on the World Nutrition Situation: Nutrition Throughout the Life Cycle. Geneva: ACC/SCN in collaboration with IFPRI.

Malnutrition when present in a community it can increase the prevalence of low birth weight (L.B.W), the consequences of being born undernourished extend into adulthood. New evidence shows that low birth weight continues to be a major contributor to child malnutrition and premature death (ACC/SCN and IFPRI, 2000). Also, fetal malnutrition as evidenced by low birth weight may be an additional risk factor for obesity and associated co-morbidity later in life (Barker, 1994; *Leon et al., 1996*). A study in France showed that adolescents who were small at birth tended to put on more weight during the growth spurt ( *Léger et al., 1999*).

In 1995, WHO reported that underweight children (low weight-for-age) tend to have more severe illnesses, including diarrhea and pneumonia. There is a strong exponential association between the severity of underweight and mortality. It has been estimated that out of 11.6 million deaths that occurred in 1995 among children under five in developing countries, 6.3 million (54 percent) were associated with low weight-for-age (Pinstrup-Andersen, 1999). The majority of deaths among children under five in developing countries can be attributed to the potentiating effect of mild to moderate undernutrition (Pelletier et al., 1993). However, many of the infectious diseases affecting preschool children persist into the school years, and aggravate malnutrition which is widespread in school-age children . These nutritional problems adversely affect attendance, performance, and learning. (*Grantham et al., 1991*).

Adolescence, a second period of rapid growth after childhood, may serve for compensating for early childhood growth failure, delayed growth and maturation as a result of chronic malnutrition in children allows for some spontaneous catch-up growth in adolescence, since the growing period is thereby extended (*Golden, 1994*). However, this catch-up is not complete, particularly for those remaining in the same (adverse) environment ( *Martorell et al., 1994* ) . A stunted girl is thus most likely to become a stunted adolescent and later a stunted woman. which increase the chance that her children will be born with low birth weight. (ACC/SCN and IFPRI, 2000).

#### 2.1.4 Malnutrition in childhood

Over 200 million children in developing countries under the age of five are malnourished. Malnutrition contributes to more than half of the nearly 12 million under-five deaths in developing countries each year.<sup>6</sup>(Understanding Malnutrition). Childhood is a period where balanced food intake is necessary, while any deficit of essential nutrients can cause growth retardation in children. Good nutrition is even more important as a preventive approach to reduce mortality and improving health status (Jansen, 1985 ).

Few studies showed that malnourished children may develop fatigue easily, they have poor learning experience and have decreased learning abilities. These abnormalities are due to aberrations in attention , cognitive function , activity level, and due to diminished capacity to learn (Deinard, 1980). Furthermore, inadequate nutrition (malnutrition) can decrease the capacity of the immune system of the human body, predispose the person to infections and contributes to the negative downward spiral of undernutrition and infection, where undernutrition increases both susceptibility to, and the severity of infection (Tomkins and Watson, 1989; FAO, 1994 ).

There is sufficiently good evidence to show that poor growth and smaller size in schoolchildren is associated with impaired development, and a number of studies have demonstrated a relationship between growth status and school performance or intelligence (Grantham - McGregor et al., 1991); also as a consequences of stunting, poor mental development (Grantham-McGregor, *et. al.*, 1996) and increase the risk of sickness and death (Chen, *et. al.*, 1980). When the nutrients deficit persists for long time, physical and mental development can be compromised and the impact becomes irreversible for life. However, altered cognitive development as a direct negative effects of chronic malnutrition may not be reversed (irreversible), ( *Martorel, et al., 1994*). This effect is clear in the case of stunting (height deficit). It is known that the greater the degree of stunting in the early years, the greater the height deficit in the adult years, but growth catch up is possible if appropriate follow up and adequate nutrients provided for children who are in need in appropriate time. So delayed growth and maturation as a result of chronic malnutrition in children allows for some spontaneous catch-up growth in adolescence, since the growing period is thereby extended (Golden MHN, 1994). However, this catch-up is not complete, particularly

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<sup>6</sup> Available:<http://www.nutrition.uu.se/studentprojects/group98/malnutrition/intro.htm>

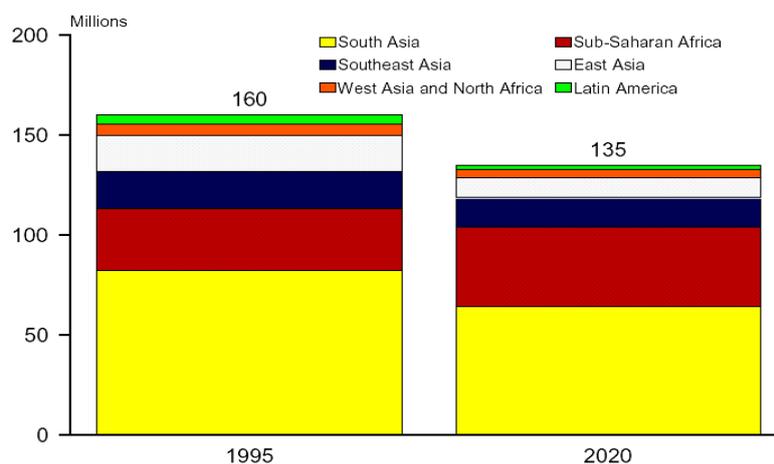
for those remaining in the same (adverse) environment (*Martorel, et al., 1994*) where the damage to the skeletal growth becomes permanent if the problem persists for more than a period of two years (*Kumar, 1995*).

Family socioeconomic level seems to be an important determinant of the nutritional status of children (*Patricia Cima-Isaacs, 1988; Rizkalla N, 1991*). Children who came from families in the high socioeconomic level and who are presumably well nourished are taller in height and more in weight than children who are from lower socioeconomic level and who might have experienced some type of undernourishment, or malnutrition (*Patricia Cima-Isaacs, 1988*).

#### 2.1.4.1 Prevalence of undernutrition in childhood

About 160 million preschool children, or about 30 percent of all preschool children in developing countries, are currently malnourished (FAO, 2000b). Under the most likely scenario, International Food Policy Research Institute (IFPRI) 2000, projects that 135 million children under five years of age will be malnourished in 2020 (Figure 2.1).

**Figure 2.1 Number of malnourished children in developing countries (1995 Vs 2020)<sup>7</sup>**



Child malnutrition is expected to decline in all major developing regions except Sub-Saharan Africa (SSA), where the number of malnourished children is forecast to

<sup>7</sup> Source: Pinstrip-Andersen, Pandya-Lorch, and Rosegrant (1999).

Pinstrip-Andersen, P., R. Pandya-Lorch, and M.W. Rosegrant. 1999. World Food Prospects: Critical Issues for the Early Twenty-First Century. 2020 Vision Food Policy Report. Washington, DC: IFPRI.

increase by more than 30 percent by 2020. Sub-Saharan Africa is the only region where the number of malnourished children has consistently increased since 1970, and it is the only region in the world where it is projected to continue to increase by 2020.(WHO, 1997). This is mostly due to severe famine as a result of drought and armed conflict in the areas which increases vulnerability to food insecurity (Messer, E., M.J. Cohen, and J. D'Costa., 1998), where poverty is seen as one of the main factors contributing to the high and static prevalence of malnutrition. Significant poverty reduction would be a necessary contributor to any significant improvement in nutritional status in SSA (World Bank, 1997).

The number of malnourished (stunted) pre-school children in developing countries was around 220 million in 1990 and fell to 184 million in 2000 (ACC/SCN, 2000a). The prevalence of stunting in children below five years in East Africa averages about 48 percent (ACC/SCN, 2000).

#### **2.1.4.2 Improvements in child nutrition**

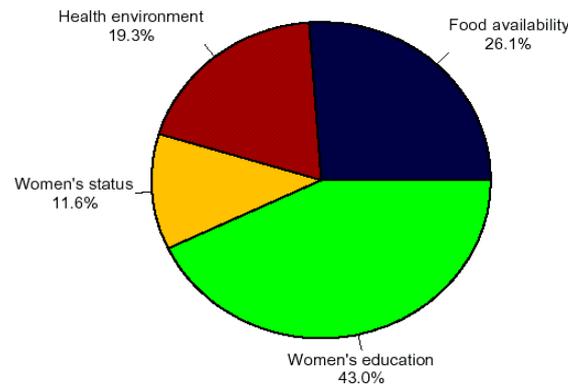
Good nutritional status promotes optimal growth and development of children and adolescents (ACC/SCN, 2002). Malnutrition among children could be affected by multiple factors including: childhood infectious diseases, parasitism, unsanitary environment and weaning methods (Amine, 1980).

Improved child nutritional status in the developing countries between 1970 and 1995 was attributed to four critical reasons: improvements in women's education accounted for almost 43 percent of the total reduction in child malnutrition during this period, followed by improvements in per capita food availability(26%), improvements in the health environment(19.3%), and improvements in women's status relative to men (11.6%) (Figure 2.3).

Mother's educational level may play a role in determining the health and nutritional status. Schofield (1979) reported, "Families may also be at risk where mothers are not educated and less able to understand the health and nutritional needs of their children". She showed that there is a significant relationship between maternal education and the prevalence of malnutrition.

Women who received even a minimal education were generally more aware than those who have no education of how to utilize available resources for the improvement of their own nutritional status and that of their families.

**Figure 2.3 Estimated contribution of major determinants to reductions in child malnutrition, 1970–1995<sup>8</sup>**



Education may enable women to make independent decisions, to be accepted by other household members, and to have greater access to household resources that are important to nutritional status (ACC/SCN, 1990). Also, it was shown that the higher the level of education, the lower the proportion of undernourished women (Loaiza, 1997 ; Teller and Yimar, 2000).

It is known that education is one of the most important resources that enable women to provide appropriate care for their children, which is an important determinant of children's growth and development (Cebu Study Team 1991; Ruel et al. 1992; Engle and Menon, 1996, Ricci and Becker 1996; Ruel et al. 1999 ). Women's educational attainment is a key factor in preventing infant undernutrition (Smith and Haddad, 2000).

#### **2.1.4.3 Overnutrition**

Overnutrition resulting from excess of food relative to need, and could be one of the relative contributors of obesity. Fewer than 5% of obese children have an underlying disease that causes obesity; most simply have an imbalance between energy expenditure and intake ( Merritt, 1982). WHO reported that obesity has become a pandemic, and it is today's principal neglected public health problem(WHO, 1998a).

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<sup>8</sup> Source: Smith and Haddad (2000).

Note: Malnourished children refers to underweight children  
Smith, L.C., and L. Haddad. 2000. Overcoming Child Malnutrition in Developing Countries: Past Achievements and Future Choices. 2020 Vision Discussion Paper 30. Washington, DC: IFPRI.

#### **2.1.4.3.1 Childhood Obesity**

Data on obesity is still very little world-wide, particularly in developing countries. Childhood obesity often persists into adolescents and adulthood. More than 50% of obese children remained obese into adulthood. (Strauss, 2002) .

Body mass index (BMI) has been recommended by the Centers of Disease Control (CDC) to be an appropriate screening method for childhood obesity (Strauss, 2002). Children with a BMI greater than the 85th percentile are considered overweight and should be monitored closely. A BMI above the 95<sup>th</sup> percentile has been recommended as a cutoff point for evaluation of obesity.

It is known that low socioeconomic status is one of the risk factor for childhood obesity. An inverse relation has been shown between social class and prevalence of obesity in children 3 to 18 years of age: rates range from 25% in low- income families to 5% in high-income families (Stunkard, 1973; Ginsberg-Fellner, 1981; Saltzer, 1985).

It was observed that genetic and environmental factors have relative contributions of obesity, but genetic factors appear to be the predominate relative contributor ( Brook CGD, 1975; Börjeson, 1976; Stunkard, 1986). A recent Canadian study reported that genetic factors influenced the effect of environmental factors such as overeating on weight (Bouchard C, Tremblay A, Després JP et al). However, several diseases can cause obesity, including diseases of the endocrine and central nervous systems as well as specific congenital syndromes (e.g., Prader-Willi syndrome) (Stunkard, 1986).

#### **2.1.4.3.2 Complications of obesity**

Infants and children who are obese are at somewhat increased risk of becoming obese adults ( Johnston, 1985; Garn,1985).

Obesity in children comes many with the same complications that are seen in obese adults (Strauss, 2002). Type 2 diabetes mellitus, the form of diabetes generally associated with obesity in adults, now accounts for as many as 45% of new cases of pediatric diabetes (Nguyen, 2001). Other health problems in children that are attributed to or exacerbated by excessive body adiposity include hypertension, dyslipidemia, slipped epiphyses, tibia vara (Blount's disease), polycystic ovary syndrome, gallstones, steatohepatitis (fatty liver), asthma, sleep apnea, and pseudotumor cerebri. (Strauss, 2002). Longitudinal studies of overweight children over a forty year period show twice the rate of cardiovascular disease and

hypertension, and triple the rate of diabetes, compared with children of normal weight.(Strauss, 2002). Obese children have been observed to have high levels of low-density lipoprotein (LDL) cholesterol and low levels of high-density lipoprotein (HDL) cholesterol (Leung , 1990).

Studies showed an association between infant or childhood obesity and increased incidence of acute respiratory infections ( Tracey, 1971; Somerville et al., 1984). It was reported that severe obesity in childhood has been linked to higher age-adjusted death rates among adults, but there is no association between moderate childhood obesity and higher death rates unless other risk factors are present. (Leung, 1990)

Although there are few clear physical health risks to obese children, they may suffer significant social and psychologic difficulties. In the Western world, there is strong cultural prejudice against obesity, which can lead to stigmatization of and discrimination against obese people in schools, the workplace and social settings (Klesges, 1990).

#### **2.1.4.3.3 Prevalence of childhood obesity**

In the United States it has been estimated that 10% to 15% of children are obese (Paige, 1986; Foreyt, 1987). More recent data suggest that the prevalence of overweight among children is 34% to 36% and obesity is 18% to 20% (Strauss, 2002).

A study in Egypt showed that the proportion of overweight preschool children is 7% rising to 10 percent among school children (Shaheen, et al., 2002) .

### **2.1.5. Malnutrition in adulthood**

#### **2.1.5.1 Undernutrition**

Good nutritional status in adulthood contributes to better physiological work performance, enhances adult economic productivity, increases levels of socially desirable activities and promotes better maternal birth outcomes (ACC/SCN, 2002). On the other hand, chronic state of undernutrition in the adult has its cost in terms of risk to health and impairment of function, which may include a lowered work capacity, a reduced ability to sustain economically productive work or even socially desirable physical activities and possibly an impaired immune function with a predisposition to repeated infections (FAO, 1994). Girls may be more exposed than

boys to inadequate intakes because of dieting, lower energy intake, social discrimination, and pregnancy (Dennison et al., 1995).

For social and biological reasons, women of the reproductive age are amongst the most vulnerable to malnutrition. Consequences of malnutrition in women include: increased perinatal and neonatal mortality, a higher risk of low birth weights babies, stillbirths, and miscarriage (Krasovec et al., 1991). Some evidence in developing countries indicate that malnourished individuals, that is women with a body mass index (BMI) below 18.5, show a progressive increase in mortality rates as well as increased risk of illness (Rotimi, 1999).

Detailed studies have shown an association of poor nutritional status, identified by anthropometry, with lowered work capacity (Desai, 1989). In India, good correlations were found between body weight, BMI and work capacity in undernourished individuals in Hyderabad (Satyanarayana et al., 1989).

Adolescents are tomorrow's adults, and 85% of them live in developing countries (United Nations, 1997). WHO has defined « adolescents » as people in the 10-19 years age range, and « youth », as those between 15 and 24 years of age. (United Nations, 1997). Adolescence is a period of intense physiological, psychological, and social change. The transition from childhood to adulthood may extend over variable periods of time, depending upon socio-cultural and economic factors (ACC/SCN and IFPRI, 2000).

Maternal undernutrition during pregnancy impairs foetal growth. The Dutch famine during the Second World War provides an excellent example of the effects of maternal nutritional status on foetal outcome, the mothers of the poorer socioeconomic strata had infants with the lowest birth weights (Stein et al., 1975). Studies on maternal nutrition (in Vietnam) showed that the birthweight was always lower with low maternal BMI (< 18.5) whatever the weight gain of the mother was during pregnancy (Giay & Khoi, 1992).

It is well-documented that long-term of stunting has a negative consequences on adult stature, body composition, work capacity, and women's reproductive performance (Martorell, 1993), as well as new evidence of an association with increased risks of chronic disease and obesity (Barker, 1994).

Stunting is commonly observed among adolescents in populations with a high rate of malnutrition: it was highly prevalent in 9 of the 11 International Centre for Research on Women (ICRW) studies, ranging from 27 % to 65% (Kurz et al., 1994). In other

studies stunting was highly prevalent in adolescent boys and girls, ranging from 32% in India to 65% in the Philippines (Kurz, 1996).

#### **2.1.5.2 Adulthood Overweight and Obesity**

An adult is considered overweight if his / her BMI is between 25 – 29.9, and is obese when the BIM is 30 or over. Obesity is the contemporary pandemic and attracts the attention of health professionals.

There is still very little data on obesity worldwide, particularly in developing countries. While existing information is sufficient to show that obesity is increasing everywhere, and in all age groups. Obesity at adolescence is an issue because it tends to persist in adulthood (Stark et al., 1981; Serdula et al., 1993) and the longer its duration, the higher the associated mortality and morbidity (Must et al., 1992). High BMIs were associated with a higher prevalence of diabetes mellitus and glycosuria (Satyanarayana, 1976). Overweight & obesity together, represent a risk factors for many chronic disease such as diabetes, cardiovascular disease, hypertension, stroke, and cancer ( Kushner, 1993; Must et al., 1992; WHO, 1998a ).

There is emerging evidence that stunted individuals are at increased risk of overweight and obesity when food availability increases and lifestyles change (Popkin et al., 1996).

Socioeconomic status is one of the risk factor for obesity . Garcia & Alderman ( 1989) showed that in households having incomes at the lowest quintile, both males and females had lower BMIs than those belonging to the highest quintile income groups. Also (Ferro-Luzzi et al., 1992), reported that a consistency in the relationship between BMI and an independently assessed measure of socio-economic status was also seen in communities in India, Ethiopia and Zimbabwe despite there being a relatively small range of BMIs among the rural populations of these countries.

#### **2.1.5.3. Prevalence of adulthood Obesity**

Gortmaker SL(1987) showed that 21.9% of adolescents 12 - 17 years of age , in the United States , were obese. In China, overweight is only emerging, but it is a problem associated with urban living, high income, and adolescence.( Wang et al., 1998). In 2002 the prevalence of overweight was 29.5% , while the prevalence of obesity was 4.3%, with a greater number of women being obese than men.( Jia et al., 2002).

## **2.2 Anemia**

### **2.2.1 Determinants of Anemia**

World wide, WHO considered anemia as a commune public health problem ,and endemic for all classes of the population ( WHO, 1991). Anemia is a complex condition that cannot be explained by a single risk factor, but results form the interaction between a group of risk factors (Gillespie et al., 1998b). Also, anemia can be caused by dietary factors (micronutrient deficiencies, such as iron); infectious diseases such as malaria, intestinal parasites and HIV, or certain genetic hemoglobinopathies such as Thalasemia (Gillespie et al., 1998b). Geography, ecology, age, sex, and physiology are just some of the main factors that condition the degree to which anyone of these determinants affects the anemia outcome. Hemoglobin concentrations are also influenced by race and elevation above sea level (WHO/UNICEF/UNU, 1997).

In tropical Africa, for example, the common causes of anemia in childhood, include malaria, nutritional deficiencies of iron, folate, protein, and possibly other micronutrients (such as vitamin A and riboflavin), pyogenic infections, and sickle cell disease (Fleming et al., 1982). Chronic disorders secondary to AIDS and tuberculosis are now increasingly implicated. For instance, severe anemia in non pregnant women is virtually all due to the anemia's of chronic disorders secondary to HIV and tuberculosis (Fleming, 1998). Furthermore, menorrhagia may be a contributing factor, as suggested by data in Nigerian girls ( Barr et al., 1998).

It was observed that anemia is related to the number of pregnancies. According to the study that carried out in Bangkok (1972) the prevalence of anemia in pregnancy doubled after the 3-ed pregnancy and in over five folds after the 5<sup>th</sup> pregnancy.

### **2.2.2. Iron deficiency anemia**

Nutritional anemia's comprise the second most common group of deficiency disorder after protein–energy malnutrition (*Ebrahim, 1983*). Iron deficiency anemia (IDA) is the most prevalent of all micronutrient deficiencies, affecting one third of the world population (UNICEF, WHO, 1999).

The iron status of an individual is determined by the way in which a combination of factors relate to that person's particular requirement for absorbed iron. Such factors as age, gender, physiologic status, and preexisting iron stores. Intake of bioavailable dietary iron, which depends on the type of dietary iron (heme or nonheme) and on the concentration of various dietary constituents that either inhibit or enhance the absorption of dietary iron consumed, effects the iron status of the individual (MacPhail et al., 1992).

Inadequate intake of bioavailable dietary iron (undernutrition) leads to IDA (Scrimshaw, 1991). Infants, children, pregnant and lactating women are the population groups most vulnerable to iron deficiency due to their increased dietary requirements for growth and reproduction. It is known that Girls may be more exposed than boys to inadequate intakes of iron because of dieting, lower energy intake, social discrimination, and pregnancy (Dennison et al., 1995). Also men in general don't become anemic without a history of substantial blood loss, ( UNRWA, 1990).

Poor absorption of iron due to the presence of inhibitors of iron absorption. Tannin in tea, phytates from plants, calcium and phosphates all inhibit iron absorption. A higher prevalence of anemia was found among tea drinkers that reflects the effect of tea on iron status (Disler et al., 1975; Rossander et al., 1979; Galan et al., 1985; Razagui et al., 1991). In populations in which large amounts of iron come from vegetable sources, such as cereals and legumes, iron bioavailability is low because of inhibiting factors such as phytates and tannins (FAO/WHO, 1988). Absorption of iron from iron-containing foods eaten with high tannin foods may be as low as 1-2 percent.

On the other hand essential factors that affect iron status of the individual and lead to decrease in iron status in the body refer to losses of body iron through blood loss which may be pathologic (e.g., intestinal helminth infection) or physiologic (e.g., menstruation, pregnancy, and blood loss during delivery) (Scrimshaw, 1991).

Before the development of anemia, the reduction of body iron occurs in two main stages (Gillespie et al., 1998): iron depletion which is a decrease in iron stores, and consequently iron deficient erythropoiesis which develops when iron storage is depleted and iron absorption is insufficient to counteract the amount lost from the body through the feces, desquamated mucosal and skin cells, and menstrual blood loss among women. At this time, hemoglobin synthesis starts to become impaired and hemoglobin concentrations fall. If anemia ensues, the reduction in hemoglobin

production is severe enough to lead to distortion of red cells which become microcytic and hypochromic ( Gillespie & Johnston, 1998b).

A number of studies have demonstrated that anemia represents a more severe forms of iron deficiency, where mild forms have abnormal iron biochemistry values, such as low serum ferritin, low transferrin saturation. It is estimated that the prevalence of iron deficiency would be twice the prevalence of anemia . Approximately 20% to 25% of all infants in the world have iron deficiency anemia, and many more have iron deficiency without anemia (DeMaeyer, 1985; Freire, 1997).

#### **2.2.2.1 Consequences of iron deficiency anemia**

According to the (WHO, 1991), the functional consequences of IDA are "retardation of physical and mental development, fatigue and low productivity at work, and impairment of reproductive functions" .

Iron deficiency anemia can cause developmental deficit. Studies that assessed changes after a full course of iron treatment found that a majority of infants with IDA continued to have lower developmental test scores, despite iron therapy for 2 to 6 months and correction of anemia ( Lozoff, 1987; Walter, 1989; Lozoff, 1996).

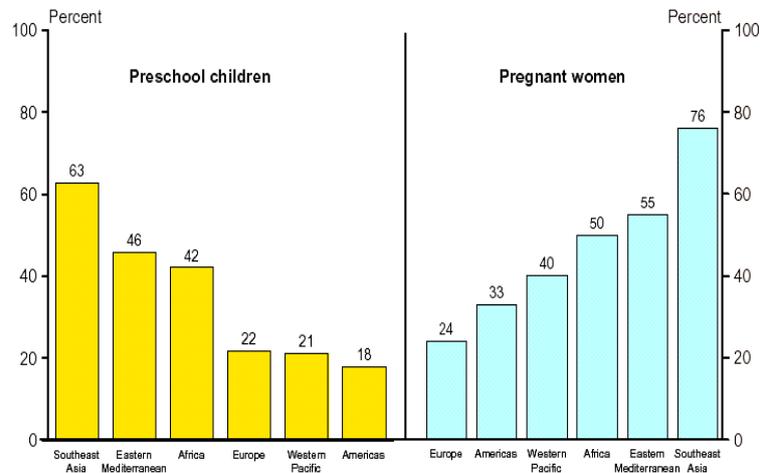
Improved iron and zinc status was found to be closely associated with improvements in psychomotor or cognitive measures (Bentley et al., 1997).

Iron-deficiency anemia increases the risk of mortality. Anemia is a major contributory cause of postpartum maternal mortality (Ross and Thomas, 1996).

#### **2.2.3 Prevalence of anemia**

Anemia is considered to a common public health problem. It affects 2.2 billion individuals in the world, half of them are estimated to have iron deficiency (*WHO, 1991*). Approximately 20% to 25% of all infants in the world have IDA, (DeMaeyer, 1985 ; Freire, 1997). Anemia still affects over 50% of pregnant women and up to 60% of pre-school children (UNICEF ESARO, 1998). Recent studies on consumption of micronutrients such as vitamins and minerals confirm that anemia stemming from insufficient iron intake is widespread among women, particularly pregnant women, and children (Figure 2.1). About 2 billion people suffer from IDA (ACC/SCN and IFPRI, 2000).

**Figure 2.1 Prevalence of anemia in preschool children and pregnant women by region, 1999**



Source: ACC/SCN and IFPRI (2000)

As seen the prevalence of IDA in preschool children was highest in Southeast Asia (63%), followed by Eastern Mediterranean (46%), and was lowest in America (18%). While the prevalence of IDA among pregnant women was also highest in Southeast Asia (76%) and also followed by Eastern Mediterranean (55%), but was lowest in Europe (24%).

In Tago West Africa, the overall prevalence of anemia among preschool children was 58 %, in rural areas the prevalence of anemia was higher than in urban areas (*Stetler, 1980*).

In a review of 32 studies from developing countries (*DeMaeyer et al., 1985*), reported that the overall prevalence of iron deficiency anemia in developing countries was of the order of 27 %, and prevalence was higher in boys. In the International Centre for Research on Women (ICRW) studies, rates ranged from 16% in Ecuador to 55% in India (*Kurz, 1994*).

### **2.3 The nutritional status in Palestine and neighboring countries**

Nutritional studies were carried out in the Palestinian Territory as well as in neighboring countries namely, Jordan, Egypt, Syria, Lebanon, and Iraq. By and large, these studies indicated the existence and persistence of malnutrition problems in the region.

#### **2.3.1 Undernutrition in Palestine and neighboring countries**

In the Palestinian Territory, malnutrition was assessed on different occasions by various authors among children living in towns, villages and /or refugee camps, in the WB and GS. The rates of malnutrition were reported to be higher among females than males (Giacamon, 1985; Abdel-Nour, 1991). The difference between the two sexes may possibly be attributed to that males are given the more nutritionally valued food and in larger portion (Giacamon, 1985). Furthermore, Giacamon and Abdel-Nour, independently, reported different rates of malnutrition (26 % - 41% ) among Palestinian children living in various villages in the West Bank (Giacamon, 1986; Giacamon, 1988; Abdel-Nour, 1991). The overall prevalence of wasting was 18.2% and stunting was 32 % among primary school children in a refugee camp in the West Bank (Rizkallah, 1991). In Gaza strip, a study in which 2 % of the sampled children were Bedouin, reported that 5.7 % of the children were wasting, 14.2 % were stunting and 15.1 were underweight (Kumar, 1995).

Very recently, the PCBS and John Hopkins (JHU) / Al Quds University (AQU), independantly reported different rates of malnutrition among Palestinian children in GS and WB (Table 3). Despite the differences, both studies agree that rates of stunting are higher than the rates of wasting and underweight. Furthermore, both studies showed that stunting is more prevalent in GS than in WB.

**Table 2.1 Comparison of malnutrition among children according to the PCBS, and John Hopkins / Al Quds Universities studies 2002<sup>9</sup>**

Malnutrition Indicators	PCBS Study			John Hopkins Study			
	Region	GS	WB	Palestine	GS	WB	Palestine
<b>Stunting</b>		10.5	8	9	17.5	7.5	11.7%
<b>Wasting</b>		2	2.9	2.5	13.3	4.3	7.8%
<b>Under weight</b>		2.6	4	3.5	11.9	3.8	8.3%

In Iraq, deteriorating trend of malnutrition among under-five children was seen throughout the 1990s after the Gulf crisis. In the South/Center of Iraq, the rates of malnutrition steadily increased from 1991 to 1996, before the onset of the Oil for Food Programme (OFFP). Chronic malnutrition rose from 18.7% to 32%; underweight shot up from 9.2% to 23.4%; and acute malnutrition increased from 3% to 11% (UNICEF, CSO, and MOH, 1996). In 2002, Nutritional Status Survey in

<sup>9</sup> Source: Ministry of Health-HMIS. Palestine Health Care System, Health Status in Palestine 2002 , July 2003

Iraq, showed that acute and general malnutrition are less than half the levels of 1996, while chronic malnutrition has fallen by nearly 30% during the same period. Chronic malnutrition became 23.1%; underweight 9.4% and acute malnutrition 4% (UNICEF, CSO, and MOH, 2002).

In Bahrain Amine (1980) reported a 14.3 % rate of stunting and a 67.6 % rate of wasting among preschool children. In Egypt, underweight among pre school children 2 to 6 years was 12 % , but only 3 % among children 6 to 10 years, while stunting was 21 % among preschoolers and only 9 % in the 6 to 10 age group (Shaheen et al., 2002).

Apparently chronic malnutrition (stunting) is the most prevalent type of malnutrition among children below 5 years in the Palestinian Territory as well as in neighboring countries (Table 4), (Amine, 1980; Rizkallah, 1991; Kumar, 1995; UNICEF, CSO, and MOH, 1996; JHU / AQU, 2002; PCBS, 2002; Shaheen et al., 2002; UNICEF, CSO, and MOH, 2002). The reported percent of stunting was highest in Egypt and lowest in Jordan. Wasting, however, was reported highest in Syria and lowest in Jordan, whereas underweight was highest in Syria and lowest in Lebanon. (MOH-HMIS, 2003).

Table 2.2 Comparison of Nutritional Status among children under five in Palestine and neighboring countries<sup>10</sup>

The country	Underweight	Wasting	Stunting
<b>Palestine (John Hopkins Study) 2002</b>	8.3	7.8	11.7
<b>Palestine (PCBs) 2002</b>	3.5	2.5	9
<b>Jordan*</b>	5	2	8
<b>Egypt*</b>	12	6	25
<b>Lebanon*</b>	3	3	12
<b>Syria*</b>	13	9	21
<b>United states</b>	1	1	2
<b>Developing countries</b>	28	9	32

In the Palestinian Territory, as in the majority of the developing countries (Pinstруп-Andersen, 1999), malnutrition (undernutrition) have decreased over time. For instance, a recent report by UNRWA showed that between 1984 and 1990 stunting rates among refugee children decreased from 20.1 % to 7.6 % in GS and from 15.7 % to 6.3 % in WB. Similarly, underweight dropped from 6% to 4.4% in GS and

- 
- <sup>10</sup> UNICEF 2002
  - Source: Ministry of Health-HMIS. Palestine Health Care System, Health Status in Palestine 2002 , July 2003.

from 7.4% to 3.9% in WB. Wasting level, however, was low in both regions in 1984 and 1990 (Yip, 1990).

### **2.3.2 Overnutrition in Palestine and neighboring countries**

Most studies on overnutrition in the Palestinian Territory were conducted very recently in last few years (Abdul-Rahim, 2001; Stene et al., 2001; Abdul-Rahim, 2003). A common finding of these studies is the prevalence of obesity in women (37.5% - 49%) is higher than in men (18.8% - 30 %) living in the WB. Furthermore, obesity among Palestinian women and men in urban areas was higher than among women and men in rural area of the WB. The observed difference in obesity between urban and rural communities may be attributed to modernization, better socio-economical condition, increased food consumption and the concomitant sedentary lifestyles in urban areas (Abdul-Rahim, 2003). Among women in the age band 15-49, the prevalence of obesity was reported higher in GS (11.9 %) than in WB (10.4 %) (John Hopkins (JHU) / Al Quds University (AQU)).

### **2.3.3. Anemia in Palestine and neighboring countries**

Anemia among Palestinians, in the Palestinian Territory in Arab countries, was assessed by different investigators. In a recent report, the Palestinian MOH pointed out that half of the children GS and WB are affected by anemia. Moreover, the same report indicates that anemia accounted for 1.8% of child deaths in Gaza during the year 1995 ( MOH – Annual report, 1996).

The determinants of anemia were investigated as well. Early childhood anemia in Palestinian refugee camps was associated with factors reflecting poor socioeconomic status and recent diarrheal and febrile illnesses ( Khurram, 1990). On the other hand, increasing poverty and feeding behavior might determine the high prevalence of anemia among girls who seems to receive lesser amounts of nutritionally valued food than boys do (Giacamon, 1985). Furthermore, parasitic infections were significantly associated with anemia among children in GS, where about 63 % of the study population were anemic (Abed et al., 1987). In the West Bank, Abdel Nour (1991), reported that 25% of assessed children were found to have anemia and she observed that children who were given breast milk only had the lowest anemia prevalence rate.

The most two recent nutritional studies reported different rates of anemia among children under five in the Palestinian Territory (PCBS, 2002 and John Hopkins (JHU) / Al Quds University (AQU), 2002). The PCBS study reported an overall prevalence

(38 %) lower than that (43.8 %) reported by the JHU/AQU study. However, both studies indicated that anemia among children in GS is higher than in WB. The prevalence of anemia among Palestinian refugee children in refugee camps (41.9%) was higher than that in rural areas (36.3%) and than that in urban areas (36.8%) (PCBS, 2002).

In the Middle East, studies have estimated the prevalence of anemia in young children to range from 19 to 71% (Madanat et al. 1984; Lavon et al. 1985; Abdelnour, 1991; Gofin et al. 1992; Hossain et al. 1995; Kocak et al. 1995;). The overall prevalence of anemia among children (6–35 months old) living in Palestinian refugee camps in Syria, Jordan, West Bank, Gaza Strip and Lebanon, was 67 % (Yip, 1990). anemia was lowest (54%) in the West Bank and highest (75% ) in Syria.

Table 5 shows different figures for anemia prevalence in the Palestinian Territory among non-pregnant Palestinian women in the age band 15-49 years (PCBS, 2002 and John Hopkins (JHU) / Al Quds University (AQU)). According to JHU/AQU study, anemia was 48.6% (52.8% in Gaza Strip, and 43.8% in WB), whereas it was 33.2% (36.5% in Gaza Strip, and 31.4% in WB) by PCBS.

The PCBS Nutritional Survey (PCBS, 2002), reported that the prevalence of anemia among refugee women aged 15-49 years living in refugee camps (34.6%) was higher than in rural (33%) and urban areas (32.8%).

**Table 2.3 Prevalence of anemia among women and children in Palestine by region 2002<sup>11</sup>**

Anemia Region	PCBs Study			John Hopkins Study		
	GS%	WB%	Pal%	GS%	WB%	Pal%
<b>Children 6-59 months</b>	41.6	35.5	38	44.1	43.7	43.8
<b>Women (15-49 years)</b>	36.5	31.4	33.2	52.8	43.8	48.6

At the regional level, the prevalence of anemia among refugee non pregnant women in child-bearing age in GS (44.4%) was higher than in Syria (30.1 %), than in Lebanon (26.9 %), than in W.B (25.3%), than in Jordan (23.4%) was reported (Yip, R.,1990). In the same study, the overall prevalence of anemia among these women (30.2 %) was found almost three-folds higher than its prevalence among men (11.6 %). The prevalence was higher among men in GS (16 %), than in Syria (12.3 %) than in

<sup>11</sup>Source: Ministry of Health-HMIS. Palestine Health Care System, Health Status in Palestine 2002 , July 2003.

Lebanon (11.5 %), than in Jordan (6 %), than in WB (3.1%). Thalasemia was the main cause of anemia among men (Yip, 1990).

In Jordan, the prevalence of anemia among Jordanian pregnant women was 23.5% during the year 1990 and 25.5% during 1992 (*Jilani et al., 1992*). While among children between 6-12 years the prevalence of anemia was 15.5% (Daradken, 1995).

In Egypt, Brink (1983), reported a higher prevalence of anemia among chronically malnourished children when compare to normal children.

#### **2.3.4. The nutritional status in the Jordan Valley (Ghawr)**

Very few studies on nutrition were conducted in the JV. The prevalence of anemia in Ein Dyuk, a village near Jericho, was 59% among children 0-5 years, and the prevalence of malnutrition was 44 % ( females 51 % and males 34 %) (UPMRC, 1988). Another study reported a prevalence of anemia 42 % among preschool children ( bellow 6 year ) in Jiftlike, the northern part of JV (*Moamar Orab, 2000*). Furthermore, Giacamon (1996) conducted a nutritional study among children in Zbeidat, and reported overweight in 1.8%, normal in 45.1%, mildly malnourished in 25.1%, moderately malnourished in 20 %, and severely malnourished in 7% of the studied children.

## **Chapter 3**

### **Health Care in Palestine**

#### **3.1. Background**

The Palestinian territories were exposed to continuous incidents of violence and rage causing a great deal of suffering. Palestinian children who are the siblings of traumatized parents (*nakseh* of 1967) and grandparents (*nakbeh* of 1948) were born and lived under stressful conditions of political and military oppression. According to the findings of available researches trauma can be transmitted inter-generation (Danieli, Y.; 1985).

Al- Aqsa Intifada, or uprising, broke out at the end of September 2000. The subsequent Israeli measures brought great pain and suffering into the Palestinian Territory. The continuing severe closures, tight restrictions on freedom of movement, in addition to prolonged curfews, and siege, fighting in civilian areas, house demolitions and the destruction of agricultural lands and crops, have disrupted the lives of families and children, and escalated poverty rates (*Peter Hansen, 2002*). The majority of households in the Palestinian Territory have faced difficulties in getting sufficient food supplies during the Intifada so a disrupted access to food, can point to a continued worsening of Palestinian children's nutritional status ( Nutritional survey PCBS- 2002 ).

#### **3.1.1. Geography of Palestine**

Palestine, currently under occupation. It is located on the East coast of the Mediterranean Sea, West of Jordan and to the south of Lebanon, in the western edge of the Asian continent. According to The Palestinian National Information Center (PNIC, 1999), the total area of Palestine is 27,000 sq.km. The most of the Palestinian land was occupied by Israel as a result of the 1948 war, while the remaining part of Palestine ( West Bank and Gaza Strip) was also occupied by Israel in the year of 1967. Prior to the war of 1967, the West Bank (W.B) was administrated by Jordan while the Gaza Strip by Egypt. According to the Oslo agreement in 1993, the Palestinian Territory comprises of the two geographically separated regions namely

the West Bank and the Gaza strip. The total area of the Palestinian Territory is 6000 square Km ; the *W.B. area is 5634 sq. km* , while *Gaza Strip is 362 sq.km* .

*Palestine can be divided into four main distinct regions:*

- ❖ Coastal and Inner Plains: The coastal stretch is divided by Jabal al-Karmel (Mount Carmel) into the plain of Akka and the plain of Palestine. The inner part consists, largely, of Marj bin amir
- ❖ The Mountains and Hills: Mountains are located in al-Jaliil (Galilee), al-Karmel, Nablus and Hebron areas.
- ❖ The Southern Desert: This region comprises almost half of the land of Palestine. Bi'r as-Sab' is the main town in that region. (Mohammad Shurraab).
- ❖ **The Jordan Valley (Al-Ghawr ):** This area of the study is considered the lowest area in the world, under sea level, and it is a part of the Great Rift Valley (PNIC, 1999). It is located between the Jordan River and eastern slopes of the central mountains of the W.B. The area is characterized by a very hot and dry summer and with mild rainy winter. January is the coldest month , where the average temperature varies between 15-19° C, while August is the hottest month with temperature up to 39° C. The average annual temperature is 23.5° C and the highest average annual temperature is 30.5° C. The average annual amount of rainfall is 150 millimeters, and the average annual humidity is 52% (Al-Jawabreh A, Barghuthy F, et al,1999). This area has very good soil but very little water resources. Agriculture there depends on irrigation either from local streams or the Jordan River.

### **3.2. Population size and structure**

According to a census conducted in 1997, the number of the population living in the Palestinian Territories (the West Bank and Gaza Strip) is 2.89 millions, including the residents of Jerusalem. About 1.57 million (53.3%) live in the West Bank, 1.02 million (35.3%) in Gaza Strip, and 330 thousands (11.4%) in East Jerusalem (PCBS census 1997). Furthermore, 1,074,718 individuals are registered refugee of whom 65% are in Gaza strip; and 35 % in the W.B. and Jerusalem ( PCBS-1997). It is projected that in Palestinian Territory the total population will be 3,827,914 by the year of 2004 while by the year of 2010 will be 4,993,650 (PCBS-1997).

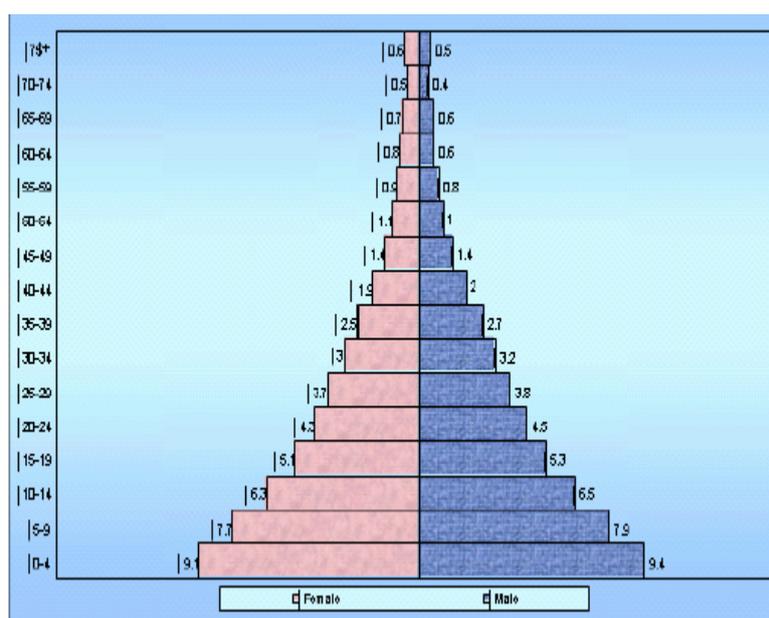
Population density in Gaza strip is very high compared with the density in the West Bank and neighboring countries. Density rate in GS is about 3,505 pers /km<sup>2</sup> and about 380 pers /km<sup>2</sup> in WB ( MOH-HMIS, 2003b).

### 3.2.1 Age and sex distribution

The Palestinian population is young where 46.4 % of them are under 15 years (Figure 3.1). This pattern is more pronounced in Gaza strip (49.6%) than in the WB (44.6%). The age group under five years constitutes the largest proportion with a percentage of 18.1% of population (19.4% in GS and 17.3%in WB ). About 3.2% of the Palestinians are 65 years and above.

The estimated number of males in the Palestinian Territory at the end of 2002 is 1.75 million compared with 1.71 million females; the sex ratio is 102.2.( MOH-HMIS, 2003b).

**Figure 3.1 Distribution of Population by age group and sex Palestine 2002<sup>12</sup>**



### 3.2.2. Dependency ratio and unemployment

Dependency ratio is calculated as the number of persons below fifteen and above sixty- five per 100 person aged 15-64 year ( economic dependency). In 2002, the dependency ratio for Palestine is 101.6% ( 108% for Gaza strip Vs 92% for west Bank) .( MOH-HMIS, 2003b).

<sup>12</sup> Source : MOH-HMIS, Population and Demography, Health Status In Palestine 2002, July 2003

According to a UN survey in October 2001, unemployment reached 31.5 per cent in the West Bank and 48 per cent in the Gaza Strip.

### 3.2.3. Population growth( Natural Increase):

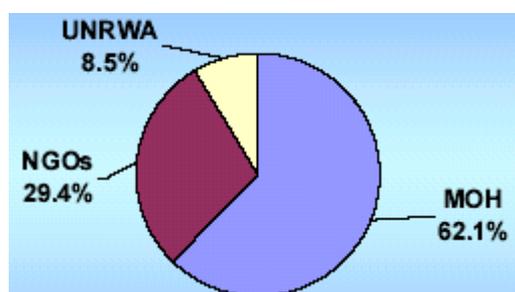
The declining mortality rate and increasing fertility rate would lead to high rates of natural increase in population. Natural increase rate in the Palestinian Territory was 3.8 % (3.6% WB & 4.1% GS) in 1997 and is estimated to decrease to 3.4% (3.1% WB & 3.9% GS) by the year 2005 (PCBS –2003).

### 3.3. Providers of health services

Health care provider is defined as an individual whose responsibility involves one or more of the following: the provision, administration, teaching, and development of health services, activities, or supplies. The provider may have direct or indirect interest in health industry (PCBS,NS-2002).

In the Palestinian Territory, there are four major health service providers (World Bank,1997), namely: the Palestinian Ministry of health (MOH), the United Nation Relief and Work Agency (UNRWA), the Non-Governmental Organizations (NGOs), and the private for-profit providers. The first three are the main health providers. In the Palestinian Territory there are 603 PHC centers, of which 375 centers are operated by MOH, 51 centers by UNRWA, and 177 centers by NGOs (Figure 3.2)

Figure 3.2 Proportional distribution of PHC centers by provider in Palestine<sup>13</sup>



### **3.3.1. Ministry of Health (MOH) :**

In Palestinian Territory MOH is considered the main health care provider who operates 375 centers (47 GS and 328 WB). The MOH is responsible for primary and secondary health care services (MOH,2003).

### **3.3.2. United Nation Relief and Works Agency (UNRWA)**

UNRWA started to provide its services free of charge to the Palestinian refugees since 1948. It plays a distinguished role in the program of vaccination in cooperation with MOH, in addition to curative, antenatal and postnatal care and other specialized services. In the Palestinian Territory, UNRWA operates 51 PHC ( 17 centers in Gaza strip and 34 in west bank ).

The average ratio of refugee per center in the Palestinian Territory is about 30,051 refugees per center, ( 52,538 in Gaza strip and 18.807 refugees per center in west Bank ). Most refugees still live in overcrowded camps with substandard dwelling and sanitation conditions. However UNRWA contracts and purchase some of the secondary and tertiary services from other health care providers (UNRWA,1999).

The number of people in Gaza strip who can make use of UNRWA services is much higher than in West Bank. any way the refugees can access to health services provided by MOH ( MOH,2003).

### **3.3.3 Non – Government Organizations (NGO):**

The NGOs sector was first initiated in the late 1970s and became well established during mid 1980s.

In the Palestinian Territory four main NGOs are operating, namely: the Health Service Council ( HSC ), the Union of Health Work Committees (UHWC ), the Health Care Committees ( HCC) and the Union of Palestine Medical Relief Committees ( UPMRC ) (MOH, 2003).

### **3.4. Health insurance:**

Results of the Nutritional Survey ( PCBS,2002) showed that 74.3% of persons in the Palestinian Territory reported to be covered by some sort of health insurance, of which 67.9 % in the West Bank and 83.9 % in Gaza Strip. Most of the insured individuals 48.4% are covered by governmental health insurance, 11.6% by UNRWA insurance , and 9.6% by private insurance (MOH,2003) .

### **3.5. Accessibility to health services**

Accessibility to health center has been a considerable source of concern for the health community especially with respect to children, chronic disease management, and emergency medical needs ( surgery ) where hospitalization and /or specialty care is needed. According to Nutritional Survey( PCBS,2002), 40.0% of households in the Palestinian Territory are unable to access health services. Also, the percentage of household reporting inability to access emergency care when needed ranged from 7.3% of households in November 2002 to 3.5% in December 2002, and the inability to access immunization services dropped from 3.6% to 2.2% in the same period ( MOH-HMIS, 2003b).

### **3.6. Selected health indicators**

The following section presents some selected health indicators that could be related to nutritional and health status of in the Palestinian Territory.

#### **3.6.1. Life expectancy**

Improvement in health situation and the gradual decline in the infant and child mortality rate in the Palestine led to longer life expectancy. It reached 71.1 years for males and 72.6 years for females in 2002. ( MOH-HMIS, 2003b).

#### **3.6.2. Total fertility rate in the Palestine (TFR)**

The fertility rate in the Palestinian Territory is high compared to those dominant in other countries. High TFR is mostly due to early marriage especially among females, the desire to have many children and prevailing tradition of the Palestinian society. TFR is on of the most important determinants of high Palestinian population, which determine the future living in the Occupied Territory and leads to high population growth rate ( Karam I, 2003). However, indicators show that the TFR started to decline. TFR rates over the past 7 years were: a decline from 7.4 in 1994 to 5.58 in 1998, and from 4.31 in 2000 to 3.73 in 2001, and a slight increase to 3.85 in 2002 ( MOH-HMIS, 2003b).

#### **3.6.3. Infant Mortality Rate (IMR)**

The infant mortality rate ( IMR ) is the number of infants out of 1,000 live birth who die in their first year. It provides information about infant feeding and early childcare practices in the home, availability of food, preventive health services and medical care. ( MOH-HMIS, 2003b).

In Palestine IMR has been declined over the past two decades from level estimated to be 150/1,000 prior to 1967 to about 22/1,000 live birth in 1996. However, in 2002, IMR increased to reach 23.3 infant deaths per 1,000 live births ( MOH-HMIS, 2003b).

#### **3.6.4. Maternal mortality ratio ( MMR )**

This parameter is one of the most important indicators to the health status of women. Most maternal deaths are results of hemorrhages, complications of unsafe abortion, pregnancy-induced hypertension, sepsis or obstructed delivery. In the Palestinian Territory, many risk factors including unrest of the political situation and repeated curfews and frequent closures and separation of Palestine areas are determinant factors that increase the risk of maternal mortality (MOH-HMIS, 2003b). In 2002 only (6) maternal deaths were reported by HMIS in Palestine ( 4 in WB and 2 in GS ), in addition to other 7 cases reported in Gaza strip by different health providers. Therefore , the reported maternal mortality ratio ( MMR ) in Palestine is about (13.8) per 100,000 live births among women aged 15-49 years ( 21.6 in GS and 7.6 in WB ) (MOH-HMIS, 2003b) .

#### **3.6.5. Crude birth rate ( CBR )**

The CBR is the number of live births per 1000 population per year. Despite the progressive decline in CBR in the Palestinian Territory, it is still high when compared with other countries. The CBR declined from 46.5/1000 in 1995 to 34.5/1000 in 1998, 28/1000 in 2001 and 27.2 in 2002 ( MOH-HMIS, 2003b).

### **3.7. Immunization**

Immunization against infectious diseases is given free of charge for all Palestinian infants and children. The Palestinian national authority adopted the Expanded Program of Immunization (EPI), as a preventive measure against the most serious communicable diseases. The EPI includes: *BCG* (Bacillus Calmet Guirin) which is against Tuberculosis.; *DPT* ( Diphtheria, Pertussis, Tetanus); *OPV* (oral polio

virus ); *IPV* ( Inactivated polio virus); *Hep B* against hepatitis B; *MMR* ( Mumps, Measles, and Rubella); and *Measles* in one dose . The high level of immunization coverage in the Palestinian Territory is a major public health success ( MOH-HMIS, 2003b).

A remarkable drop in vaccination coverage was observed in the Palestinian Territory in 2002 in comparison with 2001 (Table 2). This dropping in vaccination coverage is due to Israeli tight restrictions on freedom of movement, fighting in civilian areas, house demolitions in addition to prolonged curfews, and if the same situation continues, sever deterioration of the health situation is expected, besides the appearance of some of infectious diseases outbreaks(MOH-HMIS,2003b).

**Table 3.1 The impact of the current political situation on vaccine coverage in the West Bank in 2002 in comparison with 2001<sup>14</sup>**

<b>Vaccine</b>	<b>2001</b>	<b>2002</b>	<b>% of differences</b>
<b>BCG</b>	97.4	90.1	7.5
<b>DPT3</b>	96.1	85.5	11.0
<b>OPV3</b>	96.1	85.7	10.8
<b>HepB3</b>	95.4	87	8.8
<b>Measles</b>	96	89.9	6.4
<b>T.T.2</b>	25.8	22.1	14.3

<sup>14</sup>Source :MOH-HMIS,(2003a) Palestinian Health Care System,Health Status In Palestine 2002

## **Chapter 4**

### **Methodology**

#### **4.1. Study design**

This is a descriptive field study of the nutritional status (NS) of non-pregnant women (15-49 years) and children under five, in the Palestinian Bedouin community in the Jordan Valley (JV). The NS of the Bedouin group was compared to the NS of a group of refugees (women and children) living in Jericho.

#### **4.2. The Sample**

This study represents the research aspect of a health services project launched by ICS. The project aimed to target the Palestinian Bedouin community living in the Jordan valley. Because the Bedouin community is scattered and distributed in small clusters along the JV, the Bedouin group in this study represented a non – random convenient sample . That is during field visits, every women in the age grouping 15-49 years and every child below 5 years old,( from the south of Jerusalem, through Jericho, Ein assultan, Nuameh, Ouja, Fasaeil and up to the Jeftliq in the north of JV) were invited to participate in the study.(Figure 4.1).

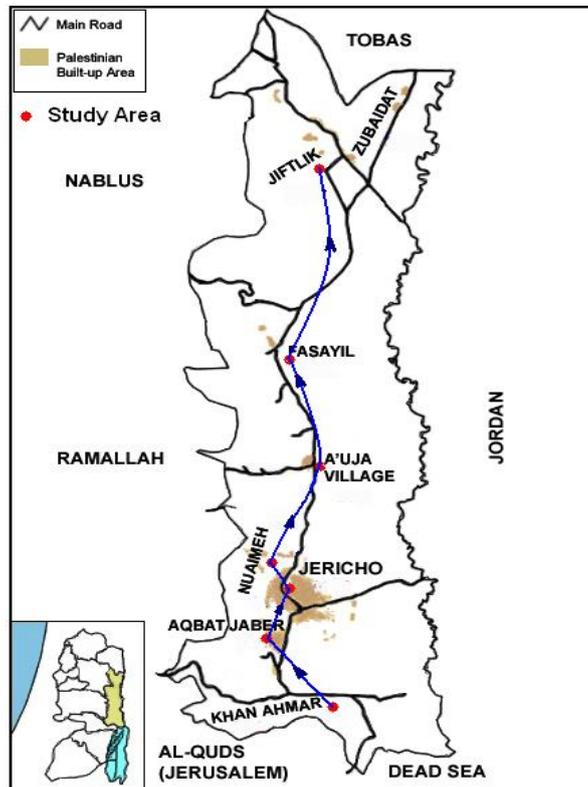
For the Refugees group, it was planned to take a random sample. But because many of the households were uncooperative and refused participation in the study, a convenient sample was also taken from Aqbat Jabber Camp, Ein El-Sultan and A’uja ( Figure 4.1) . In, Ein El-sultan , the sample was taken from women and children who visited the UNRWA clinic. However in the camps of Aqbat Jaber and A’uja, the sample was taken from households who accepted to participate in the study .

To achieve the aim of ICS project , blood samples were collected from all women who agreed to receive the service provided Hence, a total of 608 women benefited from the project . However , 94 women were pregnant and were excluded from this study. Therefore , the study sample was 514 non-pregnant women ( 5-49 ) of whom 258 were Bedouin , and 256 were Refugees. The study included also 594 children under 5 years, of whom 309 were Bedouin and 285 were refugees.

In order to associate child NS with mother-related factors, it was planned, whenever possible, to select a child under 5 years of every women included in the

sample. Subsequently, only 300 of all children were offspring of women who participated in the study, whereas the remainder were not. Of those children 163 were Bedouin and 137 were refugees.

**Figure: 4.1 Mapping of the Study area**



### 4.3 Data Collection Instrument ( The questionnaire):

Variables of the study questionnaire were collected from similar instruments used in previous studies. (Rizkallah, 1991; Hassan, 1997; AL-Quds and John Hopkins universities, 2002; PCBS, 2002; Woldemariam, 2002; SRI LANKA, 2003). The study questionnaire was of two parts. Part one consisted of 50 questions about the demographic, socioeconomic, and reproductive characteristics of the participant women. Part two included 21 questions about the child such as gestational age, birth weight, birth order, breastfeeding, weaning and child illnesses.

#### 4.3.1 Questionnaire Validity

The questionnaire was reviewed and validated by a group of referees. Furthermore validity was measured by calculating the items correlation matrix by

using Person correlation (only for items of the same scale), which shows the internal consistency of the questionnaire item and indicates that they all combined measure the description of the nutritional status of childbearing women and children under five among Palestinian Bedouins in the Jordan Valley.

### **4.3.2 Questionnaire Reliability**

As regards the questionnaire reliability, it was tested by calculating the internal consistency of the instrument using the Cronbach Alpha for the study sample (only for items of the same scale), which was (0.87). This value shows that the instrument is highly reliable.

## **4.4 Field Work Techniques**

### **4.4.1 Pilot testing of the instrument**

The questionnaire was pilot-tested at the beginning of the study. The aim of the pilot study was to test all activities related to the main survey. The questionnaire was distributed and read initially to 18 women (10 Bedouin and 8 Refugees), vague questions were reviewed, changes were made, and the questionnaire was reconstructed accordingly. Pilot-tested questionnaires were excluded from the analysis

### **4.4.2 Ethical consideration**

Before starting the research, the proposal was submitted to Al-Quds University (research committee) and had their approval to carry out the study according to the University Institutional Review Board.

Participant women agreed to complete the questionnaire and to have their blood tested, after the researcher had read to every woman an informed consent. Women were informed of their blood test results and those who were found anemic were given ferrous sulfate tablets provided by ICS.

### **4.4.3 Data Collection**

Data were collected from both groups during field visits facilitated by the health team of the mobile clinic of Al-Islah Charitable Society (ICS) in Jericho. The health

team of ICS and the researcher used to travel to the Bedouin clusters and refugee camps.

On every trip the research team prepared the equipment for anthropometric measurements (standardized adult and pediatric weight and height scales, length board and tape) and supplies for blood collection (EDTA tubes, alcohol, syringes, tourniquet and ice box carrier).

During the field visits, face to face interviews were conducted by the researcher to complete the questionnaires. Then, anthropometric measurements (weight and height or length) were taken for women and children by a nurse. Venous blood was obtained in EDTA tubes from women by a laboratory technician and placed immediately in the ice box carrier. The collected samples were transported properly in ice box to ICS laboratory for hemoglobin determination using a cell counter (Cell Dyn 1700, Abbott diagnostics, USA ). Few blood samples were randomly selected and were retested in the Arab Health Center laboratory in Bethany using a cell counter of the same series.

The study took place in two periods: first between November 2001 and February 2002, and second between October 2002 and November 2002. The prolonged time of data collection was uncontrolled due to the severe political situation characterized the military actions taken by the Israelis, including blockage of roads connecting Palestinian cities, and prolonged curfews in the majority of the region. Occasionally, travel to reach the field was interrupted by the prevailing circumstances at that time. Therefore, the team had to make several trips to the same site until the task was successfully completed.

#### **4.5 Data processing and analysis**

Every completed questionnaire was identified by a unique serial number. This number was used to link data on a participant woman and her child.

For data entry a data file (.rec) was created with the appropriate entry codes using EPI - INFO version 6 (CDC, Atlanta, Georgia, USA).

Preliminary analysis including frequency tables and cross tabulations of variables was performed using the analysis program of EPI – INFO .The generated tables were used for data cleaning.

The cleaned data file was converted into SPSS format ( Statistical Package of Social Science) . Five percent of the questionnaires were selected randomly and data cleaning process was checked up using SPSS. The SPSS file was used to calculate anthropometric indices for children using the software ANTHRO version 1.02 (CDC, Atlanta, Georgia, USA).

The Z-scores of height-for-age, weight-for-height and weight-for age were calculated according to the National Center for Health Statistics (NCHS) reference (WHO, 1985).

New variables were then derived from already existing variables in the data file. The new variables were : BMI from weight and height; Status of anemia from Hemoglobin concentrations; Stunting from Z-scores of height-for-age; Wasting from Z-scores of weight-for-height and Underweight from Z-scores of weight-for age .

Furthermore, other variables were recoded into new variables with new values e.g. marital status, education, family income etc.

To link child variables with mother variables a sub-file was created from the main data file.

SPSS was used for data analysis including cross tabulation of variable and t-test to compare means.

#### **4.6 Limitation of the study**

In this study limitation that were considered are :

- 1- This study is limited to the Bedouin community in the JV. Because of the type of sampling and sample size, the findings can not be generalized to the Palestinian population or to the Bedouin community at large .
- 2- The political situation represented by the imposed Israeli military activities including curfews, road blocks, prevention of movement between cities, fighting in civilian areas, prolonged the data collection phase of the study beyond expectations.
- 3- Some Bedouin clusters, especially those located in hilly area, were difficult to reach by car in rainy days. It was difficult for the researcher to carry the measuring equipment to these locations, and hence anthropometric measurement were not taken. Eventually, individuals from these areas were not included in the sample.

- 4- Discussion of the study findings was not feasible because of the scarcity of studies on the NS of the Palestinian population in general, and the Bedouin community in JV in particular.
- 5- Some of the participating women did not bring along their children during the field visit. Therefore, children of other non participating women were included to maintain a reasonable sample size.

## 4.7. Definition of Variables

### 4.7.1 Operational Definitions

- ☐ **Age:** Woman's age at the time of the interview, calculated from date of birth in years.
- ☐ **Age for children :** Was measured by the counting the number of months lying within the period between the month of birth of the child and the month of the data collection.

- ☐ **Age categories : for children, composed of six categories (in months):**

**< 6months ; between 6 - 11.9 ; 12 - 23.9 ; 24 - 35.9 ; 36 - 47.9 ; 48 – 59.9 months.**

For women, composed of four categories(in years): 15 - 19 year ; 20 – 29 ; 30 - 39 ; and from 40 – 49 years .

- ☐ **Gender:** Boy or girl.
- ☐ **Status:** according to status, two major categories were defined: Bedouin and Refugees.
  - a. **Refugees :** Persons who are living in refugee camps or outside and registered at UNRWA and thus posses an UNRWA registration card that qualifies him/her for it's free services.
  - b. **Bedouin :** includes those who are living in tents as a tribal settlement (nomad Bedouin) and who are living in concret or semi-concrete houses (Bedouin or semi-Bedouin ).
- ☐ **Marital Status :** composed of two categories: Never-married and ever-married ( married, separeted, divorced or widow).
- ☐ **Anemia :** Anemia was defined for the purpose of this study to be present as a

**hemoglobin (Hb) concentration level of less than: < 12 g% for adult non**

pregnant woman.

■ **Anemia categories:**

1- Mild when Hb level between 10 – 11.9 g%.

**2- Moderate Hb between 7 - 9.9 g%**

**3- Severe anemia Hb < 7 g%.**

■ **Malnutrition:** intend to express the nutrition status in this study.

**Definition differ for women and children**

**a. For women:** Malnutrition was defined by *Body Mass Index (BMI)*, a ratio of weight for height square ( $Wt / Ht^2$ ),

A woman was considered as underweight if BMI was less than 18.5; Normal if BMI was 18.5 - 24.9; Overweight if BMI was between 25 – 29.9, and Obese when BMI was equal or over 30 ( $\geq 30$ ).

**b. For children:** three categories of malnutrition were defined :

1- Acute malnutrition (*Wasting or Thinness*) defines categories of moderate and severe acute malnutrition if Z- score for weight for height was less than – 2 Z scores .

2- Chronic malnutrition (*Stunting or shortness*) Defines categories of moderate and severe chronic malnutrition if Z-score for height for age was less than – 2 Z scores .

3- *Underweight or Lightness* (low weight for age), that Z score for weight for age was less than – 2 Z scores .

■ **Z score** : 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 (SD) of the population.

■ **Diarrhea** : Was defined as a condition reported by mothers or child care providers during which the child has an episodes of three or more loss or watery stool passed in a day( *WHO, 1989*) . Only diarrhea occurring within a period of two weeks prior to assessment was considered .

■ **Family income** : composed of three categories: Low family income (< 1000 NIS); Medium family income (1000-2000 NIS) and High family income (> 2000 NIS).

- **Employment status:** who works outside the family for cash payment.
- **Education :** composed of two main categories: illiterate (who don't read or write) and literate which include those who read & write, school attendance up to Tawjihi and those with higher education.

#### 4.7. Anthropometric measurements

**4.7.1. Weight :** Was checked to the nearest 0.1 Kg, using transportable infant balance scale ( Seca beam of 20 Kg balance scale) for children , and Adult scale (Seca 140 Kg balance scale ) for women .

**4.7.2. Length ( Recumbent Length):** Was used for children bellow 2 years ,by using length board , where the child was put on his back, touching the surface of the board by the back of his head (facing strait), back, buttocks, and with strait legs, and feet positioned vertically against the surface. A mobile rigid piece for head was used, where feet plants touching the rigid margin of the board.

**4.7.3. Height ( Standing length):** Was taken for children 24-59 months, and women 15-49 years old. An adult scale which is supplied with a vertical pieces for length measurement graduated to the nearest 0.1 cm, and with a rigid head piece. The person stood with back against the rigid graduated piece, without shoes and touching it with his buttocks, back and the back of the head, while looking straight.

In some occasion where it was not possible to use the scale, a fixed tape was used against the wall.

## Chapter 5

### Results

#### 5.1. Introduction

In this chapter, the basic characteristics of the study population are described. Furthermore, the nutritional status of the non-pregnant Bedouin women (15 – 49 years) and Bedouin children under 5 living in JV, was compared to that of refugees living in the same area. The computer software SPSS was used in analysis .

The nutritional status of women was assessed by measuring hemoglobin levels and BMI. For children, the nutritional status was described by anthropometric indicators including stunting, wasting and underweight. Malnutrition among women and children was associated with certain variables including demographic, socioeconomic, and women's health related.

#### 5.2 Characteristics of the study population

##### 5.2.1. Structure of the study population

The study included 608 women of whom 310 were Bedouin and 298 were refugees in the reproductive age (15-49 years). Ninety four women were pregnant and 514 were non-pregnant, of whom 258 were Bedouin and 256 were refugees (Table 5/1). Pregnant women were excluded from the analysis .

The study included also 594 children under 5 years, of whom 52 % were Bedouin and 48 % were refugees. The male : female ratio was 1.02:1 among all children, 1.13:1 and 0.91:1 among Bedouin and refugees, respectively (Table 5/1).

Of all children, 300 were offspring of women who participated in the study, whereas the remainder were not. Of these children 163 (54.5 %) were Bedouin and 137 (45.7 %) were refugees. (Table 5/1) .

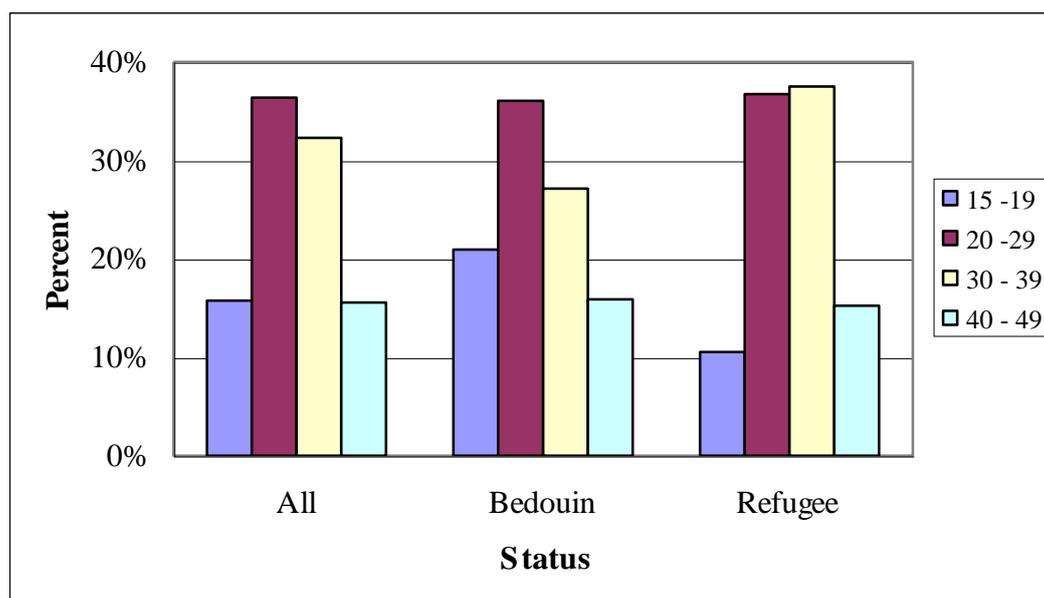
##### 5.2.2. Demographic characteristics

The mean age for all participant women was 29.5 years with SD (8.74). The mean age of Bedouin women (28.6 years  $\pm$  9.17) was significantly ( $P < 0.05$ ) lower than that of refugees (30.5  $\pm$  8.39). Figure 5/1 shows that the highest proportion of Bedouin women (36%) were in the age group (20-29 years), while the lowest (16%) were in the age group (40-49 years). Among refugees, the percent (37 %) of women in age group (20-29) was equal to that in the age group (30-39) and represented the highest proportion. The percent of refugee women in the age group (15-19 years) constituted the lowest proportion (11 %).

**Table 5/1 Structure of the study population**

		Total		Bedouin		Refugees	
		N	%	N	%	N	%
<b>Women</b>		608		310	<b>51</b>	298	<b>49</b>
	Non pregnant	514		258	<b>50.2</b>	256	<b>49.8</b>
	Pregnant	94		52	<b>55.3</b>	42	<b>44.7</b>
<b>Children</b>		594		309	<b>52</b>	285	<b>48</b>
	Boy	300		164	<b>54.7</b>	136	<b>45.3</b>
	Girl	294		145	<b>49.3</b>	149	<b>50.7</b>
	Male : Female ratio	1.02 : 1		1.13 : 1		0.91 : 1	
<b>Children offspring of participant women</b>		300		163	<b>54.3</b>	137	<b>45.7</b>
	Boy	154		89	<b>54.6</b>	65	<b>47.4</b>
	Girl	146		74	<b>45.4</b>	72	<b>52.6</b>

**Figure 5/1 Percent distribution of Bedouin and refugee women by age group**



About 23 % of all participant women were never married and 77 % were ever married as depicted in (Table 5/2).

**Table 5/2 Selected demographic characteristics of Bedouin and Refugee women**

Characteristic	Total	Bedouin	Refugees
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	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
<b>Women age (Mean ± SD)*</b>	514	<b>100</b>	258	<b>50.2</b>	256	<b>48.2</b>
	29.5 ± 8.74		28.6 ± 9.17		30.5 ± 8.39	
<b>Marital status</b>						
Never married	116	<b>23</b>	72	<b>28</b>	44	<b>17</b>
Ever married	398	<b>77</b>	186	<b>72</b>	212	<b>83</b>
Age at marriage (Mean ± SD) **	18.9 ± 3.58		18.6 ± 3.42		19.3 ± 3.70	
<b>Women's education</b>						
Don't read or write	105	<b>20</b>	88	<b>34</b>	17	<b>7</b>
Read & write	25	<b>5</b>	11	<b>4</b>	14	<b>6</b>
Up to Tawjihi	345	<b>67</b>	152	<b>59</b>	193	<b>75</b>
Higher Education	39	<b>8</b>	7	<b>3</b>	32	<b>12</b>
<b>Spouse education</b>						
Don't read or write	33	<b>9</b>	21	<b>12</b>	12	<b>6</b>
Read and write	45	<b>12</b>	28	<b>16</b>	17	<b>8</b>
Up to Tawjihi	249	<b>65</b>	118	<b>65</b>	131	<b>65</b>
Higher Education	54	<b>14</b>	12	<b>7</b>	42	<b>21</b>

\* Difference between means for Bedouin and refugees was statistically significant ( $P < 0.05$ )

\*\* Difference between means for Bedouin and refugees was statistically not significant ( $P > 0.05$ )

Furthermore, 72 % of Bedouin and 83 % of refugees were ever married (Table 5/2). The mean age at marriage for ever married Bedouin women ( $18.6 \pm 3.42$ ) was not significantly ( $P > 0.05$ ) lower than ( $19.3 \pm 3.70$ ) for refugees.

Table 5/2 shows that about 80 % of all participant women were literate and only 20 % could not read and write. The percent of illiterate women among Bedouin (34 %) was five fold that (7 %) of refugees. Furthermore, women who studied up to Tawjihi together with those who had higher education were 62 % and 87% among Bedouin and refugee women, respectively (Table 5/2). Similarly, table5/2 shows that husbands of (86%) refugee women are better educated than husbands of (72 %) Bedouin women.

### 5.2.3. Socioeconomic characteristics

Of all the participant women 467 could report their family income. The majority (51%) of these women reported a moderate family income (1000 – 2000 NIS), and about one fifth reported either low ( $< 1000$  NIS) or high ( $> 2000$ ) family income. More (23%) refugee women than (14%) Bedouin women reported high family income, whereas 24% and 20% of

Bedouin and refugee women, respectively, reported low family income (Table 5/3).

Although only 7% of the participant women were employed, the percent of employment among refugee women (11 %) was higher than among Bedouin women (3 %). However the percent of spouse employment for all women was 79%; for Bedouin 75%, and for refugees 82% (Table 5/3).

**Table 5/3 Some socioeconomic indicators of Bedouin and refugee women**

Indicator	Total		Bedouin		Refugees	
	N	%	N	%	N	%
<b>Family Income</b>						
Low (< 1000 NIS)	111	<b>22</b>	61	<b>24</b>	50	<b>20</b>
Medium (1000-2000 NIS)	261	<b>51</b>	133	<b>51</b>	128	<b>50</b>
High (> 2000 NIS)	95	<b>18</b>	35	<b>14</b>	60	<b>23</b>
<b>Employment status</b>						
Participant women	35	<b>7</b>	8	<b>3</b>	27	<b>11</b>
Women Spouse	405	<b>79</b>	194	<b>75</b>	211	<b>82</b>
<i>Type of housing</i>						
Tent	48	<b>9</b>	48	<b>19</b>	0	<b>0</b>
Concrete	339	<b>66</b>	104	<b>40</b>	235	<b>92</b>
Metal	52	<b>10</b>	50	<b>19</b>	2	<b>1</b>
Others	75	<b>15</b>	56	<b>22</b>	19	<b>7</b>
<b>Total Family size</b>						
1-4 members	114	<b>22</b>	49	<b>19</b>	65	<b>25</b>
5-9 members	298	<b>58</b>	139	<b>54</b>	159	<b>62</b>
10 members or more	102	<b>20</b>	70	<b>27</b>	32	<b>13</b>

As shown in table (5/3) the majority (92%) of refugee families and about 40 % of Bedouin families were living in concrete houses. The remainder of Bedouin families were either living in (19 %) tents, (22 %) huts made of metal or (22 %) other unusual types of housing.

The majority (58 %) of all participant women had families of 5-9 members. About 27 % of Bedouin women and 13 % of Refugees women had families of 10 members or more (Table 5/3).

#### **5.2.4 Health indicators**

Table 5/4 illustrates various health indicators for Bedouin and refugees. Concerning primary health care services, about 51 % of Bedouin claimed to attend governmental clinics, 37 % attended UNRWA clinics and the remainder relied on private health providers. On the other hand, 90 % of refugees attended UNRWA clinics, 7 % attended governmental clinics, and the remainder attended other types.

Among ever married women, 86 % of all participant, 80 % of Bedouin, and 91 % of refugees claimed to have received antenatal care. On the other hand, “hospital” was the usual place of delivery for 80 % of Bedouin and 86 % of refugees. About 13 % of Bedouin and 10 % of refugees were used deliver their babies at home. Bedouins and refugees were not significantly different in terms of number of pregnancies or number of deliveries. The mean number of pregnancies was (5.5 ± 3.87) for Bedouins and (5.4 ± 3.4) for refugees. Whereas the mean number of deliveries was (4.7 ± 3.33) for Bedouin and (4.5 ± 2.7 ) for refugees(Table 5 / 4).

**Table 5/4: Health indicators of Bedouin and refugee women**

Indicator	Total		Bedouin		Refugee	
	N	%	N	%	N	%
<b>Type of attended primary health care facility</b>						
Governmental clinics	149	<b>29</b>	131	<b>51</b>	18	<b>7</b>
UNRWA clinics	325	<b>63</b>	95	<b>37</b>	230	<b>90</b>
Private doctors	33	<b>6</b>	28	<b>11</b>	5	<b>2</b>
Hospitals	7	<b>2</b>	4	<b>1</b>	3	<b>1</b>
<b>Used to receive antenatal care</b>						
Yes	343	<b>86</b>	149	<b>80</b>	194	<b>91</b>
No	29	<b>8</b>	21	<b>11</b>	8	<b>4</b>
Others	26	<b>6</b>	16	<b>9</b>	10	<b>5</b>
<b>Usual place of delivery</b>						
Home	57	<b>11</b>	33	<b>13</b>	24	<b>10</b>
Hospital	415	<b>83</b>	206	<b>80</b>	209	<b>86</b>
Others	28	<b>6</b>	18	<b>7</b>	10	<b>4</b>
<b>Pregnancies (mean ± SD)**</b>	5.4 ± 3.62		5.5 ± 3.88		5.4 ± 3.43	
<b>Deliveries (mean ± SD)**</b>	4.5 ± 3.03		4.7 ± 3.33		4.5 ± 2.75	
<b>Use of contraceptives</b>						
IUD	80	<b>20</b>	34	<b>18</b>	46	<b>22</b>
Pills	42	<b>11</b>	13	<b>7</b>	29	<b>14</b>
None	276	<b>69</b>	139	<b>75</b>	137	<b>64</b>
<b>Use of iron Supplementation</b>	90	<b>18</b>	45	<b>17</b>	45	<b>18</b>
<b>Cigarette smoking</b>	27	<b>5</b>	17	<b>7</b>	10	<b>4</b>

\*\* Difference between means for Bedouin and refugees was statistically not significant (P> 0.05)

Thirty one percent of all married participant women used the main contraceptive methods (IUD & pills); 20% utilized IUD and 11% used pills. The use of contraceptive methods was higher among refugees (36 %) than among Bedouin women (25 %). Both Bedouin and refugee women relied on IUD more than on pills

as contraceptive means. Nonetheless, the use of pills was double (14%) among refugee than (7%) among Bedouin women.

Another indicator of women's health was the use of iron supplementation, where only 17 % of Bedouin and 18% of refugee women were using iron supplementation at the time of the study (Table 5 / 4).

The same table shows that 5% of all non-pregnant women were smoking cigarettes. About 7% of Bedouin and 4% of refugee women smoked cigarettes.

### **5.2.5. Nutritional status of non-pregnant women**

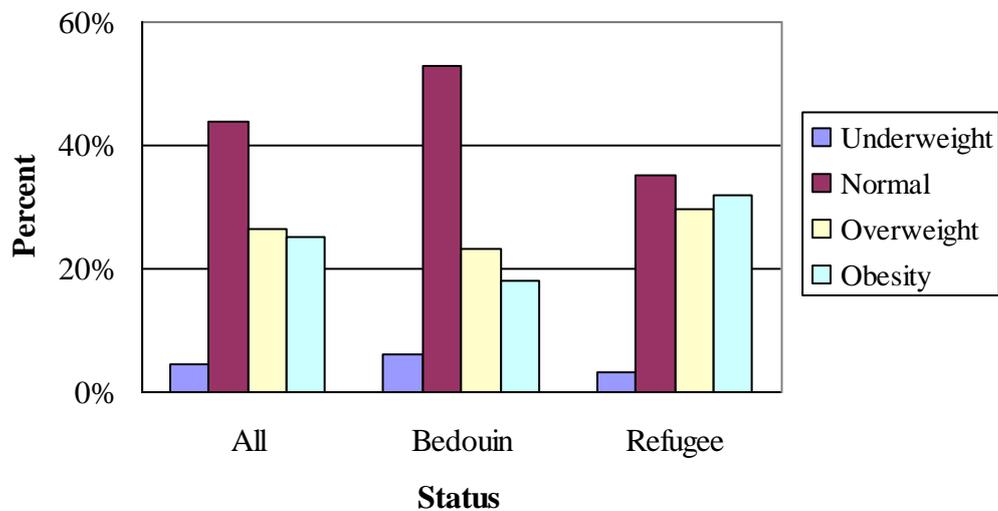
The nutritional status of non-pregnant women was assessed by anthropometric measurements and hemoglobin level. Weight and height were used to calculate BMI, and hemoglobin level to determine the status of anemia.

For all non-pregnant women the mean weight was (65.38 Kg  $\pm$  16.26) and the mean height was (1.57 m  $\pm$  0.58). For 251 Bedouin women, the mean weight (60.83 Kg  $\pm$  13.83) and mean height (1.55 m  $\pm$  0.55) were significantly lower ( $P < 0.05$ ) when compared to the 256 refugee women who had a mean weight (69.83 Kg  $\pm$  17.22) and a mean height (1.58 m  $\pm$  0.58). Furthermore, these Bedouin women had significantly lower ( $P < 0.05$ ) BMI (25.15 Kg / m<sup>2</sup>  $\pm$  5.79) than refugees (27.74 Kg / m<sup>2</sup>  $\pm$  6.53). According to their BMI, non-pregnant women were classified into underweight (4.5 %), normal weight (44 %), overweight (26 %) and obese (25 %). Figure 5/2 shows that the percent of Bedouin (6%) who were underweight almost doubled that of refugee (3 %). Similarly, the percent of normal weight among Bedouin (53 %) was higher than among refugees (35%). On the contrary, the same figure shows the percentage of Bedouin (41%) who were overweight and obese was lower than that of refugees (62 %). See (Figure 5/2).

The mean Hemoglobin level was 11.85 g/dL for all non-pregnant women, 11.84 g/dL for 256 Bedouin women and 11.85 g/dL for 255 refugee women (Table 5/5). According to the level of hemoglobin, women were categorized into: anemic (Hb  $<$  12 g / dL) and non- anemic. Thus, about 45% of all non-pregnant women, 46 % of Bedouin and 45% of refugees were categorized anemic as depicted in table 5/5.

Furthermore, mild anemia was demonstrated in 82 % of anemic Bedouin and 83 % of anemic refugee women, and moderate anemia was found in 16% of anemic Bedouin and 17 % of anemic refugee women. Severe anemia was as low as 2 % and only occurred in anemic Bedouin women (Table 5/5).

**Figure 5/2 Percent distribution of Bedouin and refugee women by BMI categories**



**Table 5/5 Hemoglobin level and the state of anemia among Bedouin and refugee non-pregnant women**

	Total N	%	Bedouin N	%	Refugee N	%
<b>Hemoglobin level (g / dL)</b>						
Mean ± SD**	11.85 ± 1.27		11.85 ± 1.32		11.84 ± 1.21	
<b>State of anemia</b>						
Not anemic	279	<b>55</b>	139	<b>54</b>	140	<b>55</b>
Anemic (Hb <12 g /dL)	232	<b>45</b>	117	<b>46</b>	115	<b>45</b>
<b>Severity of Anemia</b>						
Mild	192	<b>83</b>	96	<b>82</b>	96	<b>83</b>
Moderate	38	<b>16</b>	19	<b>16</b>	19	<b>17</b>
Severe	2	<b>1</b>	2	<b>2</b>	0	<b>0</b>

\*\* Difference between means for Bedouin and refugees was statistically not significant (P> 0.05)

### 5.3 Determinants of nutritional status in non-pregnant women

The status of anemia and overweight (overweigh and obesity) were correlated with demographic, socioeconomic and other health related variables such as: parity, number of children under 5, the use of contraceptives, use of iron supplements, in order to assess the determinants of the nutritional status of non-pregnant women in this study.

5.3.1. Demographic and socioeconomic determinants of anemia

Table 5/6 shows that anemic Bedouin and anemic refugees had comparable ages; (30.06 ± 9.33) vs. (30.46 ± 8.39), equal hemoglobin levels; (10.78 ± 1.15) vs. (10.81 ± 1.01), similar number of children under 5; (1.32 ± 1.14) vs. (1.06 ± 1.09), and matched number of deliveries (4.91 ± 3.36) vs. (4.81 ± 2.86).

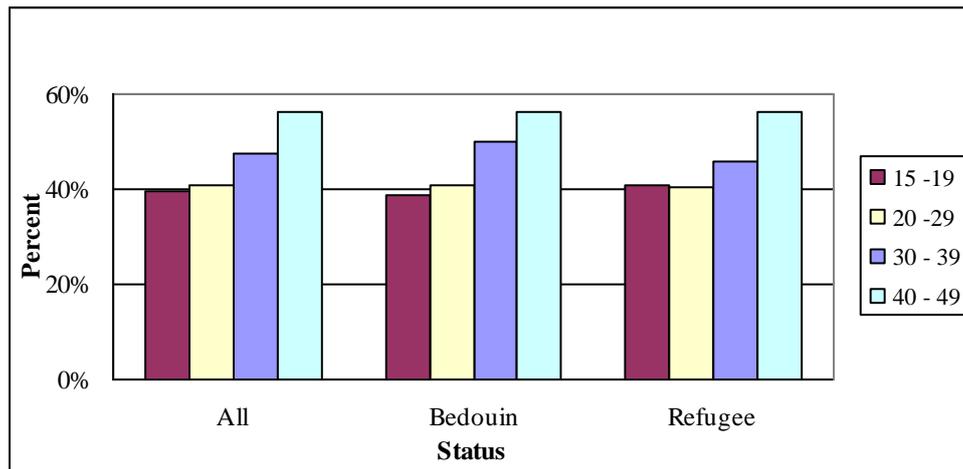
**Table 5 / 6: Comparison between Bedouin and Refugee anemic women**

	Bedouin	Refugee
<b>N</b>	<b>117</b>	<b>115</b>
Age (Year) (Mean ± SD)**	30.06 ± 9.33	30.46 ± 8.39
Hemoglobin level (g / dL) (Mean ± SD)**	10.78 ± 1.15)	10.81 ± 1.01
Number of children under 5 (Mean ± SD)**	1.32 ± 1.14	1.06 ± 1.09
<b>Number of deliveries</b>		
<b>N</b>	91	95
<b>(Mean ± SD)**</b>	4.91 ± 3.36	4.81 ± 2.86

\*\* Difference between means for Bedouin and refugees was statistically not significant (P> 0.05)

Figure 5/3 shows that the percent of anemic women increased with age in all participant women, in Bedouins and in refugees, where it reached its maximum (56 %) the in age group (40 – 49) in each of these categories. The lowest percent of anemia was among the youngest age group; 39 % in Bedouin and 41 % in refugees. Further analysis showed that among all participant women, anemia in ever married women (47 %) was higher than in never married women (40 %). Similarly, in bedouin, anemia in ever married (49 %) was higher than in never married women (36 %). However, the proportion of anemic women was the same (45 %) in both never married and ever married refugees. Comparison between the two groups showed that anemia in never married Bedouins was lower than in refugees (36 % vs. 45 %), whereas in ever married women it was higher in Bedouins than in refugees (49 % vs. 45%).

**Figure 5/3 Percent distribution of anemic Bedouin and refugee women by age-group**



Interestingly, the percent of anemia was directly proportional with family income among Bedouins and was inversely proportional among refugees. That is, anemia was highest (59 %) among Bedouins who came from high income families, and (56 %) among refugees who were from families with low income.

The percent of anemia (50 %) among illiterate was higher than (44 %) among literate women. This trend was also obvious in Bedouin women, but in refugees the percent of anemia (45 %) among illiterate and literate women was equal. On the other hand, the percent of anemia (52 %) among illiterate Bedouins was higher than (45 %) among illiterate refugees, whereas it was lower (42 %) among literate Bedouins than (48 %) among literate refugees.

### 5.3.2. Women's health related determinants of anemia

The mean number of deliveries (parity) for the 91 anemic Bedouin women ( $4.91 \pm 3.36$ ) was comparable to that for the 95 anemic refugees ( $4.81 \pm 2.86$ ) ( $P > 0.05$ ).

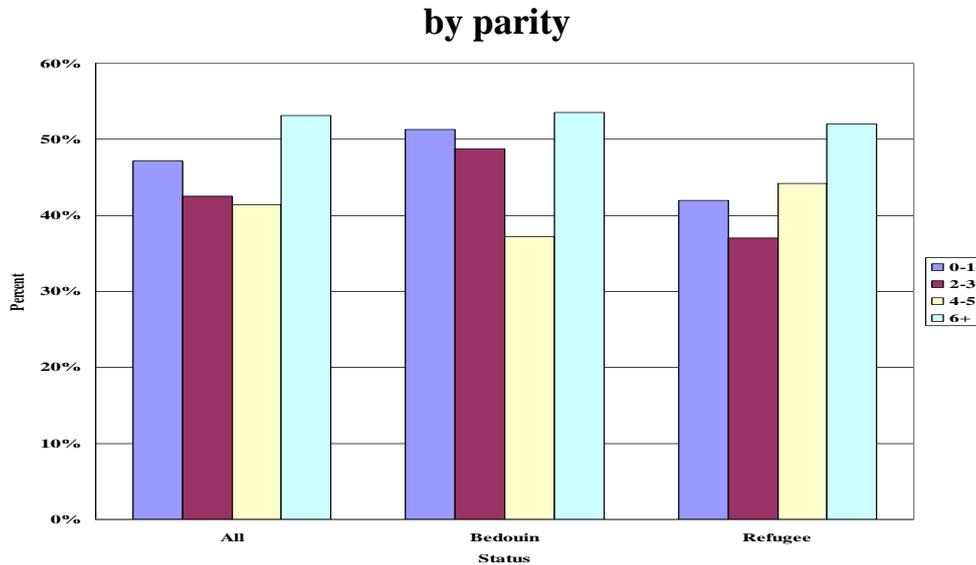
The percent of anemic women seemed to increase with parity. As depicted in figure 5 / 4 this trend was observed also in both Bedouins and refugees where the percent of anemic women was highest, 54 % and 52 % respectively, in grandmultipara (6 +) women. The lowest percent of anemia in Bedouins was (37 %) among para (4-5), and in refugees was (37 %) among para (2-3).

On the other hand, the mean number of children under 5 in the family for anemic Bedouin women ( $1.32 \pm 1.14$ ) was slightly but not significantly ( $P > 0.05$ ) lower than that for Refugees ( $1.06 \pm 1.09$ ).

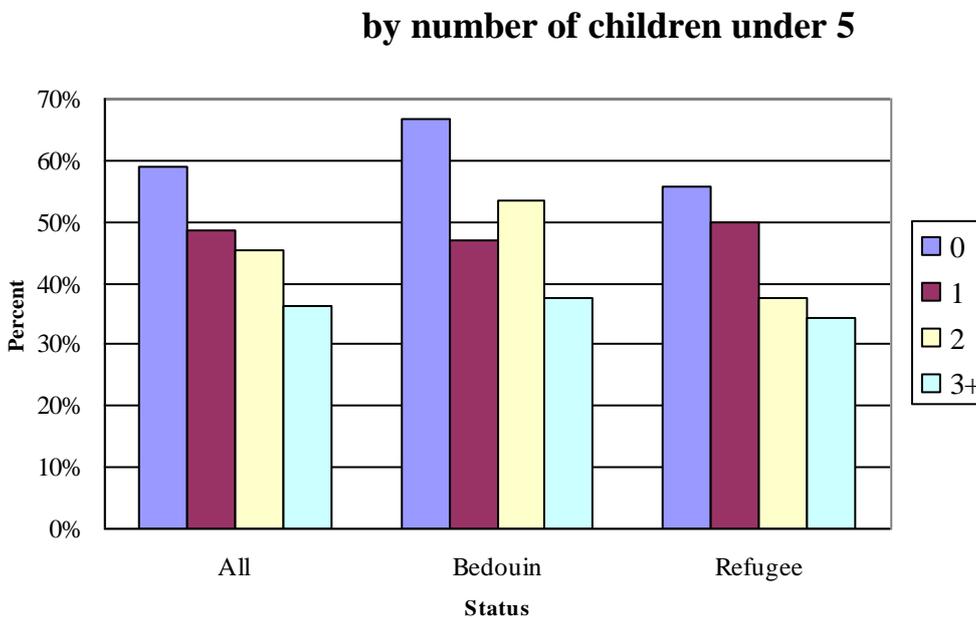
The percent of anemia seemed to decrease as the number of children under five in the family increased (Figure 5 / 5). In Bedouins, about 67% of anemic women had no

children under five, whereas only 38 % of them had 3 or more children. Similarly, about 56 % of anemic refugees had no children, and only 34 % of them had 3 or more children.

**Figure 5/4** Percent distribution of anemic Bedouin and refugee women



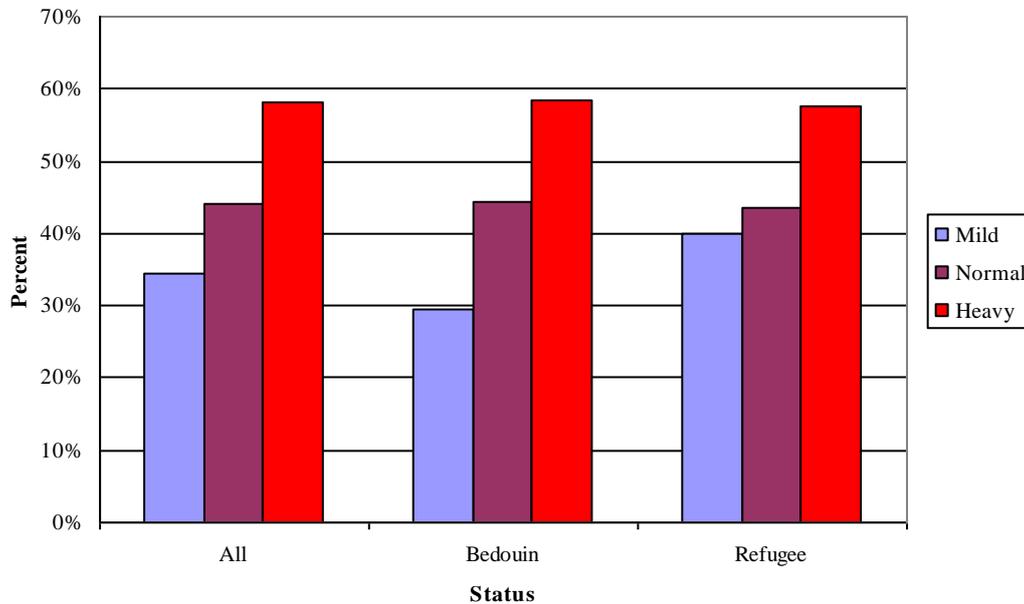
**Figure 5/5** Percent distribution of anemic Bedouin and refugee women



Although the exact amount of blood lost in menses was not measured, a direct relationship between anemia and the perceived amount of lost blood was observed (figure 5/6). The percent of anemic Bedouins who had heavy menses (59 %) was as

twice as those who had mild menses. In refugees, about 58 % of anemic women had heavy menses whereas 40 % had mild menses.

**Figure 5/6 Percent distribution of anemic Bedouin and refugee women by the amount of blood lost during menses**



Almost half of 122 participant women who utilized contraceptives were anemic. Among anemic women who utilized contraceptives 75 % used IUD and 25 % used pills. Nearly, 62 % of Bedouins and 57 % of refugees who utilized IUD were anemic. On the other hand, only 31% of Bedouins and 41 % of refugees who used contraceptive pills were anemic.

### 5.3.3 Other determinants of anemia

At the time of the study 90 of all women were using iron supplement; 45 were Bedouins and 45 were refugees. About 40 % of these women were found anemic. The percent of Bedouins who used iron supplements and were found anemic (41 %) was nearly the same as in refugees (40%).

Nearly 63 % of all participant women used to drink tea after meals. Furthermore, about 46 % of women who consumed tea after meals were found anemic. The percent of Bedouin women who consumed tea and were found anemic was (48 %) slightly higher than (43 %) among refugees.

Only 32 (14%) of 232 anemic women did not have toilets available in their households. Most (97 %) of these women were Bedouin.

5.3.4. Demographic and socioeconomic determinants of overweight including obesity

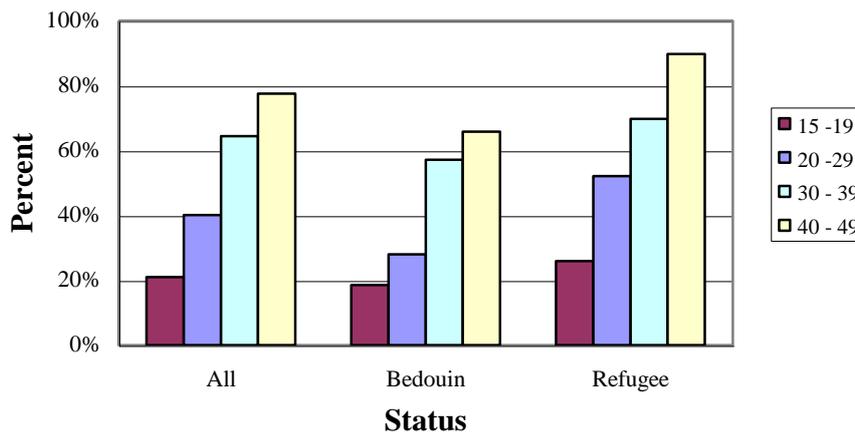
In a previous section, it was indicated that about half of the participant women were overweight – including obese. Furthermore, the percent of overweight was higher in refugees than in Bedouin women, 61.7 % vs. 41%.

The mean weight for 103 overweight Bedouin women (73.35 Kg ± 12.03) was significantly lower (P < 0.05) than the mean weight for 158 overweight refugees (79.69 Kg ± 13.94). Similarly, the mean height for Bedouin women (1.55 m ± 0.05) was significantly lower (P < 0.05) than the mean height for refugees (1.59 m ± 0.05). However, the BMI for Bedouin women (30.52 Kg /m<sup>2</sup> ± 5.08) did not significantly differ (P > 0.05) from the mean BMI for refugees (31.57 Kg /m<sup>2</sup> ± 5.27).

The mean age for all overweight women was (33.14 ± 8.38); for Bedouin (32.9 ± 8.9) it was slightly but not significantly higher (P>0.05) than for refugees (33.2 ± 8.05).

Figure (5 / 7) shows that the percent of overweight increased with age in all women (21% – 78 %), in Bedouin (19 % - 66 % ), and in refugees (26 % - 90 %).

**Figure 5/7 Percent distribution of overweight among Bedouin and refugees by age group**

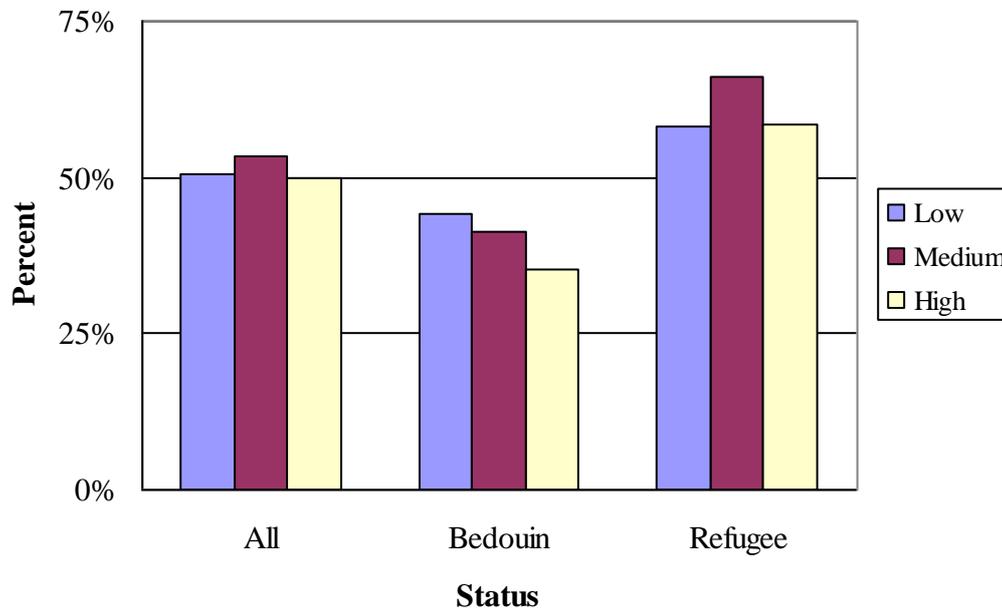


The percent of overweight (54 %) among ever married women is higher than (28 %) among never married women. Comparison between Bedouin and refugees, showed that overweight (43 %) among ever-married Bedouins was lower than (64 %) among ever married refugees. Similarly, the percent of overweight (25 %) among never-

married Bedouins was lower than (34 %) among of overweight never-married refugees were ever-married.

According to family income, it seemed that there was no difference in the percent of overweight between those coming from low income families (50 %), those from medium income families (53 %) or those from high income families (50 %). However, in Bedouins it seemed that the percent of overweight decreases as the family income increases (44% , 41% & 35% respectively), as shown in figure 5/8. This trend, however, was not seen among refugee women.

**Figure 5/8 Percent distribution of overweight among Bedouin and refugees by family income**

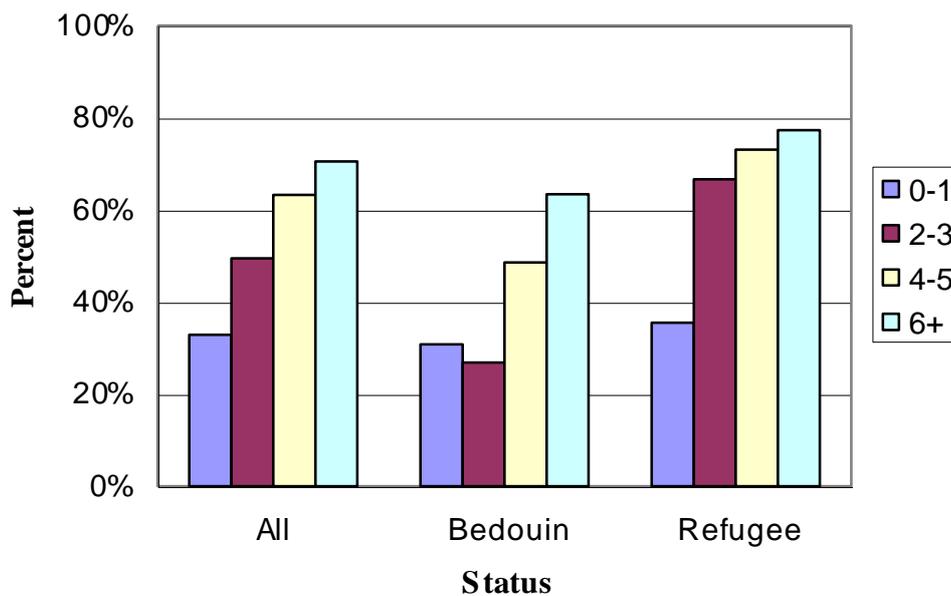


About half of literate women and half of illiterate women are overweight. Furthermore, the percent (61 %) of illiterate overweight was not different from (62 %) of literate overweight refugees. However, the percent (47 %) of illiterate overweight was higher than (35 %) of literate overweight Bedouins .

### 5.3.5 Women’s health related determinants of overweight

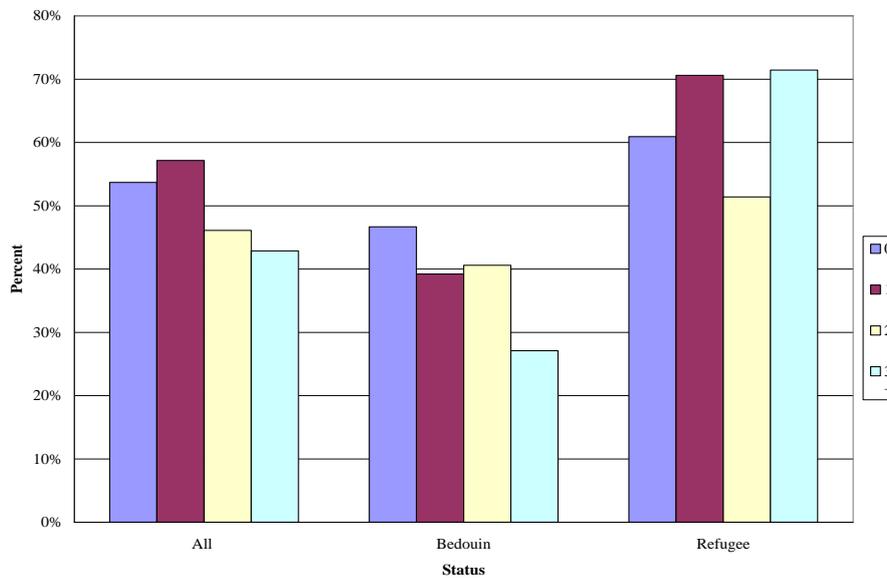
The mean number of pregnancies for the 85 overweight Bedouin women was  $(6.78 \pm 3.95)$  not significantly higher ( $P > 0.05$ ) than that for the 143 Refugees  $(5.94 \pm 3.48)$ . However, the mean number of deliveries (parity) for overweight Bedouin women was  $(5.92 \pm 3.45)$  significantly higher ( $P > 0.05$ ) than for Refugees  $(4.99 \pm 2.75)$ . Figure (5/9) shows clearly that the percent of overweight among all women, among Bedouin and among refugees increased with parity. Comparison between the two groups showed that, among women with para (2-3) the percent (67 %) of overweight refugees was almost two times the percent (27 %) of overweight Bedouins. A similar difference was seen between overweight refugees and overweight Bedouins in para 4-5 ( 73% vs 49% respectively) and in para 6+ ( 77% vs 63% respectively).

**Figure 5/9 Percent distribution of overweight among Bedouin and refugees by parity**



On the other hand, the percent of overweight seemed to decrease as the number of children under five in the family increased (Figure 5/10). In Bedouins, about 47% of overweighted women had no children under five, whereas only 27 % of them had 3 or more children. No obvious trend was found among Refugees.

**Figure 5/10 Percent distribution of overweight among Bedouin and refugees by number of children under five in the family**

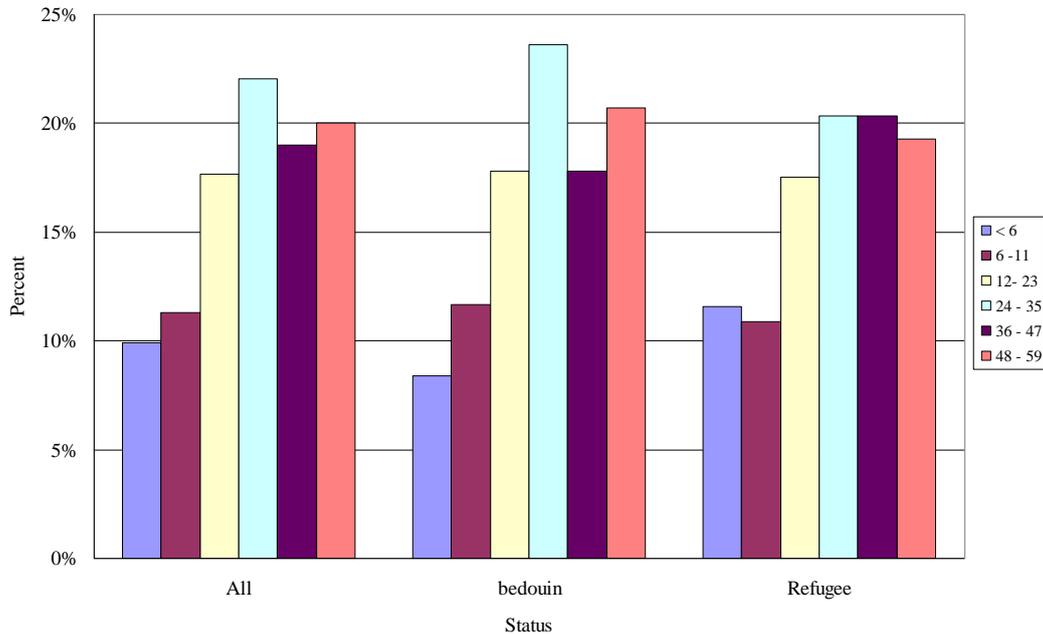


## 5.4 Malnutrition in children under 5 years

### 5.4.1. Demographic characteristics of children under five

The study included 594 children under 5 years, (52 % were Bedouin and 48 % were refugees). About 53 % of the Bedouin children and 48 % of Refugees were boys. The male : female ratio was 1.02:1 among all children, 1.13:1 and 0.91:1 among Bedouin and refugees, respectively. The mean age for all children under five was (28.47 months  $\pm$  16.8). The mean age for the 309 Bedouin children (28.82 months  $\pm$  16.52) was not significantly different ( $P > 0.05$ ) from the mean age (28.08 months  $\pm$  17.11) of the 258 refugees. Figure 5/11 shows the age distribution of children under five. The highest proportion of Bedouin children (24%) were in the age ( 24-35.99) months, while the lowest (8%) were < 6 months of age. The percent (20 %) of refugee children in the age group (24-35.99) months was equal to that in the age group (36-47.99) months and represented the highest proportion. The percent (11 %) of refugee children in the age group (6-11.99) months constituted the lowest proportion.

**Figure 5 / 11 Distribution of children under five by status and age group**



#### 5.4.2. General health status of children under five

Diarrhea (within two weeks prior to survey) occurred in 12% of all children (18% Bedouin vs. 5% Refugees). Fourteen percent of the Bedouin children got respiratory illness or fever compared to 10% of refugees. Loss of appetite was reported in 14% of Bedouin children and in about 10% of refugees.

Seven children had congenital abnormalities, three Bedouin children and 4 Refugees. These abnormalities included cataract (one Bedouin), congenital heart disease (one Refugee), hydrocephalus (one Refugee), mongolism (one Bedouin) and cerebral palsy was found in one Bedouin and two Refugees.

#### 5.4.3. Nutritional status of children under five

The mean weight (SD) was (11.92 kg  $\pm$  3.71) for all children. For 302 Bedouin children the mean weight (11.66 Kg  $\pm$  3.44) was not significantly different ( $P > 0.05$ ) from the mean weight (12.19  $\pm$  3.97) of 258 Refugees.

The mean height (length) and (SD) was (84.27 cm  $\pm$  14.55) for all children. The mean height (83.43 cm  $\pm$  14.29) for 302 Bedouin children was not significantly different ( $P > 0.05$ ) from that (85.17 cm  $\pm$  14.79) for 285 Refugees.

##### 5.4.3.1. Overall malnutrition indicated by stunting, wasting and underweight

Among all children, the percent of stunting (19.4 %) was higher than underweight (6.9 %), and higher than wasting (3 %). The percentage of stunting

among Bedouins (21 %) was higher than among refugees (17 %). Similarly, underweight among Bedouins (7.7 %) was higher than among Refugees (5.9 %) . On the other hand, wasting (2.3 %) among Bedouins was lower than (3.8 %) among refugees (Table 5/7).

**Table No 5/7 Nutritional indicators of children under five**

	<b>Total</b>		<b>Bedouin</b>		<b>Refugee</b>	
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
	<b>594</b>		<b>309</b>		<b>285</b>	
<b>Weight (Kg)</b>						
Mean	11.92		11.66		12.19	
SD	3.71		3.44		3.97	
<b>Height (cm)</b>						
Mean	84.27		83.43		85.17	
SD	14.55		14.29		14.79	
<b>Wasting</b>	18	<b>3</b>	7	<b>2.3</b>	11	<b>3.8</b>
<b>Stunting</b>	115	<b>19.4</b>	66	<b>2</b>	49	<b>17</b>
<b>Underweight</b>	41	<b>6.9</b>	24	<b>7.7</b>	17	<b>5.9</b>

Because of the high percent of Stunting (height-for age), which is considered as a cumulative indicator of growth retardation among children and known to be the most reliable indicator of long-standing malnutrition in childhood (Svedberg, 1987), this indicator was further analyzed and associated with various variables.

#### **5.4.3.2. Association of stunting with various variables**

Stunting was associated with various variables including: age group, sex, birth order, birth weight, number of gestational weeks, duration of breast feeding, and time at which weaning food was introduced.

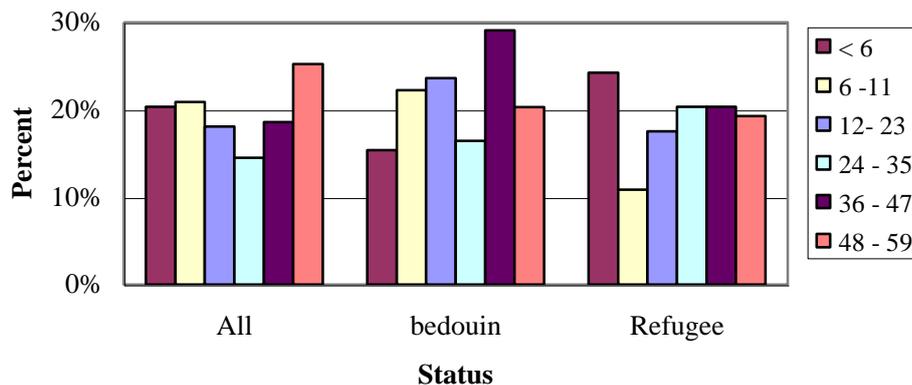
##### **Age grouping**

The mean age for all stunted children was (29.76 months  $\pm$  17.61). The mean age of the 66 stunted Bedouin children (29.89 months  $\pm$  15.89) did not significantly differ from the mean age (29.59 months  $\pm$  19.85) for 49 stunted refugees.

Figure 5 /12 shows that stunted children in the age group (48 – 59 months) represented the highest percentage (25 %), whereas those in the age group (24 – 35 months) were the lowest proportion (15 %). Stunted Bedouin children in the age group (36 – 47 months) were the highest proportion (29 %), whereas children below 6 months were the lowest (15 %). On the

contrary, stunted refugee children under 6 months represented the highest percentage (24 %), and those in the age group (6 -11 months) represented the lowest (11 %).

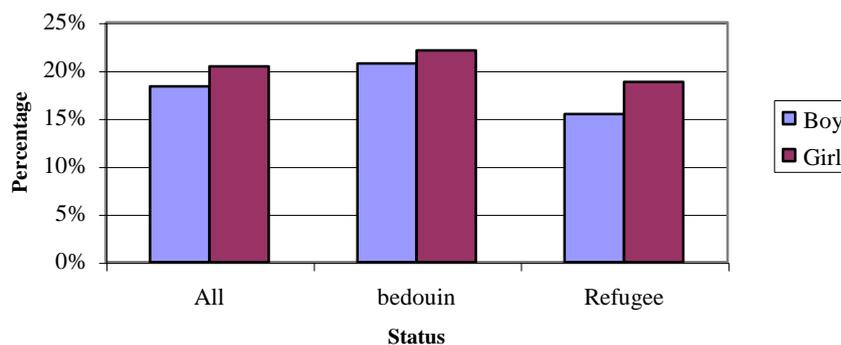
**Figure 5/12 a Percent distribution of stunted children by status and age group**



### Gender

Results showed that the percent of stunting was higher among girls than boys in all children (20% vs 18%), in Bedouins (22% vs 21%) and in refugees (19% vs 15% respectively (Figure 5/12b)

**Figure 5/12 b Percent distribution of stunted children by Gender**

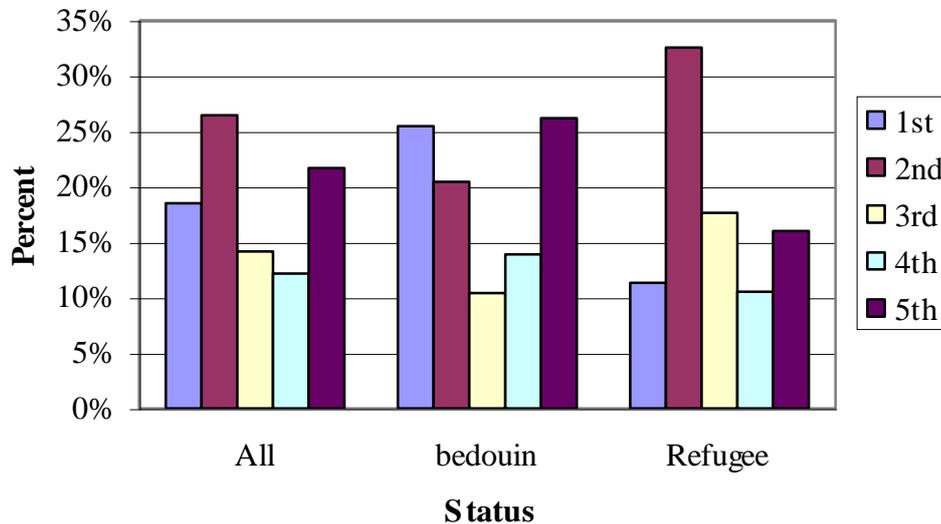


### Child birth order

Among stunted Bedouin, the highest proportion (26 %) was observed in children of the fifth birth order, followed by children of the first birth order (25%), then the 2<sup>nd</sup> birth order (20 %). While the lowest proportion of stunted children was observed for children of the third birth order (10 %). As seen in Figure (5/13 ) the trend among stunted Refugees was different, where the highest proportion was observed in 2<sup>nd</sup> birth order (33%), followed the 3<sup>rd</sup> birth order (18 %), then the 5<sup>th</sup> birth order(16 %).

While the lowest proportion of stunted children (11 %) was observed in those in the 1<sup>st</sup> as well as in the fourth birth order.

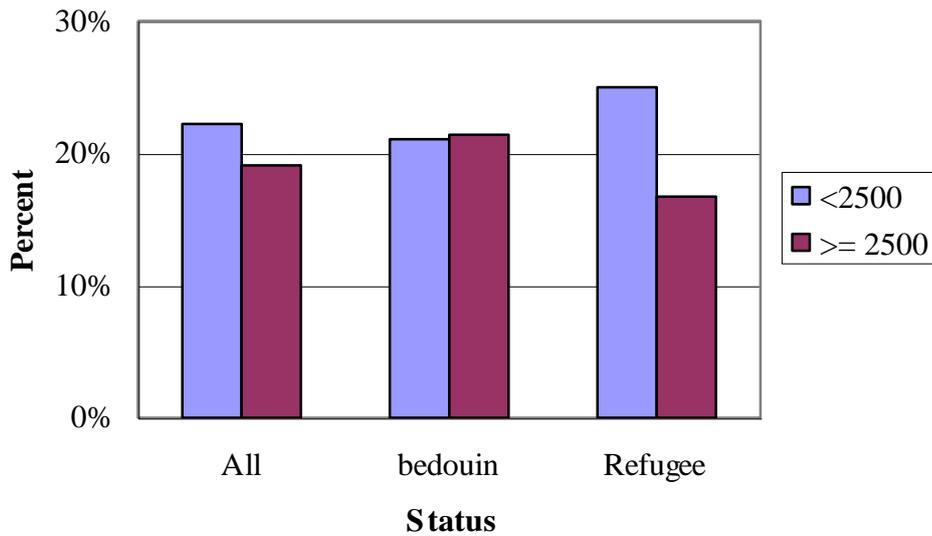
**Figure 5/13 Percent distribution of stunted children by status and child birth order**



### Birth weight

Results showed that the percent of stunting was higher among all children who born with LBW than with normal birth weight (22% vs 19%). Among Bedouins stunting with low birth weight was 21 %, which is the same percent of those stunted Bedouins with normal birth weight. As depicted in Figure 5/14, however, among refugees the percent (25 %) of stunted low birth children was higher than the percent (17 %) of stunted children with normal birth weight.

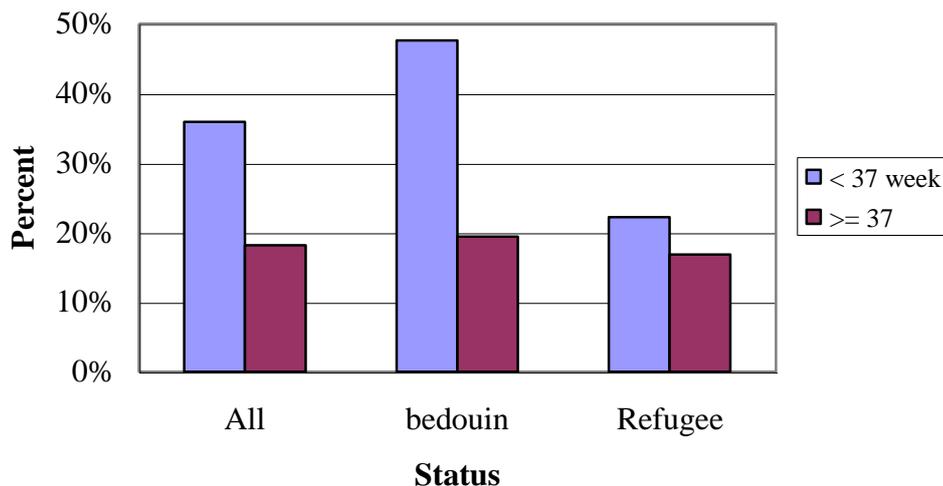
**Figure 5/14 Percent distribution of stunted children by status and birth weight**



### Number of gestational weeks

The percent (48 %) of stunted Bedouin children who were born premature (< 37 weeks) was higher than the percent (19 %) of children born after 37 weeks of gestation (Figure 3/14). Similarly, the proportion (22 %) of stunted refugee children born premature was higher than the percent (17 %) of children born after 37 weeks of gestation. The percent (48 %) of stunted Bedouins born premature was almost as twice as the percent (22 %) of those among refugees (Figure 5/15).

**Figure 5/15 Percent distribution of stunted children by status and gestational age**

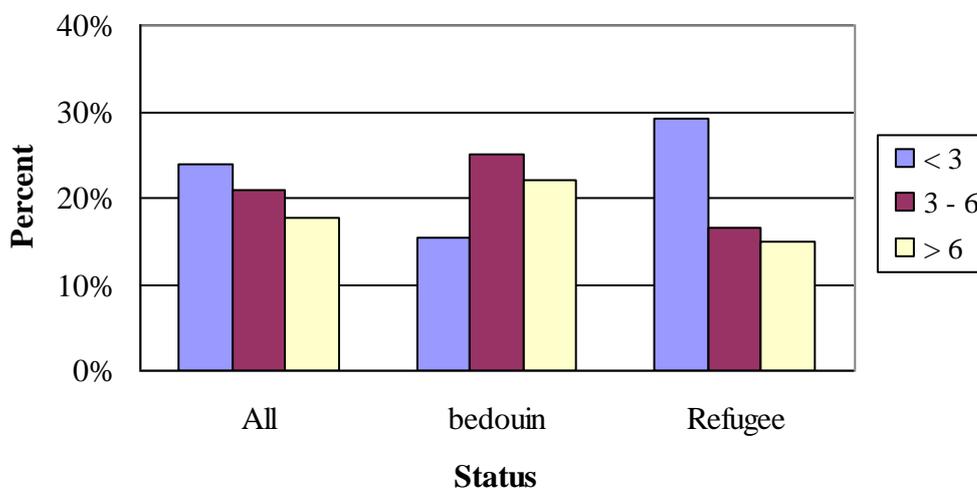


### Duration of breast feeding

About 24 % of all stunted children were breast fed for less than 3 months, 21 % were fed for 3-6 months and 18 % were fed more than 6 months. This inverse relationship between the percent of stunting and the

duration of breast feeding was also seen among refugees where it was highest (29 %) among those fed for < 3 months, and lowest (15 %) among those fed for > 6 months. An almost opposite trend was seen among Bedouins where the highest proportion of stunting was (25 %) among those who were breast fed for 3-6, 22 % among those fed for > 6 months, and the lowest was (15 %) among those fed for < 6 months. (Figure 5/16).

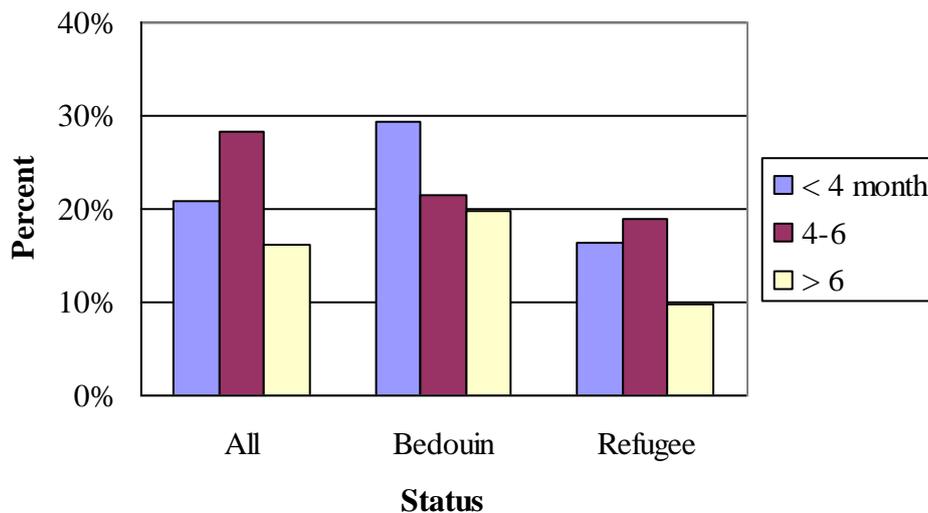
**Figure 5/16 Percent distribution of stunted children by status and duration of breast feeding**



### Time of introducing weaning food

Results showed that among Bedouins the highest proportion of stunting was (29 %) among children who were given weaning food below 4 months of age, followed by 21 % among those given food at the 4–6 months, and by 20 % among those given food at older age (> 6 months). Among refugees, however, the highest percent of stunting was (19 %) among those children given weaning food at 4-6 months of age, followed by 16 % among those given food at earlier age (< 4 months), followed by 10 % among those given food > 6 months, as depicted in Figure 5/17

**Figure 5/17 Percent distribution of stunted children by status and child age when weaning food was introduced**



### 5.5. Association of child nutritional status with selected mother-related variables

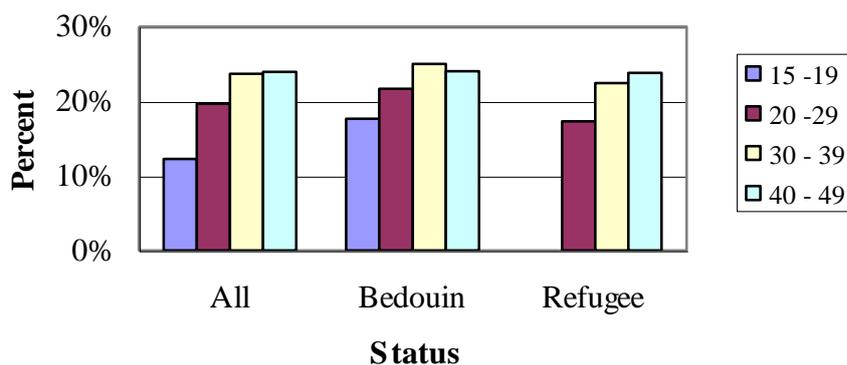
This section describes the results of association between child stunting and some selected maternal variables. The total number of children was 307, seven children from that total were dropped out due to missing data (one from the Bedouin and six from Refugees). Analysis involved 300 mother- child pairs of which 163 were Bedouin and 137 were refugees.

#### **Mother age**

The mean age for mothers of the 61 stunted children ( $30.28 \pm 8.54$ ) was not significantly higher ( $P > 0.05$ ) from the mean age for mothers of other children ( $28.55 \pm 8.58$ ). Furthermore, the mean age for mothers of 36 stunted Bedouins ( $28.61 \pm 8.47$ ) was not significantly lower ( $P > 0.05$ ) than the mean age for mothers of 25 stunted refugees ( $32.68 \pm 8.21$ ).

Among all stunted children, 12 % had mothers in the age group (15 – 19), 20 % in the age group (20 – 29), 24 % in the age group (30 – 39) and 24 % in the age group (40 – 49). This direct relationship between percent of stunting and maternal age was seen also among Bedouin as well as among refugee children (Figure 5/18).

**Figure 5/18 Percent distribution of stunted children by maternal age and status**



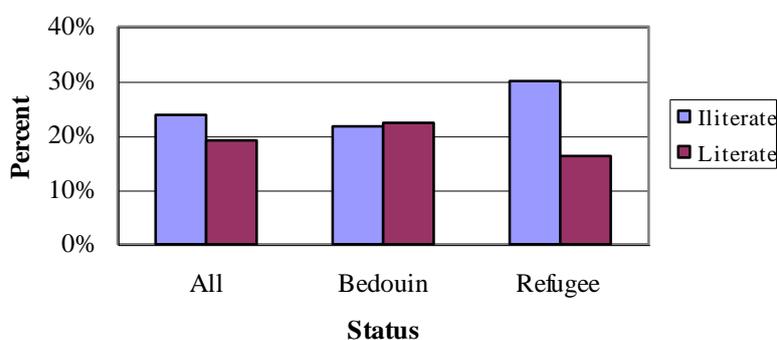
### Family income

The lowest percent of stunting was (7 %) among Bedouin children with low family income, followed by 15 % among those with family medium income, followed by 26 % among those with high family income. The opposite was seen among stunted refugees, where the highest proportion (16%) was among those with low family income, 8% among those with moderate, and 8 % among those with high family income.

### Mother literacy

The highest proportion of stunted children was (24 %) among children born to illiterate mothers, and 19 % born to literate mothers (Figure 3/19). The same was seen among refugees where 30 % of stunted children were among those who had illiterate mothers, and 16 % were among who have literate mothers. Among Bedouin 22 % of stunted children were among who had illiterate mothers, also 22 % were among those who had literate mothers (Figure 5/19).

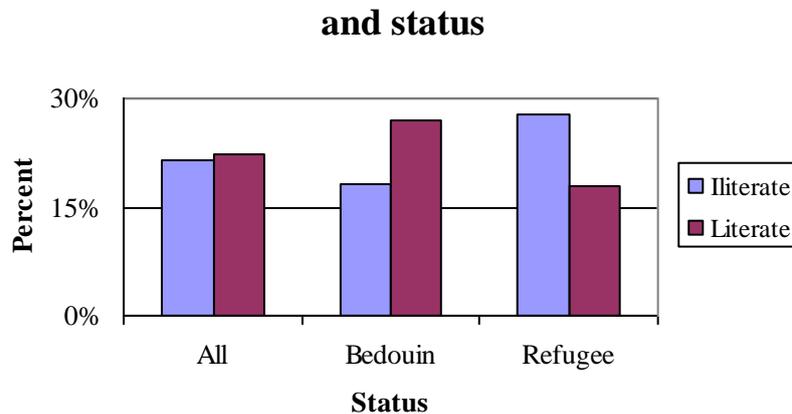
**Figure 5/19 Percent distribution of stunted children by maternal literacy and status**



### Father's literacy

Analysis showed that the highest proportion of stunting in Bedouin children was found among those who had literate fathers (27 %), whereas among refugees the highest proportion (28 %) was among those who had illiterate fathers. Figure 5/20

**Figure 5/20** Percent distribution of stunted children by Father literacy

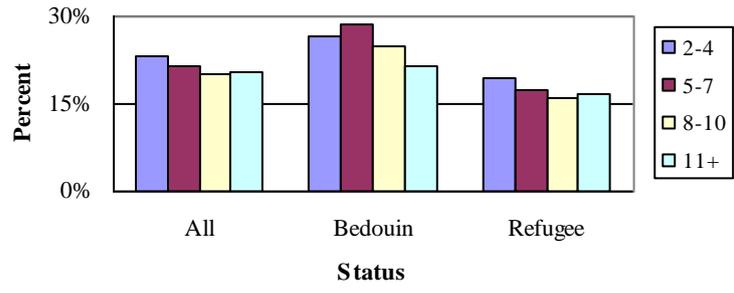


### Family size

The number of family members of the 61 stunted children ( $7.1 \pm 3.37$ ) was comparable to the number of family members of other 239 children ( $7.19 \pm 3.2$ ). Furthermore, the number of family members of the 36 stunted Bedouins ( $7.33 \pm 3.64$ ) was not significantly ( $P > 0.05$ ) higher than the number of the 25 stunted refugees ( $6.76 \pm 2.99$ ).

No particular pattern was seen between stunting and family size (Figure 3/21). Among Bedouin, the highest proportion of stunted children was (29 %) among those with family size 5 – 7 persons, and the lowest proportion was (22 %) among those with family size of > 11 persons. Among refugees, the highest proportion was (19 %) among those with family size 2 – 4 persons, and the lowest was (16 %) among those with family size 8-10 persons (Figure 5/21)

**Figure 5/21** Percent distribution of stunted children by family size and status



## **Chapter 6**

### **Discussion**

This study is one among the few studies that investigated the nutritional status of Palestinian Bedouin women (15-49 years) and Bedouin children under 5 living in the in Jordan Valley. The nutritional status of the Bedouin was compared to that of refugee women and children living in a camp in Jericho.

Since the lifestyle of Bedouin is different from that of refugees, it was expected that their nutritional status be different, too.

Hemoglobin level and BMI were used to assess the Nutritional status of women in the two groups. Stunting, wasting and underweight were determined for children under 5 years in both groups.

#### **6.1 Nutritional characteristic of non-pregnant women 15-49 years.**

##### **6.1.1. Anemia**

The mean hemoglobin level was 11.8 g % for all non-pregnant women, where there was no significant difference between Bedouin (11.84 g%) and Refugee (11.85 g% ).

According to hemoglobin level about 45 % of all non-pregnant women, 45 % of Bedouin and (46%) of Refugees were categorized as anemic. This finding is higher than what was reported by UNRWA in 1990 where 25.3 % of non-pregnant women in the child bearing age from the West Bank were anemic (Yip, 1990). Similarly, the findings of this study were also higher than the results of PCBS who reported anemia in 33.2 % of Palestinian women from the West Bank and Gaza strip, including refugees (PCBS – 2002). However, in the same year the study of John Hopkins (JHU) / Al-Quds (AQU) reported anemia in about 48.6 % of women from the West Bank and Gaza strip, which is similar to the results of this study. The difference between the results reported by PCBS and those reported by JHU / AQU and this study could be attributed to the sample size. The PCBS study involved 3331 women, the JHU /AQU included 936 women and this study investigated 514 women.

The rise in the prevalence of anemia by the year 2002 compared to 1990 could be a consequence of the impact of Israeli measures on the livelihood of the Palestinian households, food insecurity, and the deteriorating socioeconomic conditions in the Palestinian Territories during the years of the intifada (JHU/AQU, 2002). Furthermore, JHU/AQU claimed that “women show significant deficiencies in energy, iron, vitamin A and E intake; and the prevalence of chronic malnutrition has risen during the two years of intifada”.

WHO EMRO considers anemia as a severe problem if its prevalence exceeds 40%. This could be applied to women in the Palestinian Territory according to the findings of JHU / QAU.

In relation to anemia severity, mild anemia was in about 83 % of all anemic women, 82% of anemic Bedouin and 83% of anemic refugees. These figures indicated that about 37.4% of all participant women, 36.9% of Bedouin and 37.4% of Refugees have mild anemia. Moderate anemia was in 16% of all anemic women (16% Bedouin & 17% Refugees ), which represent 7.2% of all women aged 15-49 years (7.2% Bedouin & 7.6% Refugees). However, severe anemia was only in 1% of all anemic women ( 2% among Bedouin and not evident among Refugees) which is equal 0.45% of all women aged 15-49 years (0.9% Bedouin & 0.0% Refugees). Similarly, PCBS reported that 26.8 % of all women had mild anemia, 6.1% had moderate and 0.3% had severe anemia. Fortunately, mild anemia was the predominant form which can be corrected and prevented by health education, counseling and by iron supplementation.

Worldwide anemia is considered as a commune public health problem, it is endemic problem for all classes of the population ( *WHO, 1992a*). In young children in the Middle East, studies have estimated the prevalence of anemia to range from 19 % to 71% (Abdelnour 1991; Gofin et al. 1992; Hossain et al. 1995; Kocak et al. 1995; Madanat et al. 1984; Lavon et al. 1985). In pregnant women, the prevalence of anemia was shown to be highest in Southeast Africa (76%), followed by Eastern Mediterranean (55%), and Africa (50%). On the other hand, the prevalence of anemia in America (33%) and Europe (24%) were considered as the lowest values in the world (ACC/SCN and IFPRI, 2000).

### **6.1.2 Body mass index (BMI)**

Body mass index (BMI) is now internationally recognized as a valid measure of obesity in individuals(FAO 1994). In the study, women were categorized according

to their BMI into four categories: Underweight, Normal weight , Overweight and Obesity.

#### **6.1.2.1. Underweight**

The percentage of underweight among all women was 4.5%. Among Bedouin it was (6%) as twice as among Refugees (3%). Underweight in this study was three folds what was reported by JHU /AQU study 2002 (1.7%). The high percentage of underweight among Bedouin women could have contributed to the observed difference between the two studies. In this study Bedouin women constitute about 50% of the sample. The exact sample composition of the JHU/AQU study was not reported.

Undernourished (under weighed) women need attention and care to prevent consequences of malnutrition including: increased perinatal and neonatal mortality, a higher risk of low birth weight babies, stillbirths, and miscarriage (Krasovec and Anderson, 1991). Giay and Khoi (1992) showed that the birth weight was always lower with low maternal BMI (< 18.5) whatever the weight gain of the mother was during pregnancy. Furthermore, chronic state of undernutrition in the adult has its cost in terms of risk to health and impairment of function, which may include a lowered work capacity, a reduced ability to sustain economically productive work or even socially desirable physical activities and possibly an impaired immune function with a predisposition to repeated infections (FAO, 1994; Rotimi, 1999).

#### **6.1.2.2. Overweight & Obesity**

The WHO reported that obesity has become a pandemic, and it is today's principal neglected public health problem (WHO, 1998a).

Our results showed that overweight was 26% among all women, 23 % among Bedouin and 30% among Refugees.

Obesity was seen in a quarter of all women participated in this study. Obesity among Refugee women (32 %) was almost double than among Bedouin (18 %). These figures are higher than what was reported by the most recent study in the Palestinian territories (10.9 %) (JHU/AQU, 2002). Comparison of our study with other studies, however, shows similar or even higher percentages of obesity as reported among women. For instance, UNRWA-CDC reported obesity in 25 % of reproductive age women from Gaza strip (*Ibid, Pg.45*). In the West Bank obesity was

found in 38 % of women residing rural areas (Stene et al., 2001), and in 49% of women from urban areas (Abdul-Rahim, 2003). The observed difference in obesity between urban and rural communities may be attributed to modernization, better socio-economical condition, increased food consumption and the concomitant sedentary lifestyles in urban areas (Abdul-Rahim, 2003). This interpretation could also be applied to the observed difference in obesity between Bedouin and refugee women included in this study. Indeed, Bedouin women are relatively more physically active than refugees since they are engaged in handling livestock besides their domestic activities.

Globally, adult obesity was described as extremely high and may exceed 55 % (FAO, 1994). In developed countries such as France adult obesity was 32.4 %. In china however, adult obesity was much lower (4.3%) but overweight was at similar rates (29.5 %) (Jia et al., 2002).

In spite of the discrepancies, Palestinian figures on overweight and obesity among adults in the Palestinian population seem to be as high as reported internationally. This alarming fact should attract policy makers to take serious measures towards the prevention of obesity and its consequences.

The relationship between mortality and morbidity from chronic disease and high BMI in developed countries has been established (Kushner, 1993). High BMIs were associated with a higher prevalence of diabetes mellitus and glycosuria (Satyanarayana, 1976). Obesity was observed to be associated with high levels of low-density lipoprotein (LDL) cholesterol and low levels of high-density lipoprotein (HDL) cholesterol, which could expose those persons to ischemic heart attacks and myocardial infarction (Leung, 1990).

To combat obesity and its consequences, interventions should start in childhood since childhood obesity often persists into adolescents and adulthood (Strauss, 2002; Stark et al., 1981; Serdula et al., 1993), and the longer its duration, the higher the associated mortality and morbidity (Must et al., 1992). Recent studies (Nguyen, 2001) reported that, Type 2 diabetes mellitus, the form of diabetes generally associated with obesity in adults, now accounts for as many as 45% of new cases of pediatric diabetes. Furthermore, longitudinal studies of overweight children over a forty year period showed twice the rate of cardiovascular disease and hypertension, and triple the rate of diabetes, compared with children of normal weight (Strauss, 2002). On the other hand, other health problems that persist into adulthood are attributed to or exacerbated by excessive body adiposity during childhood, include:

hypertension, dyslipidemia, slipped epiphyses, tibia vara (Blount's disease), polycystic ovary syndrome, gallstones, steatohepatitis (fatty liver), asthma, sleep apnea, and pseudotumor cerebri. (Strauss, 2002).

Egypt faces a serious epidemic of obesity (Patrick, 2002) where the proportion of overweight in preschool children is 7 percent rising to 10 percent among school children. Furthermore, almost two-thirds of fathers are in the pre-obese or obese categories, while nearly 80 percent of all mothers fall into those categories (Patrick, 2002).

In developed countries such as in the USA it has been estimated that 10% to 15% of children are obese (Paige, 1986; Foreyt, 1987). More recent data suggest that the prevalence of overweight among children is 34% to 36% and obesity is 18% to 20% (Strauss, 2002). While among adolescents obesity reached 22 % (Gortmaker, 1987).

## **6.2. Determinants of malnutrition: Anemia, overweight and obesity**

In this study the indicators of malnutrition: anemia and overweight and obesity were correlated with various variables. It is noteworthy that overweight and obesity were combined, since both form of malnutrition constitute risk factors for many chronic diseases (Kushner, 1993; Must et al., 1992; WHO, 1998a). In this study the percent of overweight and obesity combined was 51 % among all women, 41 % among Bedouin and 62 % among refugees.

### **6.1.2.1. Age**

Results showed that, the percent of anemic women increased with age in all participant women, in Bedouins and in refugees. The highest proportion of anemia (56 %) was among Bedouin and Refugees in the age group 40-49 years, while the lowest was among the youngest age group.

Similarly, the percent of overweight and obesity increased with age from 21 % - 78 % in all participant women, from 19% - 66 % in Bedouin and from 26 % - 90 % in refugees. The association of overweight and obesity with age is consistent with what was reported that BMI was positively associated with age in both men and women (Abdul-Rahim , 2003).

### **6.1.2.2. Marital status and parity**

In our study, anemia in ever-married women was higher than in never-married women among all participant women and among Bedouin women. However, among refugees, the percent of anemia in never-married was similar to that in ever-married women. Furthermore, the percent of anemia in all participant women, in Bedouins and refugees seemed to increase with parity.

Generally, in ever-married women, hemoglobin levels are endangered because of pregnancy associated problems such miscarriages, deliveries and lactation (Woldemariam et al,2002). High parity is a risk factor for iron deficiency anemia, since repeated deliveries may exhaust the women's iron stores (Bangkok, 1972; Dennison, 1995; Woteki, 1993; Cunningham, 1993 ). This argument may possibly interpret the difference in anemia between never-married and ever-married Bedouin women. On the other hand, Refugee women receive better health services, including MCH, than Bedouins. This, in part, might explain why anemia in ever-married refugees is not as high as in ever-married Bedouin women.

The percent of overweight including obesity among ever married women was higher than among never-married in all participant women, in Bedouin and in refugees. Hormonal changes during pregnancies, post partum weight retention, lactation, and reduced physical activity may all contribute to overweight and obesity of ever-married women.

### **6.1.2.3 Family income**

The highest proportion of anemia in Bedouins was among women from families with high income, while in Refugees the highest proportion was among women from families with low income.

It is widely accepted that income growth helps improve both food demand and nutritional outcomes (Alderman et. al. 2000). Furthermore, it has been indicated that household economic status is positively associated with household food security, which is a pre-requisite for access to adequate dietary intake and improved nutritional status for all members of the household (Teller et al., 2000; UNICEF, 1990). These statements may be applicable to the refugees but not the Bedouin women in this study. Bedouin women may contribute to the family income by participating in family business – livestock handling- but may not directly benefit from this contribution. Under these living conditions, Bedouin women may become nutritionally exhausted.

It seemed that there was no difference in the percent of overweight-obesity between those coming from low income families (50 %), those from medium income families (53 %) or those from high income families (50 %). A similar trend was seen among refugees. However, in Bedouins the percent of overweight decreased as the family income increased (44% , 41% and 35%, respectively).

Garcia and Alderman (1989) reported that in households having incomes at the lowest quintile, both males and females had lower BMIs than those belonging to the highest quintile income groups. Moreover, women from low economic status households were the most affected by malnutrition (Loaiza, 1997; Teller and Yimar, 2000). The effectiveness of increasing income in reducing food insecurity and malnutrition was indicated by (Subramanian and Deaton, 1996; Bouis and Haddad, 1992; Behrman and Deolalikar, 1987). In a recent review, however, Monteiro et al., 2001 argued that “obesity in developing countries can no longer be considered solely a disease of groups with high socioeconomic status (SES)” in the period between 1989 - 2000. Although the reasons for this inverse association between obesity and SES in women are complex and need more research, the authors warned from the serious implications of this shift of obesity towards women (Monteiro et al. 2001).

#### **6.1.2.4. Women’s education**

Anemia was higher among illiterate (50 %) than among literate women (44 %). This trend was also obvious in Bedouin women, but in refugees the percent of anemia among illiterate and literate women was the same (45 %). It’s known that education may enable women to have greater access to household resources that are important to nutritional status (ACC/SCN, 1990). Educated women are more aware of their health than illiterates . Literate women knowledge about anemia, could be better than that among illiterates and could help them to prevent and to deal with such health problem.

Allover the percent of overweight-obesity was approximately the same among illiterate (50 %) and among literate women (51 %). The same findings was seen in Refugees (61% vs. 62% respectively). However, among Bedouin the percent of overweight-obesity was higher among the illiterate (47 %) than the literate (35 %). In a recent study, BMI was found to be negatively associated with educational level in women (Abdul-Rahim , 2003).

#### **6.1.2.5. Tea consumption**

Nearly 63 % of all participant women used to drink tea after meals. Anemia was found in 46 % of women who consumed tea after meals. Among Bedouin the percentage of anemic women who consumed tea after meals was (48 %) slightly higher than (43 %) among refugees.

Higher prevalence of anemia was found among tea drinkers which reflects the effect of tea on iron status (Disler et al., 1975; Galan et al., 1985; Razagui et al. 1991; Rossander et al., 1979). This is attributed to the poor absorption of iron in the presence of inhibitors of iron absorption such as tannin in tea ( Scrimshaw, 1991).

#### **6.1.2.6 Using of iron supplementation**

At the time of the study 18% of all participant women, 17% of the Bedouin and 18% of the Refugees were using iron supplement. Furthermore, of those who used iron supplement and were found anemic were 40 % of all women, 41 % of Bedouin and 40 % of Refugees. On the other hand, among those who did not use iron supplements and were found anemic were 44 % of all women, 47 % of Bedouin and 44 % of refugees.

Iron deficiency anemia is the most prevalent of all micronutrient deficiencies (WHO, 1999b; Gillespie et al., 1998). Although the exact reason for using iron supplement was not investigated in this study, it is apparent that its use lowered the percent of anemia to a certain extent. This is not surprisingly since most of the cases were of the mild form which can be corrected by proper diet and iron supplements.

#### **6.1.2.7. Quantity of blood lost during menses**

Analysis showed a direct relationship between anemia and the amount of blood lost in menses among Bedouin as well as Refugees. This observation is consistent with what was reported earlier that menorrhagia may be a contributing factor of anemia in non-pregnant women ( Barr et al., 1998).

#### **6.1.2.8. Number of children below 5 years in the family**

In our study, among all women, among Bedouin and among Refugees, the percent of anemia seemed to decrease as the number of children under five in the

family increased. The highest percentages of anemic women were among Bedouin (42%) and among Refugees (51%) who had no children.

Similar findings was found with overweight-obesity where seemed to decrease as the number of children under five in the family increased. This could be explained by that, by increasing the number of children < 5 years, the physical activity that women should pay to take care of her children, besides other home activities should be increased, and as a consequences body weight reduction will may occur.

#### **6.1.2.9. Using of contraceptives**

About 75 % of all anemic women used IUD and 25 % used pills for contraception. The majority of Bedouins (62 %) and (57 %) of refugees who utilized IUD were anemic. On the other hand, only one third of Bedouins and 41 % of refugees who used contraceptive pills were anemic. The use of IUDs could increase the amount and duration of bleeding through menses, and may cause bleeding or spotting between periods ( Woteki, 1993 ; Robert, 1997). On the other hand oral contraceptives tend to decrease monthly menstrual losses (Robert, 1997; Woteki, 1993).

### **6.3 Malnutrition among children**

#### **6.3.1 Stunting, Wasting & Underweight**

Among all children, stunting (19.4%) was higher than wasting (3 %) and than underweight ( 6.9%). Lower percentages of stunting 9 % and 11.7 % were reported by PCBS and JHU/AQU, respectively. Almost a similar percentage of wasting was reported by PCBS (2.5%), but a higher percentage of wasting was reported by JHU/AQU (7.8 %). The percent of under weight in this study was higher than that reported by PCBS (3.5 %) and lower than that of JHU/AQU (8.3%). Sample size and sample composition may well explain the different reported by this study and the other two studies. This study was limited to children, Bedouin and refugees, living in the Jordan valley where the other two studies included children from the West bank and from Gaza Strip.

Bedouin children were found to be more stunted and underweighed than Refugees, while Refugees were found to be more wasted.

Bedouin children are slightly more exposed to long term malnutrition than Refugees. About 27 % of the studied Bedouin children and 13 % of the refugees come from large families (10 and over). Furthermore, the majority of and area remote from city center. Hence, they may suffer from deficit of proper diet especially in winter. A cumulative effect of recurrent and long standing food deficit might lead to the higher cumulative indicator of growth retardation (stunting) among Bedouin children. In contrast, Refugees are more secure as they are supported by UNRWA through food programs and adequate health services.

Table 6/1 compares figures from this study with those from neighboring countries (MOH-HMIS, 2003). Underweight is reported highest in Syria (13 %) and Egypt (12 %) and lowest in Lebanon (3 %). Wasting is highest in Syria (9 %) and lowest in Jordan (2 %). Stunting is reported highest in Egypt (25 %) and lowest in Jordan.

This variation might be attributed to the different living standards such as different socioeconomic conditions, environment and different political conditions in different countries.

Table No. 6/1 The comparison of Nutritional Status in Palestine and **other countries**

<i>Country</i>	<i>Underweight %</i>	<i>Wasting %</i>	<i>Stunting %</i>
<i>Bedouin &amp; Refugees in JV</i>	6.9%	3%	19.4%
<i>Palestine JHU 2002*</i>	8.3	7.8	11.7
<i>Palestine PCBS 2002*</i>	3.5	2.5	9
<i>Jordan*</i>	5	2	8
<i>Egypt*</i>	12	6	25
<i>Lebanon*</i>	3	3	12
<i>Syria*</i>	13	9	21

<i>Iraq**</i>	9.4	4	23
<i>Developing Countries*</i>	28	9	32
<i>United States*</i>	1	1	2

\* Source: Ministry of Health-HMIS. Palestine Health Care System, Health Status in Palestine

2002 , July 2003. ( MOH-HMIS,2003)

\*\* UNICEF, CSO, and MOH,2002 .

Child malnutrition in developing countries is more pronounced than in developed countries (Table 6/1), (ACC/SCN, 2000). The highest prevalence of stunting among children below five years was found in East Africa (48%) (ACC/SCN, 2000). However, in developed countries such as the USA, wasting was only 1%, stunting was 2% and underweight was also only 1% ( MOH-HMIS, 2003).

Obviously child malnutrition in the JV is relatively high, and could be an alarming health problem which needs more evaluation, monitoring and follow up.

### 6.3.2. Determinants of stunting

Stunting was selected to describe the determinants of malnutrition in this study because of it's highest percentage and being a cumulative indicator of growth retardation among children. The consequences of stunting include increased risk of sickness and death (Chen et al., 1980) and poor mental development (Grantham et al., 1996), and the long-term negative consequences of stunting on adult stature, body composition, work capacity, and women's reproductive performance (Martorell, 1993), as well as its association with increased risk to chronic diseases and obesity (Barker, 1994).

#### 6.3.2.1. Stunting by Age

The highest proportion (25 %), of all stunted children was in the age group (48 – 59) whereas the lowest proportion (15 %) was in those in the age group (24 – 35). Among Bedouin and Refugees no specific trend for stunting was found with age. However, among Bedouin stunted children in the age group (36 – 47 months) were the highest proportion (29 %), whereas children below 6 months were the lowest (15 %). So stunting seems to be positively associated with age . On the contrary, stunted refugee children under 6 months represented the highest percentage (24 %), and those in the age group (6 -11 months) represented the lowest (11 %).

Stunting as a cumulative indicator of growth retardation in children is positively associated with age (Anderson, 1995; Aschalew, 2000; SRI LANKA, 2003 ). Older children are more mobile than younger, are weaned from the breast, consume inappropriate food supplementation in quality or quantity during the weaning period, are starting to eat a variety of family foods, are increasingly exposed to environmental contamination, which results in high rates of infectious diseases and poor growth and may consume inappropriate (Anderson, 1995; Aschalew, 2000 , SRI LANKA, 2003, Yimer, 2000; Genebo et al., 1999; Samson et al., 2000).

#### **6.3.2.2. Stunting by sex**

Among all participants, among Bedouins and refugees **girls** showed a slightly higher tendency of getting stunted than boys. This difference is consistent to what was reported by an earlier study in the West Bank (Abdel Nour, 1991) and a recent study in SRI LANKA (2003) where a marginal differences was also found.

In our community females are expected to be more exposed to malnutrition than males due to cultural habits. Fathers and male children are given the more nutritionally valued food and in larger portion compared to females, which makes female child (special if came from poor family ), highly predisposed to nutritional related disease (Giacamon, 1985). Furthermore, girls may be more exposed than boys to inadequate intakes because of dieting, lower energy intake and social discrimination (Dennison et al., 1995).

#### **6.3.2.3. Stunting by Birth order**

Results showed that among Bedouin and Refugees no specific trend in stunting by birth order was found. Stunting was reported rare in birth order 2-3 (Sommerfelt et al., 1994) but was positively associated with birth order 5+ (Jeyaseelan, 1997). On the other hand (Woldemariam et al, 2002), reported that children of first birth order were at a significantly higher risk of stunting than children of higher birth. This higher risk of stunting in first birth order children could be due to mothers' low level of experience at first delivery in the area of child care and feeding, which are important components of improved nutrition (Woldemariam et al, 2002).

#### **6.3.2.4. Birth weight and gestational age**

Among all children the percent of stunted children with low birth weight was higher than with normal birth weight. with similar findings

among Refugees. However, among Bedouins no difference in the percent stunted children between those with normal birth weight and with low birth weight was (21% in both). The findings among Refugees is consistent to what was reported by others. Low birth weight (LBW) infants are more exposed to poor sucking (poor feeding), to infection and deaths than infants and children with normal weight (WHO, 1995). Furthermore, low-birth weight infant is more likely to be underweight or stunted in early life, since recent evidence shows that low birth weight continues to be a major contributor to child malnutrition and premature death (ACC/SCN and IFPRI, 2000). Also, nearly one out of four children born with birth weight lower than the standard 2.5 kg, show signs of long term malnourishment, in the first five years of their life (SRI LANKA, 2003).

Dietary inadequacy is the basic cause of malnutrition in pre school children, and many of the other identified factors (Living standards, water and sanitation, birth weight, birth interval, parity, sex of child, weaning practices and mother's education) directly or indirectly contribute to the incidence of malnutrition (SRI LANKA, 2003).

#### **6.3.2.5. Gestational weeks**

The percent of stunted children who were born premature (< 37 weeks) was higher than those who were born after 37 weeks of gestation among all children, among Bedouin and among Refugees. Premature babies are usually borne with LBW, and low-birth weight infant is more likely to be malnourished (ACC/SCN and IFPRI, 2000).

Among Bedouin the percent of stunted children born premature (48 %) was almost as twice as the percent of those among refugees (22 %).

#### **6.3.2.6. Duration of Breast feed and time of introducing weaning food**

Breastfeeding is a common practice by all participant women since 98% of all children who born in the five years preceding the survey have been breastfed at some time of their life. Among all children and among refugees an inverse relationship between the percent of stunting and the duration of breast feeding was seen. But an opposite trend was seen among Bedouins where the lowest percent of stunting was among those breastfed for less than 3 months.

On the other hand, among all stunted children the highest percent of stunting was (28 %) among those children given weaning food at 4-6 months of age, while the lowest was (16 %) among those given food after 6 months of age. Among Bedouins the highest proportion of stunting was among children given weaning food early below 4 months of age,

while the lowest among those given food > 6 months. Similarly, among Refugees the lowest percent of stunting was among those given food > 6 months.

Infant and child feeding practices could be major determinants of the risks of malnutrition, where optimal infant feeding practices include exclusive breastfeeding for six months of age (SRILANKA, 2003). Caring practices that include breastfeeding and complementary feeding is one of the of underlying factors for malnutrition ( UNICEF, 1992). High risk of stunting among children may be an indication of either inappropriate food supplementation in quantity and/or quality during the weaning period, or exposure to disease. Whereas low risk of stunting may be due to the protective effect of breastfeeding (Woldemariam et al, 2002).

#### **6.4 Association of child nutritional status with selected mother-related variables**

##### **6.3.1. Mother's Age group**

A direct relationship between percent of stunting and maternal age was seen among Bedouin as well as among refugee children. At these age groups where mothers have good experience in child caring , a positive effect of nutritional status of their children is expected .On the other hand increasing in maternal age is also associated with high parity, high number of children, and as a consequence increasing in food demand. So inappropriate food supplementation in quantity and/or quality , a high risk of stunting among children may occur (Yimer, 2000; Genebo, 1999; Samson et al., 2000).

##### **6.3.2. Family income**

Percent of stunting was directly related to family income among Bedouin, while inversely related among Refugees.

Our findings among refugees was consistent with that and with what was reported by (Sommerfelt et al., 1994, Getaneh et al., 1998; Genebo et al., 1999; Yimer, 2000) who showed that the higher the level of economic status of the household, the lower the level of child stunting. However, among Bedouin other factors might be related, especially those to their lifestyle.

##### **6.3.3. Mother and father education**

Analysis showed that among all children an inverse relationship between percent of stunting and mother's education. The same was seen among refugees , but the opposite among Bedouin.

On the other hand, an inverse relationship between percent of stunting and father's education was seen among refugees whereas the highest proportion was among those who had illiterate fathers, but the opposite among Bedouin. whereas the highest proportion was among those who had literate fathers.

Education is one of the most important resources that acts largely through greater knowledge, improved care giving practices and enable women to provide appropriate care for their children, which is an important determinant of children's growth and development (Engle and Menon, 1996; Ricci and Becker 1996; Cebu Study Team, 1991; Ruel et al. 1992; Ruel et al. 1999 ).

Our findings among all and Refugees is consistent with what was reported in SRI LANKA (2003), that the proportion of stunted children is as high as when mother has not gone beyond primary level of education. The affected proportion has dropped down when the mother has had at least secondary education. Similarly, studies in the Philippines (Aguillion et al, 1982); Libya (Popkin and Bisgrove, 1988); Uganda (Statistics Department and Macro International Inc., 1996), and Ethiopia (Yimer, 2000; Genebo et al., 1999) all showed a decreased incidence of malnutrition among young children with an increase in the level of mothers' education.

#### **6.3.4. Family size**

Results showed that no particular pattern was seen between stunting and family size.

It was reported that the larger households had higher rates of stunting and wasting (Kumar, 1995). Moreover, the number of siblings appear to have a negative effect on the state of wasting as well as stunting in infants and small children (SRI LANKA, 2003).

## Conclusion

This study clearly had shown that Bedouin women and children in the JV suffer from malnutrition.

Anemia represents a severe problem of the Bedouin community since 45 % of the women are anemic. Fortunately, most of the anemia cases were of the mild form.

These women experience overweight and obesity which are risk factors for many chronic diseases. Based on the Bedouin lifestyle, overweight and obesity were expected to occur at much lower percentages than observed. Overweight in Bedouin women, however, was shown to occur at a similar rate as in refugees. This is an alarming finding that should attract health providers who care for both communities. Otherwise, a remarkable shift towards obesity would be expected since already 18 % of the Bedouin women were Obese.

Educational programs addressing anemia and obesity would help women to become aware of these health problems, and to actively participate in preventing them. These programs could be launched by health providers especially in MCH centers which women visit frequently. At a different, but rather essential level, more effort should be done to encourage school attendance among Bedouin girls, since 34 % of Bedouin women were illiterate

Stunting, which is a cumulative indicator of growth retardation was found to be the predominant form of child malnutrition where it reached 21 % among Bedouin. An inverse relationship between percent of stunting and parent's (mother or father) level of education was found. Children of educated parents are at a lower risk of malnutrition, if the risks observed for other variables are eliminated. This indicates that parents who receive even a minimal basic education (even in the poor households) are generally more aware than those who are not educated of the need to utilize available resources for the improvement of the nutritional status of their children.

Breastfeeding is a common practice by all participant women in JV including Bedouin. About 98% of all children under five years have been breastfed at some time of their life. However, the highest percentage (24 % ) of all stunted children were breast fed for less than 3 months . Optimal infant feeding practices include exclusive breastfeeding for six months (SRI LANKA 2003). On the other hand,

among all stunted children the highest percent of stunting was (28 %) among those children given weaning food at 4-6 months of age, while the lowest was (16 %) among those given food after 6 months of age. This shows that malnutrition in early infancy may be attributed to the lack of exclusive breastfeeding. Besides, early complementary feeding that may expose infants to pathogens and increase their risk of infection which would also negatively affect their nutritional status.

Based on these and other related findings, this study concludes that most of the socioeconomic variables affecting the nutritional status of women also affect the nutritional status of children. Also, some association was found between maternal and child nutritional status.

The Bedouin community deserves more attention of health researchers and health providers. This study shed some light on the nutritional status of Bedouin women and children .

## **Recommendation**

1. Primary and secondary preventive measures are needed to reduce malnutrition among Bedouin women.
2. Health and nutrition education should also be an integral part of the education process. Therefore, it is imperative that young girls and boys be enrolled in compulsory primary school education and opportunities should also be given to adult women and men to take part in non-formal education.
3. Well targeted nutrition education programs to improve specific care giving practices, such as child feeding, hygiene and use of health services, could in the short term help mothers make better use of their scarce resources and protect their child's health and nutrition.
4. Health providers should encourage exclusive breastfeeding for six months which is the optimal infant feeding practices. Therefore complementary feeding should be given after the age of six months.
5. Actions towards improving women and child nutrition should always be integrated since some association was found between maternal and child nutritional status.
6. Height (length) measurement for infant and children is recommended to be integrated in MCH .
7. More comprehensive studies should be followed to better understand the underlying factors of malnutrition in the Bedouin community.

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بسم الله الرحمن الرحيم

## استبيان

الوضع الغذائي والصحي للسكان البدو في واد الأردن

الأخت : الأم الفاضلة

أنا د. خالد الراعي وطالب ماجستير صحة عامة في جامعة القدس  
سنقوم وبالتعاون مع جمعية  
الإصلاح الخيرية - أريحا

بإجراء بحث عن الوضع الغذائي والصحي لسكان البدو في واد  
الأردن . في هذا البحث سنقوم بأخذ معلومات عنك وعن طفلك وعن  
وضع الأسرة وكذلك عمل بعض الفحوصات المخبرية لفقر الدم و بقياس  
طولك ووزنك وطول ووزن طفلك .

أرجو أن تساعدنا و تسمحي لنا بذلك .

ولك الشكر الجزيل.

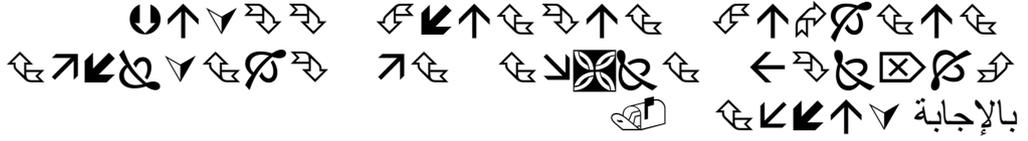
مع تحيات

د. خالد الراعي

## Annex 2

### الوضع الغذائي والصحي للسكان البدو في واد الأردن

رقم الاستمارة: ..... تاريخ إجراء البحث: / / 2000  
ساعة البدء بأخذ ..... الاستمارة ..... ساعة الإنهاء من  
لاستمارة.....



#### معلومات عن المبحوثة :

- 1- اسم المبحوثة.....
- 2- كم سنة عمرك : ..... تاريخ ميلادك / /
- 3- هل أنت متزوجة : 1- نعم 2- لا إذا كان الجواب لا انتقل إلى سؤال (10)
- 4- كم كان عمرك عند الزواج بالسنوات : .....
- 5- كم كانت المدة (بالسنوات) بين الزواج والحمل الأول : .....
- 6- كم كان لديك عدد الأحمال بما فيها الإجهاضات : .....
- 7- كم كانت عدد الولادات بما فيها المواليد الذين ولدوا غير أحياء : .....
- 8- هل تستعملي حبوب لمنع الحمل؟: 1- نعم 2- لا
- 9- هل تستعملي لولب لمنع الحمل؟: 1- نعم 2- لا
- 10- ما هو مستواك التعليمي : 1- لا تقرئي ولا تكتبي 2- تقرئي وتكتبي 3- أنهيت من (1-6) سنوات دراسية 4- أنهيت من (7-9) سنوات 5- من (10-12) سنة 6- أكثر من 12 سنة.
- 11- هل تدخنين السجائر أو أية أنواع من التبغ؟ 1- نعم 2- لا

12- هل تشربين الشاي أثناء أو بعد تناول وجبات الطعام مباشرة ؟ 1- نعم 2- لا

13- هل تعملين بأجر خارج البيت ؟ 1- نعم 2- لا

14- هل تستعملين حبوب مقوي(حديد) او غيرها ؟ 1- نعم 2- لا . حديدي .....

15- هل لديك الدورة الشهرية الآن ؟ 1- نعم 2- لا

16- هل الفترة ما بين دورتك الشهرية والدورة التي تليها تكون ما بين (25-35) يوم.  
1- نعم 2- لا 3- ليس لها نمط

17 - كم معدل عدد ايام الدورة لديك ؟ 1- اقل من(3) ايام 2- بين (3-8) ايام 3-اكثر من (8) ايام .

18 - حسب رأيك هل كمية الدم في الدورة لديك 1- طبيعية 2- قليلة 3- كثيرة ؟

19-هل أنت حاملا الآن ؟ 1- نعم 2- لا

### ارجو ان تجيبي على عدد المرات التي تتناولين فيها كل من الصناف التالية:

ولا مرة (6)	مرة في الشهر (5)	مرة اسبوعياً (4)	3مرات اسبوعياً (3)	مرة يوميّاً (2)	اكثر من مرة يوميّاً (1)	صنف الغذاء	
						خبز	20 <input type="checkbox"/>
						ارز/بطاطا/معكرونة	21 <input type="checkbox"/>
						فواكه	22 <input type="checkbox"/>
						خضار	23 <input type="checkbox"/>
						لحوم حمراء /بيضاء/سمك	24 <input type="checkbox"/>
						حمص/فول/عدس	25 <input type="checkbox"/>
						حليب /لبن	26 <input type="checkbox"/>
						جبنة بيضاء/ لبنة	27 <input type="checkbox"/>
						بيض	28 <input type="checkbox"/>
						زيت/ زيتون	29 <input type="checkbox"/>
						حلويات(كنافة/بسكوت...	30 <input type="checkbox"/>
						مشروبات ساخنة/شاي..	31 <input type="checkbox"/>
						مشروبات باردة /عصير...	32 <input type="checkbox"/>

33- طول المبحوثة لأقرب سم .....

34- وزن المبحوثة لأقرب 100 غم .....

### معلومات عن الزوج (للمبحوثات المتزوجات) :

- 35- كم عمر زوجك بالسنوات ؟ : ..... تاريخ الميلاد / /
- 36- هل كان يعمل زوجك خلال ال 12 شهراً (السنة) الماضية ؟ 1- نعم 2- لا
- 37- ما طبيعة عمل زوجك ؟: .....
- 38- ما هو مستوى التعليم عند زوجك : 1- لا يقرأ ولا يكتب 2- يقرأ ويكتب 3- انهى من (1-6)سنوات 4- من (7-9) سنوات 5- من (10-12) سنة 6- اكثر من 12 سنة دراسية

### معلومات حول الأسرة والسكن :

- 39- ما هو نوع السكن لديكم؟ هل هو : 1- خيمة 2- بيت إسمنت 3- بيت زينقو 4- بيت خشبي
- 40- كم عدد الغرف المنزل الذي تسكنون فيه؟ : .....
- 41- كم عدد أفراد الأسرة الذين يسكنون بالبيت حالياً .....
- 42- كم عدد أفراد الأسرة الذين تقل أعمارهم عن خمس سنوات : .....
- 43- كم عدد الأبناء الذين يتعلمون في مدرسة أو معهد؟ : .....
- 44- كم عدد أفراد الأسرة الذين يعملون بأجر؟: .....
- 45- كم عدد أفراد الأسرة الذين كانوا يعملون ولكنهم الآن عاطلون عنالعمل؟ .....
- 46- ما هو مجموع الدخل الشهري للأسرة 1-دون 1000 شيكل 2- (1000-2000) شيكل
- 3-1000 شيكل فاكثر 4- لا اعرف
- 47- ما مصدر مياه الشرب :1-خط رئيسي (من البلدية) 2- من مياه الأمطار(آبار تجميع) 3- شراء تنكات
- 48- هل يوجد مرحاض بالبيت 1- نعم 2- لا
- 49- أين تتلقون الخدمات الصحية الأولية ؟ من :1- عيادة حكومة 2-عيادة وكالة
- 3-عيادات خاصة 4-في المستشفى
- 50- عادة خلال الحمل هل كنت تراجعين عيادة الأمومة والطفولة:1- نعم 2- لا 3- لا يوجد

## نتائج الفحص المخبري للمبحوثة

CBC :

Hb..... Ht..... Mcv..... Mch.....

B12..... Folic Acid ..... Ferriten..... HbA2.....

## الوضع الغذائي والصحي للسكان البدو في واد الأردن

### معلومات عن الطفل:

رقم الاستمارة: ..... تاريخ إجراء البحث: / / 2000  
ساعة البدء بأخذ الاستمارة: ..... ساعة الانتهاء من  
الاستمارة: .....

### الأسئلة التالية تتعلق بطفلك أرجو أن تجيب عليها

- 51- ما اسم طفلك : .....
- 52- كم عمره بالأشهر ..... ( تاريخ الميلاد ) : / /
- 53- ما نوع جنسه؟ : 1- ذكر 2- أنثى
- 54- اين قمت بولادته؟ في : 1- البيت 2- المستشفى 3- مراكز التوليد 4- غير ذلك حدد.....
- 55- كيف كانت ولادتك : 1- طبيعية 2- قيصرية 3- باستعمال أدوات ميكانيكية 4- غير ذلك .....
- 56- وما محصول الولادتك : 1- مفرد 3- توأم
- 57- كم كان وزن طفلك عند الولادة : 1- اقل من 2500 غم 2- اكثر من 2500 غم
- 58- وزن الطفل الحالي لأقرب 100 غم ( بالقياس ) : .....غم
- 59- طول الطفل الحالي بالسنتيمتر (سم) لأقرب ملمتر (مم) ( بالقياس ) : .....سم
- 60- كم كان عدد أسابيع الحمل عند الولادة : 1- اكثر من 37 أسبوع 2- اقل من 37 أسبوع
- 61- كم مرة زررتي فيها عيادة الحوامل خلال حملك به ؟ 1- ولا مرة 2- مرة 3- (2-3) مرات 4- اكثر من 3

62- ما هو ترتيب طفلك بين الأبناء الأحياء : 1- البكر 2- الثاني 3- الثالث 4- الرابع 5- الخامس فاكثُر

63- هل ترضعينه من ثديك : 1- نعم وألان مستمرة 2- ليس ألان ولكن في السابق 3- لم يرضع مطلقا

64- ما هي المدة التي ارضعت فيها طفلك : 1- 3 اشهر 2- (3-6) اشهر 3- اكثر من 6 اشهر

65- كم شهرا كان عمره عند البدء بتناول الأغذية الفطامية: 1- اقل من أربعة 2- بين (4-6) 3- أكثر من 6

66- هل عانى طفلك من اسهالات خلال الأسبوعين الماضيين ؟ : 1- نعم 2- لا

67 - هل عانى طفلك من حرارة أو أمراض بالجهاز التنفسي خلال الأسبوعين الماضيين؟ : 1- نعم 2- لا

68- هل تم تشخيص طفلك بان لديه مرض مزمن ؟ : 1- نعم 2- لا

69- هل تم تشخيص طفلك بان لديه أية إعاقات أو تشوهات خلقية؟ : 1- نعم 2- لا

70 - إذا كان نعم حدد نوعها : .....

71- هل طفلك يعاني من فقدان شهيه ؟ : 1- نعم 2- لا

## وشكراً لتعاونكم

مع تحيات

د. خالد الراعي

## Annex III

### Photo of the field work

**Photo 1** Field photo with the car of Al- Islah Society



**Photo 2** Team work while visiting a Bedouin family



**Photo 3 Lab technician while drawing the blood samples**



**Photo 4 Team work while collecting data**

