

# The Influence of Some Environmental Factors on the Basic Anthropometric Indexes of Vietnamese People in Ecological Areas

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**ABSTRACT**— *Research was carried out involving 6000 people (3000 male and 3000 female) aged 16 to 18 They were enrolled in 3 suburban areas and 3 urban areas in Vietnam. The results show that in general, the basic anthropometric indexes of suburban people areas not higher than those of urban people areas. For reasons that effect to anthropometry index of people, except for the influences of genetic, endocrine and race Environmental factors such as nutrition, psychological influences, physical activity and economic and natural conditions are important factors which have an effect on the health, morphology and physical status of people.*

**Keywords**— Anthropometric, index, people, influence

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## 1. INTRODUCTION

Annie C. Wetter and Christina D. Economos’s study on the skeletal status of young adults does not well account for moderate as opposed to vigorous physical activity [1]. Roderic Floud, John Komlos, Richard Steckel and Kenneth Sokoloff have looked at human stature in relation to the economic welfare index by human stature and they have seen that height at maturity is a reliable proxy indicator of health and nutritive conditions and that socioeconomic factors as well as hereditary and environmental factors affect growth in terms of height. The study of DS Lauderdale and PJ Rathouz on the effects of place of birth, post-immigration time and socioeconomic status on body size is of importance [3]. In Vietnam, a number of research projects have addressed these problems. For example: “Vietnamese’ Physiologic Constants in 1975” by Nguyen Tan Gi Trong et al [8], “Vietnamese’ Anthropometry in 1990” [9], “Project KX 07-07 in 1994”, “Atlas of Vietnamese Anthropometry in 1985” and surveys conducted in some areas, provinces, schools, colleges and universities by physiology scientists, influenced particularly by the report “Vietnamese Biological Values in the 20<sup>th</sup> Century” by the Vietnamese Ministry of Health [10].

Most previous research has shown that morphological and physical index values are influenced by the environment. H. Nygard et al studied the musculoskeletal capacity of employees aged 44 to 58 engaged in physical, mental and mixed types of work in Europe [5]. Sunnegardh and E. Bratterby found the maximal oxygen uptake, anthropometry and physical activity of 8 and 13-year old children in Sweden [7] and the Midtby et al study looked at variation in bone formation markers with regards to age, gender, anthropometry and season in both men and women [4]. Ritsuko Imamura et al looked at the effect of wearing long skirts and mini-skirts for a year on subcutaneous fat thickness and body circumference [6]

## 2. CONTENT

### 2.1. Objectives

Form and physical force are the most useful indexes used to assess health status. They show actual body status and the relationship between human physiology and environmental factors such as climate, season, nutrition, activity, economy, urbanization and stress. Most previous research has shown that morphological and physical index values are influenced by the environment.

The purpose of this research is to identify ecological environment factors that effect the anthropometry of Vietnam people and from there see if there are differences between the anthropometric indexes of people in the urban area and people in the suburban area, and explain why either urban or suburban Vietnam people got better anthropometric values.

**2.2. Time, place and method**

Time period of the research: 6/2012 to 12/2012. This study was carried out on 6000 people (3000 male and 3000 female) who were from 16 to 18 years old. They were studying in the following schools:

- Three areas in suburban Vietnam: Dienbien province (North Vietnam), Binhthuan province (Central Vietnam) and Angiang province (South Vietnam).
- Three areas in urban Vietnam: Hanoi city (North Vietnam), Danang city (Central Vietnam) and Cantho city (South Vietnam).
- Using the method of Martin and M.F. Ashley Montagu’s method was used to measure morphological indexes. This is a cross-sectional study. Every subject was measured with respect to height, weight and chest girth. Average index values were calculated using Button’s formula.

**2.3. Findings**

**2.3.1. Result**

Average basic anthropometric indexes of Vietnamese people are presented in Table 1 and Table 2.

**Table 1.** Average basic anthropometric indexes of male (  $\bar{X} \pm SD$  )

No	Index	Urban (1) (n=1500)	Suburban (2) (n=1500)	$\bar{X}_1 - \bar{X}_2$	P (1-2)
1.	Height (cm)	165.73 ± 5.21	163.63 ± 6.19	2.10	P<0,05
2.	Weight (kg)	57.31 ± 5.03	54.22 ± 5.19	3.09	P<0,05
3.	Chest measurement (cm)	82.31 ± 5.26	80.15 ± 5.32	2.16	P<0,05
4.	Belly measurement (cm)	69.16 ± 4.42	66.16 ± 4.65	3.00	P<0,05
5.	Buttock measurement (cm)	86.54 ± 3.28	84.46 ± 4.17	2.08	P<0,05
6.	Body Mass index (BMI)	19.87 ± 1.34	19.12 ± 1.89	0.75	P>0.05
7.	Pignet	28.71 ± 7.34	28.16 ± 7.56	0.55	P>0.05
8.	Skelie	87.18 ± 5.56	87.04 ± 5.78	0.14	P>0.05

**Table 2.** Average basic anthropometric indexes of female (  $\bar{X} \pm SD$  )

No	Index	Urban (1) (n=1500)	Suburban (2) (n=1500)	$\bar{X}_1 - \bar{X}_2$	P (1-2)
1.	Height (cm)	156.33 ± 5.02	154.12 ± 5.11	2.12	P<0,05
2.	Weight (kg)	46.68 ± 4.32	44.50 ± 5.61	2.18	P<0,05
3.	Chest measurement (cm)	80.22 ± 7.16	78.06 ± 6.27	2.16	P<0,05
4.	Belly measurement (cm)	63.23 ± 3.41	61.56 ± 3.66	1.67	P<0,05
5.	Buttock measurement (cm)	85.71 ± 3.75	82.92 ± 4.36	3.79	P<0,05

6.	Body Mass index (BMI)	19.37 ± 1.82	19.02 ± 1.86	0.35	P>0.05
7.	Pignet	29.63 ± 7.68	29.33 ± 6.55	0.30	P>0.05
8.	Skellie	85.69 ± 5.72	85.11 ± 5.62	0.58	P>0.05

The results of our survey showed that the average basic anthropometric index values for urban people areas are higher than those for suburban people areas. There were many reasons and conditions which cause the basic anthropometry indexes of suburban people areas to be lower than that of urban people areas. Except for genetic and endocrine influences, especially concerning human growth, we believe that nutrition, psychology, physical activity and natural conditions are very important.

### 2.3.2. Discussion

In this paper we present information describing the nutrition, psychology, physical activity and natural conditions of the urban area and also the location, geography and climate of the suburban area. By comparing the nutrition, activity level and economic difference between suburban and urban people areas, we seek to explain the difference between the average basic anthropometric index values of suburban and urban people areas.

**About the nutrition of people:** Halong city, Hue city and Cantho city are three of the most developed areas in Vietnam while Dienbien province, Angiang province, and Lamdong province are considerable less developed. This difference is reflected in the quality and quantity of food eaten by resident people, with the nutritive intake of people in more developed areas being superior to people in less developed areas.

**Psychological influences on human growth:** In general, since the end of the America war (1954–1975) to now, the social environment of urban Vietnam has been peaceful and stable which influences the urban Vietnam psychosocial environment. While suburban Vietnam has also been peaceful and stable, the residents have been poorer and the suburban environment has been horribly polluted. Over the years, living conditions have improved and the physical and mental stunting caused by malnutrition has lessened and there has been rapid increase in resident body size (called catch-up). However, suburban people live in a psychosocial environment that is worse than that of urban people. This could explain why anthropometric index values of suburban people are lower today.

**Physical exercise of people:** Physical exercise is important for maintaining physical growth and helps maintain a healthy weight and build and maintain healthy bone density and muscle strength. Exercise has been shown to improve cognitive functioning via improvement of physical morphology and physiology. In addition, physical activity has been shown to change anthropometric index values. Our investigation found that there are many indoor and outdoor sports facilities in urban Vietnam while there are very few in suburban Vietnam. Such facilities encourage student activity [11].

It was found that location, regimen, psychology and physical exercise differs between urban and suburban people. We believe that the different conditions affects human body size and shape.

**Physical activity of people:** The amount of habitual physical activity was not seen to affect body height but daily caloric expenditure is a major determinant of weight. Increased physical activity or training can result in diminished levels of body fat and increased muscle mass, bone mineralization responds directly to physical stressors and there is some evidence that indicates that adults who are more active are at less risk for osteoporosis (Thomas W. Rowland, 1998) [12]. According to this theory, physical activity has an affect on the human physique. The living conditions in suburban Vietnam differ considerably from that of urban Vietnam and they can be seen as a determinant of more or less physical activity. These conditions therefore have an effect on the basic anthropometric index values of height, weight and so on.

**The natural condition:** The effects of climate on human body size and shape variation follows that of general mammalian biological adaptation to the thermal environment. In a warmer environment, excess body heat produced by mammalian metabolism and voluntary muscular activity must be dissipated to the environment to avoid hyperthermic stress [13]. This heat loss may occur by radiation (direct transfer of infra-red energy from the body to a cooler object), conduction (heat exchange by direct physical contact between the body and a cooler object), convection (heat exchange between the body and a cooler object via an intermediary medium, e.g. air flow), or evaporation (conversion of water, e.g. perspiration, to vapor using body heat). Relatively low body weight and body volume, and a relatively large body surface area caused by having legs and arms that are relatively long in proportion to the size of the trunk of the body, assist in heat loss. Low body volume decreases the amount of metabolizing tissue and also decreases the distance required for the radiation of heat from the internal organs and muscles to the surface of the body. A large body surface area increases the potential for convection, conduction and evaporation. In a colder environment, a relatively large body volume and small surface area (i.e., relatively short extremities in proportion to trunk size) is the body type best suited for heat retention. Body fat, especially the thickness of the subcutaneous fat layer, may also increase in a colder

environment. Adipose tissue is relatively inert metabolically due to poor vascularization and acts as an insulating barrier against heat loss by radiation. In warmer environments, a thin subcutaneous layer of fat helps minimize heat retention (Barry Bogin 1999) [2].

### 3. CONCLUSIONS

From the information obtained about the nutrition, psychology, physical activity and natural conditions as described, it can be seen that urban Vietnamese people experience better living conditions in Vietnam than suburban people. Therefore, the basic anthropometric index values of suburban Vietnamese people are lower than that of urban Vietnamese people. However, the difference in basic anthropometric index values between urban Vietnamese people and suburban Vietnamese people are the result of a number of conditions which will be presented in another paper.

### 4. ACKNOWLEDGMENTS

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