

MICRONUTRIENT DEFICIENCIES AND STRATEGIES FOR CONTROLLING IN VIETNAM.¹

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ABSTRACT: Micronutrient deficiencies are of great importance in public health in developing countries. In Vietnam, the prevalence of vitamin A deficiency and xerophthalmia was seven times higher than WHO's cut off point in 1988, and is xerophthalmia free in 1994 due to vitamin A capsule programme; night-blindness rate of mothers is however 0.58%. Nutritional anaemia is actually very frequent; a recent survey conducted in 9,550 households representative for 7 ecological zones showed that 40.2% of non-pregnant women, 52.7% of pregnant women, 15.7% of men, 45.3% and 60% of under 5 and 2 years of age were anaemic. Iodine deficiency is still the nation-wide problem, 94% of school children were estimated to be iodine deficient in 1993 and 27% in 1995.

In the coming years, control of micronutrient deficiencies is of the priority activities in the National Plan of Action for Nutrition. Its goal to be achieved is to eliminate micronutrient malnutrition by the year 2000. The main measures are maintaining the supplementation programme to target population: an universal vitamin A capsules distribution twice a year for the children < 36 months, once for the mother after delivery; iron and folate tablet supplement for pregnant-women daily, weekly tablet distribution in the children and adolescent girls is also studying. Hook worm is a contributor to the anemia in Vietnam, so control of hook worm and improving sanitary condition are also required. Supplementation of iodine by using universal salt iodination is reliable policy.

Improving micronutrient in the people diets is a basic and long term strategy to overcome micronutrient malnutrition problem. Micronutrient fortification on foods and dietary diversification strategies have been proposed to improve vitamin A, iron, iodine, zinc intake during pregnancy, infancy and in the elderly. More education which emphasis on the consequences of micronutrient deficiencies for public, so that they could move to an adequate awareness of these problem and know how to prevent it themselves by getting the best from local available foods.

Other micronutrient with potential public health significance, such as zinc, folate, calcium, thiamine ... need to be assessed and implicated for future programme development in Vietnam.

INTRODUCTION:

In September 1990, the World Summit for Children endorsed some challenging goals for micronutrient for the year 2000: virtual elimination of vitamin A and iodine deficiencies and a one-third reduction in iron deficiency anemia in women. These goals were subsequently reaffirmed at the "Ending Hidden Hunger" policy conference in October 1991 and at the International Conference on Nutrition in

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December 1992, as the beginning of a new period of activities against the micronutrient deficiencies in the World⁽¹⁾.

In Vietnam, the main micronutrient deficiencies (vitamin A, iron, iodine) and their clinical manifestations such as xerophthalmia, anemia, and goiter have been identified as major problems with increasing public health significance in the 1980's decade⁽²⁾.

The national programs for controlling of vitamin A deficiency, anemia and iodine deficiency have been implemented in recently years, the summit of these activities is "The National Plan of Action for Nutrition 1995-2000" approved by the Prime Minister on 16 September 1995 (576/TTg QN) who will target these micronutrient deficiencies so that by the beginning of the next century Vietnam's workforce is able to reach its full intellectual and physical potential" ⁽³⁾.

VITAMIN A DEFICIENCY AND XEROPHTHALMIA IN VIETNAM

From 1985 to 1989, the nation-wide survey carried out in 34.214 children under 5 years old by the National Institute of Nutrition and Institute of Ophthalmology has revealed that vitamin A deficiency and xerophthalmia is a problem of public health significance in Vietnam⁽⁴⁾ (**Table 1**). The total prevalence was 0,72% out of which 0,07% has corneal lesion (X2/X3), seven time higher than the WHO's cut off point (0,01%) (WHO 1976) defined the public health significance. Almost the active xerophthalmia (XN-X3B) were observed in the infant from 12 to 36 months old, and most frequent and most severe clinical form of xerophthalmia has been identified in the group of 25 - 36 months.

Table 1: Prevalence of Xerophthalmia of the Vietnamese children under 5 years (NIN/UNICEF/HK1,1995)

	National Survey 1985-1988 ⁽⁴⁾ (%)	National Survey in 1994 ⁽⁵⁾ (% and 95% C.I.)
Total sample	34,214	37,920
Night-blindness (XN)	0.37	0.05 (0.02 - 0.07)
Bitot's Spots (X1B)	0.16	0.05 (0.02 - 0.07)
X2/X3A/X3B	0.07	0.01 (0.00 - 0.02)
Corneal Scars	0.12	0.05 (0.03 - 0.08)

These studies showed also a close association between vitamin A deficiency and proteino-energy malnutrition (PEM). In fact, the nutritional status of the subjects suffering from xerophthalmia is generally low, and the active lesions of the eye were frequently observed in the severe PEM. A close relationship between xerophthalmia with breast feeding, the beginning of weaning food and the use of green vegetation

in the children dietary were also identified^(4,5).

For controlling the vitamin A deficiency, the MOH (1988) has been implemented the national program, at beginning it piloted in 7 districts, than nowadays extended in the nation-wide with the collaboration of UNICEF and others NGO. Vitamin A consumption and the coverage of the vitamin A supplementation is estimated to be almost 94%. Consequently, active xerophthalmia (XN-X3B) is rare. In 1994, the prevalence of clinical xerophthalmia in the total sample is lower than the WHO criteria of a significant public health problem in Vietnam (**Table 1**). In none of the seven ecological zones does the prevalence of active cases exceed any of the WHO cut-off points. The Central Highlands had the highest prevalence of clinical xerophthalmia as well as the lowest vitamin A capsule coverage.

Maternal vitamin A deficiency is elevated as 0.58% them were found to be nightblind. Older, illiterate and pregnant women were found to have especially elevated prevalence. Maternal nightblindness was highly associated with child night-blindness. Lactating women had a lower, less significant risk of night-blindness, again reflecting the efficacy of the vitamin A capsules distribution program.

Control Program of Vitamin A Deficiency

In 1994, the country was xerophthalmia - free mainly as a result of the universal vitamin A supplementation program. However, prevalence of night-blindness among mother is still high while sub-clinical indicator of vitamin A deficiency are still uncertain. The great challenge for the program is how to sustain its achievements as the long term effects to achieve the goal of elimination vitamin A deficiency by the year 2000⁽⁶⁾.

1. Supplementation with vitamin A of under 3 years (6 to 36 months) old children and women after delivery:
 - For the children, universal distribution of high dose vitamin A (200,000 UI) capsules twice a year through two campaigns: "micronutrient day" (1-2/June) and integrated with national "immunization day" (in December). The use of low dose of vitamin A (50,000UI/month or 2000 UI/day) is recommended.
 - Supplementation one capsule of high dose (200,000UI) of vitamin A for breast-feeding women after giving birth. Encouraged the use of low dose (2000 UI/day) vitamin A.
 - Training and formation the program's staff on the micronutrient deficiencies.
2. Piloting other alternative approaches such as vitamin A fortification in common foods, regularly use of low dose of vitamin A and specially of vitamin A-rich food.
3. Promotion of dietary diversification to increase vitamin A intake.
 - Promotion of breastfeeding is one of important components in the control of vitamin A deficiency in childhood.
 - Promotion of nutrition education emphasizing on breastfeeding and proper supplementary feeding practice "colored rice-porridge", growth monitoring.

- Promotion of the VAC system to provide more foods rich in vitamin A and carotene.

IRON DEFICIENCY IN VIETNAM

Iron deficiency is a problem of major public health significance in Vietnam. A recently in 1994 completed national survey demonstrates the severity of the problem⁽⁷⁾. The levels of anemia are high among all age groups (**Table 2**), children under two years of age are particularly affected, anemia also is a major health problem among women of reproductive age: 60% of women during the last trimester of pregnancy, and more than 40% among non-pregnant mothers are affected.

Table 2: Anemia prevalence in relation to age
(NIN/UNICEF/CDC/PAMM 1995)⁽⁷⁾

Subjects	Prevalence and 95% C.I.	
Children		
0-5 months	61.0	56.6 - 65.3
6-11 months	59.5	56.3 - 62.8
24-60 months	28.2	25.7 - 30.8
all 0-60 months	45.3	42.9 - 47.6
Non-pregnant women	40.2	37.5 - 42.9
Pregnant women	52.7	49.9 - 55.5

Anemia prevalence is high in all regions (**Table 3**), but is greater than 50% in the Central Highlands region and in the Mekong Delta. The Red River region and urban dwellers had the lowest risk of anemia. The majority of anemia is probably attributable to iron deficiency because low serum ferritin was strongly correlated with hemoglobin levels. In addition, dietary meat consumption was highly correlated to anemia levels.

Table 3: Anemia prevalence in relation to place of residence
(NIN/UNICEF/CDC/PAMM 1995)⁽⁷⁾

Factor	Prevalence (%) and 95% C.I.	
Northern Mountainous	44.1	38 - 50.2
Red River Delta	36.7	32 - 41.4
Northern Central Coast	43	37.3 - 48.7
Southern Central Coast	49.2	42.7 - 55.7
Central Highlands	61.4	55.4 - 67.4
South East	45.7	37.8 - 53.6

Mekong River Delta	52.2	46.7 - 57.6
Rural	44.7	41.4 - 47.9
Urban	36.4	30.5 - 42.2

Hookworm is also a major contributing factor to anemia in Vietnam. Helminth infection was found among the majority of women (74.8% tested positive for the ova of at least one helminth). Hookworm infection prevalence was 37%. Anemia risk among infected women was 50% greater than that of uninfected individuals and there was an increasing relationship between the risk of anemia and the intensity of infection. Thus, hookworm infection is an important cause of anemia in Vietnam.

Control of iron deficiency anemia (IDA)

With the strong and productive support and assistance from UNICEF, the central focus of IDA program should be on^(3,6)

1- Iron/folate supplementation for the subject with high risk of anemia

For pregnant women and lactating mothers,

- Universal supplementation providing all pregnant women from the beginning of pregnancy through one month post-parturition, one tablet every day with 60 mg iron and 0,25 mg folate.
- Weekly supplementation approach needs further confirmation. Anemia treatment in female adolescent and non-pregnant women to prepare them for better iron status before pregnancy is recommended (one tablet of 60 mg iron per week). For the group of 6-15 year old: through the school system by the teachers under supervision of the health worker; for the 15-45 years old non-pregnant through some mass organizations (the Women's Union, the Youth Union).

For infants and young children,

- Iron supplementation should be introduced for all infants aged 6-12 months old with daily dose of 12,5 mg iron (1/4 tablets) for 60 days. This strategy will be implemented in small scale to gain experience before going to larger scale. For infants and young children, a multi-micronutrient supplementation including zinc, vitamin A at the same time should be further studied to see impact. Because iron, vitamin A and zinc deficiency is generally associated together in Vietnamese children, these micronutrients have a close relationship to regulate the growth rate^(9,10,11,12).

2. Information, Education and Communication (IEC) activities:

IEC is of highest priority in the IDA program to make the whole population understand the important role of iron in health, iron in foetal growth, in perinatal mortality, in child growth and development, in physical activity and work performance, and finally in intellectual performance and productivity. At the same

time that IEC will focus on adding iron-rich foods to the dietary and an inter-sectorial approach in IEC activities will actually be need.

3- Intestinal worm control

In Vietnam iron deficiency is closely associated with high prevalence of hookworm. The information education and communication on the promotion of hand washing, sanitary disposal of feces and refuse and personal hygiene will be focused. A deworming program through yearly campaigns to deworm children and non-pregnant women will be applied (PCD project).

4- Measures to increase dietary intake of iron

- Promote breast-feeding is very important for control of anemia among infants, promoted early breastfeeding and of exclusive breastfeeding up to 4-6 months of age, because breast milk is a good source of well absorbed iron.
- Improve complementary feeding and dietary diversification, education and communication will zero-in on proper weaning patterns, correcting the wrong habit in child feeding practices, on the promotion of consumption of foods with high hemoglobin iron (meat, fish), on the promotion of processing of foods at household level to enhance the iron absorption and to minimize absorption inhibitor. Promotion of the VAC ecosystem in order to produce more iron-rich foods to be consumed by the family.
- Food fortification with iron: a pilot study on iron and vitamin A fortification on biscuits for the children, between iron, zinc and calcium fortification for the pregnant women are studying in the National Research Program (KHCN-11-09).

IODINE DEFICIENCY (IDD)

Goiter and iodine deficiency has been recognized as a public health problem in mountainous regions of Vietnam since the beginning of the 1970 decade. Since then, the Ministry of Health have implemented the control of goiter program with emphasis to the high regions which include 15 provinces with 7 millions of people. Nowadays, iodine deficiency is still nation-wide problem. The national survey in 1993 of 3,062 children between 8 and 12 years from 30 schools yielded a prevalence of 94% (16% severe, 55% moderate and 23% mild) IDD based on urinary iodine content⁽¹³⁾.

Other survey conducted in 1995 in the school children (**Table 4**) showed that IDD is widespread in Vietnam, IDD is not only limited in mountainous areas but also in other part of the country, there was geographical variability in the severity of IDD.

Table 4: Prevalence of goiter in school-age children
(My et al. 1996)⁽¹³⁾

Province	Goiter		Province	Goiter	
	N	%		N	%
Northland Mountain			Northern Central		
Tuyen Quang	2275	38,9	Thanh Hoa	2415	25,0
Cao Bang	6235	27,6	Nghe An	4949	19,7
Lang Son	1356	23,9	Ha Tinh	966	33,2
Red River Delta			Mekong River Delta		
HaNoi	2838	9,9	HCM City	2801	23,2
Hai Hung	3181	20,5	Dong Nai	3035	23,9
Thai Binh	900	16,4	An Giang	2440	26,7
Coastal Central			Central Highland		
Binh Dinh	1599	26,7	Gia lai	2521	15,8
Phu Yen	2350	25,4	Kon Tum	1442	40,3
Khanh Hoa	2738	33,5	Dak Lak	7318	17,7
East South					
Tay Ninh	2646	19,1			
Soc Trang	2835	9,0			
Vung Tau	2564	16,7			

National IDD control program^(3,13)

During the 1970 and 1980 decade, the main strategy was promotion of iodized salt use for the mountainous areas. In the beginning, iodized salt was produced locally, manually and supervised by a network of center of goiter prevention at provincial and district level. From 1980, the program have received higher concern of the government and many international agencies and NGO both in mental and material support. Sine January 1995, the government has approved the universal iodination strategy (No 481/TTg, Sep. 8, 1994). The program has initially focused on those regions of the country with the highest levels of IDD, and in these regions, the majority of households have access to adequately iodized salt.

The goals:

- Elimination of iodine deficiency by the year 2000
- Elimination of IDD by the year 2005.

Specific objectives:

- Elimination of iodine deficiency:
 1. Iodized salt coverage 90% nationwide
 2. Sufficient prophylactic iodine content (= 20ppm) found in 100% of household salt sample tested.
 3. Mean urinary iodine in children 8-12 years of age found to be $>10\mu\text{g}/\text{dl}$
- Elimination of IDD:
 4. Mean urinary iodine found to be $> 10\mu\text{g}/\text{dl}$ among people in the whole country
 5. Goiter prevalence among children 8-12 years of age less than 5%.

Content of the program :

- Short-term measures:

An effective short-term solution is the universal addition of iodine to salt, iodized salt is sufficient in prophylactic dose of iodine (20 ppm at household and 50 ppm at place of production and/or periodic distribution of iodized oil, either administrated orally or by injection (every three to six months orally, up to two year interval by injection) for the severe areas of goiter. The use of this salt is being promoted nationwide, and other methods of delivering iodine, for instance by adding to fish sauce, to drinking water or to biscuits, will be explored.
- Long-term method:

In the longer term, people's diets must include more source of iodine. In the areas where the soil has been eroded and the iodine content diminished, it may be possible to fortify the soil with fertilizer.
- IEC focus on principal activities such as
IDD control message in health education curriculum in primary schools; production of postal stem on IDD control; communication campaign on November 2nd (yearly); production of one-minute TV spot and radio spots; production and distribution of communication material such as posters, leaflets...

CONCLUSION

1. Micronutrient deficiencies, in particular vitamin A, iodine and iron deficiency, are an important public health in Vietnam. Vitamin A deficiency control project, intermediate by vitamin A capsules distribution and nutritional education have positive effects; IDD and goiter control project has been good interested by the government and have been progressed results; Iron deficiency anemia program is in initial period in spite the high prevalence of anemia.
2. Strategy for controlling the micronutrient deficiencies should need variety (fortification the micronutrient on food, food variety...) to have the more sustained

results. The disease entitled "Te te-say say" in Hoa Binh province should be enlightened ...

3. Others nutritional problems have not been scientifically assessed as Ca, Zn deficiency together with the increasing occurrence of non-communicable diseases related to nutrition as obese, hypertension, cardiovascular disease.... Controlling micronutrient-deficiencies should receive timely attention and should will be a interesting subject of nutrition in the transition period in Vietnam which we would like to learn the experience from the Japanese colleague.

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