Nutrition Survey

Saharawi Refugee Camps

Tindouf - Algeria

August 2005

United Nations High Commissioner for Refugees

World Food Programme

National Institute of Research of Food and Nutrition
Survey coordination

Francesco Branca and Marika Ferrari, *National Institute for Research on Food and Nutrition*, Rome (INRAN)
Rita Bhatia (Senior Programme Adviser, Nutrition Service WFP, Rome)

Technical Support

Fathia Abdalla (Senior Nutritionist, UNHCR, Geneva)
Pushpa Acharya (Programme Advisor, WFP Regional Bureau - Cairo)

Field Support and Operational Coordination

<table>
<thead>
<tr>
<th>UNHCR - Algeria</th>
<th>WFP - Algeria</th>
<th>INRAN</th>
<th>Saharawi Ministry of Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr Houssam Mu'alleem</td>
<td>Mr. Mamoudou Mbaye</td>
<td>Francesco Branca</td>
<td>Mr Mohamed Fadel Saleh</td>
</tr>
<tr>
<td>Mr. Aissa Elzaki</td>
<td>Mr. Nguyen Duc Hoang</td>
<td>Marika Ferrari</td>
<td>Dr Ahmed Ahmed Baba</td>
</tr>
<tr>
<td>Mr. Mahjoub Boulanuar</td>
<td>Ms. Karima Osmani</td>
<td>Paola D’Acapito</td>
<td>Lorenza Mistura</td>
</tr>
</tbody>
</table>

Report Compilation and Laboratory Analysis

M. Ferrari, P. D’Acapito, L. Mistura, F. Branca (INRAN, Rome)

Editorial Review

Sudeep Roy (Intern, Nutrition Service WFP, Rome)
## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgements</td>
<td>1</td>
</tr>
<tr>
<td>Abbreviations and acronyms</td>
<td>2</td>
</tr>
<tr>
<td>Executive summary</td>
<td>3</td>
</tr>
<tr>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>Objectives</td>
<td>5</td>
</tr>
<tr>
<td>1. PART I – QUANTITATIVE SURVEY</td>
<td>6-10</td>
</tr>
<tr>
<td>2. RESULTS</td>
<td>11-23</td>
</tr>
<tr>
<td>3. PART II – QUALITATIVE DATA SURVEY</td>
<td>24-25</td>
</tr>
<tr>
<td>4. RESULTS</td>
<td>25-28</td>
</tr>
<tr>
<td>5. DISCUSSION</td>
<td>29-31</td>
</tr>
<tr>
<td>6. RECOMMENDATIONS FOR ACTIONS AND FOLLOW-UP</td>
<td>32</td>
</tr>
<tr>
<td>7. ANNEXES</td>
<td></td>
</tr>
<tr>
<td>ANNEX 1 – Terms of reference</td>
<td></td>
</tr>
<tr>
<td>ANNEX 2 – Timetable</td>
<td></td>
</tr>
<tr>
<td>ANNEX 3 – List of local staff</td>
<td></td>
</tr>
<tr>
<td>ANNEX 4 – Questionnaire</td>
<td></td>
</tr>
<tr>
<td>ANNEX 5 – List of clusters</td>
<td></td>
</tr>
<tr>
<td>ANNEX 6 – Food aid graph</td>
<td></td>
</tr>
<tr>
<td>IMAGES FROM SURVEY</td>
<td></td>
</tr>
</tbody>
</table>
TABLES AND FIGURES

Table 1 – Sample size
Table 2 – Criteria for severity of anemia
Table 3 – Actual sample size for main indicators
Table 4 – Age and gender characteristics of the surveyed population
Table 5 – Prevalence (%) of anemia in women of childbearing age (15-49 years)
Table 6 – Prevalence of Iron deficiency in non-pregnant women 15-49 years
Table 7 – Prevalence (%) of anemia in 6-59 month old children by age class
Table 8 – Iron deficiency assessed by sTfR levels (µg/mL) in different age groups
Table 9 – Prevalence of Iron deficiency in in 6-59 month old children
Table 10 – Infant and young child feeding practice indicators
Table 11 – Iodine content (µg/L) in water collected from different sources

Figure 1 – Prevalence of anemia in non-pregnant women in fertile age (15-49 years) in 1997, 2001, 2002 and 2005
Figure 2 – Distribution of Weight for Height z-score in children 6-59 months
Figure 3 – Distribution of Height for Age z-score in children 6-59 months
Figure 4 – Distribution of Weight for Age in children 6-59 months
Figure 5 – Prevalence of Wasting and Stunting in children 6-59 months in 1997, 2001, 2002 and 2005
Figure 6 – Prevalence of anemia in children 6-59 months in 1997, 2001, 2002 and 2005
Figure 7 – Time of initiation of breastfeeding after birth
Figure 8 – Complementary Foods consumed by children 6 - < 10 months aged
Figure 9 – Complementary Foods consumed by children 6 9 months old
Figure 10 – Milk Consumption during 0 - < 24 months
Figure 11 – Daily complementary food frequency
Figure 12 – Dietary Diversity
Acknowledgements

We gratefully acknowledge the important contributions made by the Agencies and individuals who made this survey possible. The survey was initiated and financially supported by WFP and UNHCR. We would like to thank Rita Bhatia, from WFP Headquarters, with whom the survey protocol and the preliminary results were discussed; Mr. Mahdjoub Boulanuar (UNHCR Field Co-ordination), Dr. Karima Osmani (Programme officer, WFP, Tindouf) and all the staff of the WFP and UNHCR Branch and Sub-Offices in Algiers and Tindouf, who helped in the survey organisation and gave efficient logistic input; the Republique Arabe Saharawi Democratique (RASD) officials: the Ministry of Health, the Saharawi Red Crescent (CRS) and the Wilaya Administration Units, who have accepted and supported the idea of the study and have provided information, technical support and hospitality; in particular, Dr. Ahmed Ahmed Baba Dih and Dr. Mohamed Fadel Saleh, who have helped coordinating the field teams; the Algerian Red Crescent (CRA), who has provided information and helped as much as possible with field operations.

We are most grateful to all Survey Team members for their professionalism and positive demeanor. We are also most appreciative of the hospitality and cooperation of all the mothers and caretakers who were interviewed during household visits in the Sahara Refugee Camps.

We are grateful to Dr Jurgen Erhardt for his invaluable aid with the ELISA measurements carried out for ferritin, serum transferring receptor and C-reactive protein and for providing some antibodies. We would also like to extend our appreciation to Dr Monica Forte for her invaluable assistance in the measurement of crucial biochemical indicators for use in this survey report.
### Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARC</td>
<td>Algerian Red Crescent</td>
</tr>
<tr>
<td>BF</td>
<td>Breast Feeding</td>
</tr>
<tr>
<td>CI and (95% C.I)</td>
<td>95% Confidence Interval in the expression of proportions</td>
</tr>
<tr>
<td>CISP</td>
<td>International Committee for the Development of Peoples</td>
</tr>
<tr>
<td>CO</td>
<td>Country Office</td>
</tr>
<tr>
<td>CRP</td>
<td>C-reactive protein</td>
</tr>
<tr>
<td>DSM</td>
<td>Dried Skim Milk</td>
</tr>
<tr>
<td>ECHO</td>
<td>European Community Humanitarian Aid Department</td>
</tr>
<tr>
<td>ELISE</td>
<td>Enzyme-linked immunosorbent assay</td>
</tr>
<tr>
<td>HAZ</td>
<td>Height For Age Z-score</td>
</tr>
<tr>
<td>ICH</td>
<td>Institute of Child Health</td>
</tr>
<tr>
<td>INRAN (previously called INN)</td>
<td>National Institute of Research of Food and Nutrition</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organisation</td>
</tr>
<tr>
<td>MUAC</td>
<td>Mid Upper Arm Circumference</td>
</tr>
<tr>
<td>RASD</td>
<td>Republique Arabe Saharawi Democratique</td>
</tr>
<tr>
<td>RBM</td>
<td>Result Based Management</td>
</tr>
<tr>
<td>SD</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>SRC</td>
<td>Saharawi Red Crescent</td>
</tr>
<tr>
<td>sTfR</td>
<td>serum Trasferring receptor</td>
</tr>
<tr>
<td>UHT</td>
<td>Ultra High Temperature</td>
</tr>
<tr>
<td>UNHCR</td>
<td>United Nations High Commissioner for Refugees</td>
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<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<tr>
<td>VAD</td>
<td>Vitamin A Deficiency</td>
</tr>
<tr>
<td>WAZ</td>
<td>Weight For Age Z-score</td>
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<tr>
<td>WFP</td>
<td>World Food Programme</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>WHZ</td>
<td>Weight For Height Z-score</td>
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</table>
**Executive Summary**

In February-March 2005 a Nutritional Survey was performed in Saharawi refugee camps. The purpose of this survey is to determine the prevalence of anaemia in preschool children (6-59 months), women of childbearing age (15-49 years) and pregnant women and to estimate the prevalence of acute and chronic malnutrition in children (6-59 months old) and the changes in the prevalence of malnutrition and anaemia since 2002.

A cluster survey was deemed most suitable for the purpose of this study. Sample sizes were calculated based on an estimated 36% and 50% prevalence of anaemia in preschool children and women, respectively, with a precision of ±5% for the 95% confidence limits and a design effect of 2. This resulted in a final sample size of 708 preschool children and 768 women. Thirty clusters were selected with a Probability Proportional to Size methodology (PPS).

The prevalence of global acute malnutrition (WHZ <-2 Z score) was found to be 7.7% with 2.3% of the cases being severe (WHZ <-3 Z score). These results show no statistically significant difference between boys and girls.

The prevalence of chronic malnutrition (HAZ <-2 Z score) was 38.9% with 15.6% of the cases being severe (HAZ <-3 Z score). These results show statistically significant difference between boys and girls.

The prevalence of underweight (WAZ <-2 Z score) was 28.8% with 7.7% of the cases being severe (WAZ <-3 Z score).

The prevalence of anaemia in women of childbearing age was observed to have remarkably increased from 47.6% since the last survey conducted in 2002, to 66.4% with (Hb<11g/dL). For pregnant women tested for anaemia, 76.5% (95% CI 71.3-81.7) were anaemic (Hb <11 g/dL).

Out of the 753 children tested for anaemia, 68.5% were diagnosed with the condition (Hb <11 g/dL). This is almost double the prevalence of anaemia found in the 2002 survey 35%, and ominously similar to the one reported in 1997. Severe cases of anaemia were present in 7.5% of the children and it was also observed that the prevalence of anaemia was highest in children in the 2nd and 3rd years of life.

The 2002 survey report showed high levels of urinary iodine among the population and has indicated that this may be due to high environmental levels of iodine in water and soil. To investigate these concerns the iodine content in the water sources of all four camps was measured. The iodine concentrations of water samples collected from the various water sources ranged between 0.008 mg/L and 0.325 mg/L. Assuming 1 mg per person per day as the maximum allowed intake level, and a daily water intake higher than 1 litre per person per day only in the summer season, there is no concern for toxicity.

In terms of feeding practices, it was observed that 81% of the infants and young children less than 24 months of age had at some point received breast milk. 98% of these infants were breastfed “on demand”. The survey also determined that 27% of the infants under 6 months of age were exclusively breastfed and 12.7%. All other children were receiving combinations of full fat cow’s milk (UHT), fresh camel milk (19.7%), infant formula (53.9%) or reconstituted milk (3.9%) in addition to breast milk.
Water, milk, and other liquids other than breast milk were given to the majority (i.e. two thirds) of the children under 6 months. Tea, especially green tea, was also used in 2 % of the cases. Even semi-solid foods such as yoghurt, porridge, bread, pasta, rice and potatoes were introduced at this early stage, although only in 3.4% of the children.

At 6-9 months of age, Complementary Feeding had been started for 81.3% of the children. Bread, pasta, rice and potatoes were the most commonly consumed food group 47,3%, while vegetables were consumed by a very small proportion of the sample 1.8%.

An analysis of the ration food distribution records for 2004 shows that the mean number of food items distributed in the year was 4.7 with lower values during the months of February and September through to December. Flour, lentils and sugar were the only three food items regularly present in monthly distributions. Some food items (for example red lentils) were not even particularly appreciated by the population. It was also found that during the last year, buffer stocks had been systematically used for ordinary distribution but without replacement. As a result, no such buffer stocks currently exist for emergencies.

On a positive note, estimated coverage of the daily energy and macronutrient provided by the ration during 2004 was adequate in terms of energy and protein, with a yearly average of 102% and 132%, respectively. The amount of fat provided, however, was 81 % of the requirement, most probably due to the missing distribution in February and December.

The micronutrient and mineral content of the daily ration was not sufficient to meet the requirements of most individuals. Coverage is in fact only achieved for Thiamin and Niacin, mainly provided by cereals. Riboflavin, Vitamin C, Calcium, Iron and Vitamin A were all provided at extremely low levels, a direct result of not including animal protein, fresh fruits and vegetables, and fortified foods in the rations.

Data comparisons between 2002 and 2005 indicate that anaemia has remarkably increased in children and non-pregnant women, as has growth retardation, thus reversing the positive trend documented between 1997 and 2002. The decrease in dietary diversity and the interruption of the distribution of micronutrient fortified foods, not adequately replaced by alternative strategies, may be responsible for such effects.

Recommended actions include an improvement of the food basket for the general ration, blanket supplementary feeding for all children under 5 and for pregnant and childbearing women Agencies should improve case finding strategies for therapeutic feeding programmes for severely malnourished children and an establishment of nutrition monitoring systems for children under 5 and women of childbearing age.
Introduction

The harsh environmental conditions to which the Saharawi refugees have been exposed over 30 years, with which they have only partially been able to cope, in addition to, are creating major public health concern, particularly in individuals at risk, such as children and young women. A survey conducted in 1997 showed that high levels of micronutrient deficiencies (70% anaemia in children under 5 and 62% in women of fertile age) and growth retardation (46% stunting in children under 5) are a serious public health problem in Saharawi population (CISP and INN, 1997). The survey was since followed up by a series of recommended nutritional interventions, among which micronutrient enrichment of the general food ration as well as supplementation programmes targeting nutritionally at-risk population groups. Two nutrition surveys have been conducted to assess the extent to which these interventions have benefited the overall nutritional status of Saharawi refugees (CISP and INRAN, 2001 and ICH/UNHCR/WFP, 2002). Both surveys indicated a remarkable reduction of anaemia in both children and women in fertile age, as well as a small reduction in stunting. The positive impact of these interventions, in terms of care and prevention of nutrition related disease, with specific regard to anaemia and growth retardation, has also been documented by two papers (Lopriore and Branca, 2001, 2003). Since then, there have been changes to the implementation of the food aid programme and WFP and UNHCR decided to carry out a new nutrition survey in collaboration the relevant Saharawi Authorities. WFP contracted the INRAN to implement the survey, to compare the actual nutritional state to the 2002 situation. The preliminary survey report was issued in April 2005. This final report contains additional data from the laboratory analysis of biological samples, infant feeding and food distribution monitoring data collected during the survey.

Objectives

The general objectives of the survey are:

• to assess the magnitude and distribution of malnutrition and micronutrient deficiencies in the Saharawi refugee population;
• to evaluate the possible causes of the presence of such deficiencies;
• To draw recommendations on future nutritional interventions

The specific objectives of the quantitative survey are to determine the prevalence of the following conditions in the survey population:

• anaemia in 6-59 months old children (Hb<11 g/dL); in NP women (Hb<12 g/dL) and in P women (Hb<11 g/dL);
• iron deficiency (sTfr>8.5 mg/L, ferritin<12 μg/L) in children and women;
• acute (WHZ<-2) and chronic (HAZ <-2) malnutrition in 6-59 month-old children;
• to evaluate the prevalence of infection in children and women (serum C-Reactive protein >5mg/L
• to evaluate breastfeeding in 0-6 month-old infants;
• to evaluate infant feeding practices;

The specific objectives of the qualitative survey are:

• to evaluate household food availability;
• to evaluate the causes of anaemia
• to evaluate knowledge and attitudes of mothers towards on breastfeeding and infant feeding.
1. PART I - QUANTITATIVE SURVEY

METHODS

Sample

The survey was carried out on a representative sample of women and children living in the camps. The sample size was calculated using the following formula:

\[
n = \frac{z^2 \cdot p(1-p)}{m^2} \cdot \text{Deff}
\]

where:
- \( n \) = sample size
- \( z \) = standard normal deviate corresponding to \( \alpha = 0.05 \) (1.96)
- \( p \) = estimated population proportion of defined conditions
- \( m \) = expected precision (0.05)
- \( \text{Deff} \) = design effect (2)

The calculation of the sample size was based on the expected outcomes using estimates given in the 2002 survey. Since a cluster sample methodology was deemed appropriate to survey the area, a design effect of 2 was considered. All sample calculations are summarised in Table 1.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Expected prevalence ((p))</th>
<th>Expected precision ((m))</th>
<th>Sample size ((n))</th>
<th>(N + 10%) sample loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaemia in 15-49 year old non-pregnant women</td>
<td>0.48</td>
<td>0.05</td>
<td>768</td>
<td>845</td>
</tr>
<tr>
<td>Anaemia in 15-49 year old pregnant women</td>
<td>0.78</td>
<td>0.06</td>
<td>269</td>
<td>292</td>
</tr>
<tr>
<td>Anaemia 6-59 month old children</td>
<td>0.36</td>
<td>0.05</td>
<td>708</td>
<td>780</td>
</tr>
<tr>
<td>Weight-for-height &lt;-2 Z score 6-59 month old children</td>
<td>0.11</td>
<td>0.05</td>
<td>300</td>
<td>330</td>
</tr>
<tr>
<td>Height-for-Age &lt;-2 Z score 6-59 month old children</td>
<td>0.33</td>
<td>0.05</td>
<td>680</td>
<td>747</td>
</tr>
<tr>
<td>sTfR in 6-59 month old children</td>
<td>0.34</td>
<td>0.05</td>
<td>690</td>
<td>759</td>
</tr>
</tbody>
</table>

According to the survey 2001 there are 1.2 children under 5 years and 1.7 women of childbearing age (15-49 years) in each household, so that a sample of 650 households would be required to find a sufficient number of children and women. It was decided that the data would be collected in 30 clusters, each one including 22 households. Clusters were selected and allocated to Daira (the administrative units) using a Probability Proportional to the Size methodology (PPS).

Data collectors met Daira leaders and examined the list of households registered for food distribution. A systematic procedure was used to select twenty-five households from the overall list. For Dairas allocated two clusters the procedure was repeated twice. The selected
households were listed in a cluster control sheet. The teams then visited the individual households. Households with at least one child under 5 (0-59 months of age) or one woman of childbearing age (15-49 years) were included. If the household members had departed permanently or were expected to return only after the survey team’s departure from the wilaya, the household was skipped and not replaced. Time did not permit any re-visiting to locate absent family members. The sample of pregnant women was selected by systematic sampling from a list of pregnant women at different stages of the pregnancy prepared by the dispensary nurse. Teams visited these women independently from the main sample. This sample was identified as the Clinic Based Sample. Data on pregnant women, however, was also collected in the surveyed houses. This particular sample was thus labelled the Household Based sample and was merely used to compare the outcomes of the clinic based sample and to check for possible selection bias.

Field work and logistics
The survey was carried out by 7 teams each consisting of three members: a trained interviewer, a medical doctor and a laboratory technician. Each team had a leader who was responsible for the organisation of the team work, household selection, collection of data using the questionnaire and biological samples. All teams member were selected by the Ministry of Health of RASD. In addition, one data specialist was selected for data entry. Two UNHCR staff members and two WFP staff members were in charge of logistics. Two INRAN nutritionists were responsible for the supervision of cluster selection, interview techniques, measurement procedures, data entry, and biological sample collection. A 3-day training was conducted prior to the survey and was structured to cover all the aspects pertinent to the final survey. Theoretical sessions explained the background of malnutrition among the Saharawi, the objectives and the methodology of the survey, anthropometric techniques, interview technique and biological sample handling methods. Practical sessions were also conducted on the appropriate filling-in of the questionnaire, clinical examinations, anthropometric methods, haemoglobin measurements and capillary blood sampling. A pilot survey was conducted prior to the full survey during which the teams gained valuable experience on how to select households, use the questionnaire and collect samples. The actual survey was carried out in about 2 weeks [17th February to 3rd March].

Data collection

Anthropometry
Anthropometric measurements were taken for children 0-59 months old in each household. Weight was determined using an electronic digital scale (UNICEF cat. no. 01-410-15) measuring to the nearest 100 grams for children or the nearest 20 grams for infants. Children unable to stand were weighed with an adult and their weight determined as the difference between the combined weight and the adult’s weight. Standing height was measured to the nearest mm Infant-Child-Adult Height Board. Supine length was measured in children under 24 months using the same instrument. Mid upper arm circumference (MUAC) was measured using a TALC MUAC tape• to the nearest mm. Anthropometric measurement procedures were standardised using guidelines published by the United Nations (1989) and WHO (1995). Anthropometric measurements were converted into z scores of the three different indices (weight-for-height, height-for-age and weight-for-age) using the 1978 CDC/WHO growth

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reference curves. This calculation had been done with the same reference population of previous survey conducted in 1997, 2001 and 2002

**Biochemical assays**

In all children 6-59 months, as well as non-pregnant and pregnant women, capillary blood was collected to measure haemoglobin, ferritin, transferrin receptor, and C-reactive protein concentrations/levels. Medical staff included in the teams were extensively trained to obtain good capillary samples. The subjects were asked to sit down and relax, after which their middle finger (always on left hand) was gently massaged and then pricked with a sterile lancet. The first drop of blood was removed and the second one was collected by capillary action with a cuvette containing dry Drabkin reagent for haemoglobin analysis. Medical staff collected additional 300 µL blood in a tube (Microtainer) containing serum separator gel. The tube was labelled with the identification code of the subject and stored in a vaccine carrier at 4-8°C until centrifugation at the end of the day. Following centrifugation, the serum was frozen in the same tube and kept at a temperature ranging between -10 and -18°C. for three weeks, then transferred to -80°C and stored for six weeks

A field haemoglobin analyser (Hemocue™) was used to assess haemoglobin to the nearest 0.1 g/dL. Haemoglobinometers were checked several times a day with a control cuvette. The instruments were only used if the reading was within ±0.3 g/dL of the cuvette factory value.

The cut-off points used to define the different classes of anaemia are shown in Table 2

<table>
<thead>
<tr>
<th>Severity of anaemia</th>
<th>Pregnant women and children under 6 years</th>
<th>Non-pregnant women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>10.0-10.9</td>
<td>11.0-11.9</td>
</tr>
<tr>
<td>Moderate</td>
<td>7.0-9.9</td>
<td>8.0-10.9</td>
</tr>
<tr>
<td>Severe</td>
<td>&lt; 7.0</td>
<td>&lt; 8.0</td>
</tr>
</tbody>
</table>

In considering the public health significance of this indicator, WHO (2000) indicates that a prevalence of mild to severe anaemia of at least 40% should be considered “high”, a prevalence of 20-40% “medium” and a prevalence of less than 20% to 5% is “low”.

The assessment of iron status was performed by measuring serum ferritin and serum transferrin receptor concentrations/levels. Ferritin is an important iron-binding protein and its main function is iron storage. Low serum ferritin indicates low iron stores while elevated serum ferritin concentrations indicate iron overload conditions. Values lower than 12 µg/L indicate severe depletion of the body’s iron stores. However, serum ferritin is also an acute-phase reactant protein that is elevated in response to infection. In order to avoid false negative cases, C-reactive protein was also measured. When values of C-reactive protein were higher than 5 mg/L, ferritin values were not considered for the assessment of iron status as this suggested possible infection. The soluble transferrin receptor in serum (sTfR) seems to correlate well with the amount of receptor expressed at the cell membrane, which in turn reflects the cellular need for iron. sTfR increases with tissue iron deficiency and with increased erythropoiesis. It does not appear to be elevated by inflammatory diseases nor by infection. Values of sTfR greater than 8.5 mg/L have been considered indicative of poor iron status. Serum ferritin, C-reactive protein and sTfR have been measured using a simple ELISA procedure.

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3 Huebers HA et al, 1990
4 Cook et al, 1994
5 Ferguson BJ et al, 1992
6 Nielsen QI et al, 1994
commercially available control sample from BioRad was used to obtain a calibration curve on each plate. Serum from healthy subjects was used as a quality control in order to monitor accuracy and precision of the determinations.

**Collection of water for iodine analysis**
The 2002 survey report showed high levels of urinary iodine among the population and has indicated that this may be due to high environmental levels of iodine in water and soil. To investigate these concerns the iodine content in the water sources of all four camps was measured.

Each of the wilayas in the survey depended upon more than one source of water. A sample of water was taken from each water source of every wilaya and transferred to designated polyethylene tubes for subsequent analysis. Estimations of iodine were performed in Rome, in the laboratory of INRAN. Iodine was determined by a colorimetric method modified for microplate readings (IODINATE PROTEINS – PBI provided by ELVI Spa). Iodine concentration was determined manually through its catalytic role in the reduction of ceric ammonium sulphate in the presence of arsenious acid:\(^7\) After the addition of arsenious acid solution, ceric ammonium sulphate solution is added and the absorbance of yellow complex is read in a spectrophotometer at 405 nm. A calibration curve was generated by using 0, 0.375, 0.75, 1.5, 3.0, 6.0, 12.0 \(\mu\)g/l of a purified standard iodine solution. The concentration was calculated by extrapolating from this standard curve.

**Questionnaire**
The full questionnaire is provided in Annex 5.

**Infant feeding indicators**
The following definitions have been used:

<table>
<thead>
<tr>
<th>Timely Breastfeeding initiation rate</th>
<th>the percentage of infants/children &lt;24 months breastfed within the first 30 minutes after birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exclusive Breastfeeding rate</td>
<td>the percentage of infants/children &lt;6 months given only breast milk and no other foods or liquids, not even water, with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines</td>
</tr>
<tr>
<td>Continued Breastfeeding rate at 12 and 24 months</td>
<td>the percentage of infants/children aged 12-15 months or 16-23 months still breastfed</td>
</tr>
<tr>
<td>Timely Complimentary Feeding initiation rate</td>
<td>the percentage of children aged between 6 and 10 months given semi-solid foods in addition to breastmilk</td>
</tr>
<tr>
<td>Continued feeding during diarrhoea</td>
<td>the percentage of infants/children with three or more loose or watery stools in a 24-hour period in whom feeding was not discontinued</td>
</tr>
</tbody>
</table>

---

DATA MANAGEMENT

Data entry and data cleaning
Questionnaire data was entered and recorded daily through specifically designed Access software. Laboratory data was entered in an Excel spreadsheet. Double data entry was performed for the questionnaire data and laboratory data to check data entry errors. Data sets were checked to identify values in the following ranges: haemoglobin (g/dL): <2 and >20; height-for-age, weight-for-age and weight-for-height: Z-score >4 and <-4 once detected these values were recoded as missing. The ‘don’t know’ and missing answers were lumped into one category.

Data analysis
Data analysis was carried out on using Epi6 and STATISTICA (StatSoft 1995™) for Windows software packages. Cross tabulations were produced for all variables in the data set in order to examine results by age and sex. Continuous variables (e.g. Haemoglobin, Weight-for-Height, Height-for-Age, Weight-for-Age,) were then transformed into categories and cross tabulations were produced. Confidence Intervals of proportions were calculated using Epi6 Cluster Sampling Analysis (CSAMPLE). In these calculations the “design effect” was also considered.

Limitations
It was not possible to reach the target sample for pregnant women since the estimated prevalence rate was less precise than expected. Another constrains has been the analysis of the mortality rate because of the difficulty involved in collecting information on the age and sex of the dead.
2 RESULTS

Study population

Table 3 shows the number of subjects for which information was obtained relative to each one of the main indicators, compared to the number expected.

### Table 3 – Actual sample size for main indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Subjects interviewed</th>
<th>Subjects measured</th>
<th>Target (n)</th>
<th>Target (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaemia in 15-49 year non-pregnant women</td>
<td>799</td>
<td>772</td>
<td>768</td>
<td>100</td>
</tr>
<tr>
<td>Anaemia in 15-49 year pregnant women (Community-based sample)</td>
<td>118</td>
<td>116</td>
<td>269</td>
<td>43</td>
</tr>
<tr>
<td>Anaemia in 15-49 year old pregnant women (Household-based sample)</td>
<td>150</td>
<td>148</td>
<td>269</td>
<td>55</td>
</tr>
<tr>
<td>Anaemia in 6-59 month children</td>
<td>793</td>
<td>758</td>
<td>708</td>
<td>107</td>
</tr>
<tr>
<td>Weight-for-height &lt;-2 Z score 6-59 month children</td>
<td>793</td>
<td>785</td>
<td>300</td>
<td>262</td>
</tr>
<tr>
<td>Height-for-Age &lt;-2 Z score 6-59 month children</td>
<td>793</td>
<td>785</td>
<td>680</td>
<td>115</td>
</tr>
<tr>
<td>sTfR in 6-59 month o children</td>
<td>793</td>
<td>613</td>
<td>690</td>
<td>89</td>
</tr>
</tbody>
</table>

Twenty-seven cases (3.5%) of non-pregnant women, two cases (1.7%) of pregnant women from the Community-based sample and two cases (1.3%) of pregnant women from the Household-based sample did not agree to provide blood samples.

With regard to children, 35 cases (4.4%) had no Hb measurement, 8 cases (1.0%) had no anthropometric measurement and 180 cases (22.7%) had no sTfR measurement. These omissions resulted from either the caretaker’s refusal to allow the measurement procedures or the size of the sample being too small.

Data for pregnant women was considered separately for those women who were selected through the dispensaries (Community-based) and those who were identified in the households (Household-based). The Household-based sample did not select a sufficient number of women. In fact, not all pregnant women located in the households were recorded in the dispensary list (63.6%).

Table 4 describes the age and gender composition of the population that was finally included in the survey.
The final number of households surveyed was 629 and 21 (3%) were absent or not eligible to participate. The average number (± SD) of household members was 6.3 (± 2.7). Households included in the survey had, on average, more then one child under 5 (1.4±0.7) and 1.8 (±1.1) women of fertile age (15-49 years). The Crude Mortality Rate was 1.1 per 10000 per month

**Women of childbearing age (15-49 years)**

The mean age of the women interviewed was 30.3±9.0. Sixty-three per cent of these were married and 4.5% were divorced. 12.3 % were illiterate, 38.8% had a primary education and 42.0% had a secondary education. 6.3 % of the women had short-term university degrees and only 0.6% had full-term university degrees. Women had on average 3.2±3.2 pregnancies and 0.5±1.2 abortions or miscarriages.

**Anaemia and iron deficiency**

The prevalence and the severity of anaemia in women (non pregnant and pregnant) of childbearing age (15-49 years) are shown in table 5. Out of 772 non pregnant women tested for anaemia 66.4 % (95% C.I. 60.5-72.3) were anaemic (<12 g/dL). The mean haemoglobin level (± SD) was 10.7 ± 2.3 g/dL. Out of 116 pregnant women included in the Community-based sample and 148 pregnant women included in the Household-based sample, 80.2% (95% C.I. 72.2-88.2) and 73.6% (95% C.I. 66.6-80.7) were anaemic (<11 g/dL), respectively.

**Table 4 – Age and gender characteristics of the surveyed population**

<table>
<thead>
<tr>
<th>Population Group</th>
<th>Age Range</th>
<th>N</th>
<th>Mean Sample</th>
<th>Median</th>
<th>% Male</th>
<th>% Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants</td>
<td>0-5 months</td>
<td>91</td>
<td>3.0 m</td>
<td>2.9 m</td>
<td>50.5</td>
<td>49.5</td>
</tr>
<tr>
<td>Children</td>
<td>6-59 months</td>
<td>793</td>
<td>33 m</td>
<td>32 m</td>
<td>52.7</td>
<td>47.3</td>
</tr>
<tr>
<td>Non-pregnant Women</td>
<td>15-49 years</td>
<td>799</td>
<td>30.3 y</td>
<td>30 y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pregnant Women (Community-based)</td>
<td>15-49 years</td>
<td>118</td>
<td>29.8 y</td>
<td>29.5 y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pregnant Women (Household-based)</td>
<td>15-49 years</td>
<td>150</td>
<td>31.7 y</td>
<td>32.0 y</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>Anaemia (95% C.I.)</th>
<th>Severe Anaemia (95% C.I.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>non-pregnant women 15-49 years</td>
<td>513 (66.4 (60.5-72.3))</td>
<td>100 (12.9 (10.1-15.7))</td>
</tr>
<tr>
<td>pregnant women 15-49 years (Community-based sample)</td>
<td>93 (80.2 (72.2-88.2))</td>
<td>6 (5.2 (1.4-9.0))</td>
</tr>
<tr>
<td>pregnant women 15-49 years (Household-based sample)</td>
<td>109 (73.6 (66.6-80.7))</td>
<td>13 (8.8 (4.0-13.6))</td>
</tr>
<tr>
<td>pregnant women Total</td>
<td>202 (76.5 (71.3-81.7))</td>
<td>19 (7.2 (3.9-10.5))</td>
</tr>
</tbody>
</table>
The prevalence of anaemia in non pregnant women has remarkably increased since the last survey conducted in 2002, where total anaemia was 47.6 % (95% C.I. 38.6-56.5) and cases of severe anaemia less than three times the present value (Figure 1).

The presence of an acute infection (serum C-Reactive Protein > 5 mg/L) was observed in 43.5% (C.I 37.0-49.9) of non-pregnant women, in 43.9% (C.I 31.2-56.6) of pregnant women in the Community based sample and 47.1% (38.1-56.1) of pregnant women in the Household-based sample. In non-pregnant women with serum C-Reactive Protein ≤ 5 mg/L the mean of serum ferritin concentrations was 14.9±22.2. In pregnant women of the Community based sample mean serum ferritin was 14.6±21.9. In pregnant women of the Household-based sample mean serum ferritin was 19.3±24.0. Using a 12 mg/L cut-off, 54.6% (C.I 46.2-63.0) of the non-pregnant women, 64.0 % (C.I 49.5-78.5) of the pregnant women in the Community based sample and 60.0% (C.I 41.1-78.9) of the pregnant women in the Household-based sample had low ferritin values.

The level of iron deficiency in non-pregnant women was 58.5 % (C.I. 53.3-63.7); in pregnant women of the Community based sample it was 56.9% (C.I. 48.0-65.8) and in pregnant women of the Household-based sample it was 66.0% (C.I 53.4-78.7) as determined by measurement of sTfR..
Table 6 shows the prevalence of iron deficiency in non-pregnant women 15-49 year

<table>
<thead>
<tr>
<th>N</th>
<th>Mean ± SD</th>
<th>% Iron deficiency&lt;sup&gt;a&lt;/sup&gt; (95% C.I.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non anaemic</td>
<td>201</td>
<td>11.4±9.7</td>
</tr>
<tr>
<td>Mild anaemia</td>
<td>150</td>
<td>11.6±7.5</td>
</tr>
<tr>
<td>Moderate anaemia</td>
<td>161</td>
<td>13.7±10.9</td>
</tr>
<tr>
<td>Severe anaemia</td>
<td>80</td>
<td>21.8±20.7</td>
</tr>
<tr>
<td>All</td>
<td>592</td>
<td>13.5±12.2</td>
</tr>
</tbody>
</table>

<sup>a</sup> TfR > 8.5 µg/mL

Children

**Anthropometry**

*Children 0-59 months*

Anthropometric measurements were collected in 785 children. The analyses for the global acute and chronic malnutrition were performed on 772 children excluding 13 cases (1.6%) which did not meet the standard EpiInfo flag criteria. For underweight assessments, 12 cases (1.5%) were excluded.

The prevalence of global acute malnutrition (wasting) was 7.7% (95% C.I. 4.1-11.2); severe acute malnutrition was 2.3% (95% C.I. 0.7-4.0). Figure 2 shows the distribution of weight-for-height Z-score. The entire curve for the survey sample is moved to the left relative to that of the reference population. The prevalence of acute malnutrition in boys (8.6%) is not statistically different from that found in girls (6.6%).
The prevalence of chronic malnutrition (stunting) was 39.1% (95% C.I. 34.4-43.8) while severe chronic malnutrition was 15.6% (95% C.I. 12.2-19.6). The mean value of HAZ was -1.62±1.51. There was a significant difference in mean HAZ between boys and girls (-1.78±1.50 and -1.44±1.52, respectively) as showed in Figure 3.

Underweight was present in 28.8% of the children (95% C.I. 22.3-35.3.) and it was mainly due to stunting (Figure 4). The average MUAC in children 6-59 months old was 14.3±1.5.

A comparison of the prevalence of wasting and stunting between present and previous surveys is shown in Figure 5. It is clear that overall, global acute malnutrition decreased, while the level of severe malnutrition remained the same. Chronic malnutrition decreased in 2001 and 2002 but then increased again in 2005, both in the moderate and severe form.
**Anaemia and iron deficiency**

Out of 758 6-59 month old children tested 68.5 % (95% C.I. 64.4-72.5) were anaemic (<11 g/dL). The mean haemoglobin level (SD) was 9.9 ± 1.9 g/dL. **Table 7** shows the prevalence of different forms of anaemia by age class.

**Table 7 – Prevalence (%) of anaemia in 6-59 month old children by age class**

<table>
<thead>
<tr>
<th>Age class (months)</th>
<th>Total Anaemia (95% C.I.)</th>
<th>Severe Anaemia (95% C.I.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-12</td>
<td>47 (67.1) (57.0-77.3)</td>
<td>3 (4.3) (0-8.7)</td>
</tr>
<tr>
<td>13-24</td>
<td>162 (88.4) (83.1-94.0)</td>
<td>18 (9.8) (6.3-13.3)</td>
</tr>
<tr>
<td>25-36</td>
<td>136 (81.3) (76.1-86.8)</td>
<td>24 (14.3) (8.9-19.9)</td>
</tr>
<tr>
<td>37-48</td>
<td>94 (62.7) (54.4-70.9)</td>
<td>9 (6.0) (1.2-10.8)</td>
</tr>
<tr>
<td>49-60</td>
<td>80 (42.5) (34.2-50.9)</td>
<td>3 (1.6) (0-3.4)</td>
</tr>
<tr>
<td>Total</td>
<td>519 (68.5) (64.4-72.5)</td>
<td>57 (7.5) (5.4-9.7)</td>
</tr>
</tbody>
</table>

The prevalence of anaemia was higher in the 2nd and 3rd years of life (88.4% and 81.3%, respectively) and decreased to less than half in older children (42.5 % at 5 years of age). Boys...
and girls were equally affected with 71.0% (95% C.I. 65.9-76.5) and 65.8% (95% C.I. 59.9-71.0) being anaemic, respectively. As one can see from Fig. 6, the prevalence of anaemia has doubled since 2002, when it was 35% (95% C.I. 26.7-43.9). The level observed in 2005 was the same as the level described in 1997 (Figure 6).

The prevalence of high values of CRP was 31.4% (95% C.I. 25.9-37.0) and in children with serum C-Reactive Protein ≤ 5 mg/L the prevalence of low ferritin values (<12 mg/L) was 59.2% (95% C.I. 51.4-66.9). With such a large prevalence of high CRP values, the prevalence of elevated sTfR is a better estimate of iron deficiency. The mean sTfR was 12.8 ± 9.8 µg/mL and the proportion of elevated values sTfR (> 8.5 µg/ml) was 62.3% (95% C.I. 55.5-69.1). Table 8 shows the mean value of sTfR for different age groups. As for anaemia, the prevalence of iron deficiency was highest in the 2nd and 3rd year of life (65.3% and 66.7% respectively).

Table 8 – Iron deficiency assessed by sTfR levels (µg/mL) in different age groups

<table>
<thead>
<tr>
<th>Age (months)</th>
<th>N</th>
<th>Mean ±SD</th>
<th>% Iron deficiencya (95% C.I.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-12</td>
<td>60</td>
<td>13.1±8.9</td>
<td>60.0 (44.2-75.8)</td>
</tr>
<tr>
<td>13-24</td>
<td>144</td>
<td>13.9±10.0</td>
<td>65.3 (56.0-74.4)</td>
</tr>
<tr>
<td>25-36</td>
<td>138</td>
<td>14.3±11.7</td>
<td>66.7 (58.2-75.0)</td>
</tr>
<tr>
<td>37-48</td>
<td>127</td>
<td>12.6±9.7</td>
<td>59.8 (48.1-71.6)</td>
</tr>
<tr>
<td>49-60</td>
<td>144</td>
<td>10.9±7.9</td>
<td>58.3 (47.5-69.1)</td>
</tr>
<tr>
<td>total</td>
<td>613</td>
<td>12.8±9.8</td>
<td>62.3 (55.5-69.1)</td>
</tr>
</tbody>
</table>

a sTfR > 8.5 µg/mL

As was observed with the women, iron deficiency was a major cause of anaemia in children. Iron deficiency (elevated sTfR) was present in 67.3% (C.I. 58.5-76.0) and 78.4% (C.I. 66.8-90.0) of the children with moderate and severe anaemia, respectively, and in 59.9% (C.I. 49.6-
70.1) and 54.2% (C.I 45.4-63.0) for the children with mild anaemia and normal haemoglobins levels, respectively (Table 9).

Table 9 – Prevalence of iron deficiency in 6-59 month old children

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean ± SD</th>
<th>% Iron deficiency a (95% C.I.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not anaemic</td>
<td>103</td>
<td>10.4±7.4</td>
<td>54.2 (45.4-63.0)</td>
</tr>
<tr>
<td>Mild anaemia</td>
<td>91</td>
<td>10.9±7.1</td>
<td>59.9 (49.6-70.1)</td>
</tr>
<tr>
<td>Moderate anaemia</td>
<td>148</td>
<td>14.2±9.6</td>
<td>67.3 (58.5-76.0)</td>
</tr>
<tr>
<td>Severe anaemia</td>
<td>40</td>
<td>21.7±16.9</td>
<td>78.4 (66.8-90.0)</td>
</tr>
<tr>
<td>All</td>
<td>382</td>
<td>17.6±9.4</td>
<td>62.3 (55.5-69.1)</td>
</tr>
</tbody>
</table>

a sTfR > 8.5 µg/mL

Birth weight
Birth weight was not reported in 65.6% of the cases because the card reporting birth weight was seldom available. The mean (±SD) birth weight was 2.7 ± 0.4 kg and the prevalence of low birth weight (< 2500 g) was 21.7 % (C.I. 17.0-26.0). The correlation between weight for height z-score and height for age z-score for birth weight was quite poor, as indicated by the respective correlation coefficients of 0.2 and 0.1.

Morbidity
The prevalence of diarrhoea (more than three loose stools a day) was 8.1% (C.I 88.8-94.4) for children in the two weeks prior to the survey. The use of soup in cases of diarrhoea 38.1% (C.I 26.5-49.6) was higher than the use of water and maternal milk 25.4% (C.I 16.4-34.3) and 21% (C.I 10.7-31.2) respectively.

Feding practices among children
Table 10 summarises the main results concerning infant feeding indicators. Four infant feeding practices have been listed: breastfeeding, complementary feeding, feeding during diarrhoea and bottle-feeding.
Table 10: Infant and young child feeding practice indicators

<table>
<thead>
<tr>
<th>Feeding practice</th>
<th>Age range (months)</th>
<th>Sample (n)</th>
<th>Prevalence (%)</th>
<th>95% C.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Breastfeeding (BF)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breastfed in the last 24h</td>
<td>0-23</td>
<td>341</td>
<td>81.2</td>
<td>76.5-85.9</td>
</tr>
<tr>
<td>Never breastfed rate</td>
<td>0-23</td>
<td>350</td>
<td>4.6</td>
<td>1.7-7.5</td>
</tr>
<tr>
<td>Timely(^1) BF initiation rate</td>
<td>0-23</td>
<td>347</td>
<td>17.3</td>
<td>8.8-25.8</td>
</tr>
<tr>
<td>Exclusive BF rate</td>
<td>0-5</td>
<td>79</td>
<td>26.6</td>
<td>16.4-36.7</td>
</tr>
<tr>
<td>Predominant BF rate</td>
<td>0-5</td>
<td>79</td>
<td>12.7</td>
<td>4.1-21.2</td>
</tr>
<tr>
<td>Continued BF rate at 12 months</td>
<td>12-15</td>
<td>57</td>
<td>89.5</td>
<td>81.8-97.1</td>
</tr>
<tr>
<td>Continued(^2) BF rate at 24 months</td>
<td>16-23</td>
<td>64</td>
<td>45.3</td>
<td>31.9-58.7</td>
</tr>
<tr>
<td><strong>On demand</strong></td>
<td>0-23</td>
<td>270</td>
<td>98.1</td>
<td>96.6-99.7</td>
</tr>
<tr>
<td><strong>Complementary feeding (CF)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timely CF initiation rate</td>
<td>6-9</td>
<td>48</td>
<td>81.3</td>
<td>69.9-92.6</td>
</tr>
<tr>
<td><strong>Feeding during diarrhoea</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continued feeding during diarrhoea</td>
<td>0-23</td>
<td>362</td>
<td>15.8</td>
<td>11.0-20.5</td>
</tr>
<tr>
<td><strong>Use of feeding bottle</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottle-fed rate</td>
<td>0-23</td>
<td>339</td>
<td>19.5</td>
<td>14.8-24.0</td>
</tr>
</tbody>
</table>

Five per cent (C.I. 1.7-7.5) of the children under 24 months had never received breast milk, while 81.2% had received breast milk in the last 24 hours. Figure 7 shows the various times of initiation of breastfeeding after birth for children under 24 months. It can be observed that 17% of the newborns were breastfeeding within 30 minutes of delivery.

Figure 7 - Time of initiation of breastfeeding after birth

Eighty-one per cent (C.I. 76.5-85.9%) of infant and young children aged <24 months had received breast milk and 98% of them had been breastfed “on demand”. In infants under 6 months, 26.6% were exclusively breastfed and 12.7% were predominantly breastfed. All other children were receiving combinations of full fat cow’s milk (UHT), fresh camel milk (19.7%), infant formula (53.9%) or reconstituted milk (3.9%) in addition to breastmilk. Even semi-solid foods were introduced at this early stage: yoghurt 3.4% (C.I. 0.0-7.3), porridge 3.4% (C.I. 0.0-10.1) and bread, pasta, rice and potatoes 3.4% (C.I. 0.0-7.2) (Figure 8).
Continued breastfeeding at 12 months was practiced for 89.5% of the children, while that at 24 months was practiced for 45.3% of the children. 19% of infants/children had been bottle-fed. Complementary Feeding (CF) had been initiated for 81.3% of the children 6-9 months old, as was recommended\(^8\). Figure 9 shows the proportion of children who consumed foods other than milk at age 6-9 months. The bread, pasta, rice and potatoes food group was the most frequently consumed 47.3% (C.I. 29.4-65.1) while the vegetables group was the least frequently consumed 1.8% (C.I. 0.0-5.5).

---

\(^8\) Guiding principles for complementary feeding of the breastfed child, PAHO/WHO, 2002, Washington, DC
Milk is the most common complementary food item. Figure 10 shows the consumption of different kinds of milk by children aged 0-23 months. As can be observed, a very high proportion of infants consume infant formula. The origin of this product, however, is unclear since it does not appear in any of the food delivery records. Fresh milk is usually diluted. This happened in 87.5% of the infants aged 0-6 months; 94.3% of the children aged 6-12 months and 93.9% of the children aged 12-23 months.

In addition, tea was given to 2% of infants aged 0-6 months, 10.8% of children aged 6-12 months and 40.7% of children aged 12-24 months.

The number of food items consumed daily was 3.5±2.2 for children aged 6-8 months, 3.9±2.1 for children aged 9-11 months and 5.7±2.9 for children aged 12-23 months (Figure 11).

Dietary Diversity is a better measure of the nutritional quality of the children’s diet. It reflects the number of different food groups rather than individual food items consumed. For the purpose of this survey a set of 6 food groups has been used: grains, other cereal products, starchy foods; fruits and vegetables; meat, poultry, fish, seafood; eggs; pulses and legumes;
milk and milk products. A low score was observed for most of the children, indicating that most of the foods consumed were part of the same food group (Figure 12).

Figure 12 - Dietary Diversity

![Dietary Diversity Diagram]

- 6-<9 m
- 9-<12 m
- 12-<24 m

% Children

- 0
- 1
- 2
- 3
- 4
- 5

Month of age
Iodine content of water

The water sources in the Saharawi camps are coming from three boreholes drilled far from the camps: one positioned near El Ajun, one in Rabuni and another one in Dakhla. El Ajun and Ausserd receive water from the different boreholes, Smara from Rabuni and Dakhla is served by its own source. In this system, water for drinking and domestic use is available in all the camps. The trucks carry water to the camps to be stored in tanks that serve the various neighbourhoods in each sub-district. An aqueduct also brings water to the wilaya. Two samples of water (tank and aqueduct) were collected from each wilaya except for Smara, where only tank water was collected. Table 11 shows the concentrations of iodine in the water samples.

Table 11 – Iodine content (µg/L) in water collected from different sources

<table>
<thead>
<tr>
<th></th>
<th>Smara</th>
<th>Ausserd</th>
<th>El-Ajun</th>
<th>Dakhla</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aqueduct</td>
<td>-</td>
<td>325.2</td>
<td>292.8</td>
<td>8.3</td>
</tr>
<tr>
<td>Tank</td>
<td>25.7</td>
<td>319.7</td>
<td>294.7</td>
<td>20.0</td>
</tr>
</tbody>
</table>

The iodine concentrations of the water samples collected was between 8.3 and 325 µg/L (0.0083 and 0.325 mg/L). This value can be compared with that of areas considered iodine sufficient, such as the U.S.A, that indicate 4 µg/L.\(^9\)

In the summer season the consume of drinking water can be higher than 1 litre per person per day and the daily iodine intake can reach 1 mg per day per person. Assuming 1mg as the maximum allowed intake level, there is no concern for toxicity, provided that no iodine is added to fortified foods.

PART II - QUALITATIVE DATA SURVEY

In order to provide reasonable and feasible recommendations, a qualitative survey was performed for the design of a conceptual framework on underlying causes of anaemia.

METHODS

Meetings
Formal and informal meetings and interviewing with local authority (SRC, ARC, Saharawi Ministry of Health) representatives, and UN Organizations (WFP, UNHCR) representatives.

Observations
Observation of living conditions and informal interviewing with local population were organized during field work. Four small food market surveys were also performed for each wilaya surveyed, in order to understand household food accessibility and availability.

Focus groups
A particular attention has been given to the performance of formal focus group discussions, a valuable research method aimed to provide a greater understanding of community people beliefs, practices and behaviours on selected topics.

Two focus group discussions have been conducted in two of the four surveyed wilayas, Aousserd and Smara, on 20th February and on 2nd March, respectively.

During the early planning and training stage of the survey in field, components of focus group sessions were chosen in the community and among field staff, with the joint support of Saharawi Health Minister representatives, field staff and dispensary heads, who also arranged the meetings and contacted key-informants. The latter ones were mothers, fertile-age women without children, and dispensary health workers selected according to the discussion group objectives and with a similar background. Collecting local people points of view concerning development, treatment and control of anaemia was the aim of the selection.

The group leader (moderator) and the note-taker of the focus group discussions were selected according to the role they had to play. They were local physicians and health workers with a good knowledge of the community and of the emergency health problems. They also were native language and Spanish speakers, such that good communication with key-informants and the observers has ensured.

Before each focus group session, the group leader and the note-takers were trained on the questions by INRAN supervisors involved in the discussion sessions as observers. A list of open-ended questions that the focus group meetings had to address were discussed.

After each focus group session, a debriefing session took place in the field in presence of the group leader, the note-taker and the observers, in order to expand notes and check their accuracy.

The focus group sessions took place in dispensary buildings. Focus group participants in Aousserd and Smara were as follows:

- one group leader (the moderator); a field staff physician, the same one for the two sessions;
- one record keepers. In Aousserd she was a field staff physician who also interacts with the group leader for the session moderation. She spoke both local Arabic language (with the key-informants and group leader) and Spanish (with the survey supervisors). In Smara the record keepers was the dispensary head, local Arabic language speaking;
- two observers, always represented by the INRAN staff;
- key informants. In Aousserd, the announcement of a focus group was probably seen as an entertaining event and a large group of 30 women convened for the session. It was impossible to record personal data of key-informants and the discussion management.
was very difficult. In Smara key informants were limited to 6: four (mean age 33) mothers (3 married and 1 divorced), two women not married with no kids (mean age 24) one of which was also a dispensary health worker;
Both focus group discussions were conducted in local Arabic language following a previously focused question line. The open-ended questions were structured according to the following selected topics:
1- infant feeding practices with particular regard to breastfeeding (timely initiation, duration, knowledge about colostrum) and complementary feeding (timely initiation, ‘traditional’ complementary food);
2- knowledge of anaemia and perception of its effects on health status.
Discussions were aimed to explore awareness, opinions, perceptions and ‘suspicions’ of key informants about the focused issues, but also Saharawi traditional beliefs and practices which might influence the prevalence, treatment and control of anaemia.
The information collected by focus group discussion, observation, informal meetings and interviewing were grouped in the following topics.
Food availability and access
The household capacity to access and produce food has been investigated in order to understand the level of self-sufficiency of Saharawi population about this matter. Observations and interviewing were aimed at the following point:
- food aid: characteristics and adequacy of current distribution and changes occurred in the last years;
Infant feeding practices and population food patterns
Information about infant feeding practices and behaviours have been collected for a better understanding of social factors, ideas and beliefs, food-related practices and behaviours which might influence the prevalence and the course of anaemia among children and women in fertile age. Observations and question-line were aimed to collect remarks about:
- breastfeeding practices;
- complementary feeding: initiation and food choices;
- general influences on food patterns;
- perception of anaemia, diagnosis and treatment of the disease.

4 RESULTS

Food aid
Information on food aid has been provided by ARC about all commodities supplied by the United Nations organizations, ECHO, bilateral donors and some NGOs. Seven items were provided during the basic food distribution in 2004: flour, lentils, rice, pasta, soy flour, sugar and oil, but not every month. The mean number of food basket items distributed in the year has been 4,7, with lower values during the months of February and September-December and higher values during the rest of the year. Flour, lentils and sugar were the only three food items present in each monthly distribution. Oil was also distributed with every food basket, save for the months of February and December. There was not a compensative increase of the ration in later distribution whenever an item where missing from the basket. Fresh and animal products were lacking entirely.
In 2004 the diet was adequate in terms of energy and protein, with a yearly average of 102% and 132%, respectively. The amount of fat, however, only provided 81% of the minimum requirement, due to the missed distributions in February and December. Cereals and legumes were the main energy source of the ration, while oil and total fat, on average, accounted for 10.4% and 13%, respectively, the latter being lower than recommended (17%).
In terms of the micronutrient content of the daily ration, there was an overall failure to meet specific micronutrient requirements. Minimum requirements were achieved for Thiamin and Niacin, both of which are mainly provided by cereals. Riboflavin, Vitamin C, Calcium, Iron
and Vitamin A, on the other hand, were not sufficient, and this can be attributed to a lack of animal protein, fresh fruits and vegetables, and fortified foods in the ration. Such inadequate micronutrient coverage was reported all year long. Iodine was also relatively low but due to the presence of high iodine concentrations in drinking water, this was not considered a problem. Calculating the nutrient composition of the average ration may have been slightly inaccurate, as detailed data on the nutrient composition of the individual food items distributed was and is not available.

In addition, the items provided might still not cover energy and nutrient needs of young children. The food items provided are also quite bulky, which make the preparation of complementary foods with adequate energy and nutrient density difficult.

The following additional points should be made:
- As reported by the Algerian Red Crescent representative in Tindouf, most of the buffer stocks have been systematically used for general distribution during the course of last year, without any replacement. This means that an emergency distribution may not be possible if needed;
- Saharawi people questioned the quality and palatability of certain food items distributed. Red lentils, which were distributed in the last few months, were particularly disliked by the beneficiaries, who lamented about the difficulty of preparation and the unsuitable taste.
- For at least two years, the distribution of micronutrient fortified foods implemented by ECHO for the prevention and control of stunting and anaemia has been interrupted. No official reason has been provided, and no replacements have been made;
- Local inhabitants and health workers informed about occasional provision of food commodities from private initiatives or other NGOs. The absence of control systems for the rationalization and monitoring of these food distributions impede the proper understanding of the nutritional adequacy of the Saharawi diet;
- The lack of accurate figures concerning the real number of beneficiaries makes it very difficult to plan actions, and for this reason, some foods remain unused while others are simply lacking. More than once has a special food distribution been performed because of rapidly approaching expiry dates on certain commodities.

Infant feeding practices and population food patterns

Breastfeeding practices
Information about timely initiation and duration of breastfeeding was collected, with particular focus to manner and place of giving birth (home or hospital), perception of colostrum, willingness to breastfeed, information received about importance of breastfeeding, cultural and religious convictions about this matter. According to what health worker referred, all women might be trained, monitored and educated during pregnancy and assisted during delivery and after that, since a pregnant women assistance service was available at the hospital and at the dispensary level. This is probably because mothers and women in general seemed to know the meaning and the importance of colostrum and breastfeeding, and the importance to start it as soon as possible. Nevertheless, the rate of home deliveries was still high. As referred by health workers, the main problem was probably caused by the mistrust and fear of people for ‘contaminations’ and infections in hospitals. This perception led women to give birth in their tents with any available kind of medical assistance.

Mothers referred to breastfeed their babies early after birth and to continue breastfeeding ‘on demand’ usually even beyond 2 years of age. Mothers used to give their breast to children above the age of 2 to calm wailing and crying and to get sleep, as well. A ‘permanent’ lactation due to repeated close pregnancies, made this practice easier to be followed. Mothers referred to exclusively or predominantly breastfeed infants during their first four/six months of age. Mothers also referred to get to give infants and children as much water to drink as possible, during hotter seasons. In general, women don’t follow hygienic practices (i.e. breast
nipple cleaning or hand washing) before infants’ breastfeeding. The use of bottle seemed not to be so common for infant feeding.

**Complementary feeding: initiation and food choices**

According to Saharawi cultural tradition breastfeeding seems to remain exclusive or predominant until the 4th month of age when complementary feeding start and breastfeeding becomes continued ‘on demand’. At present women and health workers referred a ‘new generation’ postponement of complementary feeding initiation until the 6th month of age. The complementary foods introduced earliest, seems to be yoghurt and fresh milk (usually cow’s milk), sometimes water diluted. Camel milk seems to be used especially when illness occurs including anaemia. It is clearly considered a fortifying food. Women also referred the use of powder milk during hot seasons because of the lack of a refrigeration systems.

Although milk and dairy products represent a very good source of proteins and minerals they may also be a cause of intestinal microhemorrhages if introduced too and may be a source of bacteria infection as a result of poor storing condition, occur especially during the hottest seasons.

According to Saharawi cultural tradition, a typical complementary food is a mushy soup prepared with dates and camel fat or, more usual at present, vegetable oil or milk and mothers usually feed their babies with this pap with a finger.

Mothers referred to introduce animal foods such as eggs, meat (especially camel’s) and fish quite late (beyond 1 year) unless the child was ill. Fruits and vegetables are also introduced quite late (around 2 years), and are rarely present in the traditional food patterns of the Saharawi. A traditional and typical food would be fish but unfortunately fresh fish was not an option in the camps. Pulses seemed to be introduced quite early (by the first year of age) mixed with cereal foods and/or with potatoes.

Another interesting finding concerns the daily distribution of the meals. A meal frequency of two/three times per day was referred, with a ‘main’ cereal based meal at noon, an afternoon snack with bread and/or milk and an evening meal that was often consumed the day after for breakfast. It is quite easy to understand how this practice may result dangerous during hotter seasons, in absence of suitable food storage facilities.

In general, an inadequate feeding frequency seemed to be usual especially for younger children who would need less food more frequently.

With particular regard to anaemia, mothers have been also asked about the time of introduction of typical Saharawi tea in the diet of children. They referred a late introduction of this very common drink, around 5th year of age and only once a day (generally after waking up in the morning). However, this may be the age at which a child is entitled to his/her own glass, but small amounts are also given to younger children.

In general, mothers referred to take care and feed their own children themselves. However, when more than one child is attending meal, women are probably not able to ensure a responsive feeding. Anyway, on the base of a matriarchal framework society, the management and taking care of children remain women’s property for Saharawi.

**General influences on food patterns**

Food patterns that might negatively affect health were investigated. Islam guides food choices but not in a way that may causes a health risk.

A well known Saharawi traditional behaviour is the consummation of traditional tea, very high in tannins which may reduce the absorption of iron and other metals. Saharawi tea is also used with abundant sugar leading to excess intake and related health consequences, such as increased risk of overweight and type II diabetes, as well as dental caries.

It is common belief that food should be provided in a larger amount to sick children and elderly, particularly animal foods such as camel meat and milk.
Women also consider advisable to eat more meat and pulses to treat anaemia. However, this is seldom possible, because there are not enough resources to provide such additional foods to the whole family and feeding just one person is not considered acceptable.

Perception of anaemia, diagnosis and treatment of the disease.
The hospital of each wilaya has a programme of assistance for pregnant women and young children, Niños Sano Programme. The programme provides mothers with handbooks and basic training on health, nutrition and food-safety. The Ministry of Health provides to the mother a newborn personal health card on which all data concerning delivery, vaccinations, and any kind of health problem is recorded. The card also contains growth charts - weight-for-age (0-36 months and 2-18 years), weight-for-height, height-for-age (0-24 months and 2-18 years), head circumference (0-24 months), recommendations about breastfeeding, timely complementary feeding initiation (with examples of proper complementary foods), as well as indications for basic hygienic practices both for mothers and children. Heads of dispensaries referred that all mothers, during pregnancy, are informed by health staff about causes, symptoms and treatment of anaemia. Women also received information in broadcasts.

Mothers consider anaemia as “…a disease characterized by a lower circulating blood amount in the body which lead to tiredness, exhaustion, tachycardia, loss of appetite and modified vision…” It should be treated “…by consuming regularly meat (especially camel meat), milk, fish and pulses soups but also eggs, gofio (with banana) and tomatoes...”.

Health workers and heads of dispensaries have been asked how the diagnosis of anaemia was performed and how they handled the disease. They referred to diagnose anaemia only during medical examination in the hospital. Women go to the hospital in order to be monitored, e.g. during pregnancy, or when they have symptoms and this is the most frequent case. Dispensary head referred to be provided with 1000 iron multivitamin tablets that are prescribed to anaemic women. Still, in most cases the iron supplements are not able to eliminate anaemia in fertile age women. Firstly, often anaemia is not diagnosed because no screening system is in place. Secondly, iron tablets commonly cause side effects (such as gastric pain) and are not taken as prescribed.

Furthermore, the absorption of both supplemented and dietary iron is reduced by the high consumption of tea. Women referred not to consume tea during pregnancy because of its very ‘strong taste’ due to tannins and consume a lot of milk if gastric-oesophageal reflux occurs.

Local people and health workers have been also asked if they agreed with the management of food aid or in general with the information programme about health-related issues. Women also referred to be subjected to investigation without perceived improvements of their life conditions. They felt’s “… like animals in laboratory which are daily studied without received back the results of the ‘experiments’...”. Every day locals meet ‘friendly’ people coming from every part of the world, working for every kind of NGOs. or International Humanitarian Organizations or the Ministry of Health and so on, who involve them in a lot of projects.

People receive a lot of information, and recommendations which are often impossible to manage in an efficient and useful way. A popular belief made women fear iron supplements because their skin could become darker, a characteristic that detracts from female appeal.
5 DISCUSSION

The Micronutrient and Anthropometric Status Survey was a necessary step in a critical appraisal of International assistance to the Sahrawi refugees in Algeria. Comments to the findings should be done on three issues:

a) current situation;
b) changes in time;
c) programme choices and programme operations

Current situation
Stunting is the prevalent form of malnutrition in Sahrawi children under 5 (38%), while wasting is only a moderate concern (7%).

More than two thirds of the children under 5 (68%) are anaemic, and 7% have a severe form of anaemia. Women in childbearing age, who are also responsible for the wellbeing and the care of the household, show high anaemia rates too (66%). The anaemia rate grew to a striking 80.2%, in pregnant women, with values coming as low as 4 g/dL, thus exposing women to a very serious risk of maternal mortality, particularly since women prefer to give birth at home.

Iron deficiency was observed to be the major cause of anaemia and severe forms of iron deficiency were documented by the presence of elevated sTfR values. In this survey, we used sTfR as a measure of iron deficiency because it is relatively unaffected by the acute phase response associated with inflammation and infection. Iron deficiency starts very early in life, probably during intrauterine life, since two thirds of pregnant women are affected (66%). Iron deficiency was 58.6% in non-pregnant women and it was 62.3% in infants and young children. Associations between iron-deficiency anemia, poor cognitive and motor development and behaviour problems are well known. Longitudinal studies consistently indicate that children anaemic in infancy continue to have poorer cognition, school achievement, and more behaviour problems into middle childhood.

Clinical signs of vitamin C deficiency, although non specific, are present in 27.4% of the cases in women in fertile age. Vitamin C is one of the strongest promoters of iron absorption and it is contained in fresh vegetables and fruits, that are difficult to find into the camps.

The relatively high presence of night blindness reported in women in fertile (20.6%) should be further investigated with the prevalence of biochemical vitamin A deficiency measuring the retinol in the serum. A study carried out in 2001 indicated that 51 % of the children had moderate vitamin A deficiency (serum retinol < 20 µg/dL) and 7% had biochemical severe vitamin A deficiency (serum retinol < 10 µg/dL) (Ferrari M, personal communication). Iodine deficiency was not present, with adequate iodine level in water in Dakla and Smara and extremely high level in the area of Ayun and Ausserd. This results confirm and explain the low prevalence of goitre observed in NP women (6.7%), that should not be linked to iodine deficiency but might rather be attributed to iodine toxicity. This observation also confirms previous assessments.

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Very high rates of acute infections in children and women have been documented by elevated CRP. This prevalence for the children was 31.5% and 43.5% in women.

Low rates of exclusive breastfeeding and poor infant feeding practices are another important determinant of the nutritional status of Saharawi children. Breastfeeding is initiated in the first day in 60% of the infants, and 40% in the first six hours. The large majority of children (81%) is breastfed, often until the 2nd year of age, but other types of milk, as well as water and other liquids are introduced since very early life. Levels of exclusive breastfeeding are therefore extremely low. Only 27% of infants are exclusively breastfed up to 6 months. The use of infant formula and other milks is very common. The use of baby bottles is reported in one fifth of the children. Complementary foods starts timely for 81% of the children. The Dietary Diversity is extremely low, with 2- food items given to babies aged 6-8 months, and mostly part of the same food group. Meal frequency is also low, and since the nutrient density of these meals is also low, one can expect that nutrient requirements are not met.

**Changes in time**

The design of the present survey is such that the data can be compared with the ones carried out in 1997, 2001 and 2002, although the timing was different. The 2005 survey was carried out in February, after a few months of cold weather, while the 2002 survey was performed in September, when summer was not yet over. Previous surveys had been carried out in May (1997) and in September (2001), but never in the hot season. These four surveys can then be still considered comparable because none of them were carried out in the period of July-August, which should be considered as the ‘bad’ one for diarrhoeal diseases.

The prevalence of chronic malnutrition (39.1%, 95% C.I. 34.4-43.8) showed a 6% increase compared to 2002 (32.8%, 95% CI, 29.7 - 36.1), while the prevalence of acute malnutrition (7.7%, 95% C.I. 4.1-11.2) decreased slightly from 10.6 % (95% CI, 7.7 - 13.5) in 2002. This could be predicted by the fact that the 2002 survey had been carried out soon after the bad season.

The prevalence of anaemia in children (68%, 95% C.I. 64.4-72.5) is almost double that reported in 2002 (35.3% (95% CI, 26.7 - 43.9). The severe form of anaemia occurred in 7% of the cases, while in 2002 no such severe cases were observed.

In non-pregnant women, the overall prevalence of anaemia was 66.4% (95% C.I. 60.5-72.3), 20% higher than that documented in 2002 (47.6%, 95% CI, 38.6 - 56.5). Anaemia was also markedly present in the severe form (12.9% 95% C.I. 10.1-15.7), much higher than the prevalence observed in 2002 (4.4%, 95% CI, 1.2 - 7.6).

The prevalence of anaemia data related to 2005 are particularly striking if the trend between 1997 and 2002 is considered. A reduction of 14% in the prevalence of total anaemia in women and of 36% in children were observed. A reduction of 5% of severe anaemia in women and 14% in children.

Stunting also showed a decreasing trend. The findings of 2001 indicated a 14% reduction since 1997, and the findings were confirmed by the 2002 survey, that documented a further 2% reduction.

**Programme operations**

The data provided by the key informants indicate that the total number of items included in the general ration is lower than recommended. The current ration mainly provides energy and
protein dense foods, and should be able to cover the requirements for macronutrients. However, there is a lack of micronutrient dense foods, either in the form of natural product, e.g. animal products, fresh vegetable products or in the form of fortified foods.

The selection of foods is not always as per the liking of the population, as is the case for red lentils. The food items provided by the general ration make it difficult to prepare complementary foods of adequate energy and nutrient density.

The food distribution system is difficult to control. Lists of beneficiaries are not available and there is no way to control the household supply of donated food items.

Bilateral donations are not always under control and may therefore be uncoordinated as far as timing, quantity and quality of the donated items. A striking example is the presence of infant formula in the camps, apparently available to more than 50% of the infants.

The health care system does not even have outreach activities and does not run active nutritional screening programs.
6. RECOMMENDATIONS FOR ACTIONS AND FOLLOW-UP

As a results of the survey finding, the following recommendations can be formulated:

**Public Health**
1. The health and nutrition intervention programmes should be better integrated and coordinated.
2. IMCI treatment and prevention protocols should be incorporated into routine practice in all health centers.
3. The water supply should be considered a priority and the current programmes strengthened. It is recommended that full analysis of water sources is carried out, including an evaluation of the mineral content.
4. Sanitation standards should be improved and educational messages should be given to reduce the fecalisation of the environment.

**Food basket**
5. The food basket should be adequate both providing 2,100 kcal and essential micronutrients in line with UNHCR, WHO, UNICEF and WFP guidelines on Food and Nutrition Needs in Emergencies. It is essential to provide diverse food items to meet micronutrient requirements and fortified flour and or blended food be included in general ration.
6. Given the high levels of iodine in the water in this region, inclusion of iodised salt should not be considered. It is recommended the iodine concentration of water is routinely monitored.

**Distribution system**
7. Food distribution systems should be carefully reviewed and ration cards be issued in name of the head of the household. The community, in particular women should be empowered to take responsibility.
8. Food basket monitoring should be put into place to monitor food distribution systems and adequacy of food basket.
9. Food stock monitoring should be carried out regularly by the partners and information be provided to WFP and UNHCR.
10. All food donations should be centrally coordinated by WFP. WFP and the Saharawi Authorities, with the technical support of the Algerian Red Cross.
11. Periodic and continuous coordination meetings involving NGOs, the Saharawi Government, the United Nation agencies and bilateral donors should be carried out, with the purpose of planning of all food needs and bilateral contributions. WFP jointly with the authorities should coordinate all food commodities coming into the camp.
12. Staff involved in food distribution should be retrained and supervised.

**Targeted distributions**
13. Distribution of micronutrient dense fortified foods to stunted and anaemic children under five and for anaemic non-pregnant and pregnant women in fertile age should be carried out until the levels of those conditions are not reduced below 30%.
14. Pregnant women should receive weekly distributions of fortified blended foods.
15. Children under five years should be given fortified blended foods or other fortified products integrated with health programmes. To ensure this the distribution of such commodities be managed by the health systems.

**Other measures**
16. Support to small animal rearing should be considered through micro credit programme.
17. Provision of iron and folic acid supplements for children and women in childbearing should be considered for short term treatment, but not as option for prevention of iron deficiency.

18. Education and information on infant feeding practices should be carried out with the involvement of the community. The emphasis on messages such as exclusive and continued breastfeeding, timely initiation of complementary feeding, food preparation and storage, and number of feeds for young children.

**Future assessments**

19. Haemoglobin monitoring in women and in children should be carried out on quarterly in clinics to monitor the linkage to the targeted distribution iron rich commodities.

20. A population survey should be repeated in 24 months, to evaluate the programme interventions as recommended.
7. ANNEXES

ANNEX 1 - Terms of Reference

_HCR/WFP Nutritional Survey in Western Sahara camps, Tindouf, Algeria_

_October 2004_

Background:

WFP and UNHCR has been supporting the Sharawi refugees’ camps in Algeria since 1986 in collaboration with ARC. These camps exist in a harsh desert environment with minimum food production possibilities. Consequently most refugees depend solely on the assistance. Several surveys have consistently reflected poor nutritional status of the refugees despite the assistances. In 2002, WFP and UNHCR undertook a survey to identify issues that impeded the achievement of optimal nutritional status with the aim of addressing them. In line with the previous survey results, the WFP/UNHCR survey result indicated high prevalence of acute and chronic malnutrition amongst the children under five years of age. The survey identified Iron deficiency anaemia as another major concern. Based on the findings, several recommendations were made, which included i) establishment of treatment facilities for severe malnutrition and moderate malnutrition, ii) promotion of better feeding practices, and iii) establishment of nutrition surveillance system. Therapeutic and supplementary feeding programmes were consequently established. The programmes have now been operational for more than a year.

The results of the survey have also formed a reliable baseline for the follow-up surveys and to report on result based management (RBM), although WFP’s initiative toward RBM was not foreseen at the time of the survey. Now, two years following the survey, a need for the follow-up is warranted. The follow-up joint survey is planned with the intention of assessing the impact of WFP/UNHCR assistance including the therapeutic and supplementary feeding programmes. The need to assess the impact of these programmes was also highlighted by the UNHCR/WFP Joint Assessment Mission, fielded in January 2004. The results of the survey are expected enable the Country Office (CO) to examine the impact of WFP overall assistance, how well and to what extent the recommendations made earlier report have been implemented and what are the impacts of these implementation, as well as examine the impediments in achieving the desired results so that corrective actions can be taken in time.

Objectives:

- To provide data to enable WFP/UNHCR to assess the impact of WFP assistance with regard to Strategic Priority one (SP-1) and SP-3 using the crude mortality and malnutrition indicators (anthropometry and iron status) – please refer to the attached indicators compendium for details
- To assess the change in feeding practices among young children since 2002
- To assess change in iron status of the beneficiaries since 2002 and to assess the causes of iron deficiencies
To identify strengths and weaknesses of the programme with regards to achievement of the nutritional objectives of the project (SP-1 and SP-3)

• To provide realistic recommendations for programme refinements which will assess WFP/UNHCR to achieve the objectives of the project in relation to SP-1 and SP-3

• To built the capacity of the national entity (e.g. NGO) to carry out the anthropometric and the haemoglobin measurements (using the Haemocue) on children and adults as well as qualitative data collection methodology for the future follow-ups of the survey

• To built the capacity of the national entity to analyze and report on the findings of the nutrition surveys

Desired Deliverables/Outputs:

• Crude mortality rate amongst the beneficiaries (SP-1)
• Acute and chronic malnutrition rates amongst children aged 0-59 months by age group and by gender; and amongst women aged 15-45 years (SP-1 & SP-3)
• If data available - prevalence rate of low birth weight (SP-3)
• Prevalence of anaemia amongst the targeted beneficiaries including pregnant and lactating women as separate categories (SP-3)
• Data on breast-feeding, bottle feeding and complimentary feeding practices by age groups
• Qualitative data on: causes of malnutrition amongst the surveyed groups, adequacy of complimentary food by age group; tea consumption and haemoglobin status; iron supplements – availability and intake by pregnant women
• A comprehensive report covering the above aspects. The report should include a clear cause-effect linkages for achievement of less than optimal results achieved (if applicable).
• Realistic and achievable recommendations to address identified shortcoming in relation to nutrition.
• A team of local people who are able to carry out the follow-up surveys in similar fashion excluding biochemical analysis.
### ANNEX 2 - Survey Timetable

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### ANNEX 3 - List of local staff

<table>
<thead>
<tr>
<th>Team</th>
<th>Name and Surname</th>
<th>Qualifications</th>
<th>Wilaya or institution of origin</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Ahmed Ahmed Baba Dih</td>
<td>Medical doctor coordinator</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td></td>
<td>Mohamed Fadel Saleh</td>
<td>Health coordinator</td>
<td>Ministry of Health</td>
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<tr>
<td>1</td>
<td>Said Abdelfatah Dajni</td>
<td>Medical doctor</td>
<td>Aaiun</td>
</tr>
<tr>
<td></td>
<td>Hamdi Bachir Mohamed</td>
<td>Laboratory technician</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td></td>
<td>Salek Buzeid</td>
<td>Psychologist</td>
<td>Aaiun</td>
</tr>
<tr>
<td>2</td>
<td>Ali Gali Mulay Mohamed</td>
<td>Medical doctor</td>
<td>Aaiun</td>
</tr>
<tr>
<td></td>
<td>Humsad Sidi Borra</td>
<td>Laboratory technician</td>
<td>Ausserd</td>
</tr>
<tr>
<td></td>
<td>Mahlud Chej Bedil-Ia</td>
<td>Administrative</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>3</td>
<td>Ahmed Baba Salek</td>
<td>Medical doctor</td>
<td>Ausserd</td>
</tr>
<tr>
<td></td>
<td>Gauzah Abdu</td>
<td>Laboratory technician</td>
<td>Ausserd</td>
</tr>
<tr>
<td></td>
<td>Fala Brahim Mohamed</td>
<td>Administrative</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>4</td>
<td>Fatimatu Mehdi Sidemu</td>
<td>Medical doctor</td>
<td>Smara</td>
</tr>
<tr>
<td></td>
<td>Chiжа Bachir</td>
<td>Laboratory technician</td>
<td>Smara</td>
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<td></td>
<td>Bah Hamdi Ahmed</td>
<td>Linguistic degree</td>
<td>Smara</td>
</tr>
<tr>
<td>5</td>
<td>Fatimetu Mohamed</td>
<td>Medical doctor</td>
<td>Dakla</td>
</tr>
<tr>
<td></td>
<td>Sidaḥmed Lehbib Salma</td>
<td>Laboratory technician</td>
<td>Dakla</td>
</tr>
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<td></td>
<td>Saleh Salek</td>
<td>Nurses</td>
<td>Ausserd</td>
</tr>
<tr>
<td>6</td>
<td>Embarka Salem</td>
<td>Medical doctor</td>
<td>27 Febrero</td>
</tr>
<tr>
<td></td>
<td>Kreikiba Mohamed</td>
<td>Administrative</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td></td>
<td>Mahan-na Luali</td>
<td>Laboratory technician</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>7</td>
<td>Sidi Salem Lemad-da</td>
<td>Medical doctor</td>
<td>Smara</td>
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<td></td>
<td>Huria Malhenin</td>
<td>Laboratory technician</td>
<td>Ausserd</td>
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<td>Senia Moh. Embarek</td>
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<td>Ministry of Health</td>
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<td><strong>Data entry specialist</strong></td>
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<tr>
<td></td>
<td>Brahim Salem Hafdala</td>
<td>Secretary</td>
<td>Ministry of Health</td>
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</table>
ANNEX 4 – Questionnaire

République Arabe Saharawi  
Démocratique  
Saharawi Minister of Health

World Food Programme
United Nation High Commissioner for Refugees

Micronutrient Nutrition survey Saharawi refugee camps

<table>
<thead>
<tr>
<th>Wilaya</th>
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<td>Daira</td>
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<td>Cluster number</td>
</tr>
<tr>
<td>Team number</td>
</tr>
<tr>
<td>Household number</td>
</tr>
<tr>
<td>Date of interview (dd/mm/yyyy)</td>
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# HOUSEHOLD LISTING FORM

List all people present in the household at the moment of the interview

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Relationship to HH head</th>
<th>Age (age in months for children 0-59mo old)</th>
<th>Gender</th>
<th>Date of birth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 wife</td>
<td></td>
<td>1 = male</td>
<td>1=identity card</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 son</td>
<td></td>
<td>2 = female</td>
<td>2=vaccine card</td>
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<td></td>
<td></td>
<td>3 daughter</td>
<td></td>
<td></td>
<td>3=certificate</td>
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<td></td>
<td></td>
<td>4 grandchild</td>
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<td></td>
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<td>5 brother/sister</td>
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<td></td>
<td></td>
<td>8 other</td>
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<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Month</th>
<th>Years</th>
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<tbody>
<tr>
<td>1</td>
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<td>16</td>
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Report dead, since this time Feb. 2004,

<table>
<thead>
<tr>
<th>Name</th>
<th>Sex</th>
<th>Age at the died</th>
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<tbody>
<tr>
<td></td>
<td>1 = man</td>
<td>(months or years)</td>
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<td></td>
<td>2 = women</td>
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<tr>
<td>No.</td>
<td>Question</td>
<td>Options</td>
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<tr>
<td>1</td>
<td>Cluster number</td>
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<td>2</td>
<td>Household number</td>
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<tr>
<td>3</td>
<td>Women’s code (from the first column of HH listing)</td>
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<tr>
<td>4</td>
<td>Women’s name</td>
<td></td>
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<tr>
<td>5</td>
<td>Women’s age</td>
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</tbody>
</table>
| 6   | What is your marital status?                                             | 1 = single  
2 = marriage  
3 = divorced  
4 = widow  
9 = don’t know/no answer |
| 7   | Until which grade did you attend school?                                 | 1 = illiterate;  
2 = elementary school  
3 = secondary school  
5 = short university degree  
6 = long university degree  
9 = don’t know/no answer |
| 8   | When did you have your last menstruation? (dd/mm/yyyy)                    |                                                                         |
| 9   | Do you think you are pregnant?                                           | 1 = yes  
2 = no  
9 = don’t know/no answer |
| 10  | If pregnant, are you registered at women’s consultation unit?            | 1 = yes  
2 = no  
9 = don’t know/no answer |
| 11  | Do you have vision problem at night?                                     | 1 = yes  
2 = no  
9 = don’t know/no answer |
| 12  | How many pregnancies did you have? (including abortions and still birth) | 0 = none  
9 = don’t know/no answer |
| 13  | How many miscarriages or abortions did you have?                         | 0 = none  
9 = don’t know/no answer |
| 14  | Do you have gums bleeding?                                               | 1 = yes  
2 = no  
9 = don’t know/no answer |
| 15  | Do you have perifolliclar hemorrhage?                                    | 1 = yes  
2 = no  
9 = don’t know/no answer |
| 16  | Do you have aedema of the legs?                                          | 1 = yes  
2 = no  
9 = don’t know/no answer |
| 17  | Do you have goitre?                                                      | 0 = none  
1 = visible  
2 = palpable  
8 = refused;  
9 = not examined |
| 18  | We would like to take some of yours blood from your finger, for testing. | 1 = yes  
8 = No, women refused |
<p>| 19  | Write down hemoglobin level                                              |                                                                         |
|     |                                                                           | Affix label |</p>
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<tr>
<td>22</td>
<td>Children’s code (from the first column of HH listing)</td>
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<tr>
<td>23</td>
<td>Children’s age (month)</td>
<td></td>
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<tr>
<td>24</td>
<td>What is (child’s name) date of birth? dd/mm/yyyy</td>
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<td>25</td>
<td>Do you know the birth weight of the children? 9 = don’t know/no answer</td>
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<td>26</td>
<td>Which female in the household is the mother or primary caretaker of the child (from the first column of HH listing)</td>
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<tr>
<td>27</td>
<td>Has (child’s name) had diarrhoea, more than three loose stools day, in the past two weeks</td>
<td>1 = yes</td>
<td>2 = no</td>
<td>9 = don’t know/no answer</td>
<td></td>
<td>If 2 and 9 go to 29</td>
</tr>
<tr>
<td>28</td>
<td>During the last episode of diarrhea (your child) drink any of the following items?, 1 = yes</td>
<td>2 = no</td>
<td>9 = don’t know/no answer</td>
<td></td>
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<tr>
<td>28.1</td>
<td>Breast milk</td>
<td>1</td>
<td>2</td>
<td>9</td>
<td></td>
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<tr>
<td>28.2</td>
<td>Beverages (water included) or liquids foods (infant formula, fresh milk, fruit juice, etc..)</td>
<td>1</td>
<td>2</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.3</td>
<td>Solids foods (porridge, soup, etc..)</td>
<td>1</td>
<td>2</td>
<td>9</td>
<td></td>
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</tr>
<tr>
<td>29</td>
<td>Has (child’s name) had an illness with a fever or cough or difficulty breathing in the last two weeks including today</td>
<td>1 = yes</td>
<td>2 = no</td>
<td>9 = don’t know/no answer</td>
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<tr>
<td>30</td>
<td>Does (child’s name) have vision problem at night? (vision adaptation to darkness-night blinding)</td>
<td>1 = yes</td>
<td>2 = no</td>
<td>9 = don’t know/no answer</td>
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### Children 0 – 24 months

<p>| | | | | | | |</p>
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</thead>
<tbody>
<tr>
<td>31</td>
<td>Has (your children) ever been breastfed?</td>
<td>1 = yes</td>
<td>2 = no</td>
<td>9 = don’t know/no answer</td>
<td></td>
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</tr>
<tr>
<td>32</td>
<td>How long after birth did you put (your children) to the breast?</td>
<td>1 = within the first 30 minutes from delivery</td>
<td>2 = within the first 6 hour</td>
<td>3 = more then 6 hour from delivery</td>
<td>9 = don’t know/no answer</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Actually is the child breastfed?</td>
<td>1 = yes</td>
<td>2 = no</td>
<td>9 = don’t know/no answer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Since this time yesterday, has (your children) been breastfed?</td>
<td>1 = yes</td>
<td>2 = no</td>
<td>9 = don’t know/no answer</td>
<td></td>
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</tr>
<tr>
<td>35</td>
<td>How many time did you breastfed (your children) yesterday during the daylight hours?</td>
<td></td>
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<tr>
<td>36</td>
<td>How many time did you breastfed (your children) last night between sunset and</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Question</td>
<td>Options</td>
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</tr>
<tr>
<td>37</td>
<td>How do you breastfed (your children)?</td>
<td>1 = on demand</td>
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<td>2 = at fixed intervals</td>
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<td>9 = don’t know/no answer</td>
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<td>38</td>
<td>Since this time yesterday, has (your children) received any of the following drinks?</td>
<td>1 = yes; explain the frequency (_ _)</td>
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<td>2 = no</td>
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<td>9 = don’t know/no answer</td>
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<td>38.1</td>
<td>Plain water</td>
<td>1 (_ _)</td>
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<td>38.2</td>
<td>Herbal tea</td>
<td>1 (_ _)</td>
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<td>38.3</td>
<td>Tea</td>
<td>1 (_ _)</td>
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<td>38.4</td>
<td>Fruit juices</td>
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<td>38.5</td>
<td>Oral rehydratation solution</td>
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<td>if 2 and 9 go to 39</td>
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<td>38.7 bis</td>
<td>Do you add the water to the milk?</td>
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<td>Bread, pasta, rice, potatoes</td>
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<td>41.15</td>
<td>Nutrient-dense foods or other fortified foods</td>
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<td>CHILDREN’S ANTHRROPOMETRY AND LABORATORY EXAMINATION</td>
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<td>42</td>
<td>Observe the presence of the following signs:</td>
<td>1 = yes</td>
<td>2 = no</td>
<td>8 = refused</td>
<td>9 = not examined</td>
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<td>42.1</td>
<td>Epiphyseal enlargement of the wrist</td>
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<td>Presence of craniotabes</td>
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<td>42.3</td>
<td>Frontal and parietal bossing</td>
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<td>Persistently open anterior fontanelle on palpation after the age of 18 months</td>
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<td>42.5</td>
<td>Beading of the ribs</td>
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<td>43</td>
<td>Height. Measure recumbent length for children 0-24 month old; measure standing height for children ≥24 months old (in cm, to the nearest 0.1 cm)</td>
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<td>8888 = refused</td>
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<tr>
<td>44</td>
<td>Weight. If the child is able to stand measure the weight of the child (in Kg, to the nearest 0.1 Kg). If the children is not enable to stand, measure the weight of the child plus adult (in Kg, to the nearest 0.1 Kg).</td>
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<td>8888 = refused</td>
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<td>45</td>
<td>Arm circumference (cm)</td>
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<td>8888 = refused</td>
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<td>46</td>
<td>We would like to take some of your child’s blood from his/her finger, for testing. Is this ok?</td>
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<td>47</td>
<td>Write down hemoglobin level</td>
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<td>Affix label</td>
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</table>

We are interested in the health of women and children. We request that you participate by answering some questions now, and later giving a few drops of blood from a finger. The test uses disposable, new instruments that are clean and completely safe. The blood will be analyzed with new equipment and the results given to you right after the blood is taken. The results will be kept private. If you agree to give us your consent, would you please give us your consent by signing your name or putting your thumbprint here. However, if at any point you feel uncomfortable, you can ask us to stop. If you have any questions or concerns, please talk with us today.

Signature of consent

Write number of the pages each women =
Write number of the pages each children =
## ANNEX 5 - Cluster Selection Table

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ANNEX 6 – Food aid graph

Figure 15 Monthly coverage of energy and macronutrient requirement of the ration (general + other) in 2004

Figure 16 Trends in micronutrient content (minerals and vitamins) of the ration (general + other) in 2004