CHAPTER VI

DISCUSSION

6.1 Introduction

This is a unique study with a sample of students enrolled at an International School. The findings provide detailed eating behavior, activity patterns, socio-demographic, psychosocial and environmental data. The study investigated associations between eating and physical activity behaviors and socio-demographic, psychosocial and environmental variables that are important to improve eating habits and increase physical activity among students. The high prevalence of poor diet and low physical activity levels illustrate the importance of this study.

Physical activity and nutrition are identified as determinants of body weight. Dietary patterns such as frequent consumption of high-fat foods, high salt and sugar intake, low fruit and vegetable intake and an unvaried diet are associated with later dietary patterns. Sedentary lifestyle due to increase time spent watching TV/video or playing computer-games have also shown to contribute to obesity. Ultimately, these poor habits place children at risk at risk of chronic diseases such as coronary heart disease, hypertension and some cancers (Health promotion effectiveness reviews summary bulletin, 1998).

This study also demonstrated that a coordinated school health-promotion program could be an effective strategy to significantly improve nutrition knowledge, attitude/beliefs and skills in making healthy choices vitally important to current efforts to enhance healthful eating and physical activity among students.

This chapter addresses the research questions that were posed. The findings from this study were compared with other studies.

6.2 Discussions of findings

6.2.1 Eating behavior

1. Diet (food consumption)

Consumption of high-dense (high fat or sugar) foods and lack of physical activity are the two most important factors associated with increased risk of overweight (PAHO/WHO, 2003). Fat cells normally multiply during early childhood and adolescence. Overeating during these times increases the number of fat cells (www.wy/traveldiet/fataspect). Obesity results when the body consumes more energy than it uses (Southwestern Vermont Health Care, 2001). Kids Healthworks (2003) and Children, Youth and Family Consortium (2003) concur that meals that tend to emphasize high-calorie foods can cause excess weight gain.

The findings from this current study show that among the six food components, a high percentage of students exceeded recommended number of servings/day of starches (62.5%), protein (51.4%), dairy products (50%), and fats/oils/sweets (68.1%). Low intake of fruit and vegetables were also observed with 58.3% of the students consuming <2 servings of fruit per day and 41.7% consuming <3 servings of vegetables per day.

Generally, Asians consume highly dense foods. Rice is the main carbohydrate food or staple and it is consumed with every meal. Normally rice other food including chicken, pork, fish, egg, etc. Noodles and vegetables are also common in Asia. Asian

food is strongly influenced by Chinese. South Asians on the other hand eats rice with various types of curries. South Asian meal is usually high in fat and sugar content.

Dietary and food intakes of children and adolescents in America showed that although there is a decline since 1973 of percent energy from fat, still close to 75% of children exceeded the current fat recommendation (Nicklas et. al., 2001). Findings from another study conducted among young people in the U.S. reveal that 60% eat too much fat (CDC, 2003).

The Food Frequency Survey conducted among ASB students disclosed that a high proportion of students (56%) had poor diet. This study revealed that dietary patterns among ASB students were changing. More and more students prefer Western food as supposed to traditional food. Pizza, French fries and fried chicken are becoming a common choice for most children in the study. A high proportion of students in this study had high consumption levels of starches, protein sources, fats/oils/sweets and combination food. High consumption of soft drinks is also common. According to PAHO/WHO, evidence shows that dietary fat leads to obesity and that total energy intake is an important concern regardless of the source of energy. By reducing fat intake, people tend to increase consumption of "light" products, which leads to increase in total energy intake. Another concern is the amount of sugar in foods contributes to obesity. Again, evidence shows that consuming large quantities of soft drinks high in sugar may increase the risk for weight gain.

The findings of low consumption levels of fruit and vegetables support other studies conducted in the United States. A survey conducted by the United States Department of Agriculture (USDA) based on 1989 and 1990 data samples, reveal that Americans were most likely to eat less fruit, vegetables and grains (USDA, 2003).

According to CDC 2003) less than 20% of young people in the US eat the recommended servings of fruit and vegetables.

This study concur with other studies that poor diet is rampant among young children. A 2003 study conducted by researchers from the University of Massachusetts Medical School have found that eating patterns such as frequency of meals, skipping meals and eating out play a role in obesity. Ma, the leading researcher went on to say that eating patterns, eating more food, and eating different types of food may account for part of the increase in the incidence of obesity.

Numerous lifestyle factors including time constraints, inconvenience and cost of foods, influence food preparation at home and eventually impacting the diet and eating behaviors of children and their nutritional status (Dairy Council Digest, 2003). A changing environment has also changed the eating habits of Americans (CDC, 2004). Increased selection of food items has caused many to stock their cupboards with all kinds of food, many unhealthful. This present study also concurs with results from other studies concerning the positive correlation between restaurant/fast food and diet. Ma et al (2003) confirms that restaurant food was an important factor in obesity. People who often ate breakfast or dinner in restaurants had two times the risk of being obese compared with those eating at home. The researcher explains that restaurant meals tend to be higher in calories and higher in fat and people tend to overeat in restaurants, which eventually impacts their nutritional status. Marmitt (1991) agrees that fast food restaurants are very common in most city streets. Adolescent are particularly vulnerable for these places.

Number of meals eaten at home

Students normally have three main meals per day. A high percentage of students (41.6%) reported consuming only one meal at home. About 58.4 percent of students reported normally having two meals at home. Consuming only one meal at home was significantly associated with poor diet among the sample students (p-value < .001). This variable is similar with number of meals eaten at home. This eating behavior is likely to contribute to poor diet among the students, which will eventually lead to the rising prevalence of overweight. Environmental factors are considered to contribute to the development of poor habits that lead to chronic disease. In the US harmful environmental factors include advertising low-priced products, actual sale of low-priced energy-dense food products, marketing of larger portion sizes and prizes, and the country's increased use of convenience foods (Journal of American Diet Association, 2002).

Type of food commonly eaten

Students were also asked about type of meal commonly eaten. Of the 72 total samples, 37 students (51.4%) normally eat ready-made or restaurant food while 35 students (48.6%) normally consume home-cooked meals. Type of food commonly eaten at home was significantly associated with poor diet among ASB students. This finding suggests that eating at home does not guarantee healthy eating. Even though children ate at home, what they ate were either bought or prepared from pre-packed ready-made food products. It is apparent that what students eat, whether at home or outside of home, need to be monitored. Convenience has driven most families to rely

on easy-to-cook food and restaurant food. Low cost was also reported as once factor why mothers opt for these types of food.

2. Socio-demographic factors

The association between five socio-demographic factors and food consumption were studied. However, the findings did not yield associations between these variables and food consumption.

3. Psychosocial factors

Knowledge, attitudes/beliefs

Knowledge of health information influences food choices. Results from this study support the hypothesis that poor knowledge is associated with poor diet. Poor diet was observed to be higher among those with lower knowledge. The results also revealed that low parental knowledge was associated with poor diet among ASB students ($p = .020$). Similarly, parental knowledge was found to be highly associated with students' diet ($p < .001$). A study conducted in the US found an association between greater parental nutrition knowledge and a lower prevalence of overweight among children (National Dairy Council, 2003). The association between good parental knowledge about nutrition and good diet among students implies the importance of knowledge. Increasing knowledge was one key intervention in this study to decrease the prevalence of overweight among ASB students.

Many respondents do not view themselves as eating good food or healthful food. Almost everyone say that much of the food out there are fried and with too much sugar. Younger children appear not to be concern so much about their eating

habits as older students. Older students (particularly girls) seem to be more aware of the impact of nutrition on their physical appearance. Students also mentioned that in most cases making food choices is generally made unconsciously.

Students' diet also appears to be also affected by their attitude and beliefs toward healthful eating ($p = .001$). Findings from this study support the hypothesis that negative attitude/beliefs are associated with poor diet. Results from a previous study conducted among adolescents in California found that those with positive attitudes, had intentions to consumes a healthy diet. Those with negative attitudes were unlikely to make dietary changes (Dairy Council Digest, 2003). Likewise, parental attitude/belief was also found to contribute to children's diet ($p < .001$). Poor diet was higher among children whose parents had negative attitude/beliefs than among children whose parents had fair-positive attitudes toward healthful eating.

Although this study revealed a positive association between parental attitude/beliefs and student's diet, no intervention among parents were carried out.

Eating self-efficacy

Low self-efficacy was not associated with poor diet or food consumption ($p < .001$). A number of studies have been carried out on self-efficacy to assess how it impacts behavior change. According to Schwarzer and Renner (2000), studies of intervention program revealed that clients with self-confidence were observed to less likely to have a setback into previous unhealthy diet.

The results of the present study also concur with the study conducted by WHO (2001) concerning the positive correlation between dietary self-efficacy and food

choice. Approximately 34.7 percent of respondents in this study had low self-efficacy. Of these, the majority (92%) had an intake exceeding 2200 calories per day.

FGD findings reveal that self-efficacy is somehow affected by culture. Many of the students were not sure if they could make choices. Many considered it disrespectful to request changes in what is ordered or served. For example, when a person goes to a restaurant, it is considered rude to ask to make changes in the menu or to request for changes in ingredients. When a person is invited to a party, it is also considered impolite not to eat what is served or to make a comment about the food [such as too much fat, too sweet, etc.] or to refuse what is being served. Also in most Asian culture, eating a lot during a meal is showing enjoyment of food as well as gratefulness to the host or person who prepared the food.

No statistical significant differences were found in diet between gender, age, and ethnicity among ASB students.

4. Environmental factor

Parental influence was another variable that showed significant association with diet ($p < .001$). Among the 40 students who had increased dietary intake, 30 students reported parent(s) as having the most influence in their diet while 10 students reported other than the parent(s). Parents and caregivers profoundly influence the eating environment of the child (Hershey's Topics in Nutrition: Children's Eating Patterns, 2004). This current study suggests that parental influence may be an important determinant of poor diet among ASB students aged 9-12 years. This current study concurs with Marmitt (1991) that family has the most influence in food behavior. The influence may either be negative or positive. In this current study,

parents appear to have a negative influence on their child's diet. This study indicates the importance of reaching caregivers or including them in the school health program. Family involvement will promote a wide range of resources and warrants support to enhance positive behavior among students.

6.2.2 Physical activity/inactivity

The increase in the prevalence of overweight has been claimed to low levels of physical activity and high levels of inactivity. Results from this study show that 45.8 percent of students had low level of physical activity. This study also collected socio-demographic and environmental data to investigate determinants of physical activity among ASB students.

1. Socio-demographic factors

One issue under investigation in this study was the relationship between family income and physical activity. This study yielded a significant association between family income and physical activity. Although, low physical activity was higher among students with a family income of <100,000 Bt/month than among students who reported a family income of ≥100,000 Bt/month, please note that the incomes of these families exceed most Asian country standards. Although Anderson (2000) stated that low energy expenditure is associated with affluence. Leisure time is often spent with inactive behaviors such as viewing television/video or computer/internet use. Anderson went on to say that obesity in high socio-economic status groups in developing countries appears to be due to more adequate food supplies. Leanness in lower SES groups may be the results of lack of food, high-

energy expenditure level or both. Obesity in developing countries may be a sign of health and wealth while in developed countries it is the opposite. PAHO/WHO echoes that in most developing countries, economic growth produced harmful effects such as poor nutritional and physical activity patterns. In big cities, motorized transportation and machineries have discouraged people from doing simple physical activities such as walking, bicycling and taking the stairs. As a result of higher economic status, people spend their leisure time being entertained in front of the television. As previously mentioned, the respondents in this study come from affluent families where television, video, playstation, and computer are readily available. Often the parents are out and the children are left with the maids and to fend for themselves. Because they are quite young to go out by themselves, the only option is to stay home.

2. Psychosocial factors

Knowledge, attitudes/beliefs toward physical activity

This study did not have quantitative physical activity knowledge and attitude/belief questionnaire. However, this information was explored in FGD session.

While many of these students feel that school sports and the physical activities they engage in "just for fun" keep them active enough (about four or five times a week), others (girls in particular) feel they should be or would like to be more active. Girls in this study were found to be more active than boys. For girls, playing play station or computer games were not as popular as in boys. Though friends they hang out with reportedly have similar activity levels, like shopping or going to a theme park. They reported one or two people in the group would be inactive. Meaning they prefer to stay home and just talk. Respondents perceive that active teen means

participating in sports. Girls appear to have a different reason for joining sports than boys. Girls will tend to join because a friend is joining it or the coach is good looking. On the other hand, boys join a team to prove themselves or to "look good" so people will notice. Boys tend to join or try various sports until they find what suits them. Trost et/ al. (1997) concluded that positive beliefs regarding physical activity outcomes is an important predictor of physical activity behavior among the study subjects.

Exercise self-efficacy

Students with low self-efficacy had lower physical activity and higher inactivity than those with moderate self-efficacy. Results suggest that self-efficacy was an important factor in physical activity and inactivity among ASB students ($p = .001$ and $p = .021$, respectively).

A study on determinants of exercise among children by DiLorenzo et. al. revealed that child's self-efficacy was an important determinant of physical activity among boys in the study. A study conducted among College students by Wallace et al (2000) revealed that exercise self-efficacy was one of the significant predictors of stage of exercise behavior change for both males and females. Similar result was found in a study conducted by Trost et al (1997) that self-efficacy was revealed to be significantly associated with physical activity.

3. Environmental factors

Access to recreation/exercise facility

This study did not support the hypothesis that access to recreation/exercise facility is associated with physical activity. Results showed that access was not a problem among these students. In fact, the majority has access to these facilities. Many students, particularly expatriate students live in apartment or condominium, which provides this service to its tenants. Findings from this study reveal that access to recreation facilities was not an issue among the students. As previously mentioned, children in the study are from high socio-economic status. In the US, SES showed a positive association with physical activity. Among children and adolescents, high SES meant more access to physical activity programs. Findings from studies like The Oregon Youth Risk Behavior Survey (1999) and Gordon-Larsen (2002) suggest that lack of access to safe recreation areas may lead to lack of exercise. Study results in the study by Trost et al (1997) showed that access to community physical activity outlets was an important predictor or physical activity.

Utilization of recreation/exercise facility

Findings reveal that utilization of recreation/exercise facility is associated with physical activity ($p < .001$) and inactivity ($p = .017$) levels. Recreation/exercise facility use appears to have stronger link with physical activity than with physical inactivity. Students who used recreation/exercise facility reported markedly higher levels of physical activity than those who did not. Likewise, students who did not use exercise/recreation facility reported lower inactivity level than those who did. Results from Gordon-Larsen et al study show only a small fraction (19.6%) of adolescents

used neighborhood recreation centers. The former study indicated that gender and ethnicity were important factors in community recreation center use. Another study by DiLorenzo et al (1998) suggests that child's enjoyment of physical activity was the only consistent predictor of physical activity.

PAHO/WHO iterates that gender, cultural factors, age, perceived barriers, etc. only explains a small portion of the variance of physical activity. What provide as apparent explanations for physical inactivity patterns are environmental factors such as accessibility to recreational centers, opportunities for physical activity, aesthetic factors, weather conditions and safety concerns.

Parental influence

Parental influence showed to be highly associated with physical activity ($p = .001$). Among children, parents and caregivers greatly influence their environment. Children learn [first] from their parents. Children's behaviors emerge as a result of family environment. Results from this study support the hypothesis that parental (interpersonal) influence is associated with physical activity. Students who reported, "parent" as most influential person reported lower physical activity level than those who reported "other". Parental influence was an important factor in low physical activity among ASB students. Based on their findings, DiLorenzo et al concluded that socialization within the family exerts a tremendous influence on health-related behaviors such as exercise.

Parental level of physical activity was shown to be associated with student's activity level. Students with low activity level also had parents who reported low activity level. Low activity level was higher among students with low parental activity

level than those with parents who had higher activity. Parental activity was an important factor of physical activity among ASB students. DiLorenzo et al study revealed that two of the predictors of physical activity among girls were mother's physical activity and child's and mother friend modeling/support.

This variable did not show an association with inactivity. This finding did not agree with the study conducted by Fogelholm, Nuutinen, Pasanen, et al (1999) where they found that parent inactivity was a strong and positive predictor of children inactivity. Scores of parent activity were weaker predictors of child vigorous activity.

6.2.3 Weight status

Overweight among ASB students is a problem. A 2003 nutrition screening conducted among grades 4-6 students discloses that 11.1 percent were overweight while 22.2 percent were at risk of overweight (Hegenauer, 2003).

Unhealthful food intake has been blamed for the occurrence of underweight or overweight. Meals that emphasize high-calorie foods, this can cause excess weight gain (Kids Healthworks, 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. Anderson (2001) concurs that diet and energy expenditure are important factors of body weight which function within an environment of multi-faceted surrounding of socio-economic status, behavioral, psychosocial and environmental factors. The data regarding "at risk" of overweight is a concern because without intervention, these children may become overweight. Follow up studies should be conducted to scrutinize

what happens to these children. The following section provides discussion on factors associated with nutritional status among ASB students.

1. Socio-demographic factors

In this study socio-demographic factors did not yield significant associations with weight status. However, it should be noted that the proportion of BMI $\geq 85^{th}$ percentile was higher among boys (38.9%) than girls (27.8%). Higher BMI was also observed to be higher among students whose mothers had a college or higher-level education (58.3%) than among those with lower than college level education (41.7%).

In developed countries, obesity is more common among lower income groups than among higher income groups. Socio-economic (SES) status plays an important role in obesity. SES factors are major influences on both energy intake and energy expenditure (Merck Manual of Diagnosis and Therapy, 2003). In this study however, no statistical significance was found between family income and weight status. A mentioned earlier, subjects in this study composed mainly of students who come from families in the higher economic strata. Unlike developed countries, overweight and obesity in Asia is brought about by rapid economic progress. Merely three decades ago, many Asians were suffering from undernutrition. Economic growth and urbanization have contributed to changes in diet and cut levels of physical activity. Well-off children have access to convenience foods and transportation. The result has been a rapid increase in overweight and obesity.

This study tested for differences in weight status by selected socio-demographic factors. No significant differences in nutritional status were found between gender, age, and ethnicity.

2. Behavioral factors

Eating behavior

Poor weight status [especially overweight and obesity] among Asian children has drastically increased. The results of this study suggest that diet, physical activity and inactivity patterns, may be important determinants of poor weight status among ASB students. In addition, intake levels of foods high in caloric content are most probably contributor to the prevalence of obesity among these students. (Also see 6.2.1 Eating behavior, page 204). According to Anderson (2000) obesity increases in a setting where food is plentiful, safe, good tasting and energy-rich (high energy-density and high fat). Meal patterns in the US are changing. Fewer families are eating meals together. Nicklas et al (2001) states that about 46% of family food expenditure were spend on food and drinks outside the home. Children ate one-quarter of their meals away from home. The proportion is even higher among older children. The study also found a significant association between restaurant food and weight status (body fatness) among adults. Increased spending on food prepared outside the home probably explains the rising prevalence of obesity among Americans. Ma et al (2030) and their study confirm that higher frequency of eating outside the home was associated with obesity. In the review of the literature, Ma et al says that food obtained away from home is generally higher in fat, saturate fat, and cholesterol than food prepared at home. Findings from this study also showed that restaurant food/fast food was positively associated with weight status among ASB students.

This study maintains the hypothesis that dietary intake is associated with weight status among the subjects ($p < .001$). The results also imply that students are changing their dietary patterns (consuming foods prepared outside of home) and this

is likely a contributor in the emerging prevalence of overweight among these students.

Pizza and French fries were reported as commonly eaten food. Soft drinks are becoming a popular beverage among ASB students. In the US similar findings show that soft drinks are probably being replaced by other nutritious drinks such as milk and fruit juices (Nicklas et al). The number of snacks per day as well as the type of snacks these children also pose a concern. A majority of ASB students in the study reported between 3-8 food intakes per day (meals and snacks).

Studies in the US indicate that children who get more calories from protein or fat are at increased risk for overweight (Oregon Youth Risk Behavior Survey, 1999).

One limitation with the survey examining the role of total dietary intake and eating patterns in obesity is the highly a complex one. The focus of food frequency consumption was to estimate total dietary intake. Caution must be taken in attempting to interpret these results on diet-obesity relationships. The sample size is also relatively small and limited to specific population; and no other studies have been undertaken with the same population.

Physical activity/inactivity

Low energy expenditure appears to be an important factor of the obesity epidemic (Anderson, 2000). Research such as that of Gordon-Larsen et al is reported to show a link between inactivity and obesity. Lack of exercise is a major lifestyle factor contributing to increase in overweight. When children do not get adequate physical activity or exercise, calories they eat are not used up. Findings from a study conducted among 25,000 Australian men (www.betterhealth.vic.gov, 2003) showed

that the risk of death and disease is much lower in those who are physically fit even overweight, than those who are unfit and in normal weight range.

Most students were found to be involved in light to moderate physical activities. Only one student among 72 was found to participate in high level of vigorous physical activity. Results of this study suggest that low physical activity and high inactivity levels may be important determinants of overweight among ASB students ($p < .001$ and $p < .001$, respectively). Results also imply that changes in activity and inactivity levels are likely contributor to a decrease in BMI.

Sedentary lifestyle (physical inactivity) also yielded significant association with high BMI ($p < .001$). A child who is physically inactive is more likely to have weight problems (Kids Healthworks, 2003). A number of studies are reported to show a link between numbers of hours spent watching TV/video and computer/internet use. Studies have shown that overweight children were significantly more likely to spend more hours watching TV/video or computer/internet use.

3. Psychosocial factors

Eating self-efficacy

The data collected from this study suggested that eating self-efficacy is associated with nutritional status ($p < .001$). Low self-efficacy is highest among students who are overweight followed by students who are at risk of overweight. A number of studies have been carried out on self-efficacy to assess how it impacts behavior change. This variable was included because the ultimate impact of this study was to improve weight and/or maintain healthy weight among the students. Several studies provided evidence that self-efficacy plays an important role in weight control

and treatment of obesity. This present study concurs Schwarzer and Renner (2000), and WHO (2001) concerning the positive correlation between dietary self-efficacy and eating behavior.

Exercise self-efficacy

Exercise self-efficacy was also analyzed in relation to nutritional status and found that poor nutritional status is higher among students with low self-efficacy than among those with moderate self-efficacy. Poor nutritional status is associated with exercise self-efficacy ($p = .004$). Although reduction in weight or BMI It was not a direct measurement of program success, it was envisaged that healthful eating and physical activity would impact weight status. This current study has shown that there is a significant improvement in weight status among students with high BMI.

6.2.4 School Health Promotion Program

School nutrition policy

It was interesting to observe of the lack of awareness among the school personnel and parents of the need and importance of a School Health Policy. The dissemination of the survey findings among the school personnel and parents has prompted the development of the policy. The mobilization of parents and teachers through the PTO was key ingredient to the development and successful implementation of the school nutrition program. Wechsler et al (2000) stated that schools could offer psychological support for physical activity through school policies, administrative commitment, role modeling and the use of cues and incentives.

Nutrition curriculum/instruction

Nutrition education was conducted for eight weeks, from December 2003 (for two weeks) through middle of February 2004. There were improvements in nutrition awareness among the students. Students developed increased levels of knowledge, attitudes/beliefs, eating self-efficacy and exercise self-efficacy. As presented in Table 5.56, posttest scores were significantly higher than pre-test scores. Students were also more likely, by the end of the program, to be eating more vegetables and fruits and reducing intake of food high in fats and sugar, a reflection of the high profile that healthy eating received at ASB. However, the time variable to evaluate long-term effects of the program should be considered. For example, in maintaining the knowledge and skills learned and in healthy lifestyle that is apparent in weight reduction and weight control. Generally, there was an improvement in all areas of learning, which can be taken as an indication of positive work being done, and an increased awareness at ASB of the importance of health promotion in a school setting.

Many interventions regarding nutrition education demonstrated a positive effect on nutrition knowledge. Knowledge may provide the information to perform a behavior change, but it is the individual's attitude or belief that ultimately determines whether or not this knowledge is translated into actual behavior (Dairy Council Digest). Health professionals need to be sensitive to individual's beliefs and attitudes when providing advice about dietary changes.

The results of the survey conducted regarding nutrition education conducted in public elementary school in the US (Celebuski and Farris, 2000) show that nutrition education is effective in changing eating behaviors in students. Another study shows that schools where nutrition education efforts are coordinated by a person or group

have an opportunity to present a more focused message to students about the importance of healthy eating (Nutrition Education in Public Elementary and Secondary Schools, 1996). The "Shape for Health" program was developed as a collaborative effort by parents and school. Volunteer parents and two teachers were willing to teach the curriculum to the students. This was the main reason why nutrition education was successful.

Physical activity

ASB maintains a fairly good facility for physical activity. PE classes occasionally offer an opportunity for education about nutrition and physical activity. ASB offers PE, swimming and participation in sports teams. During the implementation of this study there has been a push by some parents to improve the school PE and playground, which led to a complete renovation of the soccer field and playground, and hiring (in school year 2004-2005) of a professional PE teacher.

Almost all students participate in PE activities and swimming, which are required by the school. PE is a one-period (45 minutes) class while swimming is a two-period class. Students are in the pool no more than 45 minutes. Normally swimming starts off with learning techniques (20 minutes) then followed by practice. Fifteen-twenty minutes are allotted for shower and changing. Another opportunity for vigorous physical activity is the Friday Club. Students can choose from a range of indoor or outdoor sports. Other non-sport activities are also provided including art and music. Students were encouraged to join activities that are moderate to vigorous. As shown, demographic factors particularly age, gender, and ethnicity were not important factors in physical activity or inactivity. The trial study conducted by Sallis et al

(2003) revealed that environmental and policy interventions were effective in increasing physical activity among boys but not girls. Key to the success of this trial study was targeted environmental changes including increased supervision, equipment and organized activities.

As presented in Table 5.58, port test scores were higher that pre test scores (mean = 24.6944 for pre test and mean = 28.0417 for post test). Indeed, the school health promotion program aimed at increasing physical activity and decreasing inactivity has been successful in increasing moderate to vigorous physical activity and decreasing inactivity. Through this program, the playground was improved and supervision of students in playground was increased. Better playground has increased proportion of children involved in physical activities.

The increase in physical activity may be due to the increase in variety of activities offered at school. The inclusion of families in school health program becomes more important so that physical activity is continued out of school. If physical activity is reinforced at home and at school, this positive behavior can be maintained.

School food program

Findings from this study reveal that more than fifty percent of the students at ASB had poor eating behavior. The proportion of students consuming restaurant/fast food was also high. Because of bad traffic in Bangkok, more and more children leave home without breakfast. Children either get breakfast on the way to school or at school canteen.

Students eat at least one meal at school. ASB has become a site for programs that include opportunities for healthy lunch and snacks.

In an attempt to improve eating behavior, nutrition intervention was designed to provide better and healthier diet through the school, cafeteria. Lunch and snacks menus were improved. This provided students more opportunities to taste and consume healthy foods. Cafeteria staff were trained to prepare tasty, appealing, low-fat food. School food program and nutrition education were carefully coordinated to ensure that what students learn in the classroom can be practiced outside the classroom. In addition, the cafeteria was upgraded such as trays were bought, functioning air conditioning system, buy and sell system, etc. At lunchtime, a lunch monitor, usually teachers, supervise the students. Students were encouraged to eat and finish what's on their plate. The sale of soda and other junk food were also reduced.

Pre and posttest analysis show that posttest scores in food consumption showed significant increase in consumption of fruits and vegetables and decrease in consumption of fats/oils/sweets.

BMI monitoring

At the beginning of the study, a nutritional screening was conducted among all students in grades 4-6. Students, as part of nutrition education, were taught how to monitor their BMI. Weight and height were collected every month. The researcher and a school staff were responsible to carry out growth monitoring. Each student was provided a growth chart for which to record his or her weight, height and BMI. Students calculated their own BMI and recorded them. Students were taught how plot weight and to read growth lines. Every month, after calculating their BMI, students

were asked to interpret readings. Growth monitoring became a powerful motivator among the students to keep a healthy weight. This has made students be more responsible with monitoring their growth.

Findings from this study reveal that reduction in weight status was indeed successful. Evaluation results show that among the 24 students who had a BMI of $\geq$ 85th percentile, a reduction of weight was observed among 66.7 percent of the students while 33.3% of the students had increased their weight.

6.3 Summary

A study among international school students was conducted at ASB. Data were collected to support program development. Simple data analysis was conducted and the results presented to school staff and parents through a PTO meeting. Through a joint cooperation between the school and parents, a school nutrition program was developed. The purpose of the program was to enhance healthful eating and physical activity among the students. The results from this study show a trend of overweight that is comparable with other countries. Dietary intake showed an association with weight status. The summary findings from the data analysis are outlined below:

Univariate analysis on eating behavior showed associations between students' dietary intake and number of meals eaten at home, type of meals commonly eaten at home, knowledge, attitudes/beliefs, and self-efficacy. Environmental factors that revealed association with diet were parental influence, parental knowledge, and attitudes/beliefs. Logistic regression model identified that eating self-efficacy and parental influence were positively associated with food consumption.

The results of this study also indicate that both physical activity and inactivity patterns are likely contributors to the increasing prevalence of overweight among the participants. Family income, exercise self-efficacy, use of recreation/exercise facility and parental influence were associated with physical activity. All these factors also showed significant associations with physical activity in multivariate analysis.

The two factors that showed associations with physical inactivity were exercise self-efficacy and use of recreation/exercise facility.

The prevalence of overweight among ASB students was similar with the trend seen in other Asian countries. Univariate analysis yielded positive associations between diet, physical activity/inactivity patterns and weight status. Multiple logistic regression model showed number of meals eaten at home and eating self-efficacy were the only factors that were strongly associated with weight status among ASB students. Overweight students consumed only one meal at home than students who are not overweight. Having only one meal at home increases frequency of eating restaurant or fast foods. Ultimately, this negatively affects the nutritional quality of the diet because of the large portion sizes of foods served and the types of foods often selected. The result is high BMI.

The fact that the statistical findings did not indicate any significant differences in eating behavior, physical activity/inactivity patterns and nutritional status among gender and age was unexpected. Probably affluence and the intake of Western food are the common denominators among the samples.

There is evidence that "Shape-for-Health" was effective in improving eating and physical activity among ASB students. Pre-test and post test scores for nutrition knowledge, attitudes, belief and self-efficacy revealed an overall increase in test

scores. Eating behavior, physical activity and inactivity scores before and after program intervention also showed significant improvements. FGD and ID findings also revealed that the respondents were also quite positive about the results of the program.

Clearly the implementation of a comprehensive school health promotion program was key to the improvement in eating and physical activity behaviors among the students. These findings are valuable considerations in planning future programs. The school health promotion program was introduced to ASB as a result of this study. In that short time (August 2003- May 2004), a lot has been achieved. Cooperation between the school and parents was another critical factor in achieving success. This research suggested that implementation of a comprehensive school health promotion program would appear to be successful in preventing and treating overweight and obesity.