



# A COMPARATIVE STUDY OF FACTORS INFLUENCING OBESITY IN PRESCHOOL CHILDREN IN MUANG DISTRICT, SUPHANBURI PROVINCE, THAILAND

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## Abstract


This study aimed to investigate food consumption behavior and compare factors influencing obesity in preschool children in Muang District, Suphanburi Province, Thailand. The participants were 144 preschool children aged 3-6 years old (72 children with obesity and 72 children with normal nutritional status). Data were collected by asking mothers regarding child, mother, and family-related factors. A set of questionnaires were employed. Data were analyzed using descriptive statistics. Chi-square and t-test were used to compare the differences in the variables. The results showed that children reported a moderate level of food consumption behavior, eating rice and rice products, followed by fruit and one plate dish, milk, sweet and crunchy snacks, compressed milk tablets and vegetables. It was also found that there was a statistical difference of nutritional status of obese and normal children attributed to three child-related factors, including birth weight, breastfeeding duration, and food consumption behavior ( $t = -3.33, p < .001$ ;  $t = 3.59, p < .001$ ;  $t = 3.15, p < .05$ , respectively). Moreover, it was found that there was a statistical difference of nutritional status of obese and normal children attributed to three child-related factors, including birth weight, breastfeeding duration, and food consumption behavior ( $t = -3.33, p < .001$ ;  $t = 3.59, p < .001$ ;  $t = 3.15, p < .05$ , respectively). Regarding mother factor, there was a statistical difference of nutritional status of obese and normal children attributed to maternal body mass index (BMI) ( $t = -4.9, p < .001$ ). Regarding family-related factors, there was a statistical difference of nutritional status of obese and normal children attributed to food consumption behavior ( $t = 2.164, p < .001$ ). There were no statistical differences of nutritional status of obese and normal children attributed to maternal education, maternal occupation, and sufficient family income ( $\chi^2 = 1.091, p = .779$ ;  $\chi^2 = .327, p = .567$ ;  $\chi^2 = 2.851, p = .240$ , respectively).

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**Keywords:** food consumption, obesity, preschool children

## Introduction

Obesity is currently a significant problem with rapidly escalating prevalence among children and adolescents. In Thailand, the Prospective Cohort Study in Thai Children, Youth and Family in 2001 found that 12.3% of preschool and elementary school children had overweight and obesity. Survey findings in 2004 showed the prevalence of obesity among preschool children was at 8.2% while normal preschool children were found at only 2.0%. In Bangkok, the number of obese children aged 2-6 years has increased to 15.5% (Mosuwan, 2004) while rather overweight or “chubby” children with weights exceeding the standards in 2003 increased from 7.37% to 9.91% (Public Health Office and Hospitals under the Jurisdiction of the Department of Medical Services, 2003), and 9.55% in 2005 to 10.54% in 2008. According to surveys by the Health Department, Ministry of Public Health (2009), 1 out of 5 preschool children were anticipated to be obese in another 10 years due to their consumption of snacks, foods with no nutritional value



and lack of exercise (Administrative Commission Preparing the 10<sup>th</sup> National Health Development Plan, 2007-2011) demonstrating that rate of obese children in Thailand is skyrocketing as the number of obese Thai adults is also prompted upward.

According to previous studies of factors related to overweight and obesity in children, the demographic factors of children, mothers and families were found to be related to obesity. Child-related factors consisted of birth weight (O'connorm, Yang & Nicklas, 2006; Un-Em, 2006; Meksaworn, 2007), breastfeeding duration (Laurence, Strawn & Mei, 2004; Un-Em, 2006), and food consumption behaviors. Mother-related factors consisted of maternal body mass index (He, Ding, Fong & Karlberg, 2000; Hui, Nelson, Yu & Fok 2003; Berkowitz, Stallings, Maislin & Stunkard, 2005), level of education, and occupation (Glugliano & Carneino, 2004). Family-related factors consisted of family income sufficiency, food consumption behaviors and family activities (Un-Em, 2006). The aforementioned factors were found to impact the occurrence of obesity in children. Especially, preschool children directly influenced by family care because mothers or families members either care for or have close proximity to these children.

Suphanburi Province is a province with considerably high rates of economical and social development. According to the statistics on nutritional surveys among preschool children in the jurisdiction of the Public Health Office, Muang District, Suphanburi Province during the past three years between 2007-2009, 13.8%, 15.3%, and 18.5%, of preschool children were overweight or obese, respectively. The lifestyle changing among people in Suphanburi have leaned towards development of urban society, including reduced physical activity caused by conveniences contributing people to use less energy leading to obesity.

According to the findings among preschool grade 1<sup>st</sup>-3<sup>rd</sup> in Muang District, Suphanburi, and under the responsibility of Chaophraya Yommarat Hospital, the results showed that the number of overweight and obese children increased from 25.78% in 2008 to 26.82% in 2009. Among these children, 13.62% were obese (School Health Program of Chaophraya Yommarat Hospital, 2010). This is an upward trend. The researcher discovered factors leading to obesity, including (i.e. genetics, food consumption behavior at home, and low energy physical activity and activities such as watching television and playing computer games). For normal children, it has been found that children, mothers and family members practiced good self-care behaviors in terms of beliefs and attitudes toward food consumption, and activity performance.

This research applied the Social Ecological Theory (SET) of Bronfenbrenner (1979), which stated that factors affecting the health conditions of children were caused by the surrounding environment of the children on several levels. None of previous studies conducted in Suphanburi province employed the SET in health promoting research among preschool and school children. Hence, gap of knowledge exists.

### **Examination of Instrument Quality**

The researcher employed the questionnaires created by the researcher based on the questionnaire of Un-Em (2006). Content validity was investigated by a panel of three professors in nutritional nursing. Subsequently, the researcher revised the questionnaires according to the recommendations of the panel.

The researcher implemented the questionnaires with preschool children possessing similar qualifications to the sample group and aged 3-6 years at a municipal school in Muang District consisting of 30 preschool grade 1<sup>st</sup>-3<sup>rd</sup> at Wat Prasatthong School. Reliability was analyzed using a computer program package. A Cronbach's alpha coefficient was 0.72.



## Methodology

This study employed a cross-sectional design aimed to compare child, mother and family related factors influencing obesity in preschool children, categorized by obesity and normalness among children currently studying at the Preschool 1-3 levels of schools (preschool children aged from 3 to 6 years of both male and female gender). Research settings were four elementary schools located in Muang District, Suphanburi, including Sahawit School, Anuban Suphalak School, Suphanaphume School, and Anuban Suphanburi School.

The researcher collected data herself during February, 2010 and proceeded according to the following methodology:

1. The researcher requested letters of introduction from the Dean of the Faculty of Graduate Studies to the school administrators to request facilitation in data collection in the areas under their respective jurisdictions.
2. The researcher requested meetings with preschool administrators to introduce herself and the project, explain the details concerning data collection and request permission to collect data.
3. Upon receiving approval according to rank, the researcher requested meetings with Preschool 1-3 class teachers to explain the details regarding the collection of background data on the preschool children and families, including requesting the registered names of all children and the details of the height and weight measurements of all children which had been performed by class teachers during the past month. Then, a form was created to record data.
4. The researcher evaluated the nutritional status of the children from the height and weight measurement data of the aforementioned teachers in order to separate obese and normal population groups according to standard criteria on height and nutrition indicators for Thais aged 2-18 years from the Health Department. (2010) (Nutrition Division, Health Department, the Ministry of Public Health, 2000) whereby normal children (-1.5 S.D to + 1.5 S.D) and obese children (+ 2 S.D above line and up) of children of the same gender at the same age and record the details in the record form created for that purpose.
5. The researcher weighed and measured heights of the obese and normal children again in another month and evaluated nutritional status by standard criteria, thus acquiring samples from obese and normal populations.
6. The researcher randomized selected the obese and normal sample group members according to the ratios calculated at each school in order to obtain 72 obese preschool children and 72 normal preschool children in the sample groups. Sample size was calculated using the G-power program (Erdfelder, Faul & Buchner, 1996), with alpha at .05; power at 0.80 to prevent Type II Error. The medium effect size at 0.30 was used (Cohen, 1988). Sample size of 143 was obtained. Sample size was expanded to 144 for the purposes of this study, so sample group could be sufficiently sized for dividing into sub-groups of 72 samples with obesity and another 72 samples with good nutritional status.
7. When the mothers of the sample were willing to participate in the research project, the researcher scheduled dates for data collection according to newly appointed schedules and requested cooperation from the mothers of the sample group on the date of data collection in weighing, measuring heights and answering questionnaires. The researcher explained detail of the questions, the topic, number of questions, and time required. Afterwards, the researcher handed out the questionnaires consisting of four parts containing 22 questions on the demographic data of the children in the custody of the mothers and families of the sample group. Food consumption behavior on children included 38 questions. Food consumption behaviors in general consisted of 10 questions, and 8 questions on family activities. The researcher also explained the methods for answering the questionnaires and allowed mothers of the sample group to ask questions. The researcher let mothers of the sample group answer questionnaires on their own for approximately 20-30 minutes and, while mothers of the sample group were

answering questions, the researcher remained in the area to immediately provide details and answer questions in relation to questionnaires as necessary. The total time required for collecting data was approximately 30-45 minutes.

8. The researcher re-evaluated nutrition by measuring weights and heights of obese and normal grade 1<sup>st</sup>-3<sup>rd</sup> students who had been selected according to the criteria and whose mothers had already answered the questionnaires.

## Results

The present study aimed to compare factors influencing obesity in preschool children currently studying at the Preschool 1-3 levels at schools located in Muang District, Suphanburi Province.

### Children's Food Consumption Behavior

With regard to the food consumption behavior of the children in the sample group of 144 obese and slender preschool children, the subjects practiced correct behavior at a moderate level (74.3%) (as shown in Table 1).

**Table 1** The numbers and percentages of obese and normal preschool children categorized by level of food consumption behavior for children and families ( $n=144$ )

Level of Proper Behavior	Obese Children n (%)	Normal Children n (%)	Total n (%)
Total	72 (100)	72 (100)	144 (100)
<b>Children's Food Consumption</b>			
High (>86.5 points and up)	6(8.3%)	13 (18.1%)	19 (13.2%)
Moderate (67.9-86.4 points)	55(76.4%)	52 (72.2%)	107 (74.3%)
Low (< 67.8 points)	11 (15.3%)	7 (9.7%)	18 (12.5%)

Comparison of the Differences in the mean values in child-, mother-and family-related factors in both obese and normal preschool children

Once the differences in the mean values had been analyzed using t-test, the following was found:

### Child-related Factors

Differing birth weights led to differing nutritional status in sample groups (obese and normal) with statistical significance ( $t = -3.33, p < .001$ ).

Differing breastfeeding durations led to different nutritional status in the sample groups (obese and normal) with statistical significance ( $t = 3.59, p < .001$ ).

### Mother-related Factors

Differing maternal (BMI) led to differing nutritional status in the sample groups (obese and normal) with statistical significance ( $t = -4.9, p < .001$ ).

### Family-related Factors

Differing means scores for family food consumption behavior led to differing nutritional status in sample groups (obese and normal) with statistical significance ( $p < .05$ ) (as shown in Table 2).

Table 3 showed the differences in the mother- and family-related factors in sample groups of obese and normal preschool children. The results revealed that differing levels of maternal education, and type of maternal occupations led to no differing nutritional status in children (obese and normal). As for the factor of differing family income sufficiency there was no significant difference in the nutritional status between obese and normal children group. ( $p > .05$ ) ( $\chi^2 = 1.091, p = .779$ ;  $\chi^2 = .327, p = .567$ ;  $\chi^2 = 2.851, p = .240$ ) (as shown in Table 3).

**Table 2** Comparison of the differences in means and standard deviations ( $n=144$ )

Factors	Mean	SD	t-test	p-value
<b>Child-related Factors</b>				
Birth Weight (grams)			-3.33	.001***
Obese Children	3,256.81	412.42		
Normal Children	3,051.93	318.93		
Breastfeeding Duration (months)			3.59	.001***
Obese Children	3.10	3.60		
Normal Children	7.94	10.85		
Food Consumption Behavior			3.154	.002**
Obese Children	74.87	8.80		
Normal Children	79.59	9.15		
<b>Mother-related Factors</b>				
Maternal Body Mass Index			-4.9	.001***
Obese Children	26.41	4.87		
Normal Children	23.07	3.08		
<b>Family-related Factors</b>				
Food Consumption Behavior			2.164	.032*
Obese Children	24.91	4.64		
Normal Children	26.37	3.33		
Activity Behavior			1.247	.215
Obese Children	12.94	2.86		
Normal Children	13.63	3.75		

$p < .001$  \*\*\*,  $p < .01$  \*\*,  $p < .05$  \*

**Table 3** Chi-square difference and the statistical significance in the obese group and normal group categorized by mother- and family-related factors ( $n=144$ )

Mother and Family related Factors	Obese Children n (%)	Normal Children n (%)	Total n (%)	$\chi^2$	p-value
<b>Maternal Level of Education</b>					
Under Elementary Grades 1-6	12 (16.7)	9 (12.5)	21 (14.6)	1.091	.779
High School Grades 7-12 or Vocational Certificate	21 (29.1)	18 (25)	39 (27.1)		
Associate Degree or High Vocational Certificate	8 (11.1)	9 (12.5)	17 (11.8)		
Bachelor's Degree or Higher	31 (43.1)	36 (50)	67(46.5)		
<b>Maternal Occupation Type</b>					
Labor	20 (27.8)	17 (23.6)	37 (25.7)	.327	.567
Non-labor	52 (72.2)	55 (76.4)	107 (74.3)		
<b>Family Income Sufficiency</b>					
Insufficient	4 (5.6)	10 (13.9)	14 (9.7)	2.851	.240
Sufficient Some Months	20 (27.8)	18 (25.0)	38 (26.4)		
Sufficient	48 (66.6)	44 (61.1)	92 (63.9)		

$p < .001$  \*\*\*,  $p < .01$  \*\*,  $p < .05$  \*



## Discussion

### Children's Food Consumption Behaviors

The food consumption behaviors of 74.3% of the obese and normal preschool children in the sample group were found to be correct at a moderate level and 12.5% had correct food consumption behaviors in a low level, which left 86.8% of preschool children with incorrect food consumption behaviors. It was found that preschool children consumed foods at a frequency rate of 1-2 days per week for eggs and vegetables, 3-4 days per week for meat and animal products, fish, ice cream and sweet beverages, 5-6 days for one plate dishes, sweets, crispy snacks and fruits every day of the week for milk, dairy products, rice and rice products. Obese children consume fried or stir-fried meats with oil, rice, rice products, instant noodles, extremely sweet fruits, soda, sweet beverages, fruit juice and ice cream at frequencies of more than three days to every day each week whereas normal children have similar food and frequency consumption to the group of obese children, but higher mean behavior scores. This finding was similar to the study of Yamborisut (2005), who conducted a study of preschool children in Nakhon Pathom. The result showed that most mothers did not control the amount of food consumed by children while controlling children in terms of eating high-energy foods. The amount of food consumed by children and excessive energy from food are risk factors of obesity.


### Comparison of the Differences of Child-related, Mother-related and Family-related Factors Influencing the Nutrition (Obese and Normal) of Preschool Children

Child-related factors consisted of differing birth weights and breastfeeding durations in the sample group. The children had significant different nutritional status. This finding was consistent to the study of Un-Em (2006) revealing that obese children had higher mean birth weights than normal children. Exclusive breastfeeding duration for the first four months also affected obesity. Padez and colleagues (2007) studied factors affecting over-nutrition in children and found that birth weight and breastfeeding duration were related to obesity in children. Similarly, Yamborisut (2005) found that breastfeeding affected nutritional status in children and was a predicting factor of obesity.

Differing average food consumption behavior scores of the sample group indicated that the sample group members had differing nutritional status. This is similar to the study of Rakvanich (1993) discovering that children's food consumption behaviors were related to obesity in preschool children. Consistently, Hakhun (1993) and Usman (2005) discovered that the frequency of snack food consumption and fried food consumption was significantly related to obesity in preschool children ( $p < .05$ ).

The differences of mother-related and family-related factors (maternal BMI and family-food consumption behavior) led to the different nutritional status. This finding is similar to the result of Yamborisut (2005), Un-Em (2006), and Prattanapon (2006). They studied the effects of obesity in parents on obesity among children. They found that the main role of caregivers was that mothers who were close to their children always prepared food that influenced nutritional status in the aforementioned frequency and mothers were role models for behaviors influencing children's behaviors. Preschool children were unable to select their own foods. Moreover, it was found that mothers prepared food or snacks for family members while watching television.

The differences of occupations and levels of education of mothers were not a significant cause of nutritional status. Inconsistently, Wisitcharoen (2008) found that parents' education was related to nutritional status. The explanation is that maternal education level of sample group comprised of routine education without specific coverage of knowledge in the area of nutrition care for children. As for maternal occupation and family income sufficiency in sample group, the



findings indicated that the occupations of mothers included both labor and non-labor types and the family income sufficiency of the obese and normal children in the sample group has similar rates, which might be explained in that mothers of both obese and normal children tend to practice similar childcare regardless of the level of maternal occupation and family income sufficiency.

According to the results of this study, family activities had no statistical significant difference in both groups. This might be explained that the researcher did not ask about the details concerning the activities practiced by children. Furthermore, it may also be that family activities were not the main factor influencing the physical growth of the children. Rather, an environmental factor possibly contributed to as an indirect outcome. The present study found that types of activities practiced by children in both groups were very similar in terms of frequency of performance, while the mean overall behavior was also similar in combination with the changing lifestyles of people in Suphanburi. Both the obese and normal children group lived in similar social environments and had similar reductions in physical activity. Hence, children had no differences in nutritional status.

### **Recommendations**

1. There should be work cooperation between teachers and nurses in visiting schools in terms of screening preschool children with nutritional problems, including overweight or obese children and underweight children.
2. The roles of teachers should be expanded in terms of health promotion, nutrition and exercise as suitable for preschool children. Hence, teachers can offer advice and lead parents both accurately and continually.
3. Repetitive study should be conducted on the topic and the sample group size should be sufficiently expanded.
4. Future studies might study other factors e.g. school- and media-related factors. Comparative studies should be conducted on the factors influencing obesity in children of various ages, both in other geographical regions with different contexts from the context of this study.

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