ES:DP/LEB/79/010
Final Report

الجمهورية اللبنانية
مكتب وزير الدولة لشؤون التنمية الإدارية
مركز مشاريع ودراسات القطاع العام

Republic of Lebanon
Office of the Minister of State for Administrative Reform
Center for Public Sector Projects and Studies
(C.P.S.P.S.)

NUTRITION SURVEY OF SCHOOL CHILDREN

L E B A N O N

FINAL REPORT

AMERICAN UNIVERSITY OF BEIRUT

Beirut, 1981

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Report prepared for
the Food and Agriculture Organization of the United Nations
(acting as executing agency for the United Nations Development Programme)
by
the American University of Beirut

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Acknowledgements

The efforts of the following staff in their respective fields is fully acknowledged:

Miss Mirella Mokbel, M.Sc.	as Project Supervisor
Miss Fadia Abu Samra, B.A.	as Field worker
Miss Vivian Mardelli, M.Sc.	as Field worker
Miss Rima Haddad, B.Sc.	as Field worker
Miss Cecelia Usayran, M.Sc	as Field worker
Dr. Raja Asfour, M.D.	as Clinical consultant
Dr. Saadeh George, M.D.	as Clinical consultant
Dr. Michel Abi Antoun, Ph.D.	as Statistics consultant

Special thanks go to FAO for initiating the project and particularly to Dr. Robert Weisell of FAO, Rome, for his continuous technical support throughout the project and for his diligent help in analyzing the data in FAO, Rome, and in writing the final report.

In addition the efforts of Messrs, A. Baille and Andre Hupin of FAO, Beirut for their support and assistance, of Dr. Nada Ariss from the Lebanese Government's Office of Social Development for assisting in making local arrangements for the survey and of Mr. Midani of the World Food Program for his support during the early stages of the project idea are all deeply appreciated.

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I. INTRODUCTION: OBJECTIVES OF STUDY

Various evaluation and programming missions to Lebanon have commented on the lack of adequate nutrition data describing the nutrition situation in Lebanon. The last true survey was conducted in 1961 by the ICNND in 34 individual locations throughout Lebanon (1). The sample population included 8,600 military, civilian and refugee groups of whom 3,521 were school-age children. That study was designed to assess the nutritional situation of the country using the traditional evaluation methods such as :

- Dietary information based on a questionnaire for the study of nutrient intakes and dietary patterns.
- Biochemical assessment of several nutrients in blood and urine.
- Clinical examination.
- Dental examination

The results of that study revealed a pattern of nutritional deterioration from approximately six months of age through five or six years, with a subsequent limitation of the average weight of children below standard until early puberty. This was supported by clinical and biochemical findings which suggested limitations in energy, protein, iron, iodine, ascorbic acid and vitamins A and D. These results of the non-refugee school children sample from this 1961 survey will be discussed in more detail in light of the results from the present study.

Since 1961 no extensive data has been collected, although there are indications that mild to moderate malnutrition still exists. Occasional cases of marasmus are seen in hospitals as a consequence of serious gastroenderitis which remains the main cause of infant morbidity. The following data have been collected from medical records at the American University Hospital.

Form of Malnutrition	Number of Cases	Year
Malnutrition (unspecified type in children under 2 years	11.1 (yearly average)	1956-72
	2	1979-80
Marasmus	5.8 (yearly average)	1956-72
	6	1979-80
Kwashiorkor	1 (yearly average)	1960-71
	1	1979-80

These figures confirm the occurrence of malnutrition cases but do not describe the situation in the Lebanon. A complete picture can be drawn only on a basis of a nation-wide survey.

The opportunity arose for conducting a limited nation-wide survey following the visit in April-May 1979 of a WFP/FAO/UNESCO/WHO/ILO evaluation-cum-appraisal mission of WFP assisted project 524. (See Appendix I for background information on Lebanon and on WFP food distribution in Lebanon). The mission recommended that base-line data be collected from a sample of children soon to receive food aid in the project's expanded phase. UNDP - Lebanon agreed to fund such a survey and the American University of Beirut (AUB) was contracted to carry out the survey.

The survey had two basic objectives which were:

1) to provide an indication of the current nutritional situation in Lebanon and to study the relationship between nutritional status and other factors such as family, social and economic conditions; and

2) to provide nutritional status baseline data for potential recipients of WFP food aid from project 524, thus allowing a reference point for comparison should a follow-up survey be conducted after the food aid has been distributed.

Originally the survey was to sample both school children and pre-school children. However, due to delays in the food aid distribution in the maternal and child health centres and the poor security in the country in the early part of 1981, the latter group was not included in the survey. Thus, this report covers only the school children.

II. METHODOLOGY

A. Sampling procedure

In consultation with the Office of Social Development (ODS) six areas were selected where WFP project 524 food aid was expected to begin in the 1980/81 school year. The selection of these areas involved a compromise between choosing those areas that would allow a survey team to circulate safely and freely and that together would be as representative of the country as possible. Those areas were:

Beirut area :	- Burj Hammoud
	- Ashrafieh
	- Burj El Barajneh
Beqa'a	- Baalbeck
South Lebanon:	- Saida
North Lebanon:	- Kubeiat

(The six areas can be located on the map in Appendix II).

In each area approximately 200 school children from either the 1st, 2nd, or 3rd primary school classes were sampled. This was done by first identifying those public and semi-private schools eligible for food aid, randomly selecting various classes from these schools and measuring all the children in the selected classes. In order to make the necessary arrangements, preliminary visits were made to the local ODS centres and the schools themselves. During the period April-June 1980 and October-December 1980, the survey team visited all the areas and collected data from 1181 children (Appendix III lists the schools and the number of children examined in each).

B. The Questionnaire

A questionnaire was designed seeking the advice of researchers from the agriculture and medical schools at AUB who have had previous experience in data collection under field conditions and in clinical assessment. (A copy of the questionnaire is in Appendix IV).

A pilot study during which the questionnaire was tested was conducted in a public school in the vicinity of the university, a region not covered in the survey. A class was chosen randomly, and children were interviewed using a preliminary draft of the questionnaire. This pilot study had two purposes: testing the reliability of the questions and familiarizing the team with the survey work.

As a result of the pilot study major guidelines were drawn-up for the organization of the work procedure. Also, modifications were made in the phrasing of some questions which were written in spoken arabic to minimize the differences that might result from the interviewers' interpretation.

The questionnaire consisted of the following sections:

a. Basic information
b. Anthropometric measurements
c. Clinical examination
d. 24-hour dietary recall
e. General information related to different social, economic and health conditions of the family.

The answers to most questions were precoded. For the remaining questions, a special coding system was devised. (See Appendix V for the classification of occupation). Space was provided on the right side of each page for the transfer of codes into serially numbered columns.

C. Measurement Procedures

Anthropometry

Weight and height

Both measurements were taken following the techniques recommended by Jellife (2). Readings were taken to the nearest 50 grams for weight, and 0.1 cm for height using a weight scale with height meter (manufactured by Detecto Scales Inc., Brooklyn, N.Y., U.S.A.).

Skinfold thickness

Two sites were chosen: triceps and subscapular. The left side of the body was used for all measurements. Duplicate readings were taken at each site with a Lange Skinfold Caliper (Cambridge Scientific Industries, Inc. Cambridge, Maryland). A flexible, non-stretch fibreglass tape was used to locate the mid-point of the arm.

D. Clinical Signs

The purpose of clinical examination was to detect some important physical signs of specific vitamin and mineral deficiencies. The following physical signs were investigated: hair and non-specific skin changes, eyes, signs of vitamin A deficiency, vitamin D deficiency (rickets), dental health (caries and mottling of teeth) and goiter (iodine deficiency). The complete check list of the investigated clinical signs is included in the questionnaire

(see Appendix IV). The significance of these clinical signs of malnutrition has been widely documented (2, 3, 4). Although some signs such as hair and skin changes are difficult to evaluate and their nutritional significance is still debated the remaining signs provide definitive evidence of specific deficiencies.

E. Dietary Data

1. Brief discussion of available methods.

Food consumption data provide evidence of faulty food habits and indicate deficiencies in nutrient intakes. They also can provide the necessary information for planning proper nutrition programmes (5).

Several methods are available, the choice of the method is determined mainly by the aim of the survey and the size of the sample. For instance, food balance sheets are used when evaluating the international nutrition situation. The food account method which is applicable to institutions and families is suitable for cost of living investigations. The weighing method is used when surveying the food consumption of families as well as individuals, but is restricted to rather small samples. Finally, the interview method includes two variations: the diet recall and diet history. The commonest type of recall is the 24-hour recall. Several studies have been undertaken to evaluate the reliability of this method (6). In the latter study, the 24-hour recall was compared with the diet history. Neither of the methods was considered suitable for the measurement of an individual's dietary intake. However, the 24-hour recall was found to be preferable for food consumption surveys of children as it provides fairly reliable mean results of the nutrient intakes (5). Hence, this method was adopted.

2. Description of 24-hour recall procedure.

Each child was asked to recall what he has eaten at the breakfast and mid-morning meals the day of the interview. For lunch, afternoon snacks and dinner the menu of the previous day, or that of the same day if school offered lunch was recorded. The amounts of foods eaten were recorded in household measures (cups, slices, spoons, plates) but models of various plate, cup and bread loaf sizes were used to facilitate the estimation of food amounts.

The type and quantity of foods were converted into codes and weights for computer analysis. Various household measures of cooked Lebanese meals, fruits, various sandwiches and snacks were weighed to aid in this conversion. Duplicate measurements were taken, and the average was computed. The coding system of the "Food Composition Tables for use in the Middle East" (7) was adopted and is presented in Appendix VI.

This coding system enabled the processing of the dietary information using the corresponding computer programme available at the Faculty of Agricultural and Food Sciences at AUB. The intakes of protein, fat, calories and various minerals and vitamins were calculated for each child by meal (breakfast, lunch and dinner) as well as day total. The mean intakes of nutrients could be then calculated and compared with FAO/WHO nutrient requirements (8, 9).

C. Survey Routine

The survey team consisted of the following :

a- One faculty member (part-time)

b- One supervisor (M. Sc. Nutrition, full-time)

c- One assistant (B.A. Sociology, full-time)

d- One medical doctor (part-time)

e- One statistician (part-time)

f- Two field workers (M.Sc. Nutrition, part-time)

Prior to the data collection, a preliminary visit was paid to the main social center in each region. The main purpose was to seek the assistance of the person in charge for the selection of schools. In one area, namely Kubeiat, the selection of schools was unnecessary since there were only four schools in the village. In contrast, there existed a very large choice among the 40 schools of Burj El Barajneh and from these schools a fairly representative sample from both the moderate and severely underprivileged sectors was selected.

After selecting the schools, the team supervisor and assistant supervisor visited each in the company of a social worker to explain to the school's director the purpose and procedure of the survey. During this visit, normally one class, or more if the total number of children was less than 30,was chosen at random and the basic information collected from the school's register (page 1 of the questionnaire). This basic information included the child's age which was based on the birth certificate. The actual data collection was done the same day whenever possible or the next day, if more convenient to the school. The use of an empty room for data collection was preferred so the children not being interviewed could remain in their classroom.

The actual survey process consisted of the following steps:

1. The anthropometric measurements are made in the following order:- Weight
   - Height
   - Triceps skinfold thickness
   - Subscapular " "

   These were taken by the same full-time assistants throughout the survey.

2. The clinical examination was performed by a medical doctor or in his absence, by the supervisor.

3. The 24-hour dietary recall and collection of general information was conducted by the two part-time field workers.

The procedure was as follows:

Four children were called to the room at one time. Two children are interviewed while two others were undressed for anthropometric measurements and clinical examination and then vice versa. The data collection from the four children required approximately 20 minutes.

D. Data Processing

The completed questionnaires were returned to AUB to be checked for completeness. In case of missing or doubtful information such as age, weight or other major data, the questionnaire was disregarded. (This occurred not more than five times per region).

The codes were transferred into their proper places on the questionnaire forms. For example the five digits of the serial number refer to the following :

- the lst digit: the area (e.g. Burj Hammoud: 1, Ashrafieh 2..)

- the 2nd digit: the school (numbers are given in chronological order of visits).
- the 3rd digit: the class (1 is 1st primary ...)
- the 4th and 5th digit: the individual child

The coding of the remaining questions is obvious on the questionnaire forms, except for the parents' occupation and dietary data as mentioned above.

The coded questionnaires were sent to the Computer Center at AUB for processing. All information was transferred to tapes. Before processing with detailed analysis, the codes were further checked by comparing the "print-out" with each questionnaire. The analysis procedure itself occurred on the computer facilities at both the AUB and FAO Headquarters.

III. GENERAL RESULTS

A. General description of the sample

1. Basic information

Table 1 shows the male and female distribution according to one possible age grouping (10). The percentage of the children of ages 5 and 12 is low (1.6% and 2.0% respectively), resulting in the vast majority of the sample being between the ages 6 and 11 years. The age distribution for the complete sample is shown in Fig. 1.

Table 1. Distribution of children by age group - all regions.

Age group (year)	Female		Male		Total	
	No.	% of total sample	No.	% of total sample	No.	% of total sample
5-6-7	197	16.7	200	16.9	397	33.6
8-9	240	20.2	285	24.2	525	44.5
10-11-12	131	11.1	128	10.8	259	21.9
Total	568	48.1	613	51.8	1181	100

Table 2 shows the distribution of children by nationality in all regions. Most children were Lebanese (96.8%). Table 3 shows the distribution of children by religious sect and region. As might be expected; certain religious sects are concentrated in certain areas. For example 85% of the Maronites live in either Ashrafieh or Kubeiat.

Fig. 1 Age distribution of total sample (n=1181)

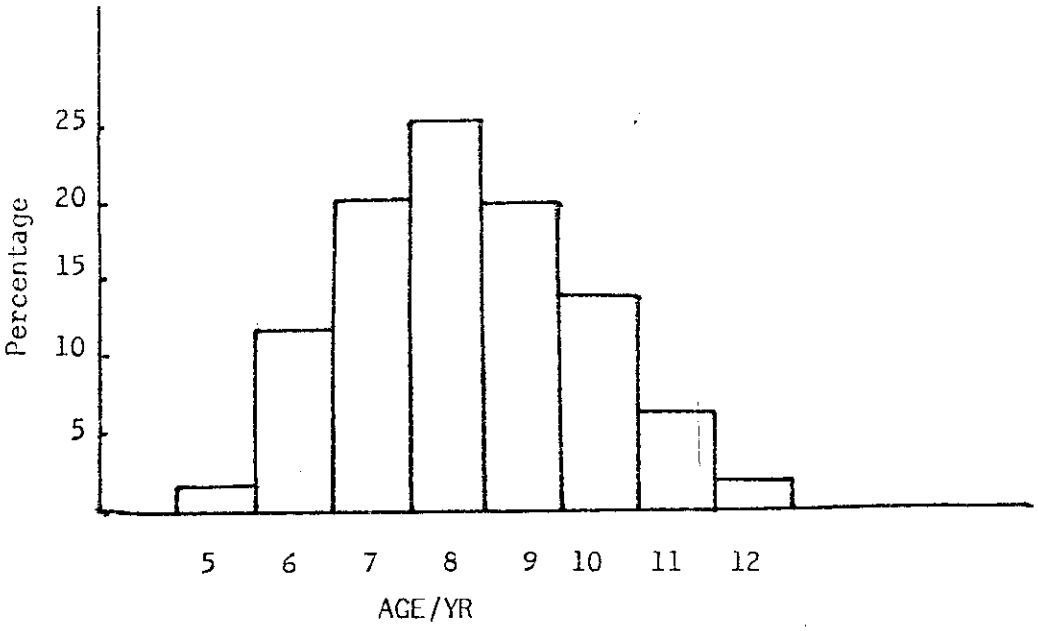


Table 2. Distribution of children by nationality - all regions.

Nationality	All regions	
	No.	% of total sample
Lebanese	1142	96.7
Palestinian	14	1.2
Syrian	24	2.0
Others	1	0.1
Total	1181	100%

Table 3 : Distribution of children by sect and region.

Sect	Burj Hammoud		Ashrafieh		Baalbeck		B. El Barajneh		Saida		Kubeiat		Total	
	No.	% of total sample	No.	% of total sample	No.	% of total sample	No.	% of total sample	No.	% of total sample	No.	% of total sample	No.	% of total sample
Unknown	23	1.9	0	0.0	11	0.9	0	0.0	0	0.0	0	0.0	34	2.9
Sunni	5	0.4	1	0.1	32	2.7	10	0.8	144	12.2	21	1.8	213	18.0
Shiaa	28	2.4	1	0.1	159	13.5	194	16.4	42	3.6	3	0.3	427	36.2
Druze	2	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	0.2
GR. Orth.	15	1.3	32	2.7	0	0.0	0	0.0	0	0.0	1	0.1	48	4.1
GR. Cath.	13	1.1	40	3.4	0	0.0	0	0.0	1	0.1	1	0.1	55	4.7
Maronite	35	3.0	126	10.7	0	0.0	0	0.0	11	0.9	129	10.9	301	25.5
Armenian	85	7.2	3	0.3	0	0.0	0	0.0	0	0.0	0	0.0	88	7.4
Minorities	4	0.4	9	0.8	0	0.0	0	0.0	0	0.0	0	0.0	13	1.1
TOTAL	210	17.8	212	18.0	202	17.1	204	17.3	198	16.8	155	13.1	1181	100.0

Table 4 : Distribution of the number of children in the family by region.

No. of Children	Burj Hammoud No.	% of regional sample	Ashrafieh No.	% of regional sample	Baalbeck No.	% of regional sample	Burj El Barajneh No.	% of regional sample	Saida No.	% of regional sample	Kubeiat No.	% of regional sample	Total No.	% of regional sample
1 - 3	50	23.8	68	32.1	14	6.9	15	7.4	11	5.6	12	7.7	170	14.4
4 - 6	114	54.3	121	57.1	81	40.1	69	33.8	106	33.5	93	60.0	584	49.4
7 - 9	33	15.7	22	10.4	71	35.1	81	39.7	57	28.8	44	28.4	308	26.1
10+	13	6.2	1	0.5	36	17.8	39	19.1	24	12.1	6	3.9	119	10.1
TOTAL	210	100	212	100	202	100	204	100	198	100	155	100	1181	100.0

2. Family size

Table 4 shows the distribution of the sample by the number of children in each region. Most families (49.4%) have between 4 and 6 children. This figure coincides with previous demographic studies (11). As to regional differences, a high percentage of families having more than 7 children are in Baalbeck and Burj El Barajneh.

Table 5 shows the mean number of persons/household, by region. Not surprisingly, the highest means are observed in Baalbeck and Burj El Barajneh.

Table 5 Mean number of persons/household, by region.

Regions	Ashrafieh	Baalbeck	Burj El Barajneh	Saida	Kubeiat	Burj Hammoud	Entire population
mean No. pers./ house	6.6	8.7	8.7	7.7	7.7	7.1	7.7

Both variables were studied in relation to religious sects as shown in table 6. There is a highly significant difference in both variables among religious sects. The highest mean number of children/family and number of persons/house is observed in the shiaa sect.

Table 6 Mean number of children/family and mean number of persons/house by religious sect.

Religious sect	Miscellaneous	Sunni	Shiaa	Greek	Maronite	Armenian	Entire population
Mean no. Child/ family	5.5	6.2	7.0	4.5	5.2	4.2	5.9
Mean no. pers/ house.	7.4	7.8	8.6	6.5	7.3	6.4	7.7

Table 7 : Distribution of the sample by the number of rooms in the house (other than kitchen and bathroom), by region.

Number	Burj Hammoud		Ashrafieh		Baalbeck		Burj El Barajneh		Saida		Kubeiat		Total	
	No.	% of regional sample	No.	% of regional sample	No.	% of regional sample	No.	% of regional sample	No.	% of regional sample	No.	% of regional sample	No.	% of total sample
1	9	4.3	20	9.4	12	5.9	38	18.6	20	10.1	7	4.5	106	9.0
2	87	41.4	104	49.1	98	48.5	103	50.5	77	38.9	54	34.8	523	44.3
3	94	44.8	68	32.1	71	35.1	50	24.5	81	40.9	57	36.8	421	35.6
4+	20	9.5	20	9.4	20	9.9	13	6.4	20	10.1	37	23.9	130	10.9
Unknown	-	-	-	-	1	0.5	-	-	-	-	-	-	1	0.1
Total	210	100.0	212	100.0	202	100.0	204	100.0	198	100.0	155	100.0	1181	100.0

3. Housing conditions

Table 7 shows the distribution of the sample by the number of rooms in the house by region. Most families (44.3%) have two rooms other than the kitchen and bathroom.

This variable becomes more meaningful when related to the number of persons living in the house. This relationship was expressed as the number of persons/room, and was studied by region as shown in table 8.

Table 8 Mean number of persons/room, by region

Region	Burj Hammoud	Ashrafieh	Baalbeck	Burj El Barajneh	Saida	Kubeiat	Entire population
Mean no. persons/ room	2.9	3.0	3.8	4.6	3.5	3.0	3.5

There is a significant difference among regions, with the highest mean reported in Burj El Barajneh. This suburb of Beirut is known to have a high population density. Housing facilities have become increasingly difficult due to the displacement of many families from the South of Lebanon.

Table 9 shows the distribution of the sample by the availability of amenities: private indoor toilet facilities, running water and refrigerator. These were available in the majority of cases. For regional differences see Appendix VII.

Table 9 : Distribution of the sample by the availability of amenities - all regions.

Availability of Facility	Private Indoor Toilet		Running water		Refrigerator	
	No.	%	No.	%	No.	%
Yes	1118	94.7	1137	96.3	1079	91.4
No	62	5.3	43	3.6	100	8.4
Unknown	1	0.1	1	0.1	2	0.2

B. Socioeconomic background

Table 10 shows the distribution of children according to the father's occupation. Of the total group, 44% are either skilled workers or laborers. Together these two groups generally make up the lowest income brackets. A similar distribution applies to each region Burj Hammoud: 57.6%, Ashrafieh: 43.4%, Baalbeck: 42.1%, Burj El Barajneh: 51.0%, Saida: 36.3%, Kubeiat: 29.7%. In the Kubeiat there is a high percentage of military occupations (indicated "representative positions"): 24.5% as compared to less than half of this in the other regions.

Table 11 shows the distribution of children according to mother's employment, by region. Only 10.5% of mothers contribute to the family income. This reflects the strong belief of the mother's role at home, that is prevalent among most sectors of the Lebanese community.

Table 12 shows the number of families with wage-earners in the house, other than the parents, such as uncles, older brothers or sisters. The highest percentage is observed in Burj El Barajneh: 53.9%, which has also the highest percentage of families having more than 7 children (see table 4).

C. Education

Table 13 shows the distribution of children by parents' literacy, by region. 28.8% of the fathers and 59.9% of mothers of children are illiterate. The highest percentage of illiteracy among the parents is observed in Burj El Barajneh: illiterate fathers: 40.7% and illiterate mothers: 80.4%.

D. Access to health services

The purpose of the question on vaccination was to evaluate the use of health facilities. The reliability of this question is doubtful according to the interviewers, as most children were not familiar with the exact meaning of "vaccination" and confused it with medical injections performed by doctors in disease cases. Nevertheless, results are shown in table 14.

Table 10 : Distribution of children according to father's occupation, by region.

Occupation	Burj Hammoud		Ashrafieh		Baalbeck		B. El Barajneh		Saida		Kubeiat		Total	
	No.	% of regional sample	No.	% of regional sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of total sample
Professionals	-	-	1	0.5	-	-	-	-	-	-	-	-	1	0.1
Office occupation	8	3.8	26	12.3	9	4.5	8	3.9	9	4.5	6	3.9	66	5.6
Private business	12	5.7	13	6.1	27	13.4	18	8.8	38	19.7	13	8.4	121	10.2
Representative Positions	6	2.9	18	8.5	20	9.9	7	3.4	6	3.0	38	24.5	95	8.0
Social, Health & Educational.	5	2.4	5	2.4	2	1.0	-	-	-	-	7	4.5	19	1.6
Tourism & Communication.	23	11.0	28	13.2	21	10.4	24	11.8	18	9.1	16	10.3	130	11.0
Skilled Work	79	37.6	49	23.1	38	18.8	34	16.7	43	21.7	11	7.1	254	21.5
Laborers	42	20.0	43	20.3	47	23.3	70	34.3	29	14.6	35	22.6	266	22.5
Miscellaneous	35	16.7	29	14.2	38	18.8	43	21.1	55	27.8	29	18.7	229	19.4
TOTAL	210	100.0	212	100.0	202	100.0	204	100.0	198	100.0	155	100.0	1181	100.0

Table 11 : Distribution of children according to mother's employment, by region

Employment	Burj Hammoud		Ashrafieh		Baalbeck		Burj El Barajneh		Saida		Kubeiat		Total	
	No.	% of regional sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% total sample
Employed	33	15.7	33	15.6	22	10.9	13	6.4	13	6.6	10	6.5	124	10.5
Unemployed	176	83.8	179	84.4	178	88.1	190	93.1	185	93.4	144	92.9	1052	89.1
Unknown	1	0.5	-	-	2	1.0	1	0.5	-	-	1	0.6	5	0.4
Total	210	100.0	212	100.0	202	100.0	204	100.0	198	100.0	155	100.0	1181	100.0

Table 12 : Number of families with wage-earners, other than the parents, by region.

Number of families with wage-earners	Burj Hammoud No.	% of regional sample	Ashrafieh No.	% of reg. sample	Baalbeck No.	% of reg. sample	B. El Barajneh No.	% of reg. sample	Saida No.	% of reg. sample	Kubeiat No.	% of reg. sample	Total No.	% of total sample
Yes	88	41.9	55	25.9	79	39.1	110	53.9	93	47.0	40	25.8	465	39.4
No	122	58.1	157	74.1	123	60.9	94	46.1	105	53.0	115	74.2	716	60.6
Total	210	100.0	212	100.0	202	100.0	204	100.0	198	100.0	155	100.0	1181	100.0

Table 13 : Distribution of children by parents' literacy, by region.

Literacy	Burj Hammoud (210)*		Ashrafieh (212)		Baalbeck (202)		B.El Barajneh (204)		Saida (198)		Kubeiat (155)		Total (1181)	
	No.	% of region. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of total sample
Father literate	151	71.9	169	79.7	134	66.3	117	57.4	123	62.1	109	70.3	803	68.0
" illiterate	52	24.8	36	17.0	61	30.2	83	40.7	71	35.9	37	23.9	340	28.8
Unknown	7	3.4	7	3.3	7	3.5	4	2.0	4	1.5	9	5.8	38	3.2
Mother literate	111	52.9	135	63.7	42	20.8	38	18.6	79	39.9	53	34.2	458	38.7
Mother illiterate	95	45.2	73	34.4	156	77.2	164	80.4	118	59.6	102	65.8	708	59.9
Unknown	4	2.0	4	1.9	4	2.0	2	1.0	1	0.5	-	-	15	1.3

* sample size by region.

Table 14 : Children receiving vaccination at present - all regions.

Vaccination	Number	% of total sample
Vaccinated	276	23.4
Nonvaccinated	871	73.8
Unknown	34	2.9
TOTAL	1181	100.0

E. Type of transportation to school

Table 15 shows the distribution of types of transport to school, by region. Most children (74.7%) came to school walking. Originally the question was, how long does it take from home to school. However, the pilot study revealed that it was very difficult for children to evaluate time.

Table 15 : Distribution of means of transport to school, by region.

Means	Burj Hammoud		Ashrafieh		Baalbeck		B. El Barajneh		Saida		Kubeiat		Total	
	No.	% of region. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of total sample
Walking	198	94.3	110	51.9	161	79.7	194	95.1	135	68.2	84	54.2	882	74.7
Vehicle	12	5.7	102	48.2	41	20.3	10	4.9	62	31.3	71	45.8	298	25.3
Unascertained	-	-	-	-	-	-	-	-	1	0.5	-	-	1	0.1
TOTAL	210	100.0	212	100.0	202	100.0	204	100.0	198	100.0	155	100.0	1181	100.0

IV CLINICAL FINDINGS

Clinical examination provides an essential part of the information needed for the assessment of the nutritional status in the community (2, 12). However clinical signs of nutritional deficiencies are manifested only in the advanced state of a nutrient deficiency.

The physical examination in the present study was restricted to signs known to be indicative or suggestive of nutrient deficiencies. The interpretation and description of these signs is shown in Appendix VIIIA.

1. THE CLINICAL PATTERN

The clinical pattern observed in the sample population is presented in Appendix VIIIB as percent prevalence of clinical signs.

The main results are as follows :

1. Hair:

   The condition was normal in 95% of the sample population. The major abnormal sign observed was thinness of hair (4.5%).

2. Eyes:

   No signs of vitamin A deficiency: sclerosis or Bitot's were observed.

3. Lips:

   Angular stomatitis and cheilosis were prevalent in 1.8% and 0.4% respectively of the sample population. Both signs are associated with riboflavin deficiency.

4. Teeth:

   Dental caries had an overall prevalence of 68.0%. The percent prevalence varied considerably by area and were as follows: Kubeiat, 91.0%; Saida, 77.8%; Burj El-Barajneh, 76.5%; Ashrafieh, 63.7%; Baalbeck, 54.5%; and Burj Hammoud, 50.9%.

Yellow enamel was adopted as an indicator of poor oral hygiene. It was seen among 45.4% of the sample, either alone or with dental caries. Mottled enamel (fluorosis) was observed in 12.0% of children examined. It was most prevalent in Baalbeck (22.8%) and least frequent in Kubeiat (1.3%).

5. Gum:

Bleeding was noted in 2.7% of the sample population. This sign is usually associated with ascorbic acid deficiency. It must be emphasized that this observation relied on the child's answer to the question: "Do your gums bleed without reason?', as it was difficult for the examiner to evaluate accurately the appearance of "spongy gum". It was explained to the child that bleeding due to an accident or dental extraction should be excluded.

6. Tongue:

The following observations of riboflavin deficiency were recorded: Magenta tongue 2.7%, Geographic tongue: 0.8% papillary hypertrophy 0.8%.

7. Thyroid enlargement:

Thyroid enlargement had an overall prevalence of 19.5%, of which Grade 1 enlargement was the most prevalent (16.5%).

The highest percent prevalence for both sexes was observed in Baalbeck: 27.3% in females and 13.9% in males. This area has repeatedly been identified as the most seriously affected area of Lebanon.

The incidence of thyroid enlargement by age group is presented in Table 16. This table reveals the increased incidence with increased age.

8. Skin:

Lesions were present in 1.9% of children. They consisted mainly of follicular hyperkeratosis over the arms and shoulders.

9. Bones:

No rickets were observed.

2. DISCUSSION OF RESULTS

A- Significance of main findings

a. Dental caries and mottled enamel:

Extensive studies have been undertaken on the effect of fluoride on teeth. It has been shown that fluoride consumption beginning at birth, provides protection against dental caries.

However an excess of fluoride in drinking water (more than 2.0 ppm), can cause fluorosis (mottling of teeth), especially during development and calcification of teeth (11). The level of fluoride which seems to be protective without being harmful is 1.0 ppm.

The fluoride content of drinking water in Lebanon as reported in 1961 (1) did not exceed 0.27 ppm. In a 1967-68 study on the chemical quality of Lebanese water sources, the fluoride content ranged from .27 ppm in North Lebanon to .39 ppm in South Lebanon (13). If the normally recommended range of.6 to 1.7 ppm for fluorides in drinking water is accepted, the fluoride levels in the various drinking water samples are too low for the optimal protection against dental caries, and obviously too low to cause mottling of teeth.

In the present survey, North Lebanon was represented by Kubeiat which has the highest prevalence of dental caries 91.0% and the lowest per cent of fluorosis 1.3%. As noted above, the drinking water in North Lebanon also has the lowest content of fluoride, thus supporting the association between low fluoride content and dental caries.

Table 16 : Percent prevalence of thyroid enlargement by age group

	Less than 96 mo.		From 96 to 119 mo.		More than 119 mo.		Total	
	#	%	#	%	#	%	#	%
Normal	333	83.9	425	81.0	191	74.0	949	80.4
1st degree	62	15.6	88	16.8	45	17.4	195	16.5
2nd degree	2	0.5	7	1.3	10	3.9	19	1.6
3rd degree	0	0	4	0.8	7	2.7	11	0.9
4th degree	0	0	1	0.2	5	1.9	6	0.5
Total	397	100	525	100	258	100	1180	100

The highest prevalence of fluorosis was observed in Baalbeck (22.8%), although the average fluoride content reported in the Beqa'a is only .31 ppm. However a detailed study of the various water supplies in the region showed a high fluoride content in shallow wells .44 ppm and in streams .49 ppm (13). It is possible that the children examined in this present survey lived in areas where the water supply comes from either of these two sources.

b. Thyroid enlargement

Goiter is mainly caused by iodine deficiency which is usually attributable to the consumption of noniodized salt and/or the interference of heavy water with iodine absorption.

Endemic goiter has been recognized as a major nutritional deficiency disease in Lebanon with the incidence varying between 24 and 60% (1, 14, 15, 16). According to these various studies iodine deficiency was the principal cause of goiter. The iodide content of water is low, the water supply is high in calcium and the salt consumption is high mostly due to the bread which may increase iodine excretion (16).

Goiter had a higher frequency in the mountain and valley regions of the country, mainly the Beqa'a.

In this sample a high percentage of thyroid enlargement was noted in the Beqa'a, 41.0% for both sexes. In addition the lowest mean value of iodine in water has been reported in the Beqa'a valley 8.04 mg/L (13). It should be noted that there is in this area a high consumption of homemade bread "markuk" which contains high amounts of salt, and a very low consumption of iodide rich foods (fish and other seafoods) which are expensive even in sea-shore villages. All these factors contribute to the endemic goiter problem in this area.

B. Comparison with 1961 survey

How do present clinical findings compare with the results of the 1961 survey?

The clinical results of ICNND survey for non-refugee civilians, ages 5 to 14 years are summarized in Appendix VIII C.

Some of these signs such as nasolabial seborrhea, angular scars and glossitis, were not investigated in the WFP survey. Some differences in the sample population should be noted before proceeding into the detailed comparison of results:

1. Age distribution

The WFP survey sample has a larger number of children 5 to 9 years old than were in the ICNND sample:

922 children as compared with 492 children in 1961.

2. Sex distribution

The non-refugee civilians, ages 5 to 12 years, in the 1961 sample was 34% (n=276) male and 66% (n=534) female. The 1980 WFP sample was nearer the true proportions of 52% males and 48% females.

A higher prevalence of some of the clinical signs was reported in 1961. The average percentage of persons (ages 5 to 14) with an enlarged thyroid in 1961 was 51.3% while in 1980, the percentage for the sampled school-children was 29.6%. The decrease in prevalence may be attributed to the increased availability of iodized salt in the market.

The 1961 survey noted a 34.6% prevalence of cheilosis of the lips as compared to 0.4% in the 1980 sample. Angular lesions were seen among 14.9% of the 5 to 14 year old non-refugees in 1961 and among 1.7% of the sample

in 1980. Large scale purchases of enriched flour might account for the decrease in prevalence of riboflavin deficiency. Follicular hyperkeratosis was seen on arms among 31% of children examined in 1961 while it was observed in only 1.9% (n=16) of children in 1980. Vitamin A deficiency symptoms seem to be on the decrease as also suggested by the absence of Bitot's spots observations in 1980 as compared with 0.4% recorded in 1961.

In contrast, the condition of bleeding gums was found worse in 1980 with 2.7% of the sample observed with this condition compared to 0.5% in 1961. However, the fact that this information came from the child's own assessment questioned the value of this variable. Magenta tongue was observed in 2.7% of the sampled population in 1980 while in 1961 the percentage prevalence was only 0.9%.

As is the case with all clinical signs the recognition is fairly subjective and two equally qualified clinicians can come to different conclusions.

Comments

The recommendations stated in the ICNND survey regarding dental caries and endemic goiter were as follows:

1. "Iodization of salt to control iodine deficiency (endemic goiter, cretinism)".
2. "Utilization of fluoridation of municipal water supplies in locations where this is indicated in order to minimize dental caries".

   Although it appears the situation has improved these two recommendations are still applicable based on the present results.

   Further comments on nutritional deficiencies are presented in the discussion of dietary intake (next section).

V DIETARY INFORMATION

Dietary information constitute an essential part of nutrition surveys. The present survey involved a large number of children (ages 5 to 12 years) interviewed in schools. The size and age of the sample population, and the location of the interview determined the choice of the 24-hour recall for collecting needed food consumption data.

However this method has some limitations in measuring the individual's dietary intake, as it relies on the subject's ability to remember and quantify foods. This is even more critical when dealing with children. In addition, the menu of the recall may be atypical.

However, when applied to a group of subjects, this method is considered indicative of the dietary pattern of the group (9). In addition, the average daily per capita consumption of nutrients can be calculated and evaluated as low, adequate or excessive by comparing with recommended amounts.

Several sets of recommended intakes are available but for international use, the FAO/WHO standards are preferable. Although not presented in the discussion, the dietary results expressed as percent of the most recent U.S.RDA are given in Appendix IX. It should be remembered that the recommended intakes are the amounts considered sufficient for the maintenance of health in nearly all people (9). Thus, an intake that is below the recommended level does not necessarily mean a deficiency.

RESULTS

Analysis of food frequencies is necessary to study the dietary pattern of children from this survey. This information can be made available after further analysis. However a general pattern of food intake can be drawn from the information gathered at present.

Sandwiches (mainly white or markouk bread) of cheese, (various kinds) thyme with oil, olives and jam were frequently reported at breakfast and morning break at school. Milk and eggs were less frequent in general.

At lunch, stews and various cereal dishes (mujaddarah, makhlouta ...) and potatoes (fried and boiled) were frequently eaten. Meat, poultry and fish were less frequently consumed.

Dinners usually consisted of sandwiches : either cheese or lunch left-overs.

Some variations in food types were observed among regions : in Baalbeck markouk bread is consumed more than white bread. Some composite dishes are more popular in one area for example in Baalbeck: "Ambariz" (a kind of dried yoghurt) and "Kibbeh bi heleh" (a mixture of flour and parboiled wheat); Kubeiat: "makhluta" (lentils, chickpeas and beans (cooked with fat); Burj Hammoud: Luncheon meat is popular.

In general, bread and other cereals are extensively used in the diet. Meat is eaten in stews or as luncheon meat. Different combinations of lettuce, cucumber and tomato are used in salads depending on the seasonal availability. That is also applicable to fruits : oranges and bananas in autumn, cherries, prunes and apricots in spring.

The meal pattern was as follows : 980 children recalled eating three meals, 180 recalled two meals and 21 recalled only one meal. In the last group, most children remembered only what they had eaten at breakfast the same day of the interview, and were excluded from the dietary analysis.

The sample population was grouped on the basis of the number of meals recalled per day :

Group 1 (n=980): children who recalled three meals/day

Group 2 (n=1160): children who recalled at least two meals/day.

The average daily per capita consumption of energy, protein, vitamin A, thiamin, riboflavin, calcium and iron are shown in table 17 for both groups.

Table 17 : Average daily per capita consumption of nutrients expressed as actual intakes and percent of the FAO/WHO requirement.

Nutrients	Energy Kcal	Protein g	Vit. A RE	Thiamin mg	Riboflavin mg	Calcium mg	Iron mg
	For children (n=980) who recalled 3 meals						
Actual intake	1508.5	48.6	278.4	0.871	0.755	404.3	8.1
% FAO recommended intake	79.7	173.9	68.0	99.4	57.7	76.1	81.2
	For children (n=1160) who recaulled at least 2 meals						
Actual intake	1429.5	46.0	258.4	0.829	0.717	381.4	7.7
% FAO recommended intake	75.5	164.7	63.0	94.7	54.8	71.7	77.2

The average actual intake of energy, protein and nutrients is higher for the first group, as expected. Since the difference is consistant for all nutrients, the discussion will be restricted to the group of children who recalled three meals, as their daily menu is more complete.

Each child's daily intake was compared with the recommended intake for his sex and age, the percent of recommended intake calculated and the average percent of these recommended intakes calculated for the whole group and for each region separately.

The average percent of FAO recommended intakes for group 1 and group 2 are shown in tables 18 and 19. However, the discussion that follows refers to the results given in table 18.

Table 18 : Average percent of FAO recommended intakes for children who recalled 3 meals, by region.

Region (No.)	Burj Hammoud (168)	Ashrafieh (183)	Baalbeck (149)	Burj El Barajneh (164)	Saida (175)	Kubeiat (141)
NUTRIENT						
Energy	66.1	70.4	81.0	90.1	88.9	82.6
Protein	154.3	161.2	168.3	189.8	195.5	174.3
Vitamin A	56.2	59.2	54.5	73.3	101.6	59.7
Thiamin	64.9	79.6	130.1	88.1	92.9	155.2
Riboflavin	44.8	56.7	57.9	54.9	68.7	63.6
Calcium	63.2	80.7	65.2	81.8	94.0	68.0
Iron	61.2	65.7	88.1	84.9	91.6	100.8

Table 19 : Average percent of FAO recommended intakes for children who reported at least 2 meals, by region.

Region (No.)	Burj Hammoud (203)	Ashrafieh (211)	Baalbeck (200)	Burj El Barajneh (197)	Saida (196)	Kubeiat (153)
NUTRIENT						
Energy	61.8	67.6	75.1	85.0	84.9	80.7
Protein	143.5	154.7	156.0	179.7	186.5	170.9
Vitamin A	50.6	56.8	49.4	67.5	95.6	57.8
Thiamin	60.4	76.7	120.1	83.2	88.7	154.2
Riboflavin	41.6	54.4	54.6	52.3	65.7	62.6
Calcium	59.5	77.1	60.5	76.8	89.0	66.6
Iron	57.2	63.9	82.5	78.8	87.7	100.0

The average reported energy intake does not meet the average requirement level in all regions, especially Burj Hammoud (66.1%).

The average protein intake exceeds the average requirement in all regions and this is in agreement with previous dietary surveys (1, 14, 15). Calculations based on the food balance sheet data for Lebanon between 1953 and 1966 showed an increase in per capita consumption of total protein from 65 to 79 gm, but the "quality" indices such as percent of calories from protein availability (PCal%) remained unchanged, about 11.5% (16). The PCal% for the 1981 WFP sample population is 11.5%, suggesting the same pattern reported in the previous studies. Another example is a 1962 dietary surveys of rural families in the Bekaa valley. The PCal% ranged from 11.3 and 12.4% which is similar to the 1981 value 12.4% for the same region.

Vitamin A intake is below recommended amounts as reflected in the mean values in all regions with the exception of Saida (101.6%). An examination of the food frequencies would be necessary in order to determine the source of the vitamin A.

The average thiamin intake meets the average requirement of the sample. The main sources of this vitamin are pulses and cereals. Various studies on the Lebanese dietary pattern have shown that the population is highly dependent on cereals (1, 14, 15). In the 1961 survey, cereals were found to contribute about 60% of daily intake of energy and nearly 60% of the total protein intake. The average thiamin intake is above the average recommended level in Baalbeck and Kubeiat: 130 and 155% respectively, suggesting the high contribution of cereals and pulses to the diet in both rural areas.

In contrast the average riboflavin intake is low in all regions. Meat and milk products are rich sources of this vitamin. The low riboflavin intake may be attributed to the suspected limited contribution of these food groups to the diet of the studied population. In addition the extensive consumption of white arabic bread (0.17 mg riboflavin/100 gm) rather than whole-wheat arabic bread (0.85 mg riboflavin/100 gm) contributes to the lesser availability of this vitamin.

On the average the calcium intake is below the recommended amounts with the exception of Saida (94.0%). Higher calcium intake is associated with greater consumption of milk products. A high milk consumption has already been suggested by the acceptable vitamin A intake reported in this region.

Iron intakes are below recommended amounts especially in Burj Hammoud and Ashrafieh. Previous nutritional status studies in the Middle East have shown iron deficiency anemia to be a problem.

The variability in food intake among regions shown by the percent of recommended intake is further stressed by analyses of variance which show a highly significant difference (at the 1% level) in mean protein, kcal and nutrient intakes according to area. This difference may be attributed to a difference in dietary habits among regions such as the higher dependence of rural areas on cereal products. However, seasonal availability of some food such as fruits and green vegetables may be a contributing factor. Previous studies conducted in the same region at different times of the year, have shown a seasonal variation in some of the nutrient intakes (14, 15).

Another interesting observation was drawn from a study of the mean percent of requirements for kcal and protein by age group. The results are shown in table 20.

Table 20: Percent of FAO kcal and Protein requirements satisfied by the diet, by age group

Age group (years)	Number of children	% kcal	% Protein
Less than 7	126	93.7	194.3
7 to 8	198	80.4	184..3
8 to 9	239	78.7	172.2
9 to 10	200	78.2	167.4
10 to 11	139	73.7	167.8
Greater than 11	78	72.3	147.5
Total	980		

The mean percent of kcal and protein requirement satisfied by the diet, decreases with increasing age. A possible answer to this observation is the tendency of younger childred to exaggerate the amounts of food eaten.. Or perhaps, the diet of younger children is more carefully monitored by the parents. However, a more comprehensive investigation would be needed to answer this question.

Finally, in addition to the 24-hour recall, the children were asked to specify the source of the snacks eaten at school. The results are shown in table 21. Most children brought their snacks from home.

Both schools in Ashrafieh offered lunch. In the first school, the children eating at school were selected on the basis of poor socioeconomic background, while in the second and smaller school, all children attending the school were offered lunch.

Table 21 : Source of mid-day snack while at school, by region.

	Burj Hammoud		Ashrafieh		Baalbeck		B. El Barajneh		Saida		Kubeiat		All regions	
	No.	% of regional sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of reg. sample	No.	% of total sample
No Snacks	33	15.7	6	2.8	71	35.1	20	9.8	11	5.6	7	4.5	148	12.5
Home	145	69.0	91	42.9	82	40.6	84	41.2	74	37.4	91	58.7	567	48.0
*School offers lunch.	-	-	44	20.8	-	-	-	-	-	-	-	-	44	3.7
Grocery	20	9.5	-	-	26	12.9	49	24.0	42	21.2	7	4.5	144	12.2
Home & Grocery	12	5.7	7	3.3	23	11.4	51	25.0	71	35.9	50	32.3	214	18.1
Home & School	-	-	61	28.8	-	-	-	-	-	-	-	-	61	5.2
Home, Grocery & School.	-	-	3	1.4	-	-	-	-	-	-	-	-	3	0.3
TOTAL	210	100.0	212	100.0	202	100.0	204	100.0	198	100.0	155	100.0	1181	100.0

* Both schools in Ashrafieh.

108 children ate their lunch at school, of whom 44 had not eaten an additional snack at 10:00 (either from home or grocery). A word of explanation is needed here: in the calculation of nutrient intakes, the morning snack (10:0'clock) is counted with breakfast, while the lunch offered by the school is included in the lunch meal along with any food eaten at home immediately after school.

The mean intakes of energy and protein of lunch and day total are shown in table 22.

Table 22 : Mean kcal and protein intakes of children receiving lunch at school.

Category	Number of Children	Protein (g)		Energy (kcal)		% of total kcal provided by lunch
		Lunch	Day total	Lunch	Day total	
Lunch and snacks	64	23.6	52.5	728.4	1527.4	47.6
Lunch without snacks	44	25.1	45.4	764.7	1358.4	56.2

It appears that a snack at 10:a.m. reduces the food intake at lunch (both at school and after school). The total caloric intake of those who had both a lunch and a snack was higher by about 170 kcal, but is still less than requirement. Whether this difference can be attributed solely to the snack is not known.

COMPARISON WITH ICNND 1961

The dietary information collected in the 1961 survey was based on recall. The mother was asked to recall what her family had eaten the day preceeding the interview. The composition of families was recorded. The average per capita consumption of nutrients was calculated on this basis. Such a methodology will underestimate the food intake of the adults and older children and overestimate the intake of the young children. This should be kept in mind when comparing the average intakes from the two surveys.

The average intakes of kcal, protein, vitamin A, riboflavin and iron reported in the 1961 survey are compared with WFP results in figures 2 to 6.

For Beirut region, only the results for Armenian sects are reported, for comparison purposes as the 1961 survey included only Armenians. It must be remembered that the 1961 dietary results refer to both the average figure of adults and children in the family, hence a higher consumption of nutrients is expected in 1961 as shown in the various figures.

The comparison cannot be detailed as the samples in both surveys belong to different age groups, but general trends can be noted.

In fig. 2 and 3, Beirut (Armenian) is the most underprivileged in caloric and protein intakes in 1961 and 1980-81 studies. Further discussion of the Beirut (Armenian) sample is included with anthropometric results.

The fact that caloric requirement is consistently less than 100% in all regions might suggest that children are not eating enough. While this possibility cannot be excluded, the fact that PCal% is about 11% suggests that calorie intakes are adequate. The other point is that the weight of children when considering their height is satisfactory as presented in the next section.

FIG. 2 AVERAGE CALORIC INTAKES BY LOCATION, WFP 1980-81 AND ICNND 1961 NONREFUGEE CIVILIANS.

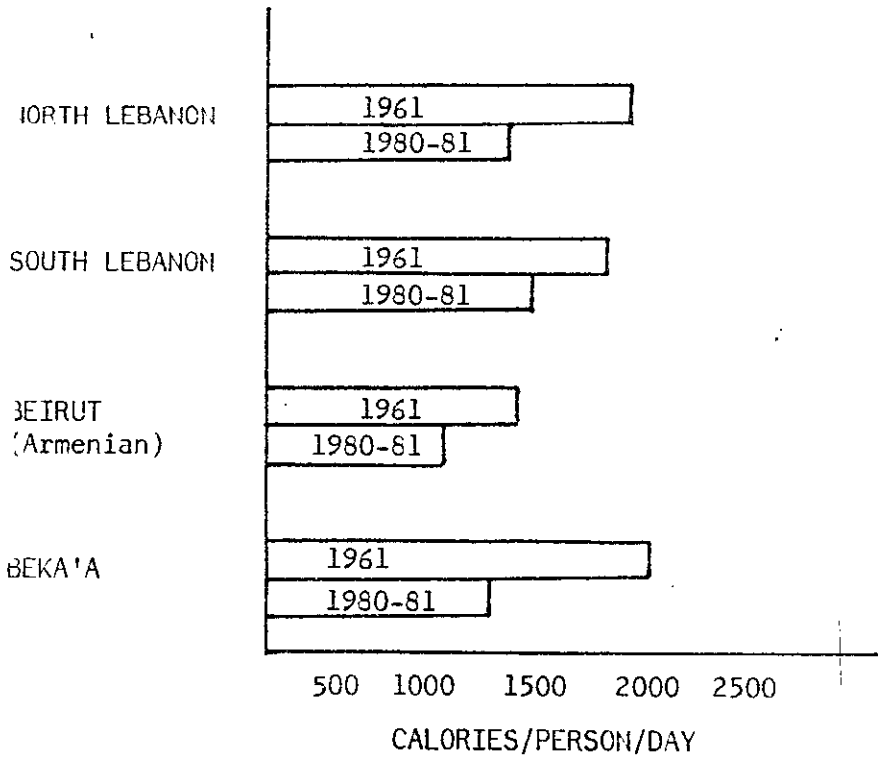


FIG. 3 AVERAGE PROTEIN INTAKES BY LOCATION, WFP 1980-81 AND ICNND 1961 NONREFUGEE CIVILIANS.

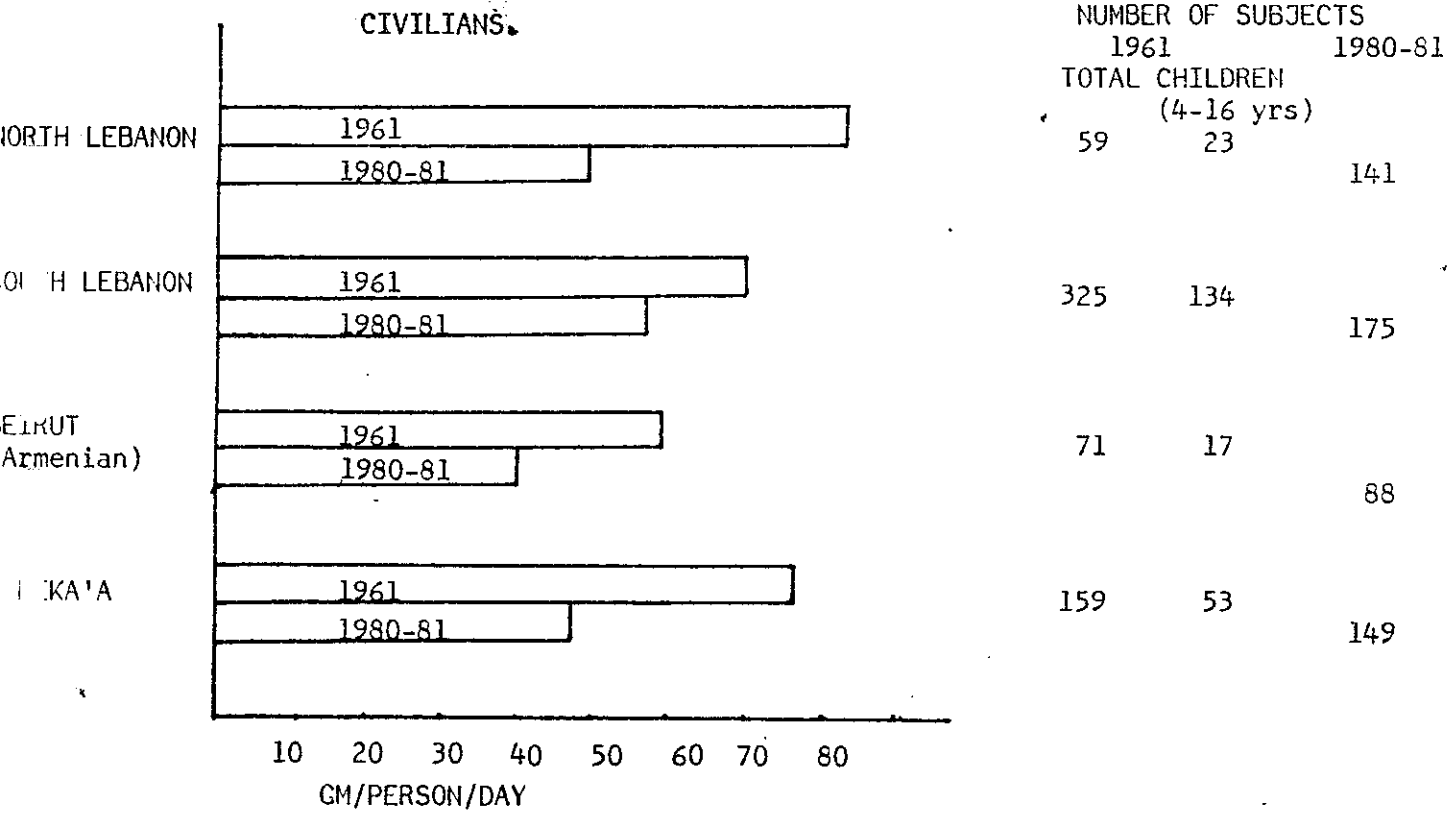


FIG. 4 AVERAGE VITAMIN A INTAKES BY LOCATION, WFP 1980-81 AND ICNND 1961 NONREFUGEE CIVILIANS.

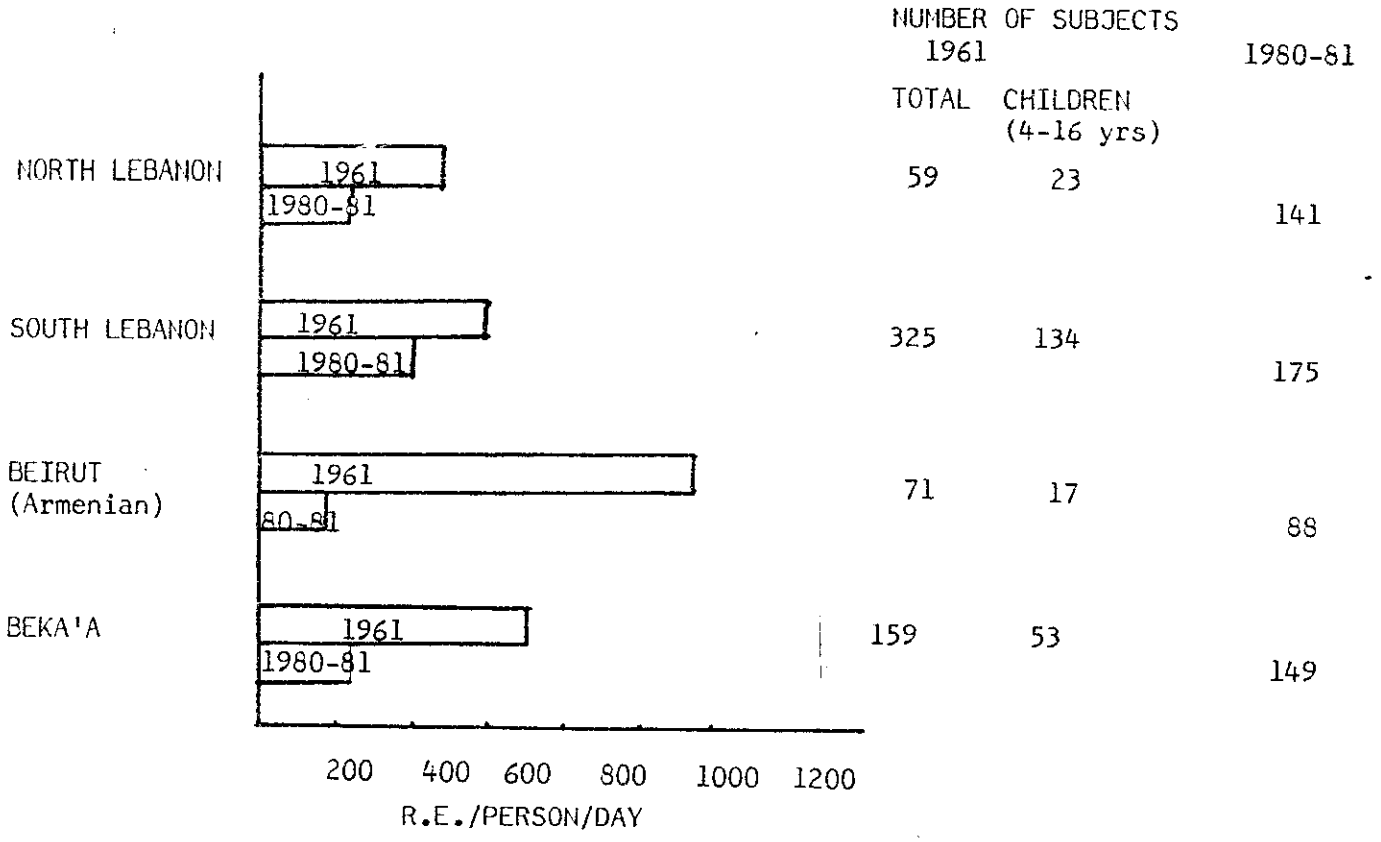


FIG. 5 AVERAGE RIBOFLAVIN INTAKES BY LOCATION, WFP 1980-81 AND ICNND 1961 NONREFUGEE CIVILIANS.

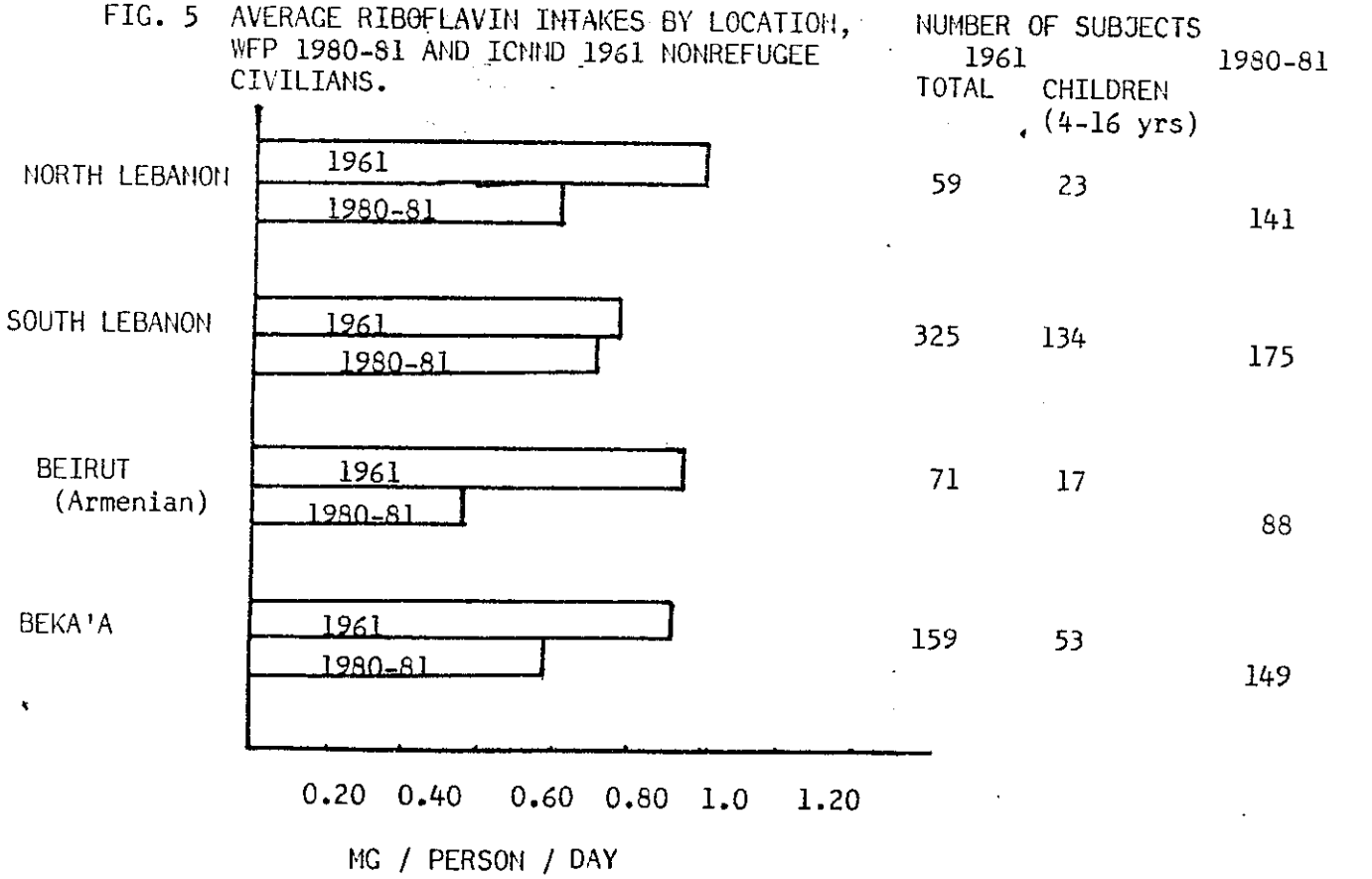
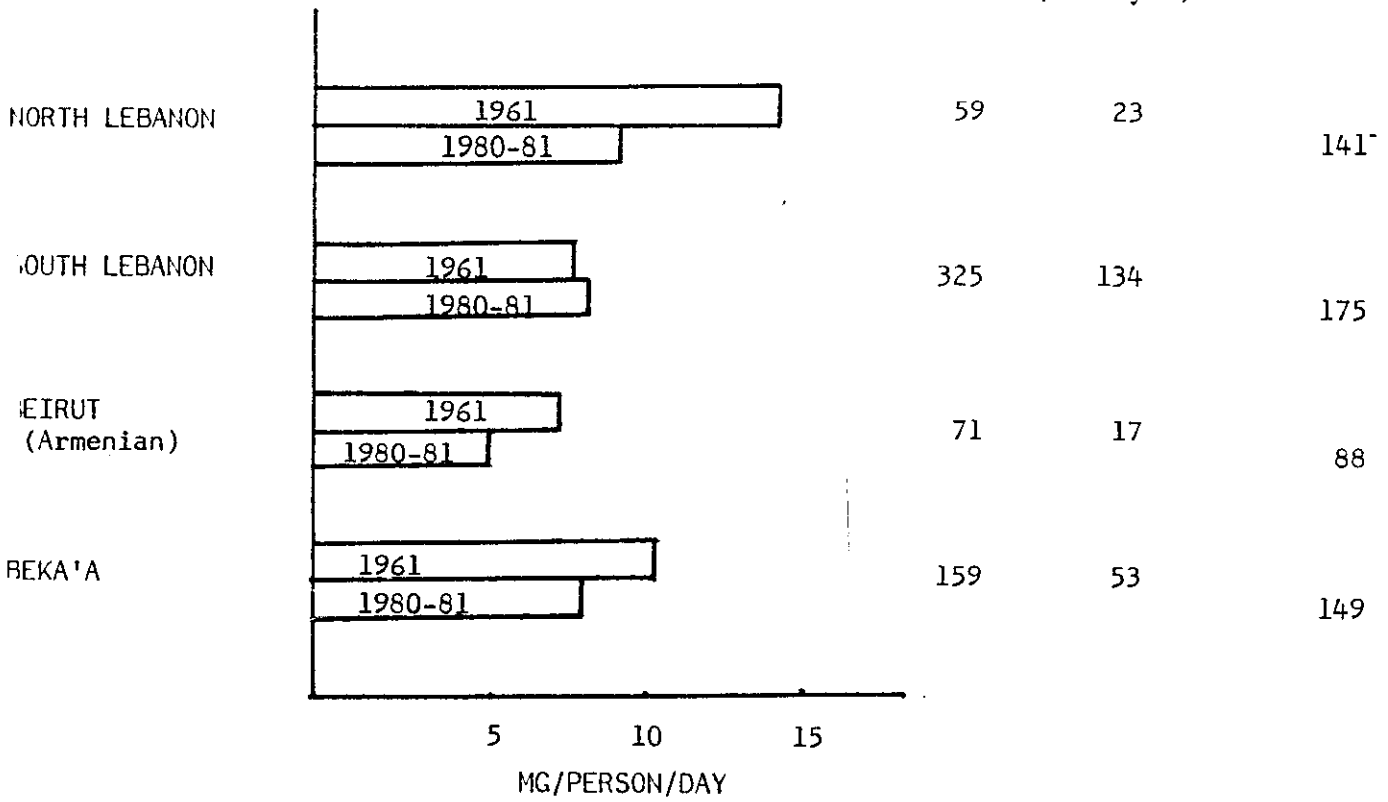


FIG. 6 AVERAGE IRON INTAKES BY LOCATION - WFP 1980-81 AND ICNND 1961 NONREFUGEE CIVILIANS.



VI : ANTHROPOMETRIC RESULTS

1. Recommended Growth Parameters

The Gomez classification based on a deficit of weight for age has been the most widely accepted indicator of protein energy malnutrition (PEM) in children (17). But this measurement alone does not distinguish between acute and chronic, or present and past malnutrition. The measurement of height is equally important, and in fact any severe retardation in growth is likely to be more permanent in height than in weight.

Recently, an FAO/UNICEF/WHO Expert Committee on Nutrition Surveillance recommended the use of height for age (ht/age) and weight for height (wt/ht) as primary indicators of the nutritional status in children (10). Weight for height is used to determine the present state of nutrition, whereas height for age is an indicator of past nutrition. In that sense, a deficit in wt/ht indicates wasting (acute malnutrition), and a deficit in ht/age stunting (chronic malnutrition).

These indicators are useful in evaluating the nutritional status of the individual child as well as that of the community. In the latter evaluation, it is advisable to present the data by age groups (10). Furthermore, combinations of indicators (wt/ht and ht/age) can be used in comparing the groups of children studied with a reference population. FAO/WHO have adopted the National Center for Health Statistics (NCHS) growth data for use as an international reference population (18). Using the median (50th centile) as the reference point, the percentage of the median for each child's height or weight can be calculated. The relationship of the height or weight to the median can also be based on the standard deviation. Arbitrary cut-off points are established to distinguish grades of deficit (mild, moderate or severe). In relatively undernourished

populations, 80% of median wt/ht (approximately corresponding to - 2.0 S.D. wt/ht) and 90% of median ht/age (-2.0 S.D. ht/age) are useful classification limits (10). In addition to these parameters, the measurement of skinfold thickness using skinfold calipers has been widely used in nutritional evaluation (2, 17). This measurement provides an indication of the amount of subcutaneous fat present, and can be taken at several sites. However, it is advisable to select easily accessible sites, especially in large scale surveys. The triceps is the most practical site for all age groups. General standards of reference are available (2).

2. Results

A. General description.

1. Children's weights, heights and skinfold thickness.

Table 23 shows the mean weights and heights of children by sex and age group (by year). As expected the mean weights and heights increase with increasing age. An analysis of variance showed no significant difference in mean height or weight by sex.

Tables 24 and 25 show the mean triceps and subscapular skinfold thickness by sex and age group (by year). The mean triceps and subscapular skinfold thickness increase with increasing age as one would expect. In addition an analysis of variance showed as highly significant difference in mean triceps thickness by sex (significant at 0.0001 level). Because the subscapular and triceps skinfold thickness measurements are strongly correlated, the remaining discussion will concentrate on the triceps measurement. This location is more frequently measured and standards are more available.

2. Comparison of anthropometric measurements with standards.

The reference used for calculating percent height for age was the NCHS centile distribution of stature by age (18). The height of each child from the survey was expressed as a percent of the median height standard for children of the same age. The weight/height values were also taken from the NCHS standards. Again the weight of a child from the survey sample was expressed as a percent of the median weight for children with the same height from the standard population.

Table 26 shows the percent of median ht/age and wt/ht of the sample of school children by sex, for each region. In reviewing the mean values of both percent ht/age and wt/ht one is struck by both the high values and their similarity. Malnutrition, as defined by these measurements, does exist but not to the extent to lower the mean values from what would have to be considered a satisfactory level.

Standards of reference for triceps skinfold are also available by age (by year only) and sex (2). Each child's triceps skinfold is expressed as a percent of the median triceps for children of the same age.

Table 23 : Mean weights and heights of children by sex and age group (by year) - all regions.

Age group (years)	Males					Females				
	Number	Weight (Kg)		Height (cm)		Number	Weight (Kg)		Height (cm)	
		Mean	± SD	Mean	± SD		Mean	± SD	Mean	± SD
Less than 7	84	20.0	2.4	115.1	4.9	75	19.9	2.8	115.3	5.8
7 to 8	116	23.1	3.2	121.6	5.3	122	22.9	3.9	120.9	5.3
8 to 9	160	25.6	4.5	126.4	6.2	135	24.2	3.4	124.8	[illegible]
9 to 10	125	27.0	3.9	130.4	5.3	105	27.2	5.1	130.2	6.1
10 to 11	79	28.8	4.7	132.9	6.0	84	29.0	5.3	133.6	6.5
Greater than 11	49	30.1	5.0	135.9	8.0	47	32.5	6.6	137.9	7.1
Total	613	25.4	5.0	126.4	8.5	568	25.3	5.7	126.1	8.9

Table 24 : Mean triceps skinfold thickness by sex and age group (by year) - all regions.

Age group (years)	Males			Females		
	Number	Triceps		Number	Triceps	
		Mean (mm)	± SD		Mean (mm)	± SD
Less than 7	84	5.8	1.1	75	6.8	1.9
7 to 8	116	6.4	1.7	121	7.2	2.0
8 to 9	159	6.7	2.8	135	7.3	2.0
9 to 10	125	6.6	2.1	105	8.1	2.9
10 to 11	79	6.8	2.7	83	8.4	2.4
Greater than 11	49	6.1	1.9	47	8.6	2.6
Total	612	6.5	2.2	566	7.6	2.4

Table 25 : Mean subscapular skinfold thickness by sex and age group (by year) - all regions.

Age group (years)	Males			Females		
	Number	Subscapular Mean (mm)	Subscapular ± SD	Number	Subscapular Mean (mm)	Subscapular ± SD
Less than 7	84	4.4	0.8	75	5.3	1.4
7 to 8	116	5.0	1.5	119	5.5	1.6
8 to 9	156	5.2	1.8	133	5.4	1.4
9 to 10	123	5.2	1.9	102	6.0	2.3
10 to 11	78	5.3	1.6	81	5.9	1.8
Greater than 11	48	5.3	1.4	44	6.2	2.1
Total	605	5.1	1.6	554	5.7	1.8

Table 26 : Percent of median height/age and weight/height by sex, by region.

Regions	Males			Females		
	Number	% ht/age	% wt/ht	Number	% ht/age	% wt/ht.
Burj Hammoud	95	96.1	98.7	115	97.0	104.2
Ashrafieh	103	99.2	97.5	109	97.1	102.4
Baalbeck	85	95.9	94.9	117	95.7	99.4
Burj El Barajneh	138	96.1	97.4	66	95.9	99.8
Saida	110	97.2	99.3	88	96.3	103.8
Kubeiat	82	97.2	98.5	73	98.4	104.3

Table 27 shows the percent of median triceps skinfold (PTSF) by sex for each region. The PTSF values differ by area and sex. The average PTSF for females is lower than the average PTSF for males in all regions, except Kubeiat where it is almost the same for both sexes. The lowest average PTSF among females is observed in Burj El Barajneh. It is surprising that the PTSF values are so low when one considers the satisfactory wt/ht and ht/age values for the same children. However, the appropriateness of the triceps skinfold references may be questioned since the reference sample was made up of well nourished American children among whom obesity is prevalent.

Table 27 : Percent of median triceps skinfold standard by sex, by region.

Regions	Males		Females	
	Number	% Std	Number	% Std
Burj Hammoud	95	75.7	114	72.1
Ashrafieh	103	87.9	108	82.0
Baalbeck	85	73.5	117	71.8
Burj El Barajneh	137	78.5	66	69.5
Saida	110	83.8	88	78.4
Kubeiat	82	86.4	73	86.5

B. Distribution of the sample on the reference standard.

The reference standards for ht/age, wt/ht and triceps skinfold are drawn from relatively well nourished populations.

The distribution of the sample along various reference point categories for percent ht/age, percent wt/ht and PTSF is shown in tables 28, 29 and 30 respectively.

Low ht/age is an indicator of past malnutrition while low wt/ht indicates present malnutrition. Just 3.3% (n=39) of the sample has a percent wt/ht less than 85% while 6.2% (n=73) of the sample has a percent ht/age less than 90%. The higher percent of children with low ht/age in addition to the lower mean percent ht/age values suggests that stunting, or malnutrition during the pre-school years, is more of a nutritional problem than wasting.

Table 28 : Distribution of the sample by percent of height for age. (PCT of HA).

Percent of height for age	Number	Percent of total sample
Less than 80	2	0.2
80 to 89.9	71	6.0
90 to 94.9	322	27.3
95 to 99.9	507	42.9
Above 100	279	23.6

Table 29 : Distribution of the sample by percent of weight for height (PCT of WH)

Percent of weight for height	Number	Percent of total sample
Less than 80	10	0.8
80 to 84.9	29	2.5
Above 85	1142	96.7

Table 30 : Distribution of the sample by percent of triceps skinfold standard (PTSF)

PTSF	Number	Percent of total
Less than 50	91	7.7
50 to 59.9	157	13.3
60 to 69.9	233	19.7
70 to 79.9	247	20.9
80 to 89.9	168	14.2
Above 90	282	23.9
Missing	3	0.3
Total	1181	100.0

The most important message from these tables is that the nutritional situation of school children in Lebanon as reflected in this sample is fairly good. Less than 10% of the sample population can be labelled as "malnourished". However one must be cautious in generalizing this funding: although the regions surveyed represent different parts of Lebanon (North, South, Beqa'a and Beirut), their selection was influenced by security considerations and thus is not truely representative.

3. Comparison with ICNND survey 1961.

An investigation of a change, if any, in the growth pattern of school children is possible by comparing the results of the WFP 1981 survey with those of the ICNND 1961 survey.

The average heights and weights for the WFP sample were precisely calculated while those of the 1961 survey were not available in tabular format and had to be approximated from graphs.

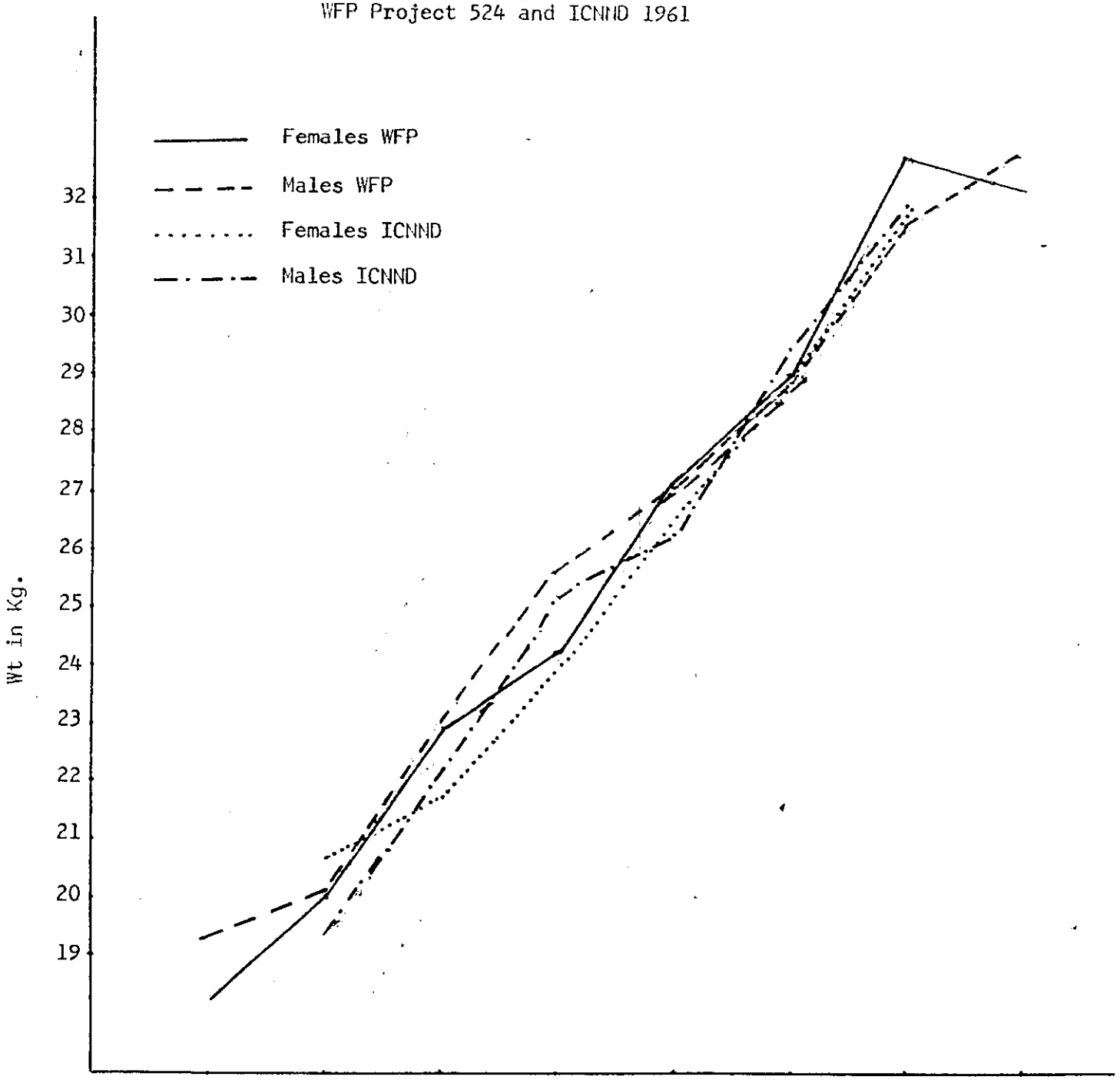
Fig. 7 shows the mean weights by year from 1980 WFP survey and 1961 ICNND survey (non-refugee civilians). The sample size for each age and sex is included in brackets beside each plotted point.

The average weights of boys and girls, ages 6 to 11, have remained about the same between 1961 and 1980. They are slightly higher in 1980 up to 9 1/2 years whereupon they cross with the 1961 weights.

The same can be said for height in Fig. 8.

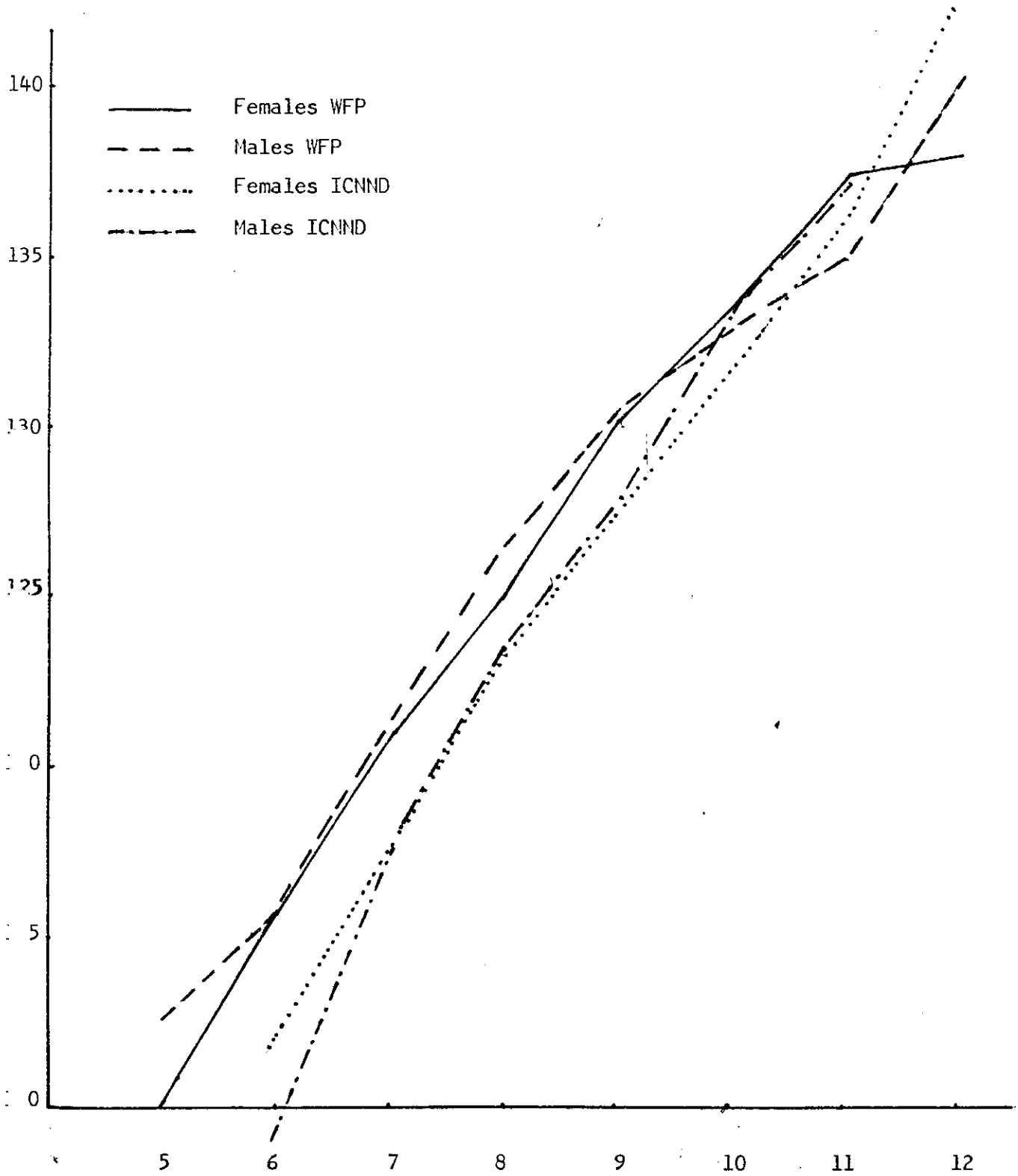
The improvement in height and weight of school children (ages 5 to 11) from 1961 to 1980 is not dramatic but it is consistent through the age categories. A statistical test of the difference was not possible because of the imprecise knowledge of the 1961 data.

Fig. 7 Mean weights by year from 1980 Lebanon WFP Project 524 and ICNND 1961



o of children FP 1980	F: 6	69	122	134	105	85	31	15
	M: 13	71	116	161	125	78	41	9
CNND 1961	F:	47	98	55	114	86	57	
	M:	45	23	22	58	56	27	

Fig. 8 Mean heights by year from 1980 Lebanon WFP Project 524 and ICNND 1961.



No. of children (See fig. 7).

VII. RELATIONSHIP OF OTHER VARIABLES TO NUTRITIONAL STATUS.

As stated earlier, the basic objectives of the survey were to provide an indication of the current nutritional situation in Lebanon and to study the relationship between nutritional status and other factors such as family, social and economic conditions.

The correlation of low percent of median ht/age, wt/ht and TSF with the various socioeconomic variables such as number of siblings, number of rooms etc..., was investigated but nothing was revealed: the nutritional status of a child cannot be predicted on the basis any one indicator of his socio-economic background. Also comparison of children above and below a selected reference point for ht/age, wt/ht and TSF revealed no significant difference in the various clinical and socioeconomic data of both groups.

In a further attempt to identify predictors of poor nutritional status, the frequencies of various indicators were examined for the 91 children less than 50% TSF, the 73 children less than 90% Ht/age and the 39 children less than 85% wt/ht. Based on these three indicators of nutritional status, these children were the worst off in the sample.

Males were over-represented in the low PWH group (significant at $p=0.01$) while females were over-represented in the low PTSF group (significant at $p=0.05$). There was no significant difference according to sex with the nutritional indicator PHA.

The distribution of the three "malnourished" subsamples by age group confirms a recognized phenomenon that the stunted population tends to be older than the wasted (See histograms in Appendix X).

In looking at the religious sects in table 31, the Armenian Orthodox was very striking. While making up only 7% of the sample, this sect made up 25% of the low triceps skinfold and 12.3% of the low ht/age. In both cases the X^2 was significant, highly so for the former and to the 0.1 level for the latter. In the dietary study both from this survey and from the 1961 survey, the kcal intake was lowest among the group.

The distribution of the three subgroups according to region is shown in table 32.

The selected socioeconomic indicators failed to predict the nutritional status of the children. A more sophisticated multivariate analysis might have been more successful. There are other possible explanations for this lack of success. The information was supplied by young children who might not truly know the true answer. In addition the enumerators were very much aware of a tendency on the part of the children to provide pleasing answers. The children often considered the interview as a test after which they would be rewarded or punished.

There is also the pervasive effect of the civil war. Socioeconomic indicators that may have been at one time meaningful may no longer be so. For example, the size of ones house has lost much of its relevance as an indicator of economic status. In parts of Beirut, poor families have moved into abandoned large houses while financially well-off families may be living in a temporary, small home.

Table 31 : Distribution of low subgroups by religious sect.

Religious Sect.	Triceps Skinfold < 50%		Ht/age < 90%		Wt/ht < 85%	
	No.	%	No.	%	No.	%
Sunni (213)*	10	11.0	13	17.8	5	12.8
Shiaa (427)	34	37.4	32	43.8	15	38.5
Druze (2)	-	-	-	-		
Gr. Orth. (48)	3	3.3	1	1.4	3	7.7
Gr. Cath. (55)	3	3.3	-	-	4	10.3
Maronite (301)	12	13.2	11	15.1	9	23.1
Protestant (0)	-	-	-	-	-	-
Armenian (all) (88)	23	25.3	9	12.3	2	5.2
Minorities (13)	2	2.2	2	2.7	1	2.6
Unascertained (34)	4	4.4	5	6.8	-	-
Total 1181	91	100.0	73	100.0	39	100.0

* Total number by sect.

Table 32 : Distribution of low subgroups by region.

	Triceps skinfold less than 50%		Ht/age less than 90%		Wt/ht less than 85%	
Regions	#	%	#	%	#	%
Burj Hammoud (210)	40	44.0	16	21.9	7	17.9
Ashrafieh (212)	8	8.8	8	11.0	9	23.1
Baalbeck (202)	21	23.1	21	28.8	7	17.9
Burj El Barajneh (204)	14	15.4	12	16.4	9	23.1
Saida (198)	7	7.7	12	16.4	3	7.7
Kubeiat (155)	1	1.1	4	5.5	4	10.3
Total	91	100.0	73	100.0	39	100.0

VIII SUMMARY AND CONCLUSIONS

SUMMARY

The nutrition survey of school children in Lebanon was initiated jointly by the World Food Program and FAO, with the technical support of FAO, with the aim of providing base line data on the nutritional status of school children in Lebanon. This came as a necessary step associated with the Food Assistance Program that FAO provided to the Republic of Lebanon.

The survey was conducted in coordination with the Office of Social Development of the Lebanese Government on school children 5 to 12 years of age, randomly selected, in governmental and semi-private schools in six regions of the country. The survey team from the Department of Food Technology and Nutrition at the American University of Beirut visited all the areas and collected data from 1181 children during the periods April-June and October-December 1980.

The methods and standards employed in this survey were chosen according to internationally accepted methods and standards, mainly those of FAO. Nutritional status was assessed on the basis of anthropometric data (height, weight, triceps and subscapular skinfold thickness), 24-hour dietary recall, clinical examination and basic socioeconomic data.

The nutritional status of school children in Lebanon as reflected in the sample population surveyed was found to be fairly good. Less than 10% of the sample population could be labelled as "malnourished" on the basis of anthropometric data : 6.2% (n=73) of the sample had a percent ht/age less than 90% and 3.3% (n=39) of the sample had a percent wt/ht less than 85%. Hence the present state of nutrition as suggested by wt/ht was satisfactory, while the higher percent of children with low ht/age in addition to the lower mean

percent ht/age values suggest that stunting, or malnutrition during the preschool years, was a more important nutritional problem than wasting.

This is also indicated by the dietary results which show low per capita intake of vitamin A, riboflavin and calories. However it seems that caloric intakes are sufficient in general, as suggested by the percent of calories from protein (PCal%) which is about 11%.

The incidence of the various clinical signs of nutritional deficiencies was relatively low, except for dental caries and goiter which had an overall prevalence of 19.6% among the sample population.

In an attempt to identify factors which may affect the nutrition of schoolchildren, the selected socioeconomic indicators failed to predict the nutritional status of the children.

To investigate whether there has been a change in the growth, dietary and clinical patterns of school children over the years, this was made possible by comparing the results of the WFP 1981 survey with those of the ICNND 1961 survey. Average weights and heights were slightly higher in 1980 consistently through the age categories, but the improvement was not dramatic. A decrease in the prevalence of clinical signs of vitamin A, riboflavin and iodine deficiencies was noted in the 1980 sample as compared with the 1961 sample.

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APPENDICES

APPENDIX I

BACKGROUND INFORMATION ON LEBANON AND WFP FOOD DISTRIBUTION IN LEBANON

Description of Country

Lebanon, on the eastern shores of the Mediterranean, is a small republic, with a total area of 10,400 sq. Km. (4.015 sq miles). Its population is unofficially put at 3.1 million with an average density of 298 person per sq. km. (772 per sq mile), one of the highest in the Middle East region. Nearly 40 percent of the population is concentrated in and around the capital, Beirut, which occupies a promontory in the centre of the coastline.

Over half of the country is mountainous, with the fertile inland plain the Beqa'a valley, separated from the coastal region by mount Lebanon. Beyond the Beqa'a is the anti-Lebanon range which separates Lebanon from Syria, the country that surrounds Lebanon on the north and east.

Lebanon has not conducted an official census since 1932. Estimates of the Lebanese population are based on projections of an assumed 3 percent annual increase. A striking demographic feature in Lebanon is the dependency ratio as manifested in the youthfulness of its population. Nearly 42% of the population are under 15 year of age (19). The school population represents approximately 30 percent of the total population (54% males and 46% females), with just over half of the primary and intermediate school population enrolled in the public school system.

The civil war has caused a disruption of the economic, educational and social institutions in Lebanon. Particularly in the south and mount Lebanon

schools have been suspended either because of the destruction to the school buildings or because of the unsafe location of the schools. The victims of the war have numbered about 50,000 dead, including approximately 6,000 heads of families, and 3,000 permanently disabled individuals, the majority of whom are under 20 years of age. The hostilities have also resulted in the dislocation of the population and has created belts of poverty around Beirut, in the villages along the frontiers and in the rural towns along the coast.

In 1979, it was estimated that nearly one million individuals were displaced including about 300,000 youths and children. A great number of these persons has been repeatedly displaced in search of safety, resulting in poverty and general emotional stress. The hostilities have also resulted in a suspension of the normal data collection procedures, thus making the assessment of the situation in Lebanon difficult.

Government programmes in social welfare

Most of the work undertaken in the area of social welfare in Lebanon is done through private local voluntary and charitable agencies. In 1959, the Government created the Office of Social Development (ODS) within the Ministry of Labor and Social Affairs for the purpose of aiding and coordinating the activities of the voluntary and charitable agencies. These activities include assistance to orphanages, boarding schools, day care centres and health dispensaries as well as initiating literary programs and training activities in the social and health fields. During the critical events of the last years in Lebanon, which have aggravated the social problems, ODS was one of the very few government organizations that continued its work throughout all areas of the country.

WFP activities in Lebanon

In 1969 the Lebanese Government requested from the World Food Program food aid for the purpose of improving the diet of orphaned, abandoned or distitute children in boarding institutions, day-care centres, nurseries and summer camps. The target population was reported to be in poor nutritional condition on admission to the institutions, being retarded in both physical and mental development for their age.

Project 524 was signed in January 1970 for a period of five years to assist 13,500 beneficiaries, rising to 18,000 by the end of the fifth year and 8,300 participants in summer camps. Food distribution began in July, 1970. The rate of utilization dropped in mid-1975 owing to the problem of security in the ports and the resulting difficulties of delivering food shipments. The project was further extended in time from mid-1975 to the end of December, 1978. As a result of the massive dislocation after the tragic events throughout the country there was a vital need to increase services to the poorer sectors of the community. Thus, WFP continued to provide food aid up to 31 December 1979, supporting about 18,500 children and youths in 124 institutions.

In January 1978, the government submitted a preliminary draft request proposing the extension and expansion of the project for a period of five years beyond December 1978. In view of the importance of the project and the volume of the food aid requested it was decided that a WFP/FAO/UNICEF/UNESCO/WHO/ILO evaluation-cum-appraisal mission should examine the on-going activities and review the request for expansion. Due to security problems, the mission was, unable to visit the country until April-May 1979.

There were two aspects to the renewal request. The first was to continue supplying WFP food aid for a further five years to the children in the educational and social institutions and centers described above. ODS planned to expand its assistance at a phased annual increase of approximately ten percent.

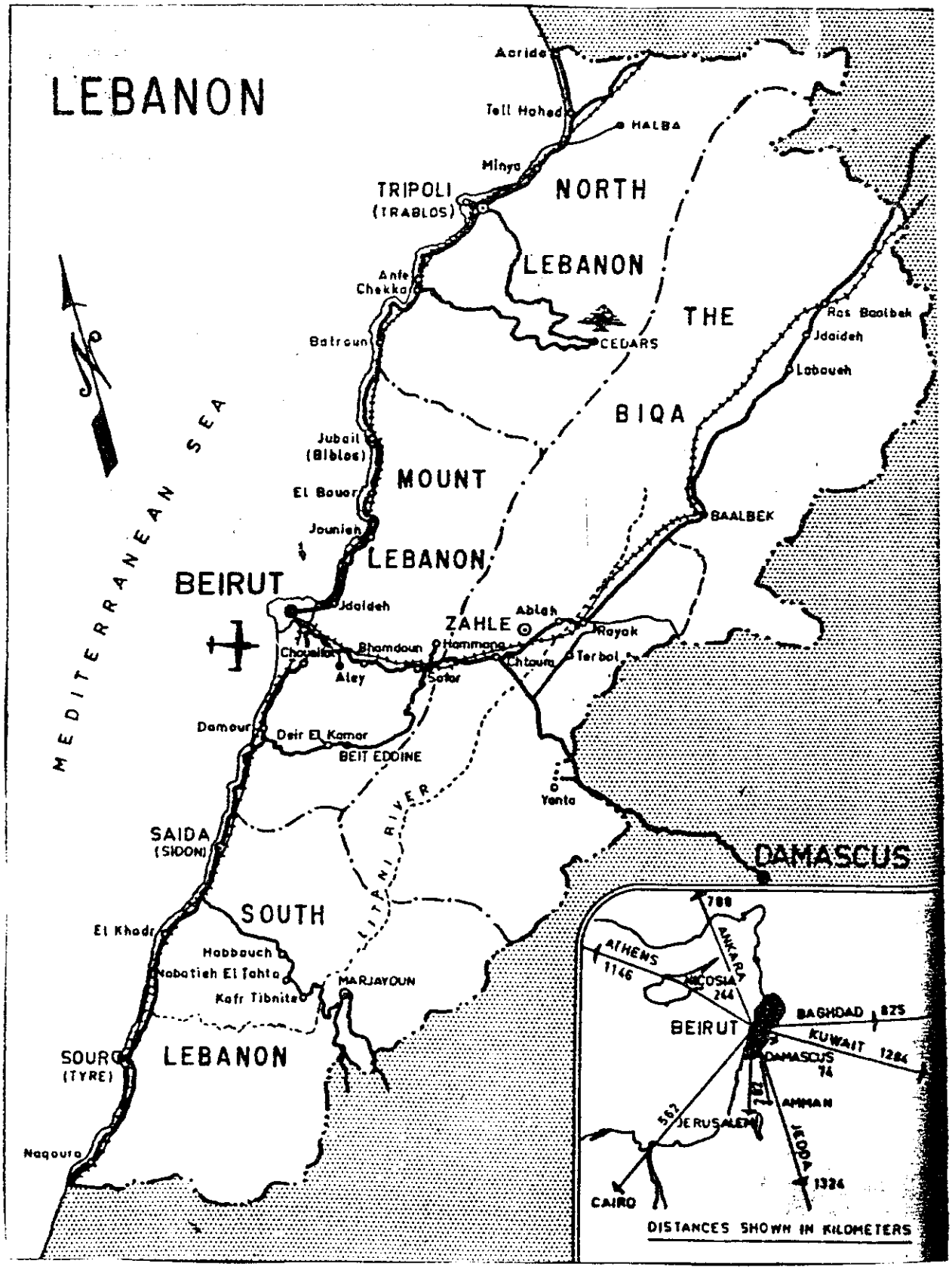
The second aspect was to assist the ODS in its efforts to launch two pilot - programmes: a school feeding canteen programme for public and semi-private primary day - school children, and a programme for the development of mother and child health centers (MCH). The target groups in both schemes were from the poorer socioeconomic stratum.

In the MCH centers, the WFP food aid was intended for pregnant and lactating mother and infants from the lowest socioeconomic stratum. The rations were to be distributed once a month to selected mothers during the last six months of pregnancy and first six months of lactation and to infants and preschool children (from six months of age) for a period of one year. It was hoped that WFP food would also act as an incentive for mothers to visit the health centers and to attend health and nutrition education.

In the school canteens ODS proposed to provide cooked meals for 250 days a year to selected school children enrolled in state and semi-private day schools. WFP support was requested to supply a mid-day meal providing about 30% of their daily calorie requirement. ODS would supervise the overall feeding operation and would provide all required financial support for the construction of canteens and relative kitchens which would be installed either in areas adjacent or as close as possible to the schools to avoid transportation problems for the children.

The evaluation-cum-appraisal mission recommended to the Committee on Food Aid Policy and Programs that the request for extending and expanding Lebanon project 524 be approved. This recommendation was accepted and the new project signed December 1979.

APPENDIX II


LEBANON
Aaride
Tell Hahed
HALBA
Minya
TRIPOLI
(TRABLOS)
NORTH
LEBANON
Anfe
Chekka
THE
CEDARS
Ras Baalbek
Jdaideh
Laboueh
Batroun
BIQA
Jubail
(Bibles)
MOUNT
El Bauer
Jounieh
LEBANON
BAALBEK
BEIRUT
Jdaideh
ZAHLE
Ablah
Rayak
Chtaura
Terbol
Hammana
Bhamdoun
Choueifat
Aley
Sofar
Damour
Deir El Kamar
BEIT EDDINE
Yanta
SAIDA
(SIDON)
DAMASCUS
SOUTH
LITANI RIVER
El Khodr
Habbouch
Nabatieh El Tahta
Kafr Tibnite
MARJAYOUN
SOUR
(TYRE)
LEBANON
Naqoura
MEDITERRANEAN SEA
788
ANKARA
ATHENS
1146
NICOSIA
244
BAGHDAD
825
BEIRUT
KUWAIT
1284
DAMASCUS
74
AMMAN
JERUSALEM
552
JEDDA
1326
CAIRO
DISTANCES SHOWN IN KILOMETERS

APPENDIX III

LIST OF SCHOOLS SURVEYED IN LEBANON - WFP 1980-1981

Name of school	Class	Number of students		
		Males	Females	Total
Burj Hammoud				
1. Aksour Kassardjian (S.P.)*	2	11	16	27
2. Apkarian Armenian (S.P.)	1	13	17	30
3. Noubarian Armenian (S.P.)	3	11	16	27
4. St. Joseph Maronite (Mar Yussef) (S.P.)	1	16	22	38
5. Al Urfan school (Governmental)	2	14	14	28
6. Burj Hammoud first Interm. Gvt. School.	2	13	20	33
7. Burj Hammoud second (Gov.)	1	17	10	27
Total		95	115	210
Ashrafieh				
1. Mar Mansour School (S.P.)	1	-	35	35
Mar Mansour School	2	-	39	39
Mar Mansour School	3	-	35	35
2. Immaculee conception (S.P.)	2	35	-	35
Immaculee conception	1	29	-	29
Immaculee conception	3	39	-	39
Total		103	109	212

* S.P. : Semi-private.

APPENDIX III (Continued)

Name of school	Class	Number of students Males	Females	Total
Baalbeck				
1. Baalbeck first Gov. for girls	2	-	41	41
2. General Fuad Shehab (S.P.)	2	18	19	37
3. Baalbeck third interm. Gov.	2	-	27	27
4. Al Nasser School (S.P.)	3	35	16	51
5. Baalbeck New Interm. Gov.	1	32	14	46
Total		85	117	202
Burj El Barajneh				
1. B. El B. Third mixed Gov.	2	25	12	37
2. Al Takamul Islamic (S.P.)	3	20	19	39
3. Dar El Tarbieh Al Lubnaniyeh (S.P.)	1	26	20	46
4. B. El B. First Gov. for boys	3	48	-	48
5. Al Sadek Al Namouzajiyah (S.P.)	2	20	14	34
Total		139	65	204
Saida				
1. Sidon New Mixed Gov.	1 2	13 9	8 15	21 24
2. Sidon Gov. for girls	2 3	- -	21 20	21 20
3. Mar Elias School (S.P.)	2	29	-	29
4. Sidon New Gov. for boys	2 3	31 13	- -	31 13
5. Sidon Greek Catholic (S.P.)	1 2	- 16	9 14	9 30
Total		111	87	198

APPENDIX III (Continued)

Name of school	Class	Number of students		
		Males	Females	Total
Kubeiat				
1. Kubeiat Mixed Gov.	1	6	5	11
	2	4	4	8
	3	10	2	12
2. Mar Dumit (S.P.)	2	15	-	15
	3	35	-	35
3. St. Theresa school (S.P.)	2	-	36	36
	3	-	10	10
4. Mart Mura Mixed Gov.	1	-	3	3
	2	4	4	8
	4	7	10	17
Total		81	74	155

APPENDIX IV

SAMPLE OF QUESTIONNAIRE

Serial Number: 1 2 3 4 5

Interviewer:

Date of interview:

Region:

School:

Class:

Full name of child:

Nationality: 1. Lebanese ☐ 6
2. Palestinian ☐
3. Syrian ☐
4. Other ☐

Religious Sect: 1. Sunni ☐ 7 8
2. Shiaa ☐
3. Druze ☐
4. Greek-Orthodox ☐
5. Greek-Catholic ☐
6. Maronite ☐
7. Protestant ☐
8. Armenian Orthodox ☐
9. Armenian Catholic ☐
10. Armenian Protestant ☐
11. Syriac Orthodox ☐
12. Syriac Catholic ☐
13. Assyrian ☐

Home Address:

Telephone:

Serial number:

ANTHROPOMETRIC MEASUREMENTS

1. Sex: 1. Female ☐ 9

2. Male ☐

2. Age (months) _____ 10 11 12

3. Weight (Kg.) _____ 13 14 15 16

4. Height (cm) _____ 17 18 19 20 21

	(1)	(2)	Average	
5. Triceps Skinfold(mm)	____	____	_____	22 23 24 25
6. Subscapular skinfold(mm)	____	____	_____	26 27 28 29

Serial number:

CLINICAL SIGNS

1. Hair
   1. Normal ☐
   2. Lacks luster ☐
   3. Easily pluckable ☐
   4. Thinness ☐
   5. Lacks luster and easily pluckable ☐
   6. Lacks luster and thin ☐
   7. Easily pluckable and thin ☐

   ☐

2. Eyes
   1. Normal ☐
   2. Bitot's spots ☐
   3. Sclerosis ☐

   ☐

3. Lips
   1. Normal ☐
   2. Angular Stomatitis ☐
   3. Cheilosis ☐

   ☐

4. Teeth
   1. Healthy ☐
   2. Caries ☐
   3. Mottled enamel ☐
   4. Yellowish ☐
   5. Caries and mottled enamel ☐
   6. Caries and Yellow color ☐

   ☐

5. Gum
   1. Bleeding ☐
   2. Not bleeding ☐

6. Tongue
   1. Normal ☐
   2. Geographic ☐
   3. Magenta ☐
   4. Hypertrophy ☐

7. Thyroid enlargement
   1. Normal ☐
   2. Grade 1 ☐
   3. Grade 2 ☐
   4. Grade 3 ☐
   5. Grade 4 ☐

8. Skin
   1. Normal ☐
   2. Presence of lesions ☐

9. Bones
   1. Normal ☐
   2. Bow legs ☐

Serial Number:

24-HOUR DIETARY RECALL

MEALS	KIND	QUANTITY	WEIGHT (gm)	CODE
BREAKFAST				
MORNING BREAK				
LUNCH BREAK				

MEALS	KIND	WUANTITY	WEIGHT (gm)	CODE
LUNCH				
AFTERNOON BREAK				
DINNER				

Serial Number:

SOCIOECONOMIC DATA

FAMILY MEMBERS

1. How many brothers and sisters are you? 39 40
2. How many persons are living in your home? 41 42

LIVING CONDITIONS

1. How many rooms do you have in your home other than the kitchen and bathroom? 43 44
2. Do you have an indoor toilet? 45
   1. Yes
   2. No
   3. Shared
   4. Unascertain
3. Do you have running water? 46
   1. Yes
   2. No
   3. Unaecertain
4. Where do you store food? 47
   1. Cupboard
   2. Refrigerator
   3. Uncovered
   4. Unascertain

SOCIOECONOMIC DATA

1. What does your father work? 48 49
2. Does he have another job? 50
   1. Yes
   2. No
   3. Unascertain
3. If the answer is yes, what is it? 51
   1. Unascertain
4. Does your mother have an occupation outside home? 52
   1. Yes
   2. No
   3. Unascertain
5. If the answer is yes what does she work? 53 54
6. Does your father read and write? 55
   1. Yes
   2. No
   3. Unascertain

7. Does your mother read and write? [56]

1. Yes
2. No
3. Unascertain

8. How many other than your parents have a job? [57]

DISTANCE FROM HOME TO SCHOOL

1. How do you come to school? [58]

1. Walking
2. Car
3. Bicycle
4. Other means

VACCINATION

1. Were you vaccinated this year? [59]

1. Yes
2. No
3. Unascertain

2. If the answer is yes, where did you get vaccinated? [60]

1. School
2. MCH
3. Other place
4. Unascertain

From where did you get the food at the 10 o'clock & lunch breaks? [61]

1. I brought it from home
2. I bought it
3. The school offers lunch
4. 1 and 2
5. 1 and 3
6. 1, 2 and 3

Observations: General appearance

Cleanliness: [62]

1. Clean
2. Unclean

Physical fitness: [63]

1. Physically fit
2. Physically unfit
3. Unascertain

Smartness: [64]

1. Bright
2. Average
3. Dull
4. Unascertain

APPENDIX V

CLASSIFICATION OF OCCUPATIONS

Code Number

I. PROFESSIONALS

Engineers, Medical doctors, Pharmacists, Lawyers, Journalists, Scientists - Various specializations, and other professions.

II. OFFICE OCCUPATIONS

Accountants, Consultants, Secretaries, Draftmen, Programmers, Employees (government and private institutions), Technicians (dealing with photocopying machines and calculators), and others.

III. PRIVATE BUSINESS

Industrialists, Wholesalers, Retailers, Landlords, Farm owners, Business men and others.

IV. REPRESENTATIVE POSITIONS

A. Governmental : Ministers, Members of Parliament and Diplomats.

B. Administrative: Governers, Mayors, Inspectors and Directors.

C. Army: All grades.

D. All religious representatives.

E. Others.

V. SOCIAL, HEALTH AND EDUCATIONAL OCCUPATIONS

A. Social: Social workers.

B. Health: Midwife, Nurse, Anesthetist, Laboratory technicians.

C. Education: Teachers, Professors.

D. Others : Such as Topographers and Photographers.

Code Number

VI. TOURISM AND COMMUNICATION

Artists : Singers and Dancers, Barmen, Butlers, Waiters, Cooks, Tourist guides, Pilot, Copilot, Hostess, Sailors and Others.

VII. SKILLED WORK

Carpenters, Foremen, Paviors, Plasterers, Glaziers, Printers, House painters, Blacksmith, Plumbers, Technicians, Mechanics, Tailors, Jewelers and Others such as Glass maker, Mattress maker, Shoe maker, and Repairers.

VIII. LABORERS

Agricultural and Industrial workers, Door-keepers, Orderly, Postmen, Porter, Maid and Others.

IX. MISCELLANEOUS

Itinerant dealers, Hairdressers, Fishermen, Retired, Unemployed, Deceased, Prisoners, Unascertained.

Note: This list was taken from Computer Center at the American University of Beirut. It was used for other studies carried out at the University.

APPENDIX VI

LIST OF FOOD TYPES

BREAKFAST

TYPE	CODE	PORTION	WEIGHT (g)
Tea	TEBX	1 cup	170 (½ , 85)
Milk (powder)	MLWD	1 glass	15 (½ , 8)
Sugar	SUGX	1 tsp.	5
Cornflakes	MZDW	1 serving	13
Honey	HONX	1 tsp.	10
Egg (fried)	EGWW OLVX	1 1 Tsp.	50 10
Egg (boiled)	EGWW	1	56
Bread - Arabic	BRAX	½ loaf	75 (¼ , 38)
- French	BRAX	½ loaf	55
- Markuk	BRMX	½ loaf	72 (¼ , 36)
Brioche	BRAX	1 big	63
Kaak irshalli	BRAX	1 big	40
Yoghurt	YOGW	1 cup	150
Cucumber with yoghurt	CULR	1 cup	130
Figs dry with sugar	FGDX SUGX	1½ Tsp.	16 16
Knafeh bjibn(Arabic sweet) Kaak of Knafeh	KNJX KAAX	1 Kaak 1	120 50
Kaak with zaater	THYW KAAX	1 Tsp. 1	4 165

Breakfast (Cont'd.)

TYPE	CODE	PORTION	WEIGHT (g)
Olives (black)	OLBW	1	3
Olives (green)	OLGW	1	3
Cucumber	CUCW	1 medium	68
Tomato	TOMW	1 medium	127
Butter	BUTX	1 tsp.	6
Margarine	MRGX	1 tsp.	6
Cocoa powder	COAW	1 tsp.	4
Mollasses (Dibs)	TREX	1 Tsp.	27
Tehineh	TEHW	1 Tsp.	11
Kareeshe	CHRX SUGX	3 Tsp. 3 tsp.	110 15

Sandwiches with arabic bread

Akkawi	(Cheese)	CHSX	½ loaf	40
Kashkawan	"	CHCX	½ loaf	20
Yellow Cheese	"	CHCX	½ loaf	40
Picon	"	CSTX	½ loaf	28
Kiri	"	CSTX	½ loaf	20
Labneh		LEBW	½ loaf	40
Luncheon meat		LMHX	½ loaf	40
Ham		PRSW	½ loaf	19
Pate		PATX	½ loaf	20

Breakfast (Cont'd.)

TYPE	CODE	PORTION	WEIGHT (g)
Jam	JAMX	½ loaf	40
Chocomax	CHOX BUTX	½ loaf	6
Tuna	TOCX	½ loaf	50
Shankleesh	SNKX OLOX ONOW TOMW	½ loaf	21 10 10 30
Thyme	THYW OLOX	½ loaf	5 10
Halaweh	HALX	½ loaf	27

Sandwiches with Markouk

Labneh	LEBW	½ loaf	35
Akkawi (Cheese)	CHSX	½ loaf	45
"Ambariz"	CHRX	½ loaf	35
Thyme	THYW OLOX	½ loaf	4 11
Manaeesh	MAEX	1	200
Manaeesh b' Kishk	BRAX KISW OLOX	1	150 15 12

LUNCH AND/OR DINNER

TYPE	CODE	PORTION	WEIGHT (g)
Rice (white)	RIPR	small plate 2 Tsp.	130 103
Yachneh* Green beans	YLUR	3 Tsp.	100
" Beans	YBLR	2 Tsp.	103
" Mixed Veg.	YVER	2 Tsp.	118
" Okra	YOKR	2 Tsp.	100
" Peas	YPER	2 Tsp.	92
" Potato	YPOR	2 Tsp.	142
" Spinach	YSPR	2 Tsp.	137
" Squash	YSQR	2 Tsp.	110
" Tomato	YTOR	2 Tsp.	126
" Green broad beans	BFAW BUTX BWFW	3 Tsp. 1 Tsp. 2 pieces	110 12 14
" Cauliflower	YKAR	2 Tsp.	120
Jew's mallow stew	YMAR	1 portion	216
Masbahet El Derwish (Eggp. Squash, Potato)	YDER	2 Tsp.	120
Sheikh El Mehshi (Eggplant)	SHER	1 medium	150
Stuffed Squash	KUSR	1 medium 1 small, 1 med.	98 203
Stuffed Cabbage	MALR	1 portion	155 (1, 30)
Stuffed Grape leaves	WARR	6 pieces	64 (1, 11)

* Stew

Lunch and/or Dinner (Cont'd.)

TYPE	CODE	PORTION	WEIGHT (g)
Stuffed Artichokes	ARSR	1 medium	90
Basic Stuffing (Hashwet el mehshi)	STUR	2 Tsp.	129
Mixed Chickpeas, Lentils, Beans	PCHW	Med. Plate	20
	LENW		20
	BHAW		20
	OLVX		15
Burghol bi banadura	BURX	2 Tsp.	26
	TOMW		26
	MRGX		10
Burghol with beans and meat	YBLR	Med. Plate	103
	BURX		26
Burghol with lentils	BURX	Med. Plate	26
	LENW		20
	OLVX		10
Burghol with meat	BURX		39
	KABR		21
	OLVX		10
Kibbeh saynieh	KIBR	Medium	87
Kibbeh (balls)	KIBR	1 Medium	45
Kibbeh bi laban	KIBR	1 piece	50
	YOGW	1 cup	100
	RIPR	2 Tsp.	68
Kibbeh raw	BWFW	1 Tsp.	34
	BURX		16
Kibbeh bi hileh	BURX	Medium	20
	FLMW		20
Hreesseh	HERR	2 Tsp.	100

Lunch and/or Dinner (Cont'd.)

TYPE	CODE	PORTION	WEIGHT (g)
Rice with chickpeas	RBDR	2 Tsp.	160
Mjaddara (Rice with lentils)	MGAR	2 Tsp. (Sand.)	90
		3 Tsp.	120
		Med. Plate	180
Macaroni with cheese	MCCR	2 Tsp.	146
Macaroni with meat	MCMR	3 Tsp.	160
		Med. Plate	240
Omelette	IJER	Medium	84
Omelette with squash	MUFR	Medium	84
Kafta	KAFR	2 long	68
Lamb kabab	KABR	1 long (6 P)	42 (1 , 7)
Kafta sanieh & potato	KAFR	Medium	60
	POBH		85
Fish	FFAH	1 portion	130
Sayyadieh (Fish with rice)	SAYR	Small	118
		Medium	175
Broiled chicken	CKKR	Leg	74
		Breast	94
Chicken with rice	CKRR	Small plate	118
Rice Soup	RIPR	Med. Plate	68
	KABR		21
	MRGX		6
Lentil Soup	LESR	1 serving	50
Vegetable Soup	SVER	1 serving	75

Lunch and/or Dinner (Cont'd.)

TYPE	CODE	PORTION	WEIGHT (g)
Meat soup	YMUR	1 serving	100
Chicken soup	CKKR	1 "	110
Nagi soup	CKKN	1 "	36
Fried potato	POFX	small plate	125
Boiled potato	POBH	2 Tsp.	116
Puree Potato	POMH	2 Tsp.	115
Sweet potato	SPOW	1	116
Potato chips	POFX	1 bag	36
Steak	BWFW OLVX	Medium 1 Tsp.	76 10
Liver	LIWW	6 small pieces	26
Pork meat	PRKW	Medium	116
Sausages (Lebanese)	SALX	6 pieces	70
Falafel	FALX	1	13
Meat stew with rice	KABR RIPR MRGX	Med. Plate	21 130 6
Mashed potato with ground meat.	POMH BWFW OLVX	Med. Plate	230 50 10
Cheese pie	PICR	1 Medium	31
Spinach turnovers	FTYR	1 Medium	28
Meat pie	PIMR	1 Medium	28

Lunch and/or Dinner (Cont'd.)

TYPE	CODE	PORTION	WEIGHT (g)
Fatayer bi jibn	BRAX CHSX	1	100 50
Lahm bi ajeen	BRAX BWFW	1	100 50
Sandwich chicken	BRAX CKKR	½ loaf ½ breast	75 45
Fried eggplant	AUBW OLVX	3 pieces	76 20
Fried cauliflower	CAUW OLVX	3 pieces	55 14
Chicory with oil	CISR	2 Tsp.	76
Stuffed chard swiss	CHAW STUR	5 pieces	55 100
Lentils (raw)	LENW	1 Tsp.	20
Chickpea salad dip	HOTR	2 Tsp.	86
Broad beans dip	BFAR	Small plate	102
Eggplant dip	BAGR	2 Tsp.	50
Green beans with oil	BRRR	2 Tsp.	100
Tarator	TEHR	2 Tsp.	21
Lima beans salad	BHAR	2 Tsp.	94
Potato salad	POSR	2 Tsp.	135
Cabbage salad	CASR	2 Tsp. Small plate	65 95
Bread salad	FATR	2 Tsp.	78
Tabbouleh	TABR	2 Tsp.	102

Lunch and/or Dinner (Cont'd)

TYPE	CODE	PORTION	WEIGHT (g)
Cuc., Tom., Lett., salad	CUCW TOMW LETW OLOX LEMW	Medium plate	40 30 13 8 8
Adas bi hamod	CHAW LENW OLOX	Small plate	25 30 10
Lamb with yoghurt	LAYR	2 Tsp.	86
Mekdous (eggplant pickles in oil).	AUBW OLOX	1 (½ loaf)	45 10
Stuffed grape leaves with oil	RIPR OLVX TOMW GRLW	2 pieces	30 10 15 15
Garlic	GARW		4
Boiled chickpeas	PCHW	3 Tsp.	84
Burghol	BURX	1 Tsp.	13
Squash boiled	MRWW	1 big 2 Tsp.	85 58
Kishk	KISW	1 Tsp.	15
Kawarma	KAWX	Sandwich	30
Snails	SNAW	1	6
Onion	ONOW	1 Medium	31
Onion (green)	ONSW	1	14
Radish	RADW	1	10

Lunch and/or Dinner (Cont'd.)

TYPE	CODE	PORTION	WEIGHT (g)
Kalkas bizeit (Colocasia)	COCW	3 Tsp.	90
	OLVX		20
	ONOW		10
	PCHW		10
Kalkas bi lahmeh	COCW	3 Tsp.	90
	ONOW		10
	KABR		21
	OLVX		10
Turnip	SWEW	1 piece	11
		3 pieces	33
Beet root	BEEW	1	90
Nisaa' (eggplant)	AUBR	Medium plate	150
Carrot	CARW	1	18
Broad beans (green)	BFAW	1 Tsp.	17
	PURW		7
Beer	BERX	1 bottle	275
Pine nuts	PINW	1 tsp.	5
Coconut	CCFW	½ tsp.	2
Peanut	PENW	handful	22
Pumpkin seed	PKSW	handful	11
Fustok halabi	PSTW	handful	22

FRUIT AND SNACKS

TYPE	CODE	PORTION	WEIGHT (g)
Orange	ORAW	1	150
Banana	BANW	1	45
Apple	APEW	1	150
Cherries	CYFW	1	5
Apricot	ARFW	1	40
Plum	PLUW	1	36
Peach	PCFW	1	130
Mandarin	MANW	1	64
Grapes	GRBW	Small portion Large portion	126 194
Kharma (persimmon)	PRNW	1	150
Watermelon	MEWW	1 slice	124
Loquat	LOQW	1	14
Strawberry	STRW	1	14
Mulberry	MULW	12	50
Dates	DAFW	1 ripe	20
Dried figs	ARFW	1 5	7 32
Grapefruit	GFFW	1	164
Jello	SUGX	1 cup	20
Rice pudding	PURR	1 cup	155
Custard	CSPH	1 cup	160

Fruit and snacks cont'd.

TYPE	CODE	PORTION	WEIGHT (g)
Mammura (Arabic sweet)	MAMR	1 Medium	67
Sfouf " "	SEMW	1	35
	SUGX		10
	BUTX		5
Kashta " "	KASK	1 Tsp.	43
Semismieh " "	SESW	1	23
	SUGX		23
Biklawah " "	BKLX	1	29
Burma bi fustok "	BUPX	1	78
'dameh (chickpeas)	PCHW	1 handful	23
'dameh bi succar	PCHW	1 handful	23
	SUGX		10
Ice cream	MLWD	1 biscuit	64
	SUGX		16
Bonjus orange	OJTX	1	182
Bonjus pineapple	PIJX	1	194
Seven Up	SEVX	1	200
Pepsi	CPEX	1	250
Miranda	GIGX	1	264
Lemonade	SUGX	1 glass	20
	LEMW		24
Sesame biscuit	BIPX	1	20
	SESW		4
	BUTX		5

Fruit and snacks (Cont'd.)

TYPE	CODE	PORTION	WEIGHT (g)
Mughli (Arabic sweet)	MUGR	1 cup	170
Cake	CAKR	1	38
Chocoprince	CHOX	1	9
	BIPX		17
Biscuits	BIPX	1 round	4
Chocolat	CHOX	1	50 (1 , 13)
Candies	SUGX	1	6
Coconut cookie	CCFW	1	21
	SUGX		21
Candies	SUGX	1	3
		5	16
Biscuit with cream	BIPX	1	5
	SUGX		1
Popcorn	MZDW	1 bag	42
	BUTX		12
Cream (cornet)	SUGX	1	10
	BIPX		10
Chocolat with cream	BIPX	1	3
	CHOX		3
	SUGX		15
Fried dough	BRAX		38
	OLOX		10
	SUGX		5
Akras b'tamr (Arabic sweet)	ARKS	1 Large	45
Maamoul b'gawz "	MAAX	1 Medium	42
Katayef b'ashta "	KASX	1 Medium	5
	FLMW		5

APPENDIX VII

PERCENTAGE OF CHILDREN WHOSE FAMILIES HAVE AMENITIES, BY REGION

Facility	Burj Hammoud (210)*		Ashrafieh (212)		Baalbeck (202)		Burj El Barajneh (204)		Saida (198)		Kubeiat (155)	
	No.	%	No.	%	No.	%	No.	%	No	%	No.	%
Toilet												
Yes	195	92.9	207	97.6	187	92.6	204	100	190	96.0	135	87.1
No or unascertained	15	7.1	5	2.4	15	7.4	-	-	8	4.0	20	12.9
Running water												
Yes	202	96.2	211	99.5	186	92.1	200	98.0	196	99.0	142	91.6
No or unascertained	8	3.8	1	0.5	16	7.9	4	2.0	2	1.0	13	8.4
Refrigerator												
Yes	195	92.9	208	98.1	164	81.2	187	91.7	189	95.5	136	87.7
No or unascertained	15	7.1	4	1.9	38	18.8	17	8.3	9	4.5	19	12.3

* Sample size by region

APPENDIX VIII A

SIGNS ASSOCIATED WITH MALNUTRITION AND THEIR INTERPRETATION

Body area	Clinical Sign	Description	Associated disorder or nutrient
Hair		Lack of luster Thinness and sparseness Easy pluckability	Kwashiorkor, less commonly marasmus
Eyes	Bitot's spots Sclerosis	Dry greyish plaques Hazy opaque cornea	Vitamin A
Lips	Angular stomatitis Cheilosis	Angular fissures Redness and swelling	Riboflavin
Teeth	Mottled enamel Caries	Gray or black spots Cavities	Fluorosis
Gum	Spongy bleeding	Purplish or red spongy swelling	Ascorbic acid
Tongue	Magenta Geographic Hypertrophic	Purplish, red Patchy areas of atrophy of epithelium Granular appearance	Riboflavin
Glands	Thyroid enlargement Grade 1 Grade 2 Grade 3	 Palpable goiter Visible goiter Very large goiter	Iodine
Skin	Perifollicular hyperkeratosis	Plaques of dry skin	Vitamin A
Skeletal system	Bow legs		Vitamin D

Clinical signs	Males		Females		Total	
	No.	%	No.	%	No.	%
LIPS						
Normal	601	50.9	554	46.9	1155	97.8
2. Angular Stomatitis	8	0.7	13	1.1	21	1.8
3. Cheilosis	4	0.3	1	0.1	5	0.4
Total	613	51.9	568	48.1	1181	100.0
TEETH						
1 Healthy	39	3.3	70	5.9	109	9.2
2. Caries	183	15.5	221	18.7	404	34.2
3 Mottled Enamel	25	2.1	23	1.9	48	4.1
4. Yellowish	64	5.4	64	5.4	128	10.8
5 Caries and Mottled enamel	48	4.1	36	3.0	84	7.1
6 Caries and Yellow color	249	21.1	150	12.7	399	33.8
7 Caries, Mottled enamel and Yellowish	5	0.4	4	0.3	9	0.8
Total	613	51.9	568	48.1	1181	100.0

Clinical signs	Males		Females		Total	
	No.	%	No.	%	No.	%
GUM						
1. Bleeding	18	1.5	14	1.2	32	2.7
2. Not Bleeding	595	50.4	554	46.9	1149	97.3
Total	613	51.9	568	48.1	1181	100.0
TONGUE						
1. Normal	585	49.5	545	46.1	1130	95.7
2. Geographic	6	0.5	3	0.3	9	0.8
3. Magenta	14	1.2	18	1.5	32	2.7
4. Hypertrophy	7	0.6	2	0.2	9	0.8
5. Cracked	1	0.1	0	0.0	1	0.1
Total	613	51.9	568	48.1	1181	100.0
THYROID ENLARGEMENT						
1. Normal	502	42.5	448	37.9	950	80.5
2. Grade 1	104	8.8	91	7.7	195	16.5
3. Grade 2	4	0.3	15	1.3	19	1.6
4. Grade 3	2	0.2	9	0.8	11	0.9
5. Grade 4	1	0.1	5	0.4	6	0.5
Total	613	51.9	568	48.1	1181	100.0

Clinical signs	Males		Females		Total	
	No.	%	No.	%	No.	%
SKIN						
1. Normal	597	50.6	561	47.5	1158	98.1
2. Presence of lesions	16	1.4	7	0.6	23	1.9
Total	613	51.9	568	48.1	1181	100.0
BONES						
1. Normal	613	51.9	568	48.1	1181	100.0
2. Bow legs	0	0.0	0	0.0	0	0.0
Total	613	51.9	568	48.1	1181	100.0

APPENDIX VIII C

PERCENT CLINICAL FINDINGS BY SEX AND AGE (5-14)
NONREFUGEE CIVILIANS, LEBANON (ICNND)

	Children	Males	Females nonpregnant-nonlactating
Age	5-9	10-14	10-14
Number	492	238	303
		Percent Prevalence	
Eyes			
Bitot's Spots	0.6	0.4	---
Skin-Face and neck			
Nasolabial Seborrhea	1.2	0.8	2.0
Lips			
Angular lesions	19.9	12.6	12.2
Angular Scars	1.8	1.7	5.0
Cheilosis	41.5	28.6	33.7
Gums			
Swollen Red Papillae	---	1.3	0.3
Tongue			
Filiform Papillary Atrophy			
Moderate/Severe	0.4	0.4	0.3
Glossitis	0.2	0.8	---
Magenta	0.4	1.3	1.0
Glands			
Thyroid Enlarged	46.1	41.6	67.7
Skin-General			
Follicular Hyperkeratosis			
Arms	27.4	32.4	33.3
Thighs	25.0	32.4	32.3

APPENDIX IX

AVERAGE NUTRIENT INTAKES AS PERCENT OF RDA, BY REGION.

REGION	BURJ HAMMOUD		ASHRAFIEH		BAALBECK		BURJ EL BARAJNEH		SAIDA		KUBEIAT		ALL REGIONS	
GROUP	G1	G2	G1	G2	G1	G2	G1	G2	G1	G2	G1	G2	G1	G2
NO.	168	203	183	211	149	200	164	197	175	196	141	153	980	1160
NUTRIENT														
ENERGY	61	58	65	62	77	71	85	80	83	79	78	76	74	71
PROTEIN	142	133	149	143	155	144	176	167	182	174	162	158	161	152
VITAMIN A	34	31	36	35	34	31	44	41	61	57	35	34	41	38
THIAMIN	50	46	60	58	100	92	67	63	71	67	118	117	76	72
RIBOFLAVIN	44	41	55	53	58	54	54	51	67	64	62	62	56	54
CALCIUM	42	39	52	50	43	40	53	50	61	57	43	43	49	46
IRON	59	55	64	62	82	77	82	77	89	85	99	98	78	74

G1 : Group of children who recalled 3 meals.

G2 : Group of children who recalled at least 2 meals.

APPENDIX X

DISTRIBUTION OF THE THREE "MALNOURISHED" SUBSAMPLES BY AGE GROUP