BIRZEIT UNIVERSITY

NUTRITIONAL STATUS OF PRIMARY SCHOOL CHILDREN IN A REFUGEE CAMP OF THE WEST BANK

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NAJWA RIZKALLAH

Community Health Unit

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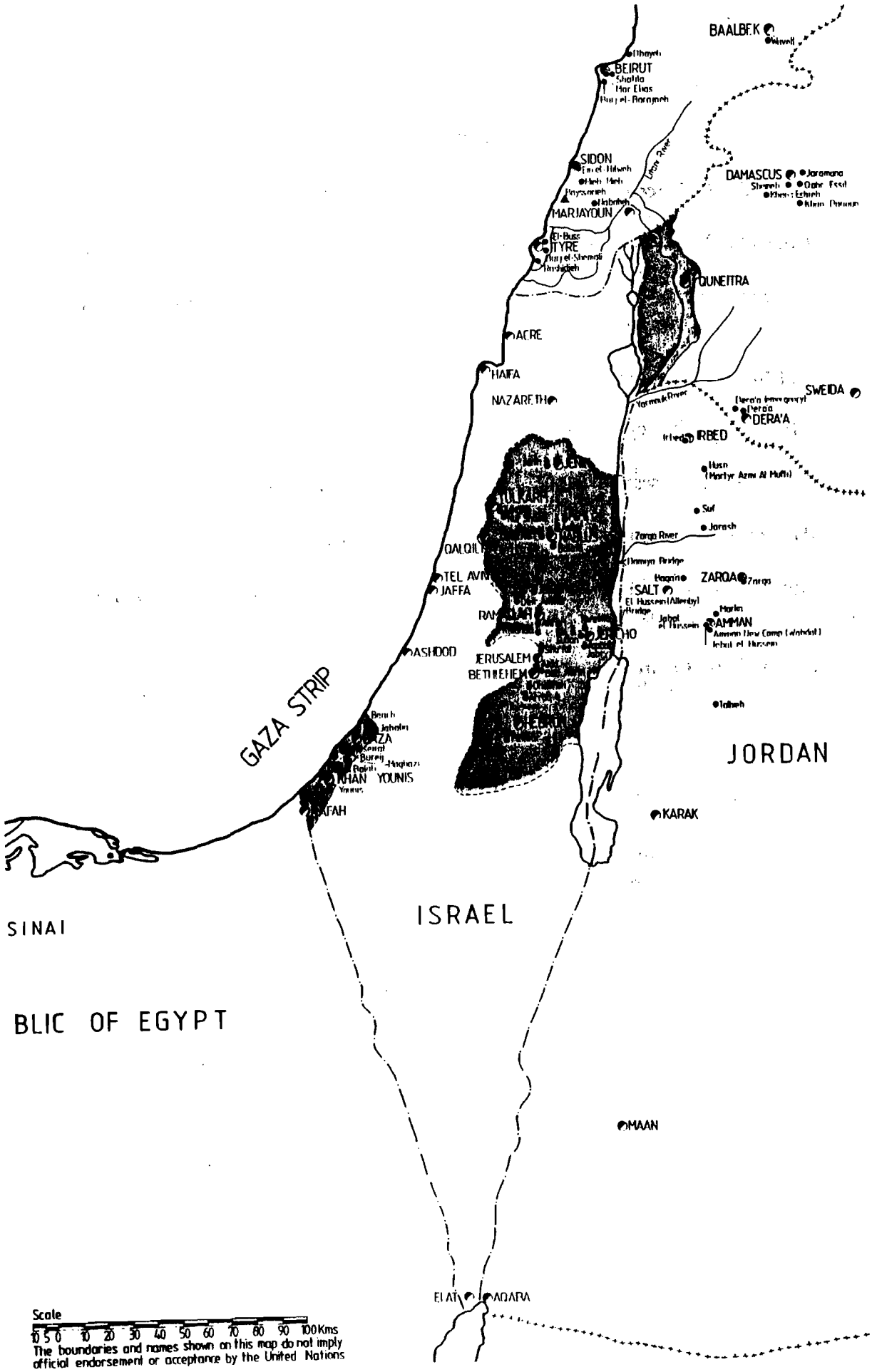
APPENDICES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The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations

SUMMARY

The aim of this study was to assess the nutritional status of primary school children in a refugee camp of the West Bank and to investigate the factors that influence the nutritional status or growth patterns of these children by examining socio-economic and environmental factors in the camp as well as assessing the diet and general health of the children.

A cross-sectional study of nutritional status of primary school children attending the boys and girls primary school in Jalazone refugee camp was carried out.

The survey identified children who were malnourished or in danger of becoming malnourished and thus priorities for nutrition interventions. Based on the results of the study, it is hoped that a nutrition intervention programme will be established in order to improve the nutritional status of primary school children in the camp. Further, the results of the study suggest that the setting up of a system for improving school health clinical records, including broadening the health indicators measured to include anthropometric measurements and dietary investigation, would be a necessary part of a programme to monitor, identify and reduce levels of malnutrition among children in the camp.

In summary, we have chosen to study the nutritional status of school children within the contexts of the political, economic and social reality within which they live, precisely because we conceptualize nutritional status as ultimately determined by the larger context. We therefore utilize the methodologies that are compatible with this approach, by physically measuring nutritional status and relating it to various questions pertains to the larger context. The major findings of this study are as follows:

1. We found an overall rate of 32% stunting (an indication of past nutritional status) among the sample of children studied. No relation was found between stunting and age nor gender (as possible determinants of malnutrition).

2. We found an overall rate of wasting of 18.4% (an indication of present nutritional status). We also found that the rate of wasting increased with age from 11.9% to 24.1%, although this difference was not statistically significant. No significant difference was found between the genders.

3. We also found an overall rate of anemia of 18.8% with girls slightly more anemic than boys, and with anemia decreasing with age.

4. Our results have also shown that family wealth status is one of the most important determinants of nutritional status of children. We found that the percentages of stunting and wasting was considerably higher among the poor 42.5% and 24.7% respectively compared to 25.4% and 13.6% respectively among the rich. In other words, malnutrition increased with increasing poverty.

5. We also discovered that wealth significantly influenced other variables, important for nutritional status i.e.: the wealthier the families the better the living conditions and the more the possession of amenities and the better the food consumed.

6. When we correlated the nutritional status of children with the type of diet consumed, we found in particular that protein consumption is one of the determinants of the nutritional status of children i.e. a significant correlation was found between protein consumption and the rate of stunting where 52.1% of stunted children reported not consuming any kind of animal protein on a regular basis (at least once weekly). We also found that protein consumption as well as the consumption of most other nutritionally valuable food items positively related to the wealth status of the families, i.e. 33.3% of the poor reported not consuming adequate amount of animal protein compared to only 2% of the rich. This indicates that wealth determines protein consumption and in turn protein consumption is an important indicator of the nutritional status of children.

7. We found that the nutritional status of children was also influenced by the educational level of both mothers and fathers but in particular with the educational level of mothers. Simultaneously educational level of mothers and fathers was found to be determined by the wealth status of the family. This is another finding that reinforces the notion that ultimately, it is wealth that is determinant of the nutritional status of children, operating directly by affecting food consumption, and indirectly, by affecting intermediate variables like mothers education as well as fathers education.

8. We also found that occupation of the father determined the wealth status of the family: most unskilled labourers come from the poor category 26% compared to 6.3% of the rich, where as most of those who own business come from the rich category, 43.8% compared to the poor 20.5% respectively which in turn has an effect on the nutritional status of children. (26.2%, 21.2%,15.4% and 14.8%) of the wasted children belong to fathers with occupation of unskilled labour, semiskilled, office, other and private business respectively. That is what fathers do for a living has a bearing on child nutritional status.

9. Anemia seemed not to be related to family wealth status of both sexes combined. However, when we separated the results by sex, we found that there is a rising rate of anemia among girls with increasing poverty, with 25.7% anemic girls among the poor compared to 19.2% among the rich, we observed the opposite pattern for boys: Rich boys tended to be more anemic than poor boys 18.2% compared to 10.5% respectively. Quite obviously, the prevalence of anemia is influenced by factors other than wealth.

10. We found no significant correlation between the frequency of eating at the Supplementary Feeding Centre and the rate of wasting and stunting where as a significant correlation did exist between the frequency of eating at the centre and

family wealth which might indicate that the selection of children to eat is based on their wealth status. It seems that children who eat regularly do belong to a disadvanced socio-economic sector of the refugee community.

11. A strong correlation was found between mother's awareness of her child having a nutritional problem and the rate of wasting but not the rate of stunting. This is due to the fact that wasting is easy to see while stunting is more difficult to recognize.

12. We found that education plays a very important role in increasing the awareness of the mother towards her child's nutritional status-in particular the rate of wasting, where as we found no correlation between stunting and mother's awareness controlling for education since as we mentioned before, stunting is much more difficult to observe. Thus education does seem to positively influence the mother's ability to detect easily recognizable nutritional problems.

13. What is alarming in particular is the percentage of wasted and stunted children, 71.2% and 84.1% respectively, whose mothers are not aware of the general health of their children. If these children remain malnourished as they are without diet councelling, nutrition education to both mothers and children and general improvement in living conditions, it is likely that their overall health would be affected and they might remain wasted and stunted for ever.

INTRODUCTION

It is well accepted that adequate nutrition is essential throughout the human life cycle, particularly during periods of rapid growth such as infancy and the pre-school years[1]. For this reason maternal and infant health workers throughout the world monitor the growth and development of children, normally until the child's fifth birthday[2]. Thereafter, growth monitoring in community or public health programmes is usually less regular or often non-existent. Yet during the primary school years, both growth and development proceed rapidly, albeit at a decelerated rate compared to that of the preschool and adolescent years[3]. Adequate nutrition during the primary school years may permit a child to "catch-up" and/or lay the foundation for optimal adolescent growth. Although physical growth and development are influenced by a variety of factors, the adequacy of dietary intake is a major determinant in an otherwise normal body and environment[4].

Nutrition studies frequently research the nutritional status of under-fives as they represent a high risk group and act as an indicator of the nutritional status of the population as a whole. Anthropometric measurements are less frequently taken for children over the age of five years although this may ascertain whether nutrition was indeed adequate in the early years,as well as whether nutritional status of older children is adequate.

Few studies have been carried out in the Palestinian Occupied Territories to determine the nutritional status of the Palestinian population as a whole. One clinic-based survey of the refugee population of the West Bank and Gaza Strip, which was carried out by UNRWA in 1984, examined a sample of the under-fives registered in UNRWA health facilities (5% in the Gaza Strip and 10% in the West Bank). Using the standard W.H.O. definitions of nutritional status, the study of height/age revealed malnutrition rates of 15% in the West Bank and 20% in the Gaza Strip[5]. Three surveys carried out by UNRWA in collaboration with the W.H.O. in 1974, 1975 and 1978 which focussed on the health of infants, young children, pregnant women and nursing mothers, found high prevalances of moderate protein-calorie malnutrition (PCM) among children, especially those in the weaning period. The surveys also found a high proportion of children and mothers to have low blood hemoglobin levels[6]. Research into the health status of mothers and children in three villages in the Ramallah area showed 41% of a sample of 209 children under the age of three years to be undernourished. The rates of malnutrition were found to be significantly higher among female children (52%) than male children (32%)[7]. Another study carried out in the West Bank town of Biddu, in the Jerusalem area, showed that 26% of the infants under the age of three years were malnourished[8]. The results of these studies suggest that there may be a problem of chronic malnutrition in the Palestinian Occupied Territories.

Some schools of thought among nutritionists suggest that the growth impairment which occurs during the first few years of life accounts to a large extent for the reduced heights of people in developing countries where undernourishment is

common. Thus the greater the degree of stunting in the early years, the greater the height deficit in adult years[9]. "Catch-up" growth may occur if cases of undernourishment are followed up through the primary school years, except in cases of severe malnourishment and depending on the duration, severity and/or timing of the nutritional deprivation[10].

Follow-up of the nutritional status of children of primary school age is important, therefore, not only as they may be severely affected by the standards of nutrition experienced as young children, but in addition, at this age, children are still undergoing a period of rapid growth and development and food habits are developing. Although the rate of growth and development differs from that of pre-school children and adolescents, during this school age period, children require adequate nutrition to allow processes of development to proceed optimally[11]. Assessment and nutrition intervention is also important at this time as it is common for the "drop-out" rate from school to increase after completion of primary school education. In addition, it is during the primary school years that children learn positive health habits which obviously have an effect on future levels of educational achievement and life-long well-being.

Because primary school children are a relatively accessible and convenient group of a community and because they act as a reflection of the total community, assessment of nutritional status of children of this age is important in indicating levels of nutrition in the community as a whole and also allows for assessment of the existing programmes which are designed to render food available and acceptable to the population of a community.

UNRWA health services include mother and child clinic facilities through which the growth and development of children under five years of age is recorded. Analysis of these records for the children of Jalazone refugee camp showed that the coverage of height and weight recording for children was neither comprehensive nor carried out on a regular basis. In addition the clinic records were not further analysed by clinic staff to determine indicators of weight/height, weight/age or height/age; thus nutritional status assessment of children was not an integral part of the health program and follow-up of malnourished children was lacking.

In this study, anthropometry was used as a tool in the epidemiological assessment of health and nutritional status of children. It can be used in health programmmes to monitor the health and nutritional status of individual children. For both group and individual health status assessment, accurate and valid anthropometric classification is a crucial component. The measurements taken in this study included: height, weight, and the biochemical measurements of hemoglobin and hematocrit.

In addition, the study attempted to measure the influence of several factors on the nutritional status of children and analyze the differences found between different age groups and gender of the children. Such factors included investigation into differentials in wealth, birth-intervals, occupation, educational-levels, housing, over-crowding and sanitary facilities in children's homes.

DESCRIPTION OF JALAZONE REFUGEE CAMP

Location and Area of the Camp

The camp was established in 1949, after the partition of Palestine in 1948. It is located 6 kms to the north of Ramallah/Al-Bireh cities on the main Nablus road. In 1949 the area of the camp was 253 dunums (4 dunums= 1 acre) and, according to UNRWA figures, the camp has expanded to encompass an area of 337 dunums today. This growth in size is due to both natural population increase and the changes in Palestinian social structure, specifically a trend towards the nuclearization of families.

The Camp Population

In 1949 there were 3,500 refugees residing in the camp, living in tents until, in 1951, UNRWA built cement and breeze blocks dwellings. In 1967, there were 4,974 people living in the camp when the June War broke out. As a result of the War, 1,700 (320 families) left the camp for Jordan. In January 1988, the population of the camp comprised 5067 individuals living in 1174 families and the average household size was calculated by UNRWA to be 4.3 persons per family[12]. UNRWA statistics are not based on house-to-house surveys and are therefore estimates. In addition, UNRWA does not keep up-to-date figures of births and deaths in the camp.

In a survey carried out by the Research and Documentation Centre at Birzeit University (BZRDC) the average household size was estimated to be six persons[13]. The figure for the present survey was 7.9 persons per family. UNRWA figures reveal that the total population living in the camp has increased by 1567 refugees over the last 40 years, an average of 39 persons per year. This statistics however does not reflect the real or a normal increase in population, partly because people have left the camp for other parts of the West Bank or abroad for a combination of reasons, including political (after the war) and economic reasons (in search of employment abroad) or because the total area of the camp is not enough to accomodate the population increase. Due to the lack of accurate UNRWA statistics, the figures obtained from the survey carried out by the Bir Zeit Research and Documentation Centre and from this study, will be used here. The BZRDC survey shows that 50.8% of the camp population are male,and 49.2% are females. The figure for those who have left the camp is 65% male and 35% female, which is to be expected as the majority of those who travel abroad for work are males.

The Jalazone refugee camp is considered to be a "young society"; the percentage of the population under 15 years of age is 47%, while only 3.4% are above 65 years of age. These numbers confirm to the general age distribution found in the West Bank as a whole[14].

Origin of the Refugees

The refugees come from six Palestinian cities and 42 villages. (See Appendix 1) for the names of these cities and villages). Most of the population are considered refugees although a small number of persons living inside the camp do not have refugee status. The families in the camp left their homes during and following the 1948 and 1967 wars as a result of the destruction of their property, villages and cities. Five families came to the camp in 1967, three were from Beit Nuba village and two from 'Emmwas village. Both of these villages were destroyed with another village in the area (Yallo) in 1967 by the Israeli military, and the population of over 4,000 from these communities were forced to leave and their land was confiscated, a total area of 16,000 dunums. The people in the camp are from different localities, but the great majority lived in the coastal plain of Palestine. The number of families from the Jaffa, Lydd and Ramle areas represent 83% of the number of families living in the camp as a whole. 167 families come from the village of Beit Naballa and 73 families are from al-'Abassiyeh. We conclude from Appendix 1 that the majority of the population in the camp were originally peasants from the coastal plain, making up 80.7% of the total families living in the camp. The number of families living in the camp, coming from cities is only 19.3%, and these reflect to a large extent the Palestinian population distribution before 1948, where the majority of people were village dwellers, dependent on agriculture for livelihood.

Socio-economic Conditions

As mentioned previously, 38% of the families in the camp come from the villages of Beit Naballa and al-'Abassiyeh and 83% of the total population were living in the coastal plain. According to UNRWA statistics[15], 27% of those who came from the Jaffa or Ramle regions have left the camp for Jordan or other areas of the West Bank, due to the social ties and family relationships between those cities and the West Bank in general. (The direction of migration was related to proximity to Arab countries). When the migration happened in 1948, the majority of people from the same clan who used to live in the same village or city, migrated together and settled in the same area. We found that in the camp people from the same village/clan settled together in the same neighbourhood of the camp as a form of social and economic security in the face of difficult circumstances. This situation helped to maintain the social ways of thinking, the habits and customs particular to the places of origin. With time, the changes that occured in the social and economic structures of the dispersed communities, led to changes in the means of production which in turn affected change in the habits and traditions of the people. In particular there have been changes in their social values with the predominant identity being that of a nationalist entity, rather than being part of a traditional village clan type structure.

Also as mentioned before, the majority of people living in camps are from villages, in Jalazone camp, 81% of the refugees are from villages. According to an UNRWA census carried out in 1951, it was found that from 161,000 persons working in Palestine, with refugee status, there was 62,745 peasant farmers and 32,399

agricultural labourers. These represented 60% of the total labour force[16]. Agricultural work was the main employment category of Palestinians at that time. After the confiscation of land and being forced to leave their land and farms and villages and as a result of their displacement, their economic situation deteriorated and in 1951 it was estimated that the average income of the emigrants in Jordan, Syria and Lebanon was 8.9 Palestinian guinea, whereas the income in 1944 for those living in Palestine, was 41 Palestinian guinea[17].

Fourty-one years after their uprooting, our study showed that significant change had affected the social and economic structures of Jalazone refugee camp. We found that more than half of the labour force in the camp are semi-skilled and un- skilled labourers (52.4%), whereas 17.5% work as employees in UNRWA or in offices or as teachers. 22.3% of the labour force work in "free labour" as tradesmen, run shops or stalls, or are drivers. According to UNRWA, there are 55 trading places in the camp itself. We found that 4.9% do not have work either because of sickness or retirement or they cannot find work. 72.8% of those who work, are employed in the West Bank: 20.4% inside the camp, 52.4% in the West Bank cities, while 14.1% work in Israel and 1.5% work abroad in Jordan or other countries. These migrant labourers return only to renew travel documents. At the time of our study 5.8% of the camp labour force were unemployed. In spite of the fact that the labourers constitute half of the work force, they do not work under permanent work contracts - a high percentage work as free labourers in short-employment jobs. This type of work is not stable, sometimes it is seasonal and workers are under threat of being fired at any time by Israeli employers - especially in construction work.

Women's Work

Our study showed that the percentage of reported working women was only 7.8%. 2.4 % of the women were unskilled labourers, working as cleaners, 3.4% work in sewing and embroidery, while 1.5% work as teachers and 0.5% as "free labour" (small shops & stalls). The majority of women, 92.2% reported that they do not work in the labour force but work as housewives. The women work in the following places; 4% in the camp, 3.3% in the Ramallah area and 0.5% in Israel. The percentage of women's participation in work reflects the overall pattern of female labour in the West Bank and Gaza Strip which was 9.4% in 1985[18].

In our study we tried to find out the number of workers in the family in addition to the head of household in order to learn more about the economic conditions of these families. Assuming that the families with more than one working person may be in a better economic situation than those with only one bread-winner, we found out that 66.5% of the total families surveyed had only one worker; 33.5% of the total families had more than 1 worker. These percentages are distributed as follows;

20.4% have 1 working person in addition to the main bread -winner

9.2% have 2 working persons in addition to the main bread-winner.

2.9% have 3 working persons in addition to the main bread-winner.

1.0% have 4 working persons in addition to the main bread-winner.

Concerning emigration from the camp, we found that the percentage of families with one or more emigrant either as temporary or permanent emigrant is 11.7% of the total families surveyed, of these, 7% had one emigrant and 4.7% had two, whereas most of the families in the camp do not have emigrants. In terms of the role of these emigrants in sending remittances to the families in the camp, we found that 6.8% of the families receive these payments, while 4.9% do not. We should treat these figures with caution, as interviewees often conceal information, in particular that related to income and earnings, tending to give a lower figure than is real, either because they are afraid, or because they hope for financial support. This idea is probably perpetuated by the charitable attitude with which refugees have been treated for the last 40 years.

In spite of the difficulties which hindered the researchers, we have also attempted to investigate the economic differences between the families surveyed; in order to assess the class status of the families. These difficulties increased when one looked at the economic differences at the level of the camp, where in general there is a homogenous community in terms of way of life, visible structures, for instance houses, location of houses, and lack of land (an indicator of ownership and therefore income). In reality, there are substantial differences between families. In order to investigate economic status we used (a) a wealth index designed for the camp, and (b) "informants" from the camp. For construction of the wealth index see Appendix 2. Using this index, 20.3% of families were categorized as relatively wealthy, 53.9% as average, and 25.7% as poor.

Household Amenities

The percentage of families with certain household appliances was as follows:

Washing machine	46.6%	Video	1.9%
Refrigerator	94.7%	Solar heating	58.7%
Gas Oven	98.5%	Private car	19.4%
Black and white T.V.	81.1%	Taxi	2.5%
Colour T.V.	11.7%		

Ownership of several of these appliances is a poor indication of economic status as most people can buy these appliances relatively cheap, in particular because they can be bought second-hand on the market. The fridge, oven, and black and white T.V. are common in houses. In contrast less than half of the families had a washing machine. 12% of the families had a colour T.V. and 19.4% had a private car which reflects an advanced economic situation for these families.

Housing Conditions

For three years from 1949-1951, refugees in the camp lived in tents. From as early as 1951, UNRWA embarked on a programme of exchanging tents with more permanent shelters, first by constructions of rough stones, subsequently by cement blocks and reinforced concrete roofs (Information Sheet, UNRWA, 1988). By the beginning of 1957, all tents in the camp had been replaced by concrete structures. Most of these houses are the property of the UNRWA. According to our study, we found that about 4% of the total families surveyed own their dwellings and 2% rent their houses from other families.

The problems faced by the residents of the camp are similar to those found in other camps, namely crowding and inadequate structures. In spite of the fact that the camp is small in terms of population size, the crowding ratio is high and it reaches 20 people per dunum (UNRWA statistics). According to our study we found that 73.3% of the total number of families live in 4 rooms or less. An average of 4 people in one room where the area of the room is between 10 - 14 square meters. 20.4% of families live in houses comprising 5 or 6 rooms, and 6.3% in dwellings with more than 6 rooms.

The houses in the camp are very small in size and built very closely to each other; there is no yard or land in front of most of the houses to plant or use for any other purpose. During the last 5 years, 184 rooms were added to the houses of the camp due to the increase of the total population in the camp and also due to the economic conditions of many of the families, as they cannot afford to move out of the camp into rented accomodations.

Kitchens and Toilets

According to our study we found 99% of the total families have kitchens and toilets. We found 66.2% own an indoor toilet; 34% have outdoor toilets and 3.4% have shared toilets with other families. There have been improvements in housing facilities, particularly over the last 10 years. According to an UNRWA Information Sheet (1988), refugees in the camp have built 493 private latrines with nominal UNRWA assistance. When the camp was originally constructed, there were no private toilets and people depended on public toilets in the camp, built by UNRWA at that time. UNRWA still maintain septic tank latrines, totalling 4 seats to serve the needs of the inhabitants.

Electricity

Jerusalem Electricity Company provides electricity to the camp and 99% of the families surveyed have electricity. In its survey carried out in 1983, BZRDC found that 91% of the houses had electricity.

Water

Water is provided to the camp by direct pipelines from 'Ein Samia and is distributed to the population of the camp through 15 water points totalling 60 taps at the average norm of 20 liters per person per day (UNRWA Information Sheet 1988). We found that 94.7% of the families surveyed have piped water to their homes while 5.3% obtain water from other sources. We found that 43.7% of the houses have taps inside the house while 14.1% have taps outdoors and 37% have both indoor and outdoor taps.

Education

There are two elementary and preparatory schools in the camp, one for boys and one for girls. The boys' school has 18 classes with 668 students in total. The girls' school has 17 classes with 607 students (UNRWA Information Sheet). In the girls' school there are two shifts of classes. The classrooms are very overcrowded and attempts that were made by UNRWA to move boys' classes into the girls' school to ease the problem failed due to the social constraints in the camp. There is a kindergarten in the camp that is owned by the YWCA and another run by a religious group.

We found that the rate of illiteracy (never having been to school) among males was less than that of females, 14.6% and 28.6% respectively. Table (1) shows the educational level among males and females found in the study:

Table 1: Educational Level Among Males and Females

Educational Level	Males%	Females%
Never been to school	14.6%	28.6%
1st -4th Grade	19.4%	25.2%
5th - 6th Grade	28.1%	18.8%
Preparatory Classes	17.0%	21.0%
Secondary School	8.7%	6.0%
College and Universities	10.7%	1.8%
Unknown	1.5%	2.0%

From this table we can see the substantial difference in the educational level between males and females. We found that males have better educational levels than females: 10.7% had finished university or college, while only 2% of the females had completed these stages of education. Female education is more concentrated on the preparatory and elementary schools.

Illiteracy is higher among females that males. Illiteracy for these tables here is classified according to the definition used by the Literacy Office of Birzeit University: Any person over the age of 14 years, who has never been to school or has been to school but has dropped out by the class 4th elementary or after 4 years of education. However in our study, we tried to find out if those who had finished the 4th elementary class were indeed illiterate. We asked the question whether they read and write and found that those males and females who had finished the 4th elementary class can read and write, so can be considered literate. Among those who had completed the 3rd elementary class, we found the same result for males, but found females to be illiterate at this level so our definition of illiteracy for females includes those who have never been to school as well as those who have finished the 3rd elementary class. For males, our definition of illiteracy is those who have never been to school as well as those who had finished the 2nd elementary class. The reason for this difference in educational level at this stage is probably due to the increased mobility of male children who go out to work, have access to reading materials like newspapers etc. whereas females have less exposure, spending much more time in the house.

Our study have shown that the real illiterate percentage among mothers was 44% depending on the ability to read and write. 44.2% of women answered that they cannot read whereas 45% answered that they cannot write.

Illiteracy was concentrated more among older women. The percentage of illiterate mothers whose age between 20-34 is 15.9%, whereas this percentage increased to 57.3% for older women whose age is above 35 years.

Table 2: Illiteracy by Mothers' Age

Age	Illitrate up to grade 3 %	4-9 %	10th grade and above %
20-34	15.9	76.5	7.6
35+	57.3	30.7	12.0

Chi Square = 61 p = 0.000

Camp Facilities

UNRWA provides the following centres, which employs 76 people;

Health Centre
Supplementary Feeding Centre
Sewing Centre
Youth Activities Centre
Distribution Centre
Slaughter House

Health Centre

This is a general clinic, a doctor is in attendance three and a half days per week. When he is absent the patients are referred to the clinic in the Al-'Amari Camp several kilometers away. There is a mother and child health section that serve refugees in the villages of Jifna, Durra el-Qurra' and 'Ein Senia in addition to the Jalazone inhabitants. There are three nurses in the clinic who test pregnant women and children on a regular basis, give vaccinations, and monitor child growth and development. Children below the age of 6 months who are not gaining weight are given free milk powder. From 6 months to 3 years, free milk is given to all children. Patients requiring dental treatment are referred to al-'Amari or el-Zawiyyeh Health Centre in Jerusalem. Those requiring hospitalization are referred to Augusta Victoria in Jerusalem from where they may be referred to Hadassah Hospital in Jerusalem.

Supplementary Feeding Centre

The Supplementary Feeding Centre is one of the services that UNRWA provides to the refugees in the Jalazone Refugee Camp.
Children up to 3 years old get powdered milk. The powdered milk is a mixture of skimmed milk as well as whole milk. The degree of the mixture depends on the age of the child.
Children up to 6 months old, as well as children who do not show a monthly increase in weight, get milk as follows: 900gm whole milk: 900gm skimmed milk.
These cases are usually transferred by the doctor to the clinic in the Jalazone Refugee Camp.
Children aged 6 months up to 2 years are provided powdered milk (by UNRWA) as follows: 1500gm skimmed milk: 1300gm whole milk.
For children aged 2-3 years, milk is distributed as follows:
1300gm skimmed milk: 300gm whole milk.
Preschool children get as well: 40gm of meat
These quantities are not fixed, but do change depending on Instructions UNRWA Health Department gets from Vienna.

No meals are provided to school children except for those who are in need. Needy children are recommended by the Headmaster or Headmistress, as well as the doctor, then they are transferred by the doctor to the Supplementary Feeding Centre.
The meals are given for a duration of 3 months for preschool children and according to the doctor's recommendation for children above 6 years old.

During the Uprising, the Supplementary Feeding Centres were opened to children of different age groups and by the end of December 1990 all Supplementary Feeding Centres have been closed.

ANTHROPOMETRY

Anthropometry is often the most practical field technique for the quantitative assessment of nutritional status[19]. Anthropometric measurements require relatively simple equipment, can be completed rapidly, and may be carried out by nontechnical personnel after a short period of training & standardization[20].

There are three main types of anthropometric measurements that are commonly used as indicators of size: height, weight and various body circumferences[21].

In this study we are interested in looking at the anthropometric measurements, weights & heights as indicators of size or growth.

The most common combinations of measures are: weight for age, height for age and weight for height. Each of the indicators described above provides a different piece of information pertaining to a child as in table (3).

Table 3: Anthropometric Indicators for Children[22].

Indicator	What it measures
Weight - for - age	Wasting and stunting combined*
Height - for - age	Stunting
Weight - for - height	Wasting

*Wasting : which is extreme thinness, reflects acute, current malnutrition;
*Stunting: which is retarded skeletal growth reflects chronic, long-term malnutrition.

In the past the nutritional status of groups of children has been most frequently assessed by using a classification based on a deficit in weight for age, originally proposed by Gomez and modified by Jelliffe[23,24]. The relative change of weight with age is more rapid than that of height and is more sensitive to any detorioration or improvement in the health of the child. Usually in growth monitoring, the weight for age is the measure that is employed because of the ease of making the measurement, therefore a high level of accuracy is possible; also significant changes can be observed over periods of a few days[25]. One of the disadvantages is that it may be affected by abnormalities in body composition, for instance by the development of oedema[26], and this may confuse its interpretation.

Over the last decade, many investigators have noted a significant failing of the Gomez classification: its inability to distinguish acute from chronic malnutrition - and have strongly advocated the use of anthropometric indicators which take into account height measurements as well as weight for age[27]. Seoane and Latham[28], Waterlow et al[29], and Trowbridge[30] have suggested indices based on these measurements using various cut-off points for normal.
The Eight Joint FAO/WHO Expert Committee on Nutrition also emphasized the importance of distinguishing between acute and chronic malnutrition[31].
The FAO/UNICEF/WHO Expert Committee on Nutritional Surviellance[32] recommended the use of height for age and weight for height as primary indicators of nutritional status in children.

When it began to be recognized that it may be important to distinguish between deficits in weight for height and in height for age[33,34,35,36], it was necessary to find names to describe these two deficits and the processes which cause them. The words "Wasting" and "Stunting" were proposed, as they are purely descriptive of what is observed[37]. Wasting indicates a deficit in tissue and fat mass compared with the amount expected in a child of the same height, and may result either from failure to gain weight or from actual weight loss. It may be precipitated by infection or some other household crisis[38] and usually occurs in situations where the family food supply is limited and the food intake of children is low.

The determinants differ in different environments. Very often there are seasonal episodes of wasting, related to variations either in food supply or in disease prevalence. One of the main characteristics of wasting is that it can develop very rapidly, and under favourable conditions can be restored rapidly.
The weight for height index is used to identify wasted children.
Stunting signifies slowing in skeletal growth. The growth rate may be reduced from birth, but a significant degree of stunting, representing the accumulated consequences of retarded growth, may not be evident for some years. Stunting is frequently found to be associated with poor overall economic conditions, especially mild to moderate, chronic or repeated infections, as well as inadequate nutrient intake. The height for age index is used to identify stunted children.
Stunting in general is a result of adaptation to adverse environmental and nutritional factors. Therefore stunted children are assessed by using the height for age index.

Standards and cut-off Points

It is always a problem to choose expected (standard) values and cut-off points for identifying the malnourished.
The mean value for a nutritional parameter is often considered as the standard reference value and the cut-off point is often set as a particular percentage of this average[39] (or a fixed number of standard deviations from the average). Any observation below this point defines a malnourished individual.
At present, there are four bodies of data that may be considered for use as an international reference, as anthropometric measurements should always be reported in

relation to international or local reference values. There are the Harvard Standard[40]; the measurements of Dutch children reported by Van Wiesingen[41]; those of the U.S. National Academy of Sciences[42], and those of British children reported by Tanner et al[43].

Waterlow et al.[44] suggested that the data recommended by the U.S. National Academy of Sciences are, on balance, most suitable for use as an international reference. These data are drawn from a defined sample of American children which contains between 300 and 1600 children in each yearly age group. The data from this reference population, has been assembled by the National Center for Health Statistics (NCHS), are available for both sexes as percentile curves of weight for age and height for age up to 18 years and of weight for height up to the age of puperty[45]. See appendix 3.

Which reference population to use is still a matter of contraversy. Should we use International Standards or should we build our own local standards?

One side of the debate holds that most children, regardless of ethnic origin, have approximately the same potential for growth given adequate nutrition, and so recommends using international standards[46]. Exisiting local data can be used as a basis for deciding which channels or cut-off points best represent the normal range for that country or region, keeping in mind that international standards should not be interpreted as targets, but rather as a reference for comparison.

The opposing view is that studies indicate that genetic background and environmental factors (diet, infection, altitude, for example) do make a difference, therefore a definition of nutritional status should be made on the basis of comparisons to a local standard[47].

Some researchers[48,49,50,51] even think that environment is more important than genetics in determining the variability of growth in samples experiencing malnutrition. Garn for example, has speculated that while parental build may be the chief detrminant of offspring growth in well nourished groups, nutrition may be more important where caloric insufficiency exists. More recently, Newman,has hypothesized that environmental factors might override any genetic expression of body size, in lower class Guatemalan children. Height increased with better nutrition but tend towards a limit imposed by the genes. In well nourished samples, this limit has for the most part been reached, and variation among individuals is more likely to be a function of genetic differences. In malnourished samples, a given range of environments might have a greater effect on the phenotype. Thus variation in height among individuals may reflect environmental differences to a greater extent than in a well nourished sample, and phenotypic variance of body size will contain a larger environmental component in malnourished population. If this is the case, heritability of body size should be reduced where protein-colorie malnutrition is a problem.

In our study, we will be using the International Reference Standard NCHS, since no local standard has to date constructed.

ANEMIA

Anemia constitutes a public health problem of considerable importance in the developing and tropical areas of the world, particularly infants, preschool children and women of child bearing age as well[52]. Children of school age usually do not have the same high prevalence of anemia as preschool children[53]. Most cases of Anemia are due to iron deficiency, although there are several other causes for nutritional anemia such as folate deficiency and vitamin B12. The most common measurements used to determine Anemia are the hemoglobin concentration and the hematocrit.

Hemoglobin is the red pigmented protein that gives blood its characteristic red colour. Hemoglobin is present almost entirely in the red blood cells and its main function in man is to transport oxygen from the lungs to the tissues. The measurement of hemoglobin is important as an indicator of the presence or absence of potential iron deficiency anemia. Iron deficiency anemia occurs when there is not enough iron for production of hemoglobin adequate for the needs of the body. It is seen most commonly in persons who have had chronic blood loss, multiple pregnancies, in children whose rate of growth outstrips their dietary iron, and in individuals of any age whose diets do not contain adequate amounts of absorbable iron.

Another measure that is used to determine iron deficiency anemia is hematocrit. Hematocrit is the volume of red blood cells expressed as a percentage of the volume of whole blood in a sample. It has approximately 3:1 relationship to hemoglobin concentration (Ht= 3xHb+ 1) and is frequently used as an indicator of potential iron deficiancy anemia. For more information see Appendix 4 Measurments and Indicators.

METHODOLOGY

Following preliminary discussions with the UNRWA office in Ramallah, permission to carry out the research project was granted from the UNRWA headquarters in Vienna, Austria.

The research was carried out by the nutritionist and researchers from the Community Health Unit, in addition to two research assistants.

Two teams of researchers were trained for the study:

* Two researchers were trained for anthropometric measurements including heights and weights while another two were trained in hemoglobin and hematocrit determination.
* A team of two researchers were trained in the methodology of survey research and questionnaire administration.

Anthropometric Measurements and Blood Sampling

The research team met with the staff responsible for the boys and girls Elementary Schools in Jalazone refugee camp to explain the aims and objectives of the study. In addition the team described fully the nutritional assessment methods that were to be carried out in the classroom, in order to maximize the participation and enthusiasm of the teachers in the study. The head teachers prepared a list of the names and dates of birth of all pupils attending both the boys' and girls' schools which was submitted to the team. At the same time, parents of the children were also informed about the study and the types of measurements, both of heights and weights as well as Hemoglobin and Hematocrit determination that were to be taken. Particular emphasis was placed on describing the reasons for blood sampling as the team had been informed that there would be resistance from parents to this test. The reasons were based mainly on the popular belief that the giving of blood is unacceptable.

Using the lists of pupils attending the schools, children were divided into groups according to age for the sample. The initial plan to group children by class was abandoned when it became clear that there was a wide discrepancy in ages of children in the same class. This difference was most pronounced among the female children where for example, girls aged 9 and 10 years were found to be in Grade 1. This phenomenon probably exists because girls often remain in the home to help with domestic responsibilities, especially when the mother is sick or has travelled or due to the ignorance of parents concerning the education of female children. The pupils were classified into 5 age groups as follows;

6 - 6.99 years of age
7 - 7.99 years of age
8 - 8.99 years of age
9 - 9.99 years of age
10 - 10.99 years of age

Children of 11 years of age and over were excluded from the survey because of the anthropometric changes associated with puberty which may cause a bias in the survey results[54].

A 50% random sample was taken from each age group of children and a list of these children was submitted to the heads of both schools. Dates were arranged for the time of the visits to the schools according to age groups. (April, 1987).

On the day of the examination we found that 20 pupils had to be excluded from the list due to logistic reasons: some pupils had dropped out from the school; some had moved to different areas; some were absent on the day of examination and on the two subsequent days when the team returned to the school to follow up those who had been absent. These students were therefore dropped from the sample, leaving a total of 282 pupils in the final sample.

On the arranged day, children were called from their classes and the aims of the study and its methods were explained to them. One member of the research team took the heights of the children and another took the weights of the children, while a third measured heamoglobin levels and a fourth took heamatocrit estimations. Double checking of all measurements was made.

The equipment used in the study included; 120kg bathroom scales, KaWe height measuring instruments (pocket size, Kat.Nr. 44442/inch), one hemoglobinometer, centrifuge and a heamatocrit reader, pippettes to draw blood for the hematocrit determination, alcohol for cleaning children's fingers before drawing the blood, cotton and distilled water.

Age was determined to the nearest month using the date of birth and the date of examination. Weight was measured to the nearest 0.1 kg using the bathroom scales[55]. Students removed their shoes, and heavy outer clothing, stood upright on the centre of the scale, without touching any object. Height was measured to the nearest 0.1 cm[56], the scale was fixed to the wall. After removing their shoes, students stood erect against the wall, on a flat surface, with feet parallel and heels, buttocks and back of head touching the wall behind them, the head was held straight looking forward, arms hang loosely at the sides. The head piece of the scale was gently lowered, crushing the hair, making contact with the top of the head and the measurement was read.

A measured sample of blood was taken from a finger-prick of each student and transferred to a micro-pippette in order to be read from the hemoglobinometer for hemoglobin determination. Also a blood sample was taken from a finger-prick, allowed to flow into a capillary tube and centrifuged to separate the blood and the plasma. In order to read the hematocrit % on the scale, the capillary was fixed on the scale and the reading taken by looking at the tube perpendicularly.

For measurements and indicators, see Appendix 4.

Questionnaire Design

The questionnaire was prepared in Arabic and was pilot tested in advance to ensure that the questions were clearly understood by the mothers. The pilot test was done through Birzeit Women's Charitable Society Clinic, as well as in one area of Jalazone Camp. For a translation of the questionnaire, see Appendix 5. After the pilot study, questions were modified and the final questionnaire was drawn up.

Survey

After assessing the nutritional status of the 282 pupils in the sample, visits were made to the 206 households of the pupils (May - July 1987) in order to obtain general information about the families and socio economic factors of potential relevance to their nutritional status.

Data Processing

All the data was then transferred to pre-coded sheets. Analysis was carried out using the SPSS PC statistical package.

RESULTS

Results of Anthropometric Measurements

Table 4.: Mean Heights and Weights, by Age and Sex, of the Jalazone Primary School Children aged 6-10 years.

	Males			Females			
Age group (years)	No. n= 148	Height (cm)	Weight (kg)	No. n= 134	Height (cm)	Weight (kg)	Total (n= 282)
6	23	115.1	20.4	19	114.9	20.6	42
7	33	120.3	22.1	26	119.8	22.3	59
8	32	125.7	25.1	36	124.6	24.8	68
9	32	130.8	26.6	23	130.2	27.8	55
10	28	133.9	29.8	30	133.7	30.0	58

Table (4) shows the mean heights and weights of the population sample classified by age and sex. The ranges of values for height were 115.1-133.9cm for males and 114.9-133.7cm for females. The ranges of values for weight were 20.4-29.8kg and 20.6-30.0kg for males and females respectively.

Results of Blood Sampling

Table 5.: Mean Hemoglobin and Hematocrit Measurements by Sex and Age Group.

	Males				Females				
Age	No	Hemoglobin g/dl		Hematocrit %		No	Hemoglobin g/dl		Hematocrit %	
		Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.
6	23	12.4	0.8	38.2	3.1	19	12.5	0.9	35.9	2.5
7	33	12.9	0.9	39.1	3.0	26	12.8	1.1	37.0	3.6
8	33	12.9	0.8	39.4	2.6	36	12.6	0.8	38.5	2.3
9	31	13.0	0.8	40.7	2.7	23	12.8	1.1	39.2	2.6
10	28	13.6	1.1	39.4	3.7	30	12.5	0.7	39.5	2.1

Table 6.: Mean Hemoglobin and Hematocrit by Sex

Sex	No.	Hemoglobin g/dl		Hematocrit %	
		Mean	S.D.	Mean	S.D.
Male	148	12.9	0.9	39.4	3.1
Female	134	12.6	0.9	38.2	2.9

Malnutrition and Anemia by Age and Sex

Two indicators of nutritional status, namely weight for height (Wt/Ht) and height for age (Ht/age), were used in this study in accordance with the WHO specification[57] as well as the Waterlow et. al recommendations[58].

Wasted children were identified by using the 25th percentile of Wt/Ht index of the NCHS Growth Charts as our cut-off point, whereas stunted children were indentified by using the 10th percentile of the NCHS Growth Charts as the cut-off point for Ht/age index[59].

For more information see appendix four - (Measurements and indicators).

From a public health point of view, we care about children with less severe forms of malnutrition. This doesn't mean that we neglect the severely malnourished children, but severe forms of malnutrition can be recognized easily because of the bio-chemical and / or the physical changes that accompanied the severely malnourished children. Therefore we care about the moderately to mildly malnourished children, since these milder forms are so common that neither parents nor health workers recognize it. That explain why we have chosen the 25th and the 10th percentile as our cut-off points to identify the wasted and the stunted children.

The percentage of wasted children (low weight for height) was 18.4% where as the percentage of stunted children (low height for age) was 31.2% which possibly indicates a decrease in the rate of malnutrition over time.

The nutritional status of the children included in the study based on weight for height and height for age indices are summarized in table (7).

Table 7.: Percentage of Wasted & Stunted Children by Age Group.

Age(yrs)	%Wasted	%Stunted
6	11.9	28.6
7	13.6	32.7
8	13.2	27.9
9	18.5	24.1
10	24.1	36.2

The percentage of wasted children seemed to increase with age where as the percentage of stunted children was high in all age groups.

In our study, we were interested in assessing the nutritional status differences between the different age groups based on the weight for height index as a measure of the present nutritional status, and height for age index as a measure of the past nutritional status. We combined the ages of children into two categories 6-8 years and 9-10 years in order to see whether a pattern exists between the different age groups. Table (8) explains the correlations.

Table 8: Distribution of Wasted & Stunted Children in the Study Population.

Age(yrs)	%Wasted	%Stunted
6-8	16.1	31.0
9-10	22.3	32.1

The rate of wasting appeared to increase with age, although this difference was not statistically significant. One possible explanation is that UNRWA MCH clinics provide free of charge services to preschool children. As school children get older, they are excluded from these services and therefore we would expect that the chance for being malnourished among school children will increase with age. No pattern was seen between the different age groups in the rate of stunting, where stunting was almost the same and was not affected by age.
We analyzed the data by sex in order to look at gender differences with age.

Table 9.: Percentage of Wasted & Stunted Children by Sex and Age Group.

Age(yrs)	Males		Females	
	%Wasting	%Stunting	%Wasting	%Stunting
6-8	16.1	31.0	16.0	30.9
9-10	28.8	32.2	15.1	32.1

Table (9) shows that males appeared to be more wasted than females in the age group 9-10, but the difference was not statistically significant. The rate of wasting was almost the same for males and females in the age group 6-8 years. This implies that the rate of wasting among males increased with age although the difference is not statistically significant. The rate of stunting is almost the same between males and females at all ages which implies that the rate of stunting is not affected by gender nor by age.

Table 10: Percentage of Wasted and Stunted Children by the Sex of the Child.

Sex	%Wasted	%Stunted
Males	20.9	31.1
Females	15.7	31.3
	Chi Square = 1.3 p = 0.5	Chi Square = 4.2 p = 0.1

We looked at the differences in wasting and stunting by sex alone and it appeared as if males are more wasted than females, although statistically no appreciable difference was found in the rate of wasting between males and females. The rate of stunting was almost the same between males and females.

Results of Blood Sampling

Table 11: Distribution of Hemoglobin Level by Sex.

HB Level(g/dl)	Males %	Females %
up to 12	20.3	27.6
greater than 12	79.7	72.4

Chi Square = 2.09
p = 0.14

27.6% of females were anemic compared to 20.3% of males. Although females appeared to be slightly more anemic than males. No significant correlation was found.

Table 12: Distribution of Hematocrit Level by Sex

Ht Level (%)	Males %	Females %
up to 36	15.5	22.4
greater than 36	84.5	77.6

Chi Square = 2.16
p = 0.14

The same results applied for the hematocrit level. 22.4% of females have hematocrit level below 36% where as 15.5% of males are below 36%. We were interested in looking at the differences found in the rate of anemia by age.

Table 13: Distribution of Hemoglobin and Hematocrit Level by Age of the Child

Age (yrs)	Hemoglobin		Hematocrit	
	up to 12g/dl %	greater than 12g/dl %	up to 36% %	greater than 36% %
6	35.7	64.3	45.2	54.8
7	18.6	81.4	22.0	78.0
8	27.9	72.1	14.7	85.3
9	20.4	79.6	11.1	88.9
10	19.0	81.0	8.6	91.4
	Chi Square = 6.2 p = 0.28		Chi Square = 26.6 p = 0.0001	

The rate of anemia as presented by Hemoglobin and Hematocrit determination decreased with age. In order to look more closely at the pattern of decreased anemia with age, we combined age in two groups. Table (14) explains the correlations.

Table 14: Distribution of Hemoglobin and Hematocrit Level by the Age Combined.

Age (yrs)	Hemoglobin		Hematocrit	
	up to 12g/dl %	greater than 12g/dl %	up to 36% %	greater than 36% %
6-8	26.2	73.8	25.0	75.0
9-10	19.6	80.4	9.8	90.2
	Chi Square = 5.11 p = 0.1		Chi Square = 10.6 p = 0.01	

Anemia as presented by hemoglobin and hematocrit determination decreased with age. A clear pattern was seen in the hematocrit determination where the difference was statistically significant. This decrease in the rate of anemia with age could probably be due to the fact that as children get older they depend on themselves for eating and choosing the type of food to consume. We still think that these results are surprising since they are inconsistent with the results on wasting. We tried to see if there is a difference by sex using the same age groups.

Table 15: Hemoglobin and Hematocrit Level by Sex and Age Combined.

Age(yrs)	Males		Females	
	Hemoglobin	Hematocrit	Hemoglobin	Hematocrit
	up to 12g/dl %	up to 36% %	up to 12g/dl %	up to 36% %
6-8	23.0	20.7	29.6	29.6
9-10	15.0	8.5	24.5	11.3
				Chi Square = 11.5
				p = 0.01

Although in general the rate of anemia decreased with age for both sexes, we noted that females tended to be more anemic than males within the same age group. This difference was statistically significant as shown in table (15). No correlation was found between anemia and the rate of wasting.

For the rest of the analysis we will be considering anemic children as those children whose hematocrit level are below or equal to 36% due to logistic reasons.

We have therefore tried to ascertain the rate of malnutrition among the school children and its possible causes in this community. Our analysis has shown the following:

1. We found an overall rate of 32% stunting among the sample of children studied. No relation was found between stunting and age nor gender (as possible determinants of malnutrition).

2. We found an overall rate of wasting of 18.4%. We also found that the rate of wasting increased with age, from 11.9% to 24.1%, although this difference was not statistically significant. No significant difference was found with gender.

3. We also found an overall rate of anemia of 18.8% with girls insignificantly more anemic than boys, and with anemia decreasing with age.

The Degree of Malnutrition in the Jalazone Community and its Determinants: Wealth, Education, Occupation and Gender

Although the camp tended to be homogenous, differences did exist and were partially based on the wealth status of the families.

When we started collecting the information about the socioeconomic conditions of the sampled school children families, we found that there were real differences in wealth status in spite of the fact that these children seemed to have similar living conditions. We faced some problems in dealing with some of the questions that we proposed for using as indicators of the socioeconomic status of families, i.e. number of working persons in the households, number of male migrants and whether they contributed to family income. It was very difficult to get accurate answers, because people in the camp tended to hide such information on the assumption that the research team is there to provide benefits to the families based on need. So we thought that maybe we should look at other indicators to measure the wealth status of the families. We thought of the gold the women were wearing, the degree of tidiness of the house and if the house was furnished with curtains or not, whether their frontyards are cared for and cemented or left unattended, as indicators of family wealth. We found these indicators not useful in our study. Specifically we found that the amount of gold or ornements women were wearing was not a sign of wealth. Although women possessed differing amounts, those amounts had an incidental relation to wealth; poor women too owned substantial amounts. In the traditional culture, gold is considered as the only source of women's wealth that she acquires in her marriage and that she could always use as savings eg. in the event of divorce. In other words, gold is used as a security for women and not necessarily as an indicator of the wealth status of the family. As a result, we opted for looking at family wealth status in two ways. First we examined the ownership of some of the commodities in the household as an indicator of wealth. Second, we also asked selected knowledgeable informants such as the camp supervisor about the socioeconomic conditions of the families. We then compared the results with the information obtained about amenities and we got nearly similar answers. (For more information on how we formulated family wealth index, see appendix 2).

In our study, we found that family wealth status is one of the most important determinants of nutritional status of children. We found that the percentage of stunting and wasting was considerably higher among the poor. See table (16).

Tabel 16: Percentage of Stunted and Wasted Children by Family Wealth Status

Family Wealth	%Stunted	%Wasted
Poor	42.5	24.7
Medium	28.0	17.3
Rich	25.4	13.6
	Chi Square = 7.4	Chi Square = 4.8
	p = 0.1	p = 0.3

Table (16) shows a pattern (although on the border line of statistical significance) between increasing rate of stunting and poverty. 42.5% of the poor were stunted compared to 28.0% of the medium class and 25.4% of the rich. This indicates that stunting is associated with poor overall economic conditions.
The same pattern was found when we correlated the present nutritional status of the children with family wealth. The rate of wasting tended to increase with poverty too. We concluded that malnutrition increased with increasing poverty.
Protein consumption is one of the factors that affects the nutritional status of children and in particular the rate of stunting. In our study we tried to correlate family wealth with animal protein consumption in order to understand how family wealth affects the nutritional status of children. Table (17) explains the correlation.

Table 17: Percentage of Children Consuming Animal Protein by Family Wealth

Family Wealth	Frequency of Animal Protein Consumption		
	None %	Sometimes daily %	at least once a day %
Poor	33.3	42.7	36.0
Medium	19.7	29.3	51.0
Rich	2.0	42.0	56.0
	Chi Square = 14.7		
	p = 0.005		

We found that 33.3% of the poor don't consume any kind of animal protein at all, compared to only 2.0% of the rich. At the same time we found a significant correlation between the lack of animal protein consumption and the degree of stunting of school children surveyed. See table (18).

Table 18: Animal Protein Consumption by Height for Age Index

A.P. Consumption	< 10th percentile	10-50th	> 50th percentile
None	52.1%	37.5%	10.4%
Sometimes daily	27.3%	59.6%	13.1%
At least once a day	26.7%	55.6%	17.8%

Chi Square = 12.8
p = 0.01

52.1% of stunted children do not consume any kind of animal protein compared with 37.5% and 10.4% for better-off children. The rate of stunting decreases for those children who consume animal protein so that the rate of stunting decrease as the rate of animal protein consumption increase. Therefore, protein consumption is considered as one of the most important determinants of nutritional status, and this consumption of animal protein is highly significantly related to the wealth status of the families.

The lower the wealth status, the more the poverty, the lower the ingestion of animal protein and quality food and the more the rate of malnutrition among children.

From all that we have been discussing so far, wealth status appeared to be one of the most important determinants of nutritional status of children. We also found that wealth significantly affected other variables important for nutritional status. For instance, we found that the wealthier the families, the better the living conditions and the more the possession of amenities and the better the food consumed and so on. The living standards of the families surveyed were affected by the wealth status of these families. We found a very significant correlation between family wealth and the possession of household amenities. Wealthier families tended to possess different kinds of amenities whereas poor families tended to have either one or none of these amenities. For more information see appendix 6. (wealth by possession of household amenities).

We also found that mothers and fathers coming from wealthier households tended to be more educated. The level of education of mothers and fathers correlated well with their wealth status as tables (19) and (20) show.

Educational Level	Wealth Status of Households		
	%rich	%medium	%Poor
Upto 2 yrs	14.0	19.4	28.4
3-6 yrs	16.0	51.0	40.5
7-16 yrs	70.0	29.7	31.1

Chi Square = 31.9
p = 0.000

Table 20: Educational Level of Mothers by Wealth Status of Households

Educational level	Wealth Status of Households		
	%rich	%medium	%poor
Upto 3 yrs	18.0	23.9	33.8
4-9 yrs	34.0	60.0	54.1
10-16 yrs	48.0	16.0	12.2

Chi Square = 30.1
p = 0.000

Tables (19) & (20) show that family wealth status is the determinant of the educational level of both mothers and fathers. The wealthier the families, the more the chance of mothers and fathers to be educated and the better the nutritional status of children. In other words, it is the wealth that determined the nutritional status of children and not the education alone, since education was found to be dependent on wealth. So in this case education did not function as an independent variable that affects nutritional status, but rather education is related to wealth, and wealth status is the ultimate determinant.

A similar pattern was found linking wealth to the father's occupation. We found that most unskilled labourers come from the poor category, where as most of those who own private bussinesses come from the rich category. See table (21).

Table 21: Occupation of Father by Family Wealth Status

Wealth	Father's Occupation				
	unskilled Labour %	semiskilled Labour %	Office %	Other %	Private bussiness %
Poor	26.0	24.7	21.9	6.8	20.5
Medium	25.7	34.9	19.7	3.3	16.4
Rich	6.3	29.2	14.6	6.3	43.8

Chi Square = 23.2
p = 0.0031

Therefore, the father's occupation determines the wealth status of the family which in turn affects the nutritional status of children especially the rate of wasting. Where as we found a pattern between wasted children and father's occupation: 26.2%, 21.2%, 13.2%, 15.4% and 14.8% of the wasted children belong to fathers with occupations of unskilled labour, semiskilled, office, other and private bussiness respectively.

Anemia seemed not to be related to family wealth status of both sexes combined. See appendix 7. However, when we separated the results by sex, we found that there is a rising rate of anemia among girls with increasing poverty and we observed the opposite pattern for boys. Rich boys tended to have more anemia than poor boys. See table (22).

Table 22: Percentage of Anemia by Sex and Wealth Status

Wealth-Status	%Anemic	
	Male	Female
Poor	10.5	25.7
Medium	16.9	21.9
Rich	18.2	19.2
	Chi Square = 1.1	Chi Square = 0.38
	p = 0.6	p = 0.8

In general, we noted that rich children tended to have more pocket money to spare which they spent on buying sweets, choclates and junk food. This replaces the nutritious food and leads to bad eating habits which in turn might lead to anemia and malnutrition. Due to the limited amount of pocket money and the scarce family resources, poor boys would eat lentils, spinach, and green leafy vegetables, as this type of food is relatively cheap (compared to animal protein) and poor families could afford buying such food, thus this sparing them anemia.

The rate of anemia among girls tended to increase with increasing poverty. This result could be explained in terms of the feeding behaviour that is related to the preference theory of males over females[60].

Generally speaking, in our society, male children and fathers are given the more nutritionally and socially valued food such as eggs, meat, etc. and food is generally given in larger portions compared to females. Therefore being poor might lead to the ingestion of lower quality food which can cause the nutritional deprivation and can create anemia and malnutrition. Being a female coming from a poor family will make the situation even more complex, where the female diet would probably be poor nutritionally and would probably be a casual factor in the presence of anemia and malnutrition.

Diet and Dietary Practices of Children

In this section we will be dealing with diet and dietary practices which we believe to be a major determinant of the nutritional status of children. Generally speaking what the child is fed and when as well as the way his/her mother prepares the food are products of the cultural pattern of the society into which the child is born. Also dietary practices are greatly influenced by the social status of the family: being rich or poor (noted through observation). Within this context, we see that mothers are usually the ones who prepare food for the family. Whenever the mother-in-low or the big sister are at home or are living in the same household,then the preparation of meals would be shared. Usually three meals are prepared: breakfast, lunch and dinner. Some children would eat their lunch at the UNRWA supplementary feeding centre. Out of the 282 school children examined, only 16.4% were participating in the mid-day meal program on a regular basis, 21.7% would eat sometimes (not regular) and 61.9% don't eat at all. 17.6% of those who eat at the center were males while 14.9% were females.

We tried to see if eating at the supplementary feeding centre has any effect on the nutritional status of children. See table (23).

Table 23: Wasting and Stunting among Children by Frequency of Eating at the Supplementary Feeding Centre.

Frequency of Eating	Wasting		Stunting	
	n	%	n	%
Eats regularly	(6)	11.5	(18)	20.7
Eats sometimes	(14)	26.9	(23)	26.4
Doesn't eat at all	(32)	61.5	(46)	52.9

We found no significant correlation between the frequency of eating at the supplementary feeding centre and the rate of wasting and stunting. Out of the 52 wasted children, only 11.5% eat regularly at the centre while 61.5% do not eat at all. The same applied to stunted children where out of 87 stunted children, 20.7% eats regularly while 52.9% don't eat at all. This could probably mean that the selection of children to eat at the centre is not based on the nutritional status of children, i.e. being malnourished as identified by weights and heights measurements, rather, there should be other factors by which the selection of children depends upon. We tried to see if family wealth has an effect on the selection of children to eat at the center. See table (24).

Table 24: Frequency of Eating at the Supplementary Feeding Centre by Family Wealth

Family Wealth	Frequency of Eating		
	Eats regularly %	Eats sometimes %	Doesn't eat %
Poor	32.6	32.8	23.0
Medium	60.9	60.7	52.3
Rich	6.5	6.6	24.7

Chi Square = 16.3
p = 0.01

We found a significant correlation between the frequency of eating at the centre and the lack of family wealth which probably indicates that the selection of children to eat is based on their wealth status and children who eat regularly do belong to a disadvantaged socioeconomic sector of the refugee community. From what we have been discussing so far, it is the mother who takes care of children in terms of raising up the children, cooking for them, taking them to doctors when they are ill etc. Within this context we were interested in looking at the mother's awareness of her children in terms of their nourishment. So we asked the mother how she finds her child's feeding behaviour (nutrition) and whether the child is suffering from a nutritional problem and if so what kind of a nutritional problem?
We found that of the wasted children 28.8% of their mothers are aware that their children are suffering from a nutritional problem while 71.2% of their mothers are not aware of any existing nutritional problem, as in tables (25) where as we found that of the stunted children 15.9% of their mothers are aware that their children are suffering from a nutritional problem while 84.1% of their mothers are not aware of any existing nutritional problem as in table (26) indicating a problem in maternal awareness of malnutrition of her child.

Table 25: Wasting by Mother's Perception of Whether her Child Suffers from a Nutritional Problem

The child suffers	% Wasted	% Normal
Yes	28.8	8.3
No	71.2	91.7

Chi Square = 16.95
p = 0.0

Table 26: Stunting by Mother's Perception

Has problems	%Stunted	%Normal
Yes	15.9	10.3
No	84.1	89.7

Chi Square = 1.8
p = 0.18

In contrast, we found a strong correlation between mother's awareness of her child having a nutritional problem and the rate of wasting table (25), as wasting is easy to see while stunting is more difficult to recognize.
We tried to see if the education of the mother would have an effect on her awareness of the nutritional status of her children, see table (27).

Table 27: Mother Awareness of Wasting, Controlling for Education

Up to 3 years of education	%Wasted	%Normal
Has problems	19.8	5.7
No problems	80.2	94.3

Chi Square = 11.8
p = 0.0081

3 years through 14 years of Education		
Has problems	64.3	4.5
No problems	35.7	95.5

Chi Square = 12.69
p = 0.0004

A significant correlation was found between the rate of wasting and mother's awareness by level of education: the more the mother is educated, the easier for her to be aware and recognize that her child is suffering from a nutritional problem i.e. being wasted. No correlation existed between stunting and mother's awareness by level of education, probably because stunting is much more difficult to observe.

We also asked the mothers who recognized their children's malnutrition about the kind of nutritional problems their children are facing. 55.9% of the children whose mothers classify them as having a nutritional problem were described as being weak, pale and had no appetite for food, whereas 41.2% were described as not consuming meat. So basically mothers classify the nutritional problems their children were facing either as being pale and having no appetite for food on one hand, or not consuming meat (an expression of animal protein consumption) on the other.

Overall the percentage of wasted and stunted children whose mothers are unaware of their bad health is alarming. If children remain as they are without diet counselling for both mothers and children, it is likely that these children's overall health would be affected and they might remain wasted and stunted forever. Here we see the role of school health program and routine check-ups for children which was lacking at the time the study was conducted (1987).

In our study we were interested in assessing the correlation between diet and the nutritional status of children, since we know that poor dietary intake is one of the many factors influencing the nutritional status of children. We asked the question of how can we obtain accurate information about what people eat, in other words, we were interested in looking at what the child consumes how often and how it is related to his/her nutritional status.

As we know, measurement of food intake of individuals ranges from a qualitative type of food to those of a more quantitative type. The quantitative type requires measurements of food intake which were beyond the scope of this study. We were concerned with collecting qualitative information about the child's diet, so for this purpose we used two methods, the first was the frequency of consuming particular food items[61] and the second method was the 24 hours dietary recall[62].

The first method gives detailed information about the frequency of the food consumed by the children. We have divided the child population into three categories according to their consumption of particular food items, (1) never or hardly ever eats, (2) sometimes not daily but at least once a week, (3) every day or almost every day. This method is considered as a qualitative descriptive method. The second method is the 24-hour dietary recall which requires individuals to give an account of the food consumed in the previous 24-hour. This approach is used to provide an estimate of the usual intake of individuals as well as groups. Although this method is considered as one of the simplest techniques to examine dietary practices of groups, one must be careful in applying it, since the ingestion of nutrients is highly variable from day to day and thus using the 24-hour recall may underestimate the extremes of intake so that when the actual intake is low, the recall technique exaggerates the intake, but when the actual intake is high the recall method underestimates the values[63,64].

For the 24 hour dietary recall, we interviewed the mother to ask about the diet of their children. However mothers might not be aware of the food their children consumed out of the house, which would in turn affect the results of the survey. Therefore we decided to skip the 24-hour dietary recall although we got interesting answers, in order to avoid misinterpretation of the diet results. So our findings will be based on the first method which is the frequency of food consumed. This type of qualitative dietary information cannot be converted into nutrients, yet it provides descriptive information about the dietary pattern for group comparison.

Generally speaking, the camp diet is composed of wheat bread as a staple, with rice, legumes, fresh green vegetable and fruits. See table (28) (frequencey of consuming particular food items).

Table 28: Frequency of Consuming Particular Food Items

Dairy Products:	Cheese %	Milk %	Laban %	Labaneh %
None	46.5	44.7	9.6	43.6
Sometimes daily	41.1	40.4	28.7	49.3
Every day	12.4	14.9	61.7	7.1

Animal Protein:	Eggs %	Meat %	Fish %	Chicken %
None	7.4	34.0	98.2	61.0
Sometimes	65.6	60.6	1.8	28.4
Every day	27.0	5.3	---	10.6

Cereals:	Bread %	Rice %	Spaghetti %	Burguhl %	Potatoes %
None	---	9.9	97.5	93.3	5.0
Sometimes daily	5.7	18.8	2.5	6.7	20.2
Every day	94.3	71.3	---	---	74.8

Fruits:	%
None	5.0
Sometimes daily	47.5
Every day	47.5

Vegetables:	%
None	5.0
Sometimes daily	25.9
Every day	69.1

As we can see from table (28) children's daily diet is based mainly on carbohydrates: such as bread, rice, and potatoes, with green vegetables as a source of plant protein, vitamins and minerals and laban (Yoghurt) as a source of dairy products (animal protein). The consumption of animal protein products as daily diet is rare. Generally speaking, we found that the kind of animal protein poor families in the camp consume is tinned meat that is distributed by UNRWA, as well as frozen meat occasionally and fish very rarely, which means that the frequency of eating animal protein as an index of food quality is rare which would have an effect on the overall nutritional status of children as we saw in table (28).

Unlike the village, the camp dwellers don't have land to plant and cultivate, which probably leads to more variation of food items consumed since refugees are not restricted with to the type of food planted in the land, but rather camp dwellers buy their food either from the vegetable market (Al-Hisbeh) in Ramallah or the shops within the camp which include many butchers, supermarkets with a lot of processed food on the shelves, as well as fruit and vegetable markets. We have noticed (either from observation or from what informants told us) that the food consumption pattern of the population in the camp is changing towards increasing the consumption of processed food such as soft drinks, white bread, biscuits, canned meat and so on. We still don't know if this processed food in the long run would replace the traditional nutritious diet.
We tried to understand how diet would have an effect on the nutritional status of children, so we correlated diet with nutritional status of the school children surveyed. See Appendix 8.

We found a pattern relating good nutritional status with good protein consumption. However, we also found that protein consumption, as well as the consumption of most other nutrionally valuable food items, tended to be positively related to wealth. See table (29). We thus deduced that wealth ultimately determines the nutritional status and operates towards improving the diet of the individual.

Table 29: Wealth Status by Consumption of Particular Food Items.

Cheese

Wealth Status	Frequency of Consumption		
	never eats	eats sometimes	eats every day
	%	%	%
poor	53.3	33.3	13.3
medium	47.8	43.9	8.3
rich	32.0	44.0	24.0

Chi Square = 12.2
p = 0.01

Laban

Wealth Status	Frequency of Consumption		
	never eats	eats sometimes	eats every day
	%	%	%
poor	18.7	28.0	53.3
medium	6.4	31.2	62.4
rich	6.0	22.0	72.0

Chi Square = 11.69
p = 0.01

Labaneh

Wealth Status	Frequency of Consumption		
	Never eats	eats sometimes	eats every day
	%	%	%
poor	58.7	30.7	10.7
medium	41.4	56.1	2.5
rich	28.0	56.0	16.0

Chi Square = 25.57
p = 0.00

Eggs

Wealth status	Frequency of consumption		
	never eats	eats sometimes	eats every day
	%	%	%
poor	9.3	65.3	25.3
medium	7.6	70.1	22.3
rich	4.0	52.0	44.0

Chi Square = 9.78
p = 0.04

Meat

Wealth Status	Frequency of Consumption		
	never eats	eats sometimes	eats every day
	%	%	%
poor	48.0	48.0	4.0
medium	34.4	61.8	3.8
rich	12.0	76.0	12.0

Chi Square = 20.4
p = 0.0004

Chicken

Wealth status	Frequency of Consumption		
	never eats	eats sometimes	eats every day
	%	%	%
poor	69.3	26.77	4.0
medium	61.8	28.7	9.6
rich	46.0	30.0	24.0

Chi Square = 14.5
p = 0.0005

Fruits

Wealth status	Frequency of Consumption		
	never eats	eats sometimes	eats everyday
	%	%	%
poor	9.3	60.0	30.7
medium	3.8	49.7	46.5
rich	2.0	22.0	76.0

Chi Square = 26.69
p = 0.000

Vegetables

Wealth Status	Frequency of Consumption		
	never eats	eats sometimes	eats every day
	%	%	%
poor	9.3	36.0	54.7
medium	3.2	26.8	70.1
rich	4.0	8.0	88.0

Chi Square = 18.03
p = 0.001

It seems that the socio-economic and political conditions in the camp determines dietary intake and plays an important role in the rate of malnutrition among school age children.
Our analyses strongly suggests that diet is a social class-linked item where poor children don't consume animal protein and dairy products in an adequate amount, compared to rich children, leading to poor children being wasted in the short run and to being stunted in the long run.

Conclusion and Recommendations

Our results have shown that malnutrition, and in particular stunting, is a serious problem facing children in the jalazone refugee camp. It is obvious that children are entering school with sub-optimal nutritional status and thus during the primary school years require conditions for "catch up" growth to occur in addition to usual nutritional requirements for childhood. In spite of the fact that stunting is a reflection of the poor overall economic conditions, it is also a reflection of the past nutritional status of the child, where children adapt to an inadequate nutrient intake by slowing his/her growth. Maternal and child health clinics are trying to play a major role in identifying and reducing childhood malnutrition, but do not have the facilities for older age groups. Therefore it is during the primary school years that children might get a chance to reduce the rate of malnutrition, especially stuntness.

To have a significant impact on reducing levels of malnutrition in the camp it would therefore be necessary for UNRWA and other institutions to initiate intervention programmes such as:

1. Regular monitoring of the nutritional status of school-age children as an integral part of school clinical records could be developed. This could be done by using anthropometric measurements such as heights , weights, as well as making biochemical tests such as hemoglobin and hematocrit measurements. This is very important to start with because most of the malnourished cases we have seen are of the milder form of malnutrition that neither parents or health workers recognize it, because no signs of biochemical or physical changes appear. So only by taking routinely heights and weights measurements of children , these milder forms of malnutrition could be identified.

2. Diet councelling and nutrition education are very important at this age where children are developing food habits. So it is important to talk about food, the different nutrients and its importance to growth and well being of the person. This could be developed as part of the science curriculum of schools. Also nutrition education could be developed in the curriculum of school teachers, whether in summer or in vocational courses.

3. Introduce meals for primary school children, where the meal could help and adjust unbalanced home diet. School meal shoud supply one third to one half of the daily dietary requirements. Also school meal could be used as a base for teaching good nutrition to students as well as their parents through effective participation and meetings of school teachers with parents, especially mothers.

4. It may be necessary for UNRWA to re-establish its supplementary feeding programme for pre-school as well as school children on a different bases than what was used before: i.e. feeding for a period of three months might not be enough time for a malnourished child to improve his / her nutritional status. Therefore we would

suggest that malnourished children be admitted to these centres, after looking at their heights and weights, and the previous health history of the child. Every 2 months through which heights and weights assessment has to be performed by trained personnel to make sure that these children have improved and the length of treatment is determined this way. In addition to that, home visits are a must in this case where these children are watched at home and nutrition education is emphasized to both mothers and children.

For the time being it might be difficult to implement any of the recommendations mentioned above due to the continuous closures of the schools at the Jalazone Refugee Camp by the Military Governer, and also due to the curfews imposed on the Camps. Thus it is difficult to initiate intervention programmes at the moment. In the long run however these recommendations are worth considering as a deep rooted solution to nutritional problems among school children.

The results of this study cannot be generalized to school age children of the Palestinian Occupied Territories. However as a pilot, it provides some information regarding the nutritional status of school age children, also it does indicate the presence of nutritional problems i.e. stunting that needs further study. We think it is necessary to conduct a comparative study of the nutritional status of school children in the West Bank and Gaza Strip since no studies did exist in this field.

Appendix 1

Place of Origin of Refugees in Jalazone Camp

Place of Origin	No. families
Beit Naballa	167
Lydd	102
el-'Abassaiyeh	73
'Annabeh	28
al-Dawaymeh	28
al-Saffriyeh	18
Imm al-Zennat	18
Wadi Haneen	16
Hooh	15
Kufr 'Annah	15
Salamah	11
Deir Tareef	9
Jimso	8
Safad	8
Rantiyeh	7
Sarafand el-Kharab	7
el-Mazra'a	6
Zeita	5
Yaffa	5
el-Ramle	4
Beit Djan	4
el-Tireh el-Zobiyeh	4
el-Khiriyeh	3
Sabreen	3
Beit Nuba	3
el-Hidithey	2
'Emmwas	2
el-Faloojeh	2
Biar 'Addas	2
el-Teeney	2
Tireh, Tulkarem	2
Barfiliyah	2
Kufr Yasif	1
abu el-Fudl	1
Bashteet	1
al-Mzer'a	1
Asdood	1
Beir Saba'	1

Yibna	1
Sarafand el-'Amar	1
Kufr 'Anaan	1
Kooleh	1
el-Wafeer el-Sharquieh	1
Tireh, Haifa	1
el-'Azaziyat	1
Saqiyeh	1
Imm el-Fooj	1

Appendix 2

Wealth Index Estimation

For calculating the wealth index we looked at some of the commodities that are owned by the people in the camp.
We took four variables:

Washing machine	46.6%
Coloured TV	11.7%
Solar heating	58.7%
Private car	19.4

Looking at the percentages, we found that less than half of the families own such commodities which might reflect an advanced economic situation for the families.
We computed the wealth index as follows:
Wealth Index = own washing machine + coloured TV + solar heating + private car.
The frequencies we got are as follows:

	Frequency	Percent
0	53	25.7%
1	54	26.2%
2	57	27.7%
3	31	15.0%
4	11	5.3%
	206	100%

0 : Means doesn't own any of these appliances.
1 : Means own one of these appliances.
2 : Means own 2 of these appliances.
3 : Means own 3 of these appliances.
4 : Means own 4 of these appliances.

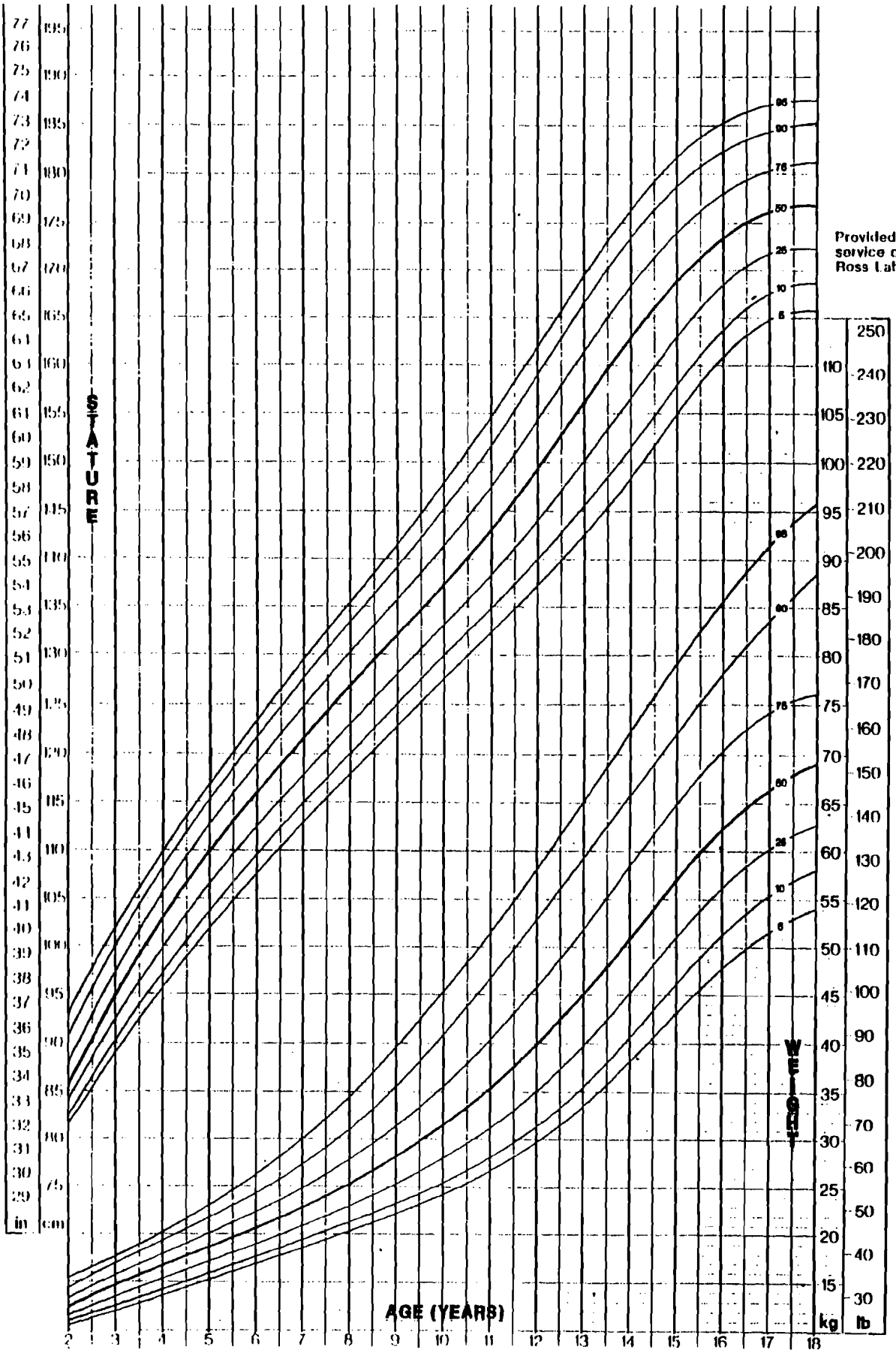
So we classifies the wealth index into 3 categories:

Poor socioeconomic condition	(0) 25.7%
Middle socioeconomic condition	(1 or 2) 53.9%
Good socioeconomic condition	(3 or 4) 20.3%

The percentages we got for the wealth index go along with the evaluation of the informants in the camp.

BOYS: 2 TO 18 YEARS
PHYSICAL GROWTH
NCHS PERCENTILES*

NAME RECORD #



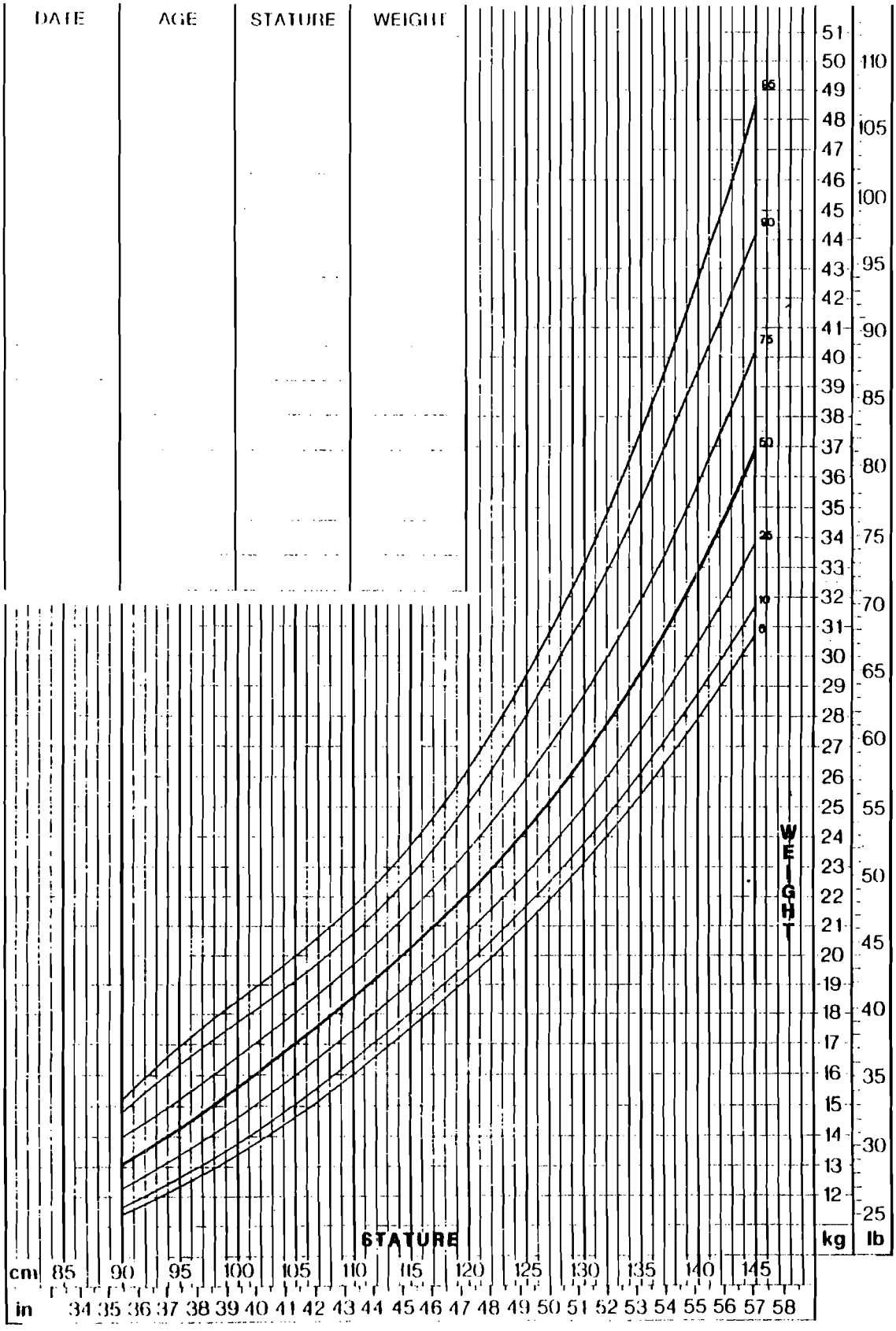
Provided as a service of Ross Laboratories

*Adapted from: National Center for Health Statistics: NCHS Growth Charts. 1976. Monthly Vital Statistics Report: Vol. 25, No. 3, Suppl. HRA 76-1120. Health Resources Administration: Rockville, Maryland. June, 1976. Data from the National Center for Health Statistics.

BOYS: PREPUBESCENT

PHYSICAL GROWTH
NCHS PERCENTILES*

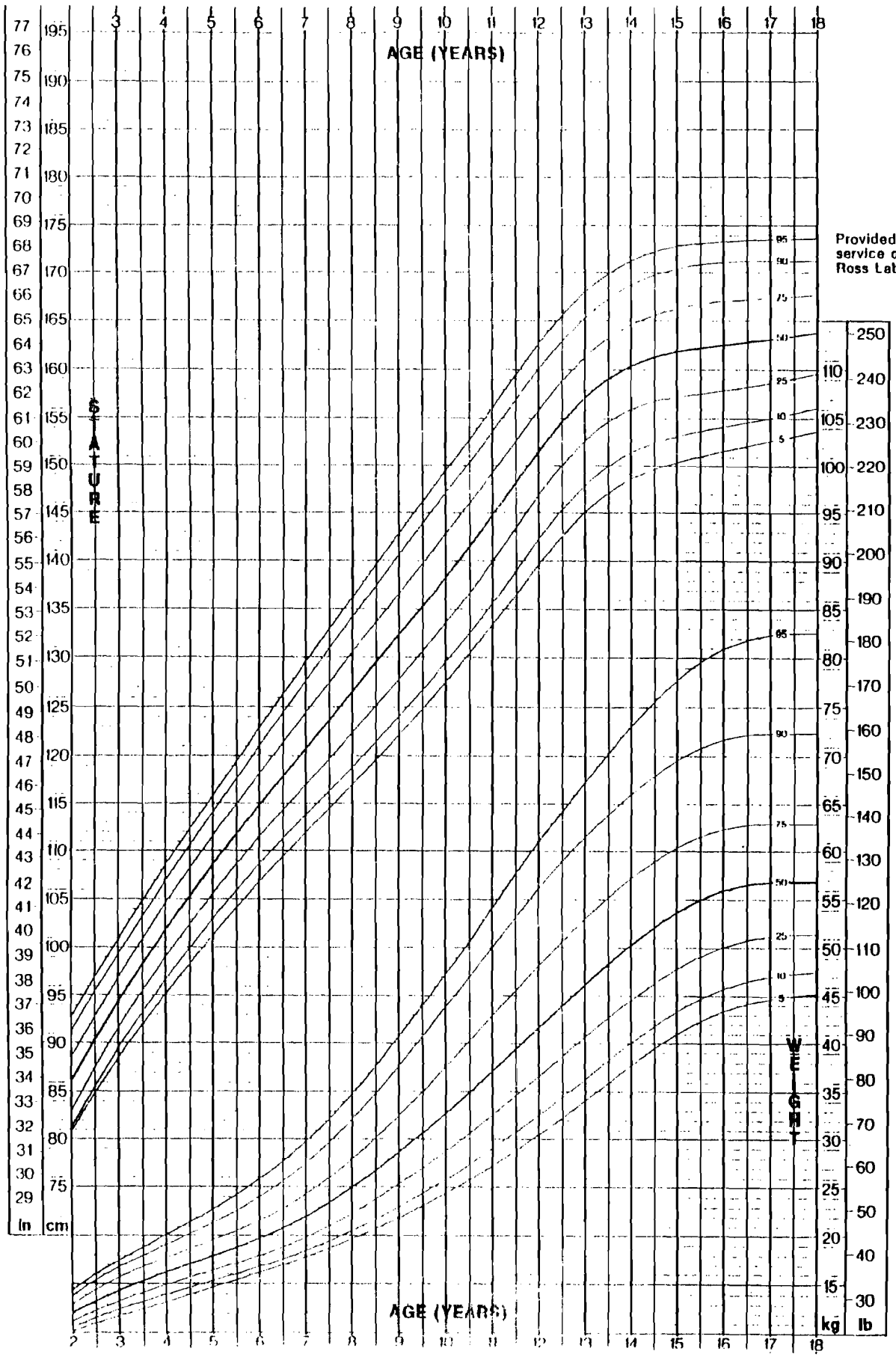
NAME RECORD #



*Adapted from: National Center for Health Statistics: NCHS Growth Charts. 1976. Monthly Vital Statistics Report, Vol. 25 No. 3, Suppl. (HRA) 76-1120. Health Resources Administration, Rockville, Maryland. June, 1976. Data from the National Center for Health Statistics.

GIRLS: 2 TO 18 YEARS
PHYSICAL GROWTH
NCHS PERCENTILES*

NAME RECORD #



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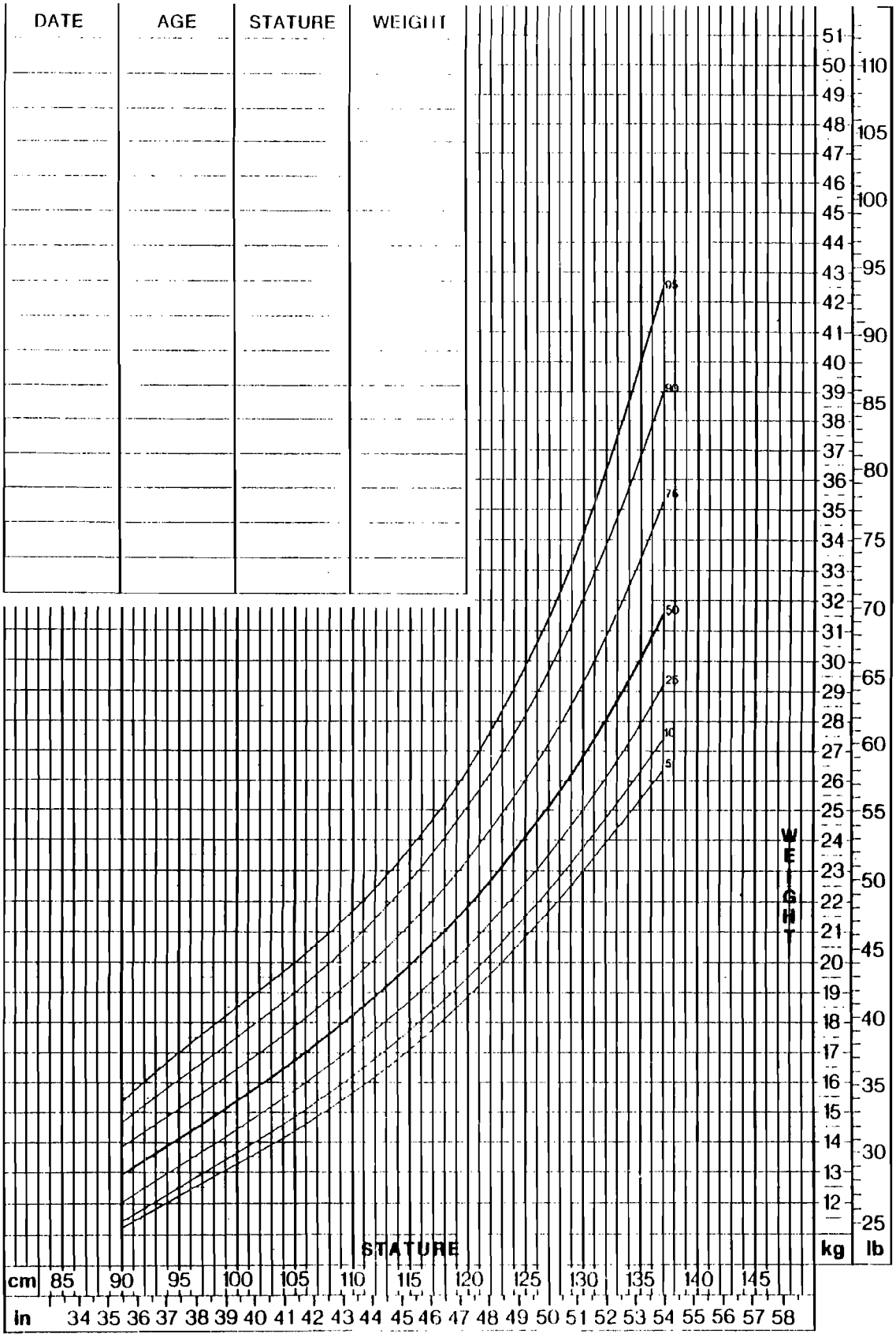
*Adapted from: National Center for Health Statistics: NCHS Growth Charts. 1976. Monthly Vital Statistics Report, Vol. 25, No. 3, Supp. (HRA) 76-1120. Health Resources Administration, Rockville, Maryland, June, 1976. Data from the National Center for Health Statistics.

GIRLS: PREPUBESCENT
PHYSICAL GROWTH
NCHS PERCENTILES*

NAME RECORD #

DATE	AGE	STATURE	WEIGHT



Adapted from: National Center for Health Statistics: NCHS Growth Charts, 1976. Monthly Vital Statistics Report. Vol. 25, No. 3, Supp. (HRA) 76-1120. Health Resources Administration. Rockville, Maryland, June, 1976. Data from the National Center for Health Statistics.

Appendix 4

Methodology

Measurements and Indicators

Measurements

1. Personal history of the child;
   a. name
   b. date of birth
   c. birth order
   d. sex
   e. class

2. Dietary history of the child:
   a. How often did the child eat certain types of food, such as diary products, animal protein, cereals, vegetables and fruits.
   b. Does the child eat at the supplementary feeding centre?
   c. Is the child taking iron and /or vitamin supplements?
   d. Details of the child's diet over the last 24 hour period.

3. Anthropometry
   a. Age
   b. Height
   c. Weight

4. Laboratory Investigation:
   a. Hemoglobin determination
   b. Hematocrit determination

5. Questionnaire

A. Socioeconomic information
   a. Main occupation of parents and/or any other member in the family
   b. Secondary occupation if any

Wealth status of the family
a. Own a B/W television, colour television, refrigerator, oven, video, private car, taxi, solar water heater, washing machine.
b. Migration of adult males, and their role in family income generation

Education of parents
a. Years of education
b. Literacy level

B. Environmental information
   a. Type of housing
   b. Age of house and rooms
   c. No. rooms in house
   d. Electricity
   e. Kitchen in house
   f. Water
   g. Toilet
   h. Toilet shared with other families in the neighbourhood.

Indicators

1. Anthropometry

The age, weight, and height measurements are combined to form three indicators of nutritional status:[65,66]

Weight / age
height / age
weight / height

These indicators are compared with those from an international reference population. The recommended data for this purpose are those collected by the United States Nutritional Center for Health Statistics (NCHS).[67]
The NCHS Growth Charts percentiles (used to assess wt/age and ht/age) were divided into 3 categories:

< 10th percentile
10th-50th percentile
> 50th percentile

The first category < 10th percentile categorizes those who are undernourished and stunting in terms of wt/age and ht/age respectively. 10-50th percentile are considered as normal where as those above the 50th percentile are considered as well nourished.

For the weight for height index, the NCHS growth charts were divided into different three categories:

< 25th percentile
75th percentile
> 25th-75th percentile

The category < 25th percentile represents wasting, 25th - 75th percentile category represents normal values where as the > 75th percentile represents very good nourishment.

2. Biochemical Measurements[68,69]

The World Health Organization considers anemia to be present when blood levels of hemoglobin are below the following values (g/100ml of the venous blood):

Children aged 6 months to 6 years	11g/dl
childre aged 6 to 14 years	12g/dl
Adult males	13g/dl
Adults females, nonpregnant	12g/dl
Adult females, pregnant	11g/dl

Appendix 5

Survey Questionnaire

Information on Heads of Household (parents).

1. Name
2. Relation to the child
3. Sex
4. Age
5. Marital status
6. Years of schooling
7. Ability to read and write
8. Occupation
9. Location of work

Information on Household

10. Total number of people living in the household.
11. Number of children covered by the sample.
12. Total number of rooms in the household.
13 Addition of new rooms since the past five years.
14. If yes, number of rooms added.
15. Is there a kitchen in the dwelling?
16. Is ther a latrine in the dwelling?
17. Type of latrine.
18. Is electricity available in the household?
19. What is the dwelling water source?
20. How and where water is stored?
21. Do you own a washing machine, refrigerater, oven, black & white TV, coloured TV, video, solar heater, private car and other amenities.
22. Number of working persons in addition to the breadwinner.
23. Number of male migrants.
24. Do they help in family income?

Information on Women (Mothers)

25. Number of pregnancies including miscourages.
26. Do you read newspapers, books, journals?
27. Do you participate in activities?
28. What kind of activities?
29. Would you like to participate in health education and councelling workshops?
30. If not, what is the reason for that?
31. Who prepares food for the family?
32. How many meals do you prepare daily?

Information on Children Surveyed

33. Name
34. Sex
35 Age
36. Order of the child in the family.
37. Height of the child.
38. Weight of the child.
39. Hemoglobin level of the child.
40. Hematocrit level of the child.
41. Does the child eat at the UNRWA Supplementary Feeding Centre?
42. How mother perceive her child's nutritional Status?
43. Does the child suffer from a nutritional problem?
44. If yes, what kind of a nutritional problem the child suffers from?
45. Frequency of the child's consumption of particular food items.
46. The child's 24-hours dietary recall.

Appendix 6

Possession of Household Amenities by Wealth Status

Own washing machine — wealth status

	poor %	medium %	rich %
Yes	-	63.1	98.0
No	100	36.9	2.0

Chi Square = 131.4
p = 0.000

Own fridge — wealth status

	poor %	medium %	rich %
Yes	86.7	97.5	100.0
No	13.3	2.5	-

Chi Square = 15.68
p = 0.0004

Own gas cooker — wealth status

	poor %	medium %	rich %
Yes	96.0	99.4	100.0
No	4.0	0.6	-

Chi Square = 4.97
p = 0.08

Own black & white TV — wealth status

	poor %	medium %	rich %
Yes	77.3	86.6	46.0
No	22.7	13.4	54.0

Chi Square = 35.29
p = 0.000

Own colour TV — wealth status

	poor %	medium %	rich %
Yes	-	5.7	56.0
No	100.0	94.3	44.0

Chi Square = 99.49
p = 0.000

Own vedio — wealth status

	poor %	medium %	rich %
Yes	-	1.3	8.0
No	100.0	98.7	92.0

Chi Square = 10.46
p = 0.005

Own solar heater — wealth status

	poor %	medium %	rich %
Yes	-	73.9	100.0
No	100.0	26.1	-

Chi Square = 156.89
p = 0.000

Own private car	wealth status		
	poor	medium	rich
	%	%	%
Yes	-	13.4	78.0
No	98.7	82.2	14.0
Sharing the car	1.3	4.5	8.0

Chi Square = 131.04
p = 0.000

Appendix 7

Percentage of Anemia by Wealth Status

Wealth Status	Anemia	
	Hematocrit up to 36%	Hematocrit greater than 36%
poor	17.8	82.2
Medium	19.3	80.7
Rich	18.6	18.4

Appendix 8

Nutritional Status of Children By Consumption Of Particular Food Items

Cheese

Frequency of Consumption	%stunted	%Wasted	%Anemic
Never or hardly ever eats	34.4	17.6	18.3
Eats sometimes	30.2	15.5	17.2
Eats everyday or almost every-day	22.9	31.4	25.7

Milk

Frequency of Consumption	%Stunted	%Wasted	%Anemic
Never eats	33.3	15.1	25.4
Eats sometimes	33.3	21.1	13.2
Eats every day	19.0	21.4	14.3

Laban

Frequency of Consumption	%Stunted	%Wasted	%Anemic
Never eats	44.4	14.8	25.9
Eats sometimes	30.9	21.0	19.8
Eats every day	29.3	17.8	17.2

Labaneh

Frequency of Consumption	%Stunted	%Wasted	%Anemic
Never eats	40.7	22.0	19.5
Eats sometimes	22.3	14.4	18.0
Eats every day	35.0	25.0	20.0

Eggs

Frequency of Consumption	%Stunted	%Wasted	%Anemic
Never eats	33.3	23.8	19.0
Eats sometimes	31.4	17.1	17.3
Eats every day	30.3	14.4	22.4

Meat

Frequency of Consumption	%Stunted	%Wasted	%Anemic
Never eats	35.4	19.8	26.7
Eats sometimes	29.2	18.7	19.8
Eats every day	26.7	6.7	17.5

Chicken

Frequency of Consumption	%Stunted	%Wasted	%Anemic
Never eats	35.0	10.0	20.9
Eats sometimes	30.2	19.2	16.3
Eats every day	26.7	10.0	13.3

Fish

Frequency of Consumption	%Stunted	%Wasted	%Anemic
Never eats	31.4	18.8	19.1
Eats sometimes	20.0	-	-
Eats every day	-	-	-

Fruits

Frequency of Consumption	%Stunted	%Wasted	%Anemic
Never eats	34.3	21.4	7.1
Eats sometimes	28.6	21.6	17.9
Eats every day	28.4	14.9	20.9

Vegetables

Frequency of consumption	%Stunted	%Wasted	%Anemic
Never eats	28.6	14.3	21.4
Eats some times	37.0	23.3	19.2
Eats every day	29.2	16.9	18.5

PERCENTAGE OF WASTED AND STUNTED CHILDREN BY AGE GROUP

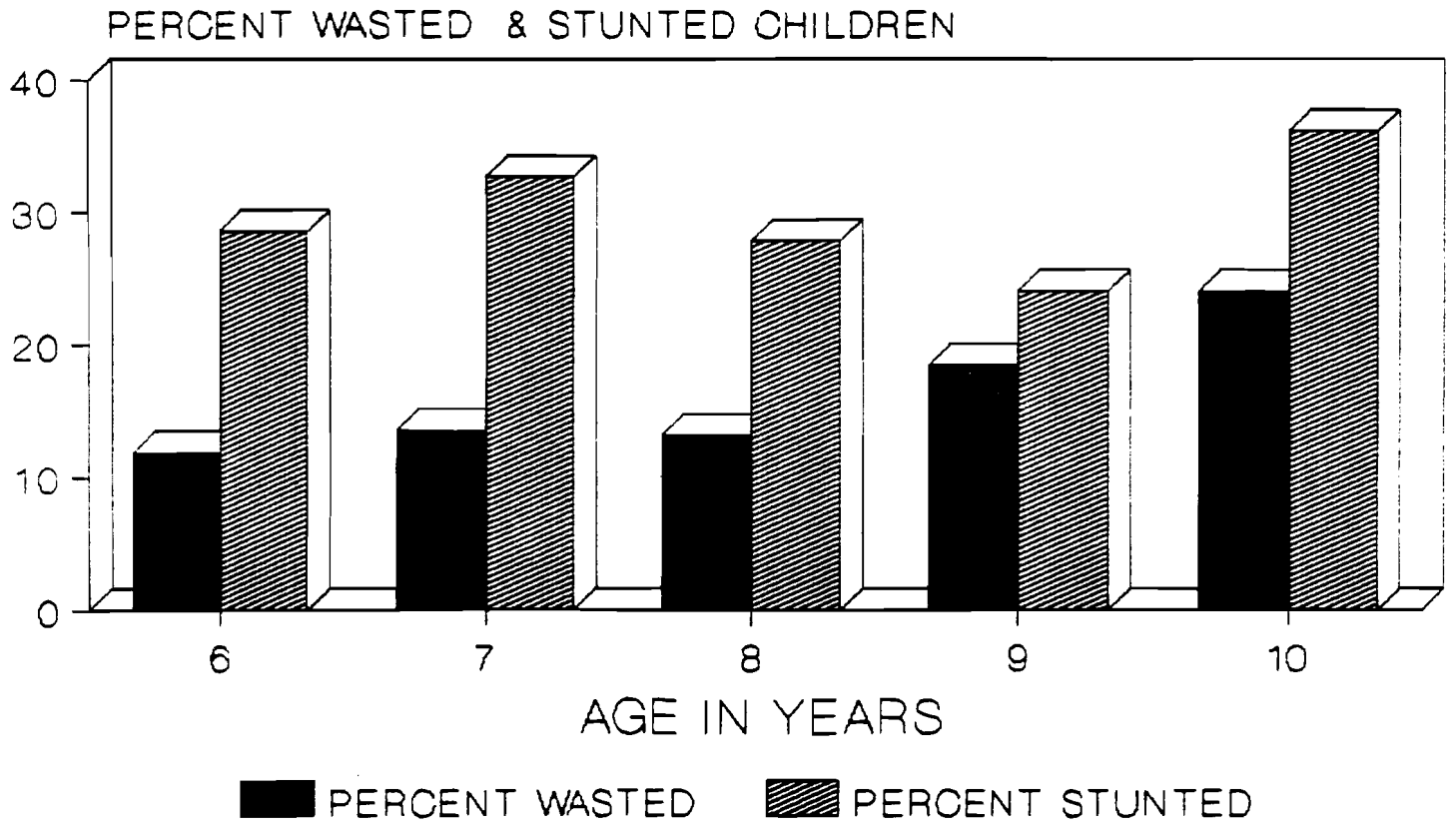


FIGURE 1

DISTRIBUTION OF HEMATOCRIT LEVEL BY AGE OF THE CHILD

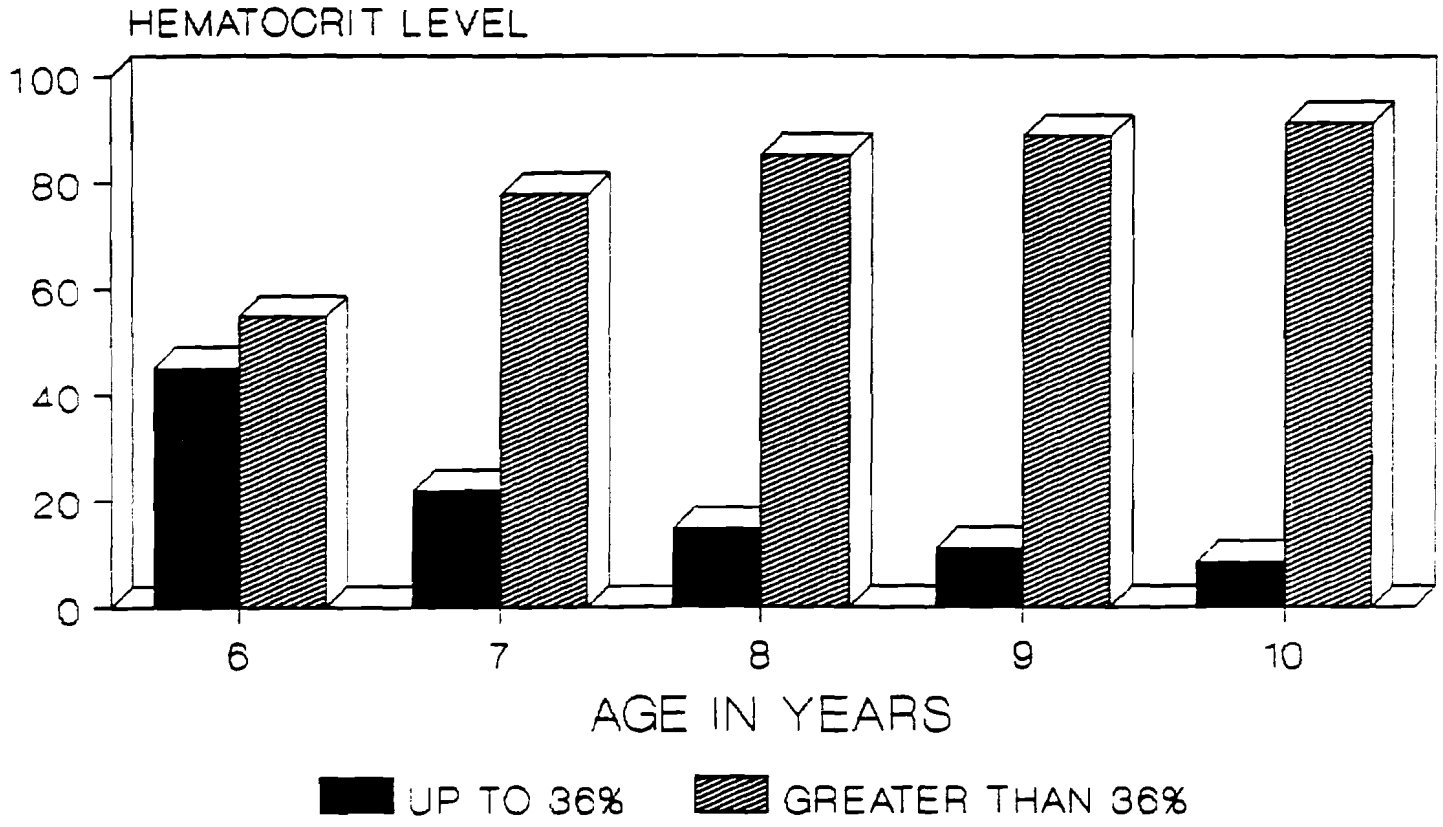


FIGURE 2

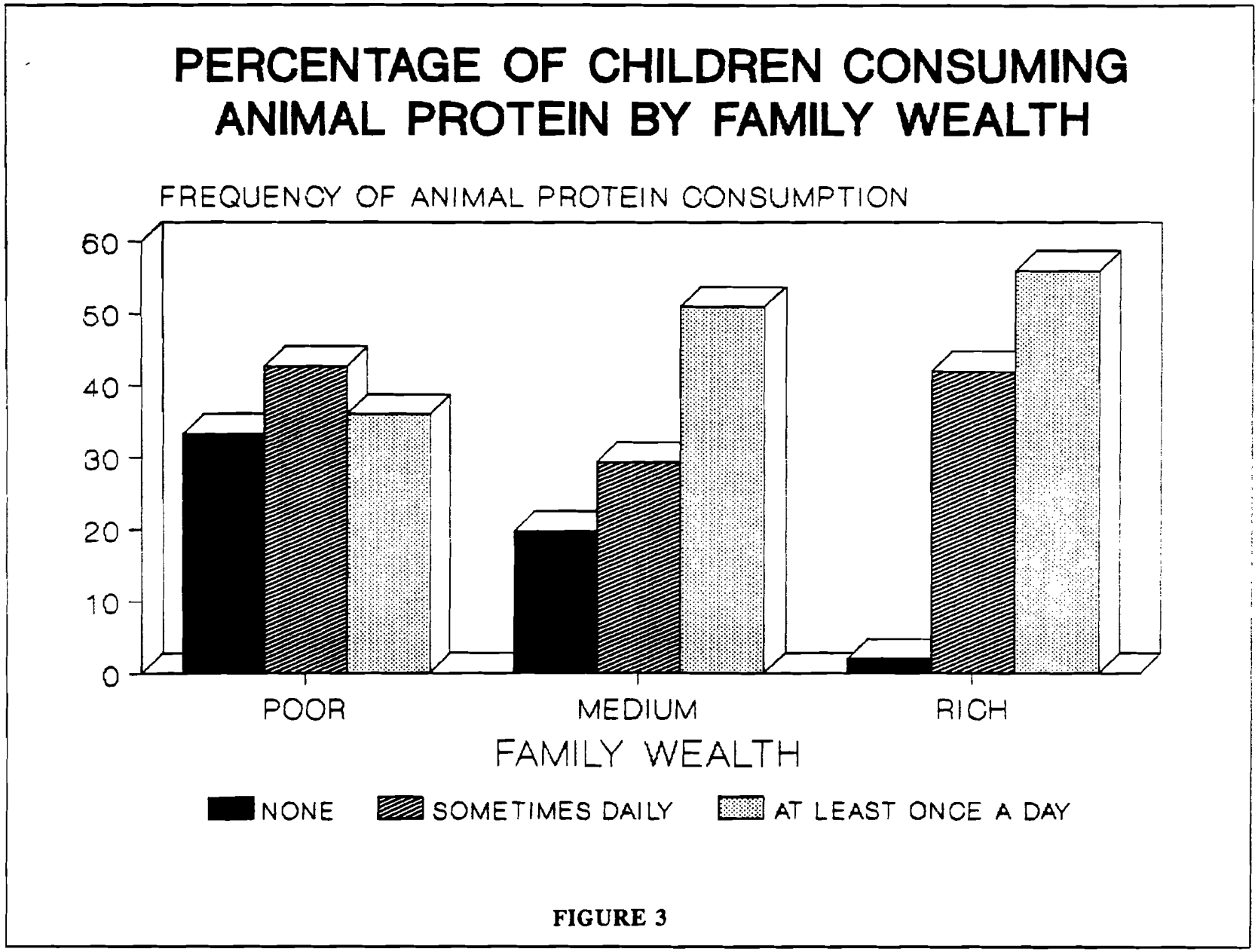

PERCENTAGE OF CHILDREN CONSUMING ANIMAL PROTEIN BY FAMILY WEALTH
FREQUENCY OF ANIMAL PROTEIN CONSUMPTION
60
50
40
30
20
10
0
POOR
MEDIUM
RICH
FAMILY WEALTH
NONE
SOMETIMES DAILY
AT LEAST ONCE A DAY

FIGURE 3

A. PROTEIN CONSUMPTION
BY HEIGHT FOR AGE INDEX

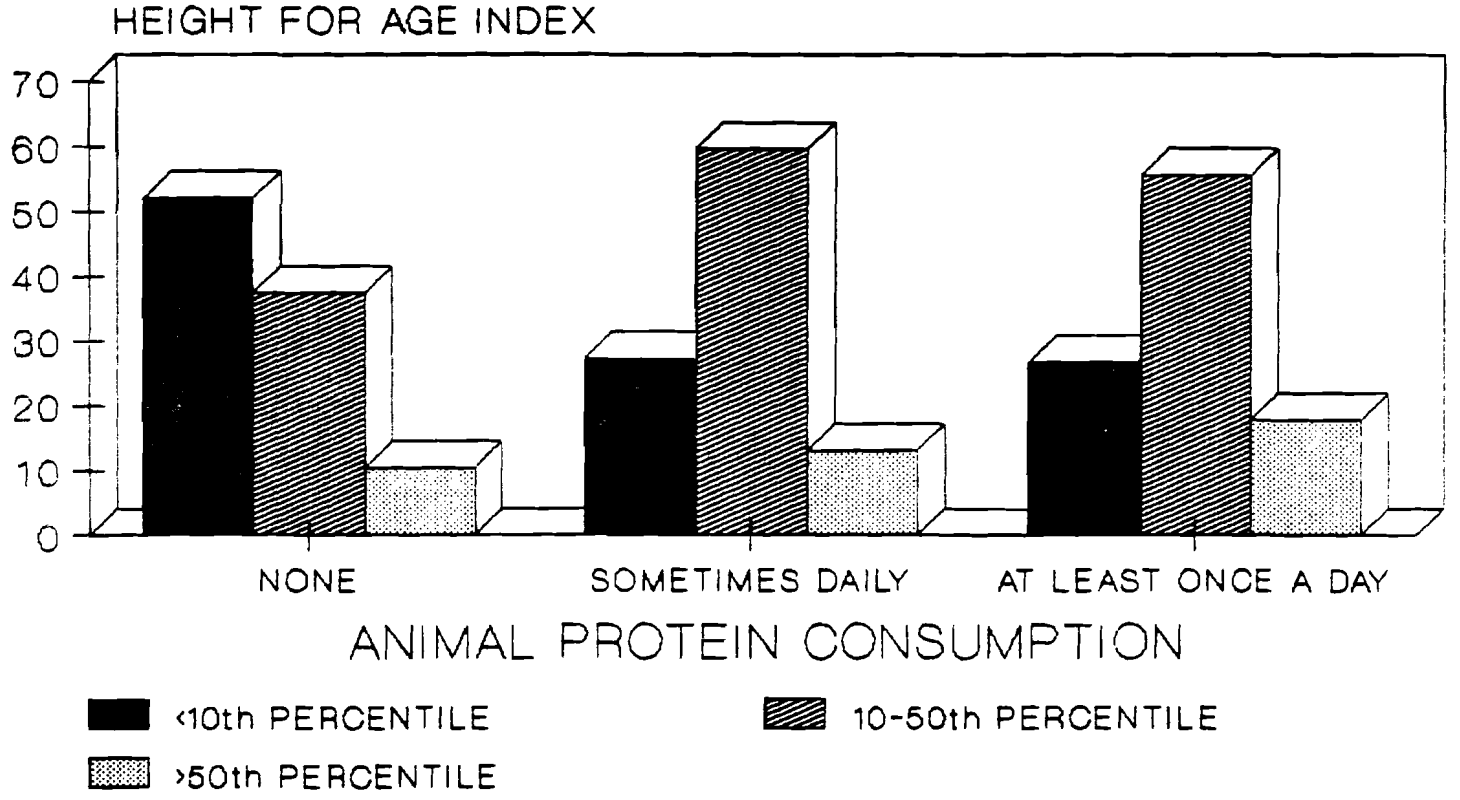


FIGURE 4

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