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Contents

Special Topic

The History of the nutrition improvement in Japan Establishment of the National Institute of Nutrition and the Birth of the Profession of Dietitian: No. 2 in a Series

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President of The Japan Dietetic Association/President of Kanagawa-University of Human Services

1) Background to the establishment of the National Institute of Nutrition

In 1868, Japan began to follow the path of a modern nation as a result of the Meiji Restoration. At that time, nutrition science was introduced from Europe and the United States, and the person who primarily contributed to its development and dissemination was Dr. Tadasu Saeki. In 1905, he studied abroad at Yale University in the United States, and after returning to Japan began researching nutrition while treating patients at a hospital in Tokyo. At that time, many researchers focused on the discovery of new nutrients and showed no interest in the practice of nutrition. However, he thought that nutrition was meaningful in practice and useful for people, and in 1914 he established the "Private Nutrition Research Institute" at his own expense in Tokyo Shiba Shirogane.

Then, in 1920, the national government designated this institute as the “National Institute of Nutrition: NIN” and he became its first president. In other words, this year (2020) is the 100th anniversary of the establishment of the NIN. The reason why the NIN was established in Japan was that nutrition officials led by Dr. Saeki were influencing the government, but also there was the social background at that time.

In Japan, due to modernization, the number of industrial workers increased, agricultural workers left the farms, and rice production became sluggish. In addition, the price of rice was soaring abnormally because farmers withheld rice from market rather than sell at prices set by military policy. People could not get rice. Japan became severely undernourished, and the rebel movement of “Give me rice” sprang up frequently in cities, and it expanded into riots. The government positioned nutrition and food issues as an important national policy, and established the “National Institute of Nutrition” as a center for policy research.

2) Origin and utilization of dietitians

The reason for the success of nutrition improvement in Japan is that the state has actively worked on nutrition policy and that people have been enthusiastic about training and utilizing dietitians. Dr. Saeki, who advocated academic independence in nutrition, said that with the low level of knowledge about nutrition among the people, it was not enough to resolve the serious food situation only by researching nutrition and providing information through the media.

In 1924, he established the first " School for Dietitians" to train nutrition professionals on the site of a private nutrition research institute. He thought, "Since doctors don’t have kitchen knives and it is difficult for cooks to learn medicine, we would create dietitians as nutrition professionals with knowledge of both areas”. The school recruited top-notch researchers as professors, and since there was no textbook, lessons were developed in line with practice. The following year, the first 13 graduates were awarded certificates and were called "The Hands of Nutrition", pioneering dietitians. The graduates worked at the forefront of nutrition improvement by finding employment as school nutrition teachers, culinary researchers, nutrition specialists in government agencies, hospitals, school lunch facilities, etc. However, they did not yet have a formal national qualification.

In 1945, the year the war ended, the government enacted the "Dietitian Regulations" in Tokyo, which had been destroyed by US airstrikes. Nutritional deficiency had become a serious social problem due to the war, and active nutritional improvement became indispensable. Not to mention the many deaths by starvation, in the turmoil, suspicious foods and health practices were prevalent, leaving people wondering what to believe and what to eat.

The following goals were established for the “Dietitian Regulations”.

(1) To define the status and duties of dietitians nation-wide and to unify and to provide uniform thorough nutritional guidance for the population.

(2) To strengthen nutritional guidance in factories, business establishments, rural areas, etc. based on the actual food situation.

The following year, the National Nutrition Survey began, and the first "Japan Dietetic Association General Assembly" was held at the Takarazuka Grand Theater. In 1947, the "Dietitian Regulations" became the "Dietitian Law" with Law No. 245, and dietitians became subject to national qualifications by law in both name and reality. With the birth of dietitians, improving nutrition in Japan became officially the national policy and rapidly expanded as a national movement. Japan was the first country in the world to demonstrate that the most important and effective way to resolve malnutrition among the people is to educate and train dietitians who are nutrition specialists.

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Original

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

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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 accelarated by the recent rapid economical develpments. 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,

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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 counsulting 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 phenomen 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 sub-urban 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 met the inclusion criteria, 233 students were selected to join in the study.

4. Methodolody 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 permited 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/m^2).

Calculate BMI of 233 students based on this fomular: BMI = (weight in kilograms)/height in meters²

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/m^2, severe wasting BMI under 12.4 kg/m^2, wasting 12.4-13.3 kg/m^2 , overweight 17.4-19.7 kg/m^2, obesity BMI over 19.7 kg/m^2. For girl (8 years old), BMI range considered normal is 12.9-17.7 kg/m^2, severe wasting BMI under 11.9 kg/m^2, wasting 11.9-12.9 kg/m^2 , overweight 17.7-20.6 kg/m^2, obesity BMI over 20.6 kg/m^2 (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 sihouette above to ask mothers who have children at 8 years old to choose the most accurate body sihouette for both boy (Fig. 4) and girl (Fig. 5). The finnal sihouette is Fig. 6.

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

Boy BMI Group	Severe wasting	Wasting	Normal				Overweight		Obesity	
(kg/m2)	<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/m2)	<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)

Exclution 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 colection

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.

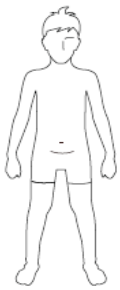
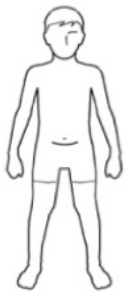
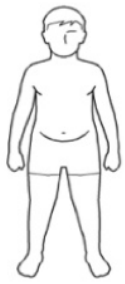
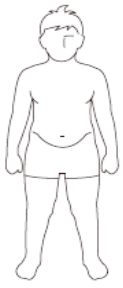
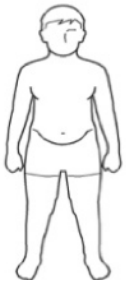
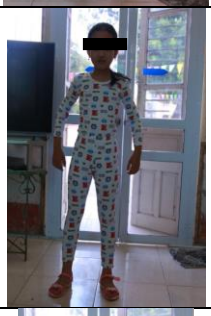
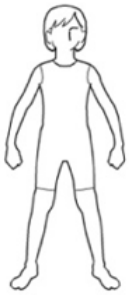
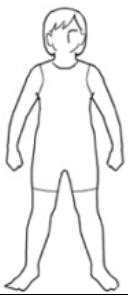
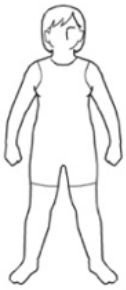
Normal (14.4-15.4 kg/m^2				
Overweight (17.5-18.5 kg/m^2)				
Obesity (19.8-22.7 kg/m^2)				
Normal (14.2-15.3kg/m^2)				
Overweight (17.8-18.9 kg/m^2)				
Obesity (22.5-24kg/ m^2)				

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

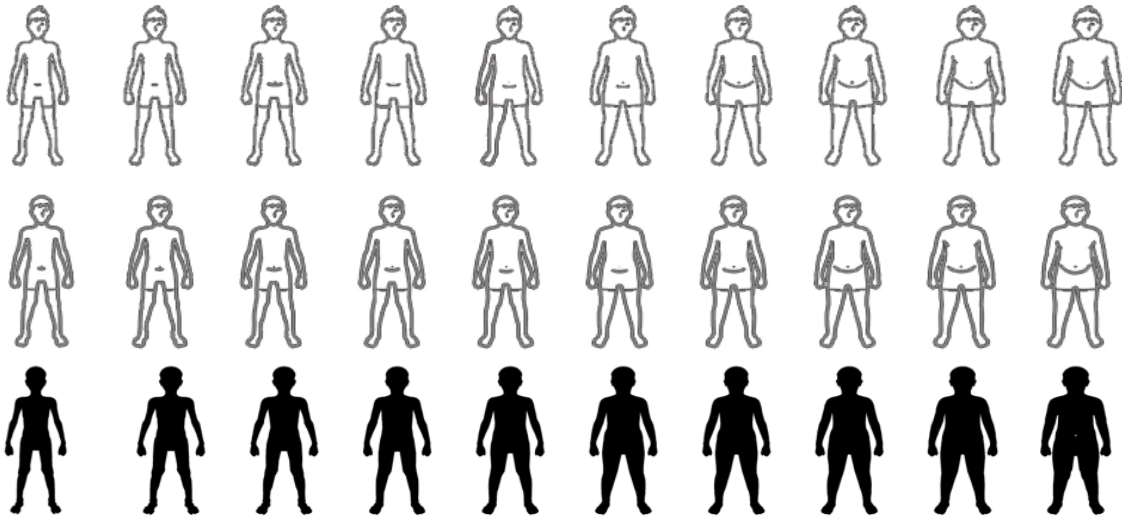


Fig. 4. Three styles of body silhouette for boy

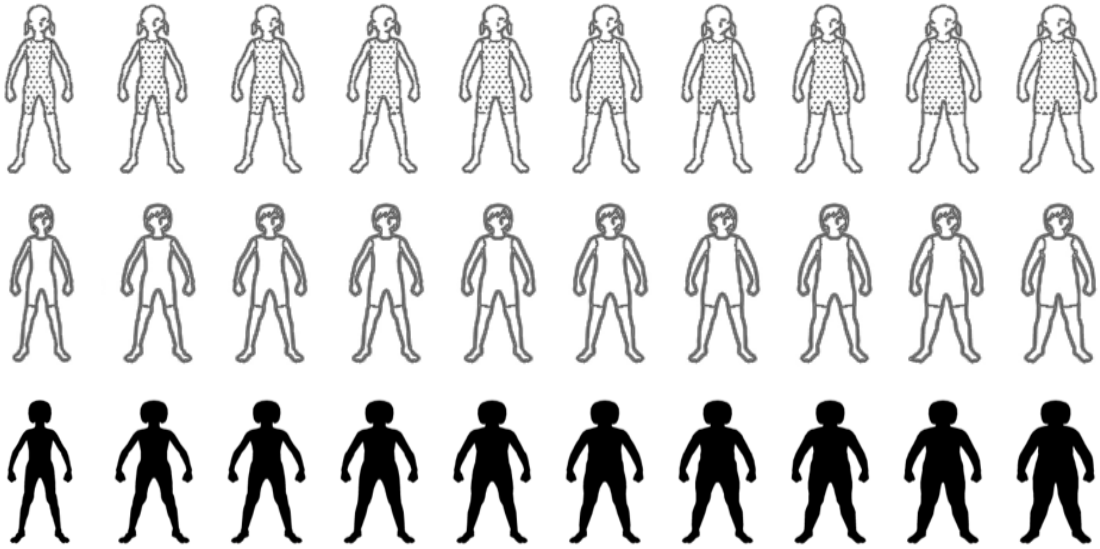


Fig. 5. Three styles of body silhouette for girl

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).

Chi^2 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 sihouette. 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 hight (ranging from 17.5% - 26.9%)

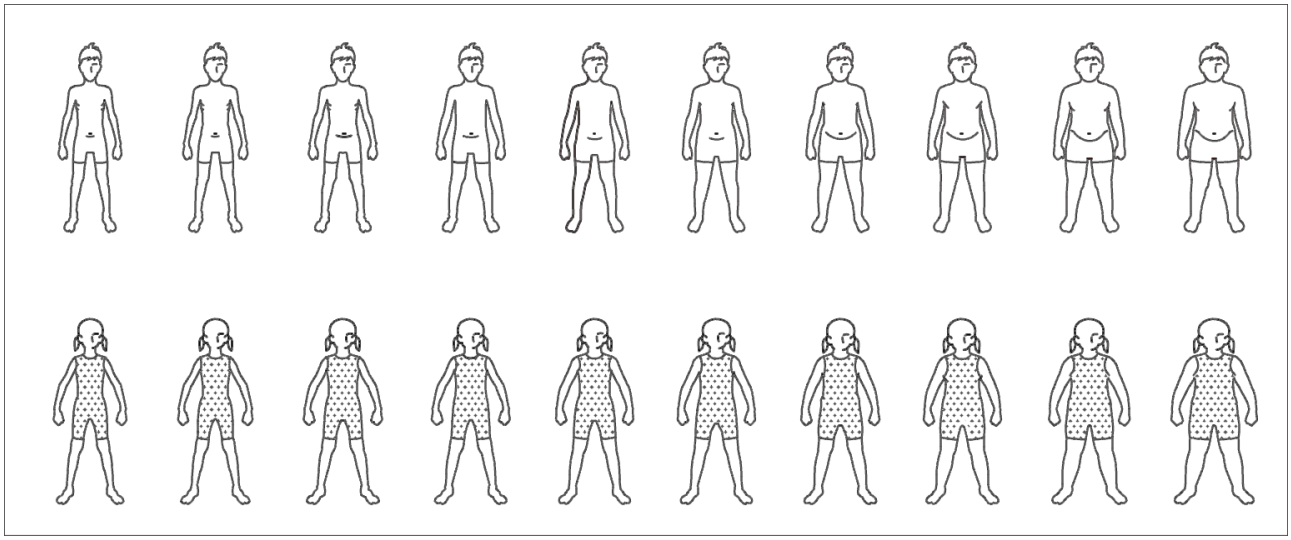


Fig. 6. The silhouette used in the questionnaire

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

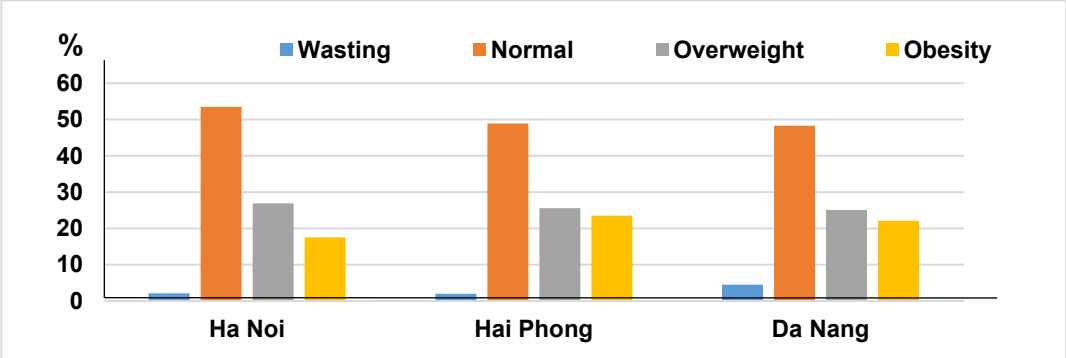


Fig.7. Nutrional status of children from 6-10 years old at 6 elementary schools in Ha Noi, Hai Phong and Da Nang

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.

Figure 14 showed the comparision between actual 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%.

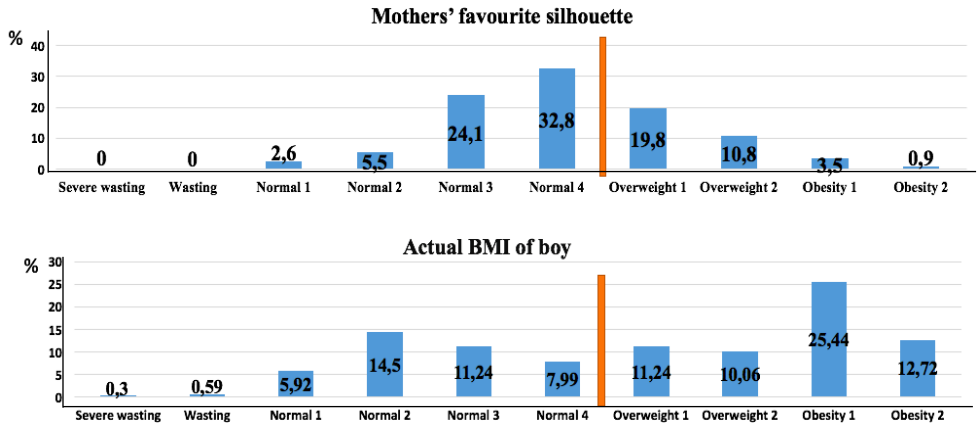


Fig.8. Mothers' favourite silhouette and actual BMI of boy

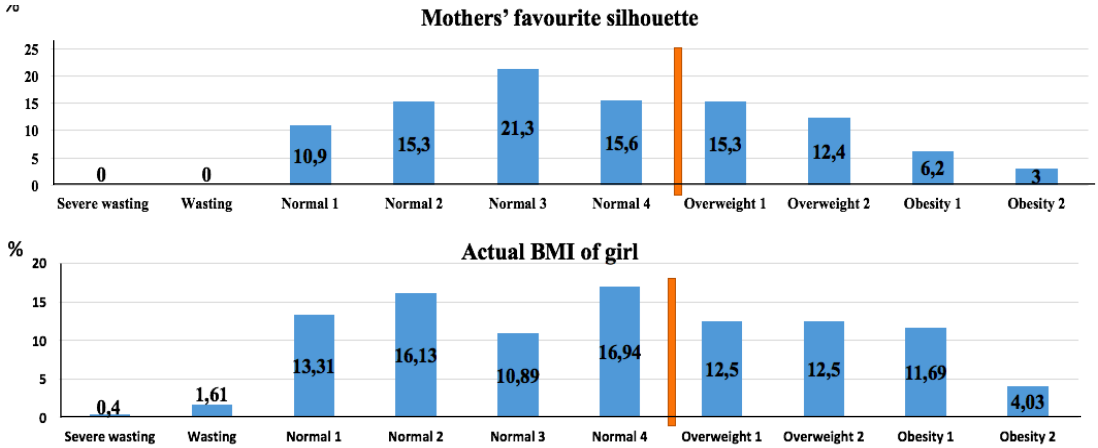


Fig. 9. Mothers' favourite silhouette and actual BMI of girl

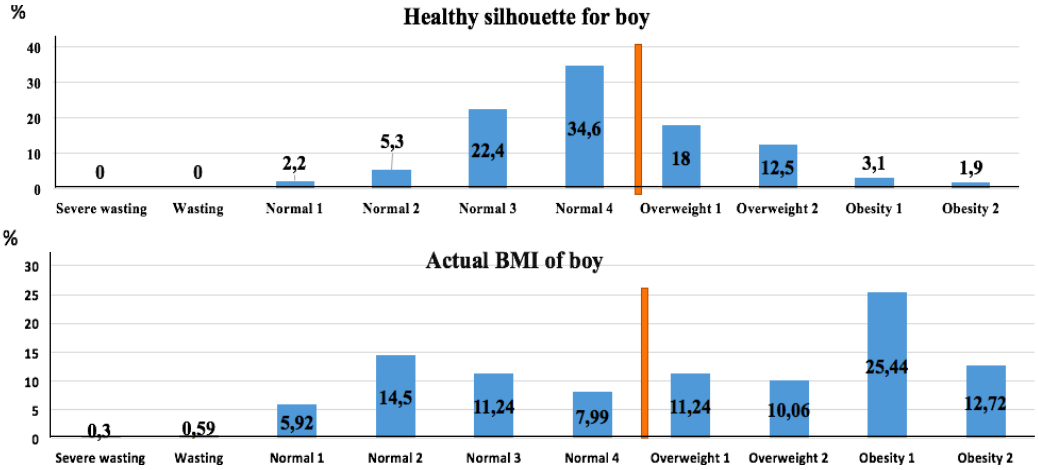


Fig. 10. Healthy silhouette for boy and actual BMI of boy

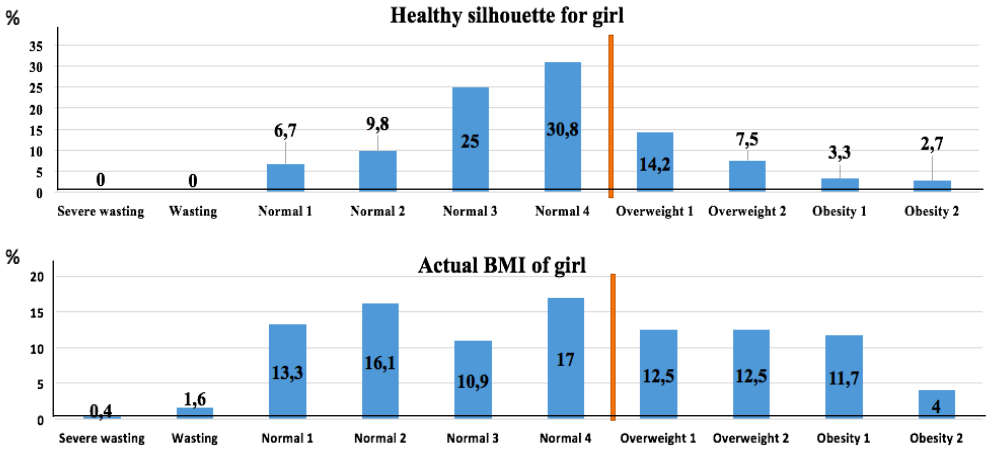


Fig. 11. Healthy silhouette for girl and actual BMI of girl

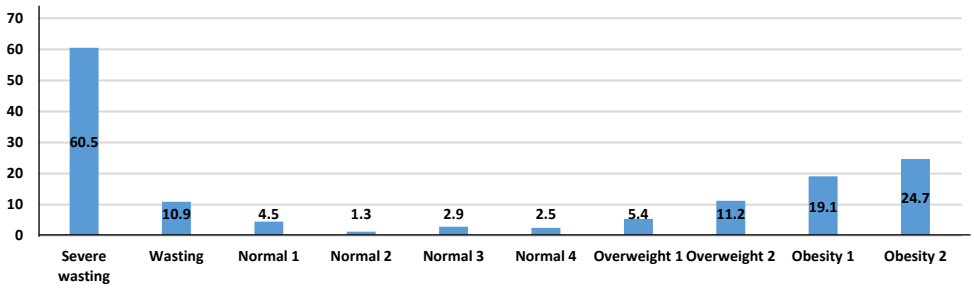


Fig. 12. Unhealthy silhouette for boy

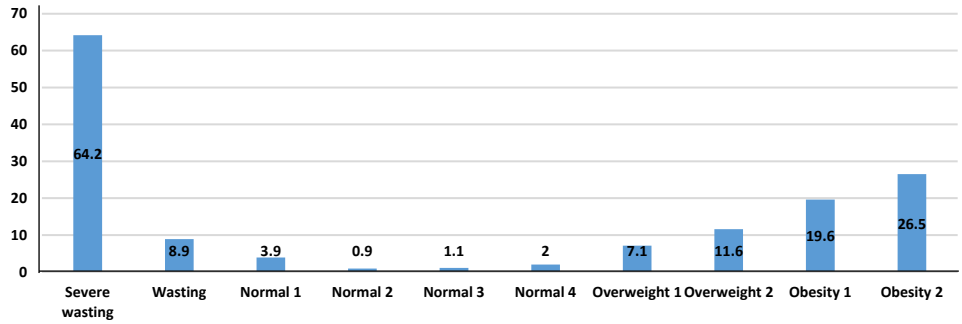


Fig. 13. Unhealthy silhouette for girl

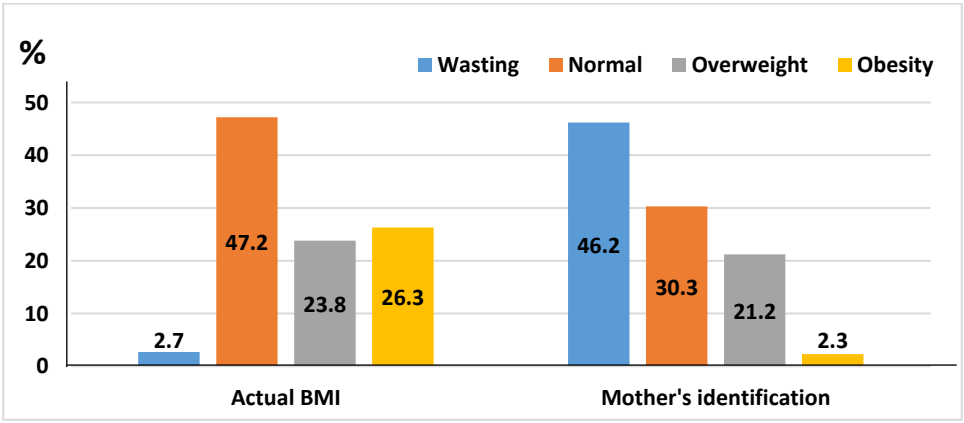


Figure 14. Summary of actual nutrition status and mother's identification of their child's nutrition status of 3 cities

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 drammatically during adolescent from child to adult. Body shape of caucasian and East Asians are also not the same. So, it is nessessary 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 becasuse 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 propotion 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 melltitus, heard 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 phenomen 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 percepiton of society and mothers can control over intake and obesity problems.

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Original

Nutrition Education Using Nutrition Handbook and Tele-Counselling Improved Nutritional Knowledge and Behaviour of Elderly in Northern Thailand

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ABSTRACT The objectives of this research were to study the effect of nutrition education for caregivers for the elderly using nutrition handbook and tele-counseling on nutritional knowledge and behavior among caregivers for the elderly**.** The sample was caregivers for the elderly in Choeng Doi Subdistrict, Doi Saket District, Chiang Mai Province**.** There were two groups, namely the intervention group **(**n=22**)** and the control group **(**n=22**).** The sample was selected based on a purposive sampling**.** The results showed that the intervention group had a higher mean score of elderly nutrition knowledge and behavior after using the handbook than before**.** The intervention group had a higher mean score of elderly nutrition knowledge and behavior after using the handbook than the control group, with a statistical significance **(**p <0**.**01**).**
Keywords: Elderly, nutrition promotion, handbook, caregivers

INTRODUCTION

According to a survey by the National Statistical Office, the size of the elderly (aged 60 years and over) population in Thailand has significantly increased in recent years. The figures from 2015 to 2019 indicate annual increases of 15.9%, 16.5%, 16.7%, 18.0%, and 19.7%, respectively (1). Moreover, Thailand has been ranked as the second most aged society (over 20% of the population aged 60 or older, according to the criteria of the United Nations) in Southeast Asia, after Singapore (2). This rapid expansion suggests that Thailand needs to make contingency plans to meet the demands of an aging society that is growing quickly. Since older persons are considered to be at high risk of diseases due to the fact of deteriorating health, they require special care from their younger family members. Preparing the caregivers for the elderly in the family is also very important because the caregivers will manage and administer the process of caring for the elderly, treating and responding to the elderly in all aspects as appropriate. Caregivers must have knowledge and understanding about the elderly. The elderly and be able to play a comprehensive role in the care of the elderly. As a result, this will make the care of the elderly both at the family level and at the community level effective and the elderly will enjoy good health and quality of life. This is a valuable human resource and very valuable social capita (3).

The nutrition status of the elderly is dependent on many factors, including social conditions, and is influenced by the long-term effects of chronic disease and overall health status. The physiological changes of aging, including perceptual, endocrine, gastrointestinal, renal, and muscular changes, may also affect nutrition needs. Dietary allowances are recommended to meet the nutrition requirements of the healthy population and do not consider disease states or other problems frequently seen in the elderly. A previous study suggests that the elderly is at an increased risk of nutrition deficiencies because they cannot meet these nutrient needs (4). Therefor caregivers play an important role in providing caregiving assistance especially with regard to food and nutrition to elderly persons and their families.

Choeng Doi Subdistrict, Doi Saket District, Chiang Mai Province is located in the far north of Thailand. It was found that the community there has entered the aging society according to the criteria of the United Nations. More than 10% of the population is aged, with 1,945 elderly people representing 26.29% of the total population of 7,396. Most of these people's caregivers are family members such as a spouse, a sibling, or grandchildren. According to the preliminary data from local health centers it was found that these elderly people suffered from nutritional problems, including both malnutrition and overnutrition. In the group of malnutritional status elderly, this is due to the fact that the elderly have certain diseases that affect the consumption of foods, such as dental and oral health, diabetes, hypertension, etc., while the group with overnutrition are among those with incorrect consumption habits, consuming more food than necessary and thus causing overweight and obesity. Along with the previously reported problems, (3) it was found that the elderly have several limitations, due to physical condition or perception. The carrying out of activities directed to the elderly to promote and modify behaviors was difficult and possibly unsuccessful. Therefore, this action turned attention to caregivers who play a role in taking care of the health of the elderly in all matters including food and nutrition. The data obtained from a preliminary survey from community leaders found that caregivers

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lacked sufficient knowledge of health, including nutrition knowledge.

There are limited data on the effects of elderly nutrition promotion using a handbook together with tele-counseling to improve nutritional knowledge and behavior of caregivers for the elderly in northern Thailand. The objectives of this research were to study the effect of nutrition education using a nutrition handbook and tele- counseling on nutritional knowledge and behavior regarding elder care among caregivers in Choeng Doi Subdistrict, Doi Saket District, Chiang Mai Province, Thailand.

METHODS

This study was a quasi- experimental research with a two-group pretest-posttest design, conducted from March 2018 to February 2019.

1. Population and sample

The population in this study were 1,945 caregivers for the elderly in Choeng Doi sub-district, Doi Saket District, Chiang Mai province. The sample size was determined by using the Power of test at the power of the test was set at 0.80, with a 0.05 level of significance and a 0.50 effect size. The sample size was 44 people. The sample was selected randomly from lists of caregivers in Choeng Doi sub-district and divided into an intervention group and a control group, with 22 persons in each group. The inclusion criteria were those who care to older persons in their families without pay, had provided such caregiving to older persons for more than one year, lived in the same house with the older persons, could communicate in Thai, and finally were willing to participate in the study.

2. The research instruments consisted of:

2.1 The elderly nutrition promotion handbook. The researcher invited the sample in the experimental group to hear how to use the handbook. They took the books to use at home by themselves for a period of 8 weeks. The contents of the handbook (5) included: definition and importance of nutritional status in the elderly, energy and nutrients requirement in the elderly, principles of selection of food ingredients for the elderly, principles of cooking for the elderly, guidelines for promoting nutritional status in the elderly and sample menus for the elderly. In the control group, the researcher introduced the research, the objectives and process of implementing all activities but the implementation of the handbook was not included.

2.2 The instrument used to collect data that the researcher developed through literature review is divided into three parts as follows:

Part 1: Demographic data relating to the participants.

Part 2: The nutritional knowledge test. A total of 20 questions with 4 choice options, which focus on assessing knowledge about proper diet and nutrition in the elderly such as energy and nutrient requirements, the selection of raw materials, proper cooking methods, disease and nutrition problems in the elderly. The test was examined by 3 experts for content consistency. All items were found to have an item of congruence index (IOC) of more than 0.70. The reliability was tested with 30 caregivers for the elderly who were not in the sample group and was determined by the Kuder-Richardson formula to be 0.74.

- Knowledge average score 00.00 - 00.09 means low level of knowledge
- Knowledge average score 10.00 - 15.00 means moderate level of knowledge
- Knowledge average score 16.00 - 20.00 means good level of knowledge

Part 3: Assessment of nutritional behavior. The questions were focused on the caregiver's usual food-handling behavior regarding the elderly. Total of 18 questions with 3 ratings (regularly practice, sometimes practice and not practice at all). A positive behavior was rated 3, 2, and 1, while a negative behavior was rated 1, 2, and 3, respectively. The questions passed three expert examinations for content validity. All items were found to have an item of congruence index (IOC) of more than 0.70. The reliability was tested with 30 caregivers for the elderly who were not in the sample group. The Cronbach's alpha coefficient was 0.87.

- Behavior average score 18.00 - 30.00 means low level of behaviour
- Behavior average score 31.00 - 42.00 means moderate level of behaviour
- Behavior average score 43.00 - 54.00 means good level of behaviour

3. Data collection

This research was conducted from December 1, 2018, to February 29, 2019. The experiment with the intervention and control groups took about 8 weeks, as depicted below:

4. Data analysis

Demographic data were analyzed using descriptive statistics. The means of the nutritional knowledge and nutritional behavior between the intervention group and the control group, before and after participated the program, were compared using paired *t-test* statistics. The means of the nutritional knowledge and nutritional behavior between the intervention group and the comparison group were compared using independent *t-test* statistics. A p-value < 0.05 was considered statistically significant

Ethical Considerations

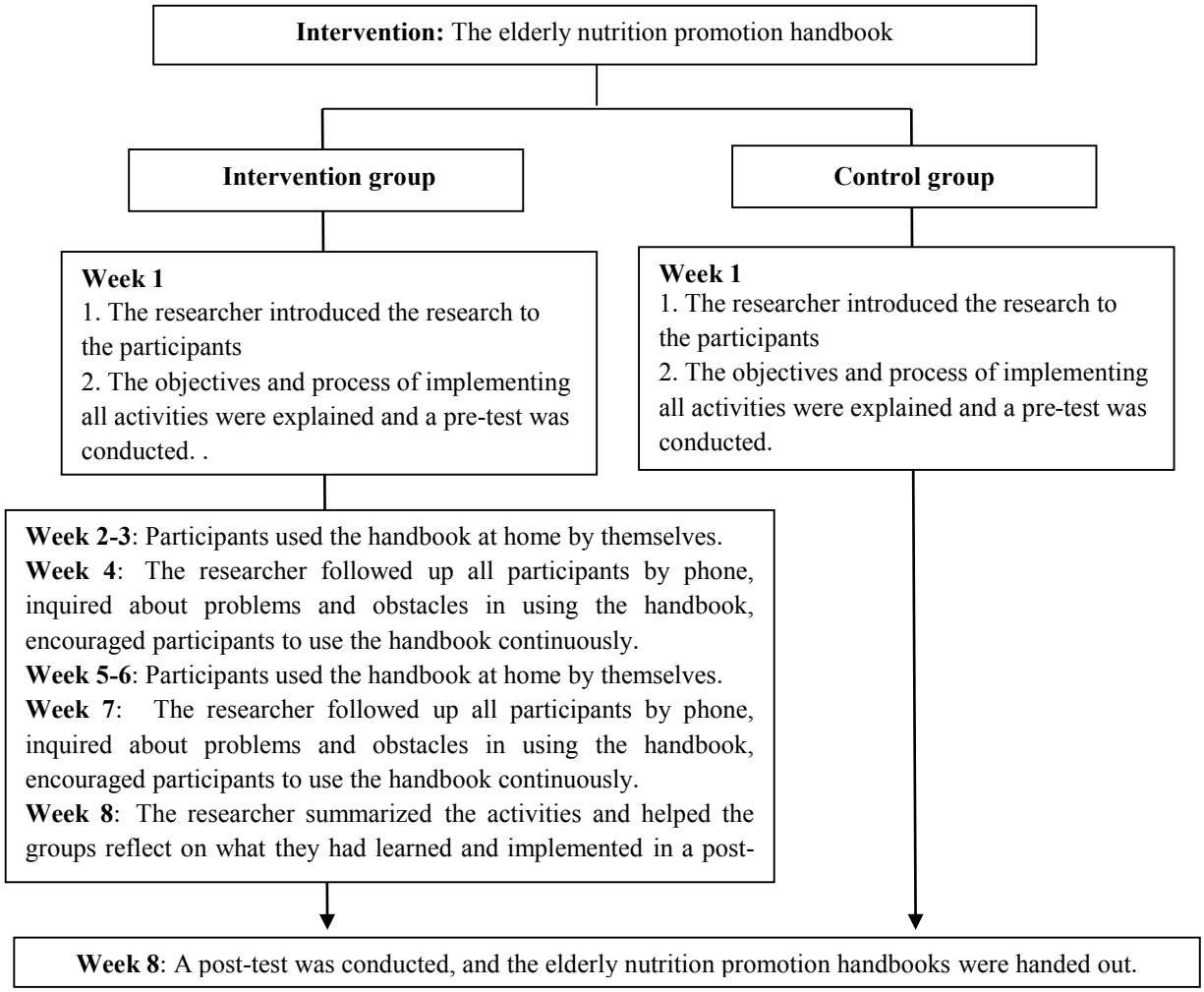
This study was conducted in accordance with the code of human research ethics and approved by The Ethical Review Committee for Human Research, Faculty of Public Health, Chiang Mai University (ET016/2561).

RESULTS

1. General information of the sample

Of the samples in the intervention and control groups, most were female (70.15 and 68.50%) and the average age was 50.60 and 51.15 years, respectively. The most common marital status was married (80.87 and 80.71%), they were educated at the secondary/ vocational level (56.23 and 54.41%), engaged in agriculture (63.05 and 65.21%), had family incomes of 10,001- 20,000 baht per month (40.43 and 42.20%) and the number of elderly needing care was between 1-2 people (90.70 and 84%).

Experimental procedures flow diagram



2. Effect of the elderly nutrition promotion handbook on the nutritional knowledge of caregivers

The pretest and post- test mean scores of the nutritional knowledge of the intervention group were 8.65 (SD = 2.47) and 18.23 (SD = 3.01), respectively. It was found that the post-test mean score of nutritional knowledge was higher than the pretest mean score, with a statistical significance ($p < 0.05$, $t = -16.67$), as shown in Table 1. The post- test mean scores of nutritional knowledge between the intervention group and the control group were 18.23(SD = 3.01) and 10.56(SD = 2.87), respectively. It was also found that the mean score of nutritional knowledge in the intervention group was higher than that of the control group, with a statistical significance ($p < 0.05$, $t = -4.28$), as shown in Table 2.

Table 1 Comparison mean average score of elderly care knowledge between intervention and control group before and after the experiment.

Sample group		$\bar{x}$	SD	level	p-value
Experimental group	before	8.65	2.47	low	0.000*
	after	18.23	3.01	good	
Control group	before	8.84	2.29	low	0.000*
	after	10.56	2.87	moderate	

*$p < 0.01$

Table 2 Comparison of mean average score of elderly care knowledge between intervention and control group after the experiment.

Variable	Intervention group		Control group		p-value
	$\bar{x}$	SD	$\bar{x}$	SD	
Mean average score of elderly care knowledge	23.18	01.3	10.56	87.2	0.000*

$p<0.01$

Table 3 Comparison mean average score of elderly care behavior between intervention and control group before and after the experiment.

Sample group		x̄	SD	level	p-value
Intervention group					
	before	28.64	7.35	moderate	*000.0
	after	42.50	56.4	high	
Control group					
	before	75.29	87.3	moderate	598.0
	after	52.29	96.3	moderate	

*$p < 0.01$

Table 4 Comparison mean average score of elderly care behavior between experimental and control group after the experiment.

Variable	Intervention group		Control group		p-value
	x̄	SD	x̄	SD	
Mean average score of elderly care behavior	42.50	56.4	52.29	96.3	*000.0

*$p < 0.01$

3. Effect of the elderly nutrition promotion handbook on the nutritional behavior of caregivers

The pretest and post-test mean scores of the nutritional behavior of the intervention group were 28.64 (SD = 3.75) and 42.50 (SD = 4.56), respectively. It was found that the post-test mean score of nutritional behavior was higher than the pretest mean score, with [a] statistical significance ($p < 0.05$, $t = -10.14$), as shown in Table3.

The post-test mean scores of nutritional behavior between the intervention group and the control group were 42.50 (SD = 4.56) and 29.52 (SD = 3.96), respectively. It was also found that the mean score of the nutritional behavior in the intervention group was higher than that of the control group, with a statistical significance ($p < 0.05$, $t = -7.80$), as shown in Table 4.

DISCUSSION AND CONCLUSION

The results of this study revealed that after participation the program, nutritional knowledge including the elder care behavior of the intervention group was higher than before, with statistical significance. The program was developed in accordance with the active learning conceptual framework which emphasized a learning-management process that allows learners to learn and practice by themselves through an effective handbook and with supervision by phone, which enabled them to maintain stable, longer learning outcomes than with a traditional learning process. Many studies have indicated that participants who take part in a program like this improve their knowledge and behavior. This study's findings illustrate that after receiving the program, the mean score of nutritional knowledge and caregiving behavior for the dependent older persons of the intervention group was higher than that of the control group. This finding supports a study by Robrujen (6) who developed the basic elderly care handbook and studied the effect of using the basic elder care handbook on knowledge and behavior regarding elder care among caregivers. The results showed that the experimental group had a higher mean score of elder care knowledge and behavior after using the handbook than before. The experimental group had a higher mean score of elder care knowledge and behavior after using the handbook than the control group. The health caring skills were at good level, while the overall satisfaction of the elderly who were cared by these caregivers was very high. As with the Suthimanus et al. (7) study that developed a handbook for caregivers for uncontrolled blood pressure, it was found that the caregivers had higher knowledge and / or perception of their competencies than before using the manual. In addition, a study by Sooksa-art et al. (8), which used an educational guide for caregivers of elderly patients with dementia, found that after using the manual caregivers had a statistically significant increase in knowledge scores on disease management and drug use.

Self-care barriers for the elderly are caused by many factors, including the environmental and cognitive factors that interfere with following the recommended treatment regimen. Because of the limitations elderly people encounter as a result of physical and mental deterioration, they need assistance from their family members in terms of health care and the performance of daily activities. However, caring for elderly persons is complicated and requires comprehensive healthcare knowledge and understanding of elderly behavior (3). Providing support from within the family, caregivers may be important in overcoming barriers to self-care. The characteristics of an elderly person's family environment in which diabetes management takes place have been associated with self-management behaviors (9-11). Fisher et al. found that family structure and organization were associated with acceptable eating behavior and exercise among the elderly (13). In another study of predominantly older African-American adults with diabetes, researchers noted that family support was comprehend to the pattern of diet self-care behaviors (12).

Tana et al. confirmed that a poor nutritional status of the older outpatient is independently more associated with the caregiver burden than with cognitive and physical disability. The combined evaluation of both patients and caregivers can improve knowledge and assistance to the elderly subjects (12). According to Correa et al. (13) the nutritional status of the elderly is a matter of concern and that it may be associated with a low quality of life influenced by the education level of the caregiver, but also by age, economic conditions and the limited autonomy of this population. The education level of the caregiver was determinant in the preparation of foods exclusively for the elderly. Apparently, those with higher education levels prepared special foods more often. The education level of the caregiver was a determining factor for nutritional status; nearly all individuals cared for by those in the tercile with the least years of

formal education were malnourished. Higher education levels reduced and even eliminated nutritional problems in the more privileged social groups (13, 14).

Consequently, if the nutritional knowledge and the care behavior of the of caregivers were developed to a higher level, it would contribute to better caregiving for older persons in general. Moreira et al.(15) showed

that improving the caregivers' knowledge about nutrition is one of the factors pointed out as important for prevention and control of avoidant food intake behavior. In addition, it was found that there were positive effects of nutritional education for elderly and their caregivers on body mass control, nutritional status, mood, and also on the reduction of cognitive decline in older adults with dementia (15). This is in accordance with the study of Hsiao et al.(16), who have investigated the effects of a family care-based dementia dietary educational program on family caregivers' nutritional knowledge, healthy eating behavior and nutritional status of people with dementia. The results found that the scores of the caregivers' nutritional knowledge significantly increased after receiving the dementia dietary educational program and enhanced the nutritional status of elderly with dementia. This is in line with Robrujen's study (5), which developed an elderly care program that emphasized the caregiver role. In this program, an elderly health care handbook was used. The content consisted of general health and nutrition promotion in the elderly; it was found that after having participated in the program and using the handbook caregivers had higher average knowledge than before. in other words, caregivers with adequate nutrition knowledge are able to apply their nutritional care practices skillfully and improve older persons' quality of life.

The findings of our study indicated that use of the elderly nutrition promotion handbook and tele-counselling had significant effects on the caregivers' nutritional knowledge and behavior. The literature review showed that using media, including a handbook, together with tele-counseling educational programs provides services for patients' health maintenance through telephone follow-up, with the advantage of promoting accessibility for patients who live far away from clinics. Tele-counseling is a comprehensive strategy to improve patients' knowledge and support lifestyle changes (17). It appears that a telehealth system that includes tele-counselling may significantly improve elderly persons' behavior, and also reduce the caregivers' burden (18). This result is expected because the lessons in the handbook contained useful information with regards to issues such as the nature and physiology of elderly, nutrient needs, raw materials and food selection, proper food menu design, nutrition problems in elderly and basic problem-solving. A previous study also found that using a health handbook could help caregivers to enhance their health knowledge and behavior (19). This may have been because after the intervention, the caregivers increased their nutritional knowledge, which may have had some impact on their behavior (16). This supports the social learning theory that personal knowledge and behavioral learning can be achieved through self-motivation, self-adjustment and interaction with a social environment (20).

The results of this study concluded that the use of elderly nutrition promotion handbook and tele-counselling improved the nutritional knowledge and behavior of the caregivers. The results were significantly higher than before using the handbook and were significantly higher than in the control group. This enables caregivers to take care of food and nutrition in the elderly effectively and as a result the elderly can enjoy a healthy and good quality of life. Pala-ard et al. (21) and Jantriyawong (22) reported in their studies that the knowledge and skills of caregivers are very important in assuring that the elderly can enjoy good health and well-being. The fact that caregivers for the elderly have accurate knowledge about nutrition aspects of the elderly will increase their health and well-being.

The results obtained from this study could be highly beneficial as basic information for promoting nutritional knowledge and behavior, especially for caregivers for the elderly, as they play an important role in looking after dependent older persons. However, this research has some limitations; the changes that occurred in the elderly were not studied after the caregivers had been encouraged to develop better knowledge and behavior concerning nutrition. Therefore, the researchers recommend that investigators conduct further studies on the issue.

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Original

Acceptance of Textured Soybean Protein in Indonesian Dishes and Its Effects on Energy in Overweight Women

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ABSTRACT *Background and purpose:* The problem of overweight and obesity has been increasing in Indonesia year by year as well as in the rest of the world; it is commonly caused by an unhealthy diet from excessive lipid intake. Increasing fiber intake from plant-based foods is known to control lipid absorption. Meat-like soybean product, Textured Soybean Protein (TSP), is made by extracting oil from soybeans and turning it into dry meat-like textured soybean which is rich in fiber, low in oil, and a high-quality protein source. In this study, TSP was substituted for meat in popular Indonesian meat dishes and its overall acceptance and effect on health with daily consumption were observed. *Methods*: The study was divided into two section: Section A, the overall acceptance of TSP dishes and Section B, the effects of including one TSP dish in the daily food intake of overweight women. In Section A, the subjects (n=17), who were all housewives, sampled 5g of four TSP types with 20 dishes in total and scored the overall taste of the dishes. The Hedonic 5-point scale was used to score overall taste. In Section B, the subjects (n=25), all overweight housewives, consumed one dish of 50g TSP daily for 3 consecutive weeks. Nutrition surveys using 3-day-24-hour recall methods were conducted at the baseline and final for dietary changes during the period of daily TSP consumption. Subjects' tolerance for and opinion of the new foods were assessed by a questionnaire at the final. *Results:* In study Section A, the average overall taste of TSP dishes was scored: Sliced Chicken 3.6, Minced Chicken 4.4, Sliced Beef 4.7, and Minced Beef 4.4. The overall evaluations were considered better than Good (above 4) with no significant differences found among the four types of TSP ($p>0.05$). In study Section B, 20 subjects completed the study. There were significant decreases in total energy and lipid intakes and significant increases in protein and fiber intakes ($p<0.001$). Questionnaire results shows that 70% of subjects felt satisfied during the study, 80% felt 50g/day was an appropriate daily amount, and 85% had no problem during the 21days of consumption. *Conclusion:* TSP dishes were well accepted overall by Indonesian women; TSP could be used as a meat substitute, could supply more protein and fiber, and could decrease energy and lipid intakes in overweight women.
Key words: soybean, food acceptance, overweight women, energy,

INTRODUCTION

High prevalence of overweight and obesity is known to be one cause of lifestyle-related diseases such as stroke, heart disease, etc. Excessive lipid intake is one factor that causes overweight problems. More fiber intake is known to help in reducing the risk of lifestyle-related diseases (1-5). It has also been found effective in weight control (6,7). If the intake of a sufficient amount of dietary fiber is continuously followed, this can be expected to improve or prevent these diseases by providing greater nutritional balance (2,3). The challenge is that dietary fiber is also one of the nutrients that is difficult to consume in sufficient amounts.

Plant-based diet is becoming popular in the movement to reduce global meat consumption (8). There are many alternatives for a plant-based diet, including the development of meat-textured plant-based foods in order to get more meat eaters to consume more plant-based foods. (9). Soybeans are commonly used as plant protein source in many countries; it is processed into foods like tofu, tempeh, miso, natto, etc (10-12). Textured Soybean Protein (TSP) is soybean textured like meat and purposely developed to have an appearance similar to real animal meat. TSP is made by extracting the oil from soybeans and then turning the soybeans into dry material. Since it is made from soybeans, this meat-like plant product is rich in fiber (13.6g/100g dry matter), low in oil, and also a plant-protein source (56g/100g dry matter).

According to a previous study on dietary intake in Indonesian women living in Jakarta, it was found that their dietary patterns included 29% fried animal protein such as fried meat, fried egg, etc., and also 6% tempura (13). Sixty-one percent of these women were overweight and obese, with nutrient intakes results

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showing a high lipid intake of 87g/day and a low fiber intake of about 10g/day (13). This suggested the importance of shifting to a better dietary habit of consuming more fiber and less lipid. When delicious main dishes using TSP can be developed, this may lead to higher intake of fiber so the total fiber intake in a day can be increased without any difficulty.

TSP has no attributes other than it is meat-textured, easy to chew, has a light bean taste and does not have any smell or stickiness, making it suitable for various recipes. There are different shapes/forms of TSP that can be used for a variety of cooking. Therefore, we decided to utilize TSP as the main ingredient in Indonesian dishes and developed low-fat high-protein and high-fiber alternative foods which could be expected to have beneficial effects on health. The approach of TSP utilization consists of two sections. The first section was to develop Indonesian dishes suitable for replacing the main ingredient with TSP and evaluate the overall scores of the dishes. The second section was to clarify nutrient intake changes with TSP as a daily substitute for meat in long period of consumption with expectation that it can be an alternative for a new healthy food culture for Indonesians

METHODS

There were two sections in this study. Section A: The overall acceptance of TSP dishes. Ten recipes were chosen based on the previous nutrition survey conducted in overweight women (13). These ten recipes were specifically chosen based on popularity, relatively have no bulky attribute, a meat-based main ingredient, and ease of cooking. The cooking process for each dish required only TSP and seasoning. TSP was first soaked in boiling water for 1 minute and then drained before stirring and mixing with the seasoning. The seasonings were spices blended into one spice mixture. The spice mixture of the nine recipes were Rendang, Sambal Goreng, Semur, Lada Hitam, Gulai Ayam, Gulai Sapi, Bumbu Rujak, Bumbu Bali, Bumbu Balado, and Opor Ayam.

There were four types of TSP with different shapes that were used to replace the meat in dishes. These TSPs were separated into two categories, Beef-like and Chicken-like (Figure 1), along with specific recipes (Table 1). In total, there were 20 dishes used in this study (Table 1). The cooking process for the TSP is shown in Figure 2. The lists of original recipes, TSP dishes, and ingredients are shown in Table 3. In a duration of three days, TSP sample dishes with 5g dry ingredients were tasted and evaluated by 17 pre-elderly women to evaluate overall scores the sliced and minced forms of TSP. A 5-level hedonic scale was used with 1= “very poor”; 2= “poor”; 3= “neither good nor poor”; 4= “good” and 5= “very good”. Then, after finishing Section A, the study continued to Section B for acceptance consumption in longer period.

Section B: The assessment of TSP dishes acceptance in daily dietary meals. There were 25 healthy overweight women (BMI≧25kg/m2) who participated in this step. The subjects were randomly selected from community health centers, in a peri-urban area in Jakarta. The subjects were asked to eat 50g of TSP every day for 3 weeks consecutively. A different TSP menu was prepared and delivered daily to the subjects. A nutrition survey (3 non-consecutive days) at the baseline (normal intake) and final (with TSP intake) was conducted to assess the change in their daily diet during the consumption of TSP. At the end of the study, a questionnaire was created to interview the subjects about their tolerance for and opinion about the new foods (Table 4). Statistical analyses were conducted with Microsoft Excel 2013.

Fig 1-1 Sliced Beef Fig 1-2 Minced Beef Fig 1-3 Sliced Chicken Fig 1-4 Minced Chicken

Figure 1. Four types of TSP

Table 1 Total dishes of TSP (20 dishes)

Sliced Beef	Minced Beef	Sliced Chicken	Minced Chicken
1.Rendang	6.Rendang	11.Bumbu Rujak	16.Bumbu Rujak
2.Sambal Goreng	7.Sambal Goreng	12.Bumbu Bali	17.Bumbu Bali
3.Semur	8.Semur	13.Bumbu Balado	18.Bumbu Balado
4.Lada Hitam	9.Lada Hitam	14.Opor Ayam	19.Opor Ayam
5.Gulai Sapi	10.Gulai Sapi	15.Gulai Ayam	20.Gulai Ayam

Figure 2-1. Heating the spice mixture (seasoning)

Figure 2-2 Mixing boiled TSP with seasoning evenly

Figure 2-3 TSP dish ready to be served

Figure 2. Cooking process of TSP dishes

Table 3. List of 10 recipes and ingredients of spice mixture (seasoning).

Recipe	Ingredients	Recipe	Ingredients	Recipe	Ingredients
 **Rendang**	1. Beef-like TSP (50g) 2. Rendang seasoning (candlenut, garlic, red chili, shallot, chili, ginger, turmeric, galangal, coriander, salt, nutmeg)	 **Bumbu Balado**	1.Chicken-like TSP (50g) 2.Balado seasoning (chili, red chili, garlic, shallot, galangal, daun salam,lemongrass)	 **Opor Ayam**	1. Chicken-like TSP (50g) 2. Opor seasoning (garlic, coriander, candlenut, ginger, turmeric, salt, galangal, brown sugar, tamarind)
 **Semur**	1. Beef-like TSP (50g) 2. Semur seasoning (Shallot, tomato, red chili, ginger, candlenut, pepper, lemongrass, clove, nutmeg, salt, sweet soy sauce, oil)	 **Bumbu Rujak**	1.Chicken-like TSP (50g) 2.Bumbu Rujak seasoning (shallot, garlic, red chili, chili, ginger, laos, turmeric, salt, sugar)	 **Lada Hitam**	1. Beef-like TSP (50g) 2. Lada hitam (Sweet soy sauce, oyster sauce, sesame oil, onion, red chili, black pepper, corn starch, sugar, salt)
 **Sambal Goreng Ati**	1.Beef-like TSP (50g) 2.Sambal goreng ati seasoning (chili, shallot, garlic, candlenut, ginger, galangal, daun jeruk, brown sugar, salt, sugar, lemongrass,)	 **Gulai Ayam**  **Gulai Sapi**	1.Chicken-like TSP (50g) or Beef-like TSP (50g) 2.Gulai seasoning (Garlic, shallot, red chili, ginger, candlenut, sugar, galangal,turmeric, lemongrass, daun salam, daun jeruk, asam kandis, salt)	 **Bumbu Bali**	1.Chicken-like TSP (50g) 2.Bumbu Bali seasoning (tomato, galangal, daun jeruk, daun salam, tamarind, sweet soy sauce, salt, sugar, shallot, garlic, red chili, candlenut, ginger, lemongrass, terasi)

Table 4. TSP dish tolerance and opinion questionnaire

QUESTIONNAIRE		
Q1. (Satisfaction) Can you describe whether 50g TSP in 1 dish is enough to eat daily for three consecutive weeks? A. Too much. B. Enough. C. Too little.	*Q2. (Amount Suggestion) Do you have any suggestion on the amount that should be served daily?* A.Higher than amount served B.The same as amount served C. Less than amount served	*Q3. (Problems during Consumption) Do you have any problem after consuming TSP for 21 days?* A. No particular problem B. Yes, it was … (please explain)
Thank you for your cooperation!		

RESULTS

Table 5 shows the overall hedonic scores for chicken-like TSP dishes. The average scores for the five TSP dishes of sliced chicken and minced chicken were 4.2 and 4.2 points for Rujak, 4.5 and 4.1 for Balado, 4.1 and 4.3 points for Bumbu Bali, 3.9 and 4.6 points for Opor, and 3.6 and 4.4 points for Gulai, respectively. The overall scores of TSP dishes were close to each other and there was no different found ($p>0.05$). Highest overall score was found for Minced Chicken with Opor seasoning (4.6±0.8). Lowest overall scores was found for Sliced Chicken with Gulai seasoning.

Table 6 shows the overall hedonic scores for beef-like TSP dishes. The average scores for the five TSP dishes of sliced beef and minced beef were 4.2 and 4.2 points for Rendang, 4.5 and 4.1 for Semur, 4.1 and 4.3 points for Sambal Goreng, 3.9 and 4.6 points for Lada Hitam, and 3.6 and 4.4 points for Gulai, respectively. The overall scores for TSP dishes were close to each other ($p>0.05$), but there was a significant different found for Gulai ($p<0.05$). Highest overall scores were found for Sliced Beef with Gulai seasoning (4.7±0.8). Lowest overall scores were found for Minced Beef with Semur seasoning. Figure 3 shows the overall scores for four types of TSP using the same seasoning, Gulai of Sliced Beef, Minced Beef, Sliced Chicken, and Minced Chicken were scored 4.7, 4.4, 3.6, and 4.4 respectively. There was no difference between TSP types.

Table 5. Overall Evaluation Scores for Chicken-like TSP

Seasoning	Sliced Chicken (mean±SD)	Minced Chicken (mean±SD)	p-value
Rujak	4.2±1.3	4.2±1.1	0.99
Balado	4.5±1.0	4.1±1.2	0.23
Bumbu Bali	4.1±1.4	4.3±1.1	0.38
Opor	3.9±1.6	4.6±0.8	0.09
Gulai Ayam	3.6±1.7	4.4±0.9	0.07
Average	4.1±0.9	4.3±0.9	0.13

Table 6. Overall Evaluation Scores for Beef-like TSP

Seasoning	Sliced Beef (mean±SD)	Minced Beef (mean±SD)	p-value
Rendang	4.4±0.9	4.4±1.2	0.75
Semur	4.3±1.3	4.0±1.3	0.14
Sambal Goreng	4.6±0.7	4.4±1.1	0.48
Lada Hitam	4.5±0.8	4.5±0.9	0.58
Gulai Sapi	4.7±0.8	4.4±0.9	0.02*
Average	4.5±0.8	4.3±0.9	0.13

***Significant differences ($p<0.05$)**

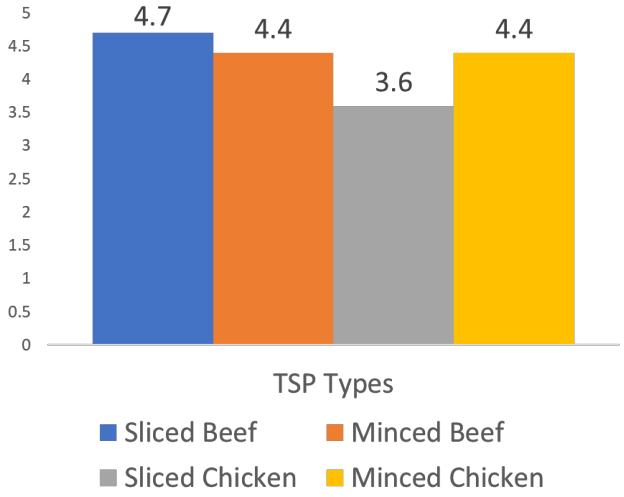

Figure 3. Overall scores of four types TSP

Table 7 shows the average age, weight, and BMI of the subjects and the final measurement of the subjects. There were 20 subjects who finished the study, all overweight women (28.3±2.5kg/m^2) with average age of 56±5years old.

Table 7. Characteristics of the subjects (n=20)

Characteristics	Value (mean±SD)
Age (years)	56 ± 5
Height (cm)	149.5 ± 4.9
Weight (kg)	62.6 ± 7.5
BMI (kg/m^2)	28.3 ± 2.5

Table 8 shows the energy and nutrient intakes in the daily diet for 3 weeks of 50g TSP consumption. There were significant decreases in total energy (kcal/day) from baseline 2037 to final 1666 and lipid intake (g/day) from 94 to 54. There were significant increases in protein (g/day) from baseline 47 to final 60 and fiber intake (g/day) from 10 to 16 ($p<0.001$). There was no significant difference found in carbohydrate intake (g/day) from baseline 267 to final 248.

Figure 4 shows the tolerance of TSP dishes after 3 weeks of 50g TSP consumption. Figure 4-1 shows the answers for Q1 about satisfaction of 50g/day TSP consumption; 70% (n=14) felt satisfied and 30% (n=6) felt that the amount was too much. Figure 4-2 shows the suggestion of an appropriate amount for daily TSP consumption; 80% (n=16) felt 50g/day would be appropriate, 15% (n=3) felt 50g/day was too much, and 5% felt the amount could be more than 50g/day (n=1). Figure 4-3 shows the answers for Q3 about any problems during the daily 50g/day consumption. 85% (n=16) felt no particular problem and 15% (n=4) felt there was a problem. We asked for explanations and descriptions of the problems. These subjects had gout problems and eating TSP made them feel tingly when they didn't drink enough water.

Table 8. Energy and nutrient intakes in the daily diet for 3 weeks of 50g TSP consumption.

Energy and Nutrient	Baseline (n=20)	Final (n=20)	p value
Energy (kcal/day)	2037±185	1666±152	<0.001*
Protein (g/day)	47±12	60±54	<0.001*
Lipid (g/day)	94±18	54±14	<0.001*
Carbohydrate (g/day)	267±35	248±38	0.08
Fiber (g/day)	10±3.6	16±3.7	<0.001*

* Significant differences ($p<0.05$)

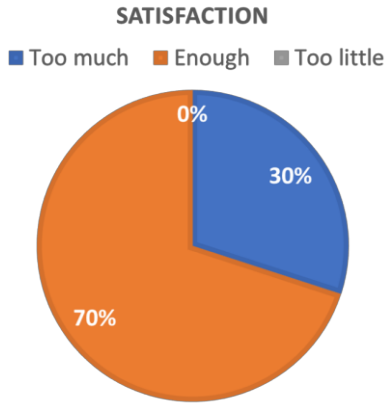

Figure 4-1 Satisfaction (Q1)

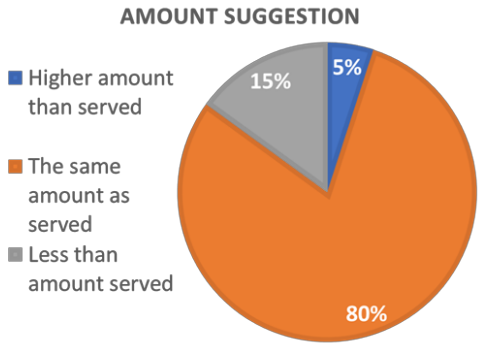

Figure 4-2 Amount Suggestion (Q2)

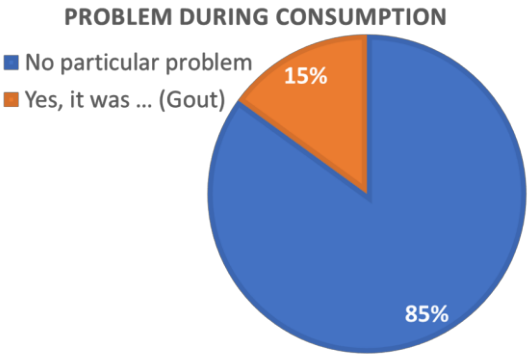

Figure 4-3 Problem during Consumption (Q3)

Figure 4 shows the tolerance of TSP dishes after 3 weeks of 50g TSP consumption

DISCUSSION

In the first step, we found that TSP dishes using Indonesian traditional recipes in which the main ingredient is meat were highly evaluated with overall scores of more than 4, which is better than good. In the next step of the study. There were significant decreases in energy of 371kcal/day and in lipid intake of 40g/day, while protein and fiber intake were increased by 13g/day and 6g/day, respectively, compared with their normal diet. These results showed that TSP can be a meat substitute in Indonesian meat dishes and have beneficial effect on health by improving nutritional balance in daily life.

The overall scores showed results of better than good, which means that the taste of these TSP dishes was acceptable. Selected recipes in this study, Gulai and Opor, include coconut milk as a soup base in the traditional recipes. Then, we modified the recipe without using coconut milk. Exclusion of coconut milk as the soup base made the TSP Gulai and Opor had much lower calorie than the traditional recipes, in our attempt to develop low-fat high-protein high-fiber food alternative. By this exclusion, variation of an acceptable low-fat high-protein high-fiber food alternative could be developed and be introduced to Indonesian food culture.

Indonesia has a culturally long-established tradition of a plant-based protein food: tempeh. Other than tempeh, other plant-based protein such as tofu and mushrooms are also commonly found in Indonesian cuisine. Unfortunately, due to the economic development of Indonesia, plant-based protein often considered as `the food of the poor` since it is not as fancy as animal protein like meat (11,12). With the continuous increase in lifestyle-related diseases, dietary habits are important in assuring a healthy life (1-3). Previous research showed that in total, 35% of housewives` food intake comes from fried foods, which mostly included fried animal protein such as fried eggs, fried chicken, etc (13). It was also found that vegetable intake was just 83g/day. The Indonesian government recommendation for vegetable and fruit intake is 400g/day in total, so the amount of 83g/day was less than half of the recommendation (14,15). Moreover, with this vegetable intake, fiber could only be supplied at 9.5g/day, much lower than the recommendation of 30g/day (13-16)

The recommendation is intended to establish a healthier life for people (14,16). While vegetables and fruits are good sources for micronutrients such as vitamins and minerals, vegetable and fruits also provide fiber, which is effective in prevention of lifestyle-related diseases (1-3). Studies focusing on higher vegetable intake have proven it effective in controlling lifestyle-related diseases; this may be the result of intake of fiber from vegetables (7, 17, 18). Consumption of high-fiber pre-germinated brown rice (PGBR) could also reduce blood glucose level and body weight (6). Other research also found that increasing fiber intake from a tofu side product, Okara, can decrease glucose levels of subject[s] with diabetes mellitus (19). For these reasons, fiber in any form can have beneficial effects on health.

Even though there was a successful study on weight reduction and lipid profiles improvement in Indonesian overweight women with high vegetable intake, it is still difficult to take more fiber only from vegetables (7). When the approach is shifted to a plant-based protein such as tempeh, people still haven't realize the beneficial effects of eating more plant-based foods (11,12). There are many variations of tempeh recipes in Indonesian traditional cuisine, but society is already too familiar with tempeh taste and tends to look at tempeh as food for the poor (11,12). Therefore, the application of meat-like, TSP in Indonesian traditional recipes can provide more variation of plant-based foods, especially with its fiber content and its possibility to increase fiber intake.

From many dishes that include meat as the main ingredient in Indonesian cuisine, our selected dishes which meat were substituted with TSP had the results of averagely high overall scores. The results were compared with tempeh acceptance in Japanese dishes, which replace the main ingredient like meat, fish, and dairy products in Japanese dishes (10). It was scored 3.5 points for overall taste (10). If fiber intake was compared, tempeh study can increase fiber by 2g/day, while TSP in this study could increase fiber by 6g/day. Similar results were found on Okara study (6g/day) and PGBR study (7g/day) (6,19).

The decrease of energy intake found in this study might result from the combination of higher fiber intake and lower lipid intake. First, higher fiber intake is commonly associated with increase of satiety, meaning that subjects feel full longer, which eventually reduces hunger and leads to an energy intake decrease (20-23). Digestion and absorption of fiber are slow, resulting in longer stimulation of nutrient receptors in the gastrointestinal tract, prolonging the feedback signal to the satiety center and thus reducing hunger(20,21). In controlling body weight, fiber might also have effects through multiple pathways, including through insulin secretion modulation and satiety control (24-26).

Second, in terms of lipid intake, some studies have shown that diets resulting in lower energy intake including protein from vegetables can significantly reduce lipid intake and LDL cholesterol levels (27-31). A Mediterranean diet that focusses on carbohydrate and protein sources from legumes and soy is associated with lower risk of coronary artery disease progression(28,29). In this study, the TSP dishes that included only TSP and spice mixtures showed the best effect of TSP consumption by using minimal ingredients in the recipe. The TSP dishes were changed daily and had a 10-day menu-cycle, so boredom with the TSP dishes could be avoided, and the basic effect of TSP could be observed while substituting TSP dishes for regular dishes resulted in lower calorie intake of the subjects.

After three consecutive weeks, the acceptance of TSP dishes for long period of daily consumption showed that 70% of subjects felt satisfied during the study, 80% felt 50g/day was an appropriate daily amount, and 85% had no problem during the three consecutive week's consumption. These suggested that daily consumption TSP dishes in longer term has many possibilities for further researches focusing on its effects on health and also biochemical features.

TSP has no taste or smell, but has attributes of a meat-like texture, which can easily be adapted for various dishes. The utilization of TSP in selected Indonesian traditional cuisine exceeded expectations that it was acceptable as substitute for meat as the main ingredient. A desirable new method of ingesting dietary fiber from main dishes was also found through this study. Long period of consumption also showed properly good satisfaction. More awareness concerning the benefits of plant-based foods for health is expected to a healthier life with lower risk of lifestyle-related disease.

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Original

Predictors of food insecurity in the selected areas of SINDH Pakistan

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ABSTRACT *Background and Purpose*: Food insecurity is associated with a variety of nutrition problems. Families vulnerable to food insecurity need to be efficiently identified to assure cost effectiveness of the interventions. In Pakistan exploration of community and family level determinants of food insecurity is relatively rare. This paper estimated the variation in food insecurity and identified predictors of food insecurity in the selected areas of Sindh province of Pakistan. *Methods*: Data was collected from six districts of Sindh namely Karachi, Hyderabad, Mirpurkhas, Thatta, Thar, Tando Ala Yar. Household food insecurity was assessed by Household Food Insecurity Access Scale (HFIAS). Several socio-demographic variables that have potential influence Food and nutrition security were measured and used to generate "Economic Score" i.e. Economic potential for assuring Food and nutrition security", "Care Score" i.e. Care potential for assuring Food and nutrition security". Overall Nutrition Care Potential" Score was estimated by summing up the score attained on "Economic score" and "Care score". Both uni-variate and Multivariate analysis were done to identify the predictive power of individual demographic variables and composite predictive tools. *Results*: A total of 573 households were surveyed. Severe food insecurity rates were the highest in Thar: 58.8%, followed by Tando Alayar: 51.9%, Hyderabad: 37.5%, Thatta: 35.8%, Mirpurkhas: 33.3%, and lowest in Karachi: 14.5%. Family's "nutrition care potential" score had a significant negative correlation with food security status of the family (r= .559; P <0.001). Association between economic score and Food Security Access Score was stronger (r=.600 P<0.001) as compared to association between care score and Food Security Access Score (r=.456 P<0.001). Strength of these associations varied between different districts and families apparently having similar "care potential" were more like to be food insecure in districts with a lower proportion of urban population. *Conclusion:* Supporting young girls formal education and decreasing the inter district disparity in access to food and relevant resources and opportunities needs to be addressed. Role of place of residence and mother's education has emerged as a very important determinant of food insecurity in study and can help in screening to identify the most vulnerable groups and plan effective interventions.
Key words: food insecurity, Sindh**,** malnutrition, stunting, wasting, overweight, double burden

INTRODUCTION

In Pakistan, malnutrition rates have been rising (1) and a variety of factors could be responsible for this situation (2). Food insecurity is associated with a variety of nutrition problems (3-7). Reduction in food insecurity is not assured by increments in national income or food production and could not be assure unless the vulnerable groups are identified and both immediate and long term actions are taken to reduce the inter and intra community disparities (8). While immediate action may provide temporary relief sustainable progress in reducing food insecurity is not possible without exploring and modifying the underlying factors. Assessing and reducing Food insecurity is a major challenge that requires understanding the dynamics of food insecurity from a variety of perspectives. In Pakistan, while there are a few observations reported that highlight the role of agriculture and economy in reducing food insecurity, exploration of community and family level determinants of food insecurity are relatively rare. Within Pakistan there are inter-province differences in the rates of Malnutrition and food insecurity and has been higher in Sindh as compared to Punjab and NWFP (1). The 2011 National Nutrition Survey (NNS) in Pakistan showed that Sindh province continues to have some of the worst undernutrition rates in South Asia (9). Though reviews have tried to explore the reasons of high rates of malnutrition and food insecurity in Sindh, community and family level disparities in modifiable factors have not been reported. This paper estimates the variation in food insecurity and explores the association between socio-demographic factors and food insecurity in the selected areas of Sindh province of Pakistan.

METHODS

Data was collected from six districts of Sindh namely Karachi, Hyderabad, Mirpurkhas, Thatta, Thar, Tando Ala Yar. Districts were selected on the basis of representativeness of the district and logistic feasibility of data collectors who were female students of Nutrition department of RLAK college of Home economics Karachi. From each location only family living in small houses (80sq yards or lower) and having a 2-5 year old child were selected as the population to represents lower middle to low income population.

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Sample size calculation was done on the basis of rates of wasting in under-five children. Data was collected from 573 households. Direct observation were made about hygiene conditions, anthropometric measurements were taken from 2 to 5 year old children and information about diet, food security, nutrition knowledge, demography etc was collected from mothers. Data collectors were trained by the principal investigator, measuring tools were calibrated and pre-testing of the questionnaire was done on 60 low income families of Karachi.

The questionnaire had queries about Demographic Information, Household Assets, Food security status, Anthropometry, Breastfeeding practices, Household hygiene index, Child care nutritional knowledge, Child feeding practices, 24-hour dietary recall of mother and index child, Recipes of dishes enlisted in 24 hours dietary recall of mother and index child, Details of utensils and portion sizes consumed by mother & index child. The data collection started from 9th march 2016 to 21st march 2016. Data was entered on SPSS (Statistical Software for Social Sciences) Software version 20.

Household food insecurity was assessed by Household Food Insecurity Access Scale (HFIAS) (10). Questions were translated in Urdu and validated for use in local population by pretesting. Interpretation of the answers was done as suggested by the developer of the tool.

The HFIAS is composed of a set of nine questions that have been used in several countries and appear to distinguish food insecure from food secure households across different cultural contexts.

Each of the following questions is asked with a recall period of four weeks (30 days).

1. Did you worry that your household would not have enough food?
2. Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?
3. Did you or any household member have to eat a limited variety of foods due to a lack of resources?
4. Did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?
5. Did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?
6. Did you or any household member have to eat fewer meals in a day because there was not enough food?
7. Was there ever no food to eat of any kind in your household because of a lack of resources to get food?
8. Did you or any household member go to sleep at night hungry because there was not enough food?
9. Did you or any household member go a whole day and night without eating anything because there was not enough food?

For each questions respondent can answer NO, rarely (once or twice), sometimes (three to ten times) or often (more than ten times) in the past four weeks.

Based on the responses households are categorized into four levels of household food insecurity (access): food secure, and mild, moderately and severely food insecure. Households are categorized increasingly food insecure as they respond affirmatively to more severe conditions and/or experience those conditions more frequently. i.e.

1. If answer to question 1 in No or rarely and answers to all other questions are NO household is categorized as FOOD SECURE.
2. If answer to Q 5 to 9 is NO and answer to Q 1 is 2/3, answer to Q2 is 1/2/3, or answer to Q 3 or 4 is 1 household is categorized is MILDLY FOOD INSECURE.
3. If answers to Q3 or Q4 is 2/3, OR answer to Q5 or Q 6 is 1or 2 and answers to Q7 8 and 9 is NO household is categorized is MODERATELY FOOD INSECURE
4. If answers to Q5 or Q6 is 3, OR answer to Q7, 8 and 9 is 1/2/3 the household is categorized is SEVERELY FOOD INSECURE

The Household Food Insecurity Access Scale (HFIAS) holds promise as an easier and more user-friendly approach for measuring the access component of household food security. HFIAS is found to be useful in approximating adequacy of urban households' diets (11).

Several socio economic and care variables likely to influence the food security status were studied. In order to facilitate assessment of variation and exploration of associate with food insecurity, relevant socioeconomic indicators were given a numeric score. “Urbanization level of the district” Urbanization level of the district was assessed on the basis of proportion of rural population in each district (12) . ‘Family’s economic burden’ was assessed on the basis of number of children (age <18) in the family. “Fathers economic performance score” was assigned on the basis of average income of the type of profession or business mentioned in which he was engaged, zero was given if not working at all. “Mothers economic performance” was assessed on the basis of average income of the type of profession or business mentioned in which he was engaged zero was given if not working at all. “Family Housing Score” was assigned on the basis of housing structure, utilities, ownership and size. “Family Assets score” was assigned on the basis of equipment, furniture, communication devices and vehicles owned and used by the family. “Economic Score” was estimated by summing ups the score attained on economic parameters i.e. family’s economics burden, economic performance housing and assets.

“Father’s education score” was determined on the basis of years of formal education. “Mother’s education” was determined on the basis of years of formal education. “Family Hygiene Score” was determined by observing the characteristics of the household by a checklist based on the parameters used in “household hygiene index” developed by Webb et al (13). Knowledge score was determined by answers to a knowledge questionnaire developed on the basis of parameters used in “Maternal Child care knowledge questionnaire” developed by Saaka et al (14).. “Care Score” was estimated by summing ups the score attained on care parameters i.e. parents’ education, maternal childcare nutrition knowledge and hygiene score.

“Overall Nutrition Care Potential” Score was estimated by summing up the score attained on “Economic Score” and “Care Score”.

Association between dependent variable (food insecurity) and independent variables (“Overall

Nutrition Care Potential" Score and its components) was estimated by comparison of means, exploring correlations between variables and comparing proportion of food insecure families within various tertiles of independent variables.

Multivariate analysis (linear regression) was done to exclude the impact of covariates and identify true significant predictors of food insecurity.

Data analysis was done SPSS version 21

RESULTS

Demographic characterstics:

A total of 573 households were surveyed. Mothers age ranged from 15 to 50 years (mean =28.6) and children age ranged from 2 to 5 years (mean = 3.4).

Food security

Overall Mean Food Insecurity Access Score was 7.12±8.469, n=573) being the highest in Thar (14.91±10.115, n=35), followed by Thatta (9.38±9.498, n=110), Tando Alayar (8.80±7.884, n=54), Mirpurkhas (8.44±9.358, n=124), Hyderabad (6.28±6.169, n=107), and the lowest in Karachi (2.32±4.741, n=143).

Rates of severe food insecurity differed according to district and urban-rural status within the district Collectively in the areas surveyed, overall rates of severe food insecurity were 34.2% (Urban: 22.1%, Rural:47.5%, P<0.001). Significant (P<0.001) between districts differences were noted. Severe food insecurity rates were the highest in Thar: 68.6% (Urban:54.5%, Rural:75.0%), followed by Tando Alayar: 51.9% (Urban:35.0%, Rural:61.8%), Thatta: 40.0% (Urban:25.0%, Rural:50.0%), Hyderabad: 39.3% (Urban:33.9%, Rural:45.1%), Mirpurkhas: 35.5% (Urban:11.1%, Rural:57.9%) and lowest in Karachi: 14.7% (Urban:20.8%, Rural:0.0%).

Association between Food insecurity and socio-economic status

Family's nutrition care potential score had a significant negative correlation with food security status of the family (r= .559; P <0.001). Means score attained by families on all the indicators excluding the mothers' economic performance, were significantly higher for the families having a lower level of food insecurity (table 1). Bivariate correlations also indicated significant negative association between food insecurity and all the economic and care indicators except mothers' 'job level' (Table 2).

Table 1 Socio-demographic characteristics of subjects

	Food Insecurity Levels								Total		Sign. P Value
	Not Food Insecure		Mildly Food Insecure		Moderately Food Insecure		Severely Food Insecure				
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Index Childs Age	3.37	1.10	3.61	1.15	3.48	1.19	3.58	1.13	3.49	1.13	0.212
Father's Age	33.2	6.0	33.2	6.3	34.6	7.7	36.6	8.6	34.6	7.4	<0.001
Mother's Age	28.0	5.4	27.4	5.4	28.1	6.2	29.4	7.3	28.4	6.3	0.063
Urbanisation level of the district	4.64	1.48	3.96	1.49	3.75	1.45	3.48	1.57	4.03	1.59	<0.001
Family's economic burden (Number of kids)	2.70	1.42	2.89	1.53	3.24	1.83	3.90	2.11	3.21	1.83	<0.001
Fathers economic performance	4.90	2.03	4.97	1.94	3.51	1.86	2.96	1.73	4.10	2.11	<0.001
Mothers economic performance	0.41	1.39	0.36	1.21	0.43	1.22	0.42	1.11	0.41	1.25	0.988
Family Housing Score	11.64	2.86	12.33	3.40	9.77	2.71	7.41	3.39	10.02	3.68	<0.001
Family Asset score	5.54	2.32	5.83	2.41	3.67	2.21	2.37	2.11	4.23	2.69	<0.001
Father's education	8.29	4.99	8.54	4.39	4.77	4.12	3.72	4.20	6.25	5.02	<0.001
Mother's education	6.65	4.78	6.20	4.61	3.26	3.30	2.13	2.64	4.56	4.44	<0.001
Hygiene Score	8.39	3.45	8.93	3.26	7.14	3.56	5.94	3.42	7.45	3.62	<0.001
Knowledge score	11.97	2.33	11.37	2.41	11.52	2.16	11.34	2.34	11.62	2.33	<0.035
Economic Score	30.00	6.58	30.14	6.47	23.52	5.79	18.59	7.14	25.23	8.46	<0.001
Care Score	34.75	11.72	34.83	11.42	26.52	8.05	23.08	8.65	29.63	11.58	<0.001
Nutrition care potential Score	64.75	16.85	64.97	16.26	50.04	11.77	41.68	13.92	54.86	18.52	<0.001

Table 2: Association of various sociodemographic factors with Food Insecurity

Determinants of Food Insecurity	Correlation	Significance (P Values)	N
Urbanisation level of the district	R= - .313**	P<.000	559
Family's economic burden (family size)	R= - .264**	P<.000	559
Fathers economic performance	R= - .417**	P<.000	480
Mothers economic performance	R= .006	P<.890	550
Family Housing Score	R= - .508**	P<.000	559
Family Asset score	R= - .528**	P<.000	559
Father's education	R= - .418**	P<.000	545
Mother's education	R= - .460**	P<.000	549
Hygiene Score	R= - .303**	P<.000	559
Knowledge score	R= - .111**	P<.008	559
Economic status score	R= - .600**	P<.000	559
Care potential score	R= - .456**	P<.000	559

Using the same variables, multiple regression analysis was also conducted. This analysis estimates proportion of variability in the outcome variable that can be predicted from the independent variables jointly and by any one factor exclusive (i.e while controlling for the confounding effects of other independent variable). R-squared measures the proportion of the variation in the dependent variable (Y) explained by the independent variables (X) for a linear regression model. Adjusted R-squared adjusts the statistic based on the number of independent variables in the model. The model had R square of .397 that means it explained 39.7% of variation in food insecurity (i.e about 40% of difference in food insecurity was due to these factors). It also shows that if we know about the values of these independent variables we can predict the level of food insecurity to a certain degree and we can modify relevant situations equivalent decrease in food insecurity is feasible.

Unstandardized coefficients are 'raw' coefficients produced by regression analysis when the analysis is performed on original, unstandardized variables. An unstandardized coefficient represents the amount of change in a dependent variable Y due to a change of 1 unit of independent variable X. Standardized coefficients, which are normalized unit-less coefficients, an unstandardized coefficient has units and a 'real life' scale. The t statistic is the coefficient divided by its standard error. The standard error is an estimate of the standard deviation of the coefficient, the amount it varies across cases. It can be thought of as a measure of the precision with which the regression coefficient is measured. Every t-value has a p-value to go with it. A p-value is the probability that the results from your sample data occurred by chance nsd indictes level of significance of the observation.

Based on regression analysis, five of the economic indicators, and one of the care potential indicators (mother's lower level of formal education) emerged as the significant predictors of food insecurity. It indicates that these factors can have an important influence on level of food insecurity if other factors wer kept constant. (Table 3).

Apparent impact of economic status or care potential on food insecurity was different in different districts (figures 1 and 2). Environmental protections against food insecurity needs to be strengthened.

Table 3: Predictors of Food Insecurity*

Independent Variables	Beta	t	Sig.
e1_Urban District	-.160	-4.123	.000
e2_Smaller Family	-.132	-3.493	.001
e3_Father's job level	-.145	-3.075	.002
e4_Mother's job.level	.003	.088	.930
e5_Housing Score	-.222	-4.048	.000
e6_Asset Score	-.164	-2.744	.006
c1_Father's Education	-.001	-.016	.987
c2_Mother's Education	**-.136**	-2.415	**.016**
c3_Household Hygeine Score	.007	.151	.880
c4_Mother's Nutrition Knwoledge Score	-.014	-.360	.719

Multivariate regression analysis: Dependent Variable: Food Insecurity Levels; R2 = 0.392; adjusted R2 = 0.379; F = 29.308, P <0.001

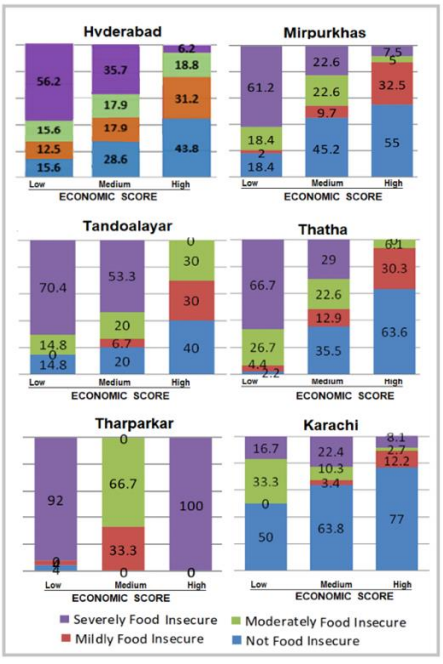

Figure 1: Proportion of Food insecure in subgroups of families having varying Economic in various districts of SINDH

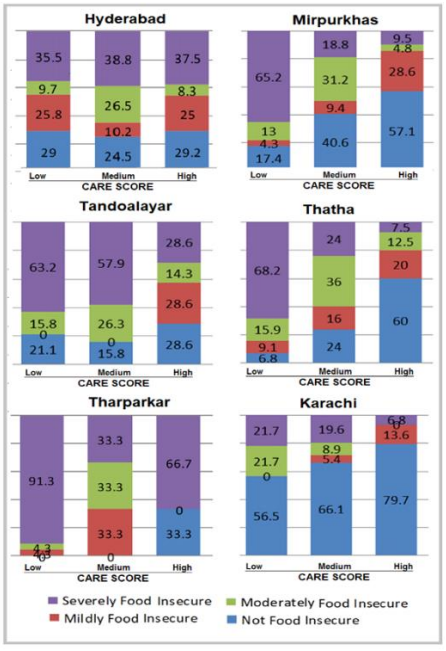

Figure 2: Proportion of Food insecure in subgroups of families having varying Care Score in various districts of SINDH

DISCUSSION

In Ethopia, Using the HFIAS, 17.7 % of households were food secure. The percentage of households that were mildly, moderately and severely food insecure was 6.8 %, 27.7 % and 47.8 %, respectively (15). In an urban resettlement colony of South Delhi, India HFIAS identified a total of 77.2% households as food-insecure, with 49.2% households being mildly food-insecure, 18.8% of the households being moderately food-insecure, and 9.2% of the households being severely food-insecure (16).

In another research that included 100 households form Pakistan as part of a multinational study, proportion of severely food insecure was 17.4 % (17). In our study 34.2% households were severely food insecure. Considering the fact that food insecurity is higher in Sindh as compared to other provinces, and that in this study only lower middle income group was included this difference in rates of sever food insecurity were as per expectations.

In Psaky et al, the mean FAIS score was 8.3-and in our study it was FAIS 7.12. The discrepancy is trends is explained by difference in proportion of moderately food insecure household's i.e. 48% in Psaki et al and 14 8% in this study. If we combine two uppermost categories of food insecurity the proportion of moderately or severe food insecurity is 60.2% in our sample and 65% in Psaky et al that corresponds to the difference in means. This observation indicates the limitations of using this tool in different settings and on the basis of mean FIAS score. As categorisation of families in different food insecurity categories is not based on total score but on the combination of answers to specific questions, differences in answers to even one or two questions can put a family in an extremely different category, comparison among different subsets of populations need to consider both mean score and all categories.

Food insecurity in Sindh has been a cause of concern however assessment of role of family and community is rarely reported. This paper has tried to explore the degree of variability in food security in the low income households of the selected areas of Sindh and the role of economic as well other nutrition-care potential indicators with the level of food insecurity. As expected and as identified in other studies all the economic indicators and most of the other nutrition care potential indicators were negatively associated with food insecurity.

There have been mixed observations about the role of mother's education in predicting food insecurity. In our study mothers formal education had a negative association with food insecurity even after controlling for other factors.

Role of place of residence has emerged as a very important determinant of food insecurity in study. Living in more urbanised districts increased the chances of being food secure even at a lower level of economic status or education. These observation calls of exploration of the reason for this trend and development of strategies to decrease inter district disparity in access to food and relevant resources and opportunities.

Conflict of Interest Declaration

Manuscript title: Predictors of food insecurity in the selected areas of SINDH Pakistan

The authors whose names are listed immediately below certify that they have NO affiliations with orinvolvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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Original

Effects of the Ghana School Feeding Programme on Social Protection and the Local Economy and Key Challenges to Programme Implementation

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ABSTRACT *Background:* School feeding is a major social protection intervention employed to improve the nutritional wellbeing of vulnerable children where they live and provide nutrition education. In addition to its nutritional goals, the Ghana School Feeding Programme (GSFP) seeks to reduce hunger in deprived communities, boost domestic food production through increase local demand for farm produce to service the programme, and increase incomes of poor rural households in line with Sustainable Development Goals 1, 2, 3 and 5. This review examined the extent to which these goals were being met and challenges encountered. *Methods:* A desk review was carried out by collating and reviewing all peer reviewed publications as well as reports, both published and unpublished emanating from various studies on the GSFP over the past 10 years. Altogether, 22 articles were included in this review. *Results:* The evidence showed that the GSFP provides protection from hunger especially for children for whom it was the main meal for the day. It also provides significant economic benefit and financial savings for the family. Poor time management by caterers reduced contact hours, meal regularity and size. While delayed and inadequate payments to caterers for services rendered affected program gains in relation to nutrition and education, it also became a major stumbling block to attracting the participation of farmers in boosting domestic food production and increasing household incomes. Better targeting of beneficiaries, improved management and monitoring, funding modalities and exploring alternate models of school feeding are required. Further studies which employ robust methodology to assess the effect of the school feeding program on social safety nets and the local economy are also needed.
Keywords: Ghana; school feeding programme; socioeconomic effects; challenges

INTRODUCTION

School feeding programmes have been shown to offer a regular source of nutrients to vulnerable children, build human capital and provide savings of up to 10% of the household income of poor families *(1)*. According to the World Food Programme, about 0.25 USD is needed for a meal per child and studies have shown that each US dollar invested in school feeding yields a 3-10 USD return on the investment resulting from improved health, education and productivity *(2)*. These programmes are regarded as social safety nets, which ensure that vulnerable children in the population go to school and their learning is improved by avoiding hunger and improving nutritional status *(3)*. Traditionally school feeding programmes, have focused on outcomes related to health, education and social protection *(3,4)*. In recent times, the home grown school feeding model (HGSF) adopted by several countries including the African union, in addition to boosting food production, food security augment the incomes of small holder farmers by providing them with a stable market *(2–5)*. Although implementing this intervention is a complex process, it has been successfully achieved in some settings, nonetheless it has its challenges *(3–5)*.

The Ghana School Feeding programme is a nationwide-wide social protection scheme of the Government of Ghana to support children in the most deprived communities, which became operational in 2005 *(5–7)*. Under this scheme, caterers are contracted to provide school children in selected kindergarten and primary schools with one hot nutritious meal a day, usually served around mid-day *(5,7)*. By 2015, the programme had reached a total of 1,739,357 children in 5,000 schools *(7)*. The Ministry for Gender, Children and Social Protection (MoGCSP) currently has oversight responsibility for the programme and is supported by a Multi-Sectoral Technical Advisory Committee (MTAC) with representatives from the ministries of health, education, finance and other stakeholders *(6)*. Regional secretariats, District Implementation Committees (DIC), School Implementation Committees (SIC), District and Municipal assemblies coordinate and monitor the programme at community level. According to the policy, the principal objectives of the programme are to promote school enrolment, attendance and retention; and improve the health and nutritional status of the pupils, especially in deprived communities *(6)*. In addition to these principal objectives, the goal of the programme was expanded to include, establishing effective local catering services; increase domestic food production and consumption; provide reliable markets for local famers; increase the incomes of poor rural

households; and enhance incomes of local communities (*6*). The policy also focused on addressing sustainable financing and governance at the local level in terms of coordination, management, monitoring, evaluation and information management (*6*). This review examined the extent to which the social protection objectives of the GSFP and effects on the local economy are being met and the challenges encountered.

METHODS

A desk review was carried out which involved the collection, assessment, analyses and synthesis of information from the published literature, grey literature such as Annual reports on the Ghana School Feeding programme (GSFP) and other evaluation reports. The review examined the nutritional and educational effects of the programme as well as its effects on household resources, social protection and the local economy. The effect of the GSFP on local economies, social protection and key challenges mitigating the success of the program are presented in this paper. The outcome measures related to social protection were increased school enrolment of vulnerable children, savings in household income or beneficial effects on family income, gender parity in education, reduction in child labour and reduction in hunger or increased satiety reported by pupils, teachers or parents. Outcome measures related to the effect on local economies included participation of caterers, farmers or other businesses in the locality in the GSFP and income obtained from the GSFP.

Computerised bibliographic medical databases were searched for relevant articles from 2010-2019. These databases were MEDLINE, (Pubmed version), the Cochrane Central Register of Controlled Trials, Google, Google scholar, Hinarii, Scopus and Science Direct. For this aspect of the review the key words used to identify the relevant articles were Ghana school feeding programme, school feeding, school feeding policy, school meals, economy, economic, evaluation, impact, effects, and Ghana. The abstracts of the identified studies were retrieved and studied. Irrelevant articles were excluded and the full text of the remaining articles obtained. The reference list of these articles examined and related articles from data bases were obtained. The bibliography from reports of UN agencies such as WHO, UNICEF, World Food Programme (WFP), Food and Agriculture Organisation (FAO) also searched for relevant articles or the reports were included and similarly, World Bank reports, proceedings of international conferences, meetings and evaluation reports.

Studies included in this study mainly involved recipients of the GSFP who are children in pre-school and school-aged children aged 3 -17 years, stakeholders such as caterers, farmers, parents, teachers and community members. Studies with an outcome measure of interest in quantitative, qualitative and evaluation. Evaluation studies, as well as mixed designs and comparison studies among schools with and without school feeding programmes were included. Studies which failed to meet the inclusion criteria as well as the following exclusion criteria were excluded: student dissertations and thesis; studies with a school feeding programme that was less than a year; and those with a sample size of less than 10 subjects.

RESULTS

A total of 49 articles and reports on the School feeding programme in Ghana were obtained, of which 22 papers were included in this aspect of the study and 27 were excluded. A sub-analysis of a cluster randomised controlled trial showing the effects of the GSFP on local farmers and households incomes reported in an online slide presentation was included due to limited evidence in this area.

Effect on households and social protection

There was little detail on the effect of the GSFP on household income and social protection, however, one study on the views of 30 parents in the Kwaebiribirim district reported that 71% perceived the GSFP beneficial as it reduced their expenses by 25% and made it easier for them to persuade their children to go to school when they were in financial difficulty *(8)*. Teachers and the traditional authority in this locality wanted the programme to be extended to other deprived schools. A longitudinal randomised cluster controlled trial conducted in all 10 regions of Ghana (nationwide) reported an increase in the height for age z-score in children aged 5-8 years particularly among girls and those from households living below the poverty line in this age group *(9)*. The effect sizes were 0.12, and 0.22 respectively. Another study reported an increase in the enrolment of girls in school *(10)*. While another reported mixed effects on gender *(8)*. Studies have consistently reported an increase enrolment of children in schools with the school feeding programme in deprived communities *(8,10–12)*. A policy brief on the GSFP in cocoa growing areas, reported a preference for schools with a GSFP by parents in these areas resulting in a decline in attendance at schools without a programme, but it also made children walk long distances to get to GSFP schools *(13)*. This is likely to have also impacted on child labour as the policy brief reported that self-funded school feeding programmes created in five such districts did not only show an increase in enrolment, but also reported reductions in absenteeism, truancy and other petty child labour issues.

Effect on the Local economy

A cost-benefit analysis jointly done by the World Food Programme and MasterCard found that the GSFP transfers economic value and significant benefits to beneficiaries *(14)*. They estimated that every 1 GHC invested in the programme makes an economic return of 3.30 GHC over the life time of each beneficiary. In economic terms, the estimated Net Present Value (NPV) was USD 1,173 (GHC 5,630) to each beneficiary across their lifetime and the total cost per beneficiary across the 8-year support cycle of the programme was USD 44.4 (GHC 213) per year or USD 356 (GHC 1.708.8). They deduced that the benefits accrued from the programme include a healthier life by providing 30-40% of the child's nutrient requirements and avoiding medical care costs as making the children healthier prevents disease *(14)*. In addition, they found that providing children with a meal at school transfers value to families as the meal can be regarded as additional income for families or savings which they can invest into other productive ventures to yield return. Besides these benefits, they reported GSFP would increase productivity by improving

educational outcomes of participants, giving them an opportunity to earn higher wages and increase their productive years due to increased life expectancy resulting from better health. This will impact the quality of the labour force and local economy, particularly if they work there as adults. By making these benefits equally available to both sexes the GSFP reduces the gender gap and improves access to education and health for the girl *(14)*.

An impact evaluation of the school feeding programme involving 116 schools randomised to include 29 schools which have the standard model of the GSFP, 29 school with the Home grown School Feeding programme which were pilots of the GSFP with agriculture/nutrition packages, and 58 schools with no school feeding programmes was carried out *(15)*. The survey covered more than 5,000 school aged children, in 2,500 households from all regions of Ghana between 2013 and 2016. They found a 5% increase in participation in agriculture among communities which had the pilot GSFP. Additionally, the income of farmers in communities with the standard GSFP increased by 100 Ghana Cedis (GHC), equivalent to 26 USD at the time. They also found an increase in the household incomes in communities with the enhanced programme and an increase in net enrolment in kindergarten by 11%. However, most of the caterers bought their commodities from market women because the farmers do not give them credit facilities *(15)*. Other studies also found that farmers were unwilling to participate in the farm-to-school lunch contracts with no immediate payments *(16,17)*. Besides they needed to sell their wares soon after harvest *(16)*.

By the 2016 budget statement, it was estimated that the GSFP had provided jobs to 20,000 caters and cooks *(6)*. However, the lack of cash flow and irregular payment of caterers made integration of local farmers into the programme difficult, so it became preferable for caterers to buy their commodities from market women limiting the programmes ability to boost the local economy by enhancing the income of farmers. Additionally, locating the farmers by the caterers posed a problem as most of them were not organised into co-operative associations and had to be engaged on their farms individually, highlighting the need for a mechanism to link these two key stakeholders *(16,18)*. A study of 100 small holder rice farmers and 90 individual players in 3 districts in Northern Ghana which assessed the accessibility of rice farmers to the GSFP also found that farmers could not access the GSFP. This was because the caterers preferred milled rice and not the paddy rice produced by the farmers locally. Thus, the GSFP had no effect on their output or productivity*(19)*.

Key challenges and bottlenecks

Caterers serving schools with the GSFP have to pre-finance the meals through loans, personal savings, credit schemes to be later reimbursed by government *(5,7)*. Although successive governments have sustained the funding of the Ghana school feeding programme since its inception in 2005 aided by donor agencies, payments made to key stakeholders such as caterers are usually delayed or insufficient *(5,8,16,18,20,21)*. These payments are not adjusted to cover the fluctuations in fuel and commodity prices and since they are not paid by the number of meals served, it costs the caterers more especially as enrolment increases during the school term *(16)*. This affects the ability to plan, the quantity and quality of food served and its impact on the nutritional status of children. To compensate, caterers reduce the portion sizes or feed the children irregularly instead of five days a week and the small portion sizes do not supply sufficient food and nutrients to the pupils *(5,16,21,22)*. Thus, some children remain hungry after the meal *(8,20,21)*. Additionally, the quantities for the menus were not standardized affecting monitoring and evaluations processes *(16,23)*. It was also observed that most caterers did not follow a meal plan or make provision for those on a special diet in addition to a lack of variety in the meals served *(8,24)*. A lack of interventions to deal with nutrition problems such overweight or obesity, from high energy intakes and iron deficiency anaemia was also found in some communities *(25–27)*.

Since caterers have to pre-finance the food served in the program, their inability to secure funding to purchase in bulk and reduce costs was a limitation *(5,16,28)*. Some caterers also had challenges with storage and cooking on their own premises posed an obstacle to the monitoring and evaluation process *(16)*. Some schools lack canteens where children can eat to avoid using classrooms, and lack of kitchens and logistics such as cutlery and plates were also observed. (8,18,20). While there was a problem of accounting for the effect of increasing enrolment on the catering service, some caterers reported problems with children who were not enrolled participating in the meals and another study reported the participation of underage children *(11,28)*. Some children also attended school for meals and left school after the meals were served *(8)*.

Some schools complained about delays in the distribution of food affecting contact hours for teaching and learning *(8,21,22)*. Lack of effective education of stakeholders such as parents and the local community was also observed *(18,20)*. This affected teamwork and led to a lack of support or misinformation, which caused some parents to send their children to school hungry, expecting that they will be served breakfast at school. This makes the children hungry and find it difficult to learn, especially when meals are delayed *(10)*. Another important observation was that, although increasing enrolment is a desired outcome of the GSFP, it also exerts pressure on the schools resources and authorities as it results in shortfalls of teaching staff, teaching materials, logistics, infrastructure and supporting services such as provision of clean water and good sanitation, which could potentially lead to poor food hygiene and disease outbreaks in schools *(18,20,21)*. Poor management as well as political involvement in the selection of caterers were also observed *(8,10,18,20)*. A qualitative study investigating the operational challenges of the GSFP found a lack of collaboration and coordination among the relevant government agencies and ministries involved and recommended the need for regular monitoring, clarification of roles and reviewing of prices of commodities to reflect actual cost, as well as making timely payments to caterers to sustain the GSFP *(29)*.

DISCUSSION

This review revealed that Caterers benefit most economically from the school feeding programme in Ghana as they are the key players *(6,7,30)*. However, they have several challenges, which need further attention, including financial constraints, storage problems and transportation delays in the delivery of supplies, food hygiene and wastage of academic time due to the feeding program *(3)*. Better oversight, monitoring and time management is needed. Due to the challenges encountered with engaging farmers and issues with cash flow, farmers were not portrayed as major actors in the programme. Therefore, suggestions have been made for a loan system to facilitate payment for goods and services and formation of co-operative associations among farmers to improve coordination with the caterers *(16,26)*.

It is important to note that the GSFP programme provided actual savings to some families and was in high demand. We also noted that gains in height were more pronounced in children living in poverty *(9)*. However, due to the small portion sizes offered by caterers, it appeared that some children's hunger was not always satisfied by the school meals. It is also concerning to note that some children were sent to school without breakfast and remain hungry until meals were served. Better education of parents about the GSFP and the importance of breakfast for the growing child could address this problem. Information on the effect of the GSFP on promoting gender parity in education and the other effects of the GSFP was limited, unlike a study in Burkina Faso which found an increase in the enrolment rate of girls by 3.2 percentage points *(31)*.

Although several challenges with the operations of the GSFP have been outlined, addressing the problems with inadequate and delayed funding to caterers stands out as the most pressing challenge that must to be resolved to maintain the gains of the GSFP. Addressing this challenge will enable children to receive the right portion sizes and quality of food for improved nutrition. Schools must also be supported to receive additional infrastructure to match increases in enrolment, and famers must be motivated and supported to invest in the programme. The GSFP is costly, so the government will have to determine what it can afford, set stringent criteria to target needy children and find alternate and complementary sources of funding to sustain the programme. To this end, needy children can be identified and categorised so that schools with large numbers of very needy pupils can be solely funded by Government, while others are funded by government with support from parents as occurs in Kenya, or the community as occurs in Cote D'Ivoire *(7,32)*. In Cote D'Ivoire, communities contribute to the programme through food stamps, salaries of canteen managers, perishables, cooking fuel and agricultural supports *(7)*. A similar arrangement involving the creation of self-financing school feeding programmes have been tried in Cocoa growing areas in Ghana with success *(13)*.

LIMITATIONS

There were some limitations with this review. The number of papers and the level of evidence available in the literature was limited and populations studied were few in some cases. Most of the studies reviewed were cross-sectional studies and evaluations. Additionally, information obtained on the challenges of the GSFP were mostly collated from reports, which are not subjected to the rigours of scientific research. One (1) randomised controlled trial provided the highest level of evidence.

CONCLUSIONS

This review provides evidence to confirm that the GSFP protects children from hunger and has led to family savings in some settings. It also showed that investment in the programme makes significant economic and social returns over the life time of each beneficiary. The programme has been economically beneficial to caterers and market women but not to most farmers in various localities. Delays in payments to caterers appear to have affected the gains and sustainability of the programme, as some children receive small portion sizes and lower quality of food as a result. It has also affected the ability to engage with farmers. Resolution of the funding problem is likely to improve outcomes and provide necessary infrastructure for the program and beneficiary schools. Better management and monitoring of the programme as well as further research using more rigorous scientific evaluation study designs are needed.

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Letter to the Editor

Impact of Changing Foodservice Systems on Japanese Hospital Kitchen Staff's Labor Time During COVID-19 Pandemic

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Dear Editor:

In March, 2020, the World Health Organization (WHO) declared the outbreak of the coronavirus disease 2019 (COVID-19) "the severe acute respiratory syndrome coronavirus 2)SARS-CoV-II(", a global pandemic. By November 1, 2020, there have been about 46 million confirmed cases of COVID-19, including about 1.2 million deaths, reported to WHO. Japan, like the rest of the world, is facing coronavirus. Japan has postponed the 2020 Olympics, and by November 2020 there have been more than 100 thousand coronavirus cases and about 1800 deaths. Many health facilities, especially acute-care hospitals, are becoming overwhelmed.

Japanese hospitals' food supply system always has to follow the Hazard Analysis and Critical Control Points)HACCP(system. All staff members have to be trained to implement proper procedures. The HACCP system helps to minimize risk when supplying food; especially in the hospital environment there are many risks of infectious disease, so compliance with the HACCP system is critical. COVID-19 is a new, complicated type of virus; there is no vaccine or medicine as yet; and it is highly infectious in the community, especially among elderly people and people with poor resistance. The hospital's kitchen staff includes mainly elderly people and unfortunately, one case of a part-time kitchen cleaning staff member with coronavirus was detected early; isolation was quickly implemented. Coronavirus anxiety throughout the workplace was unavoidable and many kitchen staff members suddenly wanted to take time off. The traditional cook-serve system is a served soon after cooking system so it requires a stable labor resource to serve patients breakfast, lunch, and dinner on time. Therefore, a lack of labor resouces became a serious problem.

In this situation, the nutrition department immediately had to implement a further solution to ensure maintenance of a safe food service for patients, to stabilize employees psychologically and to prevent spread of the nosocomial infection. The solution of the nutrition department at that time was changing temporarily from the traditional cook-serve system to a centralized foodservice system (food boxes were transported to satellites (receiving hospital's kitchen) one time per day). The HACCP system is still being maintained during the pandemic. This was the first time for us and it is a very rare situation to change the food supply system like this in Japanese hospitals.

When the pandemic occurred, all tableware except the trays of hot & cold serving carts were changed to disposable tableware so we would like to summarize the traditional cook-serve system and the outside food supply system in figure 1. With the traditional cook-serve system, all procedures are implemented in the hospital kitchen, from inputting and checking materials to serving meal for patients. The outside food supply system which replaced cook-serve at this time is a system which uses a centralized kitchen, from inputting and checking materials to putting food in tableware (packaging). After this, a serving car/truck with suitable storage temperature is used to transport meals to the hospital's kitchen. At the kitchen, the food is reheated, placed on serving trays and served to patients.

The menus of the centralized kitchen (one-month cycle menu) were designed with high quality food materials and suitable for the chilling and reheating process to maintain food quality. Dietitians needed to test the taste and quality of the food before deciding to serve it to patients. Because the centralized kitchen's menus have normal nutrition content, dietitians needed to adjust food amounts appropriately depending on disease, allergies, etc…

Comparison of the hospital kitchen shift times of the two food service systems is indicated in figure 2. To supply about 200 patients per day, compared with the traditional cook-serve system, by using a centralized foodservice kitchen staff members and labor hours were reduced by one-third. Therefore, this can be a timely

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solution for dietitians to choose in an emergency situation, and the business contract between a foodservice company and a hospital to cover such a situation should be considered beforehand. In addition, the frequency of inputting in material can be reduced from many times per day as in the traditional system to just a few. This could help to reduce the risk of infection.

Based on this experience, changing the foodservice system in a hospital can be a worthwhile solution to deal with emergency situations such as the COVID-19 pandemic.

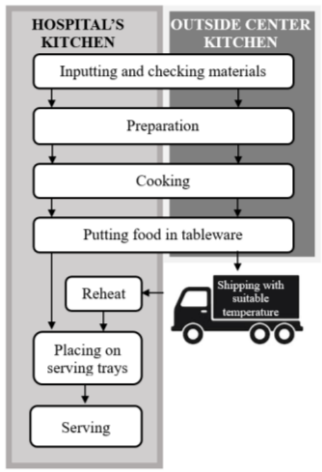

Figure 1. Food service systems

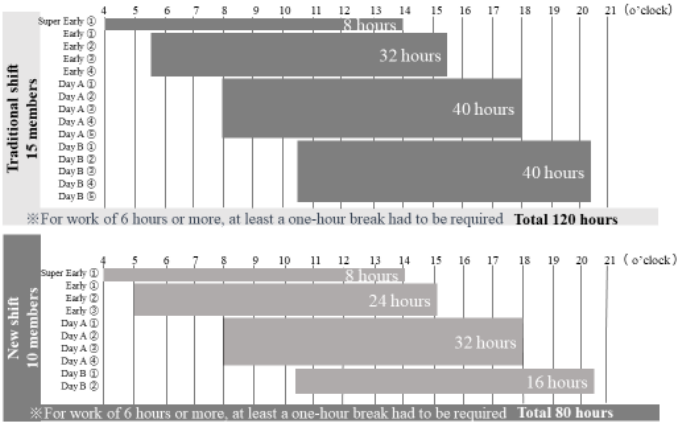

Figure 2. Comparison of the hospital kitchen shift times of the two food service systems (supply about 200 patients)

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