

Original Article

Reduction in childhood malnutrition in Vietnam from 1990 to 2004

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Reduction in childhood malnutrition in Vietnam between 1990 and 2004 was assessed using data from 5 national surveys. The prevalence of malnutrition, including stunting, declined significantly for underweight from 45% in 1990 to 26.6% in 2004. While the average reduction was 1.3% per year in the period from 1990 to 2000, it was 1.8% per year in the period from 2000 to 2004. The prevalence of stunting declined from 56.5% in 1990 to 30.7% in 2004, with an average reduction of 2% per year in the period from 1990 to 2000 and 1.5% per year in the period from 2000 to 2004. There were clear differences in the decrease in malnutrition prevalence between urban, rural and mountainous areas, the reduction being highest in the urban regions and lowest in the mountainous areas. Regression analysis showed that the nutrition status of the child is positively related to better household living conditions and to the educational level of the father, but not the mother. Stunting is higher in children whose parents are farmers and higher in households with more children. Stunting prevalence is lower in households with safe water access and hygienic toilets. In future, the dramatic reduction in childhood malnutrition as seen in the period 1990 to 2004 might not continue. More comprehensive approaches will be needed to lower childhood malnutrition in Vietnam further.

Key Words: malnutrition, Vietnam, stunting, poverty

Introduction

Childhood malnutrition impairs the physical and mental development of the child and, potentially, of future generations, which will have long term effects on socio-economic development. It is estimated that there are about 150 million malnourished preschool children in the world today¹ and goals have been set to reduce the prevalence of malnutrition in children under five years old.²

Although during the last decade, Vietnam has been regarded by UNICEF/EAPRO as one of the countries in the region with the most striking reduction of malnutrition,³ malnutrition is still an important public health concern in Vietnam. Reduction of childhood malnutrition is high on the agenda of government⁴ but country-wide the prevalence of stunting was still around 30% in 2005.⁵

We describe the changes in the prevalence of malnutrition in children less than five years old based on annual surveys from 1990 to 2004 conducted by principal investigators of the National Institute of Nutrition, Hanoi, Vietnam. Factors related to the occurrence of stunting were analysed using data of the 2004 National Survey. The study aims to help specify priority groups and actions for effective community based intervention programmes.

Subjects and methods

Data from five country wide surveys in which children under five years old participated, were used in the present study: 1. the General Nutrition Survey in 1990; 2. the National Vitamin A Deficiency and Protein-Energy Malnutrition Survey in 1994; 3. the General Nutrition Survey in

2000; 4. the National Child Malnutrition Survey in 2002 and 5: the National Child Malnutrition Evaluation Study in 2004.

Except for the General Nutrition Survey in 1990 and the National Vitamin A Deficiency and Protein-Energy Malnutrition Survey in 1994, which were regional-representative, the other surveys were representative for the whole country. The sample frame of the individual surveys was similar. Sample selection was 2 stage: (i) surveyed provinces were chosen, and (ii) within each province, 30 clusters were selected by the method of probability proportional to population (PPS). Within each cluster, 50 children under five years old were selected randomly. The sample size was 1500 children under five years old for each province (Vietnam has in total 64 provinces). The age distribution and the number of children participating in each of the studies are given in Table 1.

Weight and height (under 2 years of age lengths) of children were measured using standardized techniques with calibrated instruments by trained nutritionists while demographic and socioeconomic information was collected by a trained interviewer from the mother.

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Table 1. Age and number of children in the various used samples a)

Age (month)	Surveyed subjects				
	1990 ¹	1994 ²	2000 ³	2002 ⁴	2004 ⁵
1 – 6	4,394	4,368	7,734	5,775	6,068
7 – 12	4,646	4,618	12,957	13,936	14,323
13 – 24	7,046	6,987	20,515	21,549	22,163
25 – 36	6,961	6,897	19,125	19,379	19,998
37 – 48	7,110	7,038	17,511	15,665	16,367
49 – 60	7,815	7,746	16,627	15,617	16,461
Total	37,972	37,654	94,469	91,921	95,380

a) Years 1990 and 1994: sample selection based on 24 province; 2000 - 2004: nationwide sample selection. 1. the General Nutrition Survey; 2. the National Vitamin A Deficiency and Protein-Energy Malnutrition Survey; 3. the General Nutrition Survey; 4. the National Child Malnutrition Survey; 5: the National Child Malnutrition Evaluation Study.

Table 2. The prevalence of malnutrition by year (1990 - 2004)

Year	1990	1994	2000	2002	2004
Malnutrition					
Underweight	45.0	44.9	33.8	30.1	26.6
Moderate	29.8	33.9	27.8	25.3	22.8
Severe	13.0	9.2	5.4	4.5	3.6
Very severe	2.2	1.8	0.6	0.3	0.2
Stunting	56.5	46.9	36.5	33.0	30.7
Moderate	24.4	29.5	23.8	21.5	19.9
Severe	32.1	17.4	12.7	11.5	10.8
Wasting	9.4	11.6	8.6	7.9	7.7

Z-scores of weight for age (W/A), height for age (H/A) and weight for height (W/H) were calculated by ANTHRO software⁶ and the nutrition status defined on WHO's recommendation. Moderate, severe and very severe underweight was defined as a Z-score for W/A lower than -2, -3 and -4 respectively whereas moderate and severe stunting was defined as a Z-score for H/A lower than -2 and -3 respectively.⁷

Because stunting reflects long term malnutrition, the prevalence of stunting was used to study risk factors using binary regression analysis: $y = a + b_i X_i + e$, where: y is the dependent variable (stunted or not stunted), X_i are independent variables, e is an error term and b_i are coefficients. The statistical analyses were done using the software program SPSS, version 12). Significance level was set at 0.05.

Results

Table 1 gives the age distribution and the number of children in each age group in the various population samples. Table 2 gives the prevalence of malnutrition in children under five years old from 1990 to 2004 through the five national surveys. The prevalence of malnutrition steadily declined from 1994 onwards for underweight as well as for stunting. On average, the prevalence of underweight declined by 1.1% per year in the decade 90's, and by 1.8% per year in the period from 2000 to 2004. The prevalence of stunting declined on average by 2 % per year in the period from 1990 to 2000 by 1.5% per year in the period from 2000 to 2004. There were no differences in the prevalence figures between boys and girls.

Table 3 gives the prevalence figures for underweight, stunting and wasting in 1990 and 2004 for urban, rural

Table 3. Prevalence of malnutrition in 1990 and 2004 by area.

Year	Urban	Rural	Mountainous	
1990	Underweight	40.6	47.5	54.7
	Stunting	44.4	60.1	61.8
	Wasting	9.2	14.2	16.8
2004	Underweight	21.2	30.8	39.7
	Stunting	23.4	35.7	42.3
	Wasting	4.8	7.6	8.9

Table 4. The rate of reduction of malnutrition by rural, urban, and mountainous areas in the period 1990-2004 (%)

Malnutrition	Rate of reduction (%)		
	Urban	Rural	Mountainous
Underweight	47.7	35.1	27.4
Stunting	47.3	40.6	31.6
Wasting	47.8	46.5	47.0

and mountainous areas. The improvement of the nutritional status was most marked in the urban area and to a lesser extent in the rural and mountainous areas as can be seen in Table 4.

Table 5 lists the risk factors for stunting, based on data obtained in the National Survey in 2004. It is striking, and perhaps surprising, that low education of the father, but not the mother, is a risk factor for stunting. The child's nutrition status tends to be better with better household living conditions, like having access to safe water and

Table 5. Binary regression analysis for risk factor for stunting based on National Survey data of 2004 a)

Variable	Coefficient	Coefficient/SE	Significance
Household size	-0.1543	-11.537	0.0000
% of adults	0.7049	6.169	0.0000
Male education	0.0496	5.671	0.0000
Female education	-0.0340	-0.425	0.6711
Female household head	-0.1967	-3.181	0.0015
Farm household	-0.3532	-5.068	0.0000
Cultivated area	0.0002	5.349	0.0000
Food production	0.2103	2.088	0.0368
Live stock	0.0006	5.922	0.0000
House area	0.0219	1.882	0.0598
Flush toilet	0.0069	4.539	0.0000
Tap water	0.3252	5.348	0.0000
Electricity	0.0833	1.389	0.1648
Radio	0.0854	1.373	0.1699
Television	0.3218	5.660	0.0000

a) Dependent variable stunting = 0 if child is stunted and = 1 otherwise

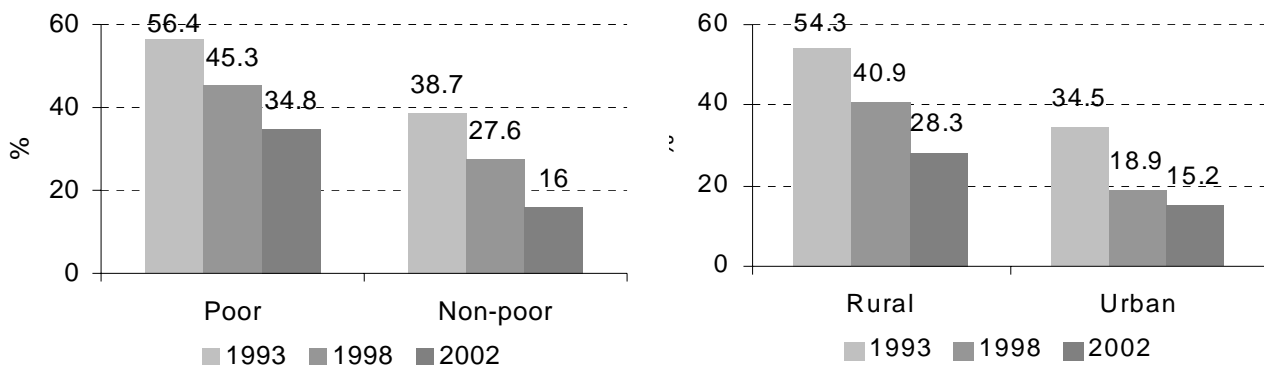


Figure 1. Stunting prevalence in children under 5 years old by poverty status and living area 1993-2002. Sources: 1997-98 VLSS data (GSO, 1994 and 2000), and NHS 2001-2002 data (MOH, 2003)

proper toilet facilities. Stunting is higher in children whose parents are farmers and higher in households which have 3 children or more.

Discussion

The population of Vietnam was projected to have reached 81 millions in 2005, of which 74 % were living in rural areas and only 26% were living in urban areas.⁸ It is estimated that, in 2004, the number of children under 5 years of age was about 8.5 million.

Over the past 14 years the prevalence of under nutrition, including stunting, has declined markedly but the reduction rate has been quite different across areas within the country. The urban area showed the fastest reduction in malnutrition prevalence, over 47% in 3 types of malnutrition (Table 4). The mountainous area had the slowest reduction rate in malnutrition prevalence. The number of children who recovered from malnutrition has increased year after year since 2000. However, in general, stunting is still highly prevalent in all areas, especially in mountainous and rural areas.

There are many factors contributing to this situation. The success of the country's family planning programme (resulting in lowering fertility rates from 3.1 in 1994 to 2.28 in 2002)⁹ might have created opportunities for families to better invest in child nutrition and health care. The effect of health care activities, including immunization,

control of diarrhoea, control of respiratory infections and other maternal and child health care programmes¹⁰ might also have contributed to the reduction in childhood malnutrition. Since 1999, the Government of Vietnam has had a 'pro-poor' policy to support for the poor through poverty reduction programs such as 'program 135' which covers 2,374 special poorest communes in the whole country, mainly in the remote, mountainous and bordering areas. Poverty alleviation programmes have had an important impact on childhood malnutrition reduction rate in Vietnam in the past.¹¹

It is recognized that nutrition intervention activities in Vietnam did play a critical role in the reduction of malnutrition.¹¹ Since the year 2000 up to now, with investment of the government every year higher and higher,¹² childhood malnutrition control programs have covered all communes over the country. The roles of nutrition programmes in Vietnam are not only providing the care to target children and mothers, but have also raised awareness and commitment from authorities at all levels. The goal of malnutrition reduction has been inserted into the government's socio-economic development agenda and many organizations such as the Women Union, the Youth Union and the Farmer Association actively participated in childhood malnutrition control programmes during the last 5 years. Along with poverty reduction, it is likely that childhood malnutrition control

programmes had a significant contribution to the high rate of malnutrition reduction in the period from 2000 to 2004 as showed in Table 4.^{11,13}

Risk factors for childhood malnutrition were analysed from data obtained in the National Survey in 2004. It was found that the economic status and living condition of the child had a very strong impact on the nutritional status (see Table 5). Poor households and lower economic areas pose a high risk for childhood malnutrition. This suggests that there is a gap among economic regions in Vietnam nowadays. No differences were observed in stunting prevalence between boys and girls but there is a large difference between areas and across economic status. Data from the Vietnam General Statistical Office^{14,15} and data from the National Health Survey¹⁶ show the same trends as our study (see Fig 1).

The main cause of malnutrition is poverty. Poverty always affects households with lowly educated members who have difficulties to have access to skills, information and health care services.¹⁷ Joblessness is a very common situation in rural and remote areas. Eighty percent of poor people are farmers whose food security is directly affected by disasters while in urban areas, where the living standard is generally higher, poverty is affected by joblessness due to unfair distribution of benefits from economical development and/or lack of opportunities.¹¹

Maternal health and nutritional status must be considered in attempts to improve infant nutritional status as they are closely linked. In the present study these factors were not tested in the binary regression model as it was shown earlier that maternal nutrition and women status have a critical role in childhood stunting in Vietnam.¹⁸

Low child care quality is reflected by access to clean/safe water and proper toilet facilities as indicated in Table 5. Child care practices depend on many factors like culture, habit, family economic status, knowledge of mother and child care takers. The proportion of children who attend day-care centers in rural and mountainous areas is still low.¹⁹ Day-care centers are needed to improve caring practices. The weaning pattern of children is sometimes still a problem. Data from this study indicate (not shown) that early complementary feeding (before 6 months of age) varied from 30% to 70% depending on areas and the proportion of mothers being aware of proper starting time for complementary feeding was only 21.2% to 42.7%. Mother's knowledge about selecting and processing food and feeding patterns was generally limited.

In conclusion, in Vietnam the prevalence of malnutrition, including stunting, has significantly declined in the past decade. Factors related to childhood malnutrition such as poverty, parents' education and environment factors should be given special attention in the battle against child malnutrition in the years ahead, although these will not always be easy to address.

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越南 1990 至 2004 年兒童營養不良下降的情形

採用五個全國性調查的資料評估越南在 1990 至 2004 年兒童營養不良情形是否下降。營養不良的盛行率，包含發育遲緩、體重過輕 1990 年的 45% 顯著降低到 2004 年的 26.6%。1990 至 2000 年間每年平均降低 1.3%，2000 年至 2004 年之間每年則下降 1.8%。發育遲緩的盛行率自 1990 年的 56.5% 降低至 2004 年的 30.7%，在 1990 至 2000 年之間每年平均降低 2%，2000 年至 2004 年之間每年則下降 1.5%。都會、鄉村及山區的營養不良盛行率下降情形有明顯的差異，降低最多的是都會地區，最低的則在山區。迴歸分析顯示兒童營養狀況與較佳的家戶居住狀況及父親的教育程度有關，與母親教育程度則無關。父母親為農民，並且其家庭的小孩數目較多者，發育遲緩率較高。發育遲緩盛行率在有安全飲用水的家戶及衛生的廁所較的家戶較低。像 1990 至 2004 年之間兒童營養不良的盛行率急遽的降低，在未來可能無法持續。需要採用更加全面的方法以降低越南兒童營養不良的情形。

關鍵字：營養不良、越南、發育遲緩、貧窮。