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STRATEGIES TO FIGHT ANAEMIA AND GROWTH RETARDATION IN SAHARAWI CHILDREN

Extension of a pilot community-based intervention
to a population-based approach with micronutrient fortified foods

FINAL REPORT

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1. EXECUTIVE SUMMARY

The present report relates the results of a 3-month nutrition intervention conducted in the refugee camps of the RASD in Algeria between November 1998 and June 1999 and carried out jointly by the Istituto Nazionale della Nutrizione di Roma (INN) and CISP in collaboration with the Saharawi authorities. This population-based programme (over 4000 beneficiaries) follows up the 1998 community-based pilot project which showed that micronutrient-fortified food supplements could significantly reduce anaemia rates and improve growth retardation in children under five years of age. The main objective was to prevent and treat anaemia and growth retardation extending the targeted intervention to all under-5 children in every wilaya. The supplement distribution and monitoring system were entirely run by local health staff and required only minimal effort to mothers as foods could be consumed directly at home. A widespread sensitisation and education campaign using printed material, group discussions and radio broadcasts was implemented with the aim of increasing nutrition awareness among the population.

The micronutrient-fortified supplements were, for the younger infants (6 to 17 months), a rice-based flour prepared as a porridge and, for the older and stunted children (18 to 59 months), a snack of groundnut paste. Foods were distributed weekly at local health dispensaries. Intake of supplements was monitored at different levels ranging from distribution attendance records up to consumption by beneficiaries. Impact on growth and anaemia was evaluated on 1800 children from selected sentinel sites in all the wilayas.

The intervention in the younger infants did not have any significant impact on nutritional status. In the older and stunted children, severe anaemia was almost entirely eliminated and overall prevalences decreased by 10%. The programme encountered a large enthusiasm within the population as shown by the growing numbers of beneficiaries and remarkable involvement of Saharawi health authorities mobilising all local health staff. A considerable achievement was reached from the sensitisation campaign disseminating nutrition and health education messages at all society levels. Furthermore, integrating this nutrition programme within the local health network proved to be an encouraging tool for health and nutrition promotion, particularly for improving child feeding practices. This result is very important considering the high mortality and morbidity rates from common childhood illnesses.

It is recommended to continue with the intervention to all the children under 5 years of age. For weanlings of 6-17 months, blended flours or alternative weaning foods are recommended however different and/or complementary interventions are needed. For older growth-retarded children, the groundnut paste is appropriate and advised. The support of the local health network in similar interventions is strongly recommended as well as the intensification of sensitisation campaigns.

Résumé

Ce rapport présente les résultats d'une intervention nutritionnelle menée conjointement par l'Institut National de la Nutrition de Rome (INN) et le CISP, en collaboration avec les autorités Sahraouiennes, dans les campements de Tindouf en Algérie entre novembre 1998 et juin 1999. Ce programme à niveau national (plus de 4000 bénéficiaires) fait suite à un projet pilote à base communautaire réalisé en 1998 lequel a montré que des suppléments alimentaires enrichis en micronutriments ont été capable de réduire de façon significative les taux d'anémie ferriprive et d'améliorer le retard de croissance chez les enfants âgés de moins de 5 ans.

Le objectif principal était de prévenir et traiter l'anémie et le retard de croissance en élargissant l'intervention à tous les enfants de moins de 5 ans dans toutes les wilayas. La distribution du supplément et le système de surveillance étaient entièrement gérés par le personnel de santé local et exigeait un minimum d'effort de la part des mères, l'aliment pouvant être consommé directement à domicile. Une campagne générale de sensibilisation et d'éducation par le biais de matériel imprimé, des groupes de discussions participatives, et d'émissions radio a été mise en oeuvre dans le but d'augmenter la prise de conscience nutritionnelle.

Les suppléments enrichis en micronutriments étaient, pour les nourissons (6 à 17 mois), une bouillie à base de farine de riz et, pour les enfants atteints de retard de croissance (18-59 mois), une pâte d'arachide. Les aliments étaient distribués chaque semaine dans les dispensaires de daïra. Le suivi de la consommation du supplément s'est fait à différents niveaux, des registres de distribution jusqu'au bénéficiaires. L'impact sur la croissance et l'anémie a été évalué sur 1800 enfants sélectionnés dans les daïras sentinelles dans toutes les wilayas.

L'intervention chez les 6-17 mois n'a pas pu rejoindre prévenir le retard de croissance ni l'anémie. Par contre, l'impact chez les enfants plus âgés a été très positifs atteignant des résultats voisins à l'intervention pilote. L'anémie sévère a été entièrement éliminée,

réduisant les taux globaux de 10%. Le programme a rencontré un vaste enthousiasme parmi la population comme le montre le chiffre croissant de bénéficiaires et le remarquable engagement des autorités Sahraouies à mobiliser tout le personnel de santé. De considérables résultats ont été atteints à travers la campagne de sensibilisation disséminant des messages éducationnels sur la nutrition et la santé à tous les niveaux de la société. De plus, l'intégration de ce programme nutritionnel dans le système de santé local s'est avérée être un instrument encourageant pour la promotion de la santé publique et la nutrition, en améliorant particulièrement les pratiques alimentaires des enfants. Ceci est un résultat d'importance fondamentale si l'on considère les taux élevés de mortalité et morbidité infantiles dues aux maladies infectieuses.

Il est recommandé de poursuivre cette intervention pour tous les enfants de moins de 5 ans. Pour les enfants en âge de sevrage (6 à 17 mois), la bouillie à base de farines mixtes de céréales ou d'autres aliments de sevrage sont recommandés. Pour les enfants atteints de retard de croissance (18-59 mois), la pâte d'arachide est appropriée et conseillée. L'appui du système de santé local dans ce genre d'intervention est fortement recommandé aussi bien que l'intensification des campagnes de sensibilisation.

2. INTRODUCTION

This present report relates the final evaluation of the project "Strategies To Fight Anaemia and Growth Retardation In Saharawi Children: Extension of a pilot community-based intervention project to a population-based approach" conducted in the Saharawi refugee camps between November and June 1999 and carried out by the Istituto Nazionale della Nutrizione (INN) with the Comitato Internazionale per lo Sviluppo dei Popoli (CISP) and in collaboration with the Saharawi authorities.

The health and nutritional situation of the Saharawi children under five years of age is very poor (Branca, 1997¹; Branca and Lopriore, 1998²). Stunting and micronutrient deficiencies, mainly anaemia, are highly prevalent among this vulnerable age group. Public health interventions are thus urgently required to tackle stunting and anaemia among Saharawi children. The 1998 pilot food-based intervention showed significant reductions in anaemia rates and a sensible improvement of stunting among the children. Following this promising community-based experience, the present intervention was undertaken applying a population prevention strategy to small children; and a risk group strategy based on screening among older ones.

3. OBJECTIVES

- to reduce the incidence of iron-deficiency anaemia and growth retardation in children aged 6-17 months by distributing a rice-based micronutrient fortified porridge;
- to reduce the prevalence of iron deficiency anaemia and growth retardation in stunted children aged 18-59 months by distributing a micronutrient fortified groundnut paste;
- to promote consumption of supplements through the network of health dispensaries and a sensitisation campaign;
- to use the supplement distribution to monitor the nutritional status of children;
- to document and evaluate the implementation and impact of the programme in order to consider further application to other similar refugee settings;
- to compare impact of interventions of population-based versus pilot trial (ideal conditions) on the prevention and reduction of anaemia and growth retardation.

1 Branca F. (1997) The health and nutritional situation of Saharawi refugees.

2 Branca F. and C. Lopriore (1998) Strategies to fight anaemia and growth retardation in Saharawi children: A community-based pilot programme with micronutrient fortified foods.

4. DESCRIPTION OF THE PROGRAMME

Screening and registration of beneficiaries

Screening of beneficiaries was carried out directly by the local health staff with appropriate training and direct supervision of international staff. All children below 5 years of age were called for registration at the dispensaries of the daira.

Each dispensary drew two registration lists according to the following age group criteria:

- ◆ Infants aged 6 to 17 months: all were automatically registered and measured;
- ◆ Children aged 18 to 59 months: only those affected by low height-for-age (i.e. height was found below the curve of -2 S.D. on the growth wall charts (Annex 1) were selected, registered and measured.

At registration, mothers were given individual supplementation card (Annex 3) for each child which they showed to collect supplements.

Supplementary foods

Two different fortified food supplements were used:

- for infants aged 6-17 months: packets of 350 g of rice flour fortified with appropriate quantities of minerals and vitamins (Annex 2). One packet contains 7 individual rations (daily dose of 50 g per child), thus covering one week supplementation. A simple preparation required the flour to be mixed with boiled water and to be served as a porridge.
- for children aged 18-59 months: packets of 40 g of groundnut paste fortified with appropriate doses of minerals and vitamins³ (Annex 2). One packet contains 1 individual ration covering one day supplementation.

The total amount of supplement was to cover a period of 3 months of feeding. The total quantity of supplement sent is 9,009 tons of flour, organised into boxes of 30 packets each, and 13,008 tons of groundnut paste, organised into boxes of 300 packets each. The flour is labelled «Farine de sevrage» by the manufacturer, while the groundnut paste is labelled «Plumpy sauce». After one month delay in the harbour of Oran due to custom procedures and unavailability of transportation, the supplement arrived to Tindouf by the 24th of March. A total of 9 boxes were missing.

The Saharawi Red Crescent (CRS) ensured, as agreed, the transportation of the supplements to every wilaya. The supplement could not leave to Dajla until the first week of April because of the long distance to this camp and the unavailability of trucks, as this distribution coincided with the monthly food distribution in the camps.

The total quantity of supplement was divided between the wilayas according to the number of children registered in each. The rest was divided as an extra-quantity to cover the eventually new registered children. A larger extra-quantity was consigned to the wilaya of Dajla as it is a remote area. The totality of supplements was delivered to the wilayas and stored in the hospitals storage places. Nothing was left in the CRS warehouse of Rabuni.

Each wilaya was duly informed of the total amount of supplements to be delivered at wilaya level as well as individual amounts to be distributed on a monthly-basis to each daira. Transportation of supplement to the dairas was ensured by means of ambulances. Chiefs of dispensaries also were informed of the quantities they were to expect to receive every month from the central storage.

³ Density of micronutrients are twice that used in the pilot project to account for the reduced daily rations

Distribution and monitoring system

Supplementation covered a period of 3 months starting on the 4th of April and ending mid-July. Supplements were distributed at the daïra's health dispensary once a week at 9 o'clock in the morning. Mothers showed the supplementation cards (Annex 2) to collect the weekly ration for each child beneficiary of the project.

Distribution of food was organised so as to take place in a different day in every wilaya which allowed project staff to carry out rotating visits and supervise correct distribution. To this purpose, a fixed calendar of distribution was set until the end of the project.

Compliance to supplementation was monitored at two levels. At dispensary level, attendance was monitored through the distribution registers as well as from the individual supplementation cards that mothers showed while collecting the supplement. Analysis of the distribution registers shows that the wide majority of beneficiaries was regularly attending distribution since the beginning of the project.

Secondly, consumption was monitored at beneficiary level in several ways. First, A monitoring questionnaire was developed to ask mothers about supplement use in their household (Annex 4). This questionnaire was used weekly both by chiefs of dispensary on supplement distribution days and by Maternal and Child Health (MCH) staff when visiting households. The aim of the questionnaire was two-fold: (1) for chiefs of dispensary, in order to immediately identify and treat sick children, so that mother will not interrupt the supplementation of her child; and (2) for MCH staff to monitor use of the supplement inside the households and also to sensitise mothers.

Furthermore, expatriate staff conducted a small survey in Ausserd, Smara and El Ayun in which 50 jaimas were selected randomly without prior notice (3 to 4 in each barrio). Compliance was determined by cross-checking if quantities of supplement available in the jaima were corresponding to amount indicated on the child's supplementation card at last distribution. From the 50 jaimas visited, 30 were complying. Reasons for not complying included: absence at previous distribution, interruption of supplementation by the mother because of diarrhoea. In some cases, mothers refused to show the remaining quantity of supplement.

Sensitisation campaign

A sensitisation campaign was continuously held in the 4 camps for the entire duration of the supplementation, in close collaboration with the directors of prevention at wilaya level. On demand of local authorities, regular meetings together with the council of the wilaya were held to animate discussions on the on-going programme. To this purpose, leaflets were distributed in Arabic at meetings describing the aims and design of the intervention and the nutritional status of Saharawi children. This allowed local authorities to provide the necessary support to the programme, such as logistical support, sensitisation and mobilisation of the population. The local radio was also used to broadcast information on the correct use of supplements.

Furthermore, sensitisation was deepened by educational discussion meetings held with mothers in the jaimas starting from the first week of the supplementation and printed material both in Spanish and Arabic (Annexes 6, 7 and 8). Using the experience of the pilot project, educational posters were prepared to this intention which delivered the following educational messages to the mothers (Annex 5):

- Water has to be well boiled for the preparation of the porridge and careful hygiene is required for the kitchen utensils used;
- Only children who need the supplement are selected for the supplementation project (this is to allow the targeted children to benefit of the project);

- The child has to eat his supplement every day;
- Do not share the ration of the child with his other brothers and sisters;
- Do not use the flour for adults consumption (which often happened to be the case in previous supplementary projects due to lack of information).

Evaluation

The anthropometric status of children was monitored at the health centre of each *daira* by the dispensary staff with direct assistance and supervision of expatriate staff. All health dispensaries monitored the height and weight of the children living in their *daira* both at registration and end of the 3-month food intervention. Haemoglobin levels were only assessed in two sentinel *dairas* per *wilaya* in order to evaluate anaemia. These measurements were carried out by the laboratory technicians of regional hospitals. Results presented hereafter are representative of a sub-sample of approximately 1200 children taken from sentinel *dairas*. Nutritional assessment includes change in anthropometric indices, haemoglobin levels between start and end of the intervention.

5. RESULTS

5.1. Screening and registration of beneficiaries

A first large registration was held in January and February yielding some 1700 children. However, as registration was kept open throughout the entire duration of the intervention, new children kept being enrolled and numbers of beneficiaries were still growing at the end. By mid-June, the total number reached was 4015 children. Table 1 gives the number of beneficiaries by age groups registered in each *wilaya*. All local health dispensaries have been equipped with nutrition instruments including weighing scales, stadiometres, growth charts, guidelines, registers and each hospital a haemoglobin spectrophotometer with cuvettes and blood lancets.

Table 1. Number of beneficiaries by age group and *wilaya* registered on June 15th

	SMARA	EL AYUN	AUSSERD	27 FEB.	DAJLA	Total
6-17 months	222	250	295	44	317	1128
18-59 months	835	628	689	117	618	2887
TOTAL	1057	878	984	161	935	4015

5.2. Impact on nutritional status

5.2.1. Description of population

Table 2 presents the main characteristics of the beneficiaries at sentinel sites.

Table 2. Characteristics of beneficiaries at sentinel *dairas*

	Porridge 6-17 months	Groundnut paste 18-59 months
Total numbers	416	796
Mean age \pm SD (months)	12.51 \pm 4.10	39.40 \pm 13.98
Sex (M/F)	196/220	399/397
Mean WHZ \pm SD	-0.90 \pm 1.88	-0.49 \pm 1.32
Mean WAZ \pm SD	-1.41 \pm 1.57	-1.79 \pm 1.09

Mean HAZ ± SD	-1.05 ± 2.06	--2.41 ± 1.35
Mean attendance (weeks)	8.01 ± 2.86	8.76 ± 2.47

* data not computed for 1 sentinel daïra in Dakla (Ain Beïda) and 27th February

Compliance to supplementation, as estimated from distribution registers of health dispensaries, show that the average attendance was approximately 8 to 9 weeks. The percentages attending at least 3/4 of supplementation were 52.5% among infants aged 6-17 months and 61.6% of children aged 18-59 months.

Haemoglobin levels before intervention differed considerably between the wilayas (Table 3). These differences were statistically significant both for 18-59 months old children (ANOVA, F=14.01, p=0.000) and for the smaller age group (ANOVA, F=4.52, p=0.001). Ausserd presented the lowest prevalences of anaemia (Hb<11 g/dl) while El Ayun and Smara had the highest. Statistically, differences in anaemia prevalences are very significant as well, for the porridge group (ANOVA, F=4.98, p=0.001) and the groundnut paste group (ANOVA, F=9.0, p=0.000).

Table 3. Haemoglobin status at baseline by wilaya

Wilaya	6-17 months			18-59 months		
	Mean Hb ± SD	n	% anaemia	Mean Hb ± SD	n	% anaemia
Smara	9.33 ± 2.05 ^a	128	74.2	9.63 ± 2.24 ^a	309	69.3
El Ayun	9.59 ± 1.55	48	83.3	10.29 ± 1.97 ^a	148	60.1
Ausserd	10.31 ± 1.43 ^a	89	59.6	10.74 ± 1.97 ^a	201	48.8
Dakla	9.66 ± 1.50	79	84.8	10.74 ± 2.03*	83*	48.2
27 Feb.	9.71 ± 1.48	34	85.3	*	*	*
TOTAL	9.70 ± 1.73	378	75.1	10.19 ± 2.14	741	59.5

^a Means sharing common superscript are statistically different (Scheffé's test, p<0.05)

5.2.2. Prevention strategy in infants aged 6-17 months

Anaemia

Complete haemoglobin (Hb) measurements, i.e. at both start and end of supplementation, are available on a total of 225 children. Mean Hb levels at start were slightly lower after intervention (Table 4).

Table 4. Change in haemoglobin status

	Mean ± SD	n	t	p
Hb (g/dL) - START	9.86 ± 1.69			
Hb (g/dL) - END	9.63 ± 1.53	225	1.95	.053

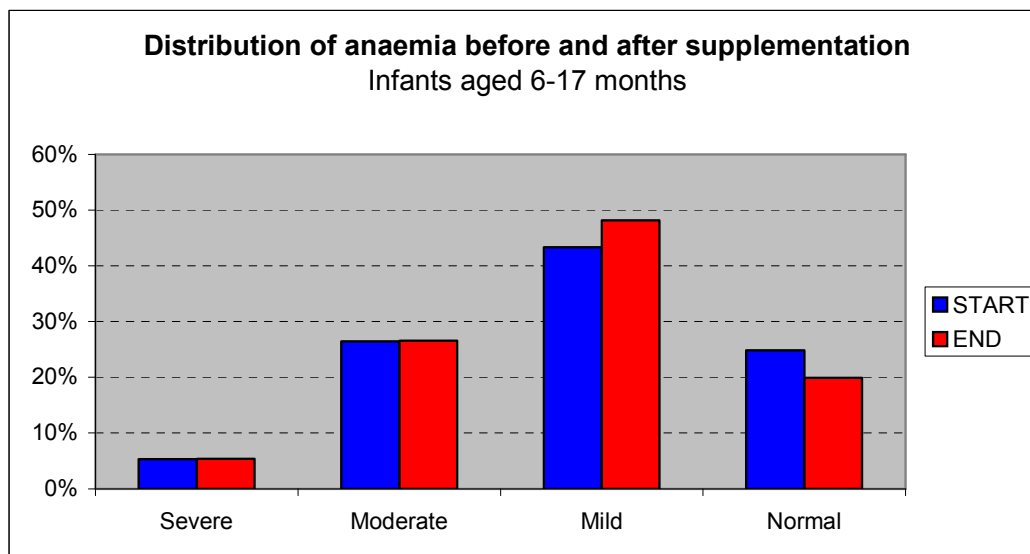
T-test for Dependent Samples (supgen_a.sta). Marked differences are significant at p < .05

Classifying anaemia by level of severity shows that the majority (43%) of infants in this young age group are affected by mild anaemia while about 30% suffer a moderate to severe anaemia (Table 5). Figure 1 depicts the distribution of anaemia before and after the intervention. No considerable change was observed except a small 5% increase in mild anaemia.

Table 5. Change in the distribution of anaemia

Class of anaemia	START % (n)	END % (n)
Severe (<7)	5.29 (20)	5.39 (13)
Moderate (7-9)	26.46 (100)	26.55 (64)
Mild (9-11)	43.39 (164)	48.13 (116)
Normal (≥11)	24.87 (94)	19.92 (48)

Figure 1. Anaemia before and after supplementation



Growth

Results on growth are given in Table 6. Growth velocity reached an average of 7 mm/months, however large variation were observed due to the difficulty of the measurement.

Table 6. Indices of growth

	n	Mean ± SD
HT_VEL (mm/months)	246	7.12 ± 15.67
Δ HAZ	244	0.32 ± 1.66

5.2.3. Treatment strategy in children aged 18-59 months

Anaemia

Haemoglobin (Hb) measurements available both before and after supplementation were completed on 592 stunted children aged 17-59 months. A statistically significant increase of 0.4 g/dL Hb was observed after supplementation (Table 7). If including only those children attending more than 9 weeks of supplementation, this difference becomes 0.6 g/dL.

Table 7. Change in haemoglobin status

	Mean ± SD	N	t	p
Hb (g/dL) - START	10.19 ± 2.15			
Hb (g/dL) - END	10.60 ± 1.79	592	-5.29	.000

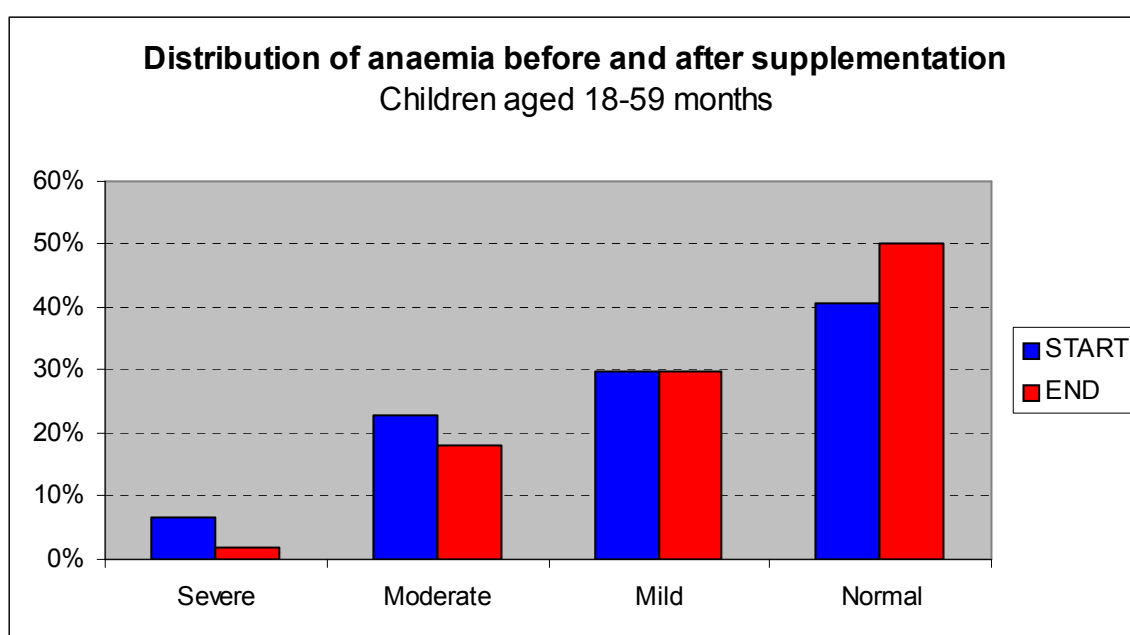
T-test for Dependent Samples (supgen_a.sta). Marked differences are significant at p < .05

The classification of anaemia by level of severity shows that approximately 60% of children suffer from severe to mild anaemia (Table 8).

After supplementation, the distribution of anaemia was shifted to the right as shown in Figure 2. Severe anaemia was markedly reduced from 7% to 2% after intervention while moderate anaemia decreased from 23% to 18%. Children classified as presenting "normal" Hb levels increased by 10% (from 40 to 50%).

Table 8. Change in the distribution of anaemia

Class of anaemia (Hb in g/dL)	START % (n)	END % (n)
Severe (<7)	6.75 (50)	2.06 (13)
Moderate (7-9)	22.94 (170)	18.04 (114)
Mild (9-11)	29.82 (221)	29.75 (188)
Normal (≥ 11)	40.49 (300)	50.16 (317)

Figure 2. Distribution of anaemia

Growth

The impact on growth retardation, as expressed in the change in Height-for-Age Z-score, showed promising results with a 0.2 difference in HAZ (Table 9). The change is of the same magnitude as that obtained in the pilot project.

Table 9. Change in height indices

	n	Mean \pm SD
Δ HAZ	629	0.19 \pm 0.87
HT_VEL (mm/months)	629	6.72 \pm 8.73

5.3. Compliance

Monitoring compliance at household level through the network of Maternal and Child Health (MCH) staff proved to be more difficult than expected. Only a minority of the MCH staff could carry out the questionnaires because checking the quantity of supplement available within the households was considered "embarrassing" for local health staff.

From the 50 jaimas included in the compliance survey, in 30 of them the quantity of supplement present in the household corresponded to the remaining number of days prior to the following distribution. For the remaining 20, the quantity of supplement found in the jaima was either higher or lower than the number of remaining days, or no supplement was found at all. Reasons for not complying were included: interruption of supplementation by mother for diarrhoea, consumption of supplement by other siblings. In some cases

mother refused to show the remaining quantity of supplement.

The questionnaire carried out by chiefs of dispensaries proved to be very useful in terms of health promotion. For example, after the sudden increase in diarrhoea in April, chiefs of dispensaries were able to identify and treat children immediately.

5.4. Documentation

To document this intervention, a video tape was produced (attached English and Spanish version) and an illustrated publication is under way of preparation. The aim being to document the rationale and techniques of implementing community-based supplementation programmes. These documentation products will be distributed among International Agencies, non-governmental organisations and concerned specialists.

In the aim of documenting the rationale, design and results of the intervention to manage child anemia and growth retardation in a refugee camp setting, the following steps of the program activities were documented with video-tape entitled «Managing child anemia and growth retardation : A food-based intervention among Saharawi refugees» :

1. Saharawi refugee situation : brief history of western sahara territory, establishment of the Republic Saharawi Arab Democratic Republic and UN peace plan for the referendum.
2. General description of life circumstances in refugee setting : environmental conditions (climate, hygiene), description of the camps.
3. Involvement of international community in humanitarian aid : ECHO, NGO's, CISP
4. Results of the 1997 survey on health and nutritional status in saharawi children
5. Causes and consequences of malnutrition : low nutritional value of the current food aid, lack of complementary food for weaning children, poor sanitation, poor health education and awareness. Consequences : anemia, stunting
6. Strategies to fight anemia and growth retardation in Saharawi children by using micronutrient fortified foods : design of the pilot community-based intervention project and results in reduction of anemia and velocity of growth retardation, extension of a community-based intervention to a population-based approach.
7. Social advantages and efficiency of the food-based intervention in managing anemia and growth retardation.

5.5. Scholarships

In the aim of long-term nutrition interventions self-managed by Saharawi health authorities, a team of 5 laboratory technicians has been trained in the nutrition assessment techniques during the first pilot project. Scholarships were planned for additional training in Italy. However, only one technician was able to attend. He has received a training in laboratory techniques for the identification of the protozoan parasite *Cryptosporidium*, a pathogen known to be associated with diarrhoeal diseases and impaired immune responses. Analyses were performed on stool samples of those children reported by mothers to suffer from diarrhoea. No infection of *Cryptosporidium* were detected.

6. DISCUSSION AND CONCLUSIONS

This large-scale supplementation programme encountered a great success among the population, as observed by the numbers of beneficiaries reached (total 4015 children by mid-June) and figures were still growing as more and more children were being registered. Enthusiasm of mothers was widespread as mothers were concerned whether this supplementation would continue in the future.

Nutritional impact of supplementation

Anaemia prevalences differed significantly across the wilayas with Ausserd showing the lowest and Smara and El Ayun the highest. The impact on reduction of anaemia was significant in the older age group, reducing almost entirely severe anaemia in only 3 months and hereby shifting the distribution towards normality. Haemoglobin levels increased by 0.5 g/dL in this group. Similar encouraging results were obtained as to the change in height-for-age Z-score (an indicator of stunting) whereby the same change was reached as in the pilot project.

Pilot versus large-scale interventions

Compared to the 1998 pilot project in which monitoring conditions were guaranteed by the permanent supervision of international staff, this population-based intervention was characterised by a considerable involvement and effort from local authorities which mobilised all health staff as well as the general population. This has its importance in that it is a first step towards nutritional awareness among the Saharawis and towards self-management of nutritional programmes. Furthermore, in the opinion of Saharawi health staff, it is the first time since refugees settled in the camps that mothers started being directly concerned with the nutritional wellbeing of their children, whereas this was until now always dealt by local health staff.

However, the correct use of supplement was not always well understood, for instance sharing of supplement with older siblings was often reported. There are still misperceptions around the nature and goal of the supplement. Indeed, the supplement is still considered by most as a common food to be shared with all family members who do not distinguish it from a fortified supplement designed for a target child. Therefore, some suggest that by bringing the child daily to the dispensary as was done in the pilot project, the mother will better understand the link between nutrition and child's health.

Effectiveness of distribution and monitoring systems

The weekly distribution system was well managed by daira health staff as to organisation and monitoring attendance. Intake of supplement proved to be very difficult to monitor in the jaimas due to strong cultural beliefs. Indeed, MCH staff is composed of old women whose visits inside jaimas are usually not well accepted because considered suspicious in bringing the "bad eye".

Use of health dispensaries as a tool for health and nutrition promotion

The sensitisation campaign through the radio broadcasts and continuous group discussions proved to very useful because it allowed to understand how health is perceived by mothers. Indeed, sick children are seldom brought to the dispensaries for treatment. Therefore, integrating similar nutrition interventions within the health system encouraged early treatment of common children diseases (diarrhoea, fever, respiratory infections) that are the major cause of mortality. For example, in April various camps experienced a sudden

increase in diarrhoeal episodes due to water contamination (this was confirmed by laboratory analyses of drinking water conducted by project staff). Information leaflets were promptly prepared in Spanish and Arabic (Annexes 6 and 7) and distributed to the health staff and local authorities at wilaya and daïra levels providing basic health education messages on proper hygiene procedures and treatment measures for diarrhoea.

Acceptability of supplement

The rice-flour porridge for 6-17 months infants continues to be poorly accepted by mothers. The proper weaning of young infants is a concept poorly understood and a real concern among Saharawi society because of mother's ignorance on child care and feeding. This stems from the fact that for many years, due to the lack of weaning foods through food aid, the weaning child has always been given milk beyond the first year of age and has thus become a rooted feeding practice. However, it is not only a matter of availability of weaning foods, as many mothers ignore how to properly feed a child which result in many cases of severe malnutrition. The taste of the rice-flour porridge still needs to be improved in order to encourage mothers to feed the weanling child. Moreover, proper hygiene practices, such as boiling water and washing hands before preparing the porridge, are not systematic practices among caretakers and expose the risk of food contamination. The groundnut snack for older age group did not pose any problem as no special preparation is needed and children are able to feed themselves.

7. RECOMMENDATIONS

Prevention

- the intervention on complementary feeding of infants 6-17 month old is not yet appropriate to slow down progression of stunting and anaemia and different approaches need to be sought;
- rice or corn-based flours should be used, given high prevalence of celiac disease (5-6% of positive anti-gluten antibodies);
- Improve the taste and "appearance" of the porridge and seek alternative weaning foods;

Treatment

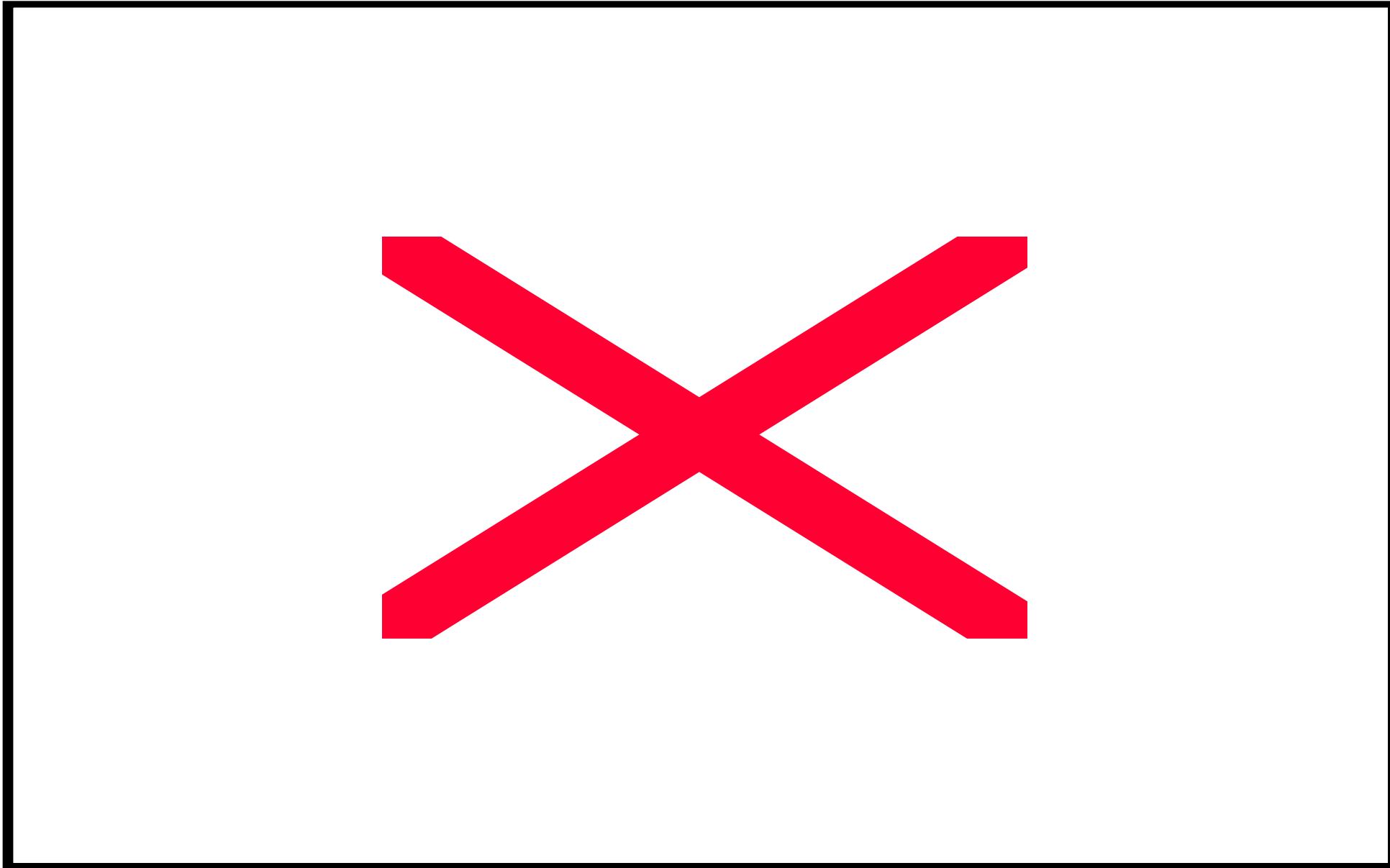
- the intervention on stunted children 18-59 month old is appropriate to slow down progression of stunting and anaemia;
- the distribution of groundnut paste supplement with high mineral and vitamin content targeting all growth-retarded and/or anaemic children aged 18-59 months in the population, is recommended to continue given the urgency of treatment of malnutrition;

General

- maintain the distribution system through the health network for health and nutrition promotion and for maximising compliance;
- strengthen education on feeding practices, child care and malnutrition for both local health workers and caretakers;
- Sensitisation campaign should be sustained and intensified. Methods include the use of educational posters, video-tapes, and radio broadcasts;

- Tackle severe malnutrition cases by providing hospitals with supplements as well as adequate nutrition training for local medical doctors;
- Provide chiefs of dispensaries with adapted guidelines on the management of common childhood illnesses;
- Indicate the composition of the groundnut paste on the packaging;

ANNEX 1: GROWTH CHART POSTER



ANNEX 2: MICRONUTRIENT COMPOSITION OF SUPPLEMENTS

SUPPLEMENT B	LARN (RPI italy) 4-6 years	PLUMPY SAUCE		
		For 100 g	Daily Dose 40g	% LARN
<u>Minerals:</u>				
Calcium (mg) (1173 mg of CaHPO4)	800	1000,0	400,0	50,0
Potassium (mg) (900 mg of K2HPO4)	800	1134,0	453,6	56,7
Phosphorus (mg) (+CaHPO4+ K2HPO4)	800	635,0	254,0	31,8
Magnesium (mg)	150-500	156,0	62,4	41,6
Iron (mg)	9	42,0	16,8	186,7
Zinc (mg)	6	41,0	16,4	273,3
Copper (mg)	0,6	2,0	0,8	133,3
<u>Vitamins:</u>				
A (micrograms)	400	2000,0	800,0	200,0
D(micrograms)	10	50,0	20,0	200,0
E (mg)	?	20,0	8,0	?
C (mg)	45	125,0	50,0	111,1
B1 (mg)	0,7	3,5	1,4	200,0
B2 (mg)	1,1	4,0	1,6	145,5
B6 (mg)	0,7	3,5	1,4	200,0
B12 (micrograms)	1	3,5	1,4	140,0
Folate (micrograms)	130	500,0	200,0	153,8
Pantothenic Ac (mg)	3-12	25,0	10,0	333,3
Niacin (mg)	11	50,0	20,0	181,8

SUPPLEMENT A	LARN (RDA italy) 0,5-1 year	RICE-FLOUR	
		Daily Dose 50 g	% LARN
<u>Minerals:</u>			
Calcium (mg)	500	500	100,0
Phosphorus (mg)	600	500	83,3
Potassium (mg)	800	400	50,0
Magnesium (mg)	150-500	160	No Data
Iron (mg)	7	9	128,6
Zinc (mg)	4	9	225,0
Copper (mg)	0,3	0,6	200,0
<u>Vitamins:</u>			
A (micrograms)	350	<u>per 100 Kcal:</u> 200	<u>200kcal/day:</u> 114,3
D(micrograms)	25	2	16,0
E (mg)	?	8	No Data
C (mg)	35	16	91,4
B1 (mg)	0,4	0,14	70,0
B2 (mg)	0,55	0,4	145,5
B6 (mg)	0,4	0,18	90,0
B12 (micrograms)	0,5	0,4	160,0
Folate (micrograms)	50	80	320,0
Pantothenic Ac (mg)	3-12	2	0,0
Niacin (mg)	5	2,6	104,0

ANNEX 3: SUPPLEMENTATION CARD

ANNEX 4: MONITORING QUESTIONNAIRE

part 1 : In the dispensary

- 1. Did the child vomit last week?*
- 2. If yes, how many days?*
- 3. Did the child had diarrhoea last week?*
- 4. If yes, how many days?*
- 5. If yes, how many looses per day?*
- 6. Did the child had fever last week?*
- 7. If yes, how many days?*
- 8. Did the child drink water just after having the supplement?*

part 2 : In the jaima

The following questions are to be answered by MCH staff after monitoring the intake inside the jaimas:

- 9. Does the child eat the entire ration of the supplement?*
- 10. Did the mother attend the last distribution (check from supplementation card)?*
- 11. What is the quantity of supplement left in the jaima?*
- 12. Is the supplement stored in a safe and clean place?*
- 13. Are the utensils used for the porridge and child hands cleaned before eating?*
- 14. Does the child eat the supplement early in the morning?*
- 15. Is the supplement shared with other members of the family?*
- 16. Does the mother want to continue supplementation after the end of the project?*

ANNEX 5: EDUCATION POSTER

ANNEX 6: DIARRHOEA INFORMATION LEAFLET

Programa de lucha contra la anemia y el retraso de crecimiento

INFORMACION SOBRE LA DIARREA

1. Causas de la diarrea

La diarrea es una enfermedad causada principalmente por microorganismos patógenos en el agua contaminada o en los alimentos contaminados (*Eschericia coli*, *Shigella*). El cólera es un ejemplo de diarreas líquidas, pero sólo una pequeña proporción de las diarreas son debidas a cólera.

2. Identificación de la diarrea

La diarrea ocurre cuando las heces son más líquidas del normal. Es muy frecuente en niños entre los 6 meses y 2 años de edad. Las deposiciones si ocurren frecuentemente (1 o 2 veces en el día) y son normal de consistencia y de aspecto NO son diarreas. Es claro que la frecuencia de las deposiciones en el día depende de la alimentación y la edad del niño.

En general, la diarrea se define cómo "3 o más deposiciones líquidas en el día".

Hay mucha desconocimiento sobre ese tema, en particular entre las madres. Las madres generalmente describen síntomas de constipación en sus hijos.

Hay muchos tipos de diarreas:

- (a) si el episodio de diarrea dura menos de 2 semanas, es una diarrea aguda. La diarrea líquida y aguda causa deshidratación y contribuye a la desnutrición.
- (b) Si la diarrea dura más de 2 semanas, es una diarrea persistente. Sólo unos 20% de las diarreas son de tipo persistente.
- (c) La diarrea con sangre en las heces, con o sin flemas, se llama disentería. La causa mayor de la disentería es la bacteria *Shigella*. Un niño puede tener las dos simultáneamente, diarrea líquida y también disentería.

3. Tratamiento de la diarrea

Un niño que tiene diarrea aguda o persistente corre el riesgo de deshidratación con unas consecuencias sobre el estado nutricional. Las pérdidas de micronutrientes durante los episodios de diarrea pueden ser muy elevadas. Es muy importante que estos niños reciben bastante fluidos (hasta los 2 años, entre 50-100 ml después de un episodio de diarrea; los mayores de 2 años de edad, entre 100 y 200 ml) y que siguen una alimentación rica en micronutrientes para compensar las pérdidas debidas a la diarrea. Los alimentos distribuidos en ese programa son en ese contexto ideal para garantizar la correcta alimentación de los niños enfermos. En caso que no hay SRO (Sales de Rehidratación Oral), las madres pueden preparar una fórmula muy cercana con los ingredientes en casa: añadir 7-8 cucharitas de azúcar y 1 cucharita de sal dentro 1 litro de agua recién hervida.

SEGUIR MUY ATENTAMENTE LAS RECOMENDACIONES EN EL PARÁGRAFO 4.

4. Mensaje para las madres y la población en general

El agua para el consumo debe reunir algunas condiciones de pureza, para que no cause problemas en la salud del hombre y para que no afecte el medio ambiente y la calidad de vida en general.

El agua contaminada actúa como medio de transporte de microorganismos patógenos provenientes de materias fecales que producen enfermedades como la fiebre tifoidea, la amebiasis, la hepatitis y sobre todo DIARREAS de origen bacteriana o viral, entre otras.

LA EBULICIÓN ES EL MÉTODO MÁS SIMPLE Y CONOCIDO PARA POTABILIZAR EL AGUA.

Consiste en la destrucción de los microorganismos por las altas temperaturas (superior a 100°C) que se producen con la ebullición. En la ebullición el agua debe hervir durante aproximadamente 10 minutos, para que el agua se considere apta para el consumo humano.

EL AGUA ES PRECIOSA PERO TAMBIÉN VEHICULO DE ENFERMEDADES.

- El agua es preciosa e indispensable para la vida. Sin embargo, bebiendo agua no potable se pueden contraer peligrosas enfermedades infecciosas y parasitosis.
- Si hay que tomar agua de origen sospechosa, asegurarse que por lo menos sea clara, sin olor y sin sabor desagradable.
- Hace falta cuidar atentamente el agua para beber, guardándola siempre en contenedores limpios, bien tapados o cubiertos, en lugar posiblemente fresco y a reparo de insectos.
- Si hay la sospecha que el agua pueda haberse contaminado es aconsejable hervirla por al menos 10 minutos.

En caso de diarrea:

Las heces son infectas y altamente contagiosas. Es a través del contacto con estas heces infectas que la diarrea se propaga a otros niños y miembros de la familia. Hay que tener mucho cuidado.

LAS 4 REGLAS DE HIGIENE

1. **SIEMPRE lavarse las manos después de haber estado a contacto con las heces;**
2. **SIEMPRE lavarse las manos antes de tocar el agua o los alimentos;**
3. **SIEMPRE lavar las manos de los niños antes de la comida;**
4. **SIEMPRE eliminar del medio ambiente - el espacio alrededor de la jaima, donde los niños juegan - las heces, hechándolas a la letrina o enterrándolas. Las moscas también pueden transportar materia fecal infecta y contaminante a los alimentos y a la boca de los niños pequeños.**

En caso de diarrea, nunca dejar de dar el pecho al niño (amamantar) y prevenir la deshidratación dándole la solución de rehidratación muy a menudo (para niños y adultos).

Recomendaciones en respecto a los alimentos:

- Si en una familia de un niño del programa se encuentran personas con diarrea, hay que tener mucho cuidado y vigilancia con la higiene en general, especialmente la persona que prepara los alimentos. Seguir atentamente LAS 4 REGLAS DE HIGIENE principales que son descritas arriba. En particular limpiar muy bien todo el material de la cocina.
- Para la preparación de la papilla: Bien hervir el agua antes de mezclar con la harina de arroz.
- Es importante recordar a las madres que el niño come la papilla dentro de 1 hora que esta ha sido preparada. Si el niño no la come enteramente de una vez, tirar la papilla que queda y no conservarla así.
- Comer la pasta de nueces inmediatamente una vez abierto el paquete. Si queda un poco, botar el paquete.

ANNEX 7: SUPPLEMENT INFORMATION LEAFLET

Programa de lucha contra la anemia y el retraso de crecimiento **INFORMACION SOBRE LOS ALIMENTOS ENRIQUECIDOS**

1. Tipo de alimentos

La CISP/INN distribuye dos tipos de alimentos de suplementación destinados (1) a los niños de 6-17 meses de edad con el objetivo de prevención y (2) a los niños de 18-59 meses de edad afectados por retraso de crecimiento con el objetivo de tratamiento.

El tipo de alimento seleccionado ha sido estudiado especialmente para que sea no solo bien aceptado por los niños (en cuanto a la consistencia, sabor, palatabilidad, etc.) pero también para minimizar al máximo los riesgos de contaminación de los alimentos (al almacenamiento y a la preparación y el consumo) y facilitar la preparación y el consumo disminuyendo los esfuerzos de las madres.

2. Ingredientes

- (1) Papilla para los niños de 6-17 meses: el ingrediente principal es la harina de arroz precocida con enriquecimiento en micronutrientes.
- (2) Pasta de nueces para los niños de 18-59 meses: nueces, soya, aceite vegetal, azúcar, lactoserum, micronutrientes.

3. Niveles de enriquecimiento en minerales y vitaminas

Estos alimentos especiales han sido enriquecidos con minerales y vitaminas. Los minerales y las vitaminas que se han añadido son: calcio, fósforo, potasa, magnesio, hierro, zinc, cobre, vit. A, D, E, C, B1, B2, B6, B12, Acido pantoténico, Folatos, Niacina.

Para la harina de arroz, que tiene el objetivo de prevención, los micronutrientes cubren por la mayoría el 100% de las necesidades nutricionales excepto por el hierro, zinc y cobre por los cuales se cubren 150-300% de las necesidades.

Para la pasta de nueces, los niveles de enriquecimiento en micronutrientes son más elevados para servir como tratamiento. En general, se cubren entre 250 y 300% de las necesidades nutricionales de los minerales y vitaminas.

4. Resultados principales en el proyecto piloto de El Ayun

Los niños que han tomado la harina de arroz han tenido una progresión considerablemente disminuida de retraso de crecimiento y de anemia comparado a los niños que no han tomado.

Los niños que han comido la pasta de nueces diariamente han tenido una aceleración muy significativa de la velocidad de crecimiento (1 mm/mes más que el grupo de control). El retraso de crecimiento ha sido reducido de casi 10%. El resultado más significativo ha sido la eliminación casi total de la anemia: 70% de la anemia desapareció (la prevalencia inicial alcanzaba a 80%) mientras en los niños que no tomaron la anemia se redujo sólo de unos 10%.

5. Alimentación de los niños durante los episodios de diarrea

La diarrea es una enfermedad causada principalmente por microorganismos patógenos en el agua contaminada. Un niño que tiene diarrea aguda o persistente corre el riesgo de deshidratación con unas consecuencias sobre el estado nutricional. Las pérdidas de micronutrientes durante los episodios de diarrea pueden ser muy elevadas. Es muy importante que estos niños reciban bastante fluidos (hasta los 2 años, entre 50-100 ml después de un episodio de diarrea; los mayores de 2 años de edad, entre 100 y 200 ml) y que sigan una alimentación rica en micronutrientes para compensar las pérdidas debidas a la diarrea.

Los alimentos distribuidos en ese programa son en ese contexto ideal para garantizar la correcta alimentación de los niños enfermos. Es importante recordar a las madres que el niño come la papilla dentro de 1 hora que esta ha sido preparada. Si el niño no la come enteramente de una vez, tirar la papilla que queda y no conservarla así.

Un informe adicional sobre la diarrea (sus causas, diagnóstico, tratamiento) ha sido preparado con las recomendaciones básicas para los jefes de los dispensarios y principalmente las madres.

ANNEX 8: SUMMARY OF THE PROJECT FOR SAHARAWI AUTHORITIES

