

# Micronutrient Powder Use and Outcomes in Refugee Camps in Nepal (ASIA)



“A refugee is a person who owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group, or political opinion, is outside the country of their nationality, and is unable to or, owing to fear, is unwilling to avail him/herself of the protection of that country.”

United Nations High Commissioner for Refugees (UNHCR)

Map created by Salahuddin Ahmed



Capital:	Kathmandu
Population:	29,519,114
Population Density:	184 per km <sup>2</sup>
Unemployment Rate:	42%
Life Expectancy at Birth:	60.94 years (total population)
GDP per Capita (PPP):	US\$1,000
Infant Mortality Rate:	43 deaths / 1,000 live births
Literacy Rate:	48.6%

According to the United Nations High Commissioner for Refugees (UNHCR), the number of refugees at the end of 2007 stood at 11.4 million, including 1.7 million people considered to be in a refugee-like situation. Developing countries hosted 82% of the global refugee population and the 50 least developed countries provided asylum to 18% of the world's refugees. Children and adolescents represent the majority of people of concern in Africa and Asia. It is well known that micronutrient malnutrition is an important public health concern in populations dependent on food assistance, such as refugees and displaced persons.

**REFUGEE FACTS:**

- By the end of 2007, Asia hosted the largest number of refugees (55%) followed by Africa (22%) and Europe (14%).
- Although the precise number of refugee locations is difficult to establish, in 2007 UNHCR identified over 1,100 different locations. These included some 370 camps/centers, 480 urban locations, and close to 300 locations where refugees and other persons of concern were living in rural areas dispersed among the local population.
- During 2007, more than 653,000 individual applications for asylum or refugee status were submitted to Governments and UNHCR offices in 154 countries.

**Nutritional status in Nepali refugee camps**

In Nepal some 100,000 Bhutanese of Nepali ethnicity live in seven refugee camps in southeastern Nepal and are highly dependent on food relief and rations from the World Food Programme (WFP). As a result of a survey in February 2007 by the Center for Disease Control (CDC), that indicated a high prevalence of anemia (43.3%) and chronic malnutrition, i.e. stunting, (26.9%) amongst the children aged 6-59 months in Damak refugee camp, a comprehensive Micronutrient Powder (MNP) program was initiated to supplement the food rations.



Above: Community Health Supervisor and Bhutanese Incentive Volunteer, instructs women on how to use the Vita-Mix-It.

Below: In her hut, a mother adds Vita-Mix-It to the food of her 4-year-old daughter.



## Improving lives with Micronutrient Powders

The MNP program started in March 2008 and aimed to reach all 8,500 children aged 6-59 months in the camps, with a 1 g sachet of a specially formulated MNP (see table below), called Vita-Mix-It (VMX), that was designed to be sprinkled every other day on to the child's home-prepared food by their mothers/caregivers. The micronutrients (16 vitamins and minerals) included in the powder and the level added (1 RNI for most micronutrients) was based on the WHO / WFP / UNICEF recommendations ([http://www.who.int/nutrition/publications/WHO\\_WFP\\_UNICEFstatement.pdf](http://www.who.int/nutrition/publications/WHO_WFP_UNICEFstatement.pdf)) and also took into consideration the micronutrients provided by the standard food rations distributed in the camp.

### Micronutrients included in Damak Refugee MNP

Nutrient	Unit	Joint Statement UNICEF/WHO/WFP <5 years No fortified food available Non malaria area	Amount per 1g sachet	%RNI* Ages 1-3 years
Vitamin A	µg RE	400.0	100.0 <sup>1</sup>	25
Vitamin D	µg	5.0	5.0	100
Vitamin E	mg	5.0	5.0	100
Vitamin K	µg	-	30.0 <sup>2</sup>	200
Thiamine	mg	0.5	0.5	100
Riboflavin	mg	0.5	0.5	100
Pyridoxine	mg	0.5	0.5	100
Folic Acid	µg	150.0	150.0	100
Niacin	mg	6.0	6.0	100
Vitamin B <sub>12</sub>	µg	0.9	0.9	100
Vitamin C	mg	30.0	30.0/60.0 <sup>3</sup>	100/200
Zinc	mg	4.1	4.1	100
Iron	mg	10.0	10.0	100
Selenium	µg	17.0	17.0	100
Copper	mg	0.56	0.34 <sup>4</sup>	100
Iodine	µg	90.0	30.0 <sup>1</sup>	33

\*RNI = Recommended Nutrient Intake (WHO/FAO 2004).  
<sup>1</sup> Reduced because fortified foods provided by WFP already contribute a considerable amount.  
<sup>2</sup> Vitamin K added as intake is usually low where vegetable consumption is low.  
<sup>3</sup> The original MNP had 30 mg of vitamin C but this has been increased, following the CDC assessment, to 60 mg to enhance iron absorption and mitigate the effect of tannins in the tea consumed.  
<sup>4</sup> Copper reduced to US RDA as upper intake level for children 1-3 year is 1 mg.

The recommended use of MNP every other day rather than on a daily basis was based on the fact that the food rations also provide some micronutrients and in line with the research finding of improved compliance and anemia cure rates with 'flexible MNP administration' compared to daily.\* The food rations together with the VMX was calculated to meet the children's micronutrient needs and so would be expected to reduce the high level of micronutrient deficiencies.

At the start of the program information materials were distributed and demonstrations/education sessions were given by trained nutrition workers to inform the mothers/caregiver on the purposes, benefits and correct use of the VMX.

## Assessing the impact of Micronutrient Powders

Six months after the initiation of the MNP distribution program another CDC survey was undertaken that included in its objectives, to estimate the current prevalence and severity of malnutrition and of anemia among the children aged 6-59 months and to evaluate the VMX program awareness, coverage and household implementation.

The assessment was a cross-sectional nutritional survey that included 502 children drawn from a systematic random sample from the camps (these were not the same children investigated 1.5 years earlier). The mothers/caregivers were asked about their knowledge, attitudes, and practices in relation to the VMX program and in addition, anthropometric measurements were taken and the prevalence of anemia was estimated using hemoglobin assessed by finger-prick blood samples.

The results showed that although there was a high (98.2%) general awareness of the program and mothers/caregivers showed an excellent compliance and knowledge of appropriate dosage and use of the MNP, the prevalence of anemia (43.6%) had not improved compared to February 2007 (43.3%). Severe anemia prevalence was 0.4%, moderate 18.1% and mild 25.1%. The 6-11 month age group had the highest prevalence (78.3%) and it was noted that anemia prevalence declined with increasing age.

### DEFINITIONS

**Stunting / Chronic malnutrition** is defined based on height-for-age and is the primary manifestation of malnutrition in early childhood. The World Health Organization criteria defines severe stunting for children aged 6-59 months as a Z-score of < -3.0; moderate stunting a Z-score of > -3.0 but < -2.0 and not stunted a Z-score of > -2.0.

**Anemia** is defined as a qualitative or quantitative deficiency of hemoglobin, a protein found inside red blood cells. The World Health Organization criteria for severe anemia in children aged 6-59 months is a hemoglobin concentration of < 7.0 g/dL; moderate anemia is 7.0 – 9.9 g/dL and mild anemia is 10.0 – 10.9 g/dL.



Refugee children eating wheat-soy porridge fortified with Vita-Mix-It.

These findings have raised a number of concerns and questions regarding MNP use and some have questioned its efficacy. However, it must be noted that numerous previous trials with MNPs have proven their efficacy and it is therefore prudent to interpret survey results with caution. It is particularly important to give due consideration to a number of important points with regard to these types of surveys in general and this survey specifically:

- Anemia prevalence may not be considered appropriate as the single criteria to use in the assessment of the efficacy of an MNP, because MNP also impacts on other micronutrient deficiencies.
- Hemoglobin concentration, which can be improved by consuming MNP, is not only affected by nutritional factors but also by inflammation, worm infestation, malaria and iron stores of the child at birth. Thus, the degree to which MNP can reduce anemia depends on the extent to which it is caused by micronutrient deficiencies versus other factors.
- Current surveys used in these program settings (cross-sectional, no control group), may not be appropriate to assess effectiveness of MNPs, thus, these designs need to be discussed in greater detail.
- Questionnaires regarding the use of MNPs given to mothers/caregivers might result in a biased response and might not give a true reflection of those who actually default in making use of the powder.
- The survey also noted a general decrease in nutritional status including increased prevalence of wasting and underweight. This could have had a negative impact on the prevalence of anemia as well, in which case the MNP may have actually prevented a deterioration of anemia prevalence.
- More than 12 months passed between the most recent survey and the introduction of the VMX, thus anemia prevalence may have been different when VMX distribution started.
- In addition, the next survey was conducted in October 2008, 18 months after the previous survey (February 2007). Seasonal differences may affect anemia levels, making it difficult to compare the October data with the February data.
- The global food crisis struck during the period between the two surveys and so could have negatively impacted on the foods the refugees were able to acquire in addition to the food ration provided by WFP, which could have increased micronutrient deficiencies.
- The high level of tea consumption reported in the survey amongst the children (75% of children aged 3-4 years had consumed tea in the past 24 hours) could have impacted on iron status, as tea is a well documented iron absorption inhibitor. The tea drinking patterns of the children needs to be further investigated to assess its possible impact.

## Actions taken

Following on the CDC survey, a number of actions have been implemented to further address the impact of the use of MNPs in the refugee setting in Nepal and these include:

- Analysis of the micronutrient content of the MNPs that has shown that the levels set in the specifications for the supplement are still met in the end product after 6 months exposure to field conditions.
- Doubling the vitamin C level of the powder (from 30 to 60 mg) to mitigate the negative effect of tea on iron absorption.
- Further investigation of the deterioration in nutritional status and of changes in food consumption pattern (including tea consumption by young children).
- Reconsideration of the survey design to possibly include a comparison group, such as school-age children or women of reproductive age from the same camps who don't receive MNP.

The results from ongoing better designed evaluations of MNP programs will have to be awaited before firm conclusions can be drawn.

## More information

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\* Ip H, Hyder S, Haseen F, Rahman M, Zlotkin SH. Improved adherence and anaemia cure rates with flexible administration of micronutrient Sprinkles: a new public health approach to anaemia control. *European Journal of Clinical Nutrition* 2009; 63:165-72.