

**CONCEPT NOTE FOR
THE 2009 NUTRITION SURVEY OF CHILDREN 6-59 MONTHS OLD IN
OCCUPIED PALESTINIAN TERRITORIES**

FEBRUARY 2009

Contact: Dr. Sam Agbo, UNICEF OPT. Chief, Health. sagbo@unicef.org

1. Background and Justification

According to the Palestinian Family Health Survey 2006 (PCBS 2007), child nutrition has been deteriorating for the past several surveys since 1996 (DHS was also conducted in 2000 and 2004).

The 2006 survey showed stunting (<-2SD HFA) to be 10.2% ranging from 7.9% in the West bank and 13.2% in Gaza Strip. GAM (>-2SD WFH) was 1.4% and Underweight (<-2SD WFA) 2.9%. Rates of EBF in 0-59 months was 24.8%. 57% of children 6-9 months had appropriate complimentary feeding of breastmilk and mushy solid foods. Vitamin A and D are provided free via MoH however only 26.6% consumed what is received.

Since the 2006 DHS there has not been a comprehensive nutrition survey despite the many changing aggravating factors that could affect nutrition status such as war and access and movement restrictions affecting access to food and livelihoods.

Moreover, although there have been various assessments and DHS, they all vary in methodologies and targets thus providing a limited view of the nutrition situation without comparability or plotting of trends.

As demonstrated in the last DHS, there is a need to further investigate knowledge attitudes and practices resulting in relatively poor nutrition and health indicators to improve or change long existing strategies.

There is need for reliable accurate nutrition figures for OPT for planning and setting of benchmarks, support tailoring of rations according to nutritional needs. This survey can also be use to support improvements upon the National Nutrition Policy and Strategy and National Nutrition Policy Statement 2008-2010 and the DHS methodology.

The methodology of this proposed survey follows the internationally endorsed SMART Methodology which can be found at www.smartindicators.org. This standard methodology has been approved by UN organizations, government agencies, non-government agencies and academic and research institutions.

This survey will NOT be comparing/assessing the recent pre/post war affect on nutritional status as this had been judged to be relatively minimal due to the short duration of the war, continued food distributions during the war along with well developed coping mechanisms by the population over the past 30 years.

2a. Survey objectives:

The overall goal of this survey is to assess the nutritional status of children between 6 to 59 months old and investigate causes to longstanding poor indicators. The objectives are:

- a) Measure prevalence of acute and chronic malnutrition via anthropometry (Height and weight to calculate wasting, stunting, underweight)
- b) Breastfeeding Knowledge, attitudes, Practices
- c) Complementary feeding Knowledge, attitudes, Practices
- d) Care seeking behaviours
- e) Micronutrient supplementation for pregnant women, lactating women and infants practices (Please see national protocols)
- f) To measure prevalence of disability

Inclusion of children less than 6 months was considered due to the low EBF rates in OPT however it was decided to keep the target age group to 6-59 months due to documented difficulties in collecting measurements (i.e. lie straight on height boards), lack of internationally recognized standards (i.e. MUAC), and high level of precision needed for relatively low height and weight measurements.

Iron status was considered however it was felt that ongoing surveillance through the MoH sufficiently captured the situation.

Demographic data on socioeconomic status, urban/rural and refugee status will also be collected.

2b. Study Locality

The entire OPT will be surveyed. OPT is divided into two separate areas within Israel: Gaza Strip on the South-western border and West Bank on the North-eastern border.

Gaza Strip has a population of 1,416,543, 3,274 households with an average household size of 6 (PCBS 2009). It is administratively divided into five governorates; North Gaza, Gaza, Dier al Balah, Khan Younis and Rafah. These governorates are subdivided into 33 localities. The population density varies throughout Gaza Strip.

The West Bank has a population of 2,350,583, 427,097 households with an average household size of 5.5 (PCBS 2009). It is administratively divided into 11 governorates: Jenin, Tubas, Tulkarem, Nablus, Qalqiliya, Salfit, Ramallah & Al-Bireh, Jericho & Al Aghwar, Jerusalem, Bethlehem and Hebron. These governorates are subdivided into 510 localities.

3. Information to be collected and from which sub-groups

Household data such as demographics, child age, sex, height, weight, MUAC, edema, duration of exclusive breastfeeding, complementary feeding practices, supplementation practices, care seeking practices, presence of disability parents' education status, family income, aid assistance.

It is recommended to modify the survey form used in UNICEF's May 2008 assessment or the DHS to include KAP questions on BF, CF, MN use and clinic use in order to avoid duplication and facilitate comparability with past surveys.

4. Additional background information necessary for carrying out the survey

The consultant will need to understand the political situation and its effects on the Ministry of Health and other ministries and on health and nutrition service delivery.

5. Determine appropriate sampling method:

This survey will use 2 stage Cluster sampling. Households will be randomly sampled.

6. Sample Size:

The SMART/WHO/WFP/UNHCR/IFRC formula was used to calculate the sample size needed to determine the prevalence of malnutrition in each of the three study areas. This formula helps determine the relevant sample size that is adequately sufficient to perform simple random selection. It was taken also into account that the three governorates incorporated in the study have similar distribution of risk factors of childhood malnutrition and the variations amongst them in terms of population density and household size are not apparently wide. The formula to calculate sample size for cluster sampling is:

$$n = 1.96^2 \times \frac{p \times (1-p)}{d^2} \times DEFF$$

whereby n = the required sample size, p is the expected prevalence of malnutrition, d is the precision desired for the estimated prevalence and $DEFF$ is the design effect to correct any loss in precision due to choosing cluster sampling as a methodology.

Option A:

- Sampling error: confidence Interval: 95%
- Precision (d): 0.05
- Estimated prevalence of the outcome being measured (p): 15% (based on 13% stunting in Gaza from May/08 nutrition assessment)
- DEFF = 2 (based on DEFF from May/08 assessment)

$$N = 1.96^2 \times \frac{0.15 \times (1-0.15)}{0.05^2} \times 2$$

$$= 3.8416 \times \frac{0.15 \times (0.85)}{.0025} \times 2$$

$$n = 391.8$$

Then to account for potential non responses, we take n and divide by (1-estimated non response rate, expressed in decimal format)

Estimated non-response: 10% or 0.1

$$\frac{391.8}{(1-0.1)} = 435.333 \text{ Sample size (\# children 6-59 months old) per governorate}$$

For simplicity, the sample size for each governorate will be rounded up to 450 children 6-59 months old.

Assuming an average of 1 child 6-59 months per household and selecting 30 clusters per governorate, one would need 30 clusters of 15 households per governorate.

Option B:

(If this option is chosen, the budget will need to be adjusted accordingly)

- Sampling error: confidence Interval: 95%
- Precision (d): 0.05
- Estimated prevalence of the outcome being measured (p): 10% (based on 10% stunting in OPT from May/08 nutrition assessment)
- DEFF = 2 (based on DEFF from May/08 assessment)

$$N = 1.96^2 \times \frac{0.10 \times (1-0.10)}{0.05^2} \times 2$$

$$= 3.8416 \times \frac{0.10 \times (0.9)}{.0025} \times 2$$

$$n = 276.6$$

Then to account for potential non responses, we take n and divide by (1-estimated non response rate, expressed in decimal format)

Estimated non-response: 5% or 0.05

$$\frac{276.6}{(1-0.05)} = 291.153 \text{ Sample size (\# children 6-59 months old) per governorate}$$

For simplicity, the sample size for each governorate will be rounded up to 300 children 6-59 months old.

Assuming an average of 1 child 6-59 months per household and selecting 30 clusters per governorate, one would need 30 clusters of 10 households per governorate.

7. Select the Sample

Please see attached for 1st Stage Cluster sampling.

2nd Stage Cluster sampling will need to be via segmentation at the locality level.

8. Time Schedule

The study will be conducted over a period of five weeks starting from early March until early April, 2009.

9. Implementation (and results-based TOR for the consultant)

Pre intervention phase (Early March)	Timeframe
This survey will rely on the recruitment of a UNICEF Nutrition officer and a Nutrition Survey consultant (who could be hired by the MoH or an NGO) to oversee implementation.	1 st -2 nd wk March/09
The survey consultant will review/modify the study proposal (including sample size and methodology), and adjust the study tools (questionnaire) and training manual based on SMART accordingly. Please see the SMART survey manual and the “Proposed Field Protocols for Cord Data Collection- Survey Package.zip” at www.smartindicators.org	
In designing the data collection form, consider modifying the survey form used in UNICEF’s May 2008 assessment (please see Annex 2) or the DHS to include KAP questions on BF, CF, MN use and clinic use in order to avoid duplication and facilitate comparability with past surveys.	
Translate and back translate the new/updated questionnaire	
Work with partners to seek and review applicants for data collectors, interviewers, supervisors, data entry clerks, and statistician positions.	
The survey consultant will need to confirm that the types and numbers of equipment needed for the survey are readily available from partners. If not, please investigate local purchase. International purchase should be unlikely as MoH and NGOs should have equipment from previous surveys or extras in health clinics.	
Collaborate and inform partners of plans including UNICEF Senior management, regional office and headquarters, OCHA, members of the Food Security Group, the Health Cluster Coordinator, and UN Security.	
Get Security Clearance to enter Gaza. Discuss with UN Security permission for entry of UN Staff, UN Consultants in to Gaza and extent of access to survey areas.	
Get Security Clearance to enter Gaza. Discuss with UN Security permission for entry of UN Staff, UN Consultants in to Gaza and extent of access to survey areas.	

Get lists and maps of each locality and conduct secondary cluster sampling. Calculate distances and estimated travel time of each cluster and develop a survey schedule detailing the locations of each team for each day of the survey. Share this plan with Security.	
Determine pay scales for survey staff. Past PCBS surveyors received ~ \$35/day. Review and confirm the proposed budget with partners and assign responsibilities.	
Depending on the location of the cluster, confirm mode of transportation (i.e. public bus or taxi) and estimate costs.	
. Preparatory phase (Second week of March)	Timeframe
Develop detailed schedule of activities and a check list for the tools required for implementation of the study such as scales, MUAC stripes, length boards, etc. Gather needed equipment and materials, stationary from partners and organized into packages for each team	
Due to movement restrictions, 2 separate trainings will need to be conducted, one in Gaza and one in the West Bank, ideally as close in time as possible but not concurrently. Because many surveyors have been well trained with extensive experience in OPT, it has been suggested that the training will be decentralized. Ensure that sufficient copies of the survey manual, stationary and anthropometric equipment is available for each training.	
Book training locations in Gaza and West Bank along with any associated catering needs	
First, a training for Supervisors will be held in each area: one in Gaza and one in West Bank. Train about 10-20% more staff than needed that there are back up survey staff in case someone falls sick. This will include a 2 day classroom practicum on interview methodologies and anthropometric measurements and new updates (I.e. WHO's new growth standards). The Principal Investigators will modify the training guidelines available from the SMART website and tailor it for use in OPT. Each question in the questionnaire will be reviewed in detail and anthropometric techniques will be practiced, standardized and improved. On the third day (last day of the training), the group will field test the forms and procedures in a nearby community.	
Amending the questionnaire, based on the findings during the training of data collectors and investigators' feedback. Do not mass photocopy the questionnaires until this has taken place.	
Based on training participation, interactions and final test, the surveyors will be selected. They will then be responsible for selecting and replicating the training that they just received to their survey teams (2 anthropometric people+ 1 interviewer). They will to select teams based on their skills and proximity to the survey area to reduce travel and take advantage of their understanding of the area.	
Mass photocopying of all survey forms. Gather and organize the supplies for each team.	
Data Collection and Cleaning (third and fourth weeks of March)	Timeframe
Carrying out the field data collection; which will take 10 days to complete. The consultant should be readily available to assist via telephone or in person should any questions from the teams arise and should receive daily updates via telephone from the teams	
Data entry and cleaning: Data entry should begin as soon as questionnaires are received, not all at the end of the survey. Data should be cleaned with questions should be clarified by phoning the interviewee. Data quality will be tested by the principal investigators by randomly selecting completed forms and contact the interviewee to double check a few questions.	

Data Analysis (Third week of March until first week of April)		Timeframe
Continuing data cleaning and quality checks.		
Analysis of the collected data.		
Produce dummy tables, graphs, and testing potential correlations/ associations.		
Ensure timely payment of staff.		
Report Writing (Ongoing, but mainly 2nd- 3rd weeks of April)		Timeframe
Writing up the introduction and methodology sections (during the first weeks of April).		
Writing up the results section (during the last two weeks of April).		
Writing up the discussion and recommendations sections (during the last week of April).		
Editing the draft report (during the last week of April).		
Modifying the report and submitting the final report (within 1 week from the date of receiving AEI and UNICEF's comments, first week of May).		
Disseminate findings in presentations, reports and a publication.		

10. Budget

The Gaza flash appeal of Feb 1, 2009 appealed for a Joint Nutrition Assessment of Children less than 5 years of age, adolescents and pregnant women in the Gaza Strip totalling \$375,000 USD to be used within 9 months (November 1, 2009) with a breakdown by partners as follows:

- UNICEF \$50,000 OPT-09/H/24007/124
- SAVE- US \$175,000 OPT-09/H/24007/5893
- MAP-UK \$100,000 OPT-09/H/24007/6042
- WHO \$50,000 OPT/09/H/24007/122

Breakdown of the Budget: The below budget table provides an idea of the items that will need to be funded by a partner. Please note that amounts and rates are approximate estimates only and will need to be negotiated and confirmed amongst the consultant and partners.

Items needed	Price per Governorate	Price for Gaza's 5 Governorates	Price for West Bank's 11 Governorates	TOTAL OPT	Partner responsible (i.e. UNICEF, SAVE- US, MAP-UK, WHO, MOH)
1. Survey Coordinator P4 (DSA, salary, travel, admin) at rate of \$ 20,000 for 2 months					TBD
2. Statistician from MOH/PCBS at rate of (please find accurate rate) of \$200 USD per day for 10 days					TBD
3a. Supervisors Training location large enough to seat 15-30 people with space to practice anthropometry. Rental room at \$300/day for 3 days (training and pilot days)					TBD
3b. Supervisors Training coffee breaks, lunch. \$15 ppd x 3 people x 3 days					TBD
3c. Training of 4 supervisors per governorate (1 per survey team) at rate of \$24 USD /ppd for 3 days (2 days classroom practicum+ 1 day pilot and role play). Note that only 3 will be selected with the other one will be backup in case someone falls ill.					TBD
4a. Surveyor's Training location- to be directly and locally by each Supervisor to 5 potential surveyors.					TBD
4b. Surveyors Training coffee breaks, lunch. \$15 ppd x 12 people x 3 days					TBD
4c. Training of 12 potential surveyor per governorate at a rate of \$24 USD/ppd for 3 days.(2 days class room practicum+ 1 day pilot and role play) Note that only 9 will be selected and the other 3 will be backup in case anyone falls ill.					TBD
5. 9 surveyors+ 3 supervisors (3 teams of 4) per Governorate working for 10 days at rate of \$35 USD/ppd					TBD
6. 1 data entry staff working for 5 days at a rate of \$35 USD/ppd (90 surveys/day)					TBD
7. Transport allowance for 3 teams for 10 days at rate of \$15 USD/ppd per team **as needed					TBD
8. Supplies (assuming height boards, electronic scales and MUAC can be borrowed from partners). Purchase carrying bags, stationary, calculators, photocopies...etc. = \$100 per team					TBD
9. Replacement of old or damaged supplies borrowed from partners (i.e. height boards, electronic scales) at the end of the survey					TBD
TOTAL					

ANNEX 1- Clusters for Gaza Strip

Territory: GAZA STRIP

Governorate	Locality	Locality code	#HH	Cumulative # of HH- Lower	Cumulative # of HH- Upper	Cluster #
North Gaza	Um Al-Nnaser (Al Qaraya al Badawiya al Maslakh)	552681	422	1	422	
	Beit Lahiya	552695	9353	423	9775	1,2,3,4,5,6,7
	Beit Hanun	552740	5429	9776	15204	8,9,10,11

	Jabalya Camp	552755	6167	15205	21371	12,13,14,15,16	
	Jabalya	552790	18891	21372	40262	17-30	
Gaza	Ash Shati Camp	602775	5194	1	5194	1,2,3	
	Gaza	602825	69625	5195	74819	4-30	
	Madinat Ezahra	602900	598	74820	75417		
	Al Mughraqa (Abu Middein)	602945	955	75418	76372		
	Juhor ad Dik	603045	437	76373	76809		
Deir al Balah	An Nuseirat Camp	653065	4384	1	4384	1,2,3,4	
	An Nuseirat	653070	5821	4385	10205	5,6,7,8,9,10	
	Al Bureij Camp	653140	3685	10206	13890	11,12,13	
	Al Bureij	653145	1552	13891	15442	14	
	Az Zawayda	653180	2661	15443	18103	15,16,17	
	Dier al Balah Camp	653200	968	18104	19071	18	
	Al Maghazi Camp	653210	2544	19072	21615	19,20	
	Al Maghazi	653215	1027	21616	22642	21	
	Deir al Balah	653240	8395	22643	31037	22,23,24,25,26,27,28,29	
	Al Musaddar	653250	304	31038	31341		
	Wadi as Salqa	653275	741	31342	32082	30	
Khan Yunis	Al Qarara	703370	3274	1	3274	1,2	
	Khan Yunis Camp	703410	5659	3275	8933	3,4,5,6	
	Khan Yunis Camp	703420	22569	8934	31502	7-22	
	Bani Suheila	703425	5020	31503	36522	23,24,25,26	
	Abasan al Jadida (as Saghira)	703430	992	36523	37514		
	Abasan al Kabira	703445	3230	37515	40744	27,28	
	Khuza'a	703470	1581	40745	42325	29,30	
Al Fukkhari	703485	878	42326	43203			
Rafah	Rafah	753490	18825	1	18825	21-Jan	
	Rafah Camp	753495	5332	18826	24157	22,23,24,25,26,27	
	Al-Nnaser (Al Bayuk)	753500	955	24158	25112	28	
	Shokat as Sufi	753505	1752	25113	26864	29,30	

Clusters for West Bank to be selected.

Annex 2- Sample survey form from the May 2008 Nutrition Assessment in 3 Governorates of Gaza¹

Interview Record			
	<input type="text"/>	Questionnaire's Serial Number	IR1
	Locality: House Number:	Governorate: 1. Gaza 2. North Gaza 3. Khanyounis	IR2
From the left: Day, Month, Year	<input type="text"/>	Date questionnaire filled in	IR3
	<input type="text"/>	Interview Result (Outcome): 1. Completed, 2. Refused, 3. Other, specify.....	IR4
		Name of Interviewer	IR5
		Name of Supervisor	IR6
		Name of Data Entry person	IR7
First Part: Demographic Information and Child's Health and Nutritional History			
	<input type="text"/>	Child's Name?	DI 1
	1- Male 2- Female	Child's Sex (gender)?	DI2
From the left: Day, Month, Year	<input type="text"/>	Child's Date of Birth?	DI3
	<input type="text"/> (Week)	Child's gestational age in weeks?	DI 4
	<input type="text"/> (Gram)	Child's Birth Weight in Grams?	DI 5
Subtract DI3 from IR3	<input type="text"/> Months <input type="text"/> Days	Child's age on the day of interview?	DI 6
	<input type="text"/>	Telephone/ Mobile phone Number?	DI 7
	<input type="text"/>	Is the child refugee or non refugee? 1: Refugee 2. Non refugee	DI 8
	<input type="text"/>	Number of family members who reside at the household?	DI 9
	<input type="text"/>	Child's rank/ order among live siblings?	DI 10
	<input type="text"/>	Mother's Educational status? 1. Elementary. 2. Preparatory. 3. Secondary. 4. University. 5. Post graduate. Other, specify	DI 11
	<input type="text"/>	Father's Educational status? 1. Elementary. 2. Preparatory. 3. Secondary. 4. University. 5. Post graduate. Other, specify	DI 12
	<input type="text"/>	Does the father, head of family, work? 1. Yes 2. No	DI 13
 NIS	Family's average monthly income (in NIS)?	DI 14
	<input type="text"/>	1. Do not know 2. Refused	
	<input type="text"/>	Is the family's income sufficient for securing food for family and child? 1. Yes 2. No	DI 15
If No, skip to DI 19	<input type="text"/>	Does the family receive assistance (aid)? 1. Yes 2. No	DI 16
	<input type="text"/>	Type of assistance (aid) received by family? 1. Financial 2. Food 3. Material (Other than food)	DI 17
	<input type="text"/>	Frequency of receiving assistance (aid) by family is once every? 1. One week 2. Month 3. Longer than one month	DI 18
	<input type="text"/>	Is the house/ apartment owned by the family or rented? 1. Owned 2. Rented	DI 19
	<input type="text"/>	Did any of your children suffered from malnutrition (wasting low weight, etc) in the past?	DI 20

¹ NUTRITIONAL STATUS OF PALESTINIAN CHILDREN UNDER FIVE (6 – 59 MONTHS) IN THREE GOVERNORATES OF THE GAZA STRIP: A RAPID ASSESSMENT STUDY May, 2008.

		1. Yes 2. No	
Second Part: Anthropometric Measurements			
	<input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> Kilogram	Child's weight on the interview's date in kilograms?	AP 1
	<input type="text"/> <input type="text"/> <input type="text"/> . <input type="text"/> Centimeter	Child's height/ length on the interview's date in centimeters?	AP 2
	<input type="text"/> <input type="text"/> . <input type="text"/> Centimeter	Child's mid upper arm circumference (MUAC) in centimeters?	AP 3
Third Part: Mother's Knowledge and Practice Regarding Child's Nutrition			
If No, skip to M 3	<input type="checkbox"/>	Did you exclusively breastfed your child? 1. Yes 2. No	M 1
	<input type="text"/> <input type="text"/>	If yes, for how long did you exclusively breastfed your child?	M2
	<input type="text"/> <input type="text"/>	For how long does a child need to be exclusively breastfed (in months)?	M3
	<input type="checkbox"/>	Is your child still being breastfed? 1. Yes 2. No	M4
	Milled Rice <input type="checkbox"/> <input type="checkbox"/> Ready made child foods <input type="checkbox"/> <input type="checkbox"/> Fruits <input type="checkbox"/> <input type="checkbox"/> Vegetables <input type="checkbox"/> <input type="checkbox"/> Meat/ chicken (poultry)/ Fish <input type="checkbox"/> <input type="checkbox"/> Eggs <input type="checkbox"/> <input type="checkbox"/> Milk/ Milk Derivatives <input type="checkbox"/> <input type="checkbox"/> Family food <input type="checkbox"/> <input type="checkbox"/> Other, specify <input type="checkbox"/> <input type="checkbox"/>	At what age did you start introducing the following complementary foods to your child (in months)?	M5
	Milk/ Milk Derivatives <input type="checkbox"/> Eggs <input type="checkbox"/> Meat (fresh, frozen, or canned) <input type="checkbox"/> Liver (fresh or frozen) <input type="checkbox"/> Fish (fresh, frozen, or canned) <input type="checkbox"/> Legumes (Lentil, beans, etc) <input type="checkbox"/> Vegetables (fresh or cooked) <input type="checkbox"/> Fruits (fresh or dried) <input type="checkbox"/>	How often do you give your child the following complementary foods? 1. Once per day 2. Once – Twice per week 3. Once per week 4. Once every two or more weeks 5. Never	M 6

	<input type="checkbox"/> Fruit juice (home made, ready made) <input type="checkbox"/> Starches (bread, rice, macaroni, pastry, etc) <input type="checkbox"/> Sweets or candy <input type="checkbox"/>		
If No, skip to M10	<input type="checkbox"/>	Does your child receive (drink) tea? 1. Yes 2. No	M 7
	<input type="checkbox"/>	How many times per day does your child receive (drink) tea?	M 8
	<input type="checkbox"/>	Does your child receive (drink) tea during meals? 1. Yes 2. No	M 9
	<input type="checkbox"/>	Do you give your child Vitamins A and D supplementation? 1. Yes, always 2. Yes, sometimes 3. No, never	M 10
	<input type="checkbox"/>	Do you give your child Iron supplementation? 1. Yes, always 2. Yes, sometimes 3. No, never	M 11

Comments

Comments with relevance to interviewee and child:

.....
.....

Comments with relevance to questions

.....
.....

Other Comments

.....
.....

Data Collector's Name.....

Date: / /

Supervisor's Comments

.....
.....

Supervisor's Name:.....

Date: / /

ANNEX 2- COMMON NUTRITION REFERENCE INFORMATION²

Operational definitions

Exclusive Breastfeeding (EBF): Giving the infant only breast milk with no other liquid, semi solid or solid foods, except for vitamin or mineral drops and medicines (WHO, 1999).

Child's Nutritional Status: Classifying nutritional status of children based on Z-score compared to standardized reference population by WHO and by using the Anthro 2005 program, children higher than -2 SD classified as normal while those less than -2 SD up to -3 SD classified as moderately malnourished, and those who are less than -3 SD classified as severely malnourished. Presence of nutritional pitting edema in both feet in a malnourished child is a characteristic of severe malnutrition regardless of the Z – score.

A stunted child: Child who has a height / length for age Z - score that is below -2 standard deviations (SD) based on the NCHS/CDC/WHO reference population. Chronic malnutrition is the result of an inadequate intake of food over a long period of time and may be exacerbated by chronic illness (Mali DHS, 1996).

A wasted child: A child who has a weight for height/ length Z - score that is below -2 SD based on the NCHS/CDC/WHO reference population.

An underweight child: A child who has a weight for age Z - score that is below -2 SD based on the NCHS/CDC/WHO reference population. This condition can result from either chronic or acute malnutrition, or a combination of both (Mali DHS, 1996).

Complementary food: Any food, suitable as a complement to breast milk/Artificial milk when becomes insufficient to satisfy the nutritional requirements of the infant (WHO, 1999); it is recommended not be introduced children aged less than 6 months.

Assessment of nutritional status by anthropometry

Anthropometry is the measurement of the human body. It is a quantitative method and is highly sensitive to nutritional status, especially among children. There are different types of measurements (Beaton, et al 1990).

1. Height/ length for age

² NUTRITIONAL STATUS OF PALESTINIAN CHILDREN UNDER FIVE (6 – 59 MONTHS) IN THREE GOVERNORATES OF THE GAZA STRIP: A RAPID ASSESSMENT STUDY May, 2008.

Low height-for-age index identifies past under nutrition or chronic malnutrition. It cannot measure short-term changes in malnutrition. For children below 2 years of age, the term is length-for-age; above 2 years of age, the index is referred to as height-for-age.

Deficit in height / length for age is referred to as stunting.

Length is measured below 85 cm; height is measured 85 cm and above. Recumbent length is on average 0.5 cm greater than standing height, although the difference is of no importance to the individual child. A correction may be made by deducting 0.5 cm from all lengths above 84.9 cm if the standing height can not be measured (WHO, 2000).

2. Weight for age

Low weight for age index identifies the condition of being underweight, for a specific age. The advantage of this index is that it reflects both past (chronic) and/or present (acute) under nutrition, although it might not be possible to distinguish between the two.

3. Weight for height/ length

Low weight for height helps identify children who suffer from current/ acute under nutrition or wasting and is useful when exact ages are difficult to determine.

Weight for height/ length is appropriate for examining short term effects such as seasonal changes in food supply or short term nutritional stress brought about by illness.

The above three indices are used to identify three nutritional conditions, stunting, underweight and wasting, respectively.

Underweight: Underweight, based on weight for age, is a composite measure of stunting and wasting and is recommended as the indicator to assess changes in the magnitude of malnutrition over time. There is a relationship between the prevalence of underweight and several national indices such as gross national product (GNP), female education, governmental social support, sources of energy foods, and distribution of income (UN Report, 1992).

Stunting: Low height/ length for age, stemming from a slowing in the growth of the fetus and the child and resulting in a failure to achieve expected length as compared to a healthy well nourished child of the same age, is a sign of stunting. Stunting is an indicator of past growth failure, constituting a proxy for chronic malnutrition. It is associated with a number of long term factors including chronic insufficient protein and energy intake, frequent infection, sustained inappropriate feeding practices and poverty (Frongillo, 1999). In children over 2 years of age, the effects of these long-term factors may not be reversible. Data on prevalence of stunting in a community may be used in problem analysis in designing interventions.

Information on stunting for individual children is useful clinically as an aid to diagnosis. Stunting, based on height for age, can be used for evaluation purposes but is not recommended for monitoring, as it does not change in the short term such as 6 - 12 months.

Wasting: Wasting is the result of the weight falling significantly below the weight expected for a child of the same height/ length. Wasting indicates current or acute malnutrition resulting from failure to gain weight or actual weight loss. Causes of that include inadequate food intake, incorrect feeding practices, disease, and infection or, more frequently, a combination of these factors. Wasting in individual children and population groups can change rapidly; it shows marked seasonal patterns associated with changes in food availability or disease prevalence to which it is very sensitive.

4. Mid upper arm circumference (MUAC) reflects the arm muscle mass and is the most widely used in older children. It is relatively easy to measure and a good predictor of immediate risk of death in the severely malnourished. It is used for rapid screening of acute malnutrition from the 6 - 59 month age range (MUAC overestimates rates of malnutrition in the 6 - 12 month age group). MUAC can be used for screening in emergency situations but is not typically used for evaluation purposes. There is no internationally recognized cut off point when it comes to classifying

malnutrition according to MUAC. AEI used the following cut-off for children aged 6 - 59 months (AEI, 2003):

Below 110 mm (severe malnutrition)

Equal to or more than 110 and less than 120 mm (moderate malnutrition)

Equal to or more than 120 & less than 125 mm (high risk of malnutrition)

Equal to or more than 125 & less than 135 mm (moderate risk of malnutrition)

Equal to or more than 135 mm (satisfactory nutritional status)

Comparison of Anthropometric Data to Reference Standards

The reference standards most commonly used to standardize measurements were developed by the US National Center for Health Statistics (NCHS) and are recommended for international use by the World Health Organization. The reference population chosen by NCHS was a statistically valid random population of healthy infants and children (Hamill, et al 1979). Questions have frequently been raised about the validity of the US - based NCHS reference standards for populations from other ethnic backgrounds. Available evidence suggests that until the age of approximately 10 years, children from well nourished and healthy families throughout the world grow at approximately the same rate and attain the same height and weight as children from industrialized countries. The NCHS/WHO reference standards are available for children up to 18 years old but are most accurate when limited to use with children up to the age of 10 years. References are used to standardize a child's measurement by comparing the child's measurement with the median or average measure for children at the same age and sex. Taking age and sex into consideration, differences in measurements can be expressed in a number of ways:

1. Standard deviation units, or Z-scores

The Z-score or standard deviation unit (SD) is defined as the difference between the value for an individual and the median value of the reference population for the same age or height, divided by the standard deviation of the reference population.

Z-scores are more commonly used by the international nutrition community because they offer two major advantages. First, using Z-scores allows us to identify a fixed point in the distributions of different indices and across different ages. For all indices for all ages, 2.28% of the reference population, lie below a cut-off of -2 Z-scores. The second major advantage of using Z-scores is that useful summary statistics can be calculated from them. The approach allows the mean and standard deviation to be calculated for the Z-scores for a group of children. The Z-score application is considered the simplest way of describing the reference population and making comparisons to it.

2. Percentage of the median

The percentage of the median is defined as the ratio of a measured or observed value in the individual to the median value of the reference data for the same age or height for the specific sex, expressed as a percentage. The median is the value at exactly the midpoint between the largest and smallest. If a child's measurement is exactly the same as the median of the reference population we say that it is 100% of the median.

3. Percentiles

The percentile is the rank position of an individual on a given reference distribution, stated in terms of what percentage of the group the individual equals or exceeds.

Use of cut offs: The use of a cut off enables the different individual measurements to be converted into prevalence statistics. Cutoffs are also used for identifying those children suffering from or at a higher risk of adverse outcomes. The most commonly used cutoff with Z - scores is -2 standard deviations, irrespective of the indicator used. This means children with a Z - score for underweight, stunting or wasting, below -2 SD are considered malnourished. For example, a child with a Z - score for height/ length for age of -2.56 is considered stunted, whereas a child with a Z - score of -1.78 is not classified as stunted. In the reference population, by definition, 2.28% of the children would be below -2 SD and 0.13% would be below -3 SD (a cut off reflective of a severe condition). In some cases, the cut off for defining malnutrition used is -1 SD (e.g. in Latin America). In the reference or healthy population, 15.8% would be below a cutoff of -1 SD. The use of -1 SD is generally discouraged as a cut-off due to the large percentage of healthy children normally falling below this cut-off.

A comparison of cutoffs for percent of median and Z-scores illustrates the following:

90% = -1 Z - score

80% = -2 Z - score

70% = -3 Z - score (approximately)

60% = -4 Z - score (approximately)

Malnutrition Classification Systems

The most widely used system is World Health Organization (WHO) classification based on Z - scores. The Road – to - Health (RTH) system is typically seen in clinic – based growth monitoring systems.

WHO system

< -1 to > -2 Z - score mild

< -2 to > -3 Z - score moderate

< -3 Z - score severe

RTH system

≥ 80% of median normal

60% - < 80% of median mild – to - moderate

< 60% of median severe