

**THE CONTRIBUTION OF BREAKFAST TO NUTRIENT
INTAKES OF THAI SCHOOL-AGED CHILDREN: CASE STUDY
IN BASIC EDUCATION COMMISSION (BEC) AREA 3**

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ABSTRACT

Breakfast has been described as the most important meal of the day, contributing substantially to daily nutrient intake and energy needs, particularly for children. This study aims to assess the contribution of breakfast to nutrient intakes and breakfast eating patterns of school-aged children. A school-based dietary survey, using 3-days food record, was carried out in 914 children who were studying in 15 primary schools (grade 5th-6th) in Bangkok. The survey included a breakfast eating pattern questionnaire, 3-d food records collected during the period November 2006-June 2007. Overall, 2.7% and 3.8% of the children skipped breakfast on weekdays and weekends, respectively. On weekdays, 59.9% and 47.7% of children were skipping breakfast because they were not hungry and did not have time or wake up late, respectively. The regularity of breakfast consumption was associated with school size, school administrative commission, parents' education, transportation and place of breakfast eaten. More than half of the children (58.4%) chose a single plate dish and the most common choice was rice porridge (rice gruel cooked with soup); about 36.2% chose rice with side dishes. Furthermore about 66.5% and 23.3% of children had breakfast at home and at school, respectively. There was no difference in breakfast eating patterns and places of breakfast eaten between sexes. Daily energy intakes contributed about 74% RDA, whereas protein intake was about 113% RDA. Daily intakes of vitamin A, vitamin C, iron and calcium were not enough for requirement (less than 67% RDA). Thiamine and riboflavin were reasonably good (more than 100% RDA). For breakfast, average energy intake was 351 kcal, which contributed about 21% of RDA and accounted for 28.4% of daily energy intakes. In addition, only 21.6% of children received > 25 % RDA of energy from breakfast. For micronutrient, breakfast contributed about one-third of daily intakes for vitamin A, thiamine, riboflavin and calcium, and slightly less for vitamin C and dietary fiber. The results of this research about breakfast consumption on health, academic and psychosocial performance should be distributed, especially among school-aged children.

KEY WORDS: BREAKFAST/ SCHOOL-AGED CHILDREN/ BREAKFAST EATING PATTERN

99 pp.

การศึกษาปริมาณพลังงานและสารอาหารที่เด็กไทยวัยเรียนได้รับจากอาหารเช้า: กรณีศึกษาเขตพื้นที่การศึกษา 3 (THE CONTRIBUTION OF BREAKFAST TO NUTRIENT INTAKES OF THAI SCHOOL-AGED CHILDREN: CASE STUDY IN BASIC EDUCATION COMMISSION (BEC) AREA 3)

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บทคัดย่อ

อาหารเช้าถือว่าเป็นมื้อที่สำคัญที่สุด หลังจากที่เราร่างกายอดอาหารมาตลอดคืน โดยเฉพาะอย่างยิ่ง ในเด็กวัยเรียน การไม่รับประทานอาหารเช้าจะมีผลต่อการรับรู้ ความจำ สมาธิ ในการเรียน และอารมณ์ การศึกษาค้นคว้าครั้งนี้เป็นการศึกษาเชิงสำรวจในเด็กชั้นประถมศึกษาปีที่ 5 และ 6 จำนวน 914 คน ในเขตกรุงเทพมหานคร ตั้งแต่พฤศจิกายน 2006-มิถุนายน 2007 โดยสุ่มเลือก โรงเรียนให้ครอบคลุมโรงเรียนขนาดเล็ก กลาง และใหญ่ ในสัดส่วนที่เท่ากัน และคำนึงถึงสัดส่วนจำนวนโรงเรียนในแต่ละสังกัดการศึกษา โดยเก็บข้อมูลทั่วไป แบบแผนการบริโภคอาหารเช้า และข้อมูลการบริโภคอาหารเช้า 3 วัน (วันเปิดเรียน 2 วัน, วันหยุด 1 วัน) ซึ่งมีวัตถุประสงค์เพื่อศึกษาถึงพฤติกรรมและแบบแผนการบริโภคอาหารเช้า รวมทั้งปริมาณพลังงานและสารอาหารที่เด็กวัยเรียนได้รับจากอาหารเช้า

ผลการศึกษาพบว่าในวันเปิดเรียนร้อยละ 2.7 ของนักเรียนไม่รับประทานอาหารเช้าเลย ในขณะที่ร้อยละ 58.0 ของนักเรียนได้รับอาหารเช้าทุกวัน ส่วนในวันหยุดเรียนนั้นพบว่าร้อยละ 3.8 ไม่ได้กินอาหารเช้าเลย เหตุผลที่นักเรียนไม่รับประทานอาหารเช้า คือ ไม่รู้สึกหิว (59.9%, 57.9%) และไม่มีเวลา/ตื่นสาย (47.7%, 51.5%) ในวันเปิดเรียนและวันหยุดเรียนตามลำดับ ซึ่งปัจจัยที่มีผลต่อการบริโภคอาหารเช้า คือ สังกัดการศึกษา, ขนาดโรงเรียน, การเดินทางจากบ้านมาโรงเรียน, การศึกษาของผู้ปกครอง และสถานที่ที่กินอาหารเช้า ส่วนแบบแผนการบริโภคอาหารเช้าพบว่าเด็กส่วนใหญ่รับประทานอาหารเช้าจานเดียว (58.4%) และข้าวราดแกง (36.2%) โดยอาหารเช้าจานเดียวพวกโจ๊ก/ ข้าวต้มจะเป็นที่นิยมมากที่สุด โดยเด็กส่วนใหญ่กินอาหารเช้าที่บ้าน (66.5%) และโรงเรียน (23.3%) นักเรียนได้รับพลังงานและ โปรตีนประมาณ 74 และ 114 %RDA ตามลำดับ โดยวิตามินเอ, วิตามินซี, เหล็ก, แคลเซียม และไฟเบอร์ได้รับในปริมาณที่ไม่เพียงพอ (< 67% RDA) ในขณะที่วิตามินบี1 และบี2 เด็กได้รับในปริมาณที่เพียงพอ สำหรับอาหารเช้าเด็กได้รับพลังงานประมาณ 351 กิโลแคลอรี คิดเป็น 21% ของ RDA และ 28.4% ของพลังงานที่ได้รับใน 1 วัน และการกระจายพลังงานของ คาร์โบไฮเดรต : โปรตีน : ไขมัน = 50 : 17 : 33 โดยจะมีเด็กประมาณ 21.6% ที่ได้รับพลังงานเกิน 25% RDA. ส่วนวิตามินและแร่ธาตุพบว่าอาหารเช้าเด็กจะได้รับประมาณ 1 ใน 3 ของพลังงานทั้งวัน ยกเว้นวิตามินซีและใยอาหารที่เด็กได้รับในปริมาณน้อยมาก ซึ่งจะเห็นว่าอาหารเช้าเป็นมื้อที่สำคัญมากสำหรับเด็ก ในส่วนของประสิทธิภาพด้านการเรียน สุขภาพ และลักษณะทางด้านสุขภาพจิต ดังนั้นควรมีการให้ความรู้และส่งเสริมให้มีการรับประทานอาหารเช้าเป็นประจำเพิ่มขึ้น

CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
ABSTRACT (ENGLISH)	iv
ABSTRACT (THAI)	v
LIST OF TABLES	x
LIST OF FIGURE	xi
CHAPTER	
1 INTRODUCTION	1
2 OBJECTIVE	3
2.1 General objectives	3
2.2 Specific objectives	3
2.3 Hypothesis	3
3 LITERATURE REVIEWS	4
3.1 The school-aged children	4
3.2 Recommended Dietary Reference Intakes (RDIs) for school-aged children	4
3.3 Breakfast definition	6
3.4 Food source for breakfast	7
3.5 Breakfast eating pattern and breakfast eating behavior	8
3.6 Breakfast consumption and dietary intake	12
3.7 Breakfast consumption and obesity	15
3.8 Breakfast consumption and academic performance	17
4 MATERIALS AND METHODS	20
4.1 Study design	20
4.2 Definition of term used in this study	20
4.3 Study population	20

CONTENTS (Cont.)

		Page
	4.4 Selection of sample	21
	4.4.1. Sample size calculation	21
	4.3.2 Sample selection	21
	4.5 Data collection	24
	4.5.1 Data processing	24
	4.5.2 Data collection tools	25
	4.6 Data analysis	26
	4.6.1 Dietary analysis	26
	4.6.2 Nutritional assessment	27
	4.5.3 Statistical analysis	27
5	RESULTS	29
	5.1 Overall sample	29
	5.1.1 Demographic information	29
	5.2 Nutritional status of the children	32
	5.3 Breakfast regularity of school-aged children	33
	5.4 The reasons of skipping breakfast	35
	5.5 Breakfast eating pattern of school-aged children	38
	5.6 Beverages consumption behavior in breakfast among children	39
	5.7 Nutrient intakes among breakfast takers	40
	5.7.1 Daily nutrient intakes among breakfast takers	40
	5.7.2 Breakfast nutrient intakes among breakfast takers	41
	5.7.3 Breakfast contribution to daily nutrient intakes	41
	5.7.4 The comparison of breakfast and daily nutrient intakes between weekdays and weekends	44
	5.8 The factors influence to breakfast behaviors in children	53
	5.9 Knowledge on breakfast of school children	57
6	DISCUSSION	60
	6.1 The regularity of breakfast behavior	60
	6.2 Breakfast eating pattern of children	61

CONTENTS (Cont.)

	Page
6.3 Breakfast and dietary intakes	62
6.3.1 Macronutrients	62
6.3.2 Micronutrients	64
6.4 The factors influence to breakfast behaviors in children	65
7 CONCLUSION	66
REFERENCES	69
APPENDIX	76
BIOGRAPHY	99

LIST OF TABLES

Tables	Page
1 The Recommended Dietary allowance (RDA) for school-aged children that have age 9-13 years old	6
2 The comparison of breakfast regularity during 1985 and 1995	11
3 The school list according to school sizes	24
4 Demographic information of the primary school children	30
5 Nutritional status (Weight for Height) of school-aged children	32
6 The regularity of breakfast consumption in weekdays and weekends	33
7 The reason (s) of skipping breakfast	35
8 Comparison of breakfast eating pattern and places in different gender	38
9 Comparison of breakfast eating pattern and places among school administrative commissions and school sizes	39
10 Types of beverages among children by school administrative commissions	40
11 Breakfast and daily nutrient intakes among breakfast takers	42
12 The distribution of children having different energy intake from breakfast	43
13 The distribution of children having different energy intake from breakfast by school administrative commissions	43
14 Comparison of nutrient intakes in daily and breakfast between weekdays and weekends	45
15 Comparison of nutrient intakes in daily and breakfast between genders	46
16 Comparison of daily nutrient intakes between children by school administrative commissions	48
17 Comparison of breakfast nutrient intakes between children by school administrative commissions	49

LIST OF TABLES (cont.)

Tables	Page
18 Comparison of daily nutrient intakes between children by school sizes	51
19 Comparison of breakfast nutrient intakes between children by school sizes	52
20 The factors influence to breakfast skipping in children	54
21 Knowledge in breakfast eating habit of school children	58
22 Knowledge in breakfast eating of school children by breakfast regularity	59

LIST OF FIGURES

Figures		Page
1	The number of primary schools in different school administrative commissions	23
2	The sequence of this study	28
3	The comparison of the breakfast regularity during weekdays and weekends by school administrative commissions	34
4	The comparison of the regularity of breakfast consumption during weekdays and weekends by school size groups	34
5	The comparison of the reasons of skipping breakfast during weekdays by school administrative commissions	36
6	The comparison of the reasons of skipping breakfast during weekends by school administrative commissions	36
7	The comparison of the reasons of skipping breakfast during weekdays by school size groups	37
8	The comparison of the reasons of skipping breakfast during weekends by school size groups	37

LIST OF ABBREVIATIONS

BEC	Basic Education Commission
BMA	Bangkok Metropolitan Administrative
PEC	Private Education Commission
RDA	Recommended Dietary Allowances
Kcal	Kilocalorie
g	gram
RE	Retinol Equivalent
mg	milligram
IDF	insoluble dietary fiber
kcal	kilocalories
kg	kilogram
ANOVA	One-way Analysis of Variance
CHO	Carbohydrate
Prot	Protein

CHAPTER I

INTRODUCTION

Food is an important factor for good health. Nutritionally, eating a variety of food which covers the basic five food groups is the best recommended regimen for a good eating habit. For Thai's, eating three meals a day is a common practice. Therefore at each meal, recommended that one should consume about 25%, 35%, 30% and 10% of total energy for breakfast, lunch, dinner and between meals respectively. (1).

Breakfast has been described as the most important meal of the day, contributing substantially to daily nutrient intake and energy needs, particularly for children. In the morning the children should have breakfast for energy to perform various functions during the day for studying. Skipping breakfast caused hypoglycemia by mid-morning and resulted in irritability, weakness and consequently poor performance (2, 3). Several studies showed that for children, skipping breakfast interferes with cognition, learning and school performance such as problem solving, short-term memory, attention and episodic memory. The effect that is more likely to be affected in nutritionally at-risk children than in well-nourished children (4-6). Studies in adolescents in the United States and Australia have shown that breakfast consumption is associated with lower body mass index (BMI) and in Canada, it has been estimated that not eating breakfast every day nearly doubled the odds of being overweight at 4.5 year (7-8). Schlundt et al. suggested that eating breakfast helped reduce dietary fat and minimized impulsive snacking. Eating breakfast did provide some advantages over eating only two meals per day (9).

Study of children in the United States about breakfast consumption patterns and trends between 1965 and 1991 for children (1–10 y old) and adolescents (11–18 y old) found a decline in breakfast consumption between 1965 and 1991, particularly for older adolescents aged 15–18 y; the rates for boys and girls declined from 89.7% and 84.4%, respectively (10). In 1995 a study among Thai school children aged 11-13

years revealed that 5.3 % of 935 children habitually skipped breakfast while 26 % occasionally ate breakfast (11). These habits were similar to those in 1985 (12). The previous study about the eating and physical exercise behavior of 4th to 6th academic year students at seven elementary government schools in Muang district, Chiang Mai province found that breakfast was taken regularly by 56.49% of the students, 39.26% had it sometimes, while the rest or 4.15% never had breakfast(13).

In Thailand, there were a few studies on breakfast consumption in school-aged children about the contribution of breakfast to nutrient intakes, the breakfast eating pattern of children in school administrative commissions and school sizes and the factors that related to breakfast eating patterns.

CHAPTER II

OBJECTIVES

2.1 General Objective

To assess the contribution of breakfast to nutrient intakes of school-aged children

2.2 Specific Objectives

1. To assess the nutrient intakes obtained from breakfast in school children.
2. To determine the breakfast eating pattern and breakfast behaviors of primary school in Basic Education Commission (BEC), Bangkok Metropolitan Administrative (BMA) and Private Education Commission (PEC).
3. To study factors that influence to breakfast eating behaviors of school children.

2.3 Hypothesis

1. Children who regularly consumed breakfast would have more adequate nutrient intakes than children who did not.
2. School-aged children in Basic Education commission (BEC), Bangkok Metropolitan Administrative (BMA) and Private Education commission (PEC) have different in breakfast eating patterns and breakfast nutrient intakes.
3. It would be anticipated that various factors much as gender, parents' education, parents occupation, family size, family income, attitude and knowledge, money, wake up, hunger, time, considering body weight were associated with breakfast behaviors of children.

CHAPTER III

LITERATURE REVIEW

Breakfast is an importance meal of the day. During the night, the body is in a fasted state for 10-12 hours. Breakfast is the starting meal for the day, and should receive optimal nutrient intakes; RDA recommended that breakfast should contribute about 25% of total energy (1). Skipping breakfast may cause hypoglycemia which result in temperament change, weakness and the inability to continue study in school-aged children.

3.1 The school-aged children

The school-aged period (also called middle childhood) refers to children from age 6 to the onset of puberty (a period characterized by a spurt in physical growth and appearance of the secondary sex characteristics). The end of the school-aged period varies widely between the sexes and between of the same sex. In boys the onset of puberty may be as early as from 9 to 10 years up to 14 years, for girls the ages range from 7 to 8 years and as late as 11 to 12 years. There is little difference between the sexes in yearly gains in height and weight until the approximate age of 9 to 9 ½ years, although males tend to be slightly taller and heavier than females. However, note that females from about the age of 9 to 13 ½ years of age tend to be taller and heavier than males because the growth spurt begins about 2 years earlier in females than in males. After this age, the situation is reversed (14).

3.2 Recommended Dietary Reference Intakes (RDIs) for school-aged children

Nutrition is an essential component of the health of school-aged children. Nutritional requirements during this time of life are greater, mainly because of growth; deficiencies can therefore be more frequent and their consequences more serious. Breakfast has been described as the most important meal of the day, contributing substantially to daily nutrient intake and energy needs, particularly for children. RDA recommended that breakfast should provide at least 25% of total energy (1).

Recommended Dietary Reference Intakes (RDIs) are reference values that are quantitative estimates of nutrient intakes to be used for planning and assessing diets for healthy people. They include RDA but also three other types of reference values (AI, UL and EAR)

Recommended Dietary allowance (RDA) is the average daily dietary intake level that is sufficient to meet the nutrient requirement of nearly all (97 to 98 percent) healthy individuals in a particular life stage (life stage considers age and, when applicable, pregnancy or lactation) and gender group. The RDA is intended to be used as a goal for daily intake by individuals.

Estimated Average Requirement (EAR) is a daily nutrient intake value that is estimated to meet the requirement of half the healthy individuals in a group.

In Thailand, Recommended Dietary Allowances has been successes by expert working group which was established on 21st May, 2000. The committees had a brainstorm and reviewed together on scientific evidence based on nutrient intakes and summarized as Thai DRI 2003. These DRIs were public launched in October, 2003 (15).

Table 1 The Recommended Dietary allowance (RDA) for school-aged children that have age 9-13 years old (15)

Energy and nutrients	Boys	Girls
Energy (Kcal)	1,700	1,600
Carbohydrate (%total energy)	45-65	45-65
Fat (% total energy)	20-35	20-35
Protein (g)	40	41
Vitamin A (RE)	600	600
Thiamine (mg)	0.9	0.9
Riboflavin (mg)	0.9	0.9
Vitamin C (mg)	45	45
Iron (mg)	11.8	19.1
Calcium (mg)	1,000	1,000
Dietary fiber (g)	25	25

3.3 Breakfast definition

From the literature reviews, the term “breakfast” was given as various definition based on Siega-Riz AM et al. (10), indicated that breakfast was any food or beverage consumed between the hours of 05.00 and 10.00 to balance the sensitivity and specificity of the measure for individuals aged 1-18 years. Affenito S et al. (7), described breakfast was as any eating that occurred between 5.00 a.m. and 10.00 a.m. weekday or between 5.00 a.m. and 11.00 a.m. during weekend. Boonpradern A et al. (16), indicated that breakfast was as a meal consumed after waking up until 10.00 a.m. Morgan KJ et al. (17), defined breakfast as meal consumption of at least one food item between 5.00 a.m. and 09.00 a.m. Preziosi P et al. (18), indicated that breakfast was the first eating occasion involving a solid food or a beverage that occurred after waking.

3.4 Food source for breakfast

“You are what you eat” is an old adage that motivates health professionals to be concerned about what children eat at breakfast and other times of the day. In the 1962 Iowa breakfast studies (1), the morning meal was defined as a meal that provides one-fourth of the daily calories and the daily protein needs. During sleep the body transitions from the fed to the fasted state as the serum insulin concentrations fall and the serum glucagons concentrations rise. The liver must begin glucose production during this time and will continue until about one-half of the glycogen stores are depleted. It is at this time that breakfast must aid in the body’s fight for fuel homeostasis; therefore the good source for breakfast was the importance factor to have the benefits for health (19)

Ruxton and Kirk’s found that breakfast cereals had the beneficial effect on breakfast nutrient intakes. Breakfast which comprised breakfast cereals was described as being more nutrient dense and lower in fat than other types of breakfast. Breakfast cereals were likely to lower percentage of energy from fat intakes. Ruxton and Kirk reasoned that firstly, by increasing the overall energy received from simple and complex carbohydrates; secondly, by replacing the traditionally higher fat cooked breakfast and thirdly, that breakfast cereal consumption was a marker for a high carbohydrate intakes were reciprocally related, which would consequence in lower fat intakes (20).

Song WO et al. reported that daily nutrient intake was significantly higher among ready-to-eat breakfast cereal (RTEC) consumers than among RTEC non consumers for all nutrients examined except cholesterol and energy intake from fats, and the RTEC contribution to daily calcium intake ranged from 4% to 6% in various age and sex subgroups. RTEC has become a well-accepted food item, often consumed with milk at the breakfast meal. Encouraging RTEC consumption with milk may be an efficient strategy to reverse the decline in calcium intake. And the previous research’ Song WO, et al. studied about the association between the intake of ready-to-eat breakfast cereal (RTEC), milk, and calcium within the context of the most current population dietary practices. This study found that RTEC was predominantly consumed at breakfast and average calcium intake at breakfast was seven times greater when RTEC was consumed with milk than when RTEC was consumed without milk.

Thus, consumption of RTEC at breakfast was associated with greater daily intake of both milk and calcium in all age and sex groups in the US population (21).

3.5 Breakfast eating pattern and breakfast eating behavior

In a rapidly changing society, breakfast eating pattern changes as lifestyle changes and may change as income increased or as the food system changes. In Thailand, Malaysia, Philippines and Indonesia, low economic group or low-income students depended on street foods for breakfast, which was convenient and cheap. The upper socio-economic class trend to eat western-styled breakfast (22).

Study of children in the United States about breakfast consumption patterns and trends between 1965 and 1991 for children (1–10 y old) and adolescents (11–18 y old) found a decline in breakfast consumption between 1965 and 1991, particularly for older adolescents aged 15–18 y; the rates for boys and girls declined from 89.7% and 84.4%, respectively (10). And, Affenito S et al. found that the frequency of breakfast consumption declined with age, and difference between races. Days eating breakfast were associated with higher calcium and fiber intake in all children groups (7).

Children under 10 years old and adults over 65 years ate breakfast on a more regular basis than any other age group. The incidence of omitting breakfast increases as children reach adolescence. While, girls skipped breakfast more than boys, perhaps due to their concern on body weight (23). A lack of time available to eat breakfast before school may be another factor in breakfast omission and Ortega, et al found that children were more likely to eat a substantial breakfast during holidays than on school days (24).

Nicklas TA et al. studied about the contribution of breakfast consumption (with or without dietary supplement intake) on total daily nutrient intake of ninth-grade students. This study revealed that 19% of 15 years old skipped breakfast, with more females skipping breakfast than males (23% vs. 14%, respectively). 36% of nonwhite females versus 20% white females skipped breakfast (25).

Nicklas TA et al. assessed the efficiency of breakfast consumption patterns in 567 ninth-grade students (57% female, 86% white, mean age 14.8 years) in New Orleans, La. Five percent of students ate a fast-food breakfast, 30% ate RTE cereal,

and 65% ate other breakfasts. The RTE cereal and other breakfasts provided significantly more energy, carbohydrate, fiber, sugar, and protein than the fast-food breakfast. The RTE cereal breakfast provided significantly more, per dollar spent, of folic acid, iron, niacin, vitamin A and D, and zinc than the other 2 breakfast meals (26).

Susan MG et al. survey in 540 fourth-grade students about the breakfast and lunch eating patterns. This study found that 20% of fourth-grade children reported skipping breakfast and lunch at least three times per week. Urban students were more than twice as likely to skip breakfast and to eat school-prepared meals compared with suburban and rural students (27).

Sjoberg A et al. related meal pattern of Swedish adolescents to food choice, nutrient intake and lifestyle factors in 1,245 who were studying in grade 9 (aged 15-16 years). About 88% and 76% of boys and girls usually had the regular breakfast intake. The boys and girls with irregular breakfast intake had markedly higher percentage of energy from sucrose and higher intake of alcohol. The nutrient intake in children with irregular and regular breakfast intake revealed that almost macro- and micronutrient were higher in regular breakfast group (28).

Young EM et al. examined the influence of demographic characteristics and selected family factors on consumption of a healthy breakfast and lunch and consumption of fruits and vegetables among 3,155 adolescents. Students consuming healthy breakfasts, healthy lunches, and more fruits and vegetables were more likely to be White or Asian (lunch/fruits and vegetables only), better able to communicate with parents or guardians on serious issues, closely monitored by their parents, living with one or both parents, spending less time at home without adults, perceiving themselves at about the right weight or underweight (lunch/breakfast only), male (lunch/breakfast only), and in 9th or 10th grade (breakfast only) (29).

Winarno FG et al found that up to 70% of school children take street foods for breakfast. Chicken rice porridge is the most popular street food for this age group being taken on average eleven times per month. Consumption of street foods by older age groups in Indonesia varies in frequency from daily to once every ten days. Dishes which are most popular in pre-school children are meat ball broth, fried banana and

sweet bread. These foods have been reported to contain colorings and sweetening agents which are not regarded as safe for young children (30).

Noipong P et al. determined the breakfast eating behavior and nutrient intakes of 263 children grade 6th in Bangkok Metropolitan Administrative school (BMA). In weekday, more than half of children (57.8%) had breakfast every day and about 31.9 % sometime had breakfast moreover 10.3% usually skipped breakfast. The children usually had rice with side dish (76.3%) for breakfast, while single plate dished which was fried rice dishes were chose only 3.2% (31).

Temcharoen P et al. studied about breakfast eating pattern of Thai school children aged 11-13 years revealed that 5.3 % of 935 children habitually omitted breakfast while 26 % occasionally ate breakfast. These habits were similar to those in 1985 (**Table 2**). For breakfast eating pattern, the children usually had rice with side dish for one or two side dish about 77%. The menus were the items which there were easy to prepare such as omelet, fried meat and only 7% usually had single plate dished in breakfast. Breakfast consumption patterns were significantly related to person whom children live with, mother' s education, father's occupation, family income, breakfast preparation patterns and breakfast eating habit of other family members (11-12).

Table 2 The comparison of breakfast regularity during 1985 and 1995

The regularity of breakfast consumption	1985 (%)	1995 (%)
Weekday		
Regular	65.4	68.7
Irregular	29.4	26
No breakfast	5.2	5.3
Weekend		
Regular	87	88.5
Irregular	10.8	9.8
No breakfast	2.2	1.7

Chittchang U et al. survey about snacks eating behavior in 1,578 children aged 3-15 years old. About 68.1% of children had breakfast every day and about 10.8 % usually had breakfast. While, about 16.0 % sometime had breakfast moreover only 5.1% usually omitting breakfast. The frequency of breakfast found more decline in older children (32).

Changkit C et al. determined about eating pattern and nutritive values of 140 adolescents aged 16-18 years in Bangkok. All data were collected by questionnaires and 24 hours recalls. This study found the same behavior about breakfast and lunch eating pattern, the favorite menus were Kao rad kaeng and fried meat or rice with vegetables stir and soup. Adolescents usually had breakfast and lunch outside. The dinner had more energy and nutrients intakes than breakfast and lunch (33).

Inmaiya W et al. assessed the factors that related to snack eating behavior of students in Bangkok area. This result revealed that children ate breakfast outside about 59.7% and the kinds of food were dishes eaten with rice about 46.81% and single plate dishes about 44.87%. The hot refreshments were tea, coffee and milk about 35.95%. This result related with the study of Utang S. which there was the same breakfast eating pattern (34, 35).

Hiranpradit M et al. studied about nutrition educations and attitude of children's breakfast in Bangkok (Phyathai district). This study revealed that most of children did not have five food groups for breakfast and they had only three food groups which there were protein, carbohydrate and fat (36).

Boonpradern A. studied in 267 personnel Mahidol University about breakfast eating pattern and breakfast nutrient intakes. This study shown that 2.6% of the subjects skipped breakfast which the regularity of breakfast consumption was not depend on sex, household income or education attainment. Females favored western-style breakfast, which included coffee with bread and sandwiches while male preferred Thai-style breakfasts (16). Overall, breakfast eating pattern was significant difference between education levels, sex while there was no correlation with breakfast regularity

3.6 Breakfast consumption and dietary intake

Nutritionally, there was a wide variation, especially in terms of energy, fat and protein. Data from Malaysian food tables (37) suggested that typical street food breakfasts in Malaysia and Singapore provided 250-400 kcal while the typical breakfast taken at home (two slices of bread with spread and a beverage) provided < 250 kcal.

Nicklas TA et al. shown that children who ate breakfast, average energy intake from breakfast were 437 kcal. Percentage of total daily energy intake was higher from fats and lower from carbohydrates for adolescents who skipped breakfast, compared with adolescents who consumed breakfast. The percentage of subjects consuming at least two-thirds of the Recommended Dietary Allowance was significantly lower among adolescents skipping breakfast than those consuming breakfast (25).

Nicklas TA et al. evaluate the impact of breakfast consumption patterns on the nutritional adequacy of 504 young adults. This study revealed that thirty-seven of young adults skipped breakfast. Of those who ate breakfast, 75% ate at home, 10% ate a fast-food breakfast, and 15% reported other sources. Mean energy intake from breakfast was 485 kcal, men consumed more energy than women, and blacks consumed more energy than whites. The breakfast meal provided and average of 13% of energy from protein, 55% from carbohydrate, 14% from sucrose, 34% from fat, and

12% from saturated. Young adults who skipped breakfast had a lower total daily intake of energy, protein per 1,000 kcal, and saturated fat per 1,000 kcal than those who consumed breakfast. For all vitamins and minerals studied, a higher percentage of young adults who skipped breakfast did not meet two thirds of the Recommended Dietary Allowance than those who consumed breakfast (38).

Jacoby E et al. measured the short-term impact of the Peruvian school breakfast program on the diet, school attendance and cognition of fourth-and fifth-graders. This study found that the children who attended the program significantly increased dietary intake of energy by 15.2%, protein by 16.1% and iron by 60% and improved rates of attendance (39).

Williams P. presented the typical breakfast consumed by young Australians was low in fat, high in carbohydrate and good source of thiamine, riboflavin, niacin, calcium and magnesium. The breakfast meal provided between 12% and 19% of the daily energy intake. For most nutrients the proportion were similar for males and females, but the breakfast meal contributed a higher proportion of the total energy intake in the younger children compared with children aged 16-18 years. Moreover children who did not eat breakfast cereal were much more likely to have inadequate nutrient intakes, especially of thiamine, riboflavin, calcium, magnesium and iron (40).

Matthys C et al. studied in 341 adolescents (13–18 years old) about breakfast consumption patterns, on a nutrient and food item level, in Belgian adolescents. It was revealed that the energy contribution of breakfast to daily energy intake was on average 15.7% in boys and 14.9% in girls. Significantly more overweight girls and significantly more girls following vocational training were categorized as eating a low-quality breakfast (41).

Wilson ND et al. described the impact of breakfast eating on the nutrient intakes of New Zealand children aged 5-14 years. The breakfast eating reported that 84% of New Zealand children usually had breakfast. Younger children were more likely to eat breakfast than older children and breakfast habits differed between ethnic. For school area, there was a lower percent of children attending urban school (83.1%) ate breakfast than children attending rural schools (90%). Daily nutrient intake of children who ate breakfast compared with those who did not, was significantly better (8,748 and 7982 KJ for breakfast consumed and breakfast not consumed groups) (42).

Farshchi and colleagues conducted a randomized crossover study with 10 healthy, lean women 9-18 years of age to look at effects of eating breakfast or skipping breakfast on calorie intake, energy expenditure and blood levels of insulin, glucose and lipids. There were two 4-day tests, eating breakfast (EB) and omitting breakfast (OB), separated by a 2-week period during which participants followed their typical diet and eating patterns. Average caloric intake was lower during the EB period than during the OB period, the percentage of calories from macronutrients did not differ significantly from one test to the other. Neither test had an effect on fasting blood glucose levels, but the OB test resulted in higher blood levels of total and LDL cholesterol and lower postprandial insulin sensitivity (43).

Siwarangsan N. determined the nutritional status of 1,897 primary school children (grade 5th-6th) in Bangkok which comprised to 3 administrative, Basic Education Commission (BEC), Bangkok Metropolitan Administrative (BMA) and Private Education Commission (PEC). Data from 24 hours recalled, about 97.7% had enough for energy requirement (more than 67% RDA). Between sexes, the energy intakes were 1,377 and 1,265 kcal for boys and girls, respectively. The daily intakes were significant difference between boys and girls which boys had more energy intakes than girls. Protein intake was reasonably good because the children received more than 100% RDA (50.3-70.5g per day). Overall, the children had protein intakes enough for requirement, while carbohydrate and fat did not enough (44).

Temchareon P et al. studied about breakfast eating pattern of 846 school-aged children in Bangkok. Data from three day food records in a sub sample, it was revealed that breakfast contributed only 15% of the Recommended Daily Allowance (RDA). Almost macro- and micronutrient intakes received less than 25% RDA. However, protein intake was quite satisfactory about 34% of RDA (11).

Boonpradern A. studied in office personnel Mahidol University revealed that both macro- and micronutrients, breakfast contributed one-fifth of daily nutrient intakes and about 15-25% RDA, whereas protein intake was received about 25 % which mainly comprised of animal protein. The overall daily energy intake was only 60-80% of the RDA, while daily protein intake seemed to be adequate. Breakfast contributed rather low vitamin C intakes but the daily intake of vitamin C was made up by other meals of the day (16).

3.7 Breakfast consumption and obesity

Song WO et al. used data from the National Health and Nutrition Examination Survey, 1999–2000, to determine whether breakfast eating is associated with BMI in US adults. Reported breakfast eaters were more likely to be older, female, white, nonsmokers, regular exercisers and trying to control their weight. In women, average daily calorie intake was higher among breakfast eaters than among those not eating breakfast; this was not true in men. For both men and women, average daily calorie intake did not differ significantly between those eating ready-to-eat cereal (RTEC) and those eating other options, but the type of food eaten at breakfast was associated with differences in macronutrient intake. RTEC eaters ate fewer calories from fat and had higher intakes of dietary fiber and calories from carbohydrate. Results showed an association between eating breakfast and eating RTEC with BMI of less than 25 (the top range for “healthy weight”) in women, but not men. Female breakfast eaters were significantly less likely to have a BMI of 25 or higher than women who did not eat breakfast. However, when RTEC was factored in as a covariate, prevalence of BMI less than 25 was more strongly associated with eating RTEC than with eating other foods (45).

Utter J et al. interviewed children about food habits, physical activity, and were weighed and measured for height. Breakfast consumption was most frequent among boys, children aged 5 to 6 years, children aged 7 to 10 years. Skipping breakfast was associated with a higher BMI. Children who usually eat breakfast at home have a lower mean BMI than children who do not. Children who missed breakfast were significantly less likely to meet recommendations for fruit and vegetable consumption and more likely to be frequent consumers of unhealthy snack foods (46).

Niemeier HM et al. investigated in 9,919 adolescents participating in Waves II (age range 11–21years) and III (age range 18–27 years). This study determined fast food consumption and breakfast skipping during the transition from adolescence to adulthood. Marked increases in fast food consumption and decreases in breakfast consumption occurred over the 5-year interval. Fast food consumption and breakfast skipping increased during the transition to adulthood, and both dietary behaviors are associated with increased weight gain from adolescence to adulthood (47).

Barton BA et al. analyzed changes in both breakfast and cereal intake of girls participating in the NHLBIGHS to explore the relation of breakfast eating and cereal eating to intake of key nutrients and BMI. Calculations for each girl at each age showed that number of days of breakfast eating and of cereal intake decreased with age. Regardless of whether cereal was eaten at breakfast or other times, girls had higher intakes of fiber, calcium, iron, folic acid, vitamin C and zinc, and lower intakes of fat and cholesterol on days when cereal was eaten. An analysis of associations among breakfast eating, cereal intake and BMI showed that girls who ate cereal, rather than other foods, at breakfast were leaner than girls who did not eat cereal. Further, using a model of risk for overweight, girls who ate cereal had lower rates of risk than girls who did not (48).

Affenito S et al. looked at frequency of breakfast eating and associations with intake of dietary calcium, fiber and body mass index (BMI). They found that girls ate breakfast less often as they grew older. Seventy-seven percent of white girls and 57% of African-American girls ate breakfast on all three days of data collection at the start of the study, compared with 32% and 22%, respectively, at the end. Additionally, days of breakfast eating were related to higher intakes of dietary calcium and fiber, even when data were adjusted for total calorie intake. Frequency of breakfast eating was also linked with lower BMI. Further, girls who reported eating cereal on all three days of data collection had a BMI about 0.1 point lower than did those who ate cereal zero, one or two days. Interestingly, after considering factors such as energy intake, physical activity and parental education, the effect of breakfast eating by itself was no longer significant (7).

Wyatt HR et al. examined breakfast consumption in subjects maintaining a weight loss in the 2,959 National Weight Control Registry (NWCR). A large proportion of NWCR subjects (2,313 or 78%) reported regularly eating breakfast every day of the week. Only 114 subjects (4%) reported never eating breakfast. There was no difference in reported energy intake between breakfast eaters and non-eaters, but breakfast eaters reported slightly more physical activity than non-breakfast eaters. Thus, eating breakfast is a characteristic common to successful weight loss maintainers and may be a factor in their success (49).

3.8 Breakfast consumption and academic performance

Children, in many developing countries went to school without breakfast and lunch. Skipping breakfast or having an inadequate morning meal before coming to school were the usual reason for short term hunger. During sleep, regulatory mechanisms provide endogenous fuel to meet the requirements of cerebral metabolism. However, when the overnight fast was extended through to waking hours, energy demands were greater, the resulting metabolic stress affecting insulin and glucose levels were likely to interfere with different aspects of cognitive function. Even small adverse changes, if repeated frequently, could have a long term detrimental effect on school performance.

Snapp BD. presented that children consuming both breakfast and lunch at school were less likely to suffer from fatigue, irritability and the inability to concentrate. Children who were at risk for hunger were also less likely to be absent from school when they consumed a school breakfast. The hungry child had been described as being “apathetic, disinterested and irritable when confronted with difficult tasks” (50).

Pollitt E et al. showed that in groups of 32-39 children aged 9-11 years, breakfast and no breakfast consumption, for a period of 1 week in a clinical setting, improved scores for picture identification (MFF-matching familiar figures). MFF tests have been found to correlate with poor performance on certain parameters of standardized educational achievement tests (51).

Wyon et al. examined the effects of energy intake of breakfast on school performance. They found that experimentally reduced energy intake of breakfast to have a significant and negative effect on a test of cognitive thinking. And on voluntary physical endurance, in the context of normal school work, and reduced energy intake at breakfast caused significantly more children to report feeling bad rather than good during the morning at school (52).

Benton D et al examined the effect of blood glucose concentrations on memory test performance in 33 university students. This study found time taken to complete both tests was greater in the fasted state but number of errors was not influenced by breakfast condition. In the fasted state, blood glucose was significantly correlated to time taken to complete the spatial memory test. In the fed state, there was a significant

negative correlation between blood glucose and number of errors on the spatial memory test (53).

Kleinman RE et al. revealed that children whose nutritional status improved showed significantly larger increases in school breakfast participation than children whose nutritional status stayed the same or worsened. And children who increases in school breakfast participation reported a significantly greater decrease in symptoms of hunger on the Child Hunger Index Child Report (CHI-C) and greater improve academic performance (54).

Loperz Sobaler AM et al. studied about the relationships between habitual breakfast habits and performance in verbal aptitude, logical reasoning and mathematical tests. This study revealed that the habitually consuming an inadequate breakfast was associated with poorer the scholastic aptitude test (SAT-1) test (55).

Kaplan RJ et al. examined about breakfast eating and cognition in 20 elderly men and women. This study found that subjects with worse glucose regulation had poorer cognitive scores at baseline, and responded with the greatest improvements in cognition after glucose ingestion (correlation between β cell function and improvement in delayed paragraph recall. There was no significant difference in the effect for the different food forms of glucose ingested (56).

Simeon DT et al. examined the effects of skipping breakfast on the cognitive functions of three groups of children: stunted, non stunted controls, and previously severely malnourished. The malnourished groups had lower scores in fluency and coding whereas the control group had higher scores in arithmetic. Wasted children were adversely affected in the digit span backwards tests, and wasted members of the malnourished groups were adversely affected in efficiency of problem solving and those in the control group in digit span forwards (57).

Mahoney CR et al. compared the effects of eating two different breakfast foods (a sweetened ready-to-eat cereal or flavored instant oatmeal) versus not eating breakfast on cognition of school-age children (6-8 year-olds and 9-11 year-olds). Results found that eating breakfast improves cognitive performance. There were also favorable effects based on the type of breakfast food eaten. After eating oatmeal, which differed from the other cereal in protein, fiber content and rate of digestion, boys and girls in both age groups had better spatial memory; girls also had improved

short-term memory. Furthermore, the younger group also had improved auditory attention (58).

Gibson SA et al. were based on a further analysis of dietary data (seven day weighed intakes) from 2,705 British schoolchildren and examined the relationship between breakfast cereal consumption and total daily nutrient intakes. The children were grouped according to amount of cereal consumed per day (none; less than 20 g; 20-40 g; over 40 g) and results examined for each age group (10-11 and 14-15 years) in boys and girls separately. This study presented that breakfast cereals were nutrient-dense foods that were also low in fat. They contributed to lowering the percentage energy from fat in the diet whilst enhancing the intake of certain nutrients. For the nutrients examined, there was a highly significant and graded increase in vitamin and mineral intake with increasing cereal consumption and a simultaneous reduction in energy from fat from 39-40% amongst non-consumers to 36-37% among children consuming a portion of cereal or more per day. Body mass index tended to be lower in the frequent breakfast cereal eaters (59).

Lopez I et al. studied 279 children from low socioeconomic level background ranging in age from 8 years 7 months to 10 years 11 months, categorized nutritionally as: normal, wasted or stunted. This study found no consistent association between study condition and performance in short-term visual memory, problem solving and attention tasks in any of the three nutritional groups. Stunted children showed significantly lower scores in the attention test irrespective of having received breakfast or not (60).

CHAPTER IV

MATERIALS AND METHODS

4.1 Study design

The study was a cross-sectional survey of breakfast eating patterns, breakfast eating behavior and the contribution of breakfast to nutrient intakes of Thai school-aged children in Basic Education Commission (BEC) area 3, Bangkok.

4.2 Definition of term used in this study

Breakfast was defined as any food or beverage consumed between the hours of 05.00 a.m. and 10.00 a.m.

Regular breakfast was the consumption of breakfast everyday in weekday and weekend.

Irregular breakfast was the consumption of breakfast from 1-4 day on school day and only 1 day in weekend.

No breakfast was the skipping breakfast everyday in weekday and weekend.

Rice with side dish was defined as kao rad kaeng

Single plate dish indicated that noodles, rice porridge, soft-boiled rice, fried rice.

Fast food was defined as foods that can be prepared and served quickly eg: bread, cereal and Bakery.

Beverage only was described as only beverage drinking on breakfast eg: milks, malts, soybean and soft drink.

4.3 Study population

Study population consisted of children who were studying in primary schools which located in Bangkok, Thailand. The primary school in Bangkok has been divided into 3 administrative areas which were under the Basic Education Commission (BEC), Bangkok Metropolitan Administrative (BMA) and Private

Education Commission (PEC). The study criteria were children who were studying in grade 5th-6th who had no obvious mental or physical handicap.

4.4 Selection of sample

4.4.1 Sample size calculation

The sample size was estimated by the formula:

$$n = \frac{Z^2 \alpha_{/2} P (1-P)}{d^2}$$

Where:

Z = Z-value for $\alpha = 0.05$, Z = 1.96

P = Proportion of studied population not eating breakfast, 4.15% (13).

(Based on study previously carried out)

D = Allowable error, 3%

Thus,

$$\begin{aligned} n &= \frac{(1.96)^2 (0.0415) (0.9585)}{(0.03)^2} \\ &= 170 \end{aligned}$$

To ensure the sample size for comparison by school in administrative commission for 10 % dropouts, the sample size for each administrative commission was 187.

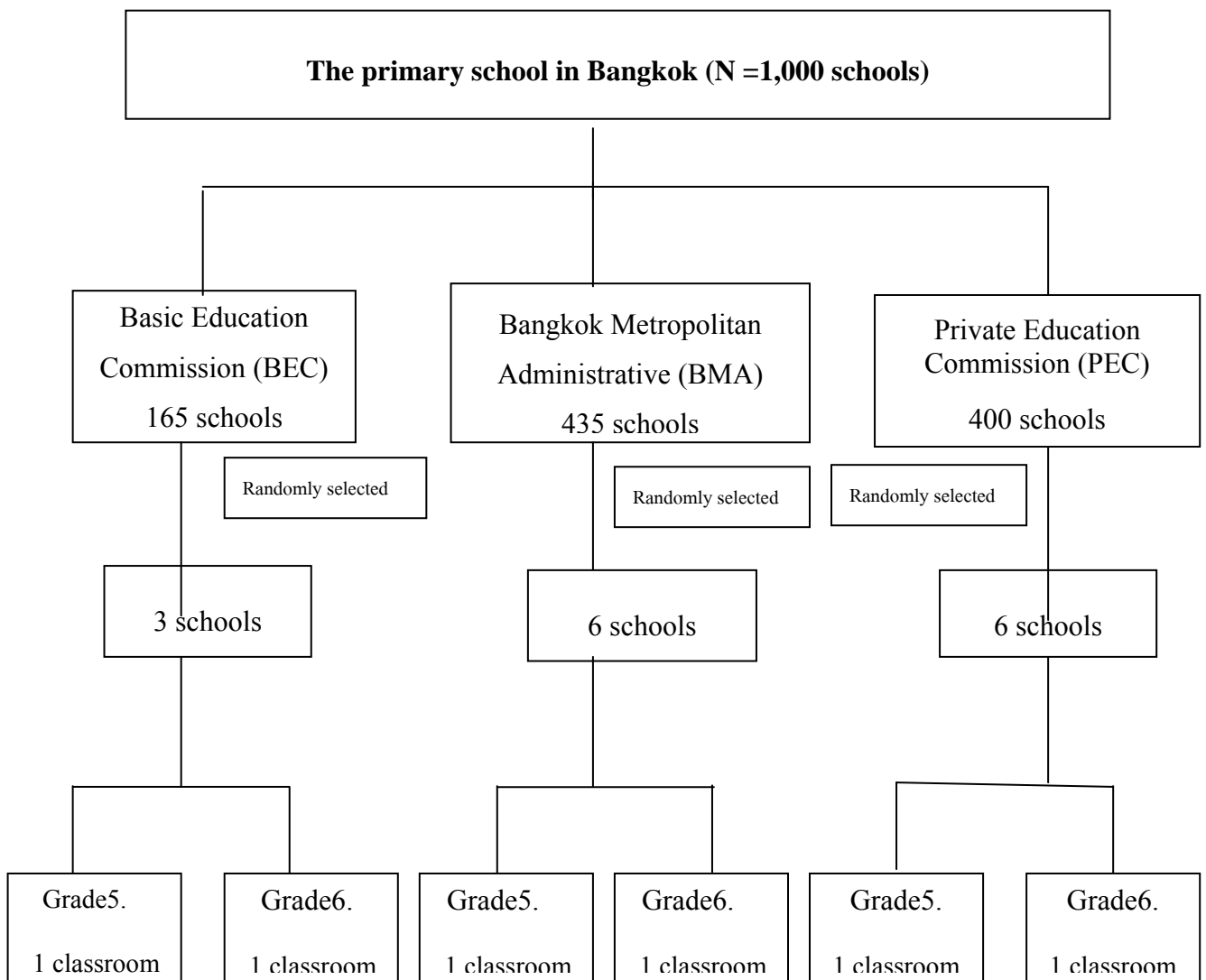
4.4.2 Sample selection

The sample sizes were randomly selected for 15 primary schools from the proportion number of school in each school administrative commission. Therefore, from the 1,000 primary schools in Bangkok were comprised to 165, 435 and 400 schools for the Basic Education Commission (BEC), Bangkok Metropolitan

Administrative (BMA) and Private Education Commission (PEC), respectively **Figure1**.

Thus, the proportions of school in each administrative commission were 1: 2: 2 for BEC: BMA: PEC, respectively. The school location was randomly selected from 3 Basic Education Commission (BEC) in Bangkok which consider the equal number of school sizes. The randomly location of this study was Basic Education Commission 3 (BEC 3), and the number of school in each school sizes is 5 schools in the ratio of 1:1:1 for small, medium and large school size, respectively. The school list was shown in **Table3**.

The study criteria were the children who were studying in grade 5th-6th (aged 10 to 13), good health, free of learning disorders and have no obvious mental or physical handicap.



Proportion number of school administrative commission = BEC: BMA: PEC: was 1: 2: 2

Proportion number of school size = small: medium: large was 1: 1: 1

Figure 1 The number of primary schools in different administrative commission

Table 3 The school list according to school sizes

Administrative area	school sizes*		
	Small < 500 *	Medium 500 – 1,000	Large > 1,000
Basic Education Commission (BEC)	Watnakprok	Watprayurawongsawat	Rachawinitbangkae
Bangkok Metropolitan Administrative (BMA)	Kohphohome Watbouphan	Watkok Watprachabumrung	Bangkhuntiensusa Watlao
Private Education Commission (PEC)	Supichaya Wansawangchit	Samithipong Padermsusa	Weerasunthon Sirinusorn

* number of students

4.5 Data collection

The data collection was performed during November 2006 and June 2007.

4.5.1 Data processing

A letter was sent to the director of each primary school in Bangkok for permission to conduct the study and obtain list of children' s grade as soon as the proposal was sent for describe about details of the study. A week after we send the letter to schools, the appointment was made by the telephone.

The appointment was made to students for explain the self-administered questionnaires, the food record forms and how to keep the 3 days food record. Finally, appointment was made with school for pick up the data of 3 days food record.

4.5.2 Data collection tools

There were two data collection tools, namely, a questionnaire and food record.

4.5.2.1 Questionnaire (Appendix A)

The questionnaire consisted of 4 parts including (1) demographic characteristics information (2) nutritional attitude (3) breakfast's knowledge and (4) breakfast eating patterns. The demographic characteristics information consisted of age, sex, weight, height, parents' education and parents' occupation. The breakfast eating patterns consisted of type of beverage or any kind of food during breakfast, breakfast consumption frequency and where breakfast were taken, etc. Only some variables from the questionnaire were used in the analysis of this thesis.

The questionnaire was pre-tested among 30 personnel at Watbouphan School. The reliability of questionnaires was 0.65. After pre-test, questions were revised as necessary.

4.5.2.2 Food record (Appendix B)

All children were asked to record their food intake for 3 days (two weekdays and one weekend), the researcher explained how to write on food record. Food models were used to assist in estimation the amount of child food intake. The tools for estimate volume of food taken were used ladle, table spoons, tea spoons which were demonstrated during the description. Some foods which have details on package, e.g. commercial name and weight were recorded as soon as the prices of food were record too. The researcher bought foods in each school for teach children record their food taken and kept characteristic for data analysis. This is the instructions will be helped to ensure a complete and accurate food record.

- Please record all foods and drinks that you have for three days: two weekdays and one weekend. Do not change the eating habits for this food record. Be sure to include any late night meals, snacks or drinks.
- List foods and drinks as soon as possible after consuming them to prevent forgetting to include something you ate or drank.

- To define how the food was prepared. Write down any thing added while cooking or at the table. This would include: butter, oil, spices, salt, cheese, other.
- When possible, please measure your food. The amount of food and drink that you consume is just as important as the type of food and drink that you consume.
- Please write down brand names of the products that you eat so we can match them up exactly in our database of foods.
- Write down the weight per serving from the package of the products that you eat (grams or ounces).
- If you eat food from shop or restaurant, please include the name of the shop or restaurant. Remember to record the size of your serving (e.g; super size, large, medium, small) and how your meal was prepared (eg: fried, baked, broiled).
- If possible, include the nutrition labels from products that you eat when you return the food record.

4.6 Data analysis

4.6.1 Dietary analysis

The 3-day food records were recorded and analyzed for nutritive values using INMUCAL computer software program version WD1.0 which was developed by Institute of Nutrition, Mahidol University (61). Ten nutrients were analyzed which were energy, protein, fat, carbohydrate, vitamin A, thiamin, riboflavin, vitamin C, iron, calcium and dietary fiber. Nutritional values of breakfast will be presented as mean value of average intake, standard deviations, percentage of Thai Recommended Daily Allowance (%RDA) and the percentage of the breakfast contribution to daily nutrient intakes.

The data from questionnaires will be analyzed by the Statistical Package for the Social Science (SPSS/PC⁺) version 13.0 for window (62) for determine the breakfast eating pattern, breakfast behavior and the factors that related to breakfast eating patterns. Children who regular eating breakfast (consumed breakfast everyday in weekdays and weekends) and children who consumed breakfast from 1-4 day on

school day and only 1 day in weekends were defined as irregular eaters, For no breakfast eaters group did not consume breakfast everyday. The purpose of nutrient analysis, breakfast size was divided into three categories, based on the contribution of breakfast energy to the Thai Recommended Dietary Allowances (RDA) for energy (19). Low-energy breakfasts provided < 15% RDA, medium energy breakfasts provided 15-25 % RDA), while high-energy breakfasts provided more than 25 % RDA.

4.6.2 Nutritional assessment

Weight and height of the children were received from the schools' measurement. Nutritional status assessment used INMU-Thai Growth program by the institute of nutrition, Mahidol University (63). The nutritional status presented in terms of weight for age, height for age and weight for height.

4.6.3 Statistical analysis

Data analysis will be analyzed by the Statistical Package for the Social Science (SPSS/PC⁺) version 13.0. Mean, Standard deviation, median and percentage will be calculated. The comparison between two groups was done using Student's t-test for independent samples. The tests were considered significant at $p < 0.05$. Chi-squared test was used to determine factors that influence to breakfast eating behaviors. The comparison of mean nutrient intakes more than 2 groups were using one-way analysis of variance (ANOVA), and non-parametric test was applied when data were not normal distribution. Multiple logistic regressions were used to determine factors that were associated with breakfast eating behavior of children.

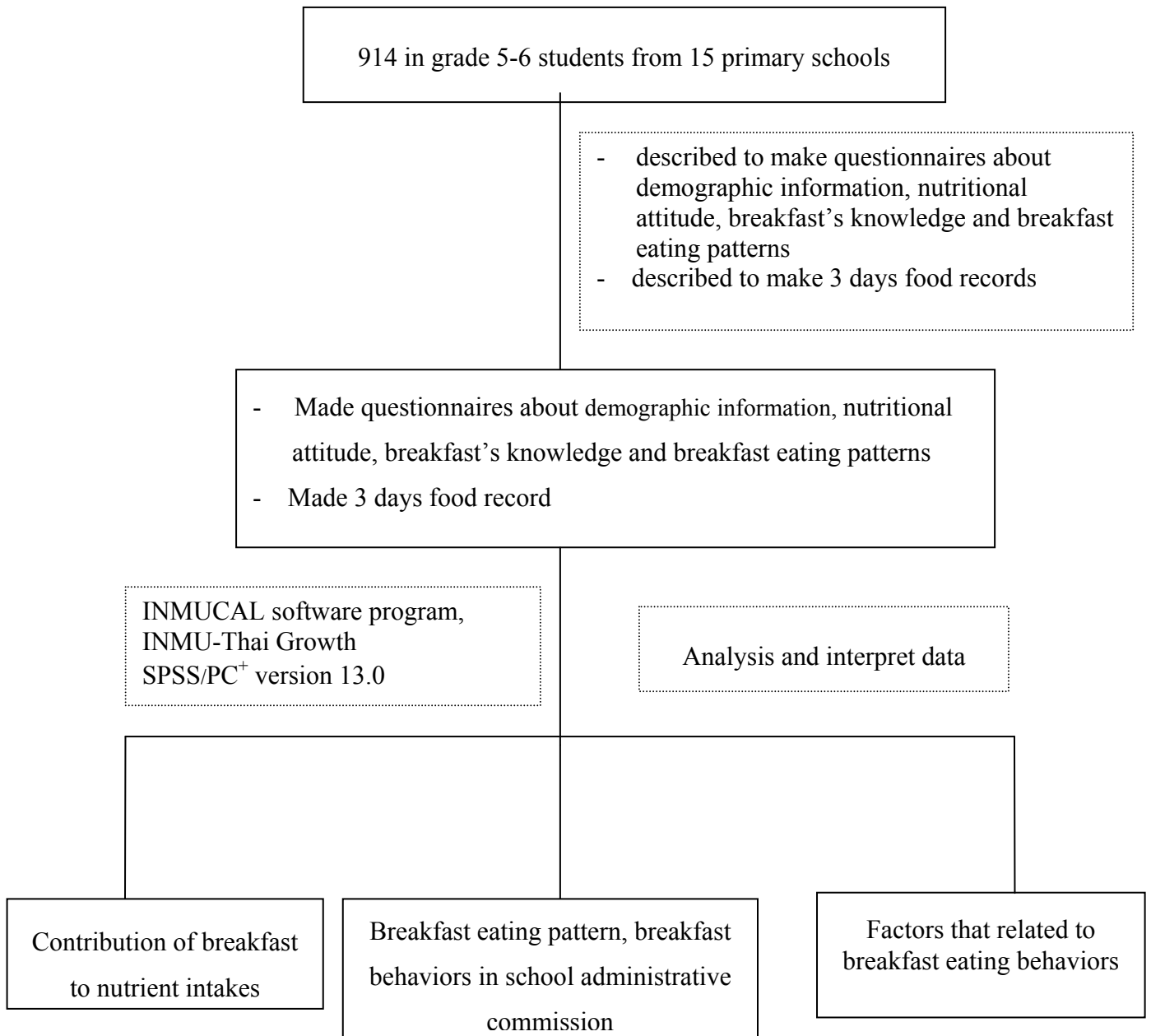


Figure 2. The sequence of this study

CHAPTER V

RESULTS

This chapter presented results of breakfast eating patterns, breakfast eating behavior, nutritional status, the factors influence to breakfast eating behaviors and the contribution of breakfast to nutrient intakes of school-aged children in Bangkok, Thailand.

5.1 Overall sample

5.1.1 Demographic information

Table 4 presented demographic information of the studied population. The study consisted of 914 children who were equal for boys (47.8%) and girls (52.2%). The children comprised of 212 children in the Basic Education Commissions (BEC) groups, 336 children in Bangkok Metropolitan Administrative (BMA) groups and 366 children in Private Education Commissions (PEC) groups. In addition, they were classified as small, medium and large school sizes. The children aged between 9-13 years and mean aged was 11 years. Most of the children lived with their parents (87.2 %) and only 6.3% lived with grandfather, grandmother. The children received money for school day about 37 Baht which they usually use for saving (39.1% of total money) and about 35.4% of total money was used for snack. Furthermore, fathers' and mothers' education levels were mainly primary school, 24.5 and 29.3%, respectively. Educations of the parents of Private Education Commissions children were higher than those of Basic Education Commissions and Bangkok Metropolitan Administrative groups.

Table 4. Demographic information of the primary school children

Demographic variables	BEC (n=212) n (%)	BMA (n=336) n (%)	PEC (n=366) n (%)	Total (n=914) n (%)
1. Genders				
- Boys	109 (51.4)	168 (50)	160 (43.7)	437 (47.8)
- Girls	103 (48.6)	168 (50)	206 (56.3)	477 (52.2)
2. Grade				
- Grade 5	180 (84.9)	166 (49.4)	206 (56.3)	552 (60.4)
- Grade 6	32 (15.1)	170 (50.6)	160 (43.7)	362 (39.6)
3. School sizes				
- Small	57 (26.9)	60 (17.9)	78 (21.3)	195 (21.3)
- Medium	78 (36.8)	126 (37.5)	142 (38.8)	346 (37.9)
- Large	77 (36.3)	150 (44.6)	146 (39.9)	373 (40.8)
4. Father' education level				
- Primary school	50 (23.6)	133 (39.6)	41 (11.2)	224 (24.5)
- Junior high school	27 (8.0)	40 (11.9)	33 (9.0)	90 (9.8)
- Senior high school	19 (13.7)	30 (8.9)	43 (11.7)	102 (11.2)
- Diploma	14 (6.6)	6 (1.8)	14 (3.8)	34 (3.7)
- Bachelor degree	19 (9.0)	18 (5.4)	65 (17.8)	102 (11.2)
- Master degree or higher	10 (4.7)	9 (2.7)	26 (7.1)	45 (4.9)
- Unknown	73 (34.4)	100 (29.8)	144 (39.3)	317 (34.7)
5. Mother' education level				
- Primary school	59 (27.8)	140 (41.7)	69 (18.9)	268 (29.3)
- Junior high school	21 (9.9)	38 (11.3)	25 (6.8)	84 (9.2)
- Senior high school	25 (11.8)	33 (9.8)	46 (12.6)	104 (11.4)
- Diploma	11 (5.2)	7 (2.1)	18 (4.9)	36 (3.9)

Table 4. Demographic information of the primary school children (con't)

Demographic variable	BEC (n=212) n (%)	BMA (n=336) n (%)	PEC (n=366) n (%)	Total (n=914) n (%)
- Bachelor degree	22 (10.4)	14 (4.2)	79 (21.6)	115 (12.6)
- Master degree or higher	8 (3.8)	7 (2.1)	14 (3.8)	29 (3.2)
- Unknown	66 (31.1)	97 (28.9)	115 (31.4)	278 (30.4)
6. Father' occupation				
- Unemployed	24 (11.3)	23 (6.8)	24 (6.6)	71 (7.8)
- Government	12 (5.7)	28 (8.3)	36 (9.8)	76 (8.3)
- Sale/ Business owners	64 (30.2)	77 (22.9)	142 (38.8)	283 (31.0)
- State Enterprises	2 (0.9)	6 (1.8)	13 (3.6)	21(2.3)
- Agricultural workers	3 (1.4)	22 (6.5)	2 (0.5)	27 (3.0)
- Employee	84 (39.6)	153 (45.5)	138 (37.7)	375 (41.0)
- Unknown	23 (10.8)	27 (8.0)	11 (3.0)	61 (6.7)
7. Mother' occupation				
- Unemployed	47 (22.2)	58 (17.3)	79 (21.6)	184 (20.1)
- Government	15 (7.1)	19 (5.7)	27 (7.4)	61 (6.7)
- Sale/ Business owners	56 (26.4)	83 (24.7)	138 (37.7)	277 (30.3)
- State Enterprises	2 (0.9)	4 (1.2)	5 (1.4)	11 (1.2)
- Agricultural workers	5 (2.4)	17 (5.1)	1 (0.3)	23 (2.5)
- Employee	71 (33.5)	129 (38.4)	107 (29.2)	307 (33.6)
- Unknown	16 (7.5)	26 (7.7)	9 (2.5)	51 (5.6)

5.2 Nutritional status of the children

5.2.1 Nutritional status of the children by weight for height

The nutritional status of the studied children was measured by INMU-Thai Growth. By weight for age measurement presented that the nutritional status of most children (80.5%) was normal whereas about 1.9% (17 children, 4 boys and 13 girls) of the studied children was underweight, while 6.2% (57 children, 33 boys and 24 girls) was overweight. By height for age, nutritional status presented that most of the children (85.4%) was normal while about 1.2% (11 children, 1 boy and 10 girls) of the studied children were stunted (Appendix C). By weight for height presented in **Table 5**, about 78% was normal whereas about 1.3% (12 children, 10 boys and 2 girls) of the studied children was obese, while 3.0% (27 children, 12 boys and 15 girls) was wasted. The nutritional status of children between sexes, schools' groups were no significant different.

Table 5 Nutritional status (Weight for Height) of school-aged children

Nutritional status	Boys (n = 437) n (%)	Girls (n = 477) n (%)	Total (n = 914) n (%)
Obesity	10 (2.3)	2 (0.4)	12 (1.3)
Slightly obesity	26 (5.9)	10 (2.1)	36 (3.9)
Overweight	38 (8.7)	24 (5.0)	62 (6.8)
Normal	330 (75.5)	383 (80.3)	713 (78.0)
Slightly wasted	21 (4.8)	43 (9.0)	64 (7.0)
Wasted	12 (2.7)	15 (3.1)	27 (3.0)

* By Chi-square test, $p > 0.05$

5.3 Breakfast regularity of school-aged children

The regularity of breakfast consumption in weekdays and weekends are shown in **Table 6**. More than half of children (58%) had breakfast every day, 39.3 % sometime had breakfast irregularly and only 2.7% usually skipped breakfast during weekdays. For the weekends about 70.9 % usually had breakfast, 25.3 % occasionally ate breakfast while 3.8 % habitually skipped breakfast. There was no difference between breakfast regularity in weekdays and weekends and between genders. The breakfast regularity during weekdays and weekends by school groups are presented in **Figure 3-4**, the children in BMA (4.8%) usually omitting breakfast more than children in BEC (1.4%) and PEC (1.6%). Children in BMA schools had breakfast everyday about 47% which was less than children in BEC and PEC schools (66% and 63.4%, respectively). During weekends, children in large schools usually skipped breakfast less than children in small and medium schools.

Table 6 The regularity of breakfast consumption in weekdays and weekends

Regularity of breakfast consumption	Boys (n=437)	Girls (n=477)	Total (n=914)	P-value
	n (%)	n (%)	n (%)	
<u>Weekdays</u>				0.07
No Breakfast	15 (3.4)	10 (2.1)	25 (2.7)	
Irregular	156 (35.7)	203 (42.5)	359 (39.3)	
Regular	266 (60.9)	264 (55.3)	530 (58.0)	
<u>Weekends</u>				0.08
No Breakfast	17 (3.9)	18 (3.8)	35 (3.8)	
Irregular	106 (24.2)	125 (26.2)	231 (25.3)	
Regular	314 (71.9)	334 (70.0)	648 (70.9)	

* By Chi-square test, $p > 0.05$

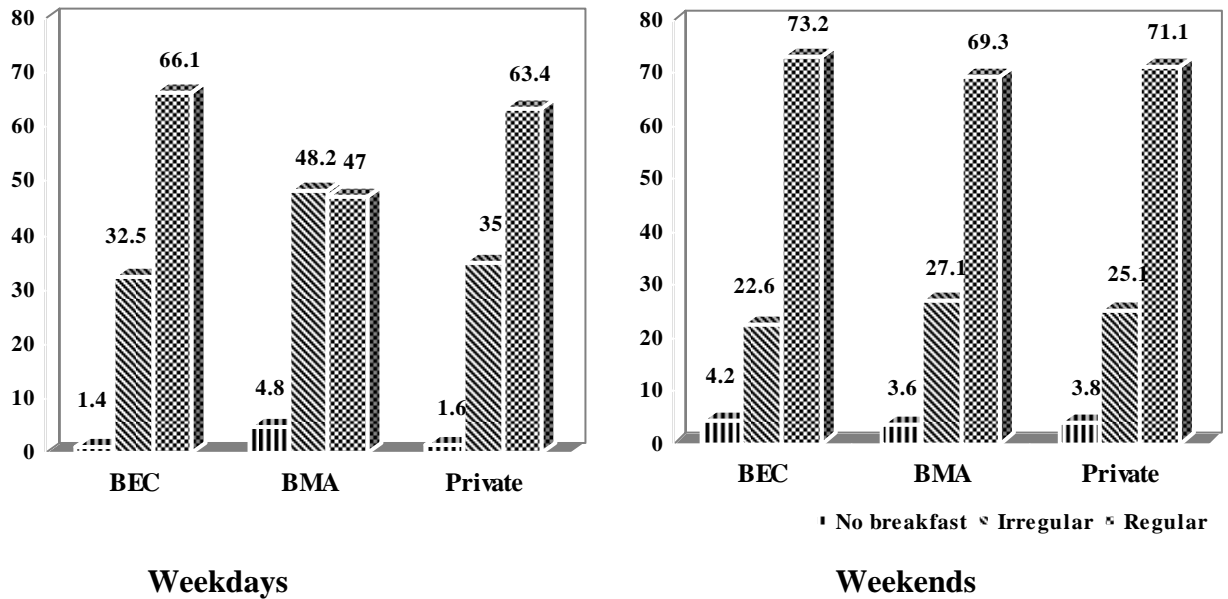


Figure 3 The comparison of the breakfast regularity during weekdays and weekends by school administrative commissions

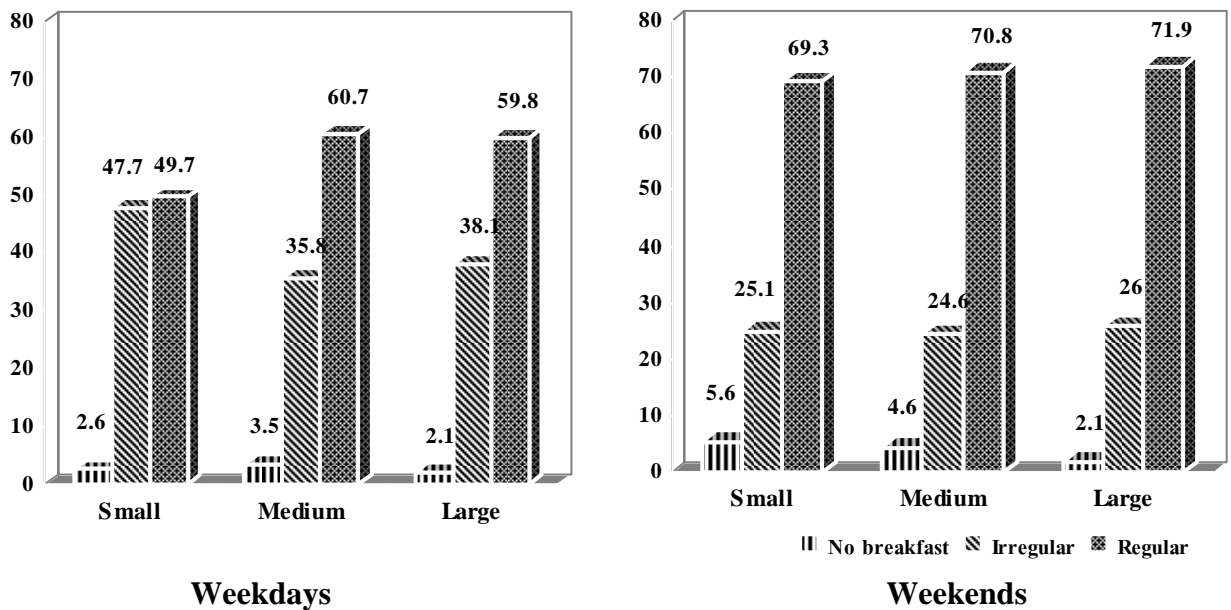


Figure 4 The comparison of the regularity of breakfast consumption during weekdays and weekends by schools' size groups

5.4 The reasons of skipping breakfast

Table 7 presented the reasons of omitting breakfast, during weekdays; the children did not have breakfast in weekdays because 59.9% and 47.7% of them reported that they were not hungry and did not have time or wake up late, respectively. While, during weekends the children gave the first reason similar to the weekdays for skipping breakfast which they were not hungry (57.9%) and the second reason was wake up late (46.6%). The reasons of skipping breakfast in different school groups are presented in **Figure 5-8**.

Table 7 The reason (s) of skipping breakfast

Reason (s) of skipping breakfast	Boys (n=171) n (%)	Girls (n=213) n (%)	Total (n=384) n (%)	P-value
<u>Weekdays</u>				
No breakfast preparation at home	29 (17.0)	37 (17.4)	66 (17.2)	0.5
No time, Wake up late*	70 (40.9)	112 (52.6)	182 (47.4)	0.00
Not being hungry	100 (58.5)	130 (61.0)	230 (59.9)	0.1
Habitually	26 (15.2)	35 (16.4)	61 (15.9)	0.4
Considering body weight	8 (4.7)	5 (2.3)	13 (3.4)	0.3
No money	2 (1.2)	3 (1.4)	5 (1.3)	0.7
Reason(s) of skipping breakfast	Boys (n=123) n (%)	Girls (n=143) n (%)	Total (n=266) n (%)	P-value
<u>Weekends</u>				
No breakfast preparation at home	18 (14.6)	26 (18.2)	44 (16.5)	0.3
No time/ Wake up late	51 (41.5)	73 (51.0)	124 (46.6)	0.7
Not being hungry	77 (62.6)	77 (53.8)	154 (57.9)	0.6
Habitually	23 (18.7)	24 (16.8)	47 (17.7)	0.9
Considering body weight	6 (4.9)	5 (3.5)	11 (4.1)	0.7

*By Chi-square test, significant at $p < 0.05$

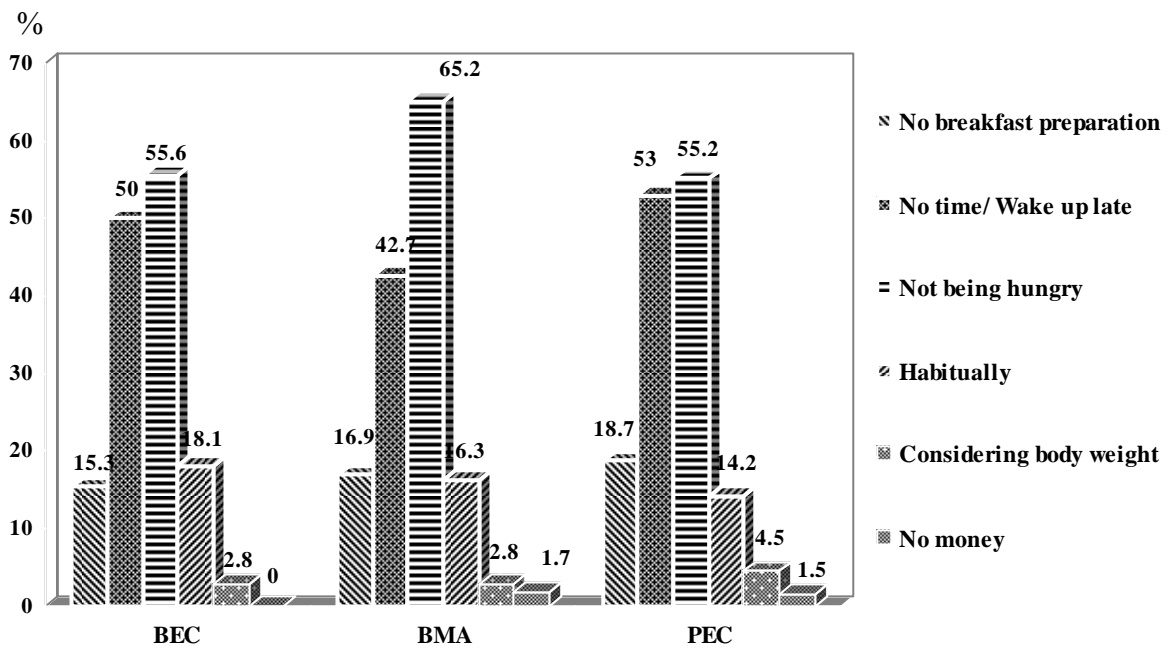


Figure 5 The comparison of the reasons of skipping breakfast during weekdays by school administrative commissions

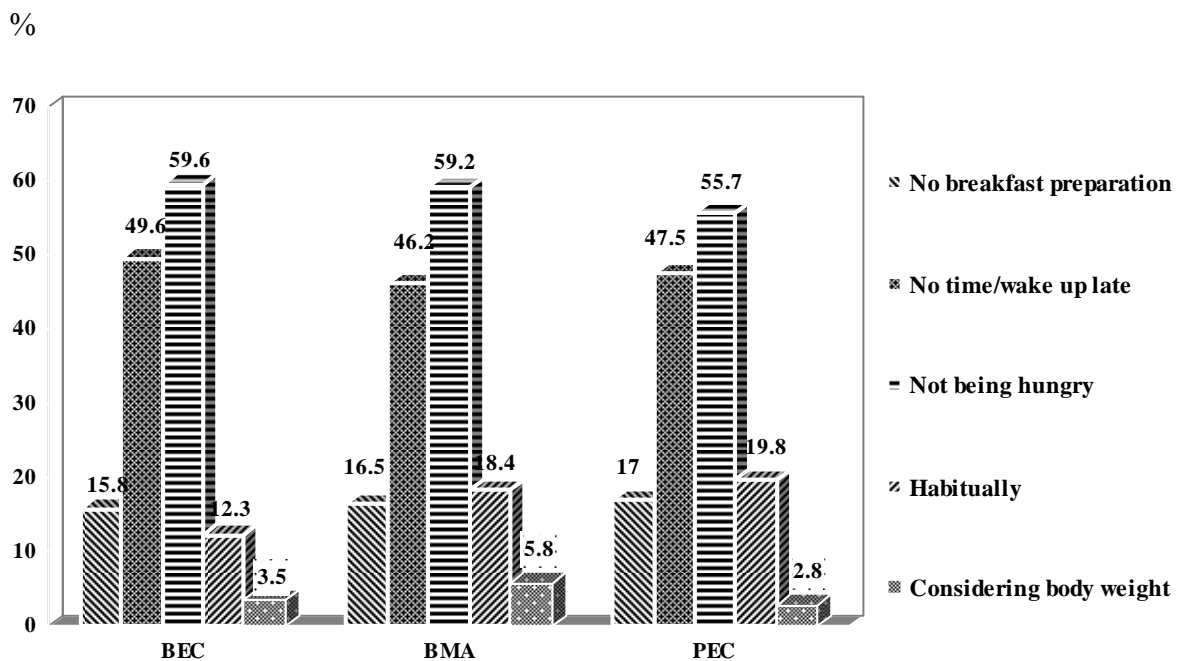


Figure 6 The comparison of the reasons of skipping breakfast during weekends by school administrative commissions

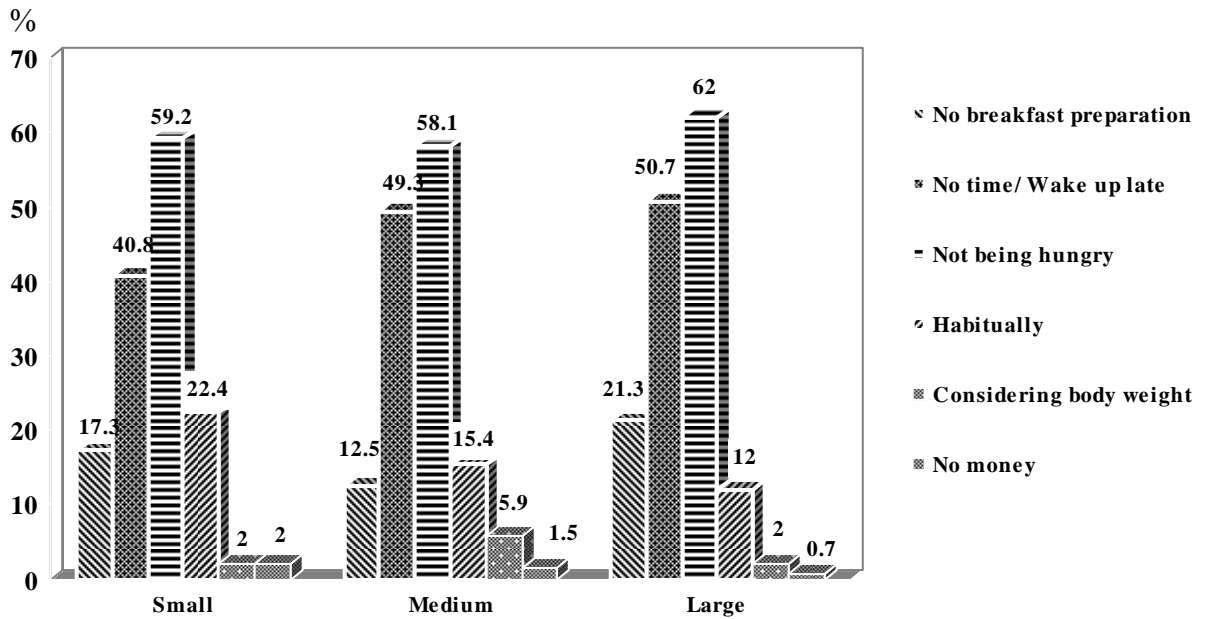


Figure 7 The comparison of the reasons of skipping breakfast during weekdays by school size groups

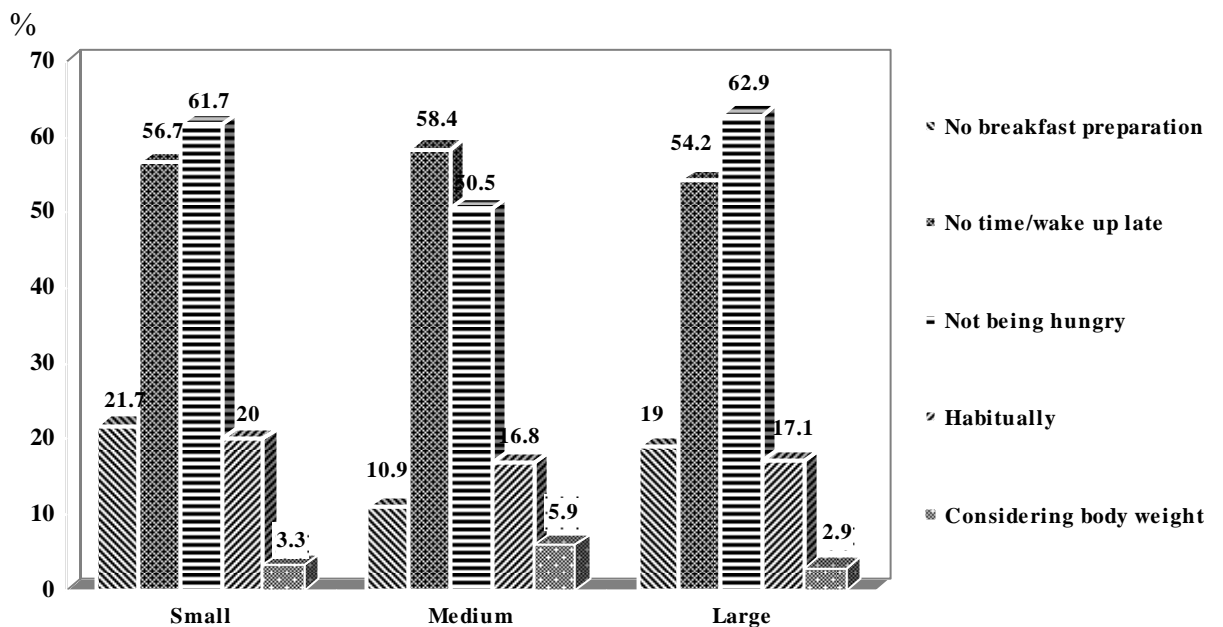


Figure 8 The comparison of the reasons of skipping breakfast during weekends by school size groups

5.5 Breakfast eating pattern of school-aged children

The breakfast eating pattern of children is presented in **Table 8**, more than half of children (58.4%) had single plate dish which there was rice porridge (rice gruel cooked with soup) and about 36.2% had rice with side dish. Furthermore about 66.5% and 23.3% of children had breakfast at home and school, respectively. Breakfast eating pattern and places of breakfast eaten between boys and girls did not significant different. The breakfast eating pattern in different school groups is presented in **Table 9**, the places of breakfast eaten were significant different among children in different school administrative commissions. By school sizes, the children in small and medium schools ate fast food for breakfast higher than children in large schools. Overall, there was no difference of breakfast eating pattern and places breakfast eaten between genders ($P > 0.05$).

Table 8 Comparison of breakfast eating pattern and places in different genders

Types and places of breakfast	Boys (n=437) n (%)	Girls (n=477) n (%)	Total (n=914) n (%)	P-value
<u>Types of breakfast</u>				
- Rice with side dish	160 (36.6)	171(35.8)	331 (36.2)	0.8
- Single plate dish	262 (60.0)	272 (57.0)	534 (58.4)	0.4
- Fast food	115 (26.3)	112 (23.5)	227 (24.8)	0.3
- Beverage only	49 (11.2)	49 (10.3)	98 (10.7)	0.6
<u>Places of breakfast eaten</u>				
- Home	284 (65.0)	324 (67.9)	608 (66.5)	0.1
- School	106 (24.3)	107 (22.4)	213 (23.3)	0.1
- Shop	38 (8.7)	28 (5.9)	66 (7.2)	0.1
- Car	9 (2.1)	18 (3.8)	27 (3.0)	0.1

* By Chi-square test, $p > 0.05$

Table 9 Comparison of breakfast eating pattern and places among school administrative commissions and school sizes

Types and Places of breakfast	School administrative commissions			School sizes		
	BEC (n =212) n (%)	BMA (n = 336) n (%)	PEC (n = 366) n (%)	Small (n = 195) n (%)	Medium (n = 346) n (%)	Large (n = 373) n (%)
<u>Types of breakfast**</u>						
- Rice with side dish	78 (36.8)	120 (35.7)	133 (36.3)	73 (37.4)	119 (34.4)	139 (37.3)
- Single plate dishes	131(61.8)	206 (61.3)	197 (53.8)	123 (63.1)	201 (58.1)	210 (56.3)
- Fast food **	55 (25.9)	85 (25.3)	87 (23.8)	54 (27.7)	98 (28.3)	75 (20.1)
- Beverage only	25 (11.8)	40 (11.9)	33 (9.0)	12 (6.2)	41 (11.8)	45 (12.1)
<u>Place of breakfast eaten*</u>						
- Home	115 (54.2)	214 (63.7)	279 (76.2)	128 (65.6)	223 (64.5)	257 (68.9)
- School	73 (34.4)	87 (25.9)	53 (14.5)	40 (20.5)	85 (24.6)	88 (23.6)
- Shop	17 (8.0)	29 (8.6)	20 (5.5)	22 (11.3)	24 (6.9)	20 (5.4)
- Car	7 (3.3)	6 (1.8)	14 (3.8)	5 (2.6)	14 (4.0)	8 (2.1)

* By Chi-square test, significant at $p < 0.05$ in school administrative commissions

** By Chi-square test, significant at $p < 0.05$ in school size groups

5.6 Beverages consumption behavior in breakfast among children

Types of beverages among children by school administrative commissions are presented in **Table 10**. More than half of BMA children (59.5%) drank whole milk for breakfast. Children in government schools (BMA and BEC) usually had yogurt milk and soft drink higher proportion than PEC children. For soft drink consumption, boys drank soft drink in breakfast about 4.6%, while there were only 1.7% of girls (Appendix C). Beverages consumption behavior among school administrative commissions was significantly different in some types of beverage (fresh milk, yogurt milk, soybean and soft drink).

Table 10 Types of beverages among children by school administrative commissions

Types of beverage	BEC (n =184) n (%)	BMA (n = 304) n (%)	PEC (n = 342) n (%)	P-value
<u>Types of beverage</u>				
Fresh milk	51 (27.7)	181 (59.5)	131 (38.3)	0.00
Sweetened milk	19 (10.3)	23 (7.6)	25 (7.3)	0.2
Yogurt milk	20 (10.9)	31 (10.2)	15 (4.4)	0.00
Flavored milk	24 (13.0)	28 (9.2)	52 (15.2)	0.3
Soybean	10 (5.4)	19 (6.3)	28 (8.2)	0.02
Soft drink	10 (5.4)	13 (4.3)	5 (1.5)	0.00
Fruit juice	16 (8.7)	9 (3.0)	17 (5.0)	0.9
Malts	23 (12.5)	10 (3.3)	27 (7.9)	0.1
Water	82 (44.6)	87 (28.6)	147 (43.0)	0.00

* By Chi-square test, significant at $p < 0.05$

5.7 Nutrient intakes among breakfast takers

There were 563 children (61.6%) who responded to take 3-day food record. From 563 food records, only 524 food records were used for nutrient analysis. Nutrient intakes presented in terms of (1) daily nutrient intakes, (2) breakfast nutrient intakes (3) breakfast contribution to daily nutrient intakes (proportion of nutrient intakes from breakfast to total daily nutrient intakes) and (4) the comparison of nutrient intakes between weekdays and weekends, genders and school groups (school administrative commissions and sizes). The macronutrients and micronutrients were analyzed according to genders, school administrative commissions and school sizes

5.7.1 Daily nutrient intakes among breakfast takers

The mean daily energy intake for the children was 74 % RDA, which was not enough for energy requirement. Protein intake was 113 % RDA and 67 % of protein intakes was derived from animal sources (**Table 11**). The energy distribution for carbohydrate: protein: fat: was 52: 16: 32.

The daily nutrient intakes of vitamin A, vitamin C, iron and calcium were less than the recommendation (61%, 55%, 42% and 30% of the RDA, respectively). For dietary fiber, the children received only 3.8 g. In addition, the daily intakes of thiamine and riboflavin were reasonably good because they intake more than 100% RDA (121% and 104% of the RDA, respectively).

5.7.2 Breakfast nutrient intakes among breakfast takers

The breakfast energy intake was 351 kcal, which contributed about 21% of RDA (**Table 11**). The mean protein intake was 15 g, which 71% derived from animal sources. Contribution of breakfast to protein intakes (34% RDA) was much higher compared to that of energy intakes (21% RDA). The energy distribution from carbohydrate: protein: fat: was 50: 17: 33.

For vitamin C, iron and calcium, these children received only 10-12% of RDA. Thiamine and riboflavin intakes were a particularly high (on average, 43% and 41% RDA, respectively). The mean intake of dietary fiber was about 3% RDA.

5.7.3 Breakfast contribution to daily nutrient intakes

Among breakfast takers, breakfast contribution to daily nutrient intakes of both macronutrients and micronutrients are summarized in **Table 11**. The mean breakfast energy intakes accounted for 28.4% of daily energy intakes. On average, protein intake from breakfast also accounted for about 30.7% of daily nutrient intakes. For other macronutrients and iron, breakfast contributed about one-fourth of daily nutrient intakes, while some micronutrients (vitamin A, thiamine, riboflavin and calcium), breakfast contributed about one-third of daily intakes. Moreover, there were slightly less for vitamin C, which was only 14.4% of daily intake. **Table 12-13**, breakfast was classified as very low, low, medium and high energy content. Energy content of breakfast of most students was in normal range. There was no significant different in energy intake between boys and girls. In adequate breakfast intake, PEC children were less proportion than other groups.

Table 11 Breakfast and daily nutrient intake among breakfast takers

Nutrients	Daily intakes ¹		Breakfast intakes ¹		% Breakfast to daily nutrient intakes (n = 524)
	Nutrient intakes (n = 524)	% RDA* (n = 524)	Nutrient intakes (n = 524)	% RDA* (n = 524)	
<u>Macronutrients</u>					
1. Energy (Kcal)	1235 ± 284	74.0 ± 17.6	350 ± 96	21 ± 6	28.4
2. Carbohydrate (g)	159 ± 42	-	43 ± 13	-	27
3. Fat (g)	45 ± 13	-	13 ± 5	-	29.3
4. Protein (g)	49 ± 12	112.8 ± 29.8	15 ± 5	34 ± 12	30.7
CHO : Prot : Fat	52 : 16 : 32		50 : 17 : 33		
<u>Micronutrients</u>					
1. Vitamin A (µg RE)	367 ± 585	61.3 ± 97.5	141 ± 299	23.6 ± 49.9	38.5
2. Thiamine (mg)	1.1 ± 0.8	120.6 ± 91.6	0.4 ± 0.5	42.9 ± 60.6	35.5
3. Riboflavin (mg)	1.0 ± 0.4	104.4 ± 44.9	0.4 ± 0.2	40.7 ± 26.5	38.9
4. Vitamin C (mg)	26 ± 34	54.9 ± 71.6	3.7 ± 8.3	8.0 ± 18.4	14.4
5. Iron (mg)	6.7 ± 2.2	42.1 ± 17.8	1.8 ± 0.8	11.2 ± 6.2	26.4
6. Calcium (mg)	300 ± 144	30.0 ± 14.4	120 ± 83	12.0 ± 8.3	40.1
7. Dietary fiber (g)	3.8 ± 2.2	-	0.8 ± 0.7	-	20.8

¹ Value was Mean ± SD

* RDA for age group 10-14 yr.

Table 12 The distribution of children having different energy intake from breakfast

Breakfast size	Boys (n=202) n (%)	Girls (n=322) n (%)	Total (n=524) n (%)	P-value
<u>Size of breakfast</u>				
Very low (< 10% RDA)	7 (3.5)	4 (1.2)	11 (2.1)	0.2
Low (10-15 % RDA)	31 (15.3)	38 (11.8)	69 (13.2)	0.2
Medium (15-25 % RDA)	124 (61.4)	207 (64.3)	331 (63.1)	0.2
High (> 25 % RDA)	40 (19.8)	73 (22.7)	113 (21.6)	0.2

* By Chi-square test, significant at $p < 0.05$

Table 13 The distribution of children having different energy intake from breakfast by school administrative commissions

Breakfast size	BEC (n=106) n (%)	BMA (n=212) n (%)	PEC (n=206) n (%)	P-value
<u>Size of breakfast*</u>				
Very low (< 10% RDA)	3 (2.8)	5 (2.4)	3 (1.5)	0.2
Low (10-15 % RDA)	12 (11.3)	16 (7.5)	40 (19.5)	0.01
Medium (15-25 % RDA)	65 (61.3)	135 (63.7)	131 (63.9)	0.6
High (> 25 % RDA)	26 (24.5)	56 (26.4)	31 (15.1)	0.04

* By Chi-square test, significant at $p < 0.05$

5.7.4 The comparison of breakfast and daily nutrient intakes between weekdays and weekends

Table 14 compared breakfast and daily nutrient intakes between weekdays and weekends. For daily, total energy, carbohydrate and protein intakes per day in weekdays (1,283 kcal, 167 g, 51 g for energy, carbohydrate and protein, respectively) were significantly lower than weekends which were 1239 kcal, 159g and 49g, for energy, carbohydrate and protein, respectively. There were no significant differences in breakfast intakes of macronutrients and micronutrients, except calcium, riboflavin, iron and dietary fiber. In weekends, calcium and riboflavin were received less than weekdays, whereas iron and dietary fiber were received more than weekdays.

Macronutrients and micronutrients of daily and breakfast intakes between genders are presented in **Table 15**. There were no differences of daily and breakfast nutrient intakes between boys and girls ($P > 0.05$).

Table 14 Comparison of nutrient intakes in daily and breakfast between weekdays and weekends

Nutrients	Daily intakes ¹		Breakfast intakes ¹	
	Weekdays (n =524)	Weekends (n =524)	Weekdays (n =524)	Weekends (n =524)
<u>Macronutrients</u>				
1. Energy (Kcal)	1239 ± 282	1283 ± 384*	351 ± 109	348 ± 133
2. Carbohydrate (g)	159 ± 42	167 ± 59*	42 ± 15	43.9 ± 19.3
3. Fat (g)	45 ± 13	46 ± 19	13 ± 6	13 ± 8
4. Protein (g)	48 ± 13	51 ± 17*	15 ± 6	15 ± 8
CHO : Prot : Fat	51 : 16 : 33	52 : 16 : 32	49 : 17 : 34	51 : 17 : 32
<u>Micronutrients</u>				
1. Vitamin A (µg RE)	361 ± 612	400 ± 1101	144 ± 367	142 ± 505
2. Thiamine (mg)	1.1 ± 0.9	1.2 ± 1.2	0.4 ± 0.6	0.4 ± 0.7
3. Riboflavin (mg)	1.0 ± 0.5	1.0 ± 0.6	0.4 ± 0.3	0.3 ± 0.3**
4. Vitamin C (mg)	25 ± 39	28 ± 52 *	3.1 ± 7.5	5.3 ± 20.3
5. Iron (mg)	6.7 ± 2.5	7.0 ± 3.3	1.7 ± 0.9	2.0 ± 1.5**
6. Calcium (mg)	311 ± 160	289 ± 201*	134 ± 103	85 ± 101**
7. Dietary fiber (g)	3.7 ± 2.2	4.2 ± 3.5	0.7 ± 0.7	0.9 ± 1.2**

¹ Value was Mean ± SD

* Daily nutrient intakes between weekdays and weekends, Student t-test, p < 0.05

** Breakfast nutrient intakes between weekdays and weekends, Student t-test, p < 0.05

Table 15 Comparison of nutrient intakes in daily and breakfast between genders

Nutrients	Daily intakes between gender ¹		Breakfast intakes between gender ¹	
	Boys (n = 208)	Girls (n = 336)	Boys (n = 202)	Girls (n = 322)
<u>Macronutrients</u>				
1. Energy (Kcal)	1245 ± 270	1251 ± 278	361 ± 108	345 ± 86
2. Carbohydrate (g)	159 ± 40	162 ± 43	44 ± 14	42 ± 12
3. Fat (g)	46 ± 13	46 ± 13	14 ± 6	13 ± 5
4. Protein (g)	50 ± 12	49 ± 12	16 ± 6	15 ± 5
CHO : Prot : Fat	51 : 16 : 33	52 : 16 : 32	49 : 17 : 34	50 : 17 : 33
<u>Micronutrients</u>				
1. Vitamin A (µg RE)	345 ± 490	390 ± 658	149 ± 332	137 ± 277
2. Thiamine (mg)	1.1 ± 0.9	1.1 ± 0.7	0.4 ± 0.6	0.4 ± 0.5
3. Riboflavin (mg)	1.0 ± 0.5	1.0 ± 0.4	0.4 ± 0.3	0.4 ± 0.2
4. Vitamin C (mg)	22 ± 25	29 ± 38	3.9 ± 10	3.6 ± 7.1
5. Iron (mg)	6.6 ± 2.2	6.9 ± 2.2	1.8 ± 0.8	1.8 ± 0.8
6. Calcium (mg)	306 ± 165	299 ± 132	121 ± 85	120 ± 82
7. Dietary fiber (g)	3.5 ± 1.9	4.0 ± 2.3	0.8 ± 0.7	0.8 ± 0.7

¹ Value was Mean ± SD,

Daily nutrient intakes between sexes, Independent t-test, p > 0.05

Breakfast nutrient intakes between sexes, Independent t-test, p > 0.05

Table 16 showed the daily nutrient intakes between school administrative commissions. There were no differences between school administrative commissions (BEC, BMA and PEC). Calcium intake in BMA children was significantly higher than the others group. **Table 17** presented the breakfast nutrient intakes between different schools, there were significant difference between groups which children in BEC and BMA schools received energy (356 kcal, 376 kcal), fat (13g, 14g) and protein (15g, 16g) more than PEC children (321 kcal, 12g and 13g for energy, carbohydrate and protein, respectively). For micronutrients, there was a statistical significant difference between school administrative commissions in most of micronutrients, except vitamin C and iron. Vitamin A, riboflavin and calcium were significant difference between three groups which BMA children had a higher vitamin A than PEC and BEC children, and children in BEC had more vitamin A than PEC children. Besides, riboflavin and calcium intakes in BMA children had more intake than PEC and BEC children, while BEC children were higher than PEC schools. For thiamine, children in BEC and BMA had intake less than PEC children while there was no significant difference between BEC and BMA children. Furthermore, PEC children had a higher intake of dietary fiber than BEC children.

Table16 Comparison of daily nutrient intakes between children by school administrative commissions

Nutrients	Daily nutrient intakes among school administrative commissions ¹		
	BEC (n =107)	BMA (n = 213)	PEC (n = 226)
<u>Macronutrients</u>			
1. Energy (Kcal)	1229 ± 328	1257 ± 266	1251 ± 256
2. Carbohydrate (g)	157 ± 48	160 ± 39	164 ± 40
3. Fat (g)	45 ± 15	47 ± 13	45 ± 12
4. Protein (g)	49 ± 13	50 ± 12	48 ± 11
CHO : Prot : Fat	51 : 16 : 33	51 : 16 : 33	52 : 16 : 32
<u>Micronutrients</u>			
1. Vitamin A (µg RE)	319 ± 544	401 ± 622	371 ± 605
2. Thiamine (mg)	1.1 ± 0.9	1.0 ± 0.6	1.2 ± 0.9
3. Riboflavin (mg)	1.0 ± 0.5	1.0 ± 0.4	0.9 ± 0.4
4. Vitamin C (mg)	23 ± 35	26 ± 35	28 ± 33
5. Iron (mg)	7.1 ± 2.6	6.7 ± 2.1	6.8 ± 2.1
6. Calcium (mg)	294 ± 136 ^a	325 ± 133 ^b	284 ± 157 ^c
7. Dietary fiber (g)	3.6 ± 2.3 ^a	3.6 ± 2.2 ^a	4.1 ± 2.0 ^b

¹Mean ± SD, values in the same row with different superscript were significantly different (p< 0.05) by ANOVA and by Post-hoc comparison test using Scheffe for macronutrients and by Non-Parametric test (Kruskal-Wallis test) for micronutrients.

Table 17 Comparison of breakfast nutrient intakes between children among school administrative commissions

Nutrients	Breakfast nutrient intakes among school administrative commissions ¹		
	BEC (n = 106)	BMA (n = 213)	PEC (n = 205)
<u>Macronutrients</u>			
1. Energy (Kcal)	356 ± 103 ^a	376 ± 95 ^a	321 ± 84 ^b
2. Carbohydrate (g)	44 ± 14 ^{ab}	44 ± 13 ^a	41 ± 13 ^b
3. Fat (g)	13 ± 6 ^a	15 ± 5 ^a	12 ± 4 ^b
4. Protein (g)	15 ± 5 ^a	16 ± 5 ^a	13 ± 4 ^b
CHO : Prot : Fat	50 : 17 : 33	48 : 17 : 35	51 : 17 : 32
<u>Micronutrients</u>			
1. Vitamin A (µg RE)	129 ± 290 ^a	155 ± 280 ^b	133 ± 323 ^c
2. Thiamine (mg)	0.4 ± 0.4 ^a	0.3 ± 0.4 ^a	0.4 ± 0.7 ^b
3. Riboflavin (mg)	0.3 ± 0.2 ^a	0.4 ± 0.2 ^b	0.2 ± 0.2 ^c
4. Vitamin C (mg)	3.0 ± 5.0	3.5 ± 6.5	4.3 ± 10.9
5. Iron (mg)	1.9 ± 0.9	1.8 ± 0.9	1.7 ± 0.8
6. Calcium (mg)	103 ± 72 ^a	159 ± 81 ^b	89 ± 75 ^c
7. Dietary fiber (g)	0.8 ± 0.6 ^{ab}	0.7 ± 0.6 ^a	0.9 ± 0.8 ^b

¹ Mean ± SD, values in the same row with different superscript were significantly different (p < 0.05) by ANOVA and by Post-hoc comparison test using Scheffe for macronutrients and by Non-Parametric test (Kruskal-Wallis test) for micronutrients.

Table 18 presented the daily nutrient intakes between different school sizes, there were significant difference of daily macronutrients intakes which children in medium and large schools received the energy (1,259 kcal, 1,286 kcal), carbohydrate (162g, 165g) and protein (50g, 51g) more than small school children (1,157 kcal, 150g and 45g for energy, carbohydrate and protein, respectively). Only fat intake was significant difference between children in large and small schools which more fat intake was found in large schools children than that of small school children. Moreover, there was a statistically significant difference between school sizes in most micronutrients, except riboflavin and vitamin C. Vitamin A, thiamine, iron and dietary fiber, children in medium and large schools received more micronutrients than small school children. On the other hand, calcium intake was statistically difference between large and small schools. **Table 19** presented breakfast nutrient intakes, children in medium and large schools received energy (355 kcal, 365 kcal), fat (14g, 14g) and protein (16g, 15g) more than small school children (317 kcal, 11g and 13g for energy, fat and protein, respectively). Large school children received significantly more carbohydrate than small school children. The macronutrients were not significant difference between children in medium and large school sizes. While, the micronutrients when considering mean intakes, there was statistical significant difference between school sizes in most of micronutrients, except vitamin C and dietary fiber. For vitamin A, thiamine, riboflavin, iron and calcium, children in small schools received less than medium and large schools. Furthermore, the micronutrient intakes were not significant difference between children in medium and large schools.

Table 18 Comparison of daily nutrient intakes between children by school sizes

Nutrients	Daily nutrient intakes in different school sizes ¹		
	Small (n = 116)	Medium (n = 197)	Large (n = 233)
<u>Macronutrients</u>			
1. Energy (Kcal)	1157 ± 245 ^a	1259 ± 263 ^b	1286 ± 289 ^b
2. Carbohydrate (g)	150 ± 42 ^a	162 ± 40 ^b	165 ± 42 ^b
3. Fat (g)	42 ± 10 ^a	46 ± 13 ^{ab}	47 ± 13 ^b
4. Protein (g)	45 ± 10 ^a	50 ± 12 ^b	51 ± 12 ^b
CHO : Prot : Fat	51 : 16 : 33	52 : 16 : 32	52 : 16 : 32
<u>Micronutrients</u>			
1. Vitamin A (µg RE)	313 ± 592 ^a	380 ± 634 ^b	396 ± 575 ^b
2. Thiamine (mg)	1.0 ± 0.8 ^a	1.2 ± 0.9 ^b	1.1 ± 0.7 ^b
3. Riboflavin (mg)	0.9 ± 0.4	1.0 ± 0.5	1.0 ± 0.4
4. Vitamin C (mg)	25 ± 36	27 ± 40	26 ± 26
5. Iron (mg)	6.1 ± 1.8 ^a	6.8 ± 2.1 ^b	7.2 ± 2.4 ^b
6. Calcium (mg)	268 ± 121 ^a	305 ± 161 ^{ab}	317 ± 140 ^b
7. Dietary fiber (g)	3.2 ± 1.8 ^a	4.0 ± 2.2 ^b	4.1 ± 2.3 ^b

¹ Mean ± SD, values in the same row with different superscript were significantly different (p < 0.05) by ANOVA and by Post-hoc comparison test using Scheffe for macronutrients and by Non-Parametric test (Kruskal-Wallis test) for micronutrients.

Table19 Comparison of breakfast nutrient intakes between children by school sizes

Nutrients	Breakfast nutrient intakes in different school sizes ¹		
	Small (n = 114)	Medium (n = 197)	Large (n = 213)
<u>Macronutrients</u>			
1. Energy (Kcal)	317 ± 94 ^a	355 ± 87 ^b	365 ± 101 ^b
2. Carbohydrate (g)	41 ± 14 ^a	43 ± 12 ^{ab}	44 ± 13 ^b
3. Fat (g)	11 ± 5 ^a	14 ± 5 ^b	14 ± 5 ^b
4. Protein (g)	13 ± 5 ^a	16 ± 5 ^b	15 ± 5 ^b
CHO : Prot : Fat	51 : 17 : 32	50 : 17 : 33	49 : 17 : 34
<u>Micronutrients</u>			
1. Vitamin A (µg RE)	90 ± 210 ^a	151 ± 342 ^b	160 ± 296 ^b
2. Thiamine (mg)	0.3 ± 0.6 ^a	0.4 ± 0.6 ^b	0.4 ± 0.5 ^b
3. Riboflavin (mg)	0.3 ± 0.2 ^a	0.4 ± 0.2 ^b	0.4 ± 0.2 ^b
4. Vitamin C (mg)	3.8 ± 11.9	3.5 ± 6.7	3.9 ± 7.3
5. Iron (mg)	1.7 ± 0.9 ^a	1.8 ± 0.8 ^b	1.8 ± 0.9 ^b
6. Calcium (mg)	90 ± 71 ^a	122 ± 88 ^b	136 ± 81 ^b
7. Dietary fiber (g)	0.8 ± 0.7	0.7 ± 0.7	0.8 ± 0.7

¹ Mean ± SD, values in the same row with different superscript were significantly different (p < 0.05) by ANOVA and by Post-hoc comparison test using Scheffe for macronutrients and by Non-Parametric test (Kruskal-Wallis test) for micronutrients.

5.8 The factors influence to breakfast behaviors in children

Table 20 showed factors that association with breakfast regularity. For school sizes, the regularity of breakfast eating in medium and large schools was good. Moreover the children in small schools usually had irregular breakfast eating. The children who went to school by walking had irregular breakfast eating habit, while the majority of children who had regular breakfast eating habit went to school by school bus. Children who had irregular breakfast showed that they usually ate breakfast at shop more than the children who had regular breakfast. Overall, breakfast regularity of children was significant association with school sizes, school administrative commissions, parents' education, traveling and places of breakfast eaten. In addition, places of breakfast eaten were associated with travel time. Those who had breakfast at school usually spent less time for traveling (< 30 minute). While, the children who usually ate breakfast at the shop and on the car spent longer than 60 minutes for traveling (Appendix C).

Table 20 The factors influence to breakfast skipping in children

Variables	Weekdays		P-value
	Regular (n=202) n (%)	Irregular (n=322) n (%)	
1. Genders			0.1
Boys	266 (50.2)	171 (44.5)	
Girls	264 (49.8)	213 (55.5)	
2. School administrative commissions*			0.00
BEC	140 (26.4)	72 (18.8)	
BMA	158 (29.8)	178 (46.4)	
PEC	232 (43.8)	134 (34.9)	
3. School sizes*			0.03
Small	97 (18.3)	98 (25.5)	
Medium	210 (39.6)	136 (35.4)	
Large	223 (42.1)	150 (39.1)	
4. Father' education level*			0.04
Primary school	121 (22.8)	103 (26.8)	
Junior high school	43 (8.1)	47 (12.2)	
Senior high school	69 (13.0)	33 (8.6)	
Diploma	17 (3.2)	17 (4.4)	
Bachelor degree	95 (17.9)	52 (13.5)	
Unknown	185 (34.9)	132 (34.4)	
5. Mother' education level*			0.001
Primary school	138 (26.0)	130 (33.9)	
Junior high school	46 (8.7)	38 (9.9)	
Senior high school	68 (12.8)	36 (9.4)	
Diploma	17 (3.2)	19 (4.9)	
Bachelor degree	105 (19.8)	39 (10.2)	
Unknown	156 (29.4)	122 (31.8)	

* By Chi-square test, significant association among the breakfast eating behavior groups ($p < 0.05$)

Table 20 The factors influence to breakfast skipping in children (con't.)

Variables	Weekdays		P-value
	Regular (n=202) n (%)	Irregular (n=322) n (%)	
6. Father' occupation			0.2
Unemployed	35 (6.6)	36 (9.4)	
Government	45 (8.5)	31 (8.1)	
Sale/ Business owners	177 (33.4)	106 (27.6)	
State Enterprises	9 (1.7)	12 (3.1)	
Agricultural workers	18 (3.4)	9 (2.3)	
Employee	214 (40.4)	161 (41.9)	
Unknown	32 (6.0)	29 (7.6)	
7. Mother' occupation			0.5
Unemployed	108 (20.4)	76 (19.8)	
Government	40 (7.5)	21 (5.5)	
Sale/ Business owners	160 (30.2)	117 (30.5)	
State Enterprises	5 (0.9)	6 (1.6)	
Agricultural workers	15 (2.8)	8 (2.1)	
Employee	172 (32.5)	135 (35.2)	
Unknown	30 (5.7)	21 (5.5)	
8. Nutritional status (W/H)			0.5
Wasting	57 (10.8)	34 (8.9)	
Normal	413 (77.9)	300 (78.1)	
Obesity	60 (11.3)	50 (13.0)	
9. Person whom children live with			0.3
Parents	460 (86.8)	334 (87.0)	
Grandfather, Grandmother	32 (6)	26 (6.8)	
Relation	38 (7.2)	24 (6.3)	

* By Chi-square test, significant association among the breakfast eating behavior groups ($p < 0.05$)

Table 20 The factors influence to breakfast skipping in children (con't)

Variables	Weekdays		P-value
	Regular (n=202) n (%)	Irregular (n=322) n (%)	
10. Knowledge			0.1
Good	423 (79.8)	292 (76.0)	
Moderate	101 (19.1)	81 (21.1)	
Worse	6 (1.1)	11 (2.9)	
11. Traveling*			0.01
School bus	110 (20.8)	71(18.5)	
By parents	273 (51.5)	167 (43.5)	
Bus	52 (9.8)	44 (11.5)	
Bicycle	22 (4.2)	18 (4.7)	
Walk	73 (13.8)	84 (21.9)	
12. Time used of traveling			0.3
< 30 minute	335 (66.6)	274 (71.4)	
30-60 minute	153 (28.9)	98 (25.5)	
> 60 minute	24 (4.5)	12 (3.1)	
13. Money			0.6
Low (< 10 Baht)	10 (1.9)	5 (1.3)	
Medium (10-30 Baht)	231 (43.6)	181 (47.1)	
High (31-50 Baht)	221 (41.7)	156 (40.6)	
Very high (> 50 Baht)	68 (12.8)	42 (10.9)	
14. Places of breakfast eaten*			0.01
Home	371 (70.0)	237 (61.7)	
School	105 (19.8)	108 (28.1)	
Shop	35 (6.6)	31 (8.1)	
Car	19 (3.6)	8 (2.1)	

* By Chi-square test, significant association among the breakfast eating behavior groups

5.9 Knowledge on breakfast of school children

Knowledge on breakfast is presented in **Table 21**. Most of children understood about breakfast eating, except the test question No. 8-11 which about 20-30% of children misunderstood. Test question No. 8-9 presented breakfast and obesity and No. 10-11 revealed foods for breakfast. The boys got more uncorrected answers about breakfast and obesity than the girls significantly (Appendix C). In addition, knowledge about foods for breakfast between boys and girls were no significant different. **Table 22** presented knowledge on breakfast among breakfast regularity of children. The irregular breakfast group misunderstood about breakfast with nutritional status, breakfast with psychosocial issues and mood significantly higher than those of regular breakfast.

Table 21 Knowledge in breakfast eating habit of school children

No.	Knowledge	% understand about breakfast eating
1.	Breakfast is the most important meal of the day	97.6
2.	Having regular breakfast important of children growth	96.9
3.	Breakfast cause to be sleepy, tired and tardy	93.2
4.	Breakfast cause to be moody and decline mental health	94.7
5.	Breakfast has a positive effect on aspects of mood and psychosocial issues	83.8
6.	Breakfast helps increase school attendance and provides energy to sustain the children through the day	91.0
7.	Breakfast eating reduces academic performance	91.7
8.	Skipping breakfast leads to weight lost	79.4
9.	Having regular breakfast causes obesity	79.3
10	Breakfast eating reduces in between meals consumption	71.9
11.	Only beverage can be counted as breakfast and good for academic performance.	68.1
12.	Eating a variety of foods and proper quantity for nutrient intakes is the best recommendation for breakfast	92.3

Table 22 Knowledge in breakfast eating of school children by breakfast regularity

No.	Knowledge	Misunderstand about breakfast eating		P-value
		Regular (n=202) n (%)	Irregular (n=322) n (%)	
1.	Breakfast is the most important meal of the day	9 (1.7)	13 (3.4)	0.1
2.	Having regular breakfast important of children growth	8 (1.5)	20 (5.2)	0.001
3.	Breakfast cause to be sleepy, tired and tardy	31 (5.8)	31 (8.1)	0.2
4.	Breakfast cause to be moody and decline mental health	18 (3.4)	30 (7.8)	0.003
5.	Breakfast have a positive effect on aspects of mood and psychosocial issues	88 (16.6)	60 (15.6)	0.7
6.	breakfast helps increase school attendance and provides energy to sustain the children through the day	41(7.7)	41(10.7)	0.1
7.	Breakfast eating reduce academic performance	39 (7.4)	37 (9.6)	0.2
8.	Skipping breakfast leads to weight lost	100 (18.9)	88 (22.9)	0.1
9.	Having regular breakfast causes obesity	99 (18.7)	90 (23.4)	0.08
10	Breakfast eating reduced in between meals consumption	154 (29.1)	103 (26.8)	0.4
11.	Only beverage can be counted as breakfast and good for academic performance.	169 (31.9)	123 (32.0)	0.9
12.	Eating a variety of food and enough for nutrient intakes is the best recommended for breakfast	33 (6.2)	37 (9.6)	0.06

* By Chi-square test, significant at $p < 0.05$

CHAPTER VI

DISCUSSION

The cross-sectional survey, which was reported in this study, used 3 days food record to assess the contribution of breakfast to nutrient intakes. This study was also conducted to determine breakfast eating pattern, breakfast behavior and determine the difference between the school groups (school administrative commissions and school sizes).

6.1 The regularity of breakfast behavior

According to this study, skipping breakfast in weekdays was found to be quite low. It was 2.7% compared to 10.3% and 5.3% that were reported by Noipong P et al. (31) and Temcharoen P et al. (12), respectively. This trend could be explained by three reasons. First of all, the breakfast meal of this study could be food or beverage before 10.00 a.m., further more, school under the BEC and BMA was supported by government for school milk program so most of children could have milk drinking. Secondly, the location of randomly school of this study was not in the crowded area, so most children (71.4%) spent time for traveling to school less than 30 minutes, and the parents also had more time to prepare and to cook breakfast for their children. Thirdly, some schools prepared food for serving students between meals at 09.00-09.45 a.m., thus children were able to have food in breakfast time. For BMA children, the regularity of breakfast eating declined when compared to Temcharoen P et al (11, 12). Children who lived with high educated parents had more regular breakfast than low educated parents which comparable with the finding of Temcharoen P et al (11). Nicklas TA, et al. (24) found that female skipped breakfast more than male, while this study found no different among boys and girls. The reasons of skipping breakfast were the same as Ortega, et al. (23) and Story et al (64), which were not hungry, wake up late and no time. When compare among school administrative commissions, regular breakfast consumption was found in PEC which similar to the finding of Siwarangsan N. (44). For students' knowledge, it was found that the knowledge on

breakfast consumption related to weight control was wrong among boys. Furthermore, about one-third of the student misunderstood that only beverage can be counted as breakfast. The irregular breakfast eating students misunderstood about breakfast benefits (breakfast with nutritional status, breakfast with psychosocial issues and mood) more than those of regular breakfast.

6.2 Breakfast eating pattern of children

In weekdays, more than half of the children (58.4%) had a single plate dishes for breakfast which there was rice porridge (rice gruel cooked with soup) and about 36.2% had rice with side dish. The children usually had breakfast at home (66.5%) before they went to school. Nicklas TA et al. (26) reported that children who ate breakfast, 75% ate at home and Winarno FG et al. (30) found up to 70% of school children in Indonesia had street foods for breakfast which the most popular dish was chicken rice porridge. While, in this study; breakfast eating pattern was different from the report of Noipong P (31), Changkit C (33) 10 years ago of which most children usually ate rice with side dishes. This difference could be explained by a few reasons. For example, socioeconomic and lifestyles were different, parents hasten for going to work, so the single-plate dish was served at home. However, choosing single plate dish of children was the similar pattern in the study of Inmaiya W. (34), Utang S. (35), whereas the place of breakfast eaten was changed from eating breakfast outside to usually eat at home. By schools' groups, the children in different school administrative commissions had the same breakfast eating pattern. Whereas, children in small and medium schools usually ate fast food for breakfast more than children in large school. Overall, breakfast eating pattern were not dependent on genders and school administrative commissions. Breakfast eating pattern of personnel at Mahidol University by Boonpradern A. (16) presented that there were difference between education level and sex, significantly.

6.3 Breakfast and dietary intakes

6.3.1 Macronutrients

Energy

The mean energy intakes were 74 % RDA, which were not enough for energy requirement (less than 90% RDA). Breakfast energy intakes were 351 kcal, which contributed about 21% of RDA, and accounted for 28% of daily energy intakes. Energy intakes of studied children were higher than the study of Noipong P. (31), which the children received only 15% daily energy intakes for breakfast. This can be explained by the children in BEC and BMA got more nutrients because they were supported by school milk for breakfast in weekdays. The breakfast's energy distribution for carbohydrate: protein: fat was 50: 17: 33 which children received high proportion on protein and fat because most of cooking method were fried or stir fried (71% of rice with side dish). Omelet and fried meat were the popular menus (49% of rice with side dish). The macronutrient and micronutrient of daily and breakfast nutrient intakes between genders were no differences, while Siwarangsan N. (44) reported that daily intakes were significant difference between boys and girls which energy consumption for breakfast in boys was higher than girls. Aranceta J et al. (64) found that boys tended to have higher total energy, carbohydrate, protein, and fat intakes at breakfast compared with girls. In addition, the children received daily nutrient intakes in weekends more than weekdays. The energy intakes of breakfast were not difference between children, who either had breakfast regularly or irregularly. Whereas, Nicklas TA et al. (25) found that percentages of subjects consuming at least two-thirds of the Recommended Dietary Allowance, was significantly higher in subjects who consumed breakfast when compared with those who skipped breakfast. Wilson NC et al. (42) described that children who ate breakfast consumed more energy (8,748 KJ) than those who did not (7982 KJ). Children in different school administrative commissions was difference of breakfast intakes, the percentage of children who had regular breakfast in BEC and BMA schools was more than the PEC children. This result could be explained by the reason which the children in PEC were not supported by school milk for breakfast. While,

the study of Siwarangsan N. (44) found PEC children were better in nutritional status and daily nutrient intakes than those of BEC and BMA children. In different school size, children in medium and large school received energy intakes more than small schools because the students had their breakfast more regular. However, only 21.6% the children received enough energy for recommended breakfast ($> 25\%$ RDA) and most of the children (63.2%) received about 15-25% RDA. Overall, the daily energy intake was depend on weekdays and weekends and school sizes. Breakfast intake was depend on school sizes and school administrative commissions.

Protein

The protein intake was 113 % RDA which 67 % of protein was derived from animal source. On average, the protein intake at breakfast contributed as much as 34 % RDA and about 30.7 % of daily intakes. Children received high protein in breakfast because most of the food items were omelet or fried meat. Similar finding was reported by Temcharoen P et al. (11). Siwarangsan N. (44) revealed that, protein intake was reasonably good because the children received more than 100% RDA (50.3-70.5g per day). In addition, children in PEC received protein lower than children in BEC and BMA than PEC. This result could be explained by the similar reason for energy intake. The children in medium and large schools also received protein on breakfast more than children in small schools.

Fat

Fat intake of breakfast also accounted for about 29.3 % of daily intakes. The energy distribution of breakfast for carbohydrate: protein: fat: were 50: 17: 33 and that of daily intake were 52: 16: 32. Thus, breakfast and other meals did not differ in the energy distribution. Energy distribution from fat in breakfast of all commissions were more than 30% of total energy. There was a different proportion of energy from fat in their breakfast when compared among different school commissions. Breakfast of BMA contributed the highest energy from fat which came from fried and deep fried food (omelet, fried eggs and pork). The children in medium and large schools also received more fat at breakfast; therefore it could be the higher intake of protein in medium and large school. Williams P. (40) presented that the

typical breakfast for the Australians was low in fat, high in carbohydrate and good source of thiamine, riboflavin, niacin, calcium and magnesium. The breakfast meal provided between 12% and 19% of the daily energy intake.

6.3.2 Micronutrients

Most of daily micronutrient intakes were not sufficient (less than 2/3 of RDA), except thiamine and riboflavin (>100% RDA). In this study, fruits and vegetables were not commonly consumed at breakfast and whole day, thus vitamin C and dietary fiber were not reached the recommendation. The micronutrient intakes of breakfast were not difference among children, who either had breakfast regularly or irregularly. Findings from Larson NI et al. (65) indicated that eating breakfast may improve total daily calcium intakes. Although, children in BEC and BMA school were supported by school milk (about 61% of the studied children), their calcium intakes were quit low, 30% and 12% RDA for daily and breakfast intake, respectively. Vitamin C intakes in weekends was higher than weekdays, it could be explained by the children consumed fruits and vegetables in weekend more than weekdays. In weekends, calcium intake was lower because they were not supported by school milk. Breakfast intakes in weekdays and weekends were no significant difference in some micronutrients (except, vitamin A, riboflavin, iron and dietary fiber). Vitamin A and riboflavin intake in weekends were less than weekdays. Daily calcium intake in BEC and BMA children were higher than PEC children. Besides, more intakes of riboflavin and calcium in children of BMA than PEC and BEC were observed. By school sizes, there were significant difference between school sizes in most micronutrients, except riboflavin and vitamin C. Children in medium and large schools received more vitamin A, thiamine, iron and dietary fiber than small school children, whereas there were not different between medium and large schools. The breakfast micronutrient intakes were significant difference between school sizes in most micronutrients, except vitamin C and dietary fiber. Vitamin A, thiamine, riboflavin, iron and calcium of children in small schools were receiving less than medium and large schools.

6.4 The factors influence to breakfast behaviors in children

The regularity of breakfast consumption in medium and large schools was good. The children who went to school by walking had irregular breakfast eating habit, while the majority of children who had regular breakfast eating habit went to school by school bus. Children who had irregular breakfast usually ate breakfast at shop and the places of breakfast eaten were associated with travel time. Those who had breakfast at school usually spent less time for traveling (< 30 minute). While, the children who usually ate breakfast at shop and on car, spent their time on traveling longer than 60 minutes. The irregular breakfast group misunderstood about breakfast with nutritional status, with psychosocial issues and mood significantly higher than those of regular breakfast. Overall, breakfast regularity of children was significant association with school size, parents' education, traveling and place of breakfast eaten. Temcharoen P et al. (11) found that breakfast consumption were significantly related to person whom children lived with, mother's education, father's occupation, family income, breakfast preparation patterns and breakfast eating habit of other family members. Keski-Rahkonen A et al. (66) revealed breakfast-skipping behavior in adults were associated with smoking, infrequent exercise, and dieting or concerns about body weight.

CHAPTER VII

CONCLUSION

A cross-sectional study was conducted among 914 primary children in Bangkok during November 2006-June 2007. The objectives of the study were to determine breakfast eating pattern, breakfast eating behavior and nutrient intake in different school administrative commissions and school sizes. The primary school children were randomly taken from Basic Education Commission (BEC) area 3 in Bangkok. The schools were sampling based on the proportion of schools in each administrative commission with equal proportion of school sizes. On collecting data, information of demography, breakfast eating behaviors, breakfast eating pattern were collected by questionnaires. Moreover, 3-day food record was used to determine breakfast and daily nutrient intakes.

More than half of children ate breakfast everyday and only 2.7% usually skipped breakfast during weekdays. In weekends, most of children usually had breakfast, while 3.8 % habitually skipped. Children in BMA usually skipped breakfast more than children in BEC and PEC, while children in large schools skipped breakfast less than in small and medium school children. The children did not have breakfast because they were not hungry and did not have time or wake up late. More than half of children had a single plate dish which was rice porridge (rice gruel cooked with soup) and about 36.2% ate rice with side dishes. Children in small and medium schools had fast food for breakfast more than children in large schools.

Daily energy intakes contributed about 74% RDA, whereas protein intake was about 113% RDA. Vitamin A, vitamin C, iron, calcium and fiber were not enough for requirement (less than 2/3 RDA). Thiamine and riboflavin were reasonably good (more than 100% RDA). For breakfast, energy intake was 351 kcal, which contributed about 21% of RDA and accounted for 28.4% of daily energy intakes. Among breakfast taker, 21.6% of children received appropriately energy for breakfast

(25 % RDA). Children in BEC and BMA received macronutrients (except carbohydrate) more than PEC children. Children in large and medium school sizes received macronutrients (except carbohydrate) more than small school children. Some micronutrients such as vitamin A, thiamine, riboflavin and calcium, breakfast also contributed about one-third of daily intakes, and slightly less for vitamin C and dietary fiber. Only thiamine and riboflavin were reasonably good (more than 25% RDA).

Most of the children had a knowledge about breakfast eating, but about 20-30% of children misunderstood about foods for breakfast and breakfast with obesity. The irregular breakfast eating students misunderstood about breakfast on nutritional status, psychosocial issues and mood significantly more than those of regular breakfast eating students.

Breakfast eating behavior was associated with school administrative commissions, school sizes, parents' education, traveling and place of breakfast eaten. Students who had breakfast at school usually spent less time for traveling (< 30 minutes).

Suggestion and recommendation for practical applications

1. This research study is a study case on breakfast regularity, breakfast eating pattern and breakfast nutrient intakes of students in BEC 3, Bangkok. This could not be a representative of all of students in Bangkok. Other BEC areas should be explored. It would be more perfect if the study could cover the students from other parts of Thailand in order to represent Thai students

2. Breakfast has been described as the most important meal of the day, contributing substantially to daily nutrient intake and energy needs. Transferring the right information of eating breakfast to consumers should be performed for recognizing and choosing foods correctly, especially in schools. School policy should not only provide some breakfast to their students but also give them the information of how importance of breakfast on health benefits and how to choose breakfast suitably.

3. This study showed a slightly low intake of vitamin C and fiber. Thus, increasing fruits and vegetables consumption in breakfast and other meals should be promoted.

4. Children who tend to skip breakfast because of a lack of time in the morning, should eat breakfast either at school or on their way to school. The example of breakfast foods which were easy to eat, are breakfast cereal, bakery with milk, 100% juice, and fresh fruit.

5. Nutritionists can help parents and care givers by providing suggestions on appropriate and easy to serve foods, homemade or commercial, for children breakfast.

REFERENCES

1. Cereal Institute, inc. A complete summary of the Iowa breakfast studies. Chicago: Cereal Institute Inc, 1962.
2. Benjamin T, Burton D, Willis RF. Human Nutrition. 4th edition: Mcgrac-Hill, 1988: 202.
3. Daum K, Tuttle WW, Larsen R, Roloff L, Salazano J. Physiologic response of boys twelve to fourteen years old to different breakfast. *J Am Diet Assoc.* 1995; 31: 359-62.
4. Pollitt E. Breakfast and cognition: an integrative summary. *Am J Clin Nutr.* 2001; 67(suppl): 804–13.
5. Simeon DT, Grantham-McGregor S. Effects of missing breakfast on the cognitive functions of school children of differing nutritional status. *Am J Clin Nutr.* 1989; 49: 646–53.
6. Pollitt E, Jacoby E, Cueto S. School breakfast and cognition among nutritionally at-risk children in the Peruvian Andes. *Nutr Rev.* 1996; 54: 22–6.
7. Affenito S, Thompson C, Barton A, Franko D, Daniels S, Obarzanek E, Schreiber G, Striegel-Moore R. Breakfast consumption by African-American and White adolescent girls correlates positively with calcium and fiber intake and negatively with body mass index. *J Am Diet Assoc.* 2005; 105: 938-45.
8. Schlundt DG, Hill JO, Sbrocco T, Pope-Cordle J, Sharp J. The role of breakfast in the treatment of obesity a randomized clinical trial. *Am J Clin Nutr.* 1992; 55: 645-51.
9. Williams P. Breakfast and the diets of adult Australian adults: an analysis of data from the 1995 National Nutrition Survey. *Int J Food Sci Nutr.* 2005; 56: 65-79.
10. Siega-Riz AM, Popkin BM, Carson T. Trends in breakfast consumption for children in the United States from 1965-1991. *Am J Clin Nutr.* 1998; 67(suppl): 748-56.

11. ภารดี เต็มเจริญ, พรพิมล หลวงทิมอิน และวงเดือน ปั้นดี. การเปลี่ยนแปลงพฤติกรรมการบริโภคอาหารและภาวะโภชนาการของนักเรียนในโรงเรียนสังกัดกรุงเทพมหานครในช่วงทศวรรษ. รายงานการวิจัย พ.ศ. 2538.
12. ภารดี เต็มเจริญ, รัตนาภรณ์ เจริญพงศ์, พรพิมล หลวงทิมอิน, ฉวีวรรณ บุญสุยา. พฤติกรรมการบริโภคอาหารเช้าของนักเรียนประถมศึกษาในโรงเรียนสังกัดกรุงเทพมหานคร. โภชนาการสาร. 2529; 20: 193-210.
13. Mahawana T, Sirisawang V. Eating and physical exercise behavior of children in elementary school. Chiang Mai Med Bull. 2005; 44(2): 65-71.
14. Taral L, Suzen M, Aleksandra K. Beverage patterns, diet quality, and body Mass index of US Preschool and School-Aged Children. J Am Diet Assoc. 2007; 107: 1124-33.
15. คณะกรรมการจัดทำข้อกำหนดสารอาหารประจำวันที่ร่างกายควรได้รับของประชาชนชาวไทย กรมอนามัย กระทรวงสาธารณสุข. ข้อกำหนดสารอาหารที่ได้รับประจำวันและแนวทางการบริโภคอาหารสำหรับคนไทย พิมพ์ครั้งที่ 2: กรุงเทพมหานคร: โรงพิมพ์องค์การสงเคราะห์ทหารผ่านศึก 2546.
16. Boonpraderm A. Breakfast eating pattern and dietary intake: A case study of personnel at Mahidol University, Salaya, Nakhon Pathom, Thailand [M.Sc. Thesis in Food and Nutrition for Development]. Nakhon Pathom: Faculty of Graduate Studies. Mahidol University; 1997.
17. Morgan KJ, Zabik M, Stampley G. Breakfast consumption patterns of older Americans. J Nutr Elderly. 1996; 5: 19-44.
18. Preziosi P, Galan P, Deheeger M, Yacoub N, Drewnowski A. Breakfast type, daily nutrient intakes and vitamin and mineral status of French children, adolescents and adults. Am Coll Nutr. 1999; 18: 171-8.
19. Pivik RT, Dykman RA, Tennal K, Gu Y. Skipping breakfast: gender effects on resting heart rate measures in preadolescents. Physiology and Behavior. 2006; 89: 270-80.
20. Ruxton CHS, Kirk TR. Breakfast: a review of associations with measures of dietary intake, physiology and biochemistry. Br J Nutr. 1997; 78: 199-213.

21. Song WO, Chung CE, Chun OK, Cho, Kerver J. Ready-to-Eat breakfast cereal consumption enhances milk and calcium intake in the US population. *J Am Diet Assoc.* 2006; 106: 1783-9.
22. Hii S, Ebro LL, and Leong JK. Food consumption behavior and nutrition and health knowledge of Malaysian students. *J Am Diet Assoc.* 1997; 97(9): p. A74.
23. Gross SM, Bronner Y, Welch C, Dewberry-Moore N, Paige DM. Breakfast and lunch meal skipping patterns among fourth-grade children from selected public schools in urban, suburban, and rural Maryland. *J Am Diet Assoc.* 2004; 104: 420-3.
24. Ortega RM, Requejo AM, Lopez-Sobaler AM, AndresP, Quintas ME, Navia B, Izquierdo M, Rivas T. The importance of breakfast in meeting daily recommended calcium intake in a group of school children. *J Am Coll Nutr.* 1998; 17: 19-24.
25. Nicklas TA, Bao W., Webber LS, Berenson GS. Breakfast consumption affects adequacy of total daily intake. *J Am Diet Assoc.* 1993; 93: 886-91.
26. Nicklas TA, Mcquarrie A, Fastnaught C, O'Neil CE. Efficiency of breakfast consumption patterns of ninth graders: Nutrient-to-cost comparisons. *J Am Diet Assoc.* 2002; 102: 226-33.
27. Susan MG, Bronner Y, Welch C, Moore ND, Paige DM. Breakfast and lunch meal skipping patterns among fourth-grade children from selected public schools in urban, suburban, and rural Maryland. *J Am Diet Assoc.* 2004; 104: 420-3.
28. Sjoberg A, Hallberg, Hoglund D, Hulthen L. Meal pattern, food choice, nutrient intake and lifestyle factors in the Goteborg adolescence study. *Euro J Clin Nutr.* 2003; 57: 1569-78.
29. Young EM, Fors SW. Factors related to the eating habits of students in grades 9-12. *J Sch Health.* 2001; 71(10): 483-8.
30. Winarno FG. Street food project studies in Indonesia progress report (no. 1-8). 1992.

31. เพ็ญศิริ น้อยพงษ์. บทบาทของอาหารเข้าต่อปริมาณสารอาหารที่ได้รับใน 1 วันและสถานะโภชนาการของเด็กวัยเรียน การศึกษาเฉพาะกรณีในโรงเรียนพิบูลย์ประชาสรรค์. วิทยานิพนธ์วิทยาศาสตร์บัณฑิต (สาธารณสุขศาสตร์) สาขาโภชนวิทยา. บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล, 2529.
32. อุไรพร จิตต์แจ้ง, ประไพศรี สิริจักรวาล, กิตติ สรณเจริญพงศ์. รายงานการศึกษาพฤติกรรมการบริโภคขนมและอาหารว่างของเด็ก 3-15 ปี. นครปฐม: สถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล; 2547.
33. ฉวีวรรณ แจ่มกิจ. รูปแบบอาหารบริโภคและคุณค่าทางโภชนาการของอาหารวัยรุ่น ในเขตกรุงเทพมหานคร. วิทยานิพนธ์ปริญญาโทศึกษาศาสตร์ มหาวิทยาลัยเกษตรศาสตร์. กรุงเทพฯ: บัณฑิตมหาวิทยาลัย มหาวิทยาลัยเกษตรศาสตร์; 2537.
34. วรรณ อินทร์ไยยะ. ปัจจัยที่มีผลต่อรูปแบบการบริโภคอาหารว่างของเด็กนักเรียนในเขตกรุงเทพมหานคร. วิทยานิพนธ์ปริญญาโทศึกษาศาสตร์ มหาวิทยาลัยเกษตรศาสตร์. กรุงเทพฯ: บัณฑิตมหาวิทยาลัย มหาวิทยาลัยเกษตรศาสตร์; 2533.
35. ศันสนีย์ อุดมอ่าง. การบริโภคโยอาหารของวัยรุ่นในเขตกรุงเทพมหานคร. วิทยานิพนธ์ปริญญาโทศึกษาศาสตร์ มหาวิทยาลัยเกษตรศาสตร์. กรุงเทพฯ: บัณฑิตมหาวิทยาลัย มหาวิทยาลัยเกษตรศาสตร์; 2533.
36. มัณฑนา หิรัญประดิษฐ์. โภชนศึกษาเกี่ยวกับเจตคติในการบริโภคอาหารเข้าของนักเรียนในสังกัดกรุงเทพมหานคร เขตพญาไท. วิทยานิพนธ์ปริญญาโทศึกษาศาสตร์ มหาวิทยาลัยเกษตรศาสตร์. กรุงเทพฯ: บัณฑิตมหาวิทยาลัย มหาวิทยาลัยเกษตรศาสตร์; 2533.
37. Sripong TE, Noor MI, Azudin MN, Idris K. Nutrient composition of Malaysian foods. Food habits research and development, Malaysia. 1988.
38. Nicklas TA, Myers L, Reger C, Beech B, Berenson GS. Impact of breakfast consumption on nutritional adequacy of the diets of young adults in Bogalusa, Louisiana: Ethnic and gender contrasts. J Am Diet Assoc. 1998; 98: 1432-8.
39. Jacoby E, Cueto S, Pollitt E. Benefits of a school breakfast programme among Andean children in Huaraz, Peru. Food and Nutrition Bulletin, 17(1): 54-64.

40. Williams P. Breakfast and the diets of Australian children and adolescents: an analysis of data from the 1995 National Nutrition Survey. *Int J Food Sci Nutr.* 2007; 58(3): 201-16.
41. Matthys C, De Henauw S, Bellemans M, De Maeyer M, De Backer G. Breakfast habits affect overall nutrient profiles in adolescents. *Public Health Nutrition.* 2007; 10(4): 413-21.
42. Wilson NC, Parnell WR, Wohlers M and Shirley PM. Eating breakfast and its impact on children' daily diet. *Nutrition and Dietetics.* 2006; 63: 15-20.
43. Farshchi HR, Taylor MA, Macdonald IA. Deleterious effects of omitting breakfast on insulin sensitivity and fasting lipid profiles in healthy lean women. *Am J Clin Nutr.* 2005; 81: 388-96.
44. นภา ศิวรังสรรค์. ภาวะโภชนาการของเด็กระดับประถมศึกษา กรุงเทพมหานคร โดยการสัมภาษณ์อาหารที่รับประทานในรอบ 24 ชั่วโมง. *โภชนาการสาร* 2531; ปีที่ 22, เล่มที่ 2: 117-26.
45. Song WO, Chun OK, Obayashi S, Cho S, Chung CE. Is consumption of breakfast associated with body mass index in US adults?. *J Am Diet Assoc.* 2005; 5: 373-82.
46. Utter J, Scragg R, Mhurchu CN, Schaaf D. At-home breakfast consumption among New Zealand children: Associations with body mass index and related nutrition behaviors. *J Am Diet Assoc.* 2007; 107: 570-6.
47. Niemeier HM, Raynor HA, Lloyd-Richardson EE, Rogers ML, and Wing RR. Fast food consumption and breakfast skipping: predictors of weight gain from adolescence to adulthood in a nationally representative sample. *Journal of Adolescent Health.* 2006; 39: 842-9.
48. Barton BA, Eldridge AL, Thompson D, Affenito SG, Striegle-Moore RH, Franko DL, Albertson AM, Crockett SJ. The relationship of breakfast and cereal consumption to nutrient intake and body mass index: The National Heart, Lung and Blood Institute Growth and Health Study. *J Am Diet Assoc.* 2005; 05: 383-9.
49. Wyatt HR, Grunwald GK, Mosca CL, Klem ML, Wing RR and Hill JO. Long-term weight loss and breakfast in subjects in the National Weight Control Registry. *Obes Res.* 2002; 10:78-86.

50. Snapp BD. Too many kids still come to school hungry and stay that way till lunch. *Am School Board*. 1989; 36-7.
51. Pollitt E, Mathews R. Breakfast and cognition: An integrative summary. *Am J Clin Nutr*. 1998; 67(suppl): 804-13.
52. Wyon DP, Abrahamsson L, Jartelius M, Fletcher RJ. An experimental study of the effects of energy intake at breakfast on the test performance of 10-year-old children in school. *Int J Food Sci Nutr*. 1997; 48: 5-12.
53. Benton D and Pearl YP. Breakfast, blood and cognition. *Am J Clin Nutr*. 1998; 67(suppl): 772-8.
54. Kleinman RE, Hall S, Green H, Korzec-Ramirez D, Patton K, Pagano ME, Murphy JM. Diet, breakfast, and academic performance in children. *Ann Nutr Metab*. 2002;46(suppl 1): 24-30.
55. Lopez-Sobaler AM, Ortega RM, Quintas RM, Navia B and Requejo AM. Relationship between habitual breakfast and intellectual performance (logical reasoning) in well-nourished schoolchildren of Madrid (Spain). *Euro J Clin Nutr*. 2003; 57 (Suppl1): 49-53.
56. Kaplan RJ. Cognitive performance is associated with glucose regulation in healthy elderly persons and can be enhanced with glucose and dietary carbohydrate. *Am J Clin Nutr*. 2000; 72: 825-36.
57. Simeon DT, Grantham-McGregor S. Effects of missing breakfast on the cognitive functions of school children of differing nutritional status. *Am J Clin Nutr*. 1989; 49: 646-53.
58. Mahoney CR, Taylor HA, Kanarek RB, Samuel P. Effect of breakfast consumption on cognitive processes in elementary school children. *Physiol Behav*. 2005; 85:635-45
59. Gibson SA., O'Sullivan KR. Breakfast cereal consumption patterns and nutrient intakes of British schoolchildren. *Journal of the Royal Society of Health*. 1995, 115(6): 366-70.
60. Lopez I, de Andraca I, Perales CG, Heresi E, Castillo M, Colombo M. Breakfast omission and cognitive performance of normal, wasted and stunted schoolchildren. *Eur J Clin Nutr*. 1993; 47(8): 533-42

61. Institute of Nutrition. Food Composition Database WD.1.0 for INMUCAL Program. Salaya Nakhon Pathom Province, Thailand: Mahidol University 2007.
62. Institute of Nutrition. INMUThai growth. Salaya Nakhon Pathom Province, Thailand: Mahidol University.
63. Story M, Neumark-Sztainer D, Hannan PJ and Croll J. Overweight status and eating patterns among adolescents: Where do youths stand in comparison with the healthy people 2010 objectives?. *J Am Diet Assoc.* 2002; 102: 40-51.
64. Aranceta J, Serra-Majem L, Ribas L, Perez-Rodrigo C. Breakfast consumption in Spanish children and young people. *Public Health Nutr.* 2001; 4: 1439-44.
65. Larson NI, Story M, Wall M, Neumark-Sztainer D. Calcium and dairy intakes of adolescents are associated with their home environment, taste preferences, personal health beliefs, and meal patterns. *J Am Diet Assoc.* 2006; 106: 1816-24.
66. Keski-Rahkonen A, Kaprio J, Rissanen A, Virkkunen M, Rose RJ. Breakfast skipping and health-compromising behaviors in adolescents and adults. *Eur J Clin Nutr.* 2003; 57: 842-53.

APPENDIX

Appendix A Questionnaire

การศึกษาปริมาณพลังงานและสารอาหารที่เด็กไทยได้รับจากอาหารมื้อเช้า

ส่วนที่. 1 ข้อมูลทั่วไป

1. ชื่อ (ค.ช., ค.ญ.) นามสกุล.....
 โรงเรียน ชั้นประถมศึกษาปีที่.....
 วัน/ เดือน/ ปี เกิด อายุ..... ปี
 เบอร์โทรศัพท์
2. น้ำหนัก..... กิโลกรัม ส่วนสูง เซนติเมตร
3. ปัจจุบันอาศัยอยู่กับใคร
 () 1. พ่อ,แม่ () 2. ปู่, ย่า, ตา, ยาย
 () 3. ญาติ (ลุง, ป้า, น้า, อา) () 4. บุคคลอื่น ๆ ระบุ.....
4. โดยปกติ นื่องได้เงินมาโรงเรียนวันละ บาท ใช้จ่ายอย่างไรบ้าง
 () 1. ค่าอาหารเช้า / กลางวัน บาท () 2. ค่าขนม บาท
 () 3. ค่าเดินทาง บาท () 4. เหลือเก็บ บาท
 () 5. อื่น ๆ ระบุ บาท
5. การเดินทางจากบ้านมาโรงเรียนตอนเช้า
 () 1. รถโรงเรียนรับ-ส่ง () 2. ผู้ปกครองมาส่ง
 () 3. รถโดยสารประจำทาง () 4. จักรยาน
 () 5. เดิน () 6. รถรับจ้าง (มอเตอร์ไซค์รับจ้าง, แท็กซี่)
 () 7. อื่น ๆ ระบุ.....
6. ระยะเวลาเดินทางจากบ้านไปโรงเรียน
 () 1. น้อยกว่า 30 นาที () 2. ประมาณ 30 – 60 นาที
 () 3. มากกว่า 1 ชั่วโมง
7. ปกติ นื่องเข้านอนเวลาเท่าไร
 () 1. ก่อน 2 ทุ่ม () 2. ช่วง 2-3 ทุ่ม
 () 3. ช่วง 3- 4 ทุ่ม () 4. หลัง 4 ทุ่ม

8. ปกติตื่นนอนตอนเช้าเวลาเท่าไร

- () 1. ก่อน 6 โมงเช้า () 2. ช่วง 6 โมง ถึง 6 โมงครึ่ง
() 3. ช่วง 6 โมงครึ่ง ถึง 7 โมงเช้า () 4. หลัง 7 โมงเช้า

9. การศึกษาของพ่อ

- () 1. ประถมศึกษา () 2. มัธยมศึกษาตอนต้น หรือม.3
() 3. มัธยมศึกษาตอนปลาย หรือม.6 หรือปวช. () 4. อนุปริญญา หรือปวส.
() 5.ปริญญาตรี () 6.ปริญญาโท หรือสูงกว่า
() 7.ไม่ทราบ

10. การศึกษาของแม่

- () 1. ประถมศึกษา () 2. มัธยมศึกษาตอนต้น หรือม.3
() 3. มัธยมศึกษาตอนปลาย หรือม.6 หรือปวช. () 4. อนุปริญญา หรือปวส.
() 5.ปริญญาตรี () 6.ปริญญาโท หรือสูงกว่า
() 7.ไม่ทราบ

11. อาชีพของพ่อ

- () 1. ไม่ได้ประกอบอาชีพ () 2. รับราชการ
() 3. ค้าขาย/ธุรกิจส่วนตัว () 4. เอกชน, บริษัท
() 5. รัฐวิสาหกิจ () 6. เกษตร/ประมง
() 7. รับจ้าง () 8. ไม่ทราบ
() 9. อื่น ๆ ระบุ

12. อาชีพของแม่

- () 1. ไม่ได้ประกอบอาชีพ () 2. รับราชการ
() 3. ค้าขาย/ธุรกิจส่วนตัว () 4. เอกชน, บริษัท
() 5. รัฐวิสาหกิจ () 6. เกษตร/ประมง
() 7. รับจ้าง () 8. แม่บ้าน
() 9. ไม่ทราบ () 10. อื่น ๆ ระบุ

ส่วนที่ 2: ข้อมูลด้านทัศนคติเกี่ยวกับอาหารและโภชนาการ

ข้อความต่อไปนี้มองเห็นด้วยหรือไม่	เห็นด้วย	ไม่เห็นด้วย	ไม่แน่ใจ/ ไม่ทราบ
1. เด็กควรได้รับอาหารที่เพียงพอ เพื่อการเจริญเติบโตอย่างสมวัย			
2. การได้รับสารอาหารไม่เพียงพอทำให้เกิดโรค ขาดสารอาหาร (เช่น โรคโลหิตจาง, โรคเหน็บชา)			
3. การได้รับสารอาหารบางอย่างมากเกินไปโดยเฉพาะแป้ง, น้ำตาล, ไขมัน ทำให้เกิดโรคโภชนาการเกิน/โรคไม่ติดต่อ (เช่น โรคอ้วน, โรคหัวใจ, เบาหวาน)			
4. เด็กวัยเรียนไม่จำเป็นต้องดื่มนมทุกวัน			
5. การกินอาหารไม่จำเป็นต้องได้รับครบทั้ง 3 มื้อ			
6. อาหารแต่ละชนิดให้สารอาหารไม่ครบถ้วน ดังนั้นต้องรับประทาน อาหารให้มีความหลากหลาย			
7. คนปกติไม่จำเป็นต้องได้รับอาหารเสริมใดๆ			
8. คนที่เป็นแผลหรือฝีเมื่อรับประทานไข่ จะทำให้แผลหายช้าหรือ เป็นแผลเป็น			
9. ผลไม้ทุกชนิดทานได้ไม่จำกัดปริมาณ ไม่ทำให้อ้วน			
10. ผักมีใยอาหารมาก ซึ่งมีส่วนช่วยในการทำงานของระบบขับถ่าย			

ส่วนที่ 3: ความรู้ความเข้าใจเกี่ยวกับการบริโภคอาหารเช้า

คำถาม	คำตอบ	
	ใช่	ไม่ใช่
1. อาหารมื้อเช้าเป็นอาหารมื้อที่สำคัญที่สุด		
2. การกินอาหารเช้าทุกวันช่วยให้เด็กมีการเจริญเติบโตสมวัย		
3. การกินอาหารเช้าทำให้ง่วงนอน อ่อนเพลีย ไม่กระปรี้กระเปร่า		
4. การกินอาหารเช้าทำให้หงุดหงิด อารมณ์เสียบ้าง		
5. อาหารเช้าส่งผลให้ความเครียดลดลง มีสุขภาพจิตดีขึ้น		
6. การกินอาหารเช้าทำให้สมาธิในการเรียนดีขึ้น		
7. การกินอาหารเช้าทำให้สมองไม่ปลอดโปร่ง ทำคะแนนสอบได้ไม่ดี		
8. การงดอาหารเช้าสามารถช่วยลดน้ำหนักได้		
9. การกินอาหารเช้าเป็นประจำทุกวันมีโอกาสู่วนมากกว่าการกินอาหารเช้าเป็นบางวัน		
10. การกินอาหารเช้าช่วยลดปริมาณการกินอาหารว่าง		
11. อาหารเช้าพวกน้ำผลไม้หรือน้ำหวานเพียงอย่างเดียว ทำให้ร่างกายกระปรี้กระเปร่า สมาธิในการเรียนเพิ่มขึ้น		
12. อาหารเช้าที่ดีควรมีสารอาหารต่าง ๆ ที่เพียงพอ และหลากหลาย		

ส่วนที่ 4: พฤติกรรมการบริโภคอาหารเช้าของนักเรียน

คำจำกัดความการรับประทานอาหารเช้าในแบบสอบถามนี้ หมายถึง การรับประทานอาหารเช้าในช่วงเวลาตั้งแต่ตื่นนอนในตอนเช้า ถึง 10.00 นาฬิกา

1. การรับประทานอาหารเช้าในวันสำรวจ

() 1. รับประทาน

() 2. ไม่ได้รับประทาน

2. โดยปกติ มีการรับประทานอาหารเช้าในวันเปิดเรียนหรือไม่

() 1. รับประทานเป็นประจำทุกวัน (ข้ามไปตอบข้อ 4)

() 2. รับประทานบางวัน

() 3. ไม่ได้รับประทาน

3. สาเหตุที่น้องไม่ได้รับประทานอาหารเช้า หรือรับประทานเป็นบางวัน เพราะอะไร

(ตอบได้มากกว่า 1 ข้อ)

- | | |
|--|--|
| <input type="checkbox"/> 1. ไม่มีการทำอาหารเช้าที่บ้าน | <input type="checkbox"/> 2. ไม่มีเวลา/ ตื่นสาย |
| <input type="checkbox"/> 3. ไม่หิว | <input type="checkbox"/> 4. เคยชิน |
| <input type="checkbox"/> 5. ต้องการลดน้ำหนัก | <input type="checkbox"/> 6. ไม่มีเงิน |
| <input type="checkbox"/> 7. อื่น ๆ ระบุ | |

4. ในวันหยุดเรียน วันเสาร์, วันอาทิตย์ มีการรับประทานอาหารเช้าหรือไม่

1. รับประทานประจำทุกสัปดาห์ (ข้ามไปตอบข้อ 6)
2. รับประทานเป็นบางสัปดาห์
3. ไม่ได้รับประทาน

5. สาเหตุที่น้องไม่ได้รับประทานอาหารเช้า หรือรับประทานเป็นบางสัปดาห์ เพราะอะไร

(ตอบได้มากกว่า 1 ข้อ)

- | | |
|--|---------------------------------------|
| <input type="checkbox"/> 1. ไม่มีการทำอาหารเช้าที่บ้าน | <input type="checkbox"/> 2. ไม่มีเวลา |
| <input type="checkbox"/> 3. ไม่หิว | <input type="checkbox"/> 4. เคยชิน |
| <input type="checkbox"/> 5. ต้องการลดน้ำหนัก | <input type="checkbox"/> 6. ตื่นสาย |
| <input type="checkbox"/> 7. อื่น ๆ ระบุ | |

6. อาหารเช้าที่รับประทานประจำ หรือ บ่อยที่สุด (ตอบได้มากกว่า 1 ข้อ) คืออะไร

1. ข้าว + กับข้าว เช่น ข้าว + ไข่ พะโล้
2. อาหารจานเดียว ระบุชนิด ก๋วยเตี๋ยว โจ๊ก ข้าวต้ม
- ข้าวผัด ข้าวเหนียวหมูบั้ง
3. อาหารฝรั่ง ระบุชนิด ขนมปัง ไข่ดาว, ไข่ลวก ซีเรียล
- ไส้กรอก เบเกอรี่ เช่น ขนมเค้ก, แยมโรล
4. ดื่มเครื่องดื่มอย่างเดียวไม่มีอาหารอื่น เช่น นม, โกโก้, มอลต์สก็ด
5. อื่น ๆ ระบุ

7. เครื่องดื่มที่ดื่มเป็นประจำในตอนเช้า

- () 1. ไม่ดื่ม
- () 2.นม ระบุชนิด นมจืด นมหวาน นมเปรี้ยว
 นมปรุงแต่ง เช่น รสช็อกโกแลต
- () 3. น้ำเต้าหู้ / นมถั่วเหลือง () 4. น้ำอัดลม
- () 5. น้ำผลไม้ () 6. โกโก้, มอลต์สก็ด
- () 7. น้ำเปล่า () 8. อื่นๆ ระบุ

8. สถานที่รับประทานอาหารเช้า

- () 1. บ้าน () 2. บนรถ
- () 3. ร้านอาหาร () 4. โรงเรียน

9. นื่องรับประทานอาหารเช้าในช่วงพักระหว่างคาบเรียน (ไม่ใช่พักเที่ยง แต่เป็นช่วงพักระหว่างเปลี่ยนคาบเรียนต่อไป) หรือไม่

- () 1. ไม่มี
- () 2. มี ระบุชนิด (ตอบได้มากกว่า 1 ข้อ)
- ขนมกรุบกรอบ ขนมหวาน
- ผลไม้ ขนมปังไส้ต่างๆ
- ไอศกรีม อื่นๆ.....

10. นื่องรับประทาน เครื่องดื่มในช่วงพักระหว่างคาบเรียน (ไม่ใช่พักเที่ยง แต่เป็นช่วงพักระหว่างเปลี่ยนคาบเรียนต่อไป) หรือไม่

- () 1. ไม่ดื่ม
- () 2.นม ระบุชนิด นมจืด นมหวาน นมเปรี้ยว
 นมปรุงแต่ง เช่น รสช็อกโกแลต
- () 3. น้ำเต้าหู้ / นมถั่วเหลือง () 4. น้ำอัดลม
- () 5. น้ำผลไม้ () 6. โกโก้, มอลต์สก็ด
- () 7. น้ำเปล่า () 8. อื่นๆ ระบุ

ตัวอย่าง การบันทึกการบริโภคอาหารของนักเรียนใน 1 วัน

ชื่อ (เด็กชาย/เด็กหญิง) ...ตั้งใจ.....เรียนดี.....

ชั้นประถมศึกษาปีที่ 6

เลขที่13.....

โรงเรียน.....วัดเลา.....

วันที่ 14 มิถุนายน 2550 (/) วันเปิดเรียน

() วันหยุดเสาร์-อาทิตย์, วันหยุดนักขัตฤกษ์

อาหารเช้าที่รับประทานนี้เป็นอาหารเช้าแบบ

(/) ปกติ

() พิเศษ (แตกต่างจากวันอื่น ๆ)

เวลา	สถานที่	รายการอาหาร	ส่วนประกอบของอาหาร/ราคา	ปริมาณอาหาร
มือเช้า				
07.00 น.	ที่บ้าน	1. ข้าวสวย	ข้าวสวย	2 ทัพพี
		2. ไข่เจียว	ไข่ไก่	1 ฟอง
		3. แกงจืดเต้าหู้หมูสับผักกาดขาว	เต้าหู้ขาว	3/4 หลอด
			หมูสับ	2 ช้อนกินข้าว
			ผักกาดขาว	1 ทัพพี
10.30 น.	โรงเรียน	นมเปรี้ยว รสบลูเบอร์รี่ ชี้อัดขมิ้น	ราคา 8 บาท	180 มิลลิลิตร
มือเที่ยง				
12.00 น.	โรงเรียน	1. ก๋วยเตี๋ยวแห้งเส้นหมี่ลูกชิ้นปลา	เส้นหมี่	2 ทัพพี
			ลูกชิ้นปลา	5 ลูก
			ผักบุ้ง	1 ทัพพี
			หมูจู้	2 ช้อนกินข้าว
		2. น้ำโกโก้	5 บาท	2 แก้ว
		3. แดงโม	10 บาท	5 ช้อนคำ
16.30 น.	บนรถ	ขนมป๊อปปี้ กลิ่นสตรอเบอร์รี่	1 กล่อง 14.5 บาท	49.5 กรัม
		มันฝรั่งทอดกรอบ ชี้อัด	1/2 ห่อ 20 บาท	35 กรัม
		รสโนริสาหร่าย		
มือเย็น/18.00 น.	บ้าน	1. ข้าวสวย	ข้าวสวย	2 ทัพพี
		2. แกงเขียวหวานไก่	ไก่	2 ช้อนกินข้าว
			มะเขือ	2 ช้อนกินข้าว
			น้ำกะทิในแกง	2 ช้อนกินข้าว
		3. ผักดอกกะหล่ำกับกุ้ง	ดอกกะหล่ำ	1 ทัพพี
			กุ้ง	2 ตัว
		4. ปลาต้มทิมทอด	ปลา	2 ช้อนกินข้าว
19.00 น.	บ้าน	ลองกอง	ลองกอง	8 ลูก



ที่ ศธ. ๐๕๑๗.๒๑๖/๒๖

สถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล

ถ.พุทธมณฑล ๔ ต.ศาลายา

อ.พุทธมณฑล จ.นครปฐม ๗๓๑๗๐

วันที่ ๘ พฤศจิกายน พ.ศ.๒๕๕๕

เรื่อง ขอความร่วมมือและอนุญาตให้นักเรียนเข้าร่วมการวิจัย เรื่อง “การศึกษาปริมาณพลังงานและสารอาหารที่เด็กไทยได้รับจากอาหารมื้อเช้า”

สิ่งที่ส่งมาด้วย ๑. คำอธิบายโครงการวิจัยโดยย่อ

เรียน ผู้อำนวยการโรงเรียน

ด้วย สถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล ทำการประเมินปริมาณพลังงานและสารอาหารที่เด็กวัยเรียนได้รับจากอาหารมื้อเช้า เพื่อเป็นข้อมูลในการรณรงค์ด้านโภชนาการเพื่อสุขภาพต่อไป ทั้งนี้เพราะเด็กวัยเรียนเป็นวัยที่ร่างกายกำลังเจริญเติบโต อาหารเป็นปัจจัยหนึ่งที่มีความสำคัญต่อสุขภาพและการเจริญเติบโตของร่างกาย ร่างกายของเราใช้พลังงานจากอาหารในการทำกิจกรรมต่าง ๆ รวมทั้งการเรียนรู้ด้วย และการมีสุขภาพร่างกายแข็งแรงเป็นปัจจัยหนึ่งที่ทำให้ นักเรียนสามารถเล่าเรียนได้เต็มที่ ดังนั้นอาหารที่รับประทานในแต่ละวันจึงมีความสำคัญต่อนักเรียนมาก โดยเฉพาะอาหารมื้อเช้าถือว่าเป็นมื้อที่สำคัญที่สุด เพราะเป็นจุดเริ่มต้นของการทำกิจกรรมต่าง ๆ การขาดอาหารเช้าอาจจะทำให้รู้สึกหงุดหงิดอารมณ์เสียง่าย อ่อนเพลีย และสมรรถภาพในการเรียนลดลง ทางผู้วิจัยจึงต้องการทราบถึงรูปแบบการบริโภคอาหารเช้าของเด็กวัยเรียน เพื่อประโยชน์ในการวางแผนส่งเสริมสุขภาพให้เด็กวัยเรียนได้อย่างเหมาะสมต่อไป

สถาบันวิจัยโภชนาการจึงขอความร่วมมือท่านดังนี้

๑. ขออนุญาตนักเรียนในความดูแลของท่านอายุระหว่าง ๑๑-๑๒ ปี (ศึกษาอยู่ในชั้นประถมศึกษาชั้นปีที่ ๕-๖) ชั้นประถมศึกษาละ ๑ ห้อง
๒. ขออนุญาตใช้สถานที่สำหรับการดำเนินงานต่างๆ เช่น ชี้แจงและอธิบายเกี่ยวกับโครงการวิจัยแก่นักเรียน

โดยทางสถาบันฯ จะประสานงานกับทางโรงเรียนในรายละเอียดและการนัดหมายในโอกาสต่อไป

จึงเรียนมาเพื่อขอความร่วมมือในการดำเนินงานดังกล่าว และขอขอบพระคุณอย่างสูงมา ณ โอกาสนี้

ขอแสดงความนับถือ

(รองศาสตราจารย์ประไพศรี สิริจักรวาล)

หัวหน้าโครงการฯ

	<p>สถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล พุทธรณทล 4 ตำบลศาลายา อำเภอพุทธมณฑล จังหวัดนครปฐม 73170 INSTITUTE OF NUTRITION, Mahidol University (INMU) Salaya, Phutthamonthon 4, Nakhon Pathom 73170, THAILAND. Tel. +66 (0) 2800-2380 ext.305-306 Fax : +66 (0) 2441-9344 Telex : 84770 UNIMAH TH., Cable Address : INMU Salaya 73170, THAILAND</p>
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วันที่ 12 ธันวาคม 2549

เรื่อง ขอความร่วมมือในการบันทึกข้อมูลการบริโภคอาหารของนักเรียน
 เรียน ผู้ปกครองนักเรียน

เด็กวัยเรียนเป็นวัยที่ร่างกายกำลังเจริญเติบโต อาหารเป็นปัจจัยที่มีความสำคัญต่อสุขภาพ การเจริญเติบโตของร่างกาย รวมทั้งพัฒนาการในด้านต่างๆ เนื่องจากร่างกายต้องใช้พลังงานจากอาหารในการประกอบกิจกรรมต่าง ๆ รวมทั้งการเรียนรู้ด้วย การมีสุขภาพร่างกายที่แข็งแรงจึงเป็นปัจจัยหนึ่งที่ช่วยส่งเสริมให้นักเรียนสามารถเล่าเรียนได้อย่างมีประสิทธิภาพ ดังนั้นอาหารที่รับประทานในแต่ละวันจึงมีความสำคัญต่อนักเรียนเป็นอย่างมาก

การบันทึกรายละเอียดการบริโภคอาหารในแต่ละวัน เป็นวิธีการหนึ่งที่ใช้ประเมินว่า อาหารที่รับประทานในแต่ละวันเพียงพอกับความต้องการของร่างกายหรือไม่ โดยจะเก็บข้อมูลบันทึกการบริโภคอาหารเป็นเวลา 3 วัน คือ วันที่ **14-16 ธันวาคม 2549** จึงใคร่ขอความร่วมมือจากท่านผู้ปกครองในการช่วยดูแลการจัดบันทึกรายละเอียดอาหารที่บุตรหลานของท่านบริโภค ดังรายละเอียดคำชี้แจงที่แนบมานี้ หนึ่งขอให้บุตรหลานของท่านยังคงรูปแบบการบริโภคอาหารตามปกติ ข้อมูลทั้งหมดที่ได้จะนำไปใช้เพื่อศึกษาวิจัยเกี่ยวกับคุณค่าทางโภชนาการของอาหารที่นักเรียนได้รับ ซึ่งเป็นประโยชน์สำหรับการวางแผนส่งเสริมสุขภาพให้เด็กวัยเรียนได้อย่างเหมาะสมต่อไป ข้อมูลส่วนตัวของนักเรียนจะเก็บรักษาไว้เป็นความลับ ไม่เปิดเผยต่อสาธารณะเป็นรายบุคคล แต่จะรายงานผลการวิจัยเป็นเป็นข้อมูลส่วนรวม จึงขอความร่วมมือให้บันทึกข้อมูลตามความเป็นจริง

หากมีข้อสงสัยกรุณาติดต่อฝ่ายมนุษยโภชนาการ สถาบันวิจัยโภชนาการ โทร. 0-2800-2380 ต่อ 305-6 หรือ 0-2889-3947 หรือ คุณอชิรญา คำจันทร์ (081-432-7556) หรือ คุณจรีภรณ์ นวนมุสิก (089-184-1032)

ขอบคุณในความร่วมมือของท่านเป็นอย่างยิ่ง

(รองศาสตราจารย์ ประไพศรี ศิริจักรวาล)

หัวหน้าโครงการ ฯ



ที่ ศธ. ๐๕๑๗.๒๑๖/๓๙

สถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล

ถ.พุทธมณฑล ๔ ต.ศาลายา

อ.พุทธมณฑล จ.นครปฐม๗๓๑๗๐

วันที่ ๒๐ ธันวาคม พ.ศ.๒๕๕๕

เรื่อง ขอขอบคุณในความร่วมมือนำเข้าร่วมโครงการ เรื่อง “การศึกษาปริมาณพลังงานและสารอาหารที่
เด็กไทยได้รับจากอาหารมื้อเช้า”

เรียน ผู้อำนวยการ โรงเรียนบางขุนเทียนศึกษา

ตามที่สถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล ได้ทำการประเมินปริมาณพลังงานและ
สารอาหารที่เด็กวัยเรียนได้รับจากอาหารมื้อเช้า เพื่อเป็นข้อมูลในการรณรงค์ด้านโภชนาการเพื่อสุขภาพ
ต่อไป ในการนี้ทางสถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล ได้ได้รับความร่วมมือจากโรงเรียนบางขุน
เทียนศึกษา โดยเฉพาะอย่างยิ่ง อาจารย์พงษ์รัตน์ เกิดสินธุ์ ซึ่งช่วยประสานงาน รวมทั้งอาจารย์ประจำชั้น
ประถมศึกษาปีที่ ๕ และ ๖ เป็นอย่างดี ที่ได้อนุญาตให้นักเรียนในการดูแลของท่านเข้าร่วมโครงการวิจัย
ครั้งนี้

เมื่อวิเคราะห์ข้อมูลต่าง ๆ เสร็จเรียบร้อยแล้ว ทางผู้วิจัยจะจัดส่งข้อมูลที่ทำกรประเมินการได้รับ
ปริมาณพลังงานและสารอาหารของนักเรียนให้กับทางโรงเรียน โดยข้อมูลส่วนตัวของนักเรียน รวมทั้งผล
การเรียนจะเก็บรักษาไว้เป็นความลับ ไม่เปิดเผยต่อสาธารณชนเป็นรายบุคคลหรือรายโรงเรียน แต่จะ
รายงานผลการวิจัยเป็นข้อมูลส่วนรวม และนำข้อมูลทั้งหมดไปใช้ประโยชน์ในการวิจัยเท่านั้น

ทางสถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล รู้สึกซาบซึ้งและขอขอบคุณในความอนุเคราะห์
ที่ท่านให้ความร่วมมือในการสนับสนุนการทำกรวิจัยครั้งนี้เป็นอย่างดี และหวังว่าจะได้รับความร่วมมือ
จากท่านในอนาคตต่อไป

ขอแสดงความนับถือ

(รองศาสตราจารย์ ประไพศรี ศิริจักรวาล)

หัวหน้าโครงการฯ

ฝ่ายมนุษยโภชนาการ สถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล

โทรศัพท์ ๐-๒๘๐๐-๒๒๘๐ ต่อ ๓๐๕-๖ หรือ ๐-๒๘๘๕-๓๕๔๗ โทรสาร ๐-๒๔๔๑-๕๓๔๔

คุณจริกรณ์ นวนมุสิก (๐๘๕-๑๘๔-๑๐๓๒) และ คุณอชิรญา คำจันทร์ (๐๘๑-๔๓๒-๗๕๕๖)

Appendix C

Results

Nutritional status (weight for age) of school-aged children by genders

Nutritional status	Boy (n = 437) n (%)	Girl (n = 477) n (%)	Total (n = 914) n (%)
Obesity	33 (7.6)	24 (5.0)	57 (6.2)
Slightly obesity	38 (8.7)	28 (5.9)	66 (7.2)
Normal	343 (78.5)	393 (82.4)	736 (80.5)
Slightly underweight	19 (4.3)	19 (4.0)	38 (4.2)
Underweight	4 (0.9)	13 (2.7)	17 (1.9)

* By Chi-square test, $p > 0.05$

Nutritional status (Height for age) of school-aged children by genders

Nutritional status	Boy (n = 437) n (%)	Girl (n = 477) n (%)	Total (n = 914) n (%)
Normal	419 (95.9))	451 (94.5)	870 (95.2)
Slightly stunt	17 (3.9)	16 (3.4)	33 (3.6)
Stunt	1 (0.2)	10 (2.1)	11 (1.2)

* By Chi-square test, $p > 0.05$

Comparison of the breakfast regularity during weekdays and weekends by school administrative commissions

Regularity of breakfast consumption	BEC (n =212) n (%)	BMA (n = 336) n (%)	PEC (n = 366) n (%)	P-value
<u>Weekdays</u>				0.01
No breakfast	3 (1.4)	16 (4.8)	6 (1.6)	
Irregular	69 (32.5)	162 (48.2)	128 (35.0)	
Regular	140 (66.1)	158 (7.0)	232 (63.4)	
<u>Weekends</u>				0.1
No breakfast	9 (4.2)	12 (3.6)	14 (3.8)	
Irregular	48 (22.6)	91 (27.1)	92 (25.1)	
Regular	155 (73.1)	233 (69.3)	260 (71.1)	

* By Chi-square test, significant at p< 0.05

The comparison of the breakfast regularity during weekdays and weekends by school administrative commissions

Regularity of breakfast	BEC		BMA		PEC	
	Boys (n=109) n (%)	Girls (n=103) n (%)	Boys (n=168) n (%)	Girls (n=168) n (%)	Boys (n=160) n (%)	Girls (n=206) n (%)
<u>Weekday</u>						
No Breakfast	2 (1.8)	1(1.0)	10 (6.0)	6 (3.6)	3 (1.9)	3 (1.5)
Irregular	28 (25.7)	41(39.8)	76 (45.2)	86 (51.2)	52 (32.5)	76 (36.9)
Regular	79 (72.5)	61(59.2)	82 (48.8)	76 (45.2)	105 (65.6)	127 (61.7)
<u>Weekend</u>						
No Breakfast	5 (4.6)	4 (3.9)	7 (4.2)	5 (3.0)	5 (3.1)	9 (4.4)
Irregular	23 (21.1)	25 (24.3)	46 (27.4)	45 (26.8)	37 (23.1)	55 (26.7)
Regular	81(74.3)	74 (71.8)	115 (68.5)	118 (70.2)	118 (73.8)	142 (68.9)

* By Chi-square test, p > 0.05

Comparison of the breakfast regularity during weekdays and weekends by school size groups

Regularity of breakfast consumption	Small (n = 195) n (%)	Medium (n = 346) n (%)	Large (n = 373) n (%)
<u>Weekday</u>			
No breakfast	5 (2.6)	12 (3.5)	8 (2.1)
Irregular	93 (47.7)	124 (35.8)	142 (38.1)
Regular	97 (49.7)	210 (60.7)	223 (59.8)
<u>Weekend</u>			
No breakfast	11 (5.6)	16 (4.6)	8 (2.1)
Irregular	49 (25.1)	85 (24.6)	97 (26.0)
Regular	135 (69.3)	245 (70.8)	268 (71.9)

* By Chi-square test, $p > 0.05$

The association between places of breakfast eaten and time used of traveling

Places of breakfast eaten	Time used of traveling			P-value
	< 30 minute	30-60 minute	> 60 minute	
Home	416 (66.3)	172 (68.5)	20 (55.6)	0.00
School	159 (25.4)	48 (19.1)	7 (16.7)	
Shop	10 (1.6)	13 (5.2)	4 (11.1)	
Car	42 (6.7)	18 (7.2)	6 (16.7)	

* By Chi-square test, significant at $p < 0.05$

The reason (s) of skipping breakfast by school administrative commissions

Reason of skipping breakfast	BEC (n=72) n (%)	BMA (n=178) n(%)	PEC (n=134) n(%)
<u>Weekdays</u>			
No breakfast preparation	16 (22.2)	37 (20.8)	34 (25.4)
No time/Wake up late	31 (43.1)	69 (38.8)	62 (46.3)
No hungry*	40 (55.6)	116 (65.2)	74 (55.2)
Habitually	13 (18.1)	29 (16.3)	19 (14.2)
Considering body weight	2 (2.8)	5 (2.8)	6 (4.5)
No money	0 (0.0)	3 (1.7)	2 (1.5)
Reason of skipping breakfast	BEC (n=57) n (%)	BMA (n=103) n(%)	PEC (n=106) n(%)
<u>Weekends</u>			
Not have breakfast preparation	9 (15.8)	17 (16.5)	18 (17.0)
No time, Wake up late*	11 (19.3)	13 (12.6)	23 (21.7)
No hungry	34 (59.6)	61 (59.2)	59 (55.7)
Habitually	7 (12.3)	19 (18.4)	21 (19.8)
Considering body weight*	2 (3.5)	6 (5.8)	3 (2.8)
No money	23 (40.4)	34 (33.0)	41 (38.7)

* By Chi-square test, significant at $p < 0.05$

Comparison of breakfast nutrient intakes among breakfast regularity

Nutrients	Breakfast nutrient intakes ¹		P-value
	Regular (n=202)	Irregular (322)	
<u>Macronutrients</u>			
1. Energy (Kcal)	350 ± 88	352 ± 106	0.8
2. Carbohydrate (g)	43 ± 12	43 ± 14	0.6
3. Fat (g)	13 ± 5	13 ± 6	0.9
4. Protein (g)	15 ± 5	15 ± 5	0.5
CHO : Prot : Fat	50:17:33	51:17:33	
<u>Micronutrients</u>			
1. Vitamin A (RE)	139 ± 295	145 ± 307	0.9
2. Thiamine (mg)	0.4 ± 0.5	0.4 ± 0.6	0.9
3. Riboflavin (mg)	0.4 ± 0.2	0.4 ± 0.3	0.7
4. Vitamin C (mg)	3.7 ± 9.1	3.7 ± 7.1	1
5. Iron (mg)	1.8 ± 0.8	1.8 ± 0.9	0.9
6. Calcium (mg)	118 ± 81	124 ± 85	0.5
7. Dietary fiber (g)	0.8 ± 0.7	0.8 ± 0.7	0.9

¹ Mean ± SD, values in the same row with different superscript were significantly different ($p < 0.05$) by ANOVA and by Post-hoc comparison test using Scheffe for macronutrients and by Non-Parametric test (Kruskal-Wallis test) for micronutrients.

The breakfast energy intakes among breakfast size and breakfast regularity

Breakfast size	Regular (n=202)	Irregular (n=322)
	n (%)	n (%)
<u>Size of breakfast</u>		
Very low (< 10% RDA)	5 (1.6)	6 (2.7)
Low (10-15 % RDA)	38 (12.5)	31 (14.1)
Medium (15-25 % RDA)	199 (65.5)	132 (60.0)
High (> 25 % RDA)	62 (20.4)	51 (23.2)

* By Chi-square test, $p > 0.05$

Types of beverages among children by school size groups (Questionnaires).

Types of beverage	Small (n = 195) n (%)	Medium (n = 346) n (%)	Large (n = 373) n (%)
Fresh milk	83 (50.3)	119 (37.9)	161(45.9)
Sweet milk	16 (9.7)	18 (5.7)	33 (9.4)
Yogurt milk	22 (13.3)	22 (7.0)	22 (6.3)
Flavored milk	19 (11.5)	39 (12.4)	46 (13.1)
Soybean	14 (8.5)	23 (7.3)	20 (5.7)
Soft drink	4 (2.4)	13 (4.1)	11 (3.1)
Fruit juice	15 (9.1)	11 (3.5)	16 (4.6)
Malts	11 (6.7)	21 (6.7)	28 (8.0)
Water	55 (33.3)	118 (37.6)	143 (40.7)

* By Chi-square test, $p > 0.05$ **Types of breakfast among breakfast takers by genders (3-day food record).**

Types of breakfast	Boys (n=606) n (%)	Girls (n=966) n (%)	Total (n=1572) n (%)
- Rice with side dish	335 (55.3)	470(48.7)	805 (51.2)
- Single plate dish	186 (30.7)	351 (36.3)	537 (34.2)
- Fast food	62 (10.2)	97 (10.0)	159 (10.1)
- food and Beverage and Beverage only	284 (46.9)	489 (50.6)	773 (49.2)

* By Chi-square test, $p > 0.05$

Types of breakfast among breakfast takers by school administrative commissions (3-day food record)

Types of breakfast	BEC (n=318) n (%)	BMA (n=639) n (%)	PEC (n=615) n (%)	P-value
- Rice with side dish	161(50.6)	352(55.1)	292 (47.5)	0.1
- Single plate dish	110 (34.6)	202 (31.6)	225 (36.6)	0.08
- Fast food	29 (9.1)	36 (5.6)	94 (15.3)	0.00
- food and Beverage and Beverage only	137 (43.1)	416 (65.1)	220 (35.8)	0.01

* By Chi-square test, significant at $p < 0.05$

Types of single plate dish among breakfast takers by genders (Food record)

Single plate dish	Boys (n=606) n (%)	Girls (n=966) n (%)	Total (n=1572) n (%)
- Rice porridge	76 (12.6)	133 (13.8)	209 (13.3)
- Rice cooked with chicken fat	27 (4.5)	59 (6.1)	86 (5.5)
- Noodles	39 (6.4)	70 (7.2)	109 (6.9)
- Rice glutinous with pork, chicken	35 (5.8)	68 (7.0)	103 (6.6)
- Rice fried	9 (1.5)	21(2.2)	30 (1.9)

* By Chi-square test, $p > 0.05$

Types of single plate dish among breakfast takers by school administrative commissions (3-day food record)

Single plate dish	BEC(n=318) n (%)	BMA (n=639) n (%)	PEC (n=615) n (%)
- Rice porridge	27 (8.5)	83 (13.0)	99 (16.1)
- Rice cooked with chicken fat	26 (8.2)	24 (3.8)	36 (5.9)
- Noodles	33 (10.3)	37 (5.9)	39 (6.4)
- Rice glutinous with pork, chicken	20 (6.3)	41(6.4)	42 (6.8)
- Rice fried	4 (1.3)	17 (2.7)	9 (1.5)

* By Chi-square test, $p > 0.05$

Type of beverages among breakfast takers by genders (3-day food record).

Beverages	Boys (n=606)	Girls (n=966)	Total (n=1572)
	n (%)	n (%)	n (%)
Fresh milk	190 (31.4)	269 (27.8)	459 (29.2)
Sweetened milk	1 (0.2)	11 (1.1)	12 (0.8)
Yogurt milk	24 (4.4)	62 (6.4)	86 (5.5)
Flavored milk	7 (1.2)	11 (1.1)	18 (1.1)
Soybean	12 (2.0)	35 (3.6)	47 (3.0)
Soft drink	11 (1.8)	21 (2.2)	32 (2.0)
Fruit juice	15 (2.5)	24 (2.5)	39 (2.5)
Malts	5 (0.8)	19 (2.0)	24 (1.5)

* By Chi-square test, $p > 0.05$

Type of beverages among breakfast takers by school administrative commissions (3-day food record).

Beverages	BEC (n=318)	BMA (n=639)	PEC (n=615)	P-value
	n (%)	n (%)	n (%)	
Fresh milk	69 (21.7)	309 (48.4)	81 (13.2)	0.01
Sweetened milk	6 (1.9)	3 (0.5)	3 (0.5)	0.1
Yogurt milk	24 (7.5)	27 (4.2)	35 (5.7)	0.2
Flavored milk	5 (1.6)	6 (0.9)	7 (1.1)	0.08
Soybean	5 (1.6)	12 (1.9)	30 (4.9)	0.02
Soft drink	6 (1.9)	21(3.3)	5 (0.8)	0.01
Fruit juice	11 (3.5)	16 (2.5)	12 (2.0)	0.6
Malts	11 (3.4)	22 (3.5)	47 (7.7)	0.03

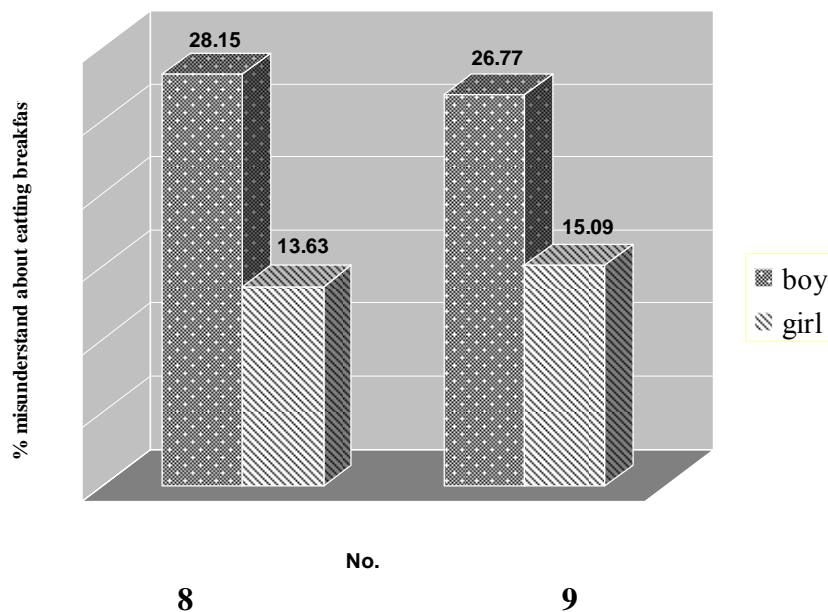
* By Chi-square test, significant at $p < 0.05$

The association between traveling and school administrative commissions

Traveling	School administrative commissions		P-value
	Government	Private	
Traveling			0.00
School bus	92 (16.8)	89 (24.3)	
By parents	217 (39.6)	223 (60.9)	
Bus	67 (12.2)	29 (7.9)	
Bicycle	33 (6.0)	7 (1.9)	
Walk	116 (21.2)	12 (3.3)	
Others	23 (4.2)	6 (1.6)	

* By Chi-square test, significant at $p < 0.05$

Knowledge on breakfast and obesity



8 Skipping breakfast leads to weight lost **9** Having regular breakfast causes obesity

BIOGRAPHY

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