How do non genetic factors affect overweight children in Bangkok?

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Introduction

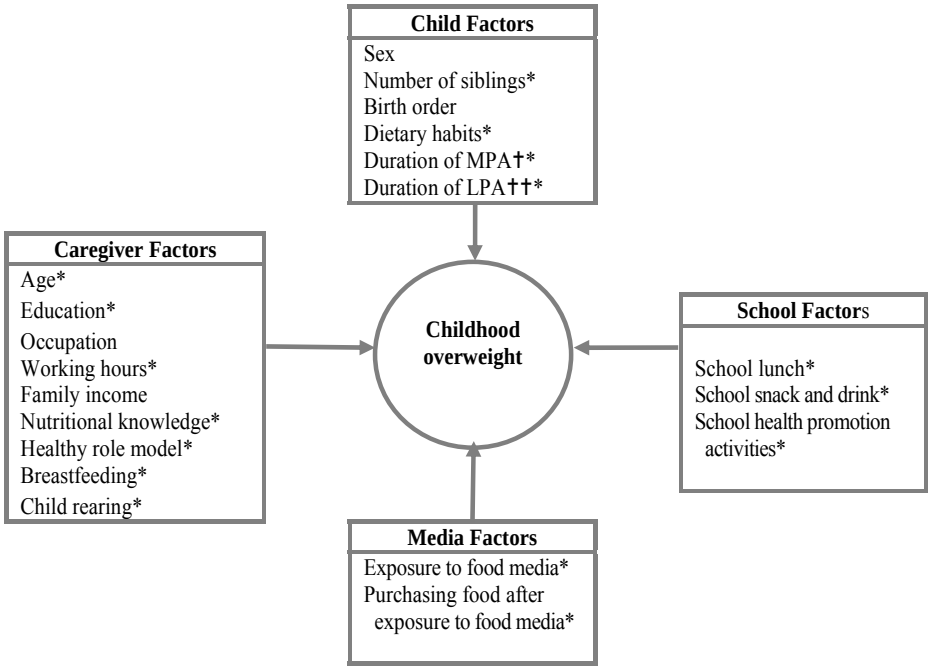
The World Health Organization (WHO) declared that obesity is the major pandemic health problem throughout many developed and developing countries (WHO, 1998; Lobstein, Baur and Uauy, 2004). The prevalence of childhood overweight and obesity is on the rise in many Asian countries, as well as in Thailand (Tee, 2002; Wang and Lobstein, 2006). Currently, Thailand has found the coincidence of *mal*nutrition: *under*weight and *over*weight (Kosulwat, 2002). It seems that the problem of overweight is emerging as the greater of these two issues. The nutrition surveillance of children in Thailand over the last five years has shown that the prevalence of childhood overweight and obesity has been increasing continuously. Results from cross-sectional surveys in primary schools in Bangkok from 1992-1994 showed that the prevalence of overweight and obesity among 2,885 children aged 6 to 12 years living in middle to high income family was 25.7%. After three years of monitoring, it increased to 28.1% (Kosulwat, 2002).

Overweight among children becomes a serious public health concern because it is associated with physical, psychological, behavioral, social, and economic consequences (Koplan, Catharyn and Vivica, 2005). In addition, it may lead to obesity in later life along with long term adverse health consequences, including cardiovascular disease, type 2 diabetes, hypertension, stroke, dyslipidemia, osteoarthritis, breathing problems, cancer, and depression (Kah, 2002; Nancy and Barbara, 2002).

The current upward trend in childhood overweight is too rapid to be explained by only genetic changes; in other words, genetic factors are not the primary determinants for this trend since human genes have not been changed for a century. The causes of overweight interface between biology and environment which interact and play an important role in different socioeconomic realities (Matthew and Randal,

2008). Studying non genetic factors helps to identify key factors influencing overweight and can lead to the development of more effective intervention strategies. Most previous research in Thailand has been limited to a number of studies examining non genetic factors focusing on the holistic domains involving the context of children, family, school, and media in an effect to predict childhood overweight. The aims of this study were to assess the prevalence of overweight and to investigate the influence of non genetic factors on childhood overweight in Bangkok. An ecological model of childhood overweight proposed by Davison and Birch (2001) was adopted as the conceptual framework. The ecological model of childhood overweight aims to summarize and classify predictors of childhood overweight into 3 domains; children, family, and community. We, however, reorganized and classified them into 4 factors based on literature reviews namely, child factors, caregiver factors, school factors, and media factors. The conceptual framework of this study is shown in Figure below.

Figure 1: **Conceptual framework**



Legends: * Numerical variable † Moderate Physical Activities †† Light Physical Activities

Methodology

Population and sample

Children, aged 9 to 12 years, including their one caregiver either real father/mother, foster father/mother, grandparents, relative or other guardians taking care of them were the participants of this study. The respondents were recruited from both public and private elementary schools to obtain a wide variety of economic status. The schools were determined by 2% of total public and private elementary schools in Bangkok; 18 elementary schools; 10 public schools and 8 private schools were selected by the simple random sampling from a list of public and private elementary schools. The sample size was calculated from the formula $n = Z^2(pq)/d^2$, where "n" is number of subjects, Z^2 is the standard deviation which specifies in the level at 1.96 (confidential interval at level 95%), "p" is the previous prevalence of overweight (20%) in Bangkok reported by Ministry of Public Health (2006), "q" = 1-p, and "d" is the estimate error of previous prevalence which would not exceed allowable error 10% multiplies (*) by the prevalence of overweight. The minimum of sample size calculated by this formula was 1,537 children. We increased it up to 2,240 children in order to attain a reliable and appropriate representative sample. Subjects were randomly selected from each of the 4^{th}, 5^{th}, and 6^{th} grade classrooms. The number of subjects in each class of each sample school was selected by probability proportional to size sampling. After editing, the complete representative sample in this study was 1,863 children.

Data collection and tools

This study was a cross-sectional study carried out in September 2007. Ethical clearance for this study was approved by College of Public Health, Chulalongkorn University ethics board. The principal of each school allowed the permission to conduct the research in the school. All caregivers of the selected children received the consent form which provided information about the purpose and methodology of the study. Two sets of structured self-administered questionnaire; one for the children and another for caregivers were developed and designed to be simple with wording in Thai. A pre-test

was conducted in 2 non-selected schools of the sampling area to ensure that questionnaires were understandable and appropriate. Revised questionnaires were made based on the children's and caregivers' feedback. The children's questionnaire was divided into 7 parts: a) demographic information, b) dietary habits, c) physical activities, d) food and activities in school, e) exposure to food media, f) appearance perception, and g) anthropometric measurement. The caregiver's questionnaire was divided into 6 parts: a) demographic information, b) food preparation, c) nutritional knowledge, d) dietary and physical activities habits, e) child rearing, and f) child's appearance perception. Children completed the questionnaire during school time in the presence of the staff. Teachers were asked to collect data according to standardized procedures. Children were required to take the questionnaire to their caregiver to be completed at home and return it to the teacher the next day. Besides questionnaires, the height and weight of the children was measured and recorded by trained teachers after submitting the completed questionnaire. Children were weighed in light clothes with empty pockets and bare shoes and were measured for height without shoes.

Definition of terms and measurements

Overweight was the dependent variable which was determined by using the weight and height measurement. The weight for height index with Thai national standard produced by Ministry of Public Health, Nutrition Division (2000) was used to assess nutritional status. The weight is correlated with height and compared with the reference standard based on the child's age and sex. The anthropometric index of weight-for-height was calculated by INMU-a Thai growth program known as the Institute of Nutrition, Mahidol University. This program calculated nutritional status among people aged 1 day to 19 years. The weight-for-height Z scores (WHZ) were classified into 6 groups namely, "Obese" (WHZ >+ 3), "Overweight" (WHZ >+ 2 to WHZ+ 3), "Plump" (WHZ >+1.5 to WHZ +2), "Normal" (WHZ -1.5 to WHZ +1.5) "Rather thin" (WHZ <-1.5 to WHZ -2), and "Thin" (WHZ <-2).

The independent variables consisted of twenty variables; four were nominal and ordinal variables, and the rest were numerical variables marked with a star (*) in

Figure 1. The child factors were comprised of four numerical variables: number of siblings, dietary habits, duration of moderate physical activities, and duration of light physical activities. Dietary habits of children were assessed by accumulating scores from Likert-type scale (never, seldom, sometimes, and often). The duration of moderate and light physical activities were determined by observing the number of hours subjects participated in physical activities such as swimming, table tennis, badminton, tennis, basketball, football, running, and aerobics classified as "moderate physical activities" and the number of hours subjects engaged in mild activities such as TV watching, and playing on the computer classified as "light physical activities". The caregiver factors consisted of eight numerical variables: age, education, working hours, family income, nutritional knowledge, the presence of a healthy role model, breastfeeding, and child rearing. The presence of a healthy role model and child rearing were assessed by summing scores from Likert-type scale (never, seldom, sometimes, and often) as regards to the caregiver's personal dietary habits and physical activities, and regarding how the caregiver looked after his/her own children on matters of dietary health and physical well-being. The school factors consisted of three numerical variables, namely: school lunch, school snack and drink, and school health promotion activities, which were measured by item-questions with Likert-type scale (never, seldom, sometimes, and often). The media factors were comprised of two numerical variables: exposure to food media, and purchasing food after exposure to food media, which were measured by item-questions with Likert-type scale (never, seldom, sometimes, and often).

Data analysis

Descriptive statistics were reported as frequencies, percentages, means, standard deviations, minimums and maximums to describe the characteristics of the sample. Binary logistic regression analysis; simple binary logistic regression analysis, multiple binary logistic regression analysis, and stepwise multiple binary logistic regression analysis were used to investigate the association between overweight and child factors, caregiver factors, school factors, and media factors, respectively. Simple binary logistic regression analysis was analyzed as bivariate analysis to test the hypotheses. For the multivariate analysis, multiple binary logistic regression and

stepwise multiple binary logistic regression analyses were employed to demonstrate a cumulative explanatory effect and to examine the best candidate variables to explain the dependent variable. To investigate the influence of non genetic factors, overweight was compared with normal weight as a reference group. Overweight was defined as WHZ >+ 2 according to the National Center for Health Statistics/World Health Organization (NCHS/WHO). Normal weight was defined as WHZ +2 to WHZ -2. Thin was not included in the analysis. Hence, the total sample for analysis was 1,815 subjects, all children. Odd ratio was employed to examine the magnitude of association and to investigate whether the association was positive or negative. Statistical significance measured as $p \leq 0.05$. Data were entered and analyzed by using SPSS for window, version 12.0. No independent variables were highly related after multicollinearity was tested between twenty independent variables.

Results

Characteristics of sample

Table 1 described the characteristics of the sample. Of the total 1,863 children, there were more females than males (52.2% vs. 47.8%). The mean age of the children was ten years. The average number of siblings was one. About 38% were the youngest child in the family. The mean score of appropriate dietary habits among children was about 29. The mean duration of doing moderate and doing light physical activities were approximately 7 and 10 hours per week, respectively. Among characteristics of caregiver factors, most caregivers were mothers and were married. The mean age of the caregivers was about 42 years. The average number of years elapsed since completion of education was almost 13 years. About 36% were merchants. The mean number of working hours was 7 per day. Almost 30% had a monthly family income between 10,000-29,999 Baht. The average score of nutritional knowledge was about 6. The mean score of being a healthy role model was about 31. The average duration of breastfeeding was 4 months. The average score on child rearing was about 32. The characteristics of school factors showed that the average scores of school lunch and school snack and drink evaluated by children were 12.4 and 13.0, respectively. The mean score of school

health promotion activities was 5.3. For the media factors, the average score of exposure to food media and purchasing food after exposure to food media were about 11 and 7, respectively.

Table 1: Characteristics of the sample (N=1,863)

Characteristic	N	%	Mean	SD	Min	Max
Child factors						
Sex						
Male	890	47.8				
Female	973	52.2				
Age*			10.4	0.9	9	12
9	344	18.5				
10	663	35.6				
11	594	31.9				
12	262	14.1				
Number of siblings			1.2	0.9	0	6
0	402	21.6				
1	916	49.2				
> 1	545	29.3				
Birth order						
Single	402	21.6				
Oldest	522	28.0				
Youngest	716	38.4				
Other	223	12.0				
Dietary habits (Score)			28.6	4.4	11	42
<25	308	16.5				
25-32	1,221	65.5				
>32	334	17.9				
Duration of MPA (Hour/week)			7.4	6.3	0	54
<3.5	560	30.1				
3.5-14	1,053	56.5				
>14	250	13.4				
Duration of LPA (Hour/week)			9.8	9.4	0	71
<3.5	459	24.6				
3.5-14	1,025	55.0				
>14	379	20.3				
Caregiver factors						
Relation to children*						
Mother	1,269	68.1				
Father	479	25.7				
Other (Grandparents, aunt, uncle)	115	6.2				
Age (Year)			41.9	6.3	22	78
< 30	45	2.4				
30-39	583	31.3				
40-49	1,069	57.4				
50-59	138	7.4				
> 59	28	1.5				

Table 1: (Continued)

Characteristic	N	%	Mean	SD	Min	Max
Marital status*						
Single	56	3.0				
Married	1,614	86.6				
Widow/divorced/separated	193	10.4				
Education (Year)			12.9	4.1	0	20
< 7 [under high school]	258	13.8				
7-12 [high school]	597	32.0				
13-16 [bachelor degree]	873	46.9				
> 16 [higher than bachelor degree]	135	7.2				
Occupation						
Unemployment	307	16.5				
Professional/academic/management	207	11.1				
Clerk/ officer	402	21.6				
Merchant	665	35.7				
Service	156	8.4				
Other	126	6.7				
Working hours (Hour/day)			7.2	3.8	0	24
0	307	16.5				
1-7	325	12.6				
8	780	41.9				
> 8	541	29.0				
Family income (Baht/month)						
<10,000	243	13.0				
10,000-29,999	533	28.6				
30,000-49,999	321	17.2				
50,000-69,999	293	15.8				
> 69,999	473	25.4				
Nutritional knowledge (Score)			6.1	1.3	0	8
<6	441	23.7				
6	502	26.9				
>6	920	49.4				
Healthy role model (Score)			31.1	5.5	13	49
<27	379	20.3				
27-36	1,199	64.4				
>36	285	15.3				
Breastfeeding (Month)			4.2	4.7	0	24
<6	1,329	71.3				
>=6	534	28.7				
Child rearing (Score)			31.5	7.4	4	54
<25	294	15.8				
25-38	1,265	67.9				
>38	304	16.3				
School factors						
School lunch (Score)			12.4	2.1	2	20
<11	261	14.0				
11-14	1,335	71.7				
>14	267	14.3				

Table 1: (Continued)

Characteristic	N	%	Mean	SD	Min	Max
School snack and drink (Score)			13.0	3.1	0	18
<11	335	18.0				
11-15	1,132	60.8				
>15	396	21.3				
School health promotion activities (Score)			5.3	1.9	1	8
<4	368	19.8				
4-6	910	48.8				
>6	585	31.4				
Media factors						
Exposure to food media (Score)			10.5	4.7	0	27
<6	277	14.9				
6-14	1,217	65.3				
>14	369	19.8				
Purchasing food after exposure to food media (Score)			6.9	5.1	0	27
<3	405	21.7				
3-11	1,096	58.8				
>11	362	19.4				

* Not in analysis

The prevalence of overweight among children

Anthropometric measurement was presented in Table 2. Overweight and obesity among children according to Ministry of Public Health, Thailand cut-off points were 18.7%, and 13.4%, respectively. When combined these two nutritional levels, according to the National Center for Health Statistics/World Health Organization (NCHS/WHO) cut-off points, the overall overweight was 33%. The prevalence of overweight classified by sex and age is presented in Table 3. The prevalence of overweight among males was 46%, whereas the prevalence of overweight among females was 21%. Males were more overweight than females in every age group. Among males, the prevalence of overweight varied from 44.0% to 48.9%, but among females the prevalence of overweight varied from 18.7% to 25.2%. The pattern of overweight was varied by age and sex. For example, a greater proportion of overweight among males were observed in age group 9 (48.9%), but among females were observed in group 12 (25.2%). There was an increase in the prevalence of overweight that directly correlated with increased age only in females.

Table 2: Prevalence of childhood overweight by cut-off point

MOPH (Thailand) [N=1,863]				NCHS/WHO [N=1,815]			
Cut-off	**Meaning**	**%**	**N**	**Cut-off**	**Meaning**	**%**	**N**
>+3 SD	Obese	13.4	250	>+2 SD	Overweight	33.0	599
>+2 SD to +3 SD	Overweight	18.7	349				
>+1.5 SD to +2 SD	Plump	17.1	319	+2 SD to -2 SD	Normal	67.0	1,216
-1.5 SD to +1.5 SD	Normal	44.9	837				
<-1.5 SD to -2 SD	Rather thin	3.2	60				
<-2 SD	Thin	2.6	48				

Table 3: Prevalence of childhood overweight by sex and age (N=1,815)

Age	Total		Male		Female	
	Overweight	**Normal**	**Overweight**	**Normal**	**Overweight**	**Normal**
9	34.8	65.2	48.9	51.1	19.6	80.4
10	31.2	68.8	45.4	54.6	18.7	81.3
11	33.6	66.4	45.8	54.2	22.4	77.6
12	33.9	66.1	44.0	56.0	25.2	74.8
Total	**33.0 (599)**	**67.0 (1216)**	**46.0 (401)**	**54.0 (470)**	**21.0 (198)**	**79.0 (746)**

Non genetic factors influence on childhood overweight

Results of binary logistic regression analysis are listed in Table 4. Simple binary logistic regression analysis revealed that 12 out of 20 independent variables showed a statistically significantly relationship to childhood overweight. The increased risks of overweight were found to be associated with sex, number of siblings, duration of moderate physical activities, duration of light physical activities, age of the caregiver, occupation of the caregiver, family income, the presence of a healthy role model, breastfeeding, child rearing, school health promotion activities, and exposure to food media. In other words, children who tend to be overweight were male, had more siblings, did fewer hours of moderate physical activities, did more hours of light physical activities, had older caregivers, had caregivers who work as merchants, lived in higher income families, resided with unhealthy role model caregivers, were breastfed for a shorter than recommended, experienced inappropriate child rearing by his/her caregivers, participated in fewer health promotion activities at school, and had less exposure to food media.

Table 4: Odd ratio of non genetic factors affecting childhood overweight in Bangkok (N =1,815)

Variable	Simple logistic regression	Multiple logistic regression	Stepwise multiple logistic regression	
	Odd ratio	Odd ratio	Odd ratio	R^2
Child factors				
Sex				
Male (Ref = female)	3.215*	3.241*	3.215*	0.096[1]
Number of siblings	1.128*	1.191*	1.161*	0.172[6]
Birth order				
Single and youngest (Ref = others)	1.194	1.362*	1.399*	0.177[7]
Dietary habits	0.995	1.003		
Duration of MPA	0.959*	0.946*	0.944*	0.157[3]
Duration of LPA	1.039*	1.041*	1.037*	0.128[2]
Caregiver factors				
Age	1.019*	1.007		
Education	1.019	1.011		
Occupation				
Merchant (Ref = others)	1.272*	1.262*	1.253*	0.180[8]
Family income				
>=40,000 Baht (Ref = <40,000 Baht)	1.220*	0.950*		
Working hours	1.010	0.999		
Nutritional knowledge	0.941	0.939		
Healthy role model	0.973*	0.978*	0.974*	0.167[5]
Breastfeeding	0.954*	0.962*	0.965*	0.162[4]
Child rearing	0.972*	0.996		
School factors				
School lunch	0.958	1.031		
School snack and drink	1.008	1.005		
School health promotion activities	0.912*	0.992		
Media factors				
Exposure to food media	0.969*	0.967		
Purchasing food after exposure to food media	0.996	1.025		
-2 Log likelihood		2041.879	2051.114	
R^2		0.186	0.180	

Legend: Ref = Reference group
* = Significant at 0.05
1-8 = Explanatory effect order

Multiple binary logistic regression analysis showed that with other independent variables controlled, childhood overweight is significantly affected by the following non genetic factors including sex, number of siblings, duration of moderate physical activities, duration of light physical activities, occupation of the caregiver, family income, the presence of a healthy role model of the caregiver, and breastfeeding. In addition, birth order was found to have a significant association with childhood overweight in this model. All of 20 non genetic factors explained the variation of childhood overweight by about 19 percent. Further stepwise multiple binary logistic regression analysis confirmed the influence and direction of those factors, except family income which was lost from the model ($p < 0.05$). The prime factor explaining the variation of childhood overweight was sex, followed by duration of light physical activities, duration of moderate physical activities, breastfeeding, the presence of a healthy role model of the caregiver, number of siblings, birth order, and occupation of the caregiver, respectively. All independent variables entering in this step explained the variation of childhood overweight by 18%.

Conclusion and discussion

The results revealed that the combined prevalence of overweight and obesity according to NCHS/WHO cut-off point was rather high (33%). This finding can be explained by the fact that this situation occurred in the first semester of a new academic year. Before the new semester started, it was the long period of school closing, when children need not go to school every day. Most of them stayed at home spending the whole day either playing indoor activities or consuming food, snacks, and soda more frequently. The effect of less energy expenditure and over consumption can be attributed to an imbalance between energy intake and energy expenditure, which leads to overweight. Moreover, we found that the pattern of overweight was varied by sex and age. Males were more likely to become overweight than females in every age group. This is because growth is varied by age and sex. Boys between the ages of 6 and 12 are growing more in terms of height, weight, and muscle mass. They also prefer running, jumping, and playing outdoors. The fact that participation in such activities tends to decrease weight gain is true, but overconsumption of calories can negate the benefits of

such healthy activities. Some children consume low quality of food, snacks and beverages which can cause weight gain. In addition, we can explain by the reason of gender bias which remains in Thai culture. Boys who were born in extended or nuclear families tend to be loved and spoiled by parents and relatives. Further, the result showed that there was an increase in the prevalence of overweight with age among only females, which is because girls' activities often change when they become teenagers. Most girls prefer doing sedentary or less active behaviors such as reading, watching television, listening to songs, or shopping, while most teenaged boys are more generally involved in moderate and vigorous physical activities such as soccer, basketball, and running (Sallis, Prochaska and Taylor, 2000; Davison and Birch, 2001).

The findings on non genetic factors affecting childhood overweight analyzed by stepwise multiple binary logistic regression analysis confirmed that factors related to overweight were both child factors and caregiver factors. Children who tend to be overweight were male, the only or the youngest child, had more siblings, engaged in longer hours of light physical activities, performed shorter hours of moderate physical activities, breastfed shorter durations, lived with unhealthy role model caregivers, and had older caregivers. The supporting reasons for these findings are described as follows.

Boys were more overweight than girls because most boys are more likely spoiled by their primary caregivers. For example, they are less often required to do housework and they are more often allowed to spend free time watching television and playing on the computer. In addition, they are spoiled by serving with all sorts of special food treats. Also, it seems to be more socially acceptable for boys to carry excess weight but not girls for whom such weight gain is seen as unattractive (Langendijk, et al., 2003). The results of the sample in this study indicate a possible culturally influenced gender bias.

Numerous studies have shown that children's inactivity and indoor activities lead to increased weight gain; likewise, the finding of this study revealed that children spending more time watching television, using the computer, and playing computer games were more likely to become overweight than those who participated in more

physical activities. This effect promotes the increase of weight (Matthew and Randal, 2008). Moreover, the study found that participating in more physical activities prevents weight gain because appropriate practice of physical activities assists children in developing healthy musculoskeletal tissue, cardiovascular system, neuromuscular awareness, as well as maintaining a balanced weight (WHO, 2007).

The longer breastfed child was protected from overweight because breast milk produces a lower plasma insulin response thereby, lower lipogenesis, and breast-feeding leads to more internal control of energy intake by children (Lucas, et al., 1981 cited in Yamborisut, et al., 2006:1018-1019). In addition, Leptin in breast milk regulates food intake and metabolism, which may control body weight during developing infantcy (Miralles, et al., 2006).

Being a healthy role model as a caregiver such as demonstrating appropriately eating healthy food and beverages, selecting healthy food for one's family, and spending free time doing exercise outdoors can prevent excess childhood weight gain because caregivers are the primary agents of children's socialization and well-being. Parents' and caregivers' behavior can shape children's eating and movement directly as a result of their role modeling (Gable and Lutz, 2000).

Apparently, being an only child or the youngest child in Thai culture tends to mean being more loved and spoiled by parents, so they might allow such children to behave in self-indulgent ways such as consuming high calories food and spend much of their time in sedentary activities. Children with many siblings may also fit this "only child profile" because often caregivers with many children may tend to be less responsible for or have greater challenges paying attention to all of the individual children.

Children whose caregivers work as merchants were more likely to be overweight than others since they distracted by the demands of their busy work or they are probably too occupied to pay full attention on their children. Thus, they might neither encourage their children to consume high quality food nor promote them to

participate in moderate and vigorous activities. Moreover, lacking time to take care of their children reflects not being a suitable role model for their children.

To sum up, these findings showed that non genetic factors contributed to childhood overweight and were mainly caused by child factors and caregiver factors, most of which can be controlled and prevented by advocating increased physical activities, limiting sedentary activities, becoming healthy role models for children, and promoting an adequate duration of breastfeeding. These factors should be realized by families, schools, healthcare system, government, and related agencies to utilize and apply in strategies of prevention of childhood overweight.

Recommendation

Based on the findings of this study, policy recommendations for government and related agencies to promote and campaign for health intervention for children are shown in Table 5.

Table 5: Policy recommendations on non genetic factors affecting childhood overweight

Finding	Recommendation
Inappropriate dietary habits and inactivity during the long period of school closing caused high prevalence of overweight in the first semester.	Government in accompany with related non-profit organizations and schools should provide edutainment activities and interesting programs for children to participate in outdoor activities during school closing. This is beneficial for children in term of moving including receiving appropriate nutritional knowledge.
Boys were more likely to be overweight than girls due to the reason of children's growth and gender bias in Thai culture.	Government sector such as Ministry of Public Health, Ministry of Education, and Ministry of Tourism and Sport in cooperation with schools and families should promote and encourage boys to participate in moderate and vigorous activities such as running, swimming, aerobic, tennis, rope jumping, soccer, badminton, and bicycling. The benefit direct outcome can prevent overweight and related chronic diseases in adulthood. Moreover, healthy musculoskeletal tissues and cardiovascular system will be developed.

Table 5: (Continued)

Finding	Recommendation
Children spending less time doing moderate physical activities and spending more time doing light physical activities tend to be overweight.	The appropriate approach on energy expenditure against overweight among children should be decreasing and limitation children's television viewing and other light recreational activities to less than 2 hours per day. In addition, encouraging and supporting children and youth to be active and play outdoors can prevent weight gain.
Parents or caregivers, breastfeeding their children for a longer duration and being healthy role models can prevent childhood overweight.	Encouraging and promoting longer breastfeeding or at least 6 months, as well as demonstrating appropriately eating healthy food and spending free time doing exercise outdoors should be campaigned for mothers and caregivers continuously.
Children with more siblings and being an only or the youngest child are more likely to become overweight than others because of value and attitude on child rearing in Thai culture.	It may recommended for caregivers and kinships to change and adjust their traditional child rearing from spoiling to paying attention of children's health based on appropriate knowledge of nutrition.

Acknowledgements

Authors would like to thank to the Thailand Research Fund (TRF) through the Royal Golden Jubilee (RGJ) Ph.D. Program for financial support. We appreciated the courtesy of Professor Kaiser Lucia (Department of Nutrition, University of California, Davis) and Professor Uruwan Yamborisut (Institute of Nutrition, Mahidol University) regarding to nutritional aspects. And we are deeply grateful to Elizabeth Conway (International English and Professional Programs of University of California, Davis Extension) for language review.

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