

# Some Anthropometric Indices of Vietnamese People in the Central Northern of Vietnam<sup>1</sup>

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**ABSTRACT----** Research was carried out involving 2256 students aged 16 to 18. They were enrolled in 2 provinces: Thuathien- Hue and Thanhhoa in the central northern of Vietnam. The indices evaluate anthropometric parameters for age (including: weight, height, head circumference, neck circumference, mid-upper arm circumference, chest circumference, abdomen circumference, and hip circumference). Results showed that: The basic anthropometric indexes of central northern people development follow rules of body growth of Vietnamese people. However, weight and height of students in this study were relatively low due to a high malnutrition rate, psychological influences, physical activity and economic and natural conditions are important factors which have an effect on the health, morphology and physical status of students.

**Keywords---** Anthropometric, indices, student, growth, malnutrition, development, weight, height

## 1. INTRODUCTION

Anthropometric parameters play an important role in evaluating health status. They reflect a relationship between body physiological activities and surrounding environmental factors. Previous studies reported that anthropometric parameters are affected by living environment.

The latest study on biological indices conducted by Le Nam Tra in 1990s showed a comprehensive view of physiological and anthropometrical status of Vietnamese people [2]. Up to date, data of this research have been considered as the most updated ones for Vietnamese students. In 2003, a project named “Biological indices of Vietnamese people in 1990s of 20<sup>th</sup> century” completed and quickly became a handbook for Vietnamese anthropometrists. However, it lacks of anthropometric parameters in different ecological areas, though ecological factors are important ones affecting growth of people. Moreover, the research was also to evaluate differences of anthropometric parameters among pupils living in various ecological areas

## 2. MATERIALS AND METHODS

This research was conducted on 2256 students (1113 male and 1143 female). They come from some high schools in Thuathien- Hue and Thanhhoa provinces. Time period of the research: 1/2013 to 6/2013. Using the method of Martin and M.F., Ashley Montagu's method was used to measure morphological indexes. This is a cross-sectional study. Anthropometric parameters were measured, including weight-for-age, height-for-age, head circumference-for-age, neck circumference-for-age, mid-upper arm circumference-for-age, chest circumference-for-age, abdomen circumference-for-age, and hip circumference-for-age

Table 1. Distribution of students based on ethnicity, age and sex

Age	Sex		Total
	Male	Female	
16	376	389	765
17	370	378	748
18	367	376	743
<b>Total</b>	<b>1113</b>	<b>1143</b>	<b>2256</b>

<sup>1</sup> This research is funded by Vietnam National Foundation for Science and Technology Development (NAFOSTED) under grant number IV1.3-2011.24

After anthropometric indices, date of birth, date of measurement were determined, WHO AnthroPlus software was used to assess ages of students. This software was used to study nutritional status as well [5], [6]. Then, collected data were accessed SPSS software to evaluate factors related to development of anthropometric parameters.

Table 2. WHO malnutrition standards for children aged 5-19 [7]

Z-score	Malnutrition status based on growth indices		
	Height-for-age	Weight-for-age	BMI-for-age
> 3SD	See note 1	See note 2	Severe obesity
>2 SD	Normal		Obesity
>1 SD	Normal		Overweight
0 (TB)	Normal	Normal	Normal
< -1 SD	Normal	Normal	Normal
< -2 SD	Underheight <sup>4</sup>	Underweight	Stunted
< -3 SD	Severe underheight	Severe underweight	Severe stunted

1. A child in this range is very tall. Tallness is rarely a problem, unless it is so excessive that it may indicate an endocrine disorder such as a growth-hormone-producing tumor. Refer a child in this range for assessment if you suspect 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.

### 3. RESULTS AND DISCUSSION

#### 3.1. Anthropometric parameters of students

##### Weight-for-age

Weight is an important index to anthropometric research. Weight relates to other indices in evaluating growth of body. Concerning children, this parameter normally increase with an increase of age.

Table 3. Weight - for- age of Kinh, Ede and Jarai students

Age	Male				Female			
	n	%	X	SD	n	%	X	SD
16	376	16.6	54,5	9,1	389	17.2	46,6	7,5
17	370	16.4	56,2	9,5	378	16.7	47,2	7,6
18	367	16.2	59,6	9,7	376	16.6	48,8	7,8

Results showed that the weight of students aged 16 to 18 followed a rule of body growth. There was an increase in body weight with an increase of age. This might be contributable to some students of 18 age are the best ( $p < 0.05$ ), another way the body weight of these students in this study was higher than that reported in a research conducted by Health Ministry in 1990 [2].

##### Height-for-age

Similar to weight, standing height is an important index to to anthropometric research. It is necessary for evaluating physic status and body form indices. Height varies with different age groups and sex. Moreover, body height changes in different living environments as well.

Table 4. Height - for- age of students

Age	Male				Female			
	n	%	X	SD	n	%	X	SD
16	376	16.6	162,5	6,8	389	17.2	153,2	6,6
17	370	16.4	163,6	6,2	378	16.7	154,5	6,5
18	367	16.2	165,8	6,5	376	16.6	155,8	6,9

Results in Table 4 showed that the increase of standing height of students aged 16 to 18 follow a rule of body growth. However, these were statistically different between sex.

In comparison with data shown by Health Ministry, the mean height of students in this study was higher. The difference was greater in this study and other study (Example: with male students 163.6 cm, 164.3 cm and 165.1cm in

present study compared to 155.52 cm, 160.29 cm and 162.73 cm in the research conducted by Health Ministry, respectively). Meanwhile, the differences in height values of male between the two studies ranged from 2 cm to 8 cm.

*Head circumference - for- age*

Results showed that head circumference of students with the increase of age (Table 5).

*Table 5. Head circumference - for- age of students*

Age	Male				Female			
	<i>n</i>	%	<i>X</i>	<i>SD</i>	<i>n</i>	%	<i>X</i>	<i>SD</i>
16	376	16.6	53,6	4,6	389	17.2	53,3	4,8
17	370	16.4	54,5	5,5	378	16.7	53,2	5,6
18	367	16.2	54,1	5,8	376	16.6	53,6	4,6

Data in Table 5 showed that mean head circumference of students was higher by aged.

In comparison with data shown by Health Ministry, head circumference values of students in this study was higher. For example, head circumference of female aged 16, 17, 18 in this study was 55.5 cm, 56.2 cm and 57.8 cm compared to 53.11 cm, 53.26 cm and 53.29 cm in data of Health Ministry, respectively [2].

*Neck circumference- for- age*

Results of neck circumference were shown in Table 6.

*Table 6. Neck circumference- for- age of students*

Age	Male				Female			
	<i>n</i>	%	<i>X</i>	<i>SD</i>	<i>n</i>	%	<i>X</i>	<i>SD</i>
16	376	16.6	33,8	5,6	389	17.2	30,2	4,6
17	370	16.4	34,8	5,7	378	16.7	30,8	4,4
18	367	16.2	35,5	5,4	376	16.6	31,3	5,6

Compared to data of Health Ministry, mean neck circumference values of students in this study were lower [2]. However, data reported by Health Ministry were mean values of students at all ages, from 15 years old to 19 years old. This may be considered as the reason for the difference.

*Mid-upper arm circumference- for- age*

Left upper arm circumference is a parameter that is easy to determine and it is used extensively around the world to evaluate nutrition status of children, especially emergency situations (food crisis, war etc.). Stevens et al. reported that skinfold thickness was a important measurement to assess nutrition status of children [7].

*Table 7. Mid-upper arm circumference- for- age of students*

Age	Male				Female			
	<i>n</i>	%	<i>X</i>	<i>SD</i>	<i>n</i>	%	<i>X</i>	<i>SD</i>
16	376	16.6	21,5	5,5	389	17.2	21,2	5,4
17	370	16.4	23,6	5,3	378	16.7	22,4	5,6
18	367	16.2	24,9	5,6	376	16.6	23,5	5,9

Data in Table 7 showed that mean left upper arm circumference of students was similar students in other region. In comparison with the research of Health Ministry, this parameter in present study was greater (25.5 cm, 26.7 cm and 27.8 cm in male students and 24.3 cm, 24.8 cm and 25.2 cm in female students in present study compared to 20.15 cm, 21.37 cm and 22.04 cm in male student and 20.41 cm, 21.03 cm and 21.27 cm in female students reported by Health Ministry) [2]. These differences might be contributable to different study times. Present study was conducted when nutrition status of students has been totally improved compared to the time that research of Health Ministry was completed.

*Chest circumference - for- age*

Chest circumference together with height and weight used to determine body growth status. In present study, chest circumference of students was lower than those of foreigner students (Table 8).

Table 8. Chest circumference- for- age of students

Age	Male				Female			
	<i>n</i>	%	<i>X</i>	<i>SD</i>	<i>n</i>	%	<i>X</i>	<i>SD</i>
16	376	16.6	80,1	6,2	389	17.2	73,2	6,5
17	370	16.4	81,4	7,5	378	16.7	75,9	6,9
18	367	16.2	82,6	6,6	376	16.6	77,5	7,2

Compared to data shown by Health Ministry, mean chest circumference of students aged 18 in this study was higher. This is consistent with the rule of body growth of Vietnam students since there is a positive correlation between an increase of chest circumference and an increase of height.

*Abdomen circumference- for- age*

Abdomen circumference relates to fat and skinniness of body. Results in Table 9 showed that abdomen circumference of students in present study increased with an increase of age. However, the increasement was not similar at different ages and different sex people.

Table 9. Abdomen circumference - for- age of students

Age	Male				Female			
	<i>n</i>	%	<i>X</i>	<i>SD</i>	<i>n</i>	%	<i>X</i>	<i>SD</i>
16	376	16.6	68,2	7,9	389	17.2	62,1	5,8
17	370	16.4	70,8	7,1	378	16.7	63,5	6,5
18	367	16.2	73,6	7,8	376	16.6	64,4	6,2

The results showed that abdomen circumference of students were greater than other study. In comparison with data of Health Ministry, abdomen circumference of students in present study was higher [2].

*Hip circumference- for- age*

Similar to abdomen circumference, hip circumference is a indicator used to evaluate fat and skinniness of body. Results of hip circumference of students were shown in Table 10.

Table 10. Hip circumference - for- age of students

Age	Male				Female			
	<i>N</i>	%	<i>X</i>	<i>SD</i>	<i>n</i>	%	<i>X</i>	<i>SD</i>
16	376	16.6	82,4	8,9	389	17.2	83,2	7,2
17	370	16.4	83,5	9,1	378	16.7	85,6	7,1
18	367	16.2	85,8	9,2	376	16.6	86,8	6,2

The results showed that mean hip circumference of students was greater than other study. Compared to data of Health Ministry, hip circumference data in the present study were higher. This could be explained by the difference in times that the two studies were conducted.

**4. CONCLUSIONS**

A study was conducted on 2256 students to evaluate anthropometric parameters for age (including: weight, height, head circumference, neck circumference, mid-upper arm circumference, chest circumference, abdomen circumference, and hip circumference). Results showed that: (1) The development of these anthropometric parameters of the students follow rules of body growth of Vietnamese people. However, weight and height of students in this study were relatively low due to a high malnutrition rate. (2) The development of anthropometric parameters for age of the students follow rules of body growth of Vietnamese people. However, weight and height of the students were relatively low due to a high malnutrition rate.

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