

Original**Establishment of Child Body Image and Study on Mother's Perception for Child Body Weight**

Bui Thi Nhung¹, Nguyen Thuy Anh¹, Le Danh Tuyen¹, Nguyen Huu Chinh¹, Bui Van Tuoc¹,
 Nguyen Mai Phuong², Tran Thanh Nam³, Shigeru Yamamoto²

¹ National Institute of Nutrition, Hanoi, Vietnam

² Nutrition and Food Culture Research Center, Jumonji University, Saitama, Japan

³ Science Research and The ARC Centre of Excellence for Children and Families over the Life Course, The University of Queensland, Australia

ABSTRACT *Background and purpose:* Child obesity is a present important public health problem in Vietnam. It is accelerated by the recent rapid economic developments. There are various factors and one of them is a perception of parents and society, especially mother's. Many of them think that chubby children are healthy and beautiful, which makes them to think that their children are thinner than real. However, obesity and dietary habit in childhood will bring the serious non-communicable diseases in their future and mothers and society have to realize their wrong perception. Available body images at present are only for Western children and adolescent. We need the one for East Asian children and those before adolescent. We conducted two studies; the first is the establishment of body image of 6-10 year old children and the second is to find the wrong perception of mothers about their children. *Methods:* In Study 1 we tried to establish child body image. We measured height and weight of 8 year old students at an elementary school (233 students). Based on WHO definition, we categorized them into 5 groups and then we made 10 groups to make image more precise. We took photographs of all the children with light cloth and divided into 10 groups in both boys and girls and show them to artists to draw 3 styles of body silhouette for each groups. We asked children's mothers to choose the best silhouette from 3. Study 2 Actual BMI of children and the perception of mothers It was conducted at 6 elementary schools in 3 cities in Viet Nam (Hai Phong, Ha Noi, and Da Nang) and total subjects was 600 pairs of mother and child. We measured height and weight of all children and ask questions by using the silhouette. *Results:* Through the survey, prevalence of boys and girls suffered from overweight and obesity were quite high, being about 40%-60%. More than 30% of mothers liked overweight and obese image and thought that they are healthy. Moreover, more than 47.2% of mothers thought that their children were wasting in spite of the actual prevalence of 2.7%. *Conclusion:* In this study body image of East Asian children before adolescent was established first in the world. Prevalence of obesity was high in 3 big cities in Vietnam, and also mother's favorite and healthy BMI was higher than the actual BMI of children, furthermore 47.2% of mothers thought that their children were underweight in spite of the real underweight was only 2.7%. While only 2.3% of mothers thought that their children were obesity in spite of the real obesity was 26.3%.

Key words: Vietnam, child, obesity, body image, mother's perception

INTRODUCTION

Child obesity is a present important public health problem in Vietnam. It is accelerated by the recent rapid economical developments. Overweight and obesity in children may lead to obesity in adulthood, as well as other pathological disorders related to obesity. A study in Japan showed that 30% of obese children will be still obese when they become adults (1). For example, in Australia, in 1985, the proportion of overweight and obese aged from 2 to 18 years old was 10.2% in boys and 11.6% in girls. This proportion increased to 23.7% in boy and 24.8% in girls in 2008 (2). In China, after 20 years (1985- 2005), the proportion of overweight and obese children aged 8-18 years old increased from 2% to 14% in boys and from 1% to 9% in girls (3).

In Asia, the number of children who are overweight and obese has increased from 13 million

children in 1990 to 18 million in 2010 which is highest in 3 Continents (4).

According to the results of general nutrition survey 2009-2010 in Vietnam, prevalence of overweight and obese children aged from 5 to 19 years old was 8.5%. The prevalence in 5-19 years old children was 15.4% in big cities, 6.6% in rural areas and 27.4% in the municipalities (5). Survey conducted in 1996 and 2014 in Ho Chi Minh City showed that the prevalence of primary school children has increased from 12.2% to 51.8%. The survey in Hanoi in 1995 and 2013 increased from 3.3% to 40.6%

There are various factors which causing the rapid increase of child obesity such as energy rich diet, using soft drink in the meal, eating fast food and reduced physical activity (6-12). In Viet Nam,

*Corresponding author BN Nhung: nhungvnnin@gmail.com, S. Yamamoto: shigeruy@jumonji-u.ac.jp

parents and grandparents always think that fat children are healthy and beautiful. They usually compare their children's weight with other children's weight. So, they give a lot of food to their children when they see that their children are not as fat as other children. Some parents take their children to nutrition consulting room and doctors concluded that their children are normal (their weight and height meet World Health Organization's standard), but parents and grandparents still think that their children are suffering from underweight and they need to gain weight. Similar phenomenon can be seen in the developed countries. In England, one research was about parents' awareness of their children's obese and it was implemented at a primary school with the children from 10-12 years old. The result showed that 29.9% of children who suffer from obesity, but only 18.3% of mothers who realize that their children are obese [13]. In Spain, there was a research about mothers' perception of their children's obese with the children from 6 to 10 years old. The result showed that in 72 overweight children, there were only 29% of mothers believed that their children were overweight and in 90 obese children, only 52% of women were aware that their children were obese (14).

But in VietNam, until now, we do not have any study using body silhouettes to find whether mother's perception is one of the reasons leading to children's obesity.

However, in 1997, the study of overweight and obese children at a primary school in District 1, Ho Chi Minh City showed that 25% of parents with overweight children were not aware that their children were overweight, and when asked about solution to overweight children, 20.5% of parents still did not want their children to lose weight (15).

Furthermore, the study of body image in adolescents within Vietnam and Japan in 2005-2006 among students in 3 secondary schools in Japan and 3 secondary schools in Ho Chi Minh showed a very different trend between the desire for body shape of Japanese students and Vietnamese students. In Japan, children in the juvenile age often want to have a slender body, especially in girls. In this study, about 60% of the Japanese children think that obesity is unhealthy, whilst about 85% of the Vietnamese children think that thinness is unhealthy. Most Japanese girls are not satisfied with their body shapes and 78.3% of them want to lose weight, which is the main reason of underweight among the adolescents in Japan. Meanwhile Vietnamese students tend to gain weight.

Therefore, to build solutions of overweight and obesity prevention for school aged children, a research "Evaluation of mothers' awareness about their children's nutritional status through body image," is implemented with two purposes: the first is the establishment of body image of 6-10 year old children and the second is to find the wrong perception of mothers about their children. Hence, we build the solutions for parents to prevent overweight and obesity among school aged children.

METHOD

Study 1: Drawing the body silhouettes

1. Study subject, time and conducting place.

Study subject: 8 years old students

Selection criteria included children who:

- Without malformation
- Without chronic or acute diseases, acute infection etc...
- Parent agree to participate

Time and place

This study was conducted from October 2015 to November 2015 in one elementary school in suburban area in Ha Noi.

2. Study design.

This study was designed as a cross sectional study.

3. Sample size and selecting subject

We have to co-operate with Hanoi Preventive Health Care and Department of Education to choose one elementary school to join in the study. And we chose Kim Chung elementary school to join the study. We make student list of all 3rd grade students (8 years old). And we based on inclusion criteria to select subjects for the study. After removing people who did not meet the inclusion criteria, 233 students were selected to join in the study.

4. Methodology and data collection

Before conducting study 1, we trained for surveyor about weight and height measurement. We contacted to teacher of each class to give informed consent to parents and got the agreement of all parents who permitted your children to join in the study. We started to do anthropometric measurement and calculating BMI of 233 students.

Anthropometric measurement: Body weight and height were measured in light clothing and without shoes to the nearest 0.1 kg and 0.1 cm respectively. Body mass index (BMI) was calculated as weight per square of height (kg/m²).

Calculate BMI of 233 students based on this fomular: $BMI = (\text{weight in kilograms}) / \text{height in meters}^2$

After that, we classified of nutritional status of 233 children into 10 groups of BMI based on WHO reference 2007. Based on BMI definition of WHO, there are 5 groups of nutritional status including severe wasting, wasting, normal, overweight and obesity.

For boy (8 years old), BMI range considered normal is 13.3-17.4 kg/m², severe wasting BMI under 12.4 kg/m², wasting 12.4-13.3 kg/m², overweight 17.4-19.7 kg/m², obesity BMI over 19.7 kg/m². For girl (8 years old), BMI range considered normal is 12.9-17.7 kg/m², severe wasting BMI under 11.9 kg/m², wasting 11.9-12.9 kg/m², overweight 17.7-20.6 kg/m², obesity BMI over 20.6 kg/m² (Fig. 1).

According to WHO 2007 nutrition status is divide into 5 categories. Range of BMI of each category is too wide, so we devided into 10 groups of BMI including severe wasting (1 group), wasting (1 group), normal (4 groups), overweight (2 groups), obesity (2 groups) in order to help mothers easily to identify the tendency of nutrition status at different point of BMI (Fig. 2).

We took the photos of 233 students. For each group of BMI, artist draw 3 styles of body silhouette for boy and 3 styles of body silhouette for girl based on the photos (Fig. 3).

After that, we showed the photos and 3 styles of body silhouette above to ask mothers who have children at 8 years old to choose the most accurate body silhouette for both boy (Fig. 4) and girl (Fig. 5). The finnal silhouette is Fig. 6.

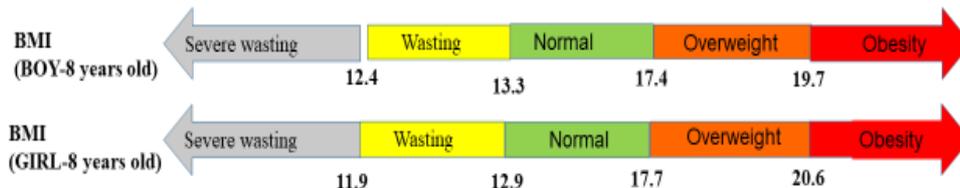


Fig. 1. Classification of nutritional status based on WHO reference 2007

Boy BMI Group	Severe wasting	Wasting	Normal				Overweight		Obesity	
(kg/m ²)	<12.4	12.4 - 13.2	13.3 - 14.3	14.4 - 15.4	15.5 - 16.5	16.6 - 17.4	17.5 - 18.5	18.6 - 19.7	19.8 - 22.7	22.8 - 25.8
(n)	0	7	17	26	18	13	13	12	24	9

Girl BMI Group	Severe wasting	Wasting	Normal				Overweight		Obesity	
(kg/m ²)	<11.9	13.0 - 14.1	13.0 - 14.1	14.2 - 15.3	15.4 - 16.5	16.6 - 17.7	17.8 - 18.9	19.0 - 20.6	20.7 - 22.4	22.5 - 24.8
(n)	0	9	16	22	21	11	4	2	4	5

Fig. 2. Based in WHO standard we categorized into 10 groups of BMI for making 10 Silhouette

Study 2: Conducting survey to find mothers’ perception

1. Study subject, time and conducting place.

Study subject:

Selection criteria: Pairs of mother and child (children are from 6 to 9 years old)

Exclusion criteria:

- Children are congenital malformation
- Children suffer from chronic diseases
- Children without mothers

2. Time & place

It was conducted from November 2015 to March 2016 at 6 elementary schools in 3 big cities Ha Noi, Hai Phong and Da Nang in Viet Nam. In each city, we selected 1 primary school in urban area and 1 primary school in sub-urban area.

3. Study design:

This study was designed as a cross-sectional study

4. Sample size and selecting subject

Sample size

This is fomular we use to collect sample size for each city:

$$N = [z^2_{(1-\alpha/2)} \times p(1-p)] / d^2 = 175$$

Where: $z_{(1-\alpha/2)} = 1.96$, is standard normal variate $p = 0.337$, this is overweight obesity prevalence of children from 6 to 10 years old in the big city in Vietnam, 2011

$d = 0.05$, absolute error or precision - has to be decided by researcher.

By the calculation we got 175 students for each city. But estimated drop out rate is 10%. So we selected 200 students for 1 city. Totally, we selected 600 students for 3 cities.

Selecting subject

Firstly, we asked for the permission of 3 provincial departments of education (Ha Noi, Hai Phong and Da Nang) and district departments of

education to choose schools for the research. For each city, we selected 2 elementary schools , 1 school in the urban area and 1 school in the suburban area. Totally, we selected 6 elementary schools. For each school, we selected the subjects as following steps: Step 1: For each grade, we selected 1 class ran-domly to join in the study. In this step, we used simple random method. Each of class in each grade is assigned a unique number. The numbers are placed in a bowl and thoroughly mixed. Then, we selected 1 number. The classes were selected in the sample if they have selected numbers

Step 2: For each class, we made the student list and selected 25 students from each class randomly. In this step, we used systematic sampling method. Total number of students in 1 class is 50. We made an ordered list of all 50 students. Next, we determined our interval size by dividing our entire population (50) by the number of students in our sample (25) to get $50/25 = 2$. This is our interval size. Lastly, from random starting point, we would take every 2nd student from the list until we had 25 students.

So totally, we selected 600 students for 6 elementary schools at 3 provinces.

5. Methodology and data collection

Before conducting the study, we trained for surveyor about weight and height measurement, how to interview mothers about the body image questionnaire. After that, we contacted to teachers to make appointment with parents. All subjects were informed carefully about the significance, purpose, method, expected results, responsibilities of participants. After that, subjects have to agree and sign in the informed consent before participating the survey. In accordance with the informed consent, participants were allowed to withdraw from the study at any time and by any reason.

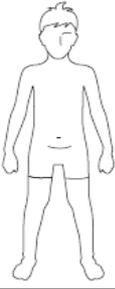
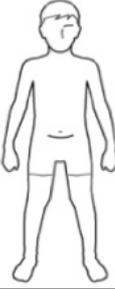
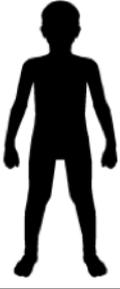
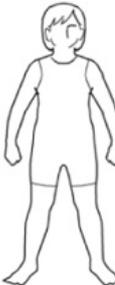
<p>Normal (14.4-15.4 kg/m²)</p>				
<p>Overweight (17.5-18.5 kg/m²)</p>				
<p>Obesity (19.8-22.7 kg/m²)</p>				
<p>Normal (14.2-15.3kg/m²)</p>				
<p>Overweight (17.8-18.9 kg/m²)</p>				
<p>Obesity (22.5-24kg/ m²)</p>				

Fig. 3. Three styles of body silhouette for boy and girl drawn by artist

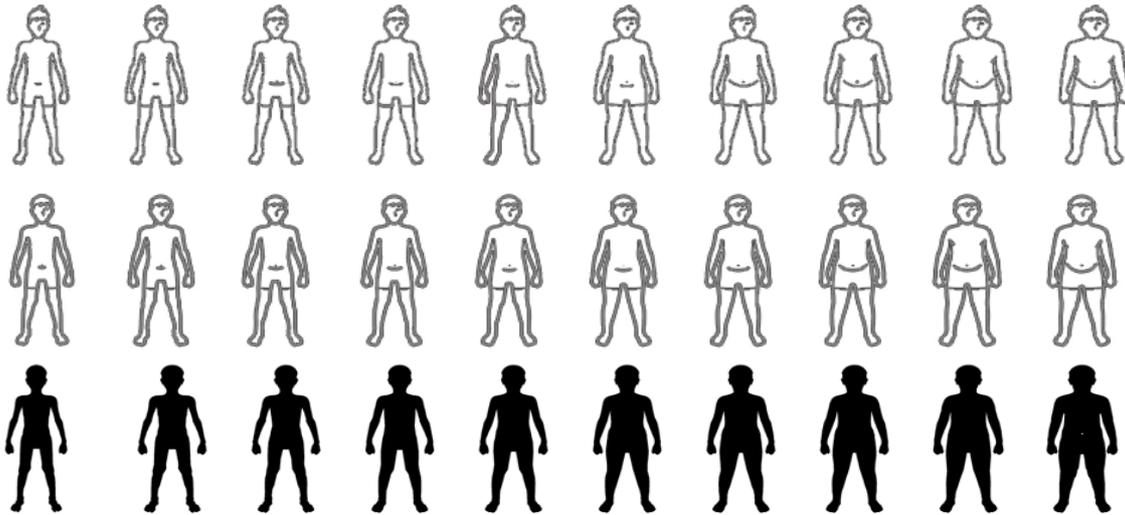


Fig. 4. Three styles of body silhouette for boy

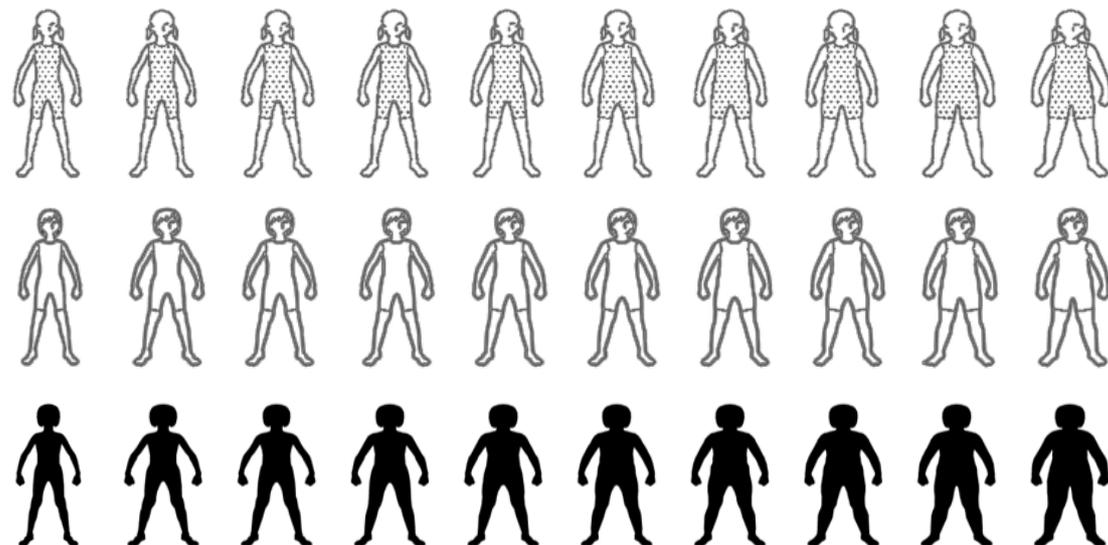


Fig. 5. Three styles of body silhouette for girl

Anthropometric measurements: Body weight and height were measured in light clothing and without shoes to the nearest 0.1 kg and 0.1 cm respectively. Body mass index (BMI) was calculated as weight per square of height (kg/m^2).

Mothers' perception survey: All mothers were interviewed by body image questionnaire.

6. Study analysis

All data were analyzed using the SPSS software (SPSS 16.0).

Chi² test was used to compare percentage of actual nutrition status and percentage of mothers' identification of their child's nutrition status.

7. Ethical approval

This study was approved by the ethical committee of the Vietnam National Institute of Nutrition. All personal data and each record such as informed consent were strictly managed by responsible persons and used only for the purposes of the study.

RESULTS

Study 1

After surveying mothers, there is 55.7% of mothers chose the 1st silhouette, 28.2% of mothers chose the 2nd silhouette, 16.1% of mothers chose the 3rd silhouette. Therefore, we chose the 1st silhouette to use in the questionnaire (Fig. 6).

Study 2

Nutritional status of children at 6 elementary schools in Ha Noi, Hai Phong and Da Nang

Table 1 shows that allocation by gender of the subjects participating in the study is the same, there is no difference between the 2 genders. There is 52.2% of boy and 47.8% of girl.

Figure 7 shows the actual nutritional status of children at 6 elementary schools in Ha Noi, Hai Phong and Da Nang. Prevalence of wasting in 3 cities is very low (ranging from 2%-4.5%) but prevalence of overweight and obesity is quite high (ranging from 17.5% - 26.9%)

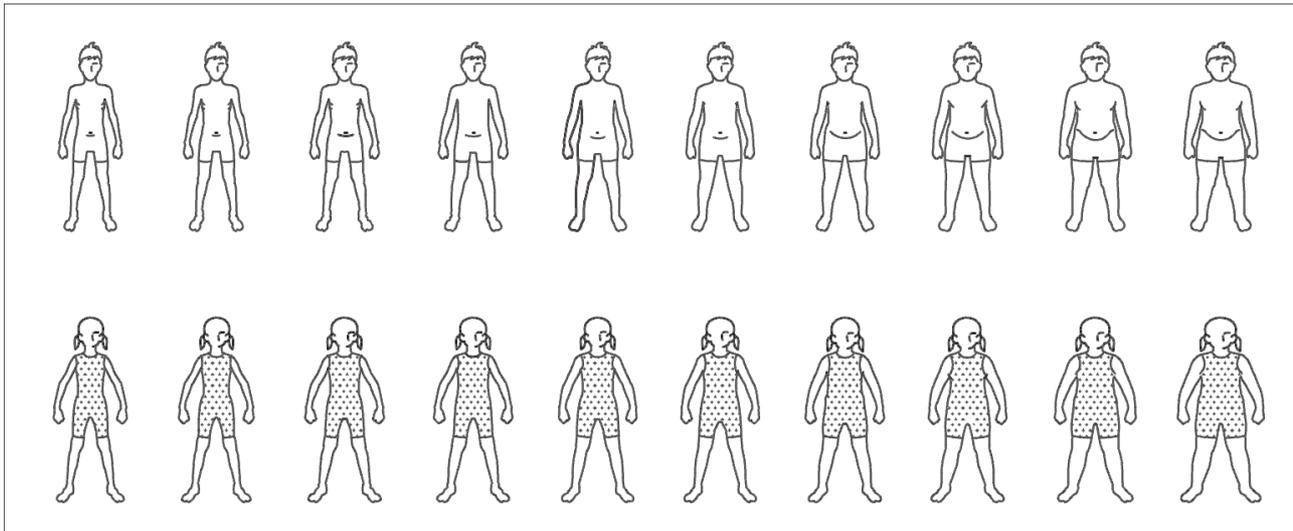


Fig. 6. The silhouette used in the questionnaire

Table 1: Number of subjects by gender in Ha Noi, Da Nang and Hai Phong

Indicator	Ha Noi (n=189)		Da Nang (n=199)		Hai Phong (n=200)		Total (n=588)	
	No of subject	Percentage (%)	No of subject	Percentage (%)	No of subject	Percentage (%)	No of subject	Percentage (%)
Boy	101	53.4	99	49.7	107	53.5	307	52.2
Girl	88	46.6	100	50.3	93	46.5	281	47.8

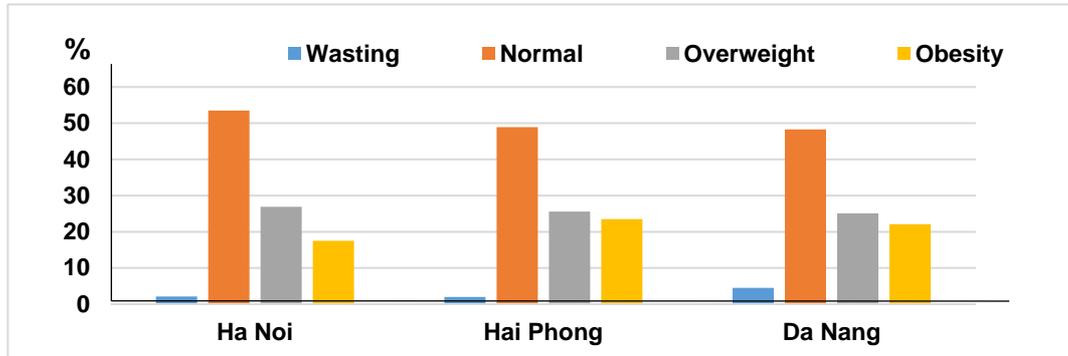


Fig.7. Nutritional status of children from 6-10 years old at 6 elementary schools in Ha Noi, Hai Phong and Da Nang

Mothers' perception

Figure 8 showed the mothers' favorite silhouette for boy. Their answers tended to be on the overweight and obesity side, none of them chose severe wasting and wasting silhouettes. And the prevalence of boy suffered from overweight and obesity was also quite high, it was about 60%.

Figure 9 showed the mothers' favorite silhouette for girl. The result was also the same with the mothers' favorite silhouettes for boy. It tended to be on the overweight and obesity side, none of them chose severe wasting and wasting silhouettes.

And the prevalence of girl suffered from overweight and obesity was also quite high.

Figure 10 showed healthy silhouette for boy, mothers' answer also tended to be on the overweight and obesity side while there was not any mothers chose

severe wasting and wasting silhouette. And the prevalence of overweight and obese boy was also high.

Figure 11 showed showed healthy silhouette for girl, mother's answer was the same with healthy silhouette for boy, it was also tended to be on the overweight and obesity side while there wasn't any mothers chose severe wasting and wasting silhouette. And the prevalence of overweight and obese girl was also high.

Figure 12 showed the percentage of mothers who have son choosing unhealthy silhouette. More than 70% of mother could realize that under nutrition silhouettes is not healthy silhouettes. But only about 50% of mother could realize that over nutrition is not healthy.

Figure 13 showed the percentage of mothers who have daughter choosing unhealthy silhouette. It is the same with Figure 10. More than 70% of mother could realize that under nutrition silhouettes is not healthy silhouettes. But only about 50% of mother could realize that over nutrition is not healthy.

BMI and mothers' identification of their own child's nutritional status. 47.2% of mothers thought that their children were underweight in spite of the real underweight was only 2.7%. While only 2.3% of mothers thought that their children were obesity in spite of the real obesity was 26.3%.

Figure 14 showed the comparison between actual

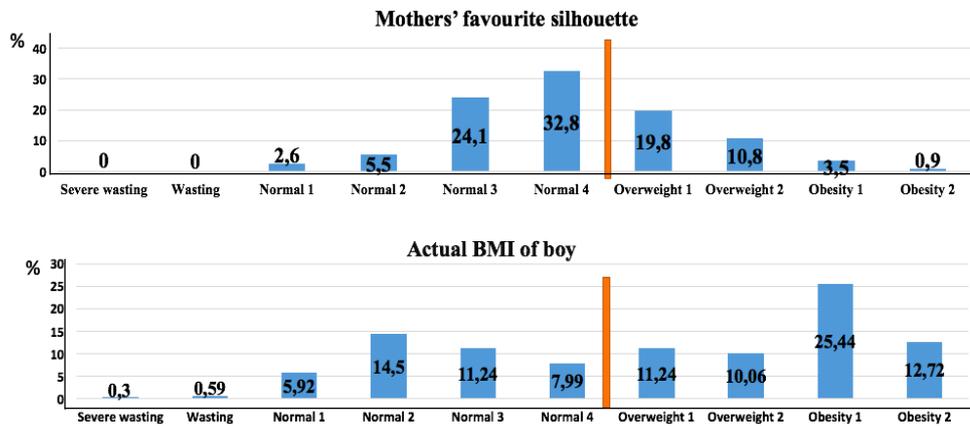


Fig.8. Mothers' favourite silhouette and actual BMI of boy

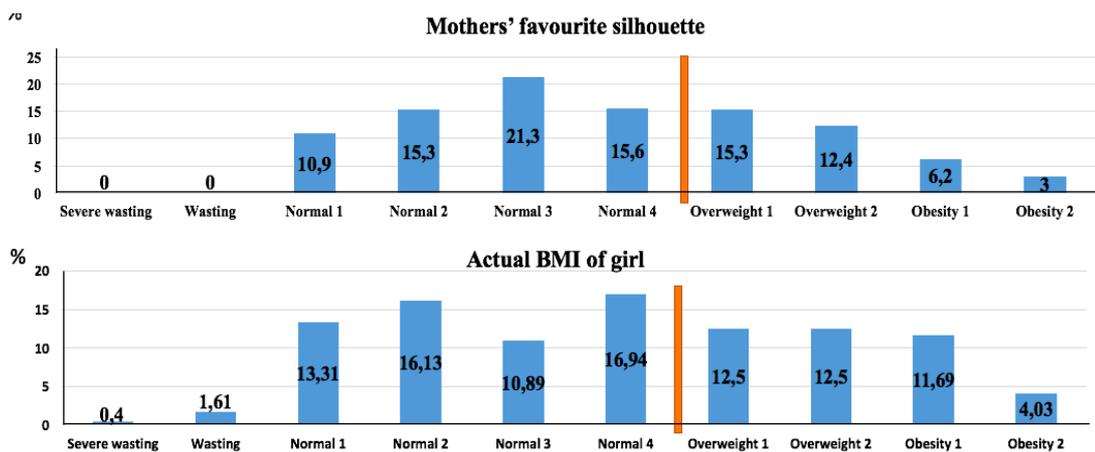


Fig. 9. Mothers' favourite silhouette and actual BMI of girl

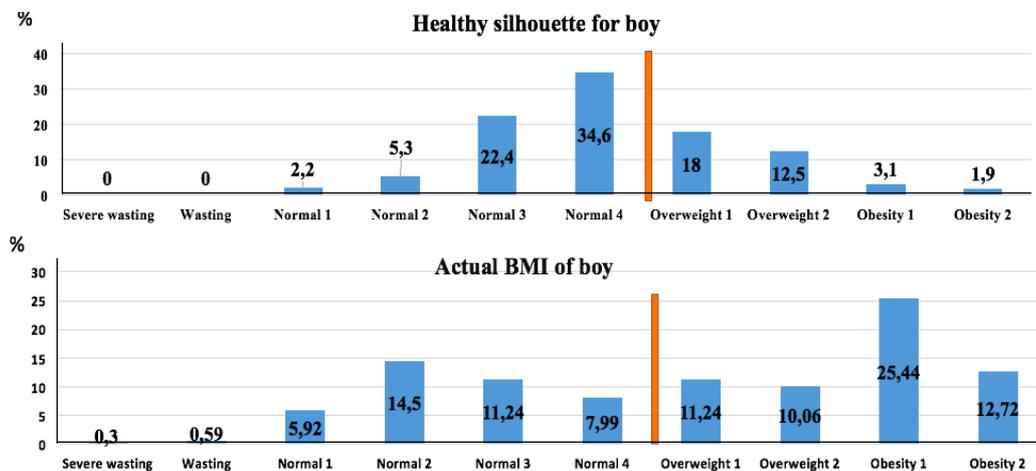


Fig. 10. Healthy silhouette for boy and actual BMI of boy

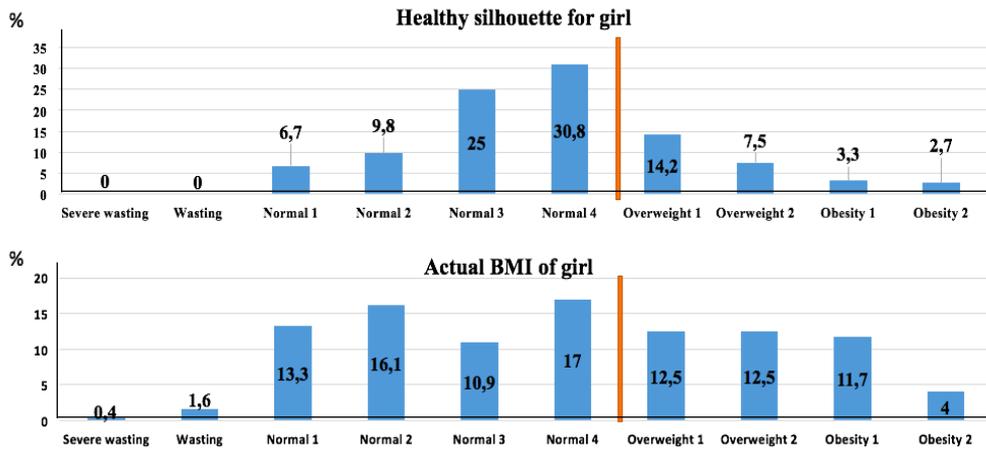


Fig. 11. Healthy silhouette for girl and actual BMI of girl

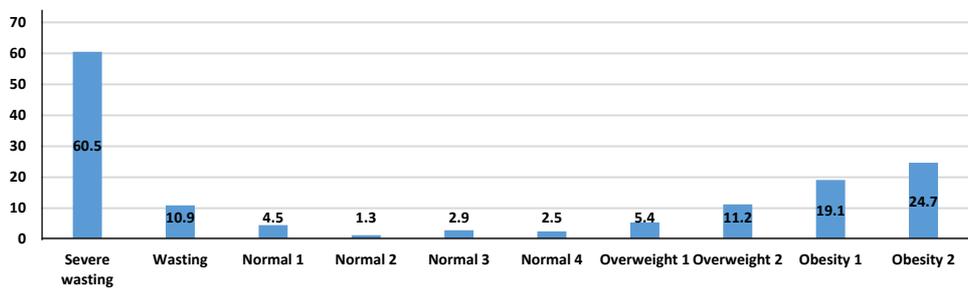


Fig. 12. Unhealthy silhouette for boy

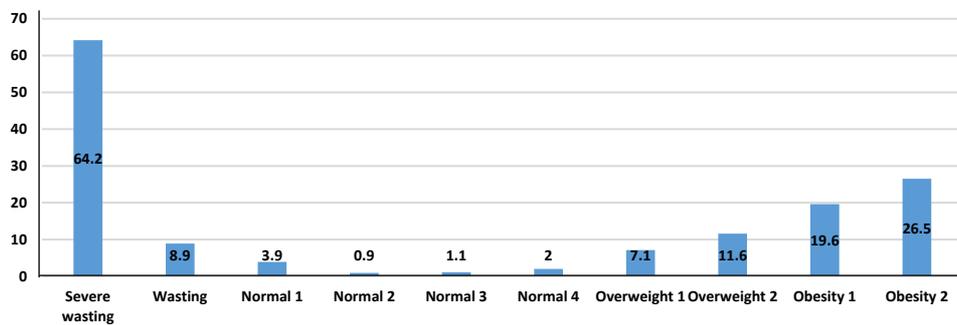


Fig. 13. Unhealthy silhouette for girl

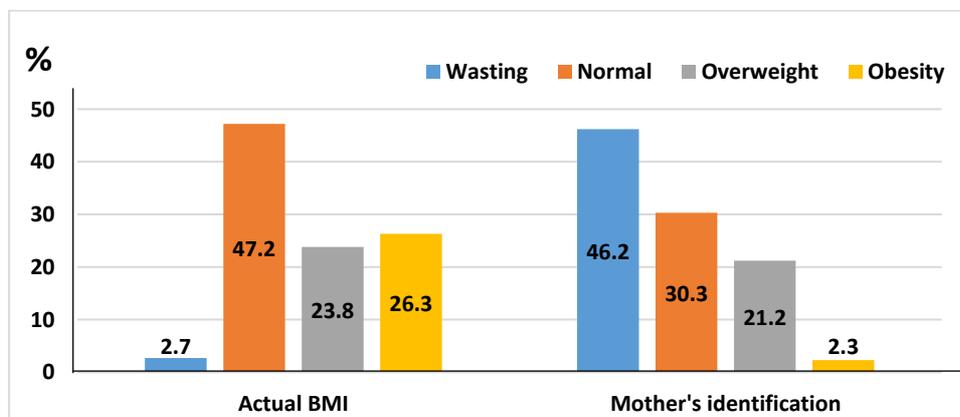


Figure 14. Summary of actual nutrition status and mother's identification of their child's nutrition status of 3 cities

DISCUSSION

In Vietnam many people think that overweight is healthy and beautiful. Such wrong perception in the present society, especially mothers, causes the high prevalence of overweight. In this study we tried to find how many mothers think such wrong perception to give proper nutrition education. For it, we first made the body silhouette of small children in Vietnam and other East Asian countries, which was not available before.

In this study, body image of East Asian children before adolescent was established first in the world. There are some study on implementing of body images reported. However, they were all for the adolescent and developed in Europe and USA for example Stunkard silhouette. Besides, body shape changes dramatically during adolescent from child to adult. Body shape of caucasian and East Asians are also not the same. So, it is necessary to make the body silhouettes for East Asian primary school children.

Body images of some previous studies were not based on the scientific evidence but just drawn by researchers and painters and no evaluation before using. Some body images look all fine regardless the shape.

However, in this study we grouped 233 children of 8 years old into 10 groups depending upon the BMI and asked painters to draw 10 body silhouettes for boy and 10 body silhouettes for girl. Based on WHO reference data 2007, BMI was categorized into only 5 groups, but if we only draw 5 silhouettes based on 5 BMI groups, it was not too clear for mothers to see which is normal silhouettes, which is obesity silhouettes. Therefore, from 5 BMI groups, we divided them into 10 BMI groups to help mothers to identify the tendency of nutritional status at different point of BMI. We believe that our present silhouettes is more based on the evidence than the previous ones and easier for selection by mothers.

By using the silhouette we studied the body shape of 600 children in 3 big cities and found that the prevalence of obesity was quite high, it was about 26.3%. We believe that our result can represent the children in big cities in Vietnam because in each city we conduct research in one urban elementary school and one suburban elementary school. The percentage of overweight and obesity in Hanoi was 44.4% (including the overweight rate is 26.9% and obesity rate is 17.5%). Our findings are similar to results of several studies in recent times, for instance: in 2011, the survey on nutritional status of students in the urban elementary schools in Hanoi showed that the prevalence of overweight and obese primary school student in the urban area was 40.7% [16]. Similar results have been reported. The survey on the situation of obesity and lipid metabolic disorders of 4-9 years old children in urban area of Hanoi (Hoan Kiem District) in 2014 showed that the proportion of overweight and obesity was 39.9% [17]. The results of a cross-sectional study among 9236 pupils in 60 primary schools in Hanoi City from October to December 2013 [18] expressed that the percentage of primary school students who were overweight, obesity in the urban area was 40.6%, in which the obesity rate was 17%. In Ho Chi Minh City, the survey in 2014 over 6000 primary school children showed that the rate of overweight and obesity was 51.8% [19].

Overweight and obesity in children may lead to obesity in adulthood, as well as other pathological disorders related to obesity. The study in Japan indicates that 30% of the fat children will become fat adults accompanied by other medical disorders related to obesity. So there should be interventions on school feeding, nutrition education and family participation in the prevention of overweight and obesity among elementary school pupils.

The main purpose of this study was to find the perception of mothers about the body weight in their children. Because if they think that overweight is healthy and beautiful, in the near future our society will be suffered greatly from life-style related diseases such as type 2 diabetes mellitus, heart disease, stroke etc. According to a survey in 2014 in Ho Chi Minh City, the percentage of overweight and obesity in primary school students was 51.8%. One of the causes of overweight and obesity in urban children was that their parents, grandparents liked chubby children and often forced them to eat more. Therefore, in this study we have developed a toolkit to learn the perception of parents on children's body shape, since then can develop a nutritional education program for the students and their parents.

In this study, we also found that mother's favorite and healthy BMI was higher than the actual BMI of children, furthermore 47.2% of mothers thought that their children were underweight in spite of the real underweight was only 2.7%. While only 2.3% of mothers thought that their children were obesity in spite of the real obesity was 26.3%. We can see the similar phenomenon in Canada. There were 22% of the parents whose children have normal weight think that their children are skinny; 63% of the children are overweight but their parents assess that they have normal-weight and 63% of the parents whose children are obese only rate that the children are only overweight. The parents tend to evaluate their child nutritional status at a lower level than reality. Approximately 26% of the parents of the overweight children and 15% of the parents of obese children do not care about their children's weight [13].

The results of our study showed that about 40% of mothers chose overweight and obesity silhouettes as their favorite silhouettes. The study results are also quite opposite the results in Japan in 2005-2006. Therefore it is shown that difference in social platforms makes changes in the awareness of nutrition and health.

In Japan before the 1970s people also thought that fat people were healthier than thin people, because at that time obesity rate among the Japanese was not high and chronic non-communicable diseases related to nutrition was not risen. Afterwards the perception of Japanese people gradually changed and they found that overweight and obesity increased the risk of illness and death. Currently, Vietnam is in the transition period and the issue of body image is going through a change as which Japan has experienced.

In conclusion, in Vietnam we found by our new body image silhouette that many people think that overweight is healthy and beautiful and such wrong perception causes the high prevalence of overweight, suggesting to change the perception of society and mothers can control over intake and obesity problems.

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