

Using the New World Health Organization Standards to Assess the Nutrition Status of Thai Preschoolers in Yen Bai Province, Viet Nam

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Abstract

The study was conducted with 270 Thai preschoolers under five years of age in the Van Chan district, Yen Bai province, Viet Nam. An anthropometric approach was taken, using WHO Anthro version 2.04 software to calculate the children's levels of malnutrition. Interviews with mothers using a structured questionnaire were also used in order to discover the factors that relate to malnutrition in children. The data showed that the proportion of undernourished Thai children has decreased, but obesity does occur and is tending to increase; no significant difference exists between Thai boys and girls in terms of their malnutrition status; and that factors including economic status, the education level of the mother, time for complementary feeding, and time for weaning have close relationship to nutrition status.

Key words: Nutrition status, preschoolers, under-five-year children, malnutrition, weight for age, length for age, weight for height, BMI for age, under weight, overweight.

INTRODUCTION

The effects of malnutrition on human performance, health, and survival have been the subject of extensive research for several decades. Although many questions remain concerning the precise mechanisms and magnitude of its effects, considerable evidence now exists that malnutrition has significant effects on physical growth, morbidity, mortality, cognitive development, reproduction, physical work capacity, and the risk of several adult-onset chronic diseases [4].

Thirty-six percent of children under five are growth retarded (that is, their height for their age is low). This figure may rise to around 50 percent in school-age children. Growth retardation is associated with a substantial reduction in mental capacity and adverse school performance, even in mild to moderate cases, and ultimately leads to reduced work productivity. Seventeen percent of infants are born with low birth weight (under 2.5 kilograms), resulting in poor cognitive performance during infancy, although this effect is overshadowed by that of malnutrition. In the longer term, children born with a low birth weight tend to have a poor attention span in school [5].

The article is a brief overview of how the new World Health Organization standards may be used to assess the nutrition status of Thai preschoolers in Yen Bai province, Viet Nam.

THE FIELD AND METHODS

Yen Bai, a mountainous province in the north of Viet Nam, is home to about 700,000 people; ethnic peoples (about 30 different groups) make up half the population of Yen Bai, and as each ethnic group lives under differing economic conditions, the nutritional environments of children are quite varied.

The Thai people of Yen Bai make up 6.1% of the province's total population [1], and are mainly located in mountainous areas where conditions such as traffic, economic development are very limited.

Various approaches in assessing nutritional status exist, such as the chemical approach (studying components of nutrients in food), the diet-determining approach (surveying quantities of nutrients in the diet), and physiological studies (investigating nutrient -absorbing and -converting abilities). This study applies an anthropometric approach to measure the proportion of malnutrition found in Thai children, using software WHO Anthro version 2.04. Interviews with mothers by structured questionnaire have also been used to investigate the factors relating to malnutrition in children.

The study was carried out among Thai people in the mountainous Van Chan commune. We collected anthropometric data from 270 Thai preschoolers under five years of age. The data was analyzed by a combination of WHO Anthro version 2.04, SPSS 11.5 for

Windows, Microsoft Excel XP, and EPINFO 6.04. The study investigated the children's nutritional status using anthropometric indicators including weight for age, height/length for age, weight for height/length, mid-upper arm circumference for age (MUAC), and Body mass index (BMI) for age. After entering the data for an under-five-year-old child (including name, date of birth, above anthropometric indicators except for MUAC) in WHO Anthro 2005, the results show whether or the child suffers from one of four malnutrition types, and the malnutrition levels of the population as a whole are calculated [10].

RESULTS AND DISCUSSION

Nutrition status of Thai children under five years of age

Weight-for-age reflects the proportion of achieved body mass to chronological age. It is influenced by the child's height (height-for-age) and weight (weight-for-height). Its composite nature makes interpretation complex. However, in the absence of significant wasting in a community, the information provided by weight-for-age is similar to that of height-for-age, that is, a reflection of the long-term health and nutrition experience of an individual or population. A short-term change in weight-for-age, especially a reduction, reveals a change in weight-for-height [8].

Table 1. Proportion of low weight for age in Thai children under five

Weight-for-age (%)			
< -3SD	< -2SD	Mean	SD
0	3.7	-0.66	0.66

Table 1 shows that the percentage of underweight Thai children is 3.7%, and that 0% are severely underweight. This 3.7% figure is lower than the average

percentage in Yen Bai province in 2000. In other words, there is a noticeable reduction in percentage of underweight and severely underweight children in Yen Bai from the year of 2000 to the time of our research. This reduction is similar to the conclusions reached by "World Health Statistics 2006" in which the prevalence of undernutrition, measured by stunting (short-for-age) among children under five years of age, declined sharply as the level of economic development (approximated by GDP per capita in international dollars) increased [9].

In terms of gender, 0% of Thai boys and 7.7% of Thai girls were underweight.

Height-for-age: Height-for-age reflects achieved linear growth, and its deficits indicate long-term cumulative health or nutritional inadequacies. Two related terms, length and stature, are also used. Length refers to measurement in a recumbent (horizontal) position, as is often done for children below 2 years of age, who cannot stand well. A standing height measurement is often referred to as *stature* [8].

Table 2. Prevalence of low length/height for age in Thai children under five years of age

Length/height-for-age (%)			
< -3SD	< -2SD	Mean	SD
3.7	7.4	-0.55	0.87

Table 2 shows that 7.4% of Thai children suffer from stunted growth (< -2SD). According to WHO, 3.7% of the children are severely stunted. In terms of sex, 7.1% and 0% of Thai boys and 7.7% and 7.7% of Thai girls experienced stunted and severely stunted growth, respectively. However, this difference is not statistically significant ($p > 0.05$).

In Viet Nam, using height for age to assess nutrition status is only in the pilot stages (in Ha Noi from 2008). Therefore, we strongly recommend that the height for

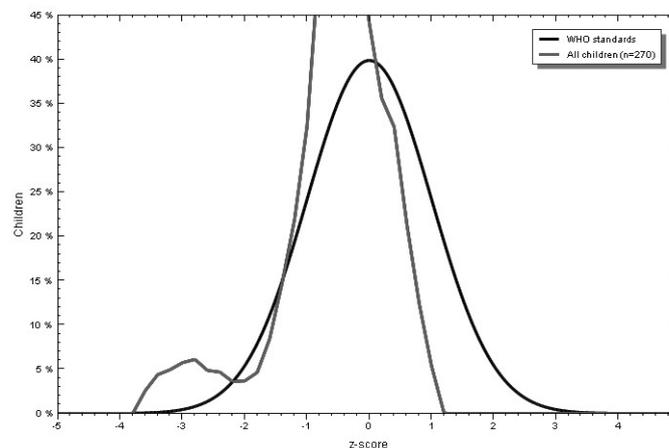


Figure 1. Distribution of length/height for age of under five year-old Thai preschoolers (left) compared to the standard distribution of the World Health Organization (right)

age index be applied all over the country to assess and control the nutrition status of under five year-old children.

The mean is negative (-0.55) when the distribution is shifted to the left, compared to WHO standards. Whenever the prevalence of being underweight, wasted or stunted (<-2 SD) is higher than 2.3%, the mean is expected to shift to the left and hence has a negative sign, which means there is a problem of being underweight, stunted, or wasted in the given population (figure 1).

Weight-for-height: Weight-for-height reflects body proportion and is particularly sensitive to acute growth disturbance. The major components of weight include adipose tissue, lean body mass, bones, and fluids. An advantage of the weight-for-height measure is that knowledge of age is not required, which may be difficult to assess in less-developed areas. However, weight-for-height is not a substitute for height-for-age or weight-for-age, because each index reflects a different combination of biological processes. Even though they may share determinants, they cannot be used interchangeably [8].

Table 3. Percentage of weight for length/height malnutrition in Thai children under five years of age

Weight-for-length/height (%)						
< -3SD	< -2SD	> +1SD	> +2SD	> +3SD	Mean	SD
0	3.7	3.7	0	0	-0.5	0.92

The above table shows that 0% of the children were seen to be obese, 0% were overweight, and 3.7% had a possible risk of being overweight. The proportion of children who tested as wasted and severely wasted was 3.7% and 0%, respectively.

According to WHO standards [8], the mean of weight for length/height (-0.5) shows that our group of children had experience of weight for length/height malnutrition at poor level. Results also showed that 0% and 7.7% Thai boys and girls tested as wasted, respectively ($p>0.05$).

Using *BMI-for-age* is the recommended method for screening overweight and underweight children. BMI-for-age indicates a child's weight in relation to his/her height for a specific age group and gender [2].

Table 4. Proportion of BMI for age malnutrition in Thai children aged less than five years

BMI-for-age (%)						
< -3SD	< -2SD	> +1SD	> +2SD	> +3SD	Mean	SD
0	3.7	3.7	0	0	-0.5	0.96

The percentages of children suffering from obesity (obese, overweight and possible overweight) and wasted conditions (wasted and severely wasted) are similar to those measured by the weight for length/height method. BMI is the new system of measurement recommended by the WHO for accessing the nutrition status of children;

this similarity, therefore, indicates that the WHO recommendation is a sensible one. The results also showed that 0% and 7.7% of Thai boy and girls tested as wasted, respectively ($p>0.05$).

Mid-upper arm circumference (MUAC) data can be used as a quality check on weight for height data, as we expect that the majority of children classified as undernourished by one measure will also be classified as malnourished by the other measure. Reviewing MUAC and weight for height data during the data collection phase of a survey can help identify problems with measurement and data collection [6]. MUAC is useful for the rapid screening of acute malnutrition, and weight for height provides evidence of acute (current) malnutrition [3].

Concerning the second set of standards, the WHO has not yet developed any guidelines, due to the fact that less is known about their value in public health and clinical practice. Therefore, we apply a single cut-off value of MUAC to assess nutrition status, for which a child with MUAC < 13cm is considered to be stunted [7].

Table 5. MUAC by age of Thai children

	Mid-upper arm circumference-for-age (%)			
	< 13cm (stunted)		≥ 13cm (normal)	
	n	%	n	%
Thai	50	18.5	220	81.5

Data in table 5 shows that 18.5% of Thai children test as stunted.

Relationship between nutrition status of Thai children and other factors

The data shows that children from households who don't have enough to eat have a higher risk of being stunted than children from households who do have enough to eat. It is clear that stunted growth bears a close relationship with the economic status of household (OR =3.68).

Table 6. Relationship between economic and nutrition status

Economic status	Nutrition status		OR
	Stunted	Normal	
Don't have enough to eat	14	97	3.68
Have enough to eat	6	153	1.27 < OR < 11.15

Table 7. Relationship between education level of mother and nutrition status of children

Education level of mother	Nutrition status		OR
	Stunted	Normal	
Illiterate	15	73	7.27
Literate/high education level	5	177	2.36 < OR < 23.87

The table above indicates that there is close correlation

between education level of the mother and the nutrition status of her children. OR = 7.27 signifies that the risk of illiterate mothers' children being stunted is 7.27 times more than literate mothers' children. We know that education level correlates with knowledge and understanding of pregnancy and child care; in other words, the higher an education the mother has, the better she is able to care for her children.

Table 8. Relationship between time for complementary feeding and nutrition status

Time for complementary feeding	Nutrition status		OR
	Stunted	Normal	
< 4 months	17	43	27.28
≥ 4 months	3	207	7.09 < OR < 122.92

The results show that children whose time for complementary feeding is less than 4 months have higher a risk of being stunted than children whose time for complementary feeding is greater than or equal to 4 months (OR = 27.28) (Table 8).

Similarly, weaning times were also seen to correlate with a child's stunted status. OR = 9.82 signifies that children weaned before 1 year have a higher possibility of being stunted than children weaned after one year of age (table 9).

Table 9. Relationship between time for weaning and nutrition status

Time for weaning	Nutrition status		OR
	Stunted	Normal	
< 1 year	14	48	9.82
≥ 1 year	6	202	3.30 < OR < 30.43

CONCLUSIONS

2006's World Health Statistics concluded that the prevalence of undernutrition in Thai children decreased, but that obesity did occur and tended to increase. No significant difference between Thai boys and girls in terms of malnutrition status was found to exist.

Anthropometric indicators including weight for age, height/length for age, weight for height/length, mid-upper arm circumference for age, and BMI for age can be used to assess the nutritional status of children under five years of age. MUAC for age is particularly useful for the rapid screening of acute malnutrition, and weight for height/length provides evidence of acute (current) malnutrition; weight for age provides a measure of both

acute and chronic malnutrition, and height for age (stunting) provides evidence of past malnutrition. WHO Anthro 2.04 is useful software to both assess and control the nutrition status of preschoolers.

Economic status, the education level of mother, time for complementary feeding, and time for weaning were seen to have a close relationship with nutrition status of Thai children under five years of age.

The height for age index should be applied all over Vietnam to assess and control the nutrition status of children. In the future, as recommended by the WHO, the new BMI indicator should be used to collect measurements of weight for height/length.

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