CHAPTER V

RESULTS

5.1 Introduction

A study was conducted among students from grades 4-6 who were enrolled at The American School of Bangkok, Thailand. The purpose of the study was to enhance healthful eating and physical activity among these students through a School Nutrition Program. The conduct of this study involved three main phases: a) Situation analysis, b) Program development and implementation, and c) Evaluation.

The situation analysis phase involved determining eating and physical activity patterns among the students through assessments. Various factors that may contribute to eating and physical activity patterns were collected including socio-demographic, behavioral, psychosocial, and environmental. Calculating the students' BMI to determine nutritional status was also conducted during the first phase of the study.

The second phase involved program development and implementation of the various activities set forth in the program including policy development, nutrition education, physical activity enhancement, school food service improvement, and BMI monitoring; and on-going assessment (monitoring) to ensure that activities were carried out as planned and/or [where needed] to make adjustments to the program.

The last phase was program evaluation. In this study, this meant assessing the value of the Shape-for-Health program. This was undertaken after the completion of

program intervention. The overall purpose of evaluation was to document the results and the utility of the program as well as to explore how the results have been created.

5.2 Study Process

The study process involved three major phases: situation analysis (assessments), program development and implementation, and program evaluation.

The first phase includes data collection or assessments. A survey was administered to collect socio-demographics, socio-cultural, behavioral and psychological information to determine eating habits and physical activity among the students and their parents. The information was analyzed to determine relationships between potential factors and students' eating behaviors, physical activity and nutritional status. The survey was administered to all students in grades 4-6 and their parents. Qualitative data collection including focus groups discussions and in-depth interviews were also conducted among key participants including the principal, assistant principal, school administrator, teachers, canteen staff, parents and students. The student group ensured that the group comprised of: a) a representation from four major ethnic groups (Southeast Asian, Northeast Asian, South Asian, Westerner/ European/African); b) four classifications of nutritional status represented; and c) students were articulate and comfortable in group settings. Qualitative data collection was conducted to explore some items from the quantitative survey.

The second phase involved the use of data gathered in the first phase, for program development and implementation of the school health promotion program to improve eating and physical activity habits of students at ASB. All data collected in the first phase were analyzed and used as guidelines in program development. The program

focused on five major areas: policy development, nutrition education, enhancement of physical activity, school food-service improvement and BMI monitoring. On-going program monitoring was conducted for feedback and making adjustments as seen appropriate.

The third phase was program evaluation. An evaluation was carried out to measure program effectiveness in relation to improvements made in eating behavior, physical activity level and nutritional status.

5.2.1 Approvals and Coordination

1. Approval

Approvals to conduct the study at ASB were obtained from the school principal and school administrator (also school owner). A project proposal was written and submitted to both parties for comments. Adjustments were made to the proposal by the principal and administrator. Once approved, the project was initiated. Approval of all program areas was obtained from the school principal. However, approvals for purchase of cafeteria materials/supplies and changes in food service system were obtained from the administrator. All school personnel were informed about the program. Before implementation of any activity, the principal was informed and the principal related the information to concerned parties.

2. Coordination

Coordination of the project was outlined in the proposal. However, the researcher was aware that the proposal maybe subject to change since it was designed as a participatory program. All program activities were coordinated through the

principal's office. Letters that were sent out to parents had to go through the PTO and the principal's office for clearance. The Health Committee was responsible to develop the program as well as provide necessary changes. Changes in school food service were coordinated through the administration office and finance office. The researcher facilitated all program activities to ensure that program activities were implemented ad planned.

5.2.2 Selection of Samples

This study used convenience sampling with the selection of study venue. The criteria for the selection of the study area were:

1. An International School
2. A student population of not more than 500
3. At lest 70% of students are expatriates
4. English is used as mode of instruction

The researcher approached a number of International Schools with the criteria above. Due to the nature of the study, it was important that the school sincerely agrees to the project and approves the proposal. It was however made understood that, as a participative program, adjustments to the proposed program organization, process and intervention, will be carried out as deemed appropriate.

1. Students

All 72 students in grades 4-6 participated in the study. The selection of sample students in grades 4 – 6 was based on the following:

1. High prevalence of overweight among students in grades 4 - 6.

2. Ages 9 – 12 years were appropriate ages to self-administer the questionnaire.
3. This was the first attempt to implement a school-health program. Therefore, the school saw the need for smaller sample size. The project was considered a pilot project with the intent that program would be expanded to the whole school.

2. Parents

Parents were told in advance about the project. Then, letters were sent home along a consent form and questionnaire. Out of the 72 potential subjects 43 parents (59.7%) completed questionnaires.

3. Focus group discussion/in-depth interview participants

Two types of FGDs were carried out: students and parents. The participants were selected based on their ability to provide rich information. The students group was made up of students from various nationalities as well as students in different weight status (underweight, normal and overweight) and a balance representation of boys and girls. Through the PTO, parents were invited to participate in FGDs. Parents were informed that their participation is purely voluntary.

Respondents for in-depth interviews were carefully selected and based on their ability to provide rich data as well as authority in able to influence changes in the school.

5.3 Situation Analysis and Data Analysis

Findings from quantitative and qualitative research methods were merged rather than analyzed separately. The Statistical Package for the Social Science (SPSS version 10) was used for quantitative data compilation and statistical analysis. Food frequency, physical activity/inactivity, and BMI were calculated by simple frequency. Chi-square and odds ratio were used in univariate analysis. One-way analysis of variance (ANOVA) and Independent Samples T test were used to compare means and test differences among groups. One-Way ANOVA was used to compare differences in food consumption, physical activity/inactivity, and nutritional status by gender (two categorical independent variables). Independent Samples T test was used to compare differences in food consumption, physical activity and nutritional status by age, ethnicity, and grade. One Sample T Test was used to compare pre-test and post test differences. All tests were significant at $p \leq 0.05$.

Qualitative data provided an explanation to some data collected through quantitative method. All 72 students in grades 4 – 6 participated in the survey. There were 26 persons who participated in FGD and in-depth interview. The 28 interviewees comprised of: School administrator, School Principal; Assistant Principal; 18 students; 5 parents and 2 canteen staff. Students were interviewed in a classroom setting while the other interviews were conducted at the conference room or individual offices. Findings from this method were presented in narrative format.

5.3.1 Characteristics of the sample

Utilizing a questionnaire, a total of 72 grades 4 - 6 students who were enrolled at the American School of Bangkok were surveyed. There were equal numbers of 36

boys and 36 girls represented. The ages of the samples ranged from nine through 12 years of age. Among 72 students: 18 (25.0%) were 9 years old; 32 (44.5%) were 10 years old; and 22 (30.5%) were over the age of 10 years. The mean age was 10.16 years. There were 22 (30.6%) students in grade four; 33 (45.8%) students in grade five and 17 (23.6%) students in grade six. The majority of the children come from families with small number of children. Twenty-one (29.2%) children reported being the only child; 39 (54.2%) students come from two-child families; and 12 (16.6%) come from families with three children. The respondents' birth order was also asked.

The majority of the sample (40 or 55.6%) reported being the first child; 11 (15.2%) were middle children; and 21 (29.2%) reported being the last child in the family.

The samples' ethnicity was divided into four groups including Southeast Asian (Thai: 20, Malaysian: 4, Brunean: 1, Indonesian: 1), East Asian (Japanese: 8, Korean: 10, Chinese: 2), South Asians (Indian: 16); and other (North American: 4, European: 5, African: 1). There were 26 students (30.6%) who were Southeast Asians, 20 (27.8%) who were East Asians; 16 (22.2%) South Asians and 10 students (13.9%) were categorized as "other".

Regarding number of years living in Thailand: 22 (30.5%) reported living in Thailand two years or less; 22 (30.5%) reported three years or over; and 28 (39.0%) reported always lived in Thailand. Regarding type of diet: the majority (77.7%) of the students had no special diet; 16.7% were vegetarians; and 5.6% reported other (Table 5.1).

Table 5.1 Number and percentage of students by characteristics of sample

Characteristics	Number	Percentage
Total samples	72	100.0
Sex		
Male	36	50.0
Female	36	50.0
Age		
9 years old	18	25.0
10 years old	32	44.5
11 & 12 years old	22	30.5
Mean age (9-12 years)	10.16	
Grade		
4^{th}	22	30.6
5^{th}	33	45.8
6^{th}	17	23.6
Number of children in family		
1	21	29.2
2	39	54.2
3	12	16.6
Birth order		
First child	40	55.6
Middle child	11	15.2
Last child	21	29.2
Ethnicity		
Southeast Asian	26	36.1
East Asian	20	27.8
South Asian	16	22.2
Other	10	13.9
Number of years living in Thailand		
2 years or less	22	30.5
3 years or over	22	30.5
Always lived in Thailand	28	39.0
Type of diet		
None	56	77.7
Vegetarian	12	16.7
Other	4	5.6

5.3.2 Eating behavior

Overweight and obesity are significant problems is Asia. There are a variety of factors that play a role in overweight and obesity. However, the two most immediate causes of obesity are diet and lack of exercise (Lemonick & Walsh, 2004).

Both individual-level and environmental-level factors that contribute to eating habits were investigated in this study. Eating behavior in this study pertains to types of food and beverages consumed and frequency of consumption, number of meals eaten at home, and type of meals commonly eaten at home. Individual-level factors that were included in this study were: 1) socio-demographic factors including gender, age, ethnicity, maternal education, maternal work status, and family income; 2) psychosocial including students' and parental knowledge, attitudes/beliefs, and students' self-efficacy; 3) behavioral or lifestyle factors particularly food consumption and restaurant/fast food consumption; and 4) environmental factors including parental influence, access to and utilization of exercise/recreation centers.

1. Diet (food consumption)

The Food Frequency Questionnaire was designed to reflect six food components. The purpose of FFQ in this study was to collect food consumption and to analyze data by food groups to determine distribution of consumption among the food groups as well as to determine overall quality of the diet among ASB students.

The food components and types of food under each heading were adapted after the Food Frequency Questionnaire developed by Johns Hopkins Weight Management Center (2002). However, food consumption columns were altered to reflect daily consumptions. Some foods were either replaced or added to also reflect Asian foods. Refer to Appendix A for the questionnaire. In this study, the following six food components were included:

1. Starches that includes bread, cereal, rice, potato (baked/mashed), noodles and pasta

2. Protein Sources including meat, poultry, fish/shellfish, dried beans, eggs, tofu, and nuts
3. Fruit, which includes raw, juice and dried or canned.
4. Vegetables including raw, juice, canned and cooked
5. Dairy product including milk, yogurt and cheese
6. Fats/oils/sweets include deep fried animal skin, cakes, pies, cookies, doughnut, candies, soft drinks, sugared beverages

Three FFQs were used to collect food intake or consumption among the samples. The components of the survey were examined according to how frequent and the amount the type of food is eaten. Various types of common food are listed under each food group. Based on the survey, a grade of zero to four was used to provide a "rating" of food consumption: none (1), 1 time/day (2), 2 times/day (3), and >3 times/day (4). All food items from three FFQs were summed up and their averages calculated. Total food consumption was compared with the FGP to reflect consumption levels.

Table 5.2 above, presents the level of food consumption (good and poor), across the seven food components. The results reveal that more than 50% of the samples high consumption levels of starches (62.5%), protein sources (51.5%), and fats/oils/sweets. At least 50% of the students had high intake level of dairy products. Fruit was the least eaten with 58.3% of students consuming <2 servings/day. A high proportion of students had good intake level of vegetables with 58.3% consuming ≥3 serving/day.

Table 5.2 Food consumption among ASB students aged 9-12 years

Food consumption	Number	Percentage
Starches		
Poor (>11 servings/day)	45	62.5
Good (≤11 servings/day)	27	37.5
Protein sources		
Poor (>3 servings/day)	37	51.4
Good (≤3 servings/day)	35	48.6
Fruits		
Poor (<2 servings/day)	42	58.3
Good (≥2servings/day)	30	41.7
Vegetables		
Poor (<3 servings/day)	30	41.7
Good (≥3 servings/day)	42	58.3
Dairy products		
Poor (>3 servings/day)	36	50.0
Good (≤3 servings/day)	36	50.0
Fat/oils/sweets		
Poor (>6 times/day)	41	56.9
Good (≤6 times/day)	31	43.1
Overall diet (total component score)		
Poor (4-6 points)	40	55.6
Good (0-3 points)	32	44.4

Due to limited number of samples, consumption level was classified into two categories. Overall diet was based on total component score. In this study, overall diet or food consumption was classified as *poor* (0-3 component score) and *good* (4-6 component score). Also refer to Chapter IV, 4.3.5 Instrumentation, Diet (page105). A component score between 0-3 points was given a categorical score of "0" or poor diet and a component score between 4-6 was given a categorical score of "1" or good diet.

High or low intake of calories adversely affects nutritional status. Based on literature review, food with high caloric content poses a greater risk for overweight and obesity. According to Southwestern Vermont Health Care (2001), obesity results when the body consumes more energy than it uses. If a child consumes more food and calories than what is required by their energy allowance, then those excess calories are

converted to fat for storage. Equally, if a child consumes less food and calories, then their body fat is converted to energy for the needed calories (keepkidshealthy.com, 2003). A diet high in fats and sugars is a contributing factor to overweight (Children, Youth and Family Consortium, 2003).

Figure 5.1 shows that among 72 students, 40 students or 56% had poor diet while 32 students or 44% had good diet.

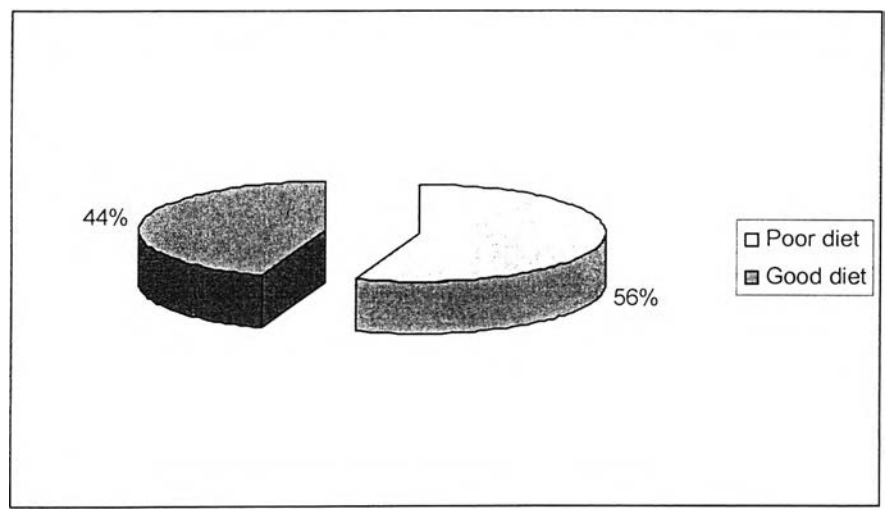

Figure 5.1 Diet among ASB students

5.3.3 Factors influencing diet

5.3.3.1 Univariate analysis

A questionnaire was utilized among 72 grades 4-6 students. The questionnaire was designed to collect socio-demographics, behavioral and psychosocial information to assist in determining the students' eating behavior. Eating behavior in this study includes type of food consumed, eating frequency and restaurant food/fast food consumption. Pearson Chi-square test was used for each variable to test for statistical significance. The significance level was specified at alpha 0.05. A p-value of ≤ 0.05 was

determined as acceptance region for both univariate and multivariate analyses. The following analyses with corresponding study variables are provided below.

A. Socio-demographic factors

1. Gender

Gender and its relation to food consumption level were also investigated. Among 36 male respondents: 23 or 63.9 percent had poor diet and 13 boys or 36.1 percent had good diet. Among 36 female students: 17 girls or 47.2 percent had poor food consumption while 19 girls or 52.8 percent had good food consumption. The results show that food consumption was slightly better among girls than boys. However, this study did not find a significant relationship between gender and diet among the subjects (p = .155). See Table 5.3.

Table 5.3 Diet by gender

Gender	Number (%) of students		Total	p-value
	Poor diet	Good diet		
Male	23	13	36	
	(63.9)	(36.1)	(50.0)	
Female	17	19	36	.155
	(47.2)	(52.8)	(50.0)	
Total	40	32	72	
	(55.6)	(44.4)	(100.0)	

2. Age

Student's age was classified into three groups: 9 years, 10 years, and 11-12 years of age. Table 5.4 shows that poor diet was highest among 10-year old students (68.8%). This was followed by >10 years old (54.5%) and nine-year old students

(33.3%). The results did not reveal a significant association between diet and age (p = .053).

Table 5.4 Diet by age

Age	Number (%) of students		Total	p-value
	Poor diet	Good diet		
9 years old	6	12	18	
	(33.3)	(66.7)	(25.0)	
10 years old	22	10	32	
	(68.8)	(31.3)	(44.4)	.053
11 & 12 years old	12	10	22	
	(54.5)	(45.5)	(30.6)	
Total	40	32	72	
	(55.6)	(44.4)	(100.0)	

3. Mother's education

Education level was classified into < College education (1) and College or higher (2). The majority of mothers had college or higher than college level education totaling 47 mothers (65.3%) of the samples (Table 5.5). Poor diet appears to be highest among students with mothers who had a college education or higher (57.4%) than among those whose mothers had lower than college level education (52%). No significant relationship was found between student's diet and mother's education (p = .658).

Table 5.5 Diet by mother's education

Education level	Number (%) of students		Total	p-value
	Poor diet	Good diet		
< College	13	12	25	
	(52.0)	(48.0)	(34.7)	
≥ College	27	20	47	.658
	(57.4)	(42.6)	(65.3)	
Total	40	32	72	
	(55.6)	(44.4)	(100)	

4. Mother's work status

Work status was categorized into employed (0) and not employed (1). Employed mother was given a score of "0" with the assumption that mothers who work cannot properly fend for their child's food needs.

Of the 72 mothers, 39 (54.2%) were unemployed whereas 33 (45.8%) were employed. Poor diet seems to be higher among students whose mothers were employed (63.9%) than among those whose mothers were not employed (48.7%). This study did not yield a significant association between mother's work status and diet (p = .204) (Table 5.11). FGD findings reveal that all expatriate students came to Thailand due to their father's job. Many wives cannot find a job because of language problems (wives only speaking their native language).

Table 5.6 Diet by mother's work status

Employment status	Number (%) of students		Total	p-value
	Poor diet	Good diet		
Employed	21	12	33	
	(63.6)	(36.4)	(45.8)	
Not employed	19	20	39	.204
	(48.7)	(51.3)	(54.2)	
Total	40	32	72	
	(55.6)	(44.4)	(100)	

5. Family income

Family income was investigated as a factor in food consumption among the students. Income was divided into <100,000 Bt/month (categorical score = 0) and >100,000 Bt/month (categorical score = 1). Table 5.7 show that 19.5 percent reported an income of <100,000/month and 80.6 percent reported an income of >100,000/month.

Table 5.7 Diet by family income

Family income	Number (%) of students		Total	p-value
	Poor diet	Good diet		
<100,000 Bt/month	8	6	14	
	(57.1)	(42.9)	(19.4)	
>100,000 Bt/month	32	26	58	.894
	(55.2)	(44.8)	(80.6)	
Total	40	32	72	
	(55.6)	(44.4)	100.0%	

The results show that the majority (80.6%) of the respondents reported an income of >100,000/month. Only 19.4 percent has an income of <100,000/month. In this study no significant relationship was found between students' diet and family income (p = .894).

B. Psychosocial factors

1. Knowledge

Student's knowledge

Knowledge was classified as "poor" (0) or "good" (1). Of the total 72 samples: there were 38 students (52.8%) with poor knowledge and 34 students (47.2%) with good knowledge. Among the 38 students with poor knowledge, 68.4 percent had poor diet whereas 31.6 percent had good diet. Among 34 students with good knowledge, 41.2 percent had poor diet and 58.8 percent had good diet. In this study, a strong association (p = .020) was found between knowledge and diet among the students (Table 5.8). Students who had good knowledge seem to have better diet than those students who have poor knowledge.

Almost 53 percent of the students displayed poor level of awareness regarding nutrition, 27.8 percent had a fair level and 19.4 percent had a high level of awareness.

The percentage of correct responses ranged from about 19 percent to 71 percent. The question for which the lowest percentage of students gave the correct answer (16.7%) was about underweight contributing to poor learning performance in school. Close to 39 percent of the students knew that the most important reason for eating is to maintain health and provide energy for work and play. Only 19.4 percent of the students knew that overweight could be prevented.

Table 5.8 Diet by student's knowledge

Knowledge	Number (%) of students		Total	p-value
	Poor diet	Good diet		
Poor (≤10 points)	26	12	38	
	(68.4)	(31.6)	(52.8)	
Good (>10 points)	14	20	34	.020
	(41.2)	(58.8)	(47.2)	
Total	40	32	72	
	(55.6)	(44.4)	(100)	

Figure 5.2 provides detail information on students' knowledge based on 18 questionnaire items. Among 72 samples: more than 60% of the students knew the most important reason for eating (A); less than 50% of students knew that healthful eating can prevent some chronic diseases (B); 50% knew that healthful eating can control weight (C); 50% knew that keeping a healthy weight can help maintain good health (D); may prevent diseases (E); about 23% reported keeping healthy weight is important to look good (F); about 37% knew that overweight may lead to some diseases (G); a small proportion reported overweight may lead to unattractiveness (H), low self-esteem (I) and poor learning (J). Approximately 50% reported that underweight may lead to poor health (K), 51% easily tired (L), 51% unattractiveness (M), 18% poor learning (N). A small proportion of students (16.7%) knew that overweight can be prevented or that unhealthful eating may lead to overweight (19.4%) (O).

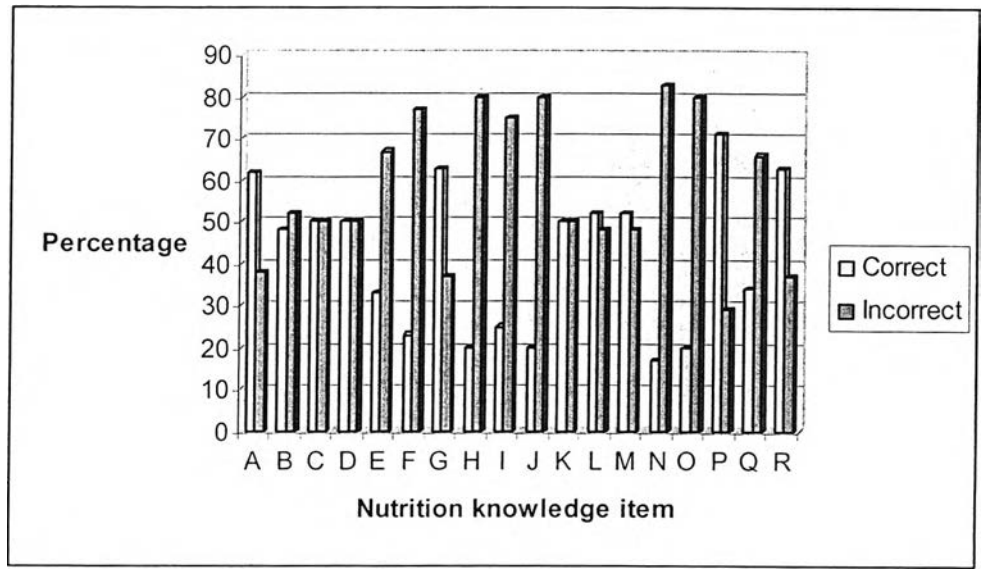

Figure 5.2 Nutrition knowledge by item response

Seventy percent of the students knew that unhealthful eating may mead to poor weight status (P). About 32% were aware that eating and physical activity behaviors affect health (Q) and 62% of the students knew that limiting television, video games/computer use, to few hours a week could contribute to weight control (R).

Parental knowledge

The association between greater parental knowledge in nutrition and a lower prevalence of overweight among children tells us of the importance of knowledge. In Table 5.14, among 43 respondents: 26 parents or 60.5 percent had poor knowledge and 17 parents or 39.5 percent had good level of knowledge.

Of the 26 parents with poor knowledge: 17 children or 65.4 percent had poor diet and nine children or 34.6 percent had good diet. Of the 17 parents with good knowledge: 5.9 percent had poor diet whereas 94.1 percent had good diet. A strong association ($p < .001$) was established between student's diet and parental knowledge. Parental knowledge is an important factor in food consumption among ASB students.

Table 5.9 Diet by parental knowledge

Parental knowledge	Number (%) of students		Total	p-value
	Poor diet	Good diet		
Poor (≤10 points)	17	9	26	
	(65.4)	(34.6)	(60.5)	
Good (>10 points)	1	16	17	< .001
	(5.9)	(94.1)	(39.5)	
Total	18	25	43	
	(41.8)	(58.2)	(100.0)	

2. Attitudes and beliefs

Student's attitude and beliefs

A total of 20 items were included in the attitude and belief scales. The scale ranged from 1 (strongly agree) to 5 (strongly agree). Possible score is between 0 and 100. Students with a score of ≤ 50 were classified with "negative" attitude and beliefs whereas those who scored > 50 were classified with positive attitude and beliefs. Negative attitude and beliefs was scored "0" and positive attitude and beliefs was scored "1".

Attitudes and beliefs regarding nutrition among the samples were substantially poor. Approximately 62.5 percent have negative attitude and beliefs toward nutrition while 37.5 percent had positive attitude and beliefs. Among 45 students who scored low in the attitude and beliefs test: 71.1 percent had poor diet while 28.9 percent had good diet. Among 27 students who scored higher in the attitude and beliefs test: 29.6 percent had poor diet while 70.4 percent had good diet. The results show a significant relationship (p = .001) between attitude and beliefs and diet among ASB students. Poor diet is higher among students with negative attitude and beliefs.

Table 5.10 Diet by student's attitude and beliefs

Attitude and beliefs	Number (%) of students		Total	p-value
	Poor diet	Good diet		
Negative (≤50)	32	13	45	
	(71.1)	(28.9)	(62.5)	
Positive (>50)	8	19	27	.001
	(29.6)	(70.4)	(37.5)	
Total	40	32	72	
	(55.6)	(44.4)	(100.0)	

Survey findings regarding with potential to influence on dietary and physical activity behavior were:

- 13.9% of the students strongly agree that healthy foods are attractive while 45.8% strongly disagree
- 8.3% strongly agree that healthy foods are convenient and 52.8% strongly disagree
- 4.2% strongly agree that consuming a healthy diet will make them feel good about themselves while 36.1% strongly disagree
- 15.3% strongly agree that there is a need to change their diet while 38.9% strongly disagree
- 29.2% strongly agree that they should worry about their weight while 34.7% strongly disagree
- No one strongly agree that eating healthy food will prevent some diseases while 34.7% strongly disagree
- 6.9% strongly agree that an inactive child is too much involved in sedentary activities while 50% strongly disagree
- 25% strongly agree that an inactive child is lazy and out of shape while 27.8 strongly disagree

- 9.7% strongly agree that being overweight is a sign of wealth and good health while 56.9% strongly disagree
- 1.4% strongly agree that healthy food are expensive while 31.9%strongly disagree
- No one strongly agree that unhealthy foods may be harmful for their health while 36.1% strongly disagree
- 1.3% strongly agree that there are few healthy choices in fast food restaurants while 16.7% strongly disagree
- 4.1% strongly agree that vegetables are healthy while 55.6 strongly disagree
- 16.7% strongly agree that vegetables taste good while 41.7% strongly disagree
- 6.9% strongly agree that meals prepared at home offer the best opportunity for healthy eating while 34.7% strongly disagree
- 12.5% strongly agree that low-fat food products taste as good as regular food products while 23.6% strongly disagree
- 15.2% strongly agree that they feel physically active enough while 34.7% strongly disagree
- 8.3% described themselves as overweight while 16.7% described themselves as underweight

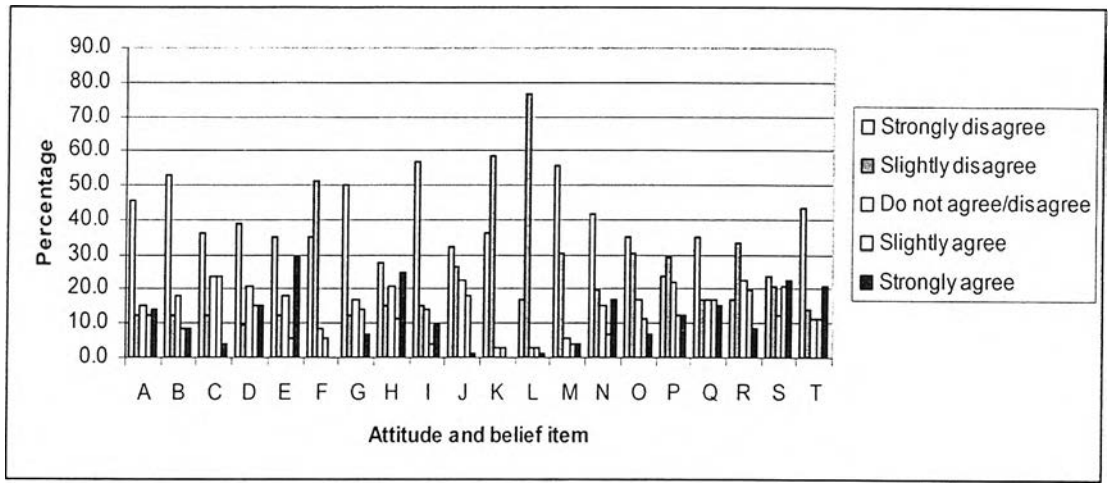

Figure 5.3 Attitude and beliefs regarding nutrition

- 22.3% consider themselves to be very physical active while 23.6% described themselves as not active at all
- 20.8% strongly agree that eating a variety of foods each day probably gives them all the vitamins and minerals they need while 43.1% strongly disagree

Findings from group interview conducted among 18 students reveal the following:

- The majority (15 out of 18) of the interviewees "agree" that eating and exercise habits affect health
- Nine students strongly agree that unhealthful eating may lead to weight problems
- 15 students agree that limiting television, video, and computer use can contribute to weight control
- Nine students strongly agree that they are too young to worry about their weight
- Ten of 18 students strongly disagree that vegetables taste good

- 12 students out of 18 reported that their attitude and beliefs regarding nutrition is mainly influenced by their parents. "Friend" as influential person was reported by 16 students.

Parental attitudes and beliefs

Parental attitude and beliefs also revealed to impact student's dietary intake ($p < .001$). As Table 5.11 shows, among 43 parent respondents: 37.2 percent (16 parents) scored lower in the attitude and beliefs test and 62.8 percent (27 parents) scored higher. The study revealed that among 16 parents with negative attitude and beliefs: 15 parents or 93.7 percent had children with poor diet and only one parent or 6.3 percent had a child with good diet. Poor diet was higher (83.3%) among students with parents who had negative attitude and beliefs than among students with parents who had positive attitude and beliefs.

Table 5.11 Diet by parental attitude and beliefs

Attitude and beliefs	Number (%) of students		Total	p-value
	Poor diet	Good diet		
Negative (<50)	15	1	16	
	(93.7)	(6.3)	(37.2)	
Positive (>50)	3	24	27	< .001
	(11.1)	(88.9)	(62.8)	
Total	18	25	43	
	(41.8)	(58.2)	(100)	

4. Eating self-efficacy

Eating self-efficacy was collected by a 10-item, 7-point scale questionnaire. The questionnaire was scaled from no difficulty (1) and very difficulty (7). Possible total score ranged from 0 to 70. In this study, lower score means higher the self-efficacy and the higher the score the lower the self-efficacy. Self-efficacy was classified as low (0)

and moderate (1) since only two students scored in the high category. A score of >35 was considered "low" self-efficacy and a score of ≤35 was considered "moderate" self-efficacy.

Eating self-efficacy among the students was quite low with about 65 percent of students scoring > 35. Table 5.12 presents the proportion of students with low and high self-efficacy levels. Of the 25 students with low self-efficacy: 23 students (92%) had poor diet while two students (8%) had good diet. Students with poor food consumption tend to have lower self-efficacy than among students with moderate self-efficacy. This study showed a strong association between eating self-efficacy and diet among the respondents ($p < .001$).

Table 5.12 Diet by eating self-efficacy

Self-efficacy level	Number (%) of students		Total	p-value
	Poor diet	Good diet		
Low (>35)	23	2	25	
	(92.0)	(8.0)	(34.7)	
Moderate (<35)	17	30	47	< .001
	(36.2)	(63.8)	(65.3)	
Total	40	32	72	
	(55.6)	(44.4)	(100.0)	

A. Behavioral factors

1. Number of meals eaten at home

Number of meals eaten at home was also included as a lifestyle factor in this study. This variable was measured by number of meals students eat at home. Since students eat their lunch at school, they were asked what meals they consume at home [on most days] – breakfast, dinner or both. Consumption of one meal at home was scored as "0" while two meals was scored as "1".

Table 5.13 presents the distribution of students consuming one or two meals at home and how they rate in their dietary intake. Results show that a greater proportion of students (58.4%) consume at least two meals at home and 41.6 percent consume one meal at home. Among the 46 students with poor diet: 25 students (83.3%) reported having one meal at home whereas 21 students or 50 percent had more than one meal at home. Number of meals eaten at home was strongly associated with student's diet ($p < .001$). Students who had only one meal at home were at greater risk of having poor diet compared with students who had two meals at home.

Table 5.13 Diet by number of meals eaten at home

Number of meals	Number (%) of students		Total	p-value
	Poor diet	Good diet		
1 meal	25	5	30	
	(83.3)	(16.7)	(41.6)	
2 meals	15	27	42	< .001
	(35.7)	(64.3)	(58.4)	
Total	40	32	72	
	(55.6)	(44.4)	(100.0)	

FGD findings disclose that eating breakfast at home is almost impossible for most students. Some students reported sometimes skipping breakfast due to lack of time. They report making up for missed meals with snacks in school. Sometimes they buy something from a shop or vendor near the school.

"Sometimes I wake up late. There's recess before lunch and I eat something then."[girl, 11]

"If don't have time to eat at home, I buy food from a food vendor on my way to school." [boy, 10]

Another finding reveals that meals are normally prepared if only one or two children will eat it. Parents normally come home late. In most occasions, food are bought or ordered from fast food restaurants.

Most weekday meals sound rushed, with fairly few students eating together with parents. Family meals usually take place on weekends. However, meals with the family tend to happen outside the home, i.e. restaurant. There is very little in student conversation to suggest regular family-style meals during the week. Respondents typically dictate their parents or caretakers what they want to eat.

"We wake up so early in the morning and we have to rush to beat the traffic." [girl, 10]

"Usually my parents are not home, and I can get any food from the refrigerator or cupboard." [boy, 10]

"We eat dinner early. Before going to bed I'm hungry, so I eat again." [boy, 12]

'I eat first. My mom waits for my dad. He comes home late." [boy, 9]

Eating frequency is also high among the students. A majority of students eat two - three meals and three to five snacks a day:

- breakfast before school
- mid-morning snack (9:45 am)
- lunch (11:45 noon)
- mid-afternoon snack (2:15 pm)
- after-school snacks (buying from canteen or from shops outside the school before heading home)

- pre-homework snacks (at home)
- dinner
- midnight/before-bed snack

2. Type of food commonly eaten

This study investigated the impact of fast food/restaurant food consumption on student's diet. In this study, this was measured by the type of food commonly consumed at meal time and number of meals regularly consumed at home. Type of food was classified into two groups: restaurant food/fast food (0) and home-cooked meals (1). Out of 72 respondents: 37 students or 51.4 percent reported eating meals that were ready-made food products (pre-packed) or ordered from restaurant while 35 students or 48.6 percent reported eating home-cooked meals. Of the 37 students who reported consuming restaurant/fast food, 29 students (78.4%) had poor diet while eight students (21.6%) had good diet. There is a strong significance between diet and type of meals eaten at home ($p < .001$). This study revealed that students who frequently consumed restaurant/fast food had poor diet while those who had home-cooked meals had better diet. See Table 5.14.

Table 5.14 Diet by type of food commonly eaten

Type of meal	Number (%) of students		Total	p-value
	Poor diet	Good diet		
Restaurant/fast food meal	29	8	37	
	(78.4)	(21.6)	(51.4)	
Home-cooked meal	11	24	35	< .001
	(31.4)	(68.6)	(48.6)	
Total	40	32	72	
	(55.6)	(44.4)	(100.0)	

FGD findings confirm the findings above. Participants reported that buying food outside or ready-to-eat food is convenient:

"We get our breakfast from the food vendor near my house."[boy,10]

"If we buy food, we can choose what you want." [girl,12]

"I eat cereal almost everyday."[boy,10]

"My mom doesn't cook breakfast." [girl, 9]

3. Time constraint

Parents were asked what the most important factor in cooking family meal is. Of the 43 respondents, 23 parents or 53.5 percent reported time; only two parents reported budget; and 18 parents or 41.9 percent reported other (Table 5.6). However, this study did not yield a significant association between student's diet and most important factor in cooking family meal.

Table 5.15 Diet by most important factor in cooking family meal (parent)

Factor	Number (%) of students		Total	p-value
	Poor diet	Good diet		
Time	16	7	23	
	(69.6)	(30.4)	(53.5)	
Budget	2	0	2	
	(100.0)	(0.0)	(4.6)	.503
Other	13	5	18	
	(72.2)	(27.8)	(41.9)	
Total	31	12	43	
	(72.1)	(27.9)	(100.0)	

Several mothers in the FGD mentioned cooking traditional food is time consuming. In many occasions they reported not easily finding the ingredients they

need at the grocery stores. Mothers also complained that children prefer fast food than traditional food.

It is easier to buy food outside. They are cheaper and usually taste better." [mother, 40]

I buy vegetables. I tell my children to eat vegetables. But I cannot force them to eat." [mother, 34]

"You spent a long time in the kitchen. Many times children do not like to eat the food I cook. They prefer hamburger, pizza or French fries". [mother, 38]

"My maid is not a good cook. Ordering outside is the only option." [mother, 40]

"Food is cheap in Thailand." [mother, 35]

D. Environmental factor

1. Parental influence

In this study, students were asked who influences their eating habits the most. Students were asked to choose from five choices, which included parent, sibling, peer, classmate, teacher, media, and other. To facilitate in data analysis, the classifications were later collapsed into "parents" and "other". Parent was given a score of "0" and other a score of "1".

Of the total 72 students in the study: 39 students or 54.2 percent reported "parents" as having the greatest influence in their eating behavior while 33 students or 45.8 percent reported "other" than their parents. Among the 39 students who reported parent(s): 76.9 percent had poor diet while nine students or 23.1 percent had good diet.

Of the 33 students who reported "other": 30.3 percent had poor diet whereas 69.7% had good diet. The result shows that there is a significant association ($p < .001$) between student's diet and parental influence.

Table 5.16 Diet by interpersonal influence

Influence	Number (%) of students		Total	p-value
	Poor diet	Good diet		
Parent(s)	30	9	39	
	(76.9)	(23.1)	(54.2)	
Other	10	23	33	< .001
	(30.3)	(69.7)	(45.8)	
Total	40	32	72	
	(55.6)	(44.4)	(100.0)	

5.3.3.2 Differences in diet by gender, age and ethnicity

One-way ANOVA was used to detect differences in diet by gender, age and ethnicity. This was used to compare the means of two or more categorical variables The F-ratio is the ratio of between-groups variance to within-groups variance. A significant F-value of <0.05 indicates that the population means are probably not all equal. Levene's test was used to test for equality of variances. The test is significant at $p < .05$.

Table 5.17 Difference in diet by gender, age and ethnicity

Variable	Number	Mean	SD	F	p-value
Gender					
Male	36	13.6944	2.8667	.275	.602
Female	36	13.3333	2.9761		
Age					
9 yrs	18	14.000	2.7865	2.709	.074
10 yrs	32	12.6563	2.9250		
11 & 12 yrs	22	14.3636	2.7524		
Ethnicity					
Southeast Asian	29	14.3793	3.1329	1.573	.204
East Asian	18	13.0000	2.0864		
South Asian	15	13.1333	2.8999		
Other	10	12.5000	3.2404		

As shown in Table 5.17 below there was no significant difference found in diet between males and females (p = .602), age (p = .074) and ethnicity (p = .204).

5.3.3.3 Multivariate analysis

Association between factors related to diet

Multivariate analysis was conducted to explore the strength of associations between factors related to dietary intake. Associations between these factors were established through logistic regression models. Binary logistic regression in SPSS was utilized to analyze the data. Data were recoded to reflect two categorical variables. Logistic regression models of poor diet (>2200 calories/day) and good diet (≤2200 calories/day) were used to investigate interactions in relation to socio-demographic and psychosocial factors. Due to the small number of samples (72) only factors that showed significant relationships with food consumption in univariate analysis were entered in the model. The six variables include number of meals eaten at home, type of meal commonly eaten at home, knowledge, attitudes/beliefs, eating self-efficacy and parental influence.

Table 5.18 presents the results of multiple logistic regression analysis between dietary intake and factors related to dietary intake. The model is Logit (dietary intake) = -2.701 + .759 (number of meals eaten at home) + .345 (type of meals eaten at home) - .136 (knowledge) - .129 (attitude/beliefs) + 1.821 (self-efficacy) + 1.414 (parental influence).

After controlling some variables, significant associations were revealed between two factors and dietary intake. The first significant association was established between eating self-efficacy and dietary intake (p = .046). The model implies that if eating self-

efficacy increases by 1 unit, the log (odds) of dietary intake will decrease. The Odds Ratio for eating self-efficacy is 6.177. It can be concluded that higher eating self-efficacy contributes to decrease in dietary intake.

Table 5.18 Associations between factors related to students' diet

Variable	B	SE	OR	95% CI for OR		p-value
				Lower	Upper	
Number of meals at home	.759	.680	2.135	.563	8.095	.265
Type of meal eaten at home	.345	.746	1.412	.327	6.091	.644
Knowledge	-.136	.704	.872	.219	3.469	.846
Attitude/beliefs	-.129	.686	.879	.229	3.370	.851
Eating self-efficacy	**1.821**	**.913**	**6.177**	**1.032**	**36.977**	**.046**
Parental influence	**1.414**	**.589**	**4.112**	**1.296**	**13.048**	**.016**
Constant	**-2.701**	**.731**	**.067**			**.000**

The second significant association was established between parental influence and dietary intake (p = .016). The model indicates that parental influence contributes to decrease in food intake. If parental influence is increase by 1 unit, the log (odds) of food intake will decrease. The Odds Ratio for parental influence is 4.112. The model indicates that parental influence contributes to dietary intake among the students. Students who reported "parent" as main influential person in their eating habits are four times at risk of developing poor diet than students who reported an influential person other than the parent.

5.3.4 Physical activity/inactivity patterns

1. Physical activity

Another important objective of this research was to identify factors that increase or decrease physical activity among students at ASB. Identifying these determinants was necessary in the development of the school nutrition program. Levels of physical

activity were assessed using a standard 7-day (times/week) questionnaire methodology that collected intensity, duration and frequency of activity.

The American College of Sports Medicine (ACSM) and CDC recommend that moderate-intensity exercise should be done at least 30 minutes per day on most days of the week. Similarly, the International Physical Activity Questionnaire recommends three categorical physical activity scores:

1. Inactive (1). Individuals who do not meet criteria for 2 or 3 are considered inactive.
2. Minimally active (2). Any of the 3 criteria:
    - 3 or more days of vigorous activity of at least 20 minutes per day
    - 5 or more days of moderate-intensity activity or walking at least 30 minutes/day
    - 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 600 Metabolic Equivalent (MET)-min/week
3. Highly active (3). Any of the following 2 criteria:
    - Vigorous-intensity activity for at least 3 days (1500 MET-min/week)
    - 7 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 3000 MET-min/week

Another way of measuring physical activity intensity is by the metabolic equivalent, or MET, level. Although the intensity of certain activities is commonly characterized as light, moderate, or vigorous, many activities can be classified in any one or all three categories simply on the basis of the level of personal effort involved in

carrying out the activity (CDC, 2003). In the review of the literature, CDC says that one method of characterizing physical activities at different levels of effort based on the standard of a metabolic equivalent (MET). This unit is used to estimate the amount of oxygen used by the body during physical activity. See Appendix E for MET Value Table.

1 MET = the energy (oxygen) used by the body as you sit quietly, perhaps while talking on the phone or reading a book. The harder your body works during the activity, the higher the MET. Any activity that burns 3 to 6 MET is considered moderate-intensity physical activity. Any activity that burns >6 MET is considered vigorous-intensity physical activity.

The intensity of physical activity, or how hard your body is working, is typically categorized as light, moderate, or vigorous based on the amount of energy or effort a person expends in performing the activity.

Level of physical activity was based on total score obtained by types of activities, duration (minutes per episode) and frequency (number of days per week). There was only one student who scored high in physical activity. Therefore, in this study, two levels of physical activity were used to categorize physical activity: low (<30 min/day, 1-2 days/week or ≤600 MET-min/week) and moderate/high (≥30 min/day, ≥3 days/week or >600 MET-min/week).

Results that are presented in Tale 5.19 reveal that among 72 samples: 33 students (45.8%) had low activity level while 39 students (54.2%) had moderate-high physical activity level.

Duration and frequency of physical activity are presented in Figure 5.4. Results show that the majority of the students were fairly active 1-2 days per week. This was

particularly true with participating in PE activities and swimming at school with 100 percent of students participating in these activities. Between one and 32 percent of students indulged in physical activity 3-4 days per week. Between one and 21 percent of students were involved in performing physical activities most days of the week. Besides school PE activities, a substantial proportion of students were involved in walking (38.9%), jogging (33.3%) and bicycling (29.2%). Generally, students were fairly active as shown in Figure 5.4.

Table 5.19 Physical activity level among ASB students

Physical activity	Number	Percentage
Low	33	45.8
Moderate/High	39	54.2
Total	72	100.0

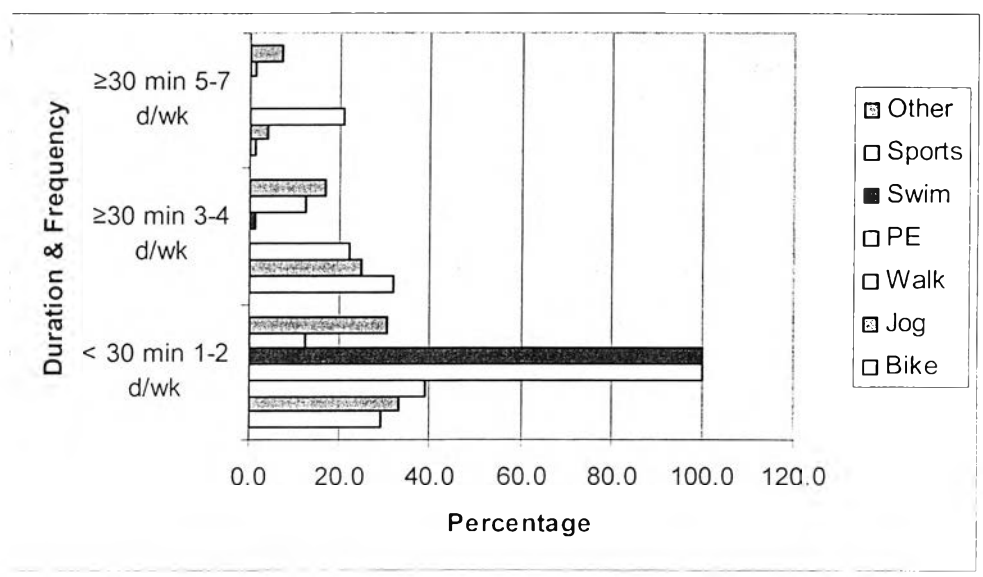

Figure 5.4 Duration and frequency of physical activity

Although students were performing other activities, many of them were performed <30 minutes, 1-2 days per week. A small percentage of students were involved in performing vigorous physical activity.

2. Physical inactivity

There was no standard tool found to measure inactivity level. Therefore, inactivity was assessed by asking students the number of hours/day they watch TV/video or number of hours/day they play video/computer games. The assessment used questions similar to used and validated in other physical activity studies. Inactivity scores were calculated using the number of hours that each student spent in specific activity. Originally, there were three categorical scores for inactivity but was later collapsed into two categories and classified into: high (>4 hours/day) which was assigned a score of "0" and moderate (≤4 hours/day) and was assigned a score of "1".

Figure 5.6 presents the time spent across three inactivity variables (watching TV, computer game use and internet use). Among 72 students, 30.6 percent spent 3-4 hours/day and 25 percent spent more than four hours per day.

Of the 72 students, 48.6 percent spent 4 hours or less/day in physical inactivity whereas 51.4 percent spent more than four hours/day.

Table 5.20 Inactivity level among ASB students

Inactivity level	Number	Percentage
Moderate	35	48.6
High	37	51.4
Total	72	100.0

5.3.5 Factors influencing physical activity/inactivity

Students' physical activity level (moderate and high) and physical inactivity (high and moderate) were used to determine interactions in relation to socio-demographic (gender, age, maternal education, family income, parental level of physical activity and exercise self-efficacy); and environmental factors (access to recreation facility, utilization of recreation facility) and environmental factors (parental influence). The following data were analyzed using several factors as correlates of physical activity/inactivity.

5.3.5.1 Univariate analysis

A. Socio-demographic factors

Among the 72 students in the study: 49 students (68.1%) had low physical activity level while 23 students (31.9%) had moderate physical activity level. The proportions of physical inactivity levels were 40 students (55.6%) who participated in the high category and 32 students (44.4%) who participated in the moderate category.

1. Gender

Table 5.21 presents the proportion of students who participated in levels of activity. Low physical activity level is observed to be higher among girls (50%) than among boys (41.7%). No significant association was established between gender and physical activity ($p = .478$).

Equally, inactivity level was higher in females (55.6%) than in males (47.2%). This study did not show any significant relationship between gender and physical inactivity ($p = .479$).

FGD sessions revealed that students were reasonably active. Almost all the respondents mentioned being involved in a number of activities for the purpose of having fun or exercise. They mentioned a number of activities they are involved in including sports club inside and outside of school as well as games they play with their friends. However, time spent and level of exertion in performing the activities varied but in most cases limited to impact overall health. Boys were more active than girls and are more involved in competitive team sports. Boys reported being involved both in school and out-of-school sports. Older girls appear to be more involved with sports than younger girls but only in school. Both males and females do not necessarily enjoy similar activities. For example, boys prefer football, basketball and martial arts; while girls prefer dancing and skating. Badminton and swimming are popular with both boys and girls.

Table 5.21 Physical activity/inactivity level by gender

Gender	Number (%) of students		Total	p-value
	Poor activity level	Good activity level		
Male	15	21	36	
	(41.7%)	(58.3%)	(50.0)	
Female	18	18	36	.478
	(50.0%)	(50.0%)	(50.0)	
Total	33	39	72	
	(45.8%)	(54.2%)	(100.0)	
	Number (%) of students			
	High inactivity level	Moderate inactivity level		
Male	17	19	36	
	(47.2)	(52.8)	(50.0)	
Female	20	16	36	.479
	(55.6%)	(44.4%)	(50.0)	
Total	37	35	72	
	(51.4%)	(48.6%)	(100.0)	

Girls more frequently hang out with friends talking, laughing or go shopping. Older girls said they did not want to be involved in activities that are physically demanding:

"I don't run around as much. I should not do that anymore.

[12 year old girl]

"I like going to the movies or theme parks on weekends."

[12 year old girl]

"My parents signed me up with the soccer club. I have to go and play every Saturday."

[10 year old boy]

2. Age

Study results show that low physical activity was highest among > 10 year old students (59.1%) and lowest among nine year olds (27.8%). Among 10 year olds, the prevalence of low activity was 46.9 percent. There was no significant association found between physical activity level and age ($p = .140$).

Results of physical inactivity show slighter age variability than for physical activity. Table 5.22 presents the proportion of students participating in moderate and high categories of inactivity (TV/video viewing and video/computer game use). The proportion of students who participate in the high category of inactivity was greatest for >10-year olds (54.5%) and similar in both younger ages (50%). No significant association was found between physical inactivity and age ($p = .939$).

Table 5.22 Physical activity/inactivity level by age

Age	Number (%) of students		Total	p-value
	Poor activity level	Good activity level		
9 years old	5	13	18	
	(27.8)	(72.2)	(25.0)	
10 years old	15	17	32	
	(46.9)	(53.1)	(44.4)	.140
>10 years old	13	9	22	
	(59.1)	(40.9)	(30.6)	
Total	33	39	72	
	(45.8)	(54.2)	(100.0)	
	Number (%) of students			
	High inactivity level	Moderate inactivity level		
9 years old	9	9	18	
	(50.0)	(50.0)	(25.0)	
10 years old	16	16	32	
	(50.0)	(50.0)	(44.4)	.939
>10 years old	12	10	22	
	(54.5)	(45.5)	(30.6)	
Total	37	35	72	
	(51.4)	(48.6)	(100.0)	

3. Maternal education

Results regarding physical activity levels among the students reveal that low physical activity was highest among students whose mothers had college and higher level education (48.9%) and lowest among students whose mothers had < college level education (40%). There was no association (p = .469) between mother's education and physical activity among ASB students. There was a very slight difference in inactivity level by education level of mothers: < college level education (52%) and college and over (51.1%). Similarly, physical inactivity level among the students and mother's education did not yield a significant association (p = .940).

Table 5.23 Physical activity/inactivity level by mother's education

Education	Number (%) of students		Total	p-value
	Poor activity level	Good activity level		
< College	10	15	25	
	(40.0)	(60.0)	(34.7)	
College and over	23	24	47	
	(48.9)	(51.1)	(65.3)	.469
Total	33	39	72	
	(45.8)	(54.2)	(100.0)	
	Number (%) of students			
	High inactivity level	Moderate inactivity level		
< College	13	12	25	
	(52.0)	(48.0)	(34.7)	
> College and over	24	23	47	.940
	(51.1)	(48.9)	(27.8)	
Total	37	35	72	
	(51.4)	(48.6)	(100.0)	

4. Family income

Based on the results presented in Table 5.24, this current study showed a significant association between physical activity and economic status (p = .032). The proportions of students who participated in low and moderate/high physical activity varied by level of family income. The proportion of low physical activity level was higher among students with a family income of <100,000 Bt/month (71.4%) compared with students with a family income of ≥100,000 Bt/month (39.7%).

Table 5.24 below also shows the proportion of students who participated in moderate and high categories of physical inactivity. Among the 37 students with high inactivity level: six (42.9%) reported <100,000 Bt/month family income and 31 (53.4%) reported ≥100,000 Bt/month family income. Physical inactivity was higher among students who reported higher income. However, no association (p = .477) was established between physical inactivity and family income among ASB students.

Table 5.24 Physical activity/inactivity level by family income

Family income	Number (%) of students		Total	p-value
	Poor activity level	Good activity level		
<100,000 Bt/month	10	4	14	
	(71.4)	(28.6)	(19.4)	
≥100,000 Bt/month	23	35	58	
	(39.7)	(60.3)	(80.6)	.032
Total	33	39	72	
	(45.8)	(54.2)	(100.0)	
	Number (%) of students			
	High inactivity level	Moderate inactivity level		
<100,000 Bt/month	6	8	14	
	(42.9)	(57.1)	(19.4)	
≥100,000 Bt/month	31	27	58	.477
	(53.4)	(46.6)	(80.6)	
Total	37	35	72	
	(51.4)	(48.6)	(100.0)	

B. Psychosocial factor

Exercise self-efficacy

Self-efficacy has shown to play a role in individuals engaging in physical activity or exercise. There has been consistent significant difference in exercise self-efficacy (i.e. confidence in one's ability to engage successfully in a specific behavior) among individuals. This current study measured exercise self-efficacy among the students at ASB. The two categorical variables of exercise self-efficacy are low (≤35) and moderate/high (>35).

The results in Table 5.25 show that the majority of the students (75%) had low eating self-efficacy while 18 students (25%) had moderate/high exercise self-efficacy.

Table 5.25 Physical activity/inactivity level by exercise self-efficacy

Self-efficacy	Number (%) of students		Total	p-value
	Poor activity level	Good activity level		
Low	31	23	54	
	(57.4)	(42.6)	(75.0)	
Moderate/High	2	16	18	.001
	(11.1)	(88.9)	(25.0)	
Total	33	39	72	
	(45.8)	(54.2)	(100.0)	
	Number (%) of students			
	High inactivity level	Moderate inactivity level		
Low	32	22	54	
	(59.3)	(40.7)	(75.0)	
Moderate/High	5	13	18	.021
	(27.8)	(72.2)	(25.0)	
Total	37	35	72	
	(51.4)	(48.6)	(100.0)	

Among 33 students with low physical activity level, 57.4 percent had low self-efficacy while 11.1 had moderate/high self-efficacy level. There was a significant relationship established between exercise self-efficacy and physical activity among the respondents ($p = .001$). Students with low self-efficacy also had low physical activity level.

Of the 37 students with high inactivity level: 32 (59.3%) had low self-efficacy while five (27.8%) had moderate/high self-efficacy. There was a significant association between eating self-efficacy and physical inactivity ($p = .021$) among the students. Students with low self-efficacy had higher inactivity level than students with higher self-efficacy.

C. Environmental factors

1. Access to recreational/physical activity facility

Out of 72 samples, 66 students (91.7%) had access to recreation or physical activity facility while six (8.3%) do not have access to a center in their neighborhood. Students do not have difficulties in accessing physical activity centers. This study did not yield a significant association between physical activity level and access to facility (p = .831). Likewise, there was no relationship established between physical inactivity and access to recreation/physical activity facilities (p = 1.000).

Table 5.26 Physical activity/inactivity level by access to recreational facility

Access	Number (%) of students		Total	p-value
	Poor activity level	Good activity level		
No	3	3	6	
	(50.0)	(50.0)	(8.3)	
Yes	30	36	66	.831
	(45.5)	(54.5)	(91.7)	
Total	33	39	72	
	(45.8)	(54.2)	(100.0)	
	Number (%) of students			
	High inactivity level	Moderate inactivity level		
No	4	2	6	
	(9.5)	(6.7)	(8.3)	
Yes	38	28	66	1.000
	(90.5)	(93.3)	(91.7)	
Total	37	35	72	
	(51.4)	(48.6)	(100.0)	

FGD revealed that students had access to many types of recreation facilities including gym, playground, tennis/squash court, and health club or sports club. Expatriate students live in condo or apartment. Although Thai students live in homes their families are health club members and because they can afford it, children are enrolled in sports clubs or clinics. All students have family transportation:

"There is a gym, swimming poor, tennis court but it boring after a while". I want to exercise but have fun".[girl, 12]

"My mom drives me to the soccer club every Saturday".[boy, 10]

"I meet some of my friends at the sports club". [boy, 9]

2. Utilization of exercise/recreational facility

Table 5.27 reveals that 38 students (52.8%) reported the use of recreation facility while 34 students (47.2%) do not use the facility. Among the 33 students with low physical activity: 76.5 percent do not use the facility while 18.4 percent reported using the facility. Low physical activity level is higher among students who do not use the facility than among those who use them ($p < .001$).

Level of physical inactivity was also measured in relation to facility use. Data shown in Table 5.27 reveal that facility use was also strongly associated with level of physical inactivity ($p = .017$). Physical inactivity level was higher (66.7%) among students who do not use recreational or physical activity centers than among those who use them (33.3).

At the FGD session, students reported that in Bangkok, walking, jogging and biking are limited by congested environment. Most students live in condominiums or apartments. Some adolescents do not have bicycles. They complain that although the living area has a gym it's not fun to exercise in a gym. Usually older folks exercise in the gym.

"Pollution is so bad in Bangkok. It's not fun to go out and bike or walk around." [girl, 11]

"Sometimes I go to the park and there are a lot of people around. I bump with other people jogging". [girl, 12]

"My parents do not allow me to bike out on the street. It's not safe." (boy, 12)

Table 5.27 Physical activity level by utilization of exercise/recreation facility

Utilization	Number (%) of students		Total	p-value
	Poor activity level	Good activity level		
No	26	8	34	
	(76.5)	(23.5)	(47.2)	
Yes	7	31	38	< .001
	(18.4)	(81.6)	(52.8)	
Total	33	39	72	
	(45.8)	(54.2)	100.0%	
	Number (%) of students			
	High inactivity level	Moderate inactivity level		
No	28	11	39	
	(66.7)	(36.7)	(54.2)	
Yes	14	19	33	.017
	(33.3)	(63.3)	(45.8)	
Total	37	35	72	
	(51.4)	(48.6)	(100.0)	

Students were also candid to discuss about physical education at ASB. The results highlight ASB physical education program as well as activities students are involved in. In particular:

- PE is provided once a week for one period (45 minutes); swimming once a week for two periods.
- Very few students participate in organized competitive sports. Non-participants in sports say they are not good athletes.
- High level of physical activity is higher among boys than girls.
- Most PE teachers are not professionally trained in PE.

- Students were asked about what leisure activities they are involved in: the most common leisure activities are playing computer games.
- Boys like hanging out with friends and be involved in vigorous activities such as biking, running, and playing soccer.
- Sports activities among boys were more natural than among girls. Girls who would like to be more active feel that the school should provide a variety of fun activities or sports with better playground and equipment.
- To get kids more involved in physical activity, the respondents feel the school must encourage their participation and by providing more variety of sports in school.
- They have also expressed the need for teachers to help students be more aware [not only] of the health benefits of exercise but also the benefits of participation in having fun and socializing with others.
- Students also reported the importance of reward to encourage students to participate. They also mentioned not being aware of how much physical activity is required at their age (i.e. types of activities/exercises, how many minutes/day, how many days/week).

3. Parental influence

In Table 5.28, students were asked who influences their physical activity the most. Students were asked to choose between five choices. These choices were later collapsed and classified into parent and other. Forty-two students (58.4%) ranked "parent" as the most influential person whereas 30 students (41.6%) ranked other than parent. Among the 33 students with low physical activity level, 61.9 percent reported

parent" while 23.3 percent, reported "other". Parent as most influential person revealed significant association with physical activity level among the students (p = .001).

Table 5.28 Physical activity/inactivity level by parental influence

Influence	Number (%) of students		Total	p-value
	Poor activity level	Good activity level		
Parent	26	16	42	
	(61.9)	(38.1)	(58.4)	
Other	7	23	30	.001
	(23.3)	(76.7)	(41.6)	
Total	33	39	72	
	(45.8)	(54.2)	(100.0)	
	Number (%) of students			
	High inactivity level	Moderate inactivity level		
Parent	25	17	42	
	(59.5)	(40.5)	(58.4)	
Other	12	18	30	.628
	(40.0)	(60.0)	(41.6)	
Total	37	35	72	
	(51.4)	(48.6)	(100.0)	

Parental influence and physical inactivity was also measured. The results showed no relationship (p = .628) between parent as most influential person and physical inactivity among ASB students.

4. Physical activity/inactivity level of parents

Table 5.29 presents the levels of activity and inactivity among parents and compared it with physical activity/inactivity levels among students. The results showed a strong association between parent's level of physical activity and student's physical activity level ($p < 0.001$). Among 43 parents who responded to the questionnaire: 27 (62.8%) were classified with "low" physical activity level while 16 (37.2%) were classified with "moderate" physical activity level. Of the 18 students with low activity

level, 94.4 percent also had parents with low activity level while 5.6 percent had moderate physical activity level.

Table 5.29 Students' physical activity/inactivity level by physical activity level of parents

Parent's activity level	Number (%) of students		Total	p-value
	Poor activity level	Good activity level		
Low	17 (94.4)	10 (40.0)	27 (62.8)	
Moderate	1 (5.6)	15 (60.0)	16 (37.2)	< .001
Total	18 (41.8)	25 (58.2)	43 (100.0)	
Parent's inactivity level	**Number (%) of students**			
	High inactivity level	Moderate inactivity level		
High	19 (76.0)	9 (50.0)	28 (65.1)	
Moderate	6 (24.0)	9 (50.0)	15 (34.9)	.109
Total	25 (58.2)	18 (41.8)	43 (100.0)	

Regarding physical inactivity (time spent TV/video viewing, computer use), this study did not reveal an association (p = .109) between parent's inactivity level and student's inactivity level.

Mothers in the FGD remarked that physical activity/inactivity levels among parents varied from that of children. Parents are likely to be involved with activities such as golf, walking or use of tread machines and swimming. In many cases, it's done mainly as a social activity. Regular exercise is also difficult to sustain:

"I golf with my friends once a week. It's a group function".

[mother, 41]

"My children do not like to exercise with me." [mother, 40]

"I do not have the time to exercise. I'm busy all the time."

[mother, 37]

Students describe inactive children as very much involved with sit-down activities such as watching TV, playing computer/video games, doing homework or studying, reading and not wanting to sweat or smell.

"I want to go out and play but my parents want me to study."

[11 year old girl]

"The teacher gives so much homework. By the time I'm done, it's too late to play.

[9 year old boy]

"I don't want to go out in the sun. It's too hot." [12 year old]

5.3.5.2 Differences in physical activity/inactivity by gender, age and ethnicity

1. Physical activity

One-way ANOVA was used to detect differences in physical activity and inactivity by gender, age and ethnicity grade. This was used to compare the means of two or more categorical variables The F-ratio are the ratio of between-groups variance to within-groups variance. A significant F-value of <0.05 indicates that the population means are probably not all equal. Levene's test was used to test for equality of variances. The test is significant at $p < .05$.

As shown in Table 5.30 above there was a significant difference found in physical activity and ethnicity ($p = .049$). It is shown that Southeast Asian students had the lowest physical activity level (Mean = .3846) followed by South Asian (M = .4375)

and "Other" (Mean = .7000). East Asian students had the highest physical activity level (Mean = .7500).

Table 5.30 Differences in physical activity level by gender, age and ethnicity

Variable	#	Mean	SD	SE	95% CI for mean		F	p-value
					Lower	Upper		
Gender								
Male	36	.5833	.5000	8.333E-02	.4142	.7525	.493	.485
Female	36	.5000	.5071	8.452E-02	.3284	.6716		
Age								
9 yrs	18	.7222	.4609	.1086	.4930	.9514	1.995	.144
10 yrs	32	.5313	.5070	8.963E-02	.3485	.7140		
11 & 12 yrs	22	.4091	.5032	.1073	.1860	.6322		
Ethnicity								
SEA	26	.3846	.4961	9.730E-02	.1842	.5850	2.749	.049
East Asian	20	.7500	.4443	9.934E-02	.5421	.9579		
South Asian	16	.4375	.5123	.1281	.1645	.7105		
Other	10	.7000	.4830	.1528	.3544	1.0456		

2. Physical inactivity

As shown in Table 5.31 above there was a significant difference found in physical inactivity and ethnicity (p = .036). It is shown that inactivity level was lowest among students from the "other" category (M = 2000), followed by Southeast Asian

Table 5.31 Differences in physical inactivity level by gender, age and ethnicity

Variable	#	Mean	SD	SE	95% CI for mean		F	p-value
					Lower	Upper		
Gender								
Male	36	.4444	.5040	8.399E-02	.2739	.6150	.223	.628
Female	36	.3889	.4944	8.240E-02	.2216	.5562		
Age								
9 yrs	18	.4444	.5113	.1205	.1902	.6987	.178	.838
10 yrs	32	.4375	.5040	8.910E-02	.2558	.6192		
11 & 12 yrs	22	.3636	.4924	.1050	.1453	.5819		
Ethnicity								
SEA	**26**	**.2692**	**.4523**	**8.871E-02**	**8.652E-02**	**.4519**	**3.003**	**.036**
East Asian	20	.6000	.5026	.1124	.3648	.8352		
South Asian	16	.5625	.5123	.1281	.2895	.8355		
Other	10	.2000	.4216	.1333	-.1016	.5016		

students (M = .2692) and South Asian students (M = .5625). Inactivity level was highest among East Asian students (M = .6000).

5.3.5.3 Multivariate analysis

Association between factors related to physical activity and inactivity

To measure the associations related to physical activity and inactivity, only factors that showed statistical significance in univariate analysis were included in the model. There were four factors included in the physical activity model (family income, exercise self-efficacy, utilization of exercise/recreation facility, and parental influence). Only two factors (exercise self-efficacy and utilization of exercise/recreation facility) were included in the physical inactivity model. A p-value of < .05 was used as statistical significant value. All 72 samples were used in statistical calculation. Physical activity and inactivity were calculated as dependent variables. Table 5.32 presents multiple regression analysis between physical activity and factors of physical activity. The model is Logit (physical activity) = - 9.677 + 3.746 (family income) + 3.691(exercise self-efficacy) + 2.773 (use of recreation facility) and + 1.968 (parental influence).

After controlling some variables, significant associations were revealed between physical activity and all four variables: family income (p = .008), exercise self-efficacy (p = .005), use of recreation center (p = < .001) and parental influence (p = .013). The model indicates that the four variables were associated with physical activity. Students with higher family income (≥100,000 Bt/month) and moderate self-efficacy have higher physical activity than students with lower income and lower self-efficacy. Students who use recreation center/facility have higher physical activity than those who do not use

these facilities. The results also show that students who are influenced by their parents also have higher physical activity than those who are not influenced by their parents.

Table 5.32 Associations between factors related to physical activity

Variables	B	SE	OR	95% CI for OR		p-value
				Lower	Lower	
Family income	3.746	1.410	42.343	2.668	672.023	.008
Exercise self-efficacy	3.691	1.314	40.097	3.050	527.141	.005
Use of recreation center	2.773	.778	16.006	3.481	73.602	< .001
Parental influence	1.968	.795	7.154	1.507	33.951	.013
Constant	**-9.677**	**3.053**	**.000**			**.002**

2. Physical inactivity

Table 5.33 presents multiple regression analysis between physical inactivity and two factors (exercise self-efficacy and use of recreation center) related to physical inactivity. The model is Logit (physical inactivity) = - .690 + 1.154 (exercise self-efficacy) and + .862 (use of recreation facility). As shown in the table, no significant associations were revealed between these factors and physical inactivity. Please note that these factor, although did not show any significance here, have shown significance in univariate analysis.

Table 5.33 Associations between factors related to physical inactivity

Variables	B	SE	OR	95% CI for OR		p-value
				Lower	Lower	
Exercise self-efficacy	1.154	.611	3.171	.958	10.492	.059
Use of recreation center	.862	.506	2.369	.879	6.385	.088
Constant	**-.790**	**.380**	**.454**			**.037**

5.3.6 Weight status

Poor eating habits and physical inactivity ultimately will impact a person's nutritional status. Being overweight or underweight can affect health. Overall there are

a variety of factors that play a role in underweight and obesity. A link between eating habits and obesity has been established. According to CDC (April 2004) underweight and overweight are results of energy imbalance. This involves eating too little or too many calories. Eating too much calories and not getting enough physical activity leads to excess weight. Obesity can also be a result of genes, metabolism, behavior, environment, culture and socioeconomic status. Additionally, behavior and environment play a large role resulting in people becoming overweight or obese. Concomitantly, these factors also play a role in people becoming underweight.

This study attempted to investigate factors that may contribute to poor nutritional status among students at ASB. The nutritional status of students was also investigated in relation to their eating behavior as well as other socio-demographic factors. BMI was used in this study to determine nutritional status. Various factors and its relationship to nutritional status were investigated in this current study.

Table 5.34 represents the number of students surveyed and their corresponding BMI. BMI was divided into four categories: ≤5 BMI-for-age percentile (underweight); >5 to <85 BMI-for-age percentile (normal); 85 to <95 BMI-for age percentile (at risk of overweight); and ≥95 BMI-for-age percentile (overweight). Of the total students surveyed: six students or eight percent were underweight; 42 students or 59 percent had normal status; 16 or 22 percent were at risk of overweight; and eight students or 11 percent were overweight.

Weight status was eventually collapsed into two categories: <85 BMI-for-age percentile and ≥85th BMI-for-age percentile. Figure 5.5 shows that 48 students or 66.7 percent of the students had BMI-for-age percentile of <85 and 24 students or 33.3 percent had BMI-for-age percentile of ≥85.

Table 5.34 Weight status among ASB students aged 9-12 years

Weight status	Number	Percentage
Underweight (BMI-for-age $\leq 5^{th}$ percentile)	6	8.0
Normal (BMI-for-age $>5^{th}$ - $<85^{th}$ percentile)	42	59.0
At risk of overweight (BMI-for-age 85^{th} - $<95^{th}$ percentile)	16	22.0
Overweight (BMI-for-age $\geq 95^{th}$ percentile)	8	11.0
Total	72	100.0

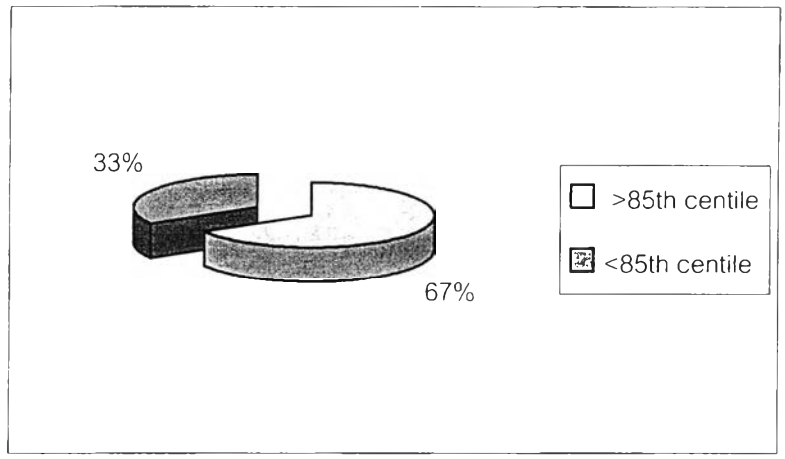

Figure 5.5 Weight status among ASB students

5.3.7 Factors influencing weight status

5.3.7.1 Univariate analysis

A. Socio-demographic factors

1. Gender

Among the 24 students with BMI $\geq 85^{th}$ percentile: 14 (38.9%) were boys while 10 (27.8%) were girls. It is apparent that overweight was higher among male students than among female students. However, the results showed no relationship ($p = .317$) between student's nutritional status and gender (Table 5.35).

Table 5.35 Weight status by gender

Gender	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
Male	14	22	36	
	(38.9)	(61.1)	(50.0)	
Female	10	26	36	.317
	(27.8)	(72.2)	(50.0)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

2. Age

In this study, there was no significant relationship (p = .770) established between nutritional status and age. Based on the results shown in the table below, the prevalence of overweight was highest (37.5%) among 10-year old children and lowest among 9-yer olds (27.8%). No significant association was found between weigth status and age.

Table 5.36 Weight status by age

Gender	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
9 years old	5	13	18	
	(27.8)	(72.2)	(25.0)	
10 years old	12	20	32	
	(37.5)	(62.5)	(44.4)	.770
> 10 years old	7	15	22	
	(31.8)	(68.2)	(30.6)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

3. Mother's education level

Previous studies show that mother's education level affects their child's weight status. Therefore, mother's education level was included in this study. Education level was categorized into two groups: <college and college and higher than college level.

Findings reveal that 25 mothers or 34.7 percent had <college level education while 47 mothers or 65.3 percent had college or higher than college level education. There was relationship found between weight status and maternal education (p = .437).

Table 5.37 Weight status by mother's education

Maternal education	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
< College	10	15	25	
	(41.7)	(31.3)	(34.7)	
College and over	14	33	47	.437
	(58.3)	(68.8)	(65.3)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

4. Mother's work status

Maternal work status was classified into employed and not employed. Of the 72 mothers, 25 (34.7%) were employed and 47 (65.3%) were not. Of the 25 who were working: 20 mothers were involved with business; and the rests were in education, health or government jobs. Mother's work status did not impact (p = .381) nutritional status (Table 5.38).

Table 5.38 Weight status by mother's work status

Maternal work status	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
Employed	10	15	25	
	(40.0)	(60.0)	(34.7)	
Not employed	14	33	47	.381
	(29.8)	(70.2)	(65.3)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

5. Family income

Family income was investigated as a determinant in nutritional status among the students in the study. Family income was classified into two categories: <100,000 Bt/month and ≥100,000 Bt/month. The results showed no relationship (p = .400) between family income and weight status (BMI). This result contradicts with other similar studies. However, it in good to know that the majority (80.5%) reported a family income of ≥100,000 Bt/month while 19.5 percent reported <100,000 Bt/month.

Higher weight status appear to be slightly higher (42.9%) among students who come from families with an income of <100,000 Bt/month than among students who come from families with an income of ≥100,000 Bt/month (31%). As mentioned earlier, please note that the family income of these students exceed Thai or Asian average income.

Table 5.39 Weight status by family income

Family income	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
< 100,000 Bt/month	6	8	14	
	(42.9)	(57.1)	(19.5)	
≥ 100,000 Bt/month	18	40	58	.400
	(31.0)	(69.0)	(80.5)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

B. Behavioral factors

1. Diet (food consumption)

Unhealthful food intake has been blamed for the occurrence of underweight or overweight. Meals that emphasize high-calorie foods can cause excess weight gain (Kids Healthworks, September 2003). Besides genetic factors and lack of physical

activity, unhealthy eating pattern is one of the most common causes of overweight. A diet that is high in calorie especially fats and sugars were shown to be culprits in weight gain.

In the succeeding analysis, food consumption was based on number of servings/day. The following tables present intake in each of the six major food components in the study. Their association with nutritional status was also calculated. Pearson Chi-square test was used to test associations between variables.

Consumption of starches

Unhealthful intake (low or high) of food has been blamed as one of the major causes in the occurrence of underweight and overweight. Intake of starches was measured in relation to nutritional status. Two classifications: high and low/moderate were used to calculate associations with the two categories of weight status.

Table 5.40 Weight status by consumption of starches

Consumption	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
>11 servings/day	18	27	45	
	(40.0)	(60.0)	(62.5)	
≤11 servings/day	6	21	27	.121
	(22.2)	(77.8)	(37.5)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

As presented in Table 5.40, the majority of the students (62.5%) had high intake of starches while 37.5 percent of the students had low/moderate intake of starches. This study showed no association between intake of starches (p = .090) and weight status.

Among the 24 students with BMI ≥85 percentile, 40 percent had high intake of starches whereas 22.2 percent had low/moderate intake of starches.

Consumption of vegetables

Intake of vegetables was also investigated. The results show that quite a high percentage of students (41.7%) had low vegetable intake. This study yielded a significant relationship (p = .011) between intake of vegetables and weight status. Higher BMI was noted among students with low vegetable intake (50.0%) than among those with moderate/high vegetable intake (21.4%). Refer to Table 5.41.

Table 5.41 Weight status by consumption of vegetables

Consumption	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
<3 servings/day	15	15	30	
	(50.0)	(50.0)	(41.7)	
≥3 servings/day	9	33	42	.011
	(21.4)	(78.6)	(58.3)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

Consumption of fruit

Fruit intake is generally low among the students. Of the 72 students, 58.3 percent had low consumption of fruits while 41.7 percent had moderate/high level of consumption. Among the 24 students with high BMI, 42.9 percent had low fruit consumption whereas 20 percent had moderate/high fruit consumption. This current study showed an association (p = .043) between fruit consumption level and weight status. Students with fruit consumption of <2 servings/day had higher BMI compared with students who consumed ≥2 servings of fruit per day.

Table 5.42 Weight status by consumption of fruit

Consumption	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
<2 servings/day	18	24	42	
	(42.9)	(57.1)	(58.3)	
≥2 servings/day	6	24	30	.043
	(20.0)	(80.0)	(41.7)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

Consumption of dairy products

Regarding dairy products, the findings reveal that approximately 50 percent of the samples had high intake of dairy products (milk, cheese and yogurt). There was a significant association established between intake of dairy products and weight status (p = .012) among ASB students. Higher BMI was observed among students with high consumption of dairy products (47.2%) than among students with low/moderate consumption of dairy products (19.4%).

Table 5.43 Weight status by consumption of dairy products

Consumption	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
≥2 servings/day	17	19	36	
	(47.2)	(52.8)	(50.0)	
<2 servings/day	7	29	36	.012
	(19.4)	(80.6)	(50.0)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

Consumption of protein

Table 5.44 presents intake level of protein. The results show that a high percentage of students had high consumption of protein with 51.4 percent consuming >3 servings/day. This study showed no significant association (p = .868) between

protein intake and weight status. Of the 24 students with ≥85th BMI, 32.4 percent had high protein consumption while 34.3 percent had low/moderate protein consumption.

Table 5.44 Weight status by consumption of protein sources

Consumption	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
>3 servings/day	12	25	37	
	(32.4)	(67.6)	(51.4)	
≤3 servings/day	12	23	35	.868
	(34.3)	(65.7)	(48.6)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

Consumption of fats/oils/sweets

Level of fats/oils/sweets intake was classified into >6 times/day and ≤6 times/day. In Table 5.45, it is apparent that the majority of the respondents (56.9%) consumed fats/oils/sweets >6 times/day whereas 43.1 percent consumed ≤6 times/day. This study showed a strong significant relationship (p = .007) between intake of fats/oils/sweets and weight status.

Table 5.45 Weight status by consumption of fats, oils and sweets

Consumption	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
>6 times/day	19	22	41	
	(46.3)	(53.7)	(56.9)	
≤6 times/day	5	26	31	.007
	(16.1)	(83.9)	(43.1)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

Figure 5.6 presents food items in fats/oils/sweets component and frequency of consumption per day. Soda (66.6%) was consumed the most by the students. This was

followed by candy. Students reported consuming cookies, chips, donut and cakes/pies at least once per day. Ice cream is consumed at least two times per day by 47.2 percent of the students.

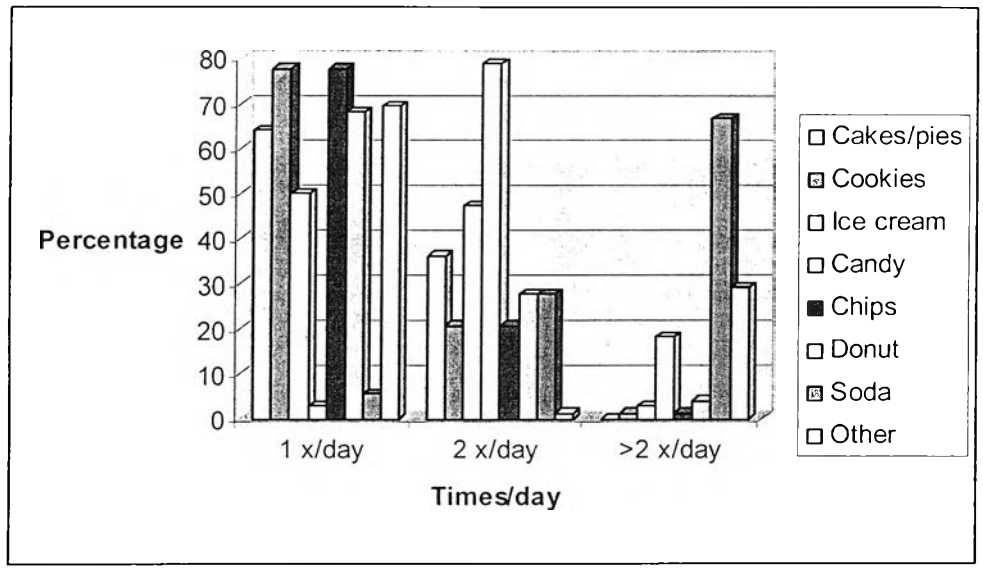

Figure 5.6 Intake of fats/oils/sweets

At school, it was observed that students usually drank soda at morning break (9:45), after lunch and after class is dismissed (2:45 pm). Students also tend to buy fried food such as French fries, fried chicken, fried hotdogs or chips for snacks. Students normally bought their snacks if they did not like what the school provides.

FGD sessions reveal that pizza is the most commonly ordered food. Students reported usually ordering pizza for snacks or dinner. Pizza was also reported as common food item at birthday parties or when eating out. Chinese dumplings were common among Koreans and Japanese. Sandwiches were also revealed to be popular among students who buy their own breakfast.

Diet (food consumption)

Among the 24 students with BMI >85th percentile, 52.5 percent had poor diet while 9.4 percent had good diet. Diet was found to be strongly associated (p <. 001) with weight status. Students with poor diet had higher weight status than students with good diet.

Table 5.46 Weight status by diet

Diet	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
Poor	21	19	40	
	(52.5)	(47.5)	(55.6)	
Good	3	29	32	< .001
	(9.4)	(90.6)	(44.4)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

2. Number of meals eaten at home

Restaurant food consumption was measured by number of meals eaten at home and type of meals commonly eaten at home. This study showed that there is a significant association (p < .001) between number of meals eaten at home and weight status. Students who normally have just one meal at home have higher weight status than students who have two meals at home. Among 24 students with BMI ≥85th

Table 5.47 Weight status by number of meals commonly eaten at home

Number of meals	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
1 meal	19	11	30	
	(63.3)	(36.7)	(41.6)	
2 meals	5	37	42	< .001
	(11.9)	(88.1)	(58.4)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

percentile, 63.3 percent reported having one meal at home in comparison with 11.9 percent who reported consuming two meals at home.

Table 5.48 Weight status by type of food commonly eaten

Type of meals	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
Restaurant/fast food	22	15	37	
	(59.5)	(40.5)	(51.4)	
Home cooked	2	33	35	< .001
	(5.7)	(94.3)	(48.6)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

FGD findings disclose that cooking and family meals are rare in many of the households where these students come from. Many of the students are tended at home by maids. As a result, students are likely to scavenge ready-to-eat or convenient foods from the refrigerator and cupboards. Westerner and European moms seem somewhat more involved in preparing meals for their children during the week. Some overweight students complain that usually their parents restrict them to eat store-bought food such as cookies, ice cream, soda or potato chips from the refrigerator or cupboards.

"My father said I'm too fat and should not eat anything from the refrigerator." [boy, 10]

"My mom buys ice cream but she tells me not to eat it. But it's there, so I eat it. Then she gets very mad at me."[boy, 11]

The respondents reported not having much choice of healthy food at home. Chips, cookies, instant noodles, candies, and soft drinks, were normally stock at home. They were not quite sure why their moms do not stock healthy foods. When probed what healthy foods mean, students mentioned: not oily or fried and not sweet or with

too much sugar. When asked to give examples of unhealthy food, students mentioned cookies, soft drinks, ice cream, candies, potato chips, pizza, hamburger, French fries and cakes. Students appear to know more about unhealthy food than healthy food.

3. Physical activity/inactivity

Out of 24 students with $\geq 85^{th}$ BMI-for-age percentile, a high proportion (57.6%) had low physical activity level whereas 12.8 percent had moderate/high activity level. These results show strong statistical significance between student's physical activity level and weight status ($p < .001$).

Table 5.49 Weight status by physical activity level

Physical activity	Number (%) of students		Total	p-value
	BMI $\geq 85^{th}$	BMI $< 85^{th}$		
Low	19	14	33	
	(57.6)	(42.4)	(45.8)	
Moderate/high	5	34	39	< .001
	(12.8)	(87.2)	(54.2)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

As presented in Table 5.51, it is observed that students with higher BMI had higher physical inactivity level (54.1%) in comparison with students with moderate inactivity level (11.4%). Among 48 students with $< 85^{th}$ BMI-for-age percentile, 45.9 percent had low inactivity level while 88.6 percent had moderate/high inactivity level. Generally, students with high BMI had high inactivity levels. Physical inactivity was found to be strongly associated with weight status ($p < .001$).

Table 5.50 Weight status by physical inactivity level

Physical inactivity	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
High	20	17	37	
	(54.1)	(45.9)	(51.4)	
Moderate	4	31	35	< .001
	(11.4)	(88.6)	(48.6)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

C. Psychosocial factors

1. Eating self-efficacy

Eating self-efficacy is shown to be link ($p < .001$) with weight status. Among 24 students with ≥85th BMI-for-age percentile, 88 percent had low eating self-efficacy and 4.3 percent had moderate self-efficacy. Among students with <85th BMI-for-age percentile, 12 percent had low self-efficacy level while 95.7 percent had moderate self-efficacy. Low self-efficacy is highest among students with ≥85th BMI-for-age percentile than among students with low <85th BMI percentile.

Table 5.51 Weight status by eating self-efficacy

Self-efficacy	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
Low	22	3	25	
	(88.0)	(12.0)	(34.7)	
Moderate	2	45	47	< .001
	(4.3)	(95.7)	(65.3)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

2. Exercise self-efficacy

Self-efficacy was also analyzed in relation to weight status and found that among 24 students with students with ≥85th BMI-for-age percentile, a high proportion

(42.6%) had low self-efficacy while 5.6 percent had moderate self-efficacy. Likewise, among 48 students with <85th BMI-for-age percentile, 57.4 percent had low self-efficacy and 94.4 percent had moderate self-efficacy. Weight status was associated with exercise self-efficacy (p = .004).

Table 5.52 Weight status by exercise self-efficacy

Self-efficacy	Number (%) of students		Total	p-value
	BMI ≥85th	BMI <85th		
Low	23	31	54	
	(42.6)	(57.4)	(74.0)	
Moderate	1	17	18	.004
	(5.6)	(94.4)	(26.0)	
Total	24	48	72	
	(33.3)	(66.7)	(100.0)	

5.3.7.2 Differences in weight status by gender, age, and ethnicity

One-Way ANOVA was used to measure differences in nutritional status by gender, age and ethnicity. Based on the results shown in Table 5.54, there is a slight difference in food consumption by gender. Male students had higher food (Mean = 19.1) consumption in comparison with female students (Mean = 17.9).

Students who are aged 11-12 had higher food consumption (Mean = 19.4), followed by 10-year olds (Mean = 18.4) and 9-year olds (Mean = 17.4). Students who fell in the "other" ethnic group had lower food consumption (Mean = 16.1) than the three ethnic groups. Southeast Asian, East Asian and South Asian students seem to have similar food consumption. However, this study showed no significant differences in weight status among the students by gender, age and ethnicity.

Table 5.53 Differences in weight status gender, age and ethnicity

Variable	#	Mean	SD	SE	95% CI		F	p-value
					Lower	Upper		
Gender								
Male	36	19.0145	3.5916	.5986	17.7993	20.2297	1.573	.214
Female	36	17.9904	3.3325	.5554	16.8629	19.1179		
Age (yrs)								
9	18	17.4017	3.5896	.8461	15.6166	19.1868	1.770	.178
10	32	18.4651	3.0146	.5329	17.3782	19.5520		
11 & 12	22	19.4574	3.8813	.8275	17.7366	21.1783		
Ethnicity								
SEA	26	18.9988	3.3983	.6665	17.6263	20.3714	1.867	.143
EA	20	18.8425	3.7676	.8424	17.0792	20.6057		
SA	16	18.7460	3.1183	.7796	17.0844	20.4076		
Other	10	16.1422	3.1520	.9968	13.8873	18.3970		

5.3.7.3 Multivariate analysis

Association between factors related to weight status

Binary logistic regression was used to measure the associations between selected independent variables and weight status. The following factors including food consumption, number of meals at home, type of food commonly eaten at home, physical activity level, physical inactivity level, eating self-efficacy and exercise self-efficacy were included in the model. These variables showed significant association with weight status in univariate analysis.

The model derived is Logit (weight status) = - 5.313 - 3.049 (food consumption + 4.886 (number of meals at home) + 1.857 (type of meals commonly eaten at home) + 3.180 (physical activity) + .244 (physical inactivity) + 6.753 (eating self-efficacy) and + 1.162 (exercise self-efficacy).

Results in Table 5.55 show between weight status and two factors. Firstly, number of meals consumed at home showed significant association with weight status

(p = .026). The model indicates that if number of meals increases by 1 unit, the log (odds) of weight status will decrease. The Odds Ratio for number of meals eaten at home is 132.404. This result implies that number of meals at home contribute to the decrease in weight status.

Table 5.54 Association between factors related to weight status

Variable	B	SE	OR	95% CI for OR		p-value
				Lower	Upper	
Diet	-3.049	1.879	.047	.001	1.882	.105
Number meals eaten at home	**4.886**	**2.199**	**132.404**	**1.780**	**9848.664**	**.026**
Type of meals mostly eaten	1.857	1.491	6.401	.344	119.061	.213
Physical activity level	3.180	1.807	24.041	.696	830.161	.078
Physical inactivity level	.244	1.492	1.277	.069	23.789	.870
Eating self-efficacy	**6.753**	**2.425**	**856.502**	**7.389**	**99282.281**	**.005**
Exercise self-efficacy	1.162	5.509	3.195	.000	156082.695	.833
Constant	**-5.313**	**2.179**	**.005**			**.015**

Secondly, eating self-efficacy was found to be significantly link with weight status (p = .005). The model showed that if eating self-efficacy increases by 1 unit, the log (odds) of weight status would also decrease. The Odds Ratio for eating self-efficacy is 856.502. This model indicated that eating higher self-efficacy contributes to better weight status. The other five factors did not yield statistical association with weight status in multivariate analysis. Although these variables showed no statistical significance here, they showed statistical significance in univariate analysis.

5.3.8 Administrative and Policy Assessment

1. Administrative assessment

ASB is one of 34 international schools in Bangkok. The school caters to both Thai children as well as children of expatriate families living in Bangkok. The school

was founded in 1983 as a kindergarten. Today, with two campuses (Sukhumvit and Bangna), the school serves students from pre-kindergarten through high school. At the end of June 2003, ASB accommodated 559 students.

ASB became a member of the East Asia Regional Committee of Overseas Schools (EARCOS) and received accreditation from the Western Association of Schools and Colleges (WASC) in the year 2000. The school is comprised of more than 75 faculty members and administration personnel. Most of which are recruited from the United States, Great Britain, Canada, and Australia. The school has a student council that is being elected annually by the student body. Under the supervision of a teacher, the student council works as a team to represent the student body. Their goals are to improve the quality of life at school, reinforce school rules, and create unity and school spirit. The council deals with student concerns, organize activities, and raise funds.

The parent-teacher organization (PTO) is an association of parents, teachers, and the administration set up to create a constructive, supportive, and caring educational environment for the students and the ASB Community. The PTO is an active body that participates in varieties of school events. The organization holds regular meetings to discuss issues pertaining to educational developments, and runs a monthly newsletter, which covers interesting events and educational materials.

ASB has a School Director who is responsible for the overall supervision of the school. Non-academic matters are the responsibility of the School Administrator. These responsibilities include finance and accounting, canteen, purchase of materials and supplies, repair and maintenance of school facilities, etc. The School Principal is responsible for management of matters pertaining to academics including hiring and monitoring of teaching staff, curriculum development, and student matters, etc.

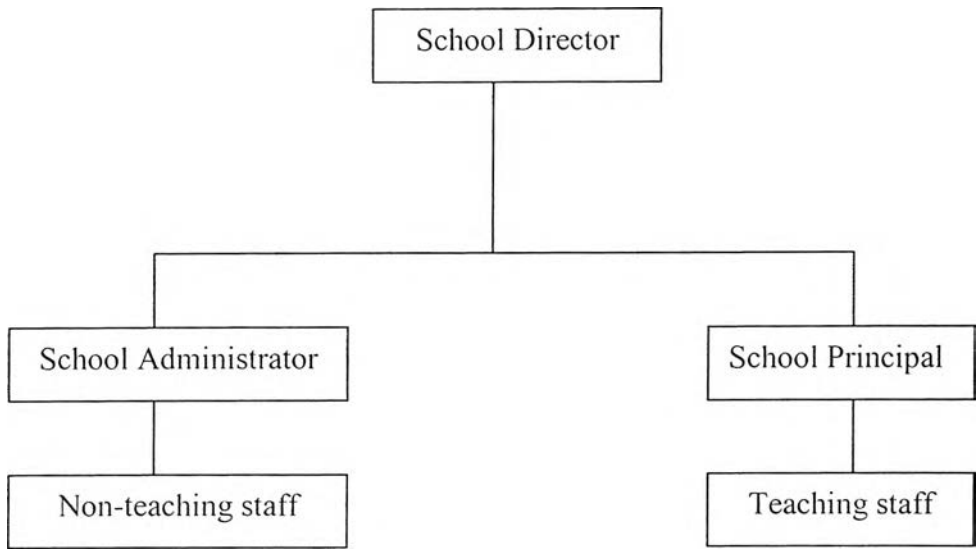

Figure 5.7 ASB Administrative structure

Because of overlapping responsibilities between the three positions, the working environment could be difficult. FGD findings reveal that due to the current management structure, addressing certain issues can take very long. In most situations, no one takes responsibility. It was not clear where the bottleneck is. However, one consistent finding from FGD session discloses the need for obtaining strong support from the School Director if program success is to be ensured.

A survey was carried out among students and school personnel to measure the level of satisfaction regarding food service provided by the school. The findings of the survey consisted of four main headings: food, canteen staff, and canteen physical environment. Below were general findings from the teachers and students.

a. Food

1. Most students prefer Western food and fried rice/noodles as supposed to Thai food.

2. Teachers prefer that students be served fruit for snacks. Not cookies or junk food.
3. Need more spices in Italian food.
4. Make salt, pepper and Different variety of sauces available at condiment counter.
5. The students would like to see more food from their individual countries and would like this rotated as often as possible [for fairness].
6. New food, different varieties.
7. Sometimes should serve a buffet lunch.
8. Food should cater to all. For example, also serve Muslim or Indian food.
9. Food is rarely served up to the standard for prices they charge.
10. More variety from day to day/more types of food.
11. Should serve food that is less oily (example fried chicken/hotdog/fish, Thai curries).
12. Healthier entrees such as baked chicken instead of grilled in charcoal or fried.
13. Meals are too small for the price being paid. Expensive. Students were willing to pay higher as long a food is adequate for the amount you pay.

b. Canteen staff

1. Servers do not serve food properly. For example, they try to put everything on rice – even beef stew; they provide very little portions of food.
2. Canteen staffs do not smile at all.
3. Cooks and servers should wear hairnets and gloves.
4. Serve faster.

5. Serve first person. Not pushy person.

c. Physical environment

1. Not clean. Need to wipe tables.
2. Stronger air-conditioning.
3. Canteen smells.
4. Separate ordering line and a la carte line.
5. More tables and chairs outside.
6. Coupon lady not always there. Doesn't speak English. More people selling coupons.
7. More coupon lines.
8. Lines do not flow smoothly.
9. Replace the female staff with attitudes. Makes people fee they are being disturbed. Can't remember the last time they smiled.

Parents, especially mothers requested to sit in one-to-one or in-group interview (FGD). Mothers reported sharing similar concerns with previous PTO officers. Even the PTO officers complained that any concerns they have had regarding the school food program were not being addressed. Findings from parent ID and FGD were the following:

1. Canteen should serve more Western food to accommodate everyone.
2. Korean and Japanese mothers reported that their children do not eat much at lunch. At times the students buy unhealthful foods because of lack of choices for lunch.
3. Some Muslim students sometimes bring lunch because of lack of choices.

4. Salads do not look appealing. Sometimes vegetables are wilted. Probably because they are prepared hours before serving.
5. Should serve variety of appealing vegetable dishes.
6. The school should serve healthy snacks such as fruit and other healthy snacks.
7. To ensure that children get nutritious food, they should be served set lunch.
8. Canteen staff should wear gloves and hairnets.
9. The cook should not use bullions to make noodle soup. It is very high in salt.
10. Because lunch is included in the school fees, the school should provide what parents pay for.
11. The sale of soda and other junk food in the canteen should be discontinued.
12. Sometimes the food is inadequate. Older students who eat later no longer have choices. They end up ordering a la carte.

2. Policy assessment

ASB do not have any policy on nutrition. Among several, there are two school objectives that relate to health: 1) To provide for each student a comprehensive education in an atmosphere that is supportive of the individual's identify, his/her talents and creativity, and 2) To provide for the facilities that will enhance the acquisition of habits in physical education (PE), of good sportsmanship, cooperation, health and physical fitness for life.

Health instruction was provided two or three times last year. Before the end of 2002 as the weather got cooler and again in early 2003 with the SARS outbreak, the

school temporarily discontinued swimming classes. The PE teachers decided, as an alternative, to provide health education to students. Health: Developing awareness of health and personal development, a book developed for Australian kids, was used by the PE teachers. One PE teacher commented that the PE curriculum is being developed. Except for verbal information, no PE curriculum was documented to guide PE teachers on how "health and physical fitness for life" can be attained. The lack of documentation was blamed on high turnover of teaching staff.

When probed about health education, one PE teacher remarked that PE at ASB is more about physical activity rather than classroom contact and therefore health education can be implemented at a minimal degree.

In 2003, the Head of the PE Department joined the sports association of International Schools that compete in sports. The PE Head also established competitive sports including soccer, swimming and basketball that will compete with other International Schools.

The PE teachers saw the need for promoting health and were open to ideas for improved PE curriculum.

5.4 School Health Program development and Implementation

The *"Shape for Health"* program used a participatory process in program planning and implementation. All information gathered in situation analysis was used in formulating the school health promotion program at ASB. To enhance program effectiveness, key program schemes such mobilization and participation, training of canteen staff and coordination of program activities were used. Other strategies used are discussed in each program component.

Program development and implementation took about seven months to complete from October 2003 through middle of May 2004. Please refer to Timetable in Appendix H (page 320).

5.4.1 Health team

Awareness of school health-promotion program was widely circulated through morning assembly, PTO meetings, letters to parents and ASB Newsletter. Ideas about what a school health-promotion program is and how it benefits students, teachers and families were also shared. Main findings from the situation analysis were also circulated. Awareness building was used to mobilize school personnel, staff, students and parents. Names of potential Health Team member were gathered. Voluntary participation was also sought through meetings and letters. Parents were given the telephone numbers of key persons in case they have any questions or need more information regarding the school health-promotion program.

Before the school nutrition program was developed, a school Health Team was formed. Parents and teachers were asked to volunteer. Eventually, a six-member team consisting of the School Principal and five parents (mothers) was established. The health team was responsible to:

1. Develop the school nutrition policy.
2. To ensure that the policy is being reinforced by conducting formal or informal monitoring of nutrition-related activities.
3. Provide feedback to the school regarding the nutrition program.
4. Participate in nutrition activities such as nutrition education and food sale.
5. Participate in the evaluation of the program.

As provided in the Health Team responsibilities, the Health Team carried out the succeeding activities. The Health Team met on a monthly basis. However, daily and weekly communications were conducted through email, telephone or letters.

5.4.2 Policy development

During a PTO meeting in September, the development of the school nutrition program was discussed. Topics to include in the policy were outlined. A draft policy was written and circulated for feedback. Necessary alterations to the policy were conducted and the final version agreed upon. Refer to Appendix F for details of the policy.

The policy was seen as a vital instrument for implementing a school health-promotion program at ASB. The policy is a brief document that incorporated inputs from all school constituents. The policy has four activity components including: 1) nutrition education, 2) physical activity enhancement, 3) school food service, and 4) BMI monitoring.

5.4.3 Nutrition education

Nutrition education involved curriculum development and instruction. Feedback regarding topical areas for nutrition education was collected. Then, a ten-week nutrition curriculum was developed. Refer to Appendix G for the curriculum. The first two weeks of instruction started in the middle of December. This was resumed in January after the winter break. As deemed appropriate, adjustments to the curriculum were conducted. It took only eight weeks to complete the teaching rather than the ten weeks that was originally planned. Teaching session was for one class period (45

minutes) rather than the 20 minutes that was initially proposed. Where appropriate, revisions to the curriculum were conducted. This involved excluding materials that were not needed, adding new materials to the curriculum and refinement of teaching and learning activities. See Appendix F for curriculum. Curriculum development was based on the knowledge and skills needed for healthful eating and enhancing physical activity. Findings from the situation analysis particularly knowledge, attitude/beliefs and behavior were used to guide curriculum development. Because of time constraint, the curriculum included everything the teachers need in order to have the needed tools and skills to teach nutrition.

After discussions between the School Principal, homeroom teachers, PE teachers, and other teachers who were interested in the program, the following agreement was reached:

1. Because the nutrition curriculum was introduced in the middle of the school year, it was quite difficult to have homeroom teachers integrate this in their normal schedule.
2. The PE should integrate some of the lessons in their curriculum.
3. Health will be taught within the "Values" class, which is on class period (45 minutes).
4. The Math teacher integrated some health teachings in his curriculum. For example, BMI calculations and calculating for calories.

Three mothers and one substitute teacher volunteered to teach the curriculum as part of the Values Class. All mothers had teaching background and was therefore comfortable teaching. Due to lack of experience in teaching health, the substitute

teacher needed some coaching. She sat in some of the classes to get hands-on experience from the mother volunteers.

Key strategies used to achieve positive changes in students' behaviors included:

- Adequate time allocated for nutrition education lessons (45 minutes).
- The curriculum was designed based on the needs and concerns of the students (based on findings from situation analysis).
- The curriculum was targeted to limited number of behavior (focusing on healthy eating and physical activity).
- Nutrition education integrated into lesson plans of other subjects such as Math, Science and PE.
- The curriculum placed emphasis on active learning and fun activities (fun and participatory activities rather than lectures).
- Social learning techniques included raising the value students' place on good health and nutrition; giving students repeated opportunities to taste healthy foods; using teachers and peers to demonstrate healthy eating practices or act as role models; providing incentives (small prizes) to reinforce messages; helping students develop skills in reading food labels and making healthy food choices; helping students to analyze their own eating patterns through self-monitoring (food diary and growth chart).
- Collaborated with PE teachers to reinforce the link between healthful eating and physical activity.
- Integrated school food service and nutrition education (canteen used as place for students to practice health eating).

5.4.4 Physical activity enhancement

The aim of the study was to increase physical activity among the students. A review of the school PE curriculum was conducted. The school Physical Education program involves:

1. PE once a week for one period (45 minutes). Usually 10-15 minutes warm-up and play activities for 20 minutes.
2. Swimming once a week for two periods (1 hour and 30 minutes). Usually a period for techniques and warm-up and one period for practice and coaching.

Besides PE, the school offers "Interest Club" every Friday for one hour and 45 minutes. Various sports that are offered in the club include badminton, cricket, basketball, swimming, and aerobics. Those who are involved in a sports team also practice their individual sports for one hour twice a week, after school.

Strategies used to increase participation in physical activity include:

- Students were provided instruction on various types of exercises and its benefits both in nutrition education and PE class.
- The school increased variety of physical activities for the Friday Club and students were encouraged to join these clubs. As part of the nutrition program, and to encourage parents to be involved in physical activity, aerobics was also offered to parents.
- Weight and height were monitored every month.
- Recess was used as opportunity for daily physical activity for students. Students were allowed to use sports facilities at break time.

- Linked students with community programs to encourage physical activity outside of school. Awareness regarding sports clubs was increased among the students.

5.4.5 School food service

Based on the comments above, the researcher met with the school Administrator to present the findings and to discuss how the school can address the issues collected from the surveys and interviews. After two months of deliberation, the school Administrator proposed the following:

1. The researcher will train the cook and kitchen staff on how to prepare nutritious food for snacks and lunch.
2. Set menu will be served. Develop a monthly menu.
3. Place a new system in place (i.e. preparation of weekly monthly menu, ordering and serving). Purchase needed canteen equipment.

The recommendations by the school Administrator were implemented immediately. Improvements in food service include:

- Kitchen staff were trained on how prepare nutritious, appealing snacks and lunch.
- A monthly Set Menu and monthly Snacks were prepared. See Appendix E for example of a monthly menu. The menu had three choices: Asian, Western and vegetarian with nutritious meal gradually introduced.
- Canteen monitors (teachers) were requested to encourage students to eat what's on their plate, particularly, fruit and vegetables.
- Serving trays with compartments for different food items were bought.

- Regular feedbacks regarding food service were provided to school administrator and canteen staff.
- Serving system was improved.
- Healthy snacks were also made available in athletic competitions (fruits and energy drink).
- The sale of foods high in fat, sodium and sugar were decreased. The sale of soft drinks was done only at certain time of the day.
- Integration of food service and nutrition education. This was intentionally done to reinforce messages in healthy eating.

To increase fruit and vegetables intake the following strategies were implemented:

- Fruit are provided for snacks and dessert in lunch menu.
- Vegetables are served everyday and included in set menu.
- Fruit and vegetables were also sold daily at the cafeteria.
- School personnel were requested to act as role models for healthy eating.

To increase intake of dairy products the following were implemented:

- Flavored milk including strawberry and chocolate were introduced
- Flavored yogurt was also introduced
- Flavored milk and yogurt were also sold daily at the cafeteria.

5.4.6 BMI monitoring

Weight and height of the subjects were taken on a monthly basis. Students were taught to record their weight and height and to calculate their BMI. BMI is marked on

their gender-specific growth chart. This helped the students be more aware how they are growing. Strategies to enhance self-monitoring include:

- Weight and height were monitored every month.
- Students were taught how to calculate their own BMI.
- Students were provided their own growth charts. They plot their BMI on their personal growth charts.
- Rewarding students. For students with weight problems, a small award (book, pens, eraser, etc.) was given as an incentive for improving their BMI.

5.5 School Health Program Evaluation

Effectiveness of the school nutrition program is dependent upon changes made in eating and physical activity behaviors among the students. Although not the direct measurement of this research, it is envisaged that changes in these behaviors will impact their nutritional status (BMI). Quantitative and qualitative data were collected to measure program effectiveness.

5.5.1 Pre-test and post test analysis

The purpose of pre-test and post-test analysis was to measure the effectiveness of the school nutrition program. Program effectiveness was based on changes in students' knowledge, beliefs/attitude, self-efficacy, diet or food consumption, physical activity behavior and weight status after program intervention (objective #2). Individual pre test and posttest scores were analyzed using One Sample T Test. Differences between pre test and posttest scores were analyzed by Paired Samples Test.

1. Food consumption

Psychosocial factors and diet

In this study it was hypothesized that there would be significant differences in knowledge, attitude/beliefs and eating self-efficacy before and after program intervention. Paired-Samples T test was used to compare differences in scores before and after program implementation. A p-value of $\leq .05$ was used as the significance level.

Results in Table 5.56 show that there are significant changes in psychosocial factors knowledge ($p < .001$), attitudes ($p < .001$), beliefs ($p < .001$) and self-efficacy ($p = .001$) before and after program intervention. The means from the four psychosocial factors showed an increase after program intervention.

Table 5.55 Psychosocial factors of food consumption before and after program implementation

Variable	Mean	SD	SE	95% CI		t	p-value
				Lower	Upper		
Knowledge							
Pre-test	.9444	1.0055					
Post-test	1.6944	.6422					
Pretest-Post-test	-.7500	.8179	9.639E-02	-.9422	-.5578	-7.781	< .001
Attitude/beliefs							
Pre-test	.3750	.4875					
Post-test	49.0000	10.3434					
Pretest-Post-test	-48.6250	9.9356	1.1709	-0.9598	-6.2902	-41.527	< .001
Self-efficacy							
Pre-test	.6528	.4794					
Post-test	1.5556	.5004					
Pretest-Post-test	-.9028	.6952	8.194E-02	-1.0662	-.7394	-11.018	< .001

Behavioral factors and food consumption

Table 5.57 presents dietary consumption in seven food components. The results show that there are significant differences in intake levels in all food components:

starches ($p < .001$), protein sources ($p < .001$), fruits ($p = .008$), vegetables ($p < .001$), dairy products ($p < .001$), and fats/oils/sweets. There were significant decreases in intake of starches (mean = 0.0416), protein (mean = 0.6666), dairy products (mean = 1.4722), and fats/oils/sweets (mean = 0.6944). The results show significant increases in intake of fruits (mean = -0.34722), and vegetables (mean = 0.45833).

Table 5.56 Food consumption before and after program implementation

Variable	#	Mean	SD	95% CI		T	p-value
				Lower	Upper		
Starches							
Pre-test	72	11.9028	1.9295				
Post-test	72	9.8611	2.1117				
Pretest-Post-test		2.0416	2.254495	1.511886	2.571447	7.684257	< .001
Protein sources							
Pre-test	72	4.7361	1.6950				
Post-test	72	4.0694	1.2927				
Pretest-Post-test		0.6666	1.162804	0.393421	0.939912	4.86484	< .001
Fruits							
Pre-test	72	2.5556	1.1615				
Post-test	72	2.9028	.6747				
Pretest-Post-test		-.34722	1.076768	-.60025	-0.09419	-2.73622	.008
Vegetables							
Pre-test	72	2.5278	1.8230				
Post-test	72	2.9861	1.3890				
Pretest-Post-test		-.45833	0.918319	-.67413	-0.24254	-4.23501	< .001
Dairy products							
Pre-test	72	5.5278	2.2390				
Post-test	72	4.0556	1.6520				
Pretest-Post-test		1.4722	1.760059	1.058629	1.885816	7.097613	< .001
Fats/oils/sweets							
Pre-test	72	6.4722	2.0416				
Post-test	72	5.7778	1.7052				
Pretest-Post-test		0.6944	1.095945	0.43691	0.951979	5.37669	< .001
Total dietary intake							
Pre-test	72	35.8472	7.0863				
Post-test	72	34.8333	6.1940				
Pretest-Post-test	72	1.0139	1.9964	.5448	1.4830	4.309	< .001

2. Physical activity/inactivity patterns

Table 5.58 shows that there are significant differences in physical activity ($p < .001$) and inactivity ($p < .001$) patterns among the students before and after program intervention. Physical activity has increased (mean = -3.3472) after program intervention and physical inactivity has decreased (mean = .5278). However, the increase in physical activity was much higher than the decrease in physical inactivity.

Table 5.57 Physical activity/inactivity patterns before and after program implementation

Variable	#	Mean	SD	95% CI		t	p-value
				Lower	Upper		
Physical activity							
Pre-test	72	24.6944	4.9835				
Post-test	72	28.0417	5.3719				
Pretest-Post-test	72	-3.3472	1.6628	-3.7380	-2.9565	-17.080	< .001
Inactivity							
Pre-test	72	4.5833	1.5542				
Post-test	72	4.0556	1.2206				
Pretest-Post-test	72	.5278	.8218	.3347	.7209	5.450	< .001

Psychosocial factors of physical activity/inactivity

There is a significant difference in exercise self-efficacy before and after program intervention ($p < .001$). A significant increase of 29.3750 was observed in exercise self-efficacy from 24.699 at pre-test and 54.0694 at posttest.

Table 5.58 Exercise self-efficacy before and after program implementation

Variable	#	Mean	SD	95% CI		t	p-value
				Lower	Upper		
Exercise self-efficacy							
Pre-test		24.6944					
Post-test		54.0694					
Pretest-Post-test	72	29.3750	14.7089	-32.831	-25.918	-16.946	< .001

3. Weight status

Weight status as measured by BMI also showed significant difference before and after program intervention (p = .025). The results show that there is an increase of -.1044 points with 18.5025 at pre-test and 18.9069 at port test. Increase in BMI is expected since children are continuously growing. Table 5.60 presents weight status in four BMI categories. Among six students who were underweight, five (83.4%) increased weight. Of the 16 students who were at risk of overweight, five (31.3%) increased weight whereas 11 students (68.7%) reduced weight. Out of eight children who were overweight, there was an increase of weight among three students (37.5%) and decrease of weight among five students (62.5%).

Table 5.59 Weight status before and after program implementation

Weight status	No. (%) of students		Total
	BMI Increased	BMI Decreased	
Underweight	5	1	6
	(83.4)	(16.6)	(8.3)
Normal	29	13	42
	(69.1)	(30.9)	(58.4)
At risk of overweight	5	11	16
	(31.3)	(68.7)	(22.2)
Overweight	3	5	8
	(37.5)	(62.5)	(11.1)
Total	42	30	72
	(58.4)	(41.6)	(100.0)

5.5.2 FGD and ID findings

Before school was closed for the summer holiday, FGDs and IDs were carried out among the school personnel, students and parents to evaluate the school health promotion program. The aim of the evaluation was to find out the extent to which the

program has achieved its goals. Six main questions guided the interviews. The following are the findings from FGD and ID sessions.

1. What was accomplished by the program?

Findings regarding what the program accomplished were:

- Initiating the program was in itself an accomplishment. Interviews revealed that no one has thought by anyone at school to start a health program. Conducting the survey and presenting findings was helpful in initiating the program.
- The program was comprehensive in the sense that it encompassed areas that affected nutrition. The program had multiple components.
- The various activities and outcomes of the program are visible. For example, children talk about how interesting the nutrition education is; students provide positive feedback about the changes in the cafeteria food; the food service system has made lunch process (serving/collecting/buying) work better; children look forward to the monthly weight monitoring; most children are involved [for Friday club] with outdoor, physical activities rather than indoor activities; more children would like to join sports activities, etc.
- Mothers make positive comments about the program when visiting the school and have expressed their interest with helping out in the nutrition program.
- The development of nutrition curriculum was key to program sustainability.

2. What is different as a result of the program?

- Students have become more attentive with their weight.
- Students have increased eating fruit and vegetables. Lunch monitors was a key factor in integrating classroom learning to cafeteria – encouraging students to eat fruit and vegetables.
- Canteen menu have drastically improved – serving better and healthier dishes.
- Students enjoy their lunch more.
- The school administrator and cafeteria staff consults or ask feedback from parents about the school health program.
- The cafeteria has become a nice place to hang out.

3. Did the program require a large budget?

- Although the program required some teaching materials, they were not inexpensive to develop.
- The program required changes but needed no extra expenses. For example, although the menu was changed, it didn't require additional funds. What was needed was training the canteen staff on preparing other types of dishes besides Thai dishes.
- The integration of health education within an existing subject did not require the hiring of a health educator.

4. In what way is the program effective?

The Principal and Assistant Principal both expressed that the program has been a success. Both students and teachers often gave positive comments about the changes that the nutrition program has done. The Principal and Assistant said that the program was not disrupted.

- The program has brought health awareness among the students. Piloting the program among a smaller group of students allowed the school to absorb the program without disturbance.

"A lot of mothers provided positive feedback about the program."[Principal]

"Older students complained at first but now they are happy with the changes." [Principal]

"The students are looking forward to eating their lunch." [Asst. Principal]

My son has been telling me all about how good the lunch program is." [mother, 33]

- Students were more conscious of what they eat.

"Look teacher, I'm eating more my vegetables."[boy, 9, during a lunch time]

I don't like eating yogurt but I have to eat it. It's healthy for me. [girl, 12]

- Students have become more involved with outdoor activities rather than indoor activities or showed interest to more physically active.

I have selected badminton instead of art club. [girl, 12]

I like to play sports on Friday but the music teacher told me to practice singing. [girl, 10]

- Snacks and lunch time is more organized.
- More parents became involved with the school.

"A lot of mothers provided positive feedback about the canteen."[Principal]

"I would like to help the school again next year. [mother, 39]

"Opening the sports to parents has been a wonderful idea. I hope they will continue this next year. I hope more parents will be participation." (mother, 41)

- Students brought home what they learned from school.

"My son asks me to prepare healthy food."[mother, 31]

"My daughter is eating vegetables." [mother, 33]

"My child has been telling me what they learned about nutrition." [mother, 45]

- The school is definitely a venue for students to learn and develop healthful eating habits.

"My kid never listens to what I tell him but he listens to what the teacher says."[mother, 40]

My son weighs himself regularly since the nutrition program started. [mother, 32]

- The program has achieved more than what was expected.

"A lot of mothers provided positive feedback about the program."[Principal]

5. What activities have taken place to ensure sustainability?

- What the students learned from nutrition education particularly healthful eating and physical activity could be carried through. Already some students exhibit change in their eating and physical activity behavior.
- Regular weight monitoring. The school will continue this activity. Students have also learned how to monitor their own BMI.
- The school administrator decided to expand the program to the whole school as well as to the other ASB campus:

> *"I'm very happy with the program. I wish I have allowed changes sooner". A lot of parents have spoken to me about how wonderful the program is Next school year this program will be expanded to the other campus in Bangna." [School Director]*

- In March, the Values teacher was summoned to prepare a health curriculum that will be integrated into the Values and PE periods. A meeting between the Administrator, PE and Values teachers, and the researcher took place in April to discuss about what has been implemented and how the program will be continued in the next school year.

> *I was requested by the Administrator to train the cook at the other school campus." [Cook]*
>
> *"I hope you will continue to assist us next year." [Administrator]*

- The Administrator also requested the researcher to develop a general school health policy.
- Program implantation took just seven months to complete. In addition, nutrition education was provided for eight weeks. Although minimal, changes have been observed.
- The principal also expressed that the achievement were beyond their expectations. This year parents have become so involved with school activities because of the nutrition program. Major plans for next year include:
  1. Integration of nutrition education into curriculum.
  2. More training of cafeteria staff.
  3. Expansion of the nutrition program to ASB Bangna Campus.
  4. The PE Department will organize a Nutrition Contest and a Mini Marathon for the students.
  5. More variety of sports will be provided for Friday club.
  6. Friday club will be open to parents.

6. In what capacity were the following persons involved in the program?

The table below provides a summary of involvement by concerned parties. The school felt that they have the responsibility to carry out the program. Parents on the other hand felt that the program can start by participating in some of the program activities. Both school and parents felt that because the program is very needed but was not originally planned, both felt the responsibility to make the program a realization. FGD findings and comments:

- A person who is a mover and shaker is vital to start the school health program initiative.
- Mobilization of school personnel and parents were key to starting the program.

The succeeding tables provide a brief description of participation by school personnel and parents.

Table 5.60 Participatory Table (ASB PERSONNEL)

Project Cycle	Type of participation			
Inform	Consult	Active involvement	Assuming responsibility	Self-management
Problem identification		X		
Project design			X	
Planning			X	
Implementation		X	X	
Monitoring		X		
Evaluation		X		

Table 5.61 Participatory Table (PARENTS)

Project Cycle	Type of participation			
Inform	Consult	Active involvement	Assuming responsibility	Self-management
Problem identification		X		
Project design		X		
Planning		X		
Implementation			X	
Monitoring			X	
Evaluation		X		

5.6 Summary

The results of the statistical analyses of univariate and multivariate methods were reported in this chapter. Findings were presented in tables and figures and discussed briefly.

Data were presented as percentage, mean, and standard deviation (SD). Correlation and chi-square test were used to test relationships between independent and dependent variables. All tests were two-sided and p-value of less than 0.05 was considered statistically significant.

The first research question dealt with determining eating and physical activity/inactivity behaviors among ASB students indicated that poor diet, low physical activity and high inactivity levels were rampant among the students. Of the 72 students: 48 (66.7%) were classified with normal BMI; 16 students (22.2%) were classified as at risk of overweight; and 8 students (11.1%) were classified as overweight. Across all food classifications, students had high frequency of intake of starches, fats/oils/sweets and combination foods. Fruit and vegetables were the least eaten. Consumption of protein sources and dairy products were fairly good. Overall diet rating revealed 26 students (36.1%) had good diet whereas 46 students (63.9%) had poor diet. The majority of the students (61.2%) had low physical activity level while 38.8 percent had moderate activity level. High inactivity level was also rampant among the students with 48.6 percent reporting high inactivity level while 30 students (41.7%) had moderate inactivity level.

Results in univariate analysis indicated that factors that were associated with eating behavior at .05 level include age ($p = .019$), ethnicity ($p = .028$), restaurant/fast food consumption ($p < .001$), knowledge ($p < .001$), attitudes ($p < .001$), beliefs ($p <$

.001), eating self-efficacy, parental influence ($p = .019$), parental knowledge ($p < .001$), attitudes ($p < .001$), and beliefs ($p < .001$).

Results in univariate analysis indicated that factors that were associated with physical activity pattern at .05 level include parental influence ($p = .023$), exercise self-efficacy ($p = .015$), use of exercise/recreation facility ($p = .002$), exercise self-efficacy ($p < .001$). Exercise/recreation facility use was the one important factor ($p = .002$) in inactivity level among the students. Both physical activity and inactivity levels showed significant association with weight status among the participants.

Results in univariate analysis indicated that factors that were associated with physical inactivity pattern at .05 level include ethnicity ($p = .027$), use of exercise/recreation facility ($p = .017$), exercise self-efficacy ($p < .001$) and physical activity level of parents ($p < .001$).

Diet, physical activity and inactivity showed strong associations with weight status ($p < .001$, $p = .008$, $p < .001$, respectively), eating self-efficacy ($p = .001$) and exercise self-efficacy ($p = .001$).

The qualitative analysis identified common themes among the narrative responses to the open-ended questions. In general, these themes were supportive of the quantitative findings.