

# The Impacts of Malnutrition Status and Relevant Factors on Preschool Children in Cao Ma Po Commune, Quan Ba District, Ha Giang Province

Vu Van Tam<sup>1</sup>, Nguyen Huu Nhan<sup>1,\*</sup>, Hoang Quy Tinh<sup>2</sup>, Nguyen Phuc Hung<sup>2</sup>

<sup>1</sup>VNU University of Science, 334 Nguyen Trai, Hanoi, Vietnam

<sup>2</sup>Hanoi National University of Education, 136 Xuan Thuy, Cau Giay, Hanoi, Vietnam

Received 15 July 2016

Revised 25 August 2016; Accepted 09 September 2016

**Abstract:** This study was conducted to evaluate malnutritional status and related factors on 388 preschool children in Cao Ma Po commune, Quan Ba district, Ha Giang province. Anthropometric indices including weight for age, height for age were used to assess children malnutrition status. Furthermore, we investigated and interviewed parents, teachers to find out related factors to children malnutritional status in this research area. Results showed that the development of these anthropometric parameters of preschool children followed the rules of body growth of Vietnamese people. Anthropometric indices of preschool children in Cao Ma Po were lower than the general values of Vietnam people. Malnutrition percentage of children was relatively high (underweight: 24.8%; stunting: 77.3%; wasted: 4.5%). Factors related to children malnutritional status were job and education level of parents, water source used in household, children weaning time.

*Keywords:* Malnutrition status, related factors, Cao Ma Po.

## 1. Introduction

Children play an important role in family as well as society life and they need to get concerns from both parents and community in many aspects, especially in nutrition and education in early years of their lives. Child development depends on many factors as genetics and living environment (nutrition, familial and social factors, education, etc.), in which nutritional status has direct and crucial effects on children growth. Nutritional status is

a factor used to assess the child development, especially for children at the age of 3 to 6.

World Health Organization (1990) estimated that there were about 500 millions children under malnutrition, 150 millions under five-year-old children suffering from underweight and more than 20 millions children in a serious malnutrition status in the world [1, 2]. In Asia and Africa, percentages of malnutrition children are the highest [3].

In Vietnam, according to an assessment of National Institute of Nutrition, percentage of malnutritional children has been decreased in recent years. In 2007, the malnutritional percentage of children younger than 5 years old

---

\* Corresponding author. Tel.: 84-913099129  
Email: nhannh@vnu.edu.vn

in Vietnam was relatively high (21.7% underweight, 33.9% stunting). In 2014, the malnutrition percentage of children younger than 5 years old decreased (14.5% underweight, 24.9% stunting) [4]. Although the percentage of malnutritional children has been reduced, however, this decrease is mostly observed in cities where living standard has been developed in rural and mountainous areas, the number of malnutritional children is still high.

Cao Ma Po commune, Quan Ba district, Ha Giang province is in mountainous area. People living in this place are mostly ethnic minority with low living standards, poor health care and education. Therefore, it is necessary to carried out an research to evaluate status and to determine related factors of preschool children in Cao Ma Po commune, Quan ba district, Ha Giang province.

## 2. Materials and methods

The study was conducted on 388 preschool children in Cao Ma Po commune, Quan Ba district, Ha Giang province (Male: 210; Female: 178).

Table 1. Number and percentage of children in temrs of age and sex

Age	Sex			
	Male		Female	
	n	%	n	%
3	46	11,9%	40	10,3%
4	50	12,9%	38	9,8%
5	52	13,4%	42	10,8%
6	62	16,0%	58	14,9%

Table 2. WHO malnutrition standards [5]

WHO malnutrition standards for children under five years old			
Z-score	Malnutrition status based on growth indicators		
	Height-for-age	Weight-for-age	BMI-for-age
> 3SD	See note 1		Obesity
>2 SD	Normal	See note 2	Overweight
>1 SD	Normal		Possible overweight 3
0 (TB)	Normal	Normal	Normal
< -1 SD	Normal	Normal	Normal
< -2 SD	Stunted 4	Underweight	Wasted
< -3 SD	Severely stunted 4	Severely underweight	Severely wasted
WHO malnutrition standards for children aged 5-19			
Z-score	Malnutrition status based on growth indices		
	Height-for-age	Weight-for-age	BMI-for-age
> 3SD	See note 1		Severe obesity
>2 SD	Normal	See note 2	Obesity
>1 SD	Normal		Overweight
0 (TB)	Normal	Normal	Normal
< -1 SD	Normal	Normal	Normal
< -2 SD	Underheight4	Underweight	Wasted
< -3 SD	Severe underheight	Severe underweight	Severely wasted

Notes: 1. A child in this range is extremely tall. The tallness is a rare problem and it may indicate an endocrine disorder such as a growth-hormone-producing tumor. It should refer a child in this range for assessment if there is a suspect of an endocrine disorder (e.g. if parents of normal height have a child who is excessively tall for his or her age). 2. A child whose weight-for-age falls in this range may have a growth problem, but this is better assessed from weight-for-length/height or BMI-for-age. 3. A plotted point above 1 shows possible risk. A trend towards the 2 z-score line shows definite risk. 4. It is possible for a stunted or severely stunted child to become overweight.

Anthropometric indices including weight for age, height for age were determined. The anthropometric indices, such as date of birth, sex, and date of objectives were inputted to WHO AnthroPlus software which showed the age of children and helped assess the nutritional status of the children [6, 7]. After the age and the nutritional status were given, SPSS software was used to statistically evaluate the relationship between factors and anthropometric indices of the children in the study.

### 3. Result and discussion

#### 3.1. Anthropometric indices

##### *Weight for age*

Weight for age is used to assess nutritional status and body growth. Table 3 presents the weight of preschool children in Cao Ma Po commune, Quan Ba district, Ha Giang province.

Table 3. Weight for age of children

Age	Sex			
	Male		Female	
	X	SD	X	SD
3	11.2	1.6	10.2	1.7
4	12.7	1.1	12.5	1.2
5	15.0	2.2	14.0	1.3
6	16.1	2.0	15.7	1.7

As shown in this table, children weight increased with an increase in age in both genders. For the male, the increase in the weight was from 11.2 kg at the age of 3 to 16.1 kg at the age of 6 while the increase in weight of female was 10.2 kg to 15.7 kg, respectively ( $P < 0.05$ ). The weight of male children was greater than that female children in each age ( $P < 0.05$ ).

Table 4. Comparison of children weight in this study and in the study of Ministry of Health in 2003

Age	Mean weight of male		Mean weight of female	
	This study	Study of Ministry of Health in 2003	This study	Study of Ministry of Health in 2003
	3	11.2	11.55	10.2
4	12.7	13.34	12.5	12.96
5	15.0	15.03	14.0	14.69
6	16.1	16.27	15.7	15.82

In comparison with a study carried out by Ministry of Health (2003), mean weight of preschool children in the present study was lower in all age groups [8]. The reason for this difference might be an economy status of research areas. In our study, the research area was mountainous and mostly households were under the poverty. The poverty led to low living standards, especially caused a lack of food and clothing.

##### *Height for age*

Table 5 shows the height for age of children in this study.

Table 5. Height for age of children

Age	Sex			
	Male		Female	
	X	SD	X	SD
3	80,0	6,0	75,8	7,4
4	85,6	3,5	86,5	3,2
5	96,3	6,0	92,9	4,8
6	101,4	6,6	100,9	8,5

The height for age of children at the age of 3 to 6 followed the rule of body growth of Vietnamese people. The height increased with an increase in the age and the values of male tended to be higher than those of female, except at the age of 4.

Compared to data of Ministry of Health (2003), the mean height of children in this study was lower at all the ages ( $P < 0.05$ ) (Table 6). The reason for this difference was due to the difference in research areas. In the present

study, living standard, economic and social conditions, health care and nutrition regime of Cao Ma Po was poorer than those in the study conducted by Ministry of Health, even though that study was carried out more than 10 years ago. The lower weight for age and height for age in the present study compared to data shown by Ministry of Health suggested that malnutrition status of children in Cao Ma Po may be severe.

Table 6. Comparison of height in this study and that in the study of Ministry of Health in 2003

Age	Mean height of male		Mean height of female	
	This study	Study of Ministry of Health in 2003	This study	Study of Ministry of Health in 2003
3	80.0	87.36	75.8	83.97
4	85.6	94.32	86.5	93.78
5	96.3	100.77	92.9	100.18
6	101.4	106.12	100.9	105.40

### 3.2. Malnutrition status of preschool children and some relevant factors

#### Malnutrition status

A WHO Plus 2007 software is used to assess nutrition status of children in this study. As shown in Table 7, the total percentage of severe underweight children was 7.2% in which

the highest value was observed at the age of 3. The total percentage of underweight children was also quite high (24.8%). Among the different ages, the highest value was seen in the age of 6 (8.8%). At the age of 3, 4 and 5, the rates of underweight children were 7.7%, 4.6% and 3.6%, respectively.

Table 7. Malnutrition status in weight for age of children

Age	Severe underweight		Underweight		Normal	
	n	%	n	%	n	%
3	14	3.6%	16	4.1%	56	14.4%
4	0	0%	18	4.6%	70	18.0%
5	6	1.5%	8	2.1%	80	20.6%
6	8	2.1%	26	6.7%	86	22.2%

The children under severe underweight and underweight status accounted for quite a large rate. However, the total percentage of children under 5-year old suffering from both severe underweight and underweight status in the present study was lower than that of Ha Giang

province (2014) (Cao Ma Po commune: 15.9%; Ha Giang province: 23.1%) [4]. These results indicate that although economic and social conditions in the study area are poor, however, those in other areas of Ha Giang province may be more severe.

Malnutrition status in height for age of children is shown in Table 8. The total percentage of height malnutrition of children was 77.3% in which the percentage of severe stunting children was 42.3% and that of stunting children was 35%. Both severe stunting and stunting percentages were high at all the age in

which severe stunting rate was high at the age of 3 and 4 while stunting rate was more pronounced at the age of 5 and 6. In comparison with Ha Giang province, the stunting malnutrition rate of under 5-year-old children in the present study was higher (study area: 27.7%; Ha Giang province: 30.7%).

Table 8. Malnutrition status in height for age of children

Age	Severe Stunting		Stunting		Normal	
	n	%	n	%	n	%
3	48	12.4%	16	4.1%	22	5.7%
4	54	13.9%	32	8.2%	2	0.5%
5	24	6.2%	48	12.4%	22	5.7%
6	38	9.8%	38	9.8%	44	11.3%

Mercedes de Onis *et al.* have been reported that though malnutrition percentage rapidly reduced in many developing countries, however, in some developing countries, this

rate tended to increase [9]. The results in the present study implied that living standards of people in Cao Ma Po were quite low.

Table 9. Malnutrition status in BMI for age of children

Age	Nutriton status of preschool children under five years old											
	Severe wasted		Wasted		Normal		Possible overweight		Overweight		Obesity	
	n	%	n	%	n	%	n	%	n	%	n	%
3	6	1.5%	0	0	32	8.2%	28	7.2%	20	5.2%	0	0
4	4	1.0%	0	0	42	10.8%	32	8.2%	10	2.6%	0	0
5	0	0%	2	0.5%	60	15.5%	16	4.1%	14	3.6%	2	0.5%

  

Age	Nutrition status of 6 age children											
	Severe wasted		Wasted		Normal		Severe obesity		Obesity		Béo phì nặng	
6	4	1.0%	2	0.5%	94	24.2%	8	2.1%	8	2.1%	4	1.0%

Table 9 showed that the percentage of BMI malnutrition was 4.5% in which severe wasted and wasted rates of under five-year-old children were 3%. This result was lower than that of the whole provinces (10%). Although the severe wasted and wasted status of children were observed but the overweight and obesity status of children in this research area was also found.

The percentage of preschool children under overweight condition was quite high (17.1%). This situation is a dual burden of malnutrition that we are facing now.

#### Some related factors

In the present study, we used the odds ratio (OR) to find out the factors related to the

malnutrition status of children. Parents and teachers were interviewed and the data were then analyzed to evaluate factors relating to malnutrition status of preschool children. As shown in the Table 10, Table 11, Table 12 and

Table 13, job of parents, education level of parents, time of weaning, water source and time of helmenthic therapy were factors that related to malnutrition status.

Table 10. Relationship between weaning time and malnutrition status

Weaning time	Underweight	Normal	OR
	n	n	
Less than 12 months	18	22	2.83
More than 12 months	78	270	1.37<OR<5.83

The time of weaning affected to malnutrition status of children in this study (Table 10). The possibility to be in malnutrition was 2.83 time higher in children weaned less than 12 months compare to those weaned more

than 12 months. National Institute of Nutrition recommended that a child should be suckled immediately after birth and should be weaned at least for 12 months and provide supplementary food to 24 month [6].

Table 11. Relationship between parent job and malnutrition status

Job of parents	Stunting	Normal	OR
	n	n	
Farming work	290	72	9.06
Office or business work	8	18	3.55<OR<23.78

Table 11 shows the correlation between parents' job and malnutrition status of children. Malnutrition percentage of children whose

parents work was farming was 9.06 times higher than those whose parents' job was office or business work.

Table 12. Correlation between education level of parent and malnutrition status

Education level of parents	Stunting	Normal	OR
	n	n	
Below secondary school	122	26	1.71
Secondary school and above	176	64	1<OR<2.94

Education level of parents expressed to the understandings of nutrition care and health care for children. As shown in Table 12, malnutrition percentage of children whose education level of parents was below secondary school was 1.71 times higher than those whose education level of parents was above secondary school. This is consistent with a study results in

My Phuc preschool, My Loc district, Nam Dinh province [9].

Households in the research area use water from wells, rivers and springs for daily life. As shown in Table 13, malnutrition percentage was 1.75 times higher in children whose their families used water from wells, rivers and springs compared to those whose the families used water from bore well and from the rain.

Table 13. Relationship between water source and malnutrition status

Water source	Underweight	Normal	OR
	n	n	
Water from well, river and spring	76	200	1.75
Water from bore well and from therain	20	92	1<OR<3.15

#### 4. Conclusions

The anthropometric parameters of preschool children in Cao Ma Po followed the rules of the body growth of Vietnamese people. Anthropometric indices of preschool children was lower than general values of Vietnam. Malnutrition percentage of children in Cao Ma Po was relatively high (underweight: 24.8%; stunting: 77.3%; wasting: 4.5%). The percentage of underweight and wasted children in this study area were lower than that of the whole Ha Giang province, however, the stunting percentage is higher.

Factors relating to children malnutrition status of children were job of parents, education level of parents, water source used in household, weaning time. These findings suggested that the living condition, nutrition care should be focused on to reduce malnutrition children in Cao Ma Po and Ha Giang province.

#### Acknowledgments

This research is funded by the VNU University of Science under project number TN.16.15.

#### References

- [1] UNICEF (1990), Situation Analysis of Woman and Children in Viet Nam, UNICEF Ha Noi, pp. 108 – 109.
- [2] UNICEF (1990), Strategy for Improved Nutrition of Children and Woman in Developing Countries, pp. 10 – 11.
- [3] Mei Z., Grummer – Strawn L.M., Thompson D., Dietz W.H. (2004), “Shifts in percentiles of growth during early childhood: Analysis of longitudinal data from the Calofornia child health and development study”, *Pediatrics*, 113(6), pp. 617 – 627.
- [4] National Institute of Nutrition (2014), Malnutrition percentage of children under 5 years old in the area of Vietnam in 2014.
- [5] World Health Organization - Department of Nutrition for Health and Development (2006), WHO Child Growth Standards: Training course on child growth assessment: C. Interpreting growth indicators, Geneva.
- [6] Hoàng Quý Tinh, Nguyễn Hữu Nhân, Nguyễn Thị Thùy Linh (2009), “WHO software used to study some anthropometric indices”, *Journal of Military Medicine*, vol. 34, Vietnam Military Medical University, Hanoi, pp 1-5.
- [7] Hoang Quy Tinh, Nguyen Huu Nhan (2010), “Using the New World Health Organization Standards to Assess the Nutrition Status of Thai Preschoolers in Yen Bai Province, Viet Nam (2010)”, *Proceeding 09 (Selected Papers): Science of Human Development for Restructuring the Gap-Widening Society*, Ochanomizu University, Japan, p. 107-110.
- [8] Ministry of Health (2003), Biological indices of Vietnam in 1990s, Medical Publishing House, Hanoi.
- [9] Nguyễn Hữu Nhân, Vũ Văn Tâm, Hoàng Quý Tinh (2014), “Some Anthropometric Indices and the Malnutrition Status of Preschool Children in Mỹ Phúc Commune, Mỹ Lộc District, Nam Định Province”, *Journal of Science*, vol. 30, pp 234-241

## Tình trạng suy dinh dưỡng và một số yếu tố liên quan ở trẻ mầm non xã Cao Mã Pờ, huyện Quán Bạ, tỉnh Hà Giang

Vũ Văn Tâm<sup>1</sup>, Nguyễn Hữu Nhân<sup>1</sup>, Hoàng Quý Tinh<sup>2</sup>, Nguyễn Phúc Hưng<sup>2</sup>

<sup>1</sup>Trường Đại học Khoa học Tự nhiên, ĐHQGHN, 334 Nguyễn Trãi, Hà Nội, Việt Nam

<sup>2</sup>Trường Đại học Sư phạm Hà Nội, 136 Xuân Thủy, Cầu Giấy, Hà Nội, Việt Nam

**Tóm tắt:** Nghiên cứu được tiến hành trên 388 trẻ mầm non xã Cao Mã Pờ, huyện Quán Bạ, tỉnh Hà Giang, các kích thước nhân trắc được đo bao gồm: cân nặng, chiều cao đứng nhằm mục đích đánh giá tình trạng suy dinh dưỡng của trẻ. Ngoài ra, chúng tôi tiến hành điều tra, phỏng vấn phụ huynh, giáo viên để tìm hiểu các nguyên nhân, yếu tố liên quan đến tình trạng suy dinh dưỡng của trẻ tại khu vực nghiên cứu. Kết quả điều tra cho thấy: 1) Tăng trưởng của trẻ trong khu vực nghiên cứu phù hợp với quy luật tăng trưởng của người Việt Nam. Các kích thước nhân trắc của trẻ trong nghiên cứu thấp hơn so với cả nước trong thống kê của Viện dinh dưỡng năm 2014. 2) Tình trạng suy dinh dưỡng của trẻ trong nghiên cứu tương đối cao (Nhẹ cân: 24.8%; Còi: 77.3%; Còm: 4.5%). 3) Có rất nhiều yếu tố ảnh hưởng đến tình trạng suy dinh dưỡng của trẻ như nghề nghiệp, trình độ học vấn của bố mẹ, nguồn nước gia đình sử dụng, thời gian cai sữa của trẻ.

**Từ khóa:** Tình trạng suy dinh dưỡng, các yếu tố liên quan, Cao Mã Pờ.