

**HEALTH BEHAVIOUR SURVEY OF SECONDARY SCHOOL STUDENTS**

**A Thesis**

**Presented to**

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**of**

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**by**

**BONNIE LYNN COHEN**

**In partial fulfilment of requirements**

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## **Abstract**

### **Health Behaviour Survey of Secondary School Students**

**Bonnie Lynn Cohen**  
**University of Guelph**

**Advisor:**  
**Dr. S.E. Evers**

The purpose of this study was to determine the prevalence of inappropriate dietary behaviours, smoking and low levels of physical activity among high school students (n=318) in Stratford, Ontario. Weight and height and 24 hour recalls were collected through individual interviews with 59 students.

Over 1/3 (36.2%) of students were defined as current smokers; 42.8% reported eating breakfast on a daily basis; boys participated in physical activity more than girls ( $\chi^2 = 4.79$  ;  $p < .05$ ). Mean intakes of energy, calcium, folate and zinc intakes were below recommended levels for both boys and girls.

Findings indicate that these risk factors are prevalent among adolescents and that health behaviours cluster. These behaviours can increase the risk of chronic disease in adulthood. Strategies must be implemented to help adolescents develop lifelong healthy behaviours.

## Acknowledgments

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## 1.0 Introduction

According to the Centers for Disease Control and Prevention (CDC), the leading causes of death in adults are cardiovascular disease (CVD), cancer and diabetes (CDC, 1998). Inappropriate dietary behaviours, smoking and low prevalence of physical activity can increase the risk of these chronic diseases in adulthood. These are behaviours that are learned in childhood and adolescence. Every day, more than 3000 young people take up smoking. Daily participation in high school physical education classes in the United States dropped from 42% in 1991 to 25% in 1995. Seventy-five percent of young Americans do not eat the recommended daily amounts of fruits and vegetables (CDC, 1999).

Since the formation of the Canadian Association for School Health in 1988, comprehensive school health has been endorsed by more than 20 national organizations in Canada. Included in the list are Health Canada, the Canadian Association of School Trustees, the Canadian Federation of Teachers and the Canadian Public Health Association (Mitchell et al, 1997). The Canadian Association for School Health identified four goals for comprehensive school health:

- ~ To promote health and wellness
- ~ To prevent specific diseases, disorder and injury
- ~ To intervene to assist children and youth who are in need or at risk
- ~ To help support those who are experiencing poor health

While the Canadian Association for School Health is working on developing comprehensive school health programs, there is little information on the health behaviours of Canadian adolescents.

This research focused on three health behaviours; smoking, physical activity and dietary intake. Subjects were high school students in three secondary schools in Perth and Huron counties in Southwestern Ontario. The intent of this research was fourfold: (1) to

determine the frequency of high school students who participated in regular physical activity; (2) to determine the prevalence of high school students who smoked; (3) to determine the interrelationships of health behaviours in adolescents; (4) to determine the mean dietary intakes and the anthropometric status of a subgroup of adolescents.

## 2.0 Review of the Literature

This review concentrates on the health behaviours of adolescents. It includes the most recent statistics for both American and Canadian high school students health behaviours.

“Reductions in morbidity and mortality associated with lifestyle diseases may be achievable if satisfactory nutritional practices are adopted early in life and maintained in the long term” (Gracey et al, 1996 p.187).

### 2.1 Health Risk Behaviours

“Today, the health of young people and the adults they will become, is critically linked to the health-related behaviours they choose to adopt” (CDC, 1998). According to the CDC, the leading causes of death in the US for adults 25 and over are cancer, cardiovascular disease and diabetes. These causes of death in adults are linked to behaviours developed in childhood and adolescence. Tobacco use, unhealthy dietary behaviours, and inadequate physical activity are three health behaviours that can contribute to chronic disease during adulthood. Because the development of these behaviours can begin at a young age, it is vital that children and adolescents develop and adopt appropriate health behaviours.

Tracking refers to the maintenance of relative ranking over time on a given health behaviour. Kelder et al (1994) tracked smoking, physical activity and dietary behaviours of grade 6 students through to the 12<sup>th</sup> grade. Results supported the hypothesis that cardiovascular disease related behaviour tracks from approximately age 11 until age 18. The results of the Class of 1989 tracking analysis indicated that there is evidence of early tracking of physical activity, food choice and smoking behaviours (Kelder et al). Researchers believed that due to the clear pattern of tracking, if students were to separate into high and

low risk groups at an early age, and maintain this ranking over time, then interventions to alter the risk at or before the age of separation are needed. Gracey et al (1996) also found that although dietary behaviour during adolescence may be transitory in some teenagers, there are health-related behaviours that show tracking from adolescence to adulthood. Gracey et al claimed that if habits acquired in adolescence persist into adult life, these behaviours may have important long-term health consequences.

Up until this decade, little was known about the prevalence of behaviours practiced by young people. In January 2000, the WHO Policy Series developed a report regarding health and health behaviours among young people. Health Canada was involved in this study and surveys were administered every four years to a representative sample of 11, 13 and 15 year olds. The intent of this research was to learn about the health knowledge, attitudes and behaviours of children and adolescents in Canada and throughout the world (WHO, 2000). In Canada in 1990, the Ontario Health Survey (OHS) was conducted to evaluate population health needs. Included in this survey is information regarding dietary and nutrient intake, body mass index (BMI) and physical activity (Hedley et al 1995). For purposes here, the OHS information is restricted to the 12-19 year old age group. Findings from these studies as well as others are discussed throughout this project. In the US, the CDC developed a Youth Risk Behaviour Surveillance System (YRBSS) which helps to provide the necessary information to be able to make the proper changes and adjustments to schools and communities to help children and adolescents form healthy habits (CDC, 1998). The International Health and Health Behaviour Survey has the most recent information available regarding the health behaviours of adolescents and therefore was used as comparison data for the results of the Stratford Health Behaviour Survey.

## 2.2 Comprehensive School Health

A coordinated, comprehensive school health program is defined as:

An integrated set of planned, sequential, and school-affiliated strategies, activities and services designed to promote the optimal physical, emotional, social and educational development of students. The program involves and is supportive of families and is determined by the local community based on community needs, resources, standards and requirements. It is coordinated by a multidisciplinary team and accountable to the community for program quality and effectiveness (CDC, 1996 p.9).

Comprehensive school health includes a broad spectrum of activities and services that take place in schools and their surrounding communities. These activities and services enable youth to enhance their health, develop to their fullest potential and establish productive and satisfying relationships in their present and future lives (Mitchell et al, 1997). A comprehensive school health program empowers students with the knowledge, attitudes and skills required to make positive health decisions, as well as the environment, motivation, services and support necessary to develop and maintain healthy behaviours. When a Comprehensive School Health Program is implemented properly, it includes the following areas for intervention: (CDC, 1996).

Health education	Healthy environment
Health services	Counseling, psychological and social services
Physical education	Integrated school and community efforts
Nutrition services	School based health program for faculty

### *Why are comprehensive school health programs needed in high schools?*

Schools are recognized as being one of the best mediums available for improving the health and nutrition of children (CDC, 1996; Luepker et al, 1996; Raizman et al, 1994). It has also been shown that school health education is cost effective. According to the CDC, for every dollar spent on tobacco education, drug, alcohol and sexuality education, fourteen dollars were saved in health care costs. Other studies have shown that coordinated health

education in schools effectively reduced the prevalence of health risk behaviours among youth. For example, a health education program resulted in a reduction of 37% in smoking initiation among 7<sup>th</sup> grade students. Self-reported reductions in alcohol and drug consumption as well as smoking were also achieved through a coordinated school health program (CDC, 1998).

The need for school-based nutrition education is strong. Schools can reach almost all children and adolescents and they provide opportunities to practice healthy eating. In the US, more than half of the students eat one major meal at school and about 1 in 10 students eat two main meals at school. Skilled personnel are available in schools to ensure that peer pressure does not help to increase unhealthy eating practices. With appropriate training, teachers can use their knowledge and skills to develop nutrition education programs (CDC, 1996). Evaluations of school based nutrition programs in the US have been very positive. The importance of healthy eating is often taken home with children and this helps to improve the health of the family as a whole (Contento et al, 1995). Kelder et al (1994) found that intervention results of comprehensive school health programs indicated positive community and school intervention effects on youth smoking, physical activity and food choice behaviours.

In Ontario, the Mandatory Health Programs and Service Guidelines include health promotion programming (Ministry of Health, 1997). Standard # 9 of the Ontario Ministry of Health's Chronic Disease Prevention Program states that: the board of health shall work with all schools and school boards to implement health promotion programming. Topics that are included are tobacco-free living, healthy eating, healthy weights and regular physical activity. Standard # 10 states that the board of health shall work with school boards, school advisory councils, principals and teachers and parents to develop and implement guidelines



that support healthy eating and regular physical activity. These mandatory regulations have only recently come into effect in Ontario. While schools throughout the province are attempting to increase and improve their health awareness programs, it is too early to determine how any programs are working, as evaluations have not yet been completed (Edward, 1997).

### 2.3 Smoking

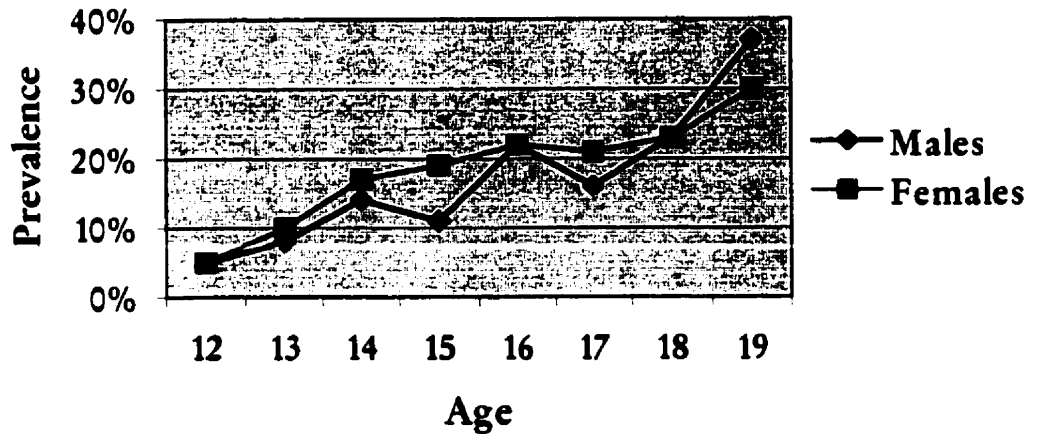
Smoking has been recently referred to as 'the Pediatric Disease' (Gritz et al, 1998). While cigarette smoking is a major cause of morbidity and mortality in adults, it is the most preventable cause in Canada (Health Canada, 1999a; Gritz et al, 1998) maintains that smoking is the most preventable cause of death and disease in Canada. According to the CDC (1997c), the optimal public health strategy is to prevent tobacco use completely, or to intervene as early in the smoking behaviour continuum as possible. The majority of daily smokers begin smoking before the age of 18, and more than 3000 young persons begin smoking each day (Camp et al, 1993). Kelder et al (1994) tracked adolescent smoking. They said, "the onset of smoking begins with initial favorable attitudes toward smoking, and through middle and high school, a substantial proportion of smokers progress from initiation on to regular nicotine-dependant smoking" (p.1121).

Approximately 75% of US high school students, from grade 8 and above have either tried smoking, have smoked at least one cigarette in the previous 30 days, or have continued to smoke on a daily basis. As well, between 80 and 90% of all children and adolescents have tried at least one cigarette and 20-40% of all adolescents become regular smokers by age 18. (CDC, 1994; Valois et al, 1997; Everett, 1998; Camp et al, 1993). According to Colby et al, (1998) while the overall prevalence of cigarette smoking has declined, the rate among

American youth has increased and keeps rising. Between 1975 and 1985, approximately 75% of those who had smoked daily during high school, were daily smokers 7-9 years later; however, as teenagers, only 5% of them had responded that they would definitely smoke 5 years after the survey (CDC, 1994). Kelder et al (1994) stated that few individuals initiate smoking past high school, and Flay (1993) showed that there is a high probability that those who become regular smokers during adolescence will continue to be regular smokers in adulthood.

The most current smoking data in Canada comes from the Addiction Research Foundation (ARF) (Truong et al, 1998). Among high school students in Ontario in 1997, 27.6% reported smoking at least once during the last year and it was determined that female students were more likely to be smokers than males. Smoking rates were shown to rise from 10.0% among 13-year-old students up to 42.3% for students aged 16 to 17. Kelder et al (1994) found a striking pattern of data regarding tracking of smoking. Once students become weekly smokers, they are unlikely to give up cigarettes. It has also been determined that the odds of becoming a heavy smoker are significantly greater for those who began smoking in adolescence, compared with those who started to smoke at 20 years or older (Chen and Millar, 1998). The following figure shows the prevalence of current smokers by age and sex and was taken from data collected in the Youth Smoking Survey (Stephens and Morin, 1996).

**Figure 2.1 Prevalence of current smokers by age and sex - Youth Smoking Survey, 1994. (Stephens and Morin, 1996)**



In 1994, the Youth Smoking Survey (YSS) established baseline data on Canadian youth smoking behaviour, knowledge and attitudes toward smoking. Results showed that the prevalence of current smokers fell from 43% in 1981 to 24% in 1994 and that in general, males smoke more than females (Adlaf and Bondy, 1996).

As with the subjects in the YSS, the students who participated in the research in this research have grown up with the knowledge that smoking causes health problems, that smoking is addictive and that it is very difficult for a smoker to quit. The reports that linked smoking to lung cancer were completed and released more than a decade before any of these students were born. Advertising of tobacco products was banned in the early 1970s and continuous and progressive measures to control tobacco sales, increased prices on cigarettes and a major increase in non-smoking in public places have occurred throughout their lifetime (Stephens and Morin, 1996). By 1994, 75% of 10-19 year olds had been exposed to some form of school-based health education about tobacco and the majority of teenagers are aware of the addictiveness as well as the health concerns that are related to smoking.

However, curiosity still abounds, and while the number of current smokers is decreasing, young people will still experiment and become addicted to tobacco (Stephens and Morin). In fact, Pierce and Gilpin (1996) found that while prevention efforts have been successful among adults, these programs do not tend to work so well with the adolescent age group. They found that smoking prevalence among high school seniors is increasing and that a reduction in smoking prevalence is more likely to be achieved by encouraging addicted smokers to quit than by preventing adolescent non-smokers from starting.

The primary reasons that both Canadian and American teens state for having tried smoking is the need for stimulation, peer pressure, curiosity, loneliness and the need for relaxation and recreation (Valois et al, 1997; Stephens and Morin, 1996). Other reasons for initiating smoking, or experimenting with smoking at a young age, include looking more mature, independent and tough, to be accepted by a peer group, to have fun, to cope with personal problems or boredom, or to be rebellious (Gritz et al, 1998; Camp et al, 1993). The likelihood of smoking increases if family members and friends smoke. According to the YSS, the most common reason youth start to smoke is the smoking behaviour of their friends. Gritz et al (1998) and Bergström et al (1996) showed that for both boys and girls, daily smoking is significantly associated with smoking in mothers, sisters, brothers and best friends. Almost half the smokers aged 10-19 in Canada have at least one parent who smokes and current smokers tend to have more close friends who also smoke (Brown and Manske, 1996). The places where teenagers generally smoke are at parties, at home, at school during recess or at a friend's house (Camp et al, 1993; Kelder et al, 1994; Meijer et al, 1996). Fifty-nine percent of Canadian males and 54% of Canadian females aged 10-19 have found that it is very easy for them to purchase cigarettes. Only 48% were ever asked their age, and only 41% were refused when attempting to buy cigarettes (Brown and Manske). Gender does not

seem to play a very important role in whether teenagers begin to smoke (Bergström et al, 1996). However, what does seem to be a factor in initiating smoking is the desire to lose weight in teenage girls. According to Kleges et al (1998), white females were the most likely to believe that smoking could help control weight; and 39% of white females and 12% of white males reported using smoking to control their appetite and weight. In a review of earlier literature, from 1983-1989, Camp et al (1993) also found that a large number of female smokers reported smoking for weight control reasons. As well, in a recent Canadian study of children aged 12-19 years of age, when overweight girls tried smoking, they were 3-5 times more likely to continue smoking than girls who were at a normal weight who had tried smoking. This suggests a strong association between body weight and smoking which begins even before adolescence (Health Canada 1999a).

## **2.4 Eating Behaviours**

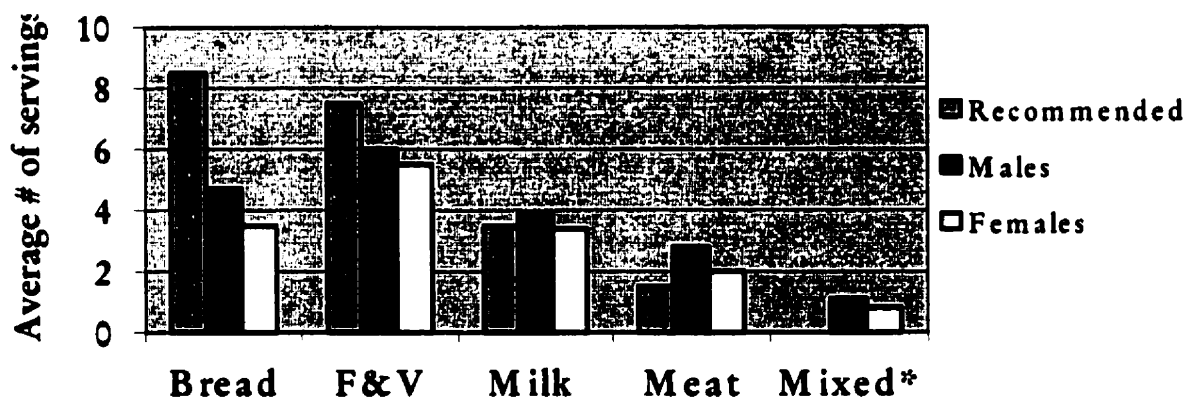
Population based studies have shown that the food intake of many adolescents includes a high proportion of energy from high fat foods, such as cheese, butter, high fat milk and ice cream (French et al, 1994, Rockett and Colditz, 1997). Many teenagers report skipping meals, such as breakfast, and tend to consume a large proportion of food away from home such as french fries, soft drinks, fried chicken, pizza, hamburgers and donuts. While the chronic disease outcomes related to obesity are not usually seen until adulthood, behaviours to predispose these outcomes generally manifest during adolescence (French et al; Rockett and Colditz). Felts et al, (1996) reported that as many as 70% of overweight adolescents become overweight adults, and according to the CDC (1996), the prevalence of overweight among youth aged 6-17 years in the US has doubled in the last 30 years. Long-term health risks are increasing with this abundance of overweight teens. The risk for

subsequent mortality from cardiovascular disease and non-insulin dependent diabetes mellitus (NIDDM) are strongly associated with adolescent obesity (Felts et al, 1996; Muñoz et al, 1997) and the CDC claims that many young persons in the US do not follow the recommendations of the dietary guidelines. According to Health Canada (1999a), excessive weight during childhood and adolescence is associated with higher morbidity and mortality in adulthood and the risk of obese children becoming obese adults increases with the child's age. Clarke and Lauer (1993) tracked levels of weight, height, BMI and tricep skinfold thickness (TSF) of children through their teens and again in adulthood. They concluded that weight, BMI and TSF track from childhood into the young adult years and that most children with high levels become adults with high levels of these measures. In a review of school lunches and school food and nutrition programs, Raizman et al (1994) found that 38-39% of the energy from school lunches comes from fat. Resnicow et al (1991) discovered that approximately 20-30% of American school aged children have total cholesterol values above 180 mg/dl.

In 1990, the Ontario Ministry of Health implemented the OHS to evaluate population health needs, provide a basis for planning and targeting programs to monitor changes in the health of the population (Hedley et al 1995). In this survey, adequacies of the population's nutrient intakes were based on comparisons made to the Recommended Nutrient Intakes and Nutrition Recommendations for Canadians (Health and Welfare Canada, 1990). The following graph shows data collected from the OHS (Hedley et al) regarding daily servings from each of the four food groups compared to recommendations found in Canada's Food Guide to Healthy Eating (CFG) (Health and Welfare Canada, 1992). The adolescent group reported the highest average daily intake of fruits and vegetables (5.8 servings) as compared to the rest of the surveyed population. More than half (53%) of the

12 to 19 year old age group reported consuming three or more servings of milk and milk products on a daily basis. Men in all age groups surveyed were found more likely to consume higher amounts of food in the grains and meat and alternative groups than were women. Mixed dishes as defined for the OHS included; hamburgers and cheeseburgers; meat and chicken pies; meat and fish stews; spaghetti, lasagna, other pasta with meat-tomato sauce; macaroni and cheese and other pasta with cheese and pizza. These dishes all involve more than one food group from Canada's Food Guide. A higher proportion of males in the 12 to 19 year age group had one serving or more per day from mixed dishes (Hedley et al 1995).

**Figure 2.2 Average intake of food group servings compared to recommended amounts in Canada's Food Guide - Ontario residents aged 12-19 (OHS 1990)**



\* There are no recommendations for the number of servings for the Mixed Dishes group.

The research done in Perth and Huron Counties in Southwestern Ontario provides data regarding the eating behaviours of high school students. With the help of 24-hour recalls and anthropometric measurements, we have determined the general eating habits of a group of Canadian adolescents. There are many implications for working with teenagers and

their eating patterns. With youth, there are high prevalence rates of inadequate food intake patterns; disordered eating behaviours; body dissatisfaction and many are overweight. Data suggest that a significant percentage of adolescents who view themselves as “too fat” are attempting to deal with the problem by limiting energy intake, which can lead to inadequate eating patterns (Felts et al, 1996). Newmark-Sztainer et al (1998) demonstrated that there is a need for nutrition intervention with adolescents. They found that eating behaviours in adolescence might have a notable impact on immediate and long-term health outcomes, such as eating disorders and osteoporosis. There are, however, some major challenges in working with youth to ensure adoption of proper eating habits as well as to ensure continuous participation in physical activity.

## 2.5 Physical Activity

Physical activity can have major health benefits for people of all ages (CDC, 1997a; Meyers et al, 1996; Pate et al, 1994; Sallis, 1993). Physical activity offers protective effects against coronary heart disease, hypertension, NIDDM, osteoporosis, colon cancer, anxiety and depression. Regular activity can also have positive effects on musculoskeletal, respiratory and endocrine systems. It can help to build and maintain healthy bones, muscles and joints; and help to control weight, build lean muscle, and reduce fat (Health Canada 1999a; Dovey et al, 1998; Ewart et al, 1998; CDC 1997a; Meyers et al; Pate et al; Sallis et al, 1993). While there is little evidence that physical activity in childhood and adolescence track into adulthood, it is reasonable to assume that regular physical activity could play a major role in the prevention of childhood obesity. This is in addition to physical activity being central to the establishment of long-term positive health related attitudes and behaviours (Allison and Adlaf, 1997; Pate, 1993). Regular physical activity can improve cardiovascular health and other components of health related fitness in children. Physically active and fit



children have lower blood pressure, higher levels of HDL and are leaner than less active or less fit children (CDC, 1997b; Sallis, 1993). As well, participation in sports and exercise can allow teenagers to become more independent and to develop higher self-esteem.

There is no standardized approach for assessing activity. The most widely used method with children and adolescents is self-report or report through proxies, such as teachers or parents. Self-administered questionnaires, interviewer administered questionnaires, and direct observations have been used to determine the amount of time children spend being physically active (Pate, 1993; Sallis et al, 1993). Recent national data on the level of physical activity among children and adolescents do not exist in Canada (Health Canada, 1999a). According to Health Canada and the Heart and Stroke Foundation, there are several methodological problems in determining these levels “older surveys that have been conducted must be interpreted cautiously since concepts of fitness and activity have changed in the last few decades” (Health Canada, 1999 p. )

In the absence of research on youth (Pate et al, 1994), activity guidelines for children and adolescents have been based on research with adults. Recently, The International Consensus Conference on Physical Activity Guidelines for Adolescents recommended that: (CDC, 1997b; Meyers et al, 1996; Pate et al).

- ~ All adolescents should be physically active daily, or nearly every day, as part of play, games, sports, work, transportation, recreation, physical education or planned exercise in the context of the family and school community.
- ~ Adolescents should engage in 3 or more sessions per week of activities that last 20 minutes or more at a time and that require moderate to vigorous levels of exertion.

According to Pate et al, on average, US adolescents spend about one hour per day on moderate to vigorous physical activity. One of the major competitors for leisure time hours

is sedentary behaviour in the form of television watching and playing computer and video games.

The US Youth Risk Behaviour Survey includes several questions designed to assess recent frequency of participation in moderate and vigorous activity (Pate, 1993). The CDC has shown through the YRBSS that nearly half of Americans, aged 12-21 years, are not vigorously active on a regular basis. Physical activity declines dramatically during adolescence. The daily enrollment in physical education classes decreased from 42% in 1991 to 25% in 1995 (CDC, 1999). Dovey et al (1998) looked at the time boys and girls, aged 15-18 spent being physically active. The overall mean time per week spent doing physical activity at age 15 was 9.7 hours, which was significantly more than the 6.1 hours of mean activity reported at age 18. There is strong evidence that physical activity decreases as adolescents age and as they go through higher levels in school (CDC, 1997a; Sallis, 1993).

Regular participation in vigorous activity is more prevalent among Canadian adolescents than those in the USA or England (Pate et al, 1994). The most recent Canadian data regarding prevalence of physical activity is from the Campbell Survey on Well-Being in Canada. This is a longitudinal study providing information on the physical recreation habits, physical fitness and health status of the Canadian population. In 1981, more than 23,000 people over the age of 7 participated. In 1988, one fifth of the original sample was contacted and the majority participated in the follow-up. Four thousand of the 1981 sample took part in the 1988 study. The main survey findings were (Stephens and Craig, 1990):

- 1) The Canadian population aged 15 and older was more active in 1988 than 1981.
- 2) One-third of Canadians aged 10 and older can be classified as active in their leisure time.
- 3) Forty-three percent of Canadians are regarded as being inactive and one-quarter as moderately active in their leisure time.

The 1990 OHS also questioned its participants about their physical activity habits. While the majority of Ontario residents reported that they were inactive, a much higher proportion of adolescents than any other age group reported being active. The following table shows the percentage of Ontario residents aged 12-19 who considered themselves to be active, moderately active or inactive.

**Table 2.1 Ontario residents aged 12-19 - level of activity (Hedley et al, 1995)**

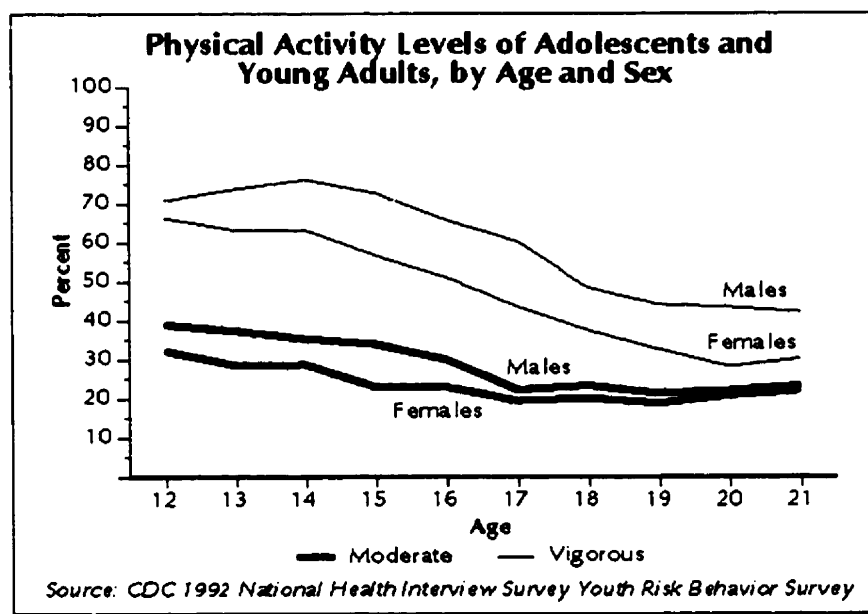
Characteristic	Active (%)	Moderately Active (%)	Inactive (%)
Age 12-19	44	22	34
Males	54	20	26
Females	36	21	42*

\*Due to a typo in the original OHS document, the actual number of females who are inactive is unknown; 42 is an approximate estimation.

Gender is a major factor in the determination of the frequency of physical activity in teenagers. As males age, they tend to be more vigorously physically active than females (CDC, 1997a; Meyers et al, 1996; Pate, 1993). The Canadian Fitness and Lifestyle Research Institute (CFLRI, 1996) has found that teenage boys spend almost six hours more each week on physical activity than do teenage girls. Pate et al (1994) reported that boys have a higher frequency of physical activity than girls do, and more of their activity tends to be vigorous. More boys than girls reported playing team sports such as basketball, football, and baseball as well as running and outdoor play; and when girls did these activities they did them for less time. Girls reported more time spent on activities such as jump rope, volleyball, dance and gymnastics. Boys would also report more outdoor activity, such as raking and mowing the lawn, while girls reported more time spent dusting and sweeping, which are considered lighter work (CDC, 1997b; Meyers et al, 1996).

The following graph from the CDC shows the relationship between physical activity levels of adolescents and young adults, by age and sex.

**Figure 2.3 Physical activity levels of adolescents and young adults by age and sex (CDC, 1997c).**



According to Vilhjalmsson and Thorlindsson (1998), the female sex was correlated with less physical activity and the higher their social class, the higher their activity level. If an adolescent had a father, mother, older brother or best friend who played sports, or did a lot of physical activity, this adolescent would have a higher level of activity as well.

Vilhjalmsson and Thorlindsson also showed that attitudes and beliefs that are related to physical activity are consistent with lifestyle and attitude and behaviour perspectives; adolescents who felt that sports and improving and maintaining good health were important, tended to be more physically active; they also had a stronger ability to interact with others.

Allison and Adlaf (1997) determined that in the case of teenagers, decline in physical activity occurs upon leaving school or when physical education ceases to be a requirement. The data on physical activity from the 1990 OHS showed that there was a major decline in participation in physical activity between the ages of 14 and 16 (Hedley et al, 1995). In Ontario, high school students are required to complete only one course credit in physical and health education, and many fulfil this requirement in the 9<sup>th</sup> grade (aged 14 or 15). Also, many students choose not to select physical education as an optional course in subsequent years (Allison and Adlaf). Another possible reason for decreased participation in activity is that many students obtain their driver's license at age 16 and thus begin to drive instead of walking, biking and rollerblading as modes of transportation. Increased emphasis on relationships, dating and social life and the beginning of menstruation for females may decrease participation in physical activity as well. Furthermore, there are increased demands on students such as homework and part-time jobs (Allison and Adlaf).

Body image is often a consideration that is included in studies involving physical activity and eating behaviours of adolescents. A study done by Stortz and Greene in 1983 showed that the majority of the female subjects studied were either within or under the average range for body weight. However, within the sample, most of the girls desired to lose weight, chose ideal outline figures when asked how they would like to look and used a greater number of negative adjectives to describe appearance. On the other hand, Felts et al (1996) and Moore (1988) noted that the increase in prevalence of obesity has occurred despite the cultural standard, which encourages thinness. These researchers said that female adolescents often have a concept of attractiveness that does not conform to reality. Many variables influence how adolescents perceive themselves. Adolescents are often more strongly influenced by their own weight relative to their peers than to an arbitrary, health

based standard. As well, adolescents tend to have distorted perceptions of their weight and many set unrealistic goals, they also tend to adopt unhealthy eating behaviours to regulate their weight (Felts et al, 1996). It has been determined that those who participate in physical activities that emphasize thinness, such as ballet or gymnastics, are more likely to be excessively concerned about their weight, to be dieting or to have an eating disorder (French et al, 1994). However, these researchers note that additional studies are needed to identify the nutritional practices and physical activity patterns that may place adolescents for developing eating disorders.

## **2.6 Clustering of Health Behaviours**

Clustering of health behaviours refers to associations between two or more health behaviours. Health behaviours such as poor dietary intake, physical inactivity and smoking have been shown to cluster (Lytle et al, 1995). Adolescents who maintain all three of these behaviours are at a much higher risk of developing cardiovascular disease, cancer and diabetes much earlier in their young lives (Lytle et al; Kelder et al, 1994). Dallongeville et al (1998), reported that smokers have higher intakes of total energy, fat and alcohol than non-smokers and fibre intake is lower in smokers than in non-smokers. Intakes of vitamin C, E and b-carotene are also lower in smokers than non-smokers. Epidemiological studies have established that multiple risk factors increase the probability of cardiovascular events, since cardiovascular risk factors tend to reinforce each other in their influence on morbidity and mortality (Berenson et al, 1998). As well, these studies have shown that clustering of risk factors is evident in childhood and persist into young adulthood. Results from the Class of 1989 study (Lytle et al) suggested that not only do associations exist between health

behaviours, but the associations strengthen over time. For the most part, students at higher risk of one behaviour are also at a higher risk for others.

Teenagers who participate in sports tend to be less depressed and anxious, they seem to have fewer aches and pains and tend to be more energetic and satisfied with life. Students who are involved in sports also tend to look at their health in a more positive light and they achieve better academic results; they also interact with others more easily and learn how to maintain social relationships (Vilhjalmsson and Thorlindsson, 1998). After the eighth grade, students who reported lower activity patterns as well as those who made fewer healthy food choices also exhibited a higher prevalence of increased smoking behaviours (Lytle et al, 1995).

Physical activity does tend to play a large role in the initiation of smoking (Winnal et al, 1995; Escobedo et al, 1993). Students who participate in interscholastic sports are less likely to be regular and heavy smokers, and physical activity in the form of athletic participation appears to be associated with decreased cigarette use. These researchers believe that it is possible that the lower rates of smoking in students who participate in interscholastic sports may be the result of greater self-confidence, extra health information from coaching staff and less peer pressure to smoke. Adolescent athletes may have perceptions about poorer physical ability due to smoking, greater awareness about the health consequences of smoking and a greater desire for an honorable appearance (Escobedo et al). Therefore, comprehensive school health programs need to focus on more than just one single behaviour that manifests during adolescence. More attention to the promotion of healthy nutrition and weight and regular physical activity throughout childhood and adolescence will help to promote healthy eating behaviours (Health Canada, 1999a). Programs encouraging smoking cessation, healthy eating and increased physical activity are

becoming more widely available in the U.S. While Canada has begun to implement these programs, the preliminary steps, such as determining current Canadian data must be completed.

### **Summary of Literature Review**

While the knowledge of risks of unhealthy behaviours is increasing in the adult population, adolescents remain prone to unhealthy eating habits, smoking initiation and decreased physical activity as they age. It has been shown that health behaviours which are learned during adolescence track into adulthood. This can heighten the chance of CVD, diabetes and cancer, the leading causes of death in adults. Health programs in Canada have begun to make their mark in public schools and high schools so that children and adolescents can learn the importance of maintaining healthy lifestyle behaviours throughout their lives.

Smoking during adolescence has decreased over the last two decades, but is still a concern for Canadian youth. Curiosity and peer pressure remain the most popular reasons to begin smoking. The eating behaviours of adolescents need to improve in order to reduce their risks of developing chronic disease. Most of the general population of Ontario consider themselves to be inactive; teenagers are the most active group. However, it has been demonstrated that throughout adolescence, the rate of physical activity decreases, and students in Ontario do not have to continue with physical education past the 9<sup>th</sup> grade

Smoking, physical inactivity and unhealthy eating behaviours tend to cluster, and have been shown to track through adulthood. The most efficient and economical method of reaching children and adolescents to help decrease their risks of unhealthy behaviours is through school health programs. Health Canada (1999a) trusts that the ongoing collection of data on physical activity, nutrition, weight and height among children and youth will



enable effective planning and evaluation of health promotion programs, policy and legislation. This study provides data on health behaviours of high school students. These data are necessary to improve and increase the level of health education and programs for secondary school students.

### 3.0 Research Objectives

There were four objectives:

- 1) To determine the physical activity patterns of high school students.
- 2) To determine the smoking patterns of high school students.
- 3) To determine the interrelationships among health behaviours
- 4) To determine the mean dietary intakes and the anthropometric status of a subgroup of adolescents.

Past work has established the validity, reliability and utility of school-based surveys directed at youth smoking (Stephens and Morin, 1996) and physical activity (K. Bercovitz, personal communication, June 7, 1999). There is however, lack of similar research available in reference to dietary behaviours. Presently, there are no Canadian data on dietary intakes of adolescents, and so there is no basis for the development of a dietary behaviour survey for high school students (Evers et al, 1998).

### 4.0 Methods

This research was a cross-sectional study of the behaviour of teenagers in South Western Ontario high schools. It provides information regarding dietary intake, anthropometric status, smoking behaviour, and physical activity. Data collection took place in April 1999 in three high schools in Perth and Huron Counties in Southwestern Ontario.

Data collection consisted of two parts. In the first part, the high school students completed a survey on smoking, physical activity and eating behaviours in class. The survey was administered by the teachers. The second part consisted of a 24-hour dietary recalls and height and weight measurements of a subgroup of these subjects.

#### **4.1 Participants**

Subjects in this study were high school students ranging from grades 9 to OAC, aged 13 to 19 years. Surveys were mailed to three schools in Perth and Huron Counties to be completed. Passive consent was used for the written surveys and an information letter was sent to each student's parents. Signed parental permission was necessary for the interview and recall portion of the study. The permission form, information letter and the full survey can be found in Appendix A.

Anthropometric data and dietary intake were determined by an individual interview including 24-hour recall and measurement of height and weight. This part of the data collection was done with students in grade 10 and 11 aged 15 and 16 years. Students were able to decide not to participate in either the interview or the survey. All information was kept anonymous and confidential. According to Camp et al (1993), the best predictor of accurate reporting among adolescents, is whether they are assured confidentiality.

#### **4.2 24 Hour Dietary Recall and Anthropometric Status**

The dietary recall as well as weight and height measurements were collected during an interview with each student in the subgroup. Twenty-four hour recalls were done to get information on the usual dietary intake of a group of adolescents. While the 24-hour recall is not used to assess usual intake for an individual, it is the most practical method for large-scale studies (Thompson and Byers, 1994). The recall interviews took place on a Monday, Tuesday, Wednesday and Thursday during one week in April 1999, which provides information on usual intakes on three weekdays and one weekend day. The benefits of using a 24 hour recall in this study included: 1) minimal expense 2) low respondent burden 3) easy administration 4) the element of surprise as the students did not know ahead of time that

they would be asked to recall their previous day's intake and 5) a relatively quick time allowance which was helpful to decrease the invasion of class time.

Dietary intake was recorded on a 24-hour recall form. Information that was collected during the interview included time of day each food was eaten, the place the food was eaten and the amount of food that was eaten. As much detail as possible was requested from each student, including a description of each food, as well as portion size estimations and brand name information. Students estimated portion sizes by using the recall kits that have been previously used in Better Beginnings Better Futures research (Hooper 1993). A copy of the height and weight recording form as well as the dietary recall form can be found in Appendix B along with a list of the calibrated models and materials in the dietary recall kit.

Height and weight measurements were taken the day of the interview. An electronic scale (Wilder Medical, Kitchener, Ontario) as well as a height measuring tape, the Microtwise Modified Tape Measure (CMS Weighing Equipment, London, UK) was used. Both measurements were taken twice with each student to ensure accuracy. Height was recorded to the nearest 0.1 cm and repeated a third time if the first two measurements differed by 0.5 cm. Weight was recorded to the nearest 0.5 lb., and repeated a third time if the first 2 measurements differed by more than 0.5 lb. Adjustments were made for weight due to the scale being on carpeted floor. Students were wearing their regular clothing, but shoes were removed for weight and height measurements. Weight and height measurement instructions can be found in Appendix B.

### 4.3 Survey Development

The health behaviour survey used to collect information from the high school students in Stratford was divided into three sections. The first twenty-three questions comprised the smoking habits of the students. The next three questions reflected eating behaviours and the last twenty-one questions considered physical activity behaviour. The survey questions regarding smoking and physical activity were taken from previously tested surveys regarding youth behaviour. A community advisory committee representing Perth and Huron counties was established to review the original surveys and determine which questions would be most appropriate and informative. The committee consisted of a wide range of health and education professionals in Perth and Huron counties, as well as researchers from both the University of Guelph and the University of Waterloo. An important group on the advisory committee was made up of representatives from the two main school boards in each county; the Avon-Maitland District School Board and the Huron-Perth Catholic School Board. A teacher's survey was also provided to be able to evaluate the health behaviour survey given to the students. The following sections will describe the development of the original surveys that were used to determine smoking and physical activity behaviour as well as the purpose of the teacher's survey.

#### 4.31 Smoking Survey

The questions on the survey that determined smoking behaviour were developed at the University of Waterloo and have been used as part of the Waterloo Smoking Prevention Program longitudinal study. The questions for this survey were originally used in the YSS in 1994. The target population for the YSS was defined as the 3.88 million people aged 10-19 in Canada. School-based surveys were done for the 10-14 year age group. Participation at

all levels were voluntary and boards, schools, students and their parents were all promised strict confidentiality. Questionnaires were completed by students in their regular classrooms in the fall of 1994. Ninety-four percent of eligible students completed the survey. For each student surveyed at school, a parental interview by telephone was done to collect data. Youths aged 15-19 were surveyed by telephone at home; the response rate for the household component was 81% (Stephens and Morin, 1996).

The validity of self reported smoking is often questioned, because of the widespread belief that smokers underreport the amounts smoked, or in the case of youth, deny smoking completely. People tend to respond in the socially desirable direction when it comes to health behaviours such as smoking. For the YSS, a meta-analysis was done on 26 validity studies which reported that self-reports of smokers are generally accurate compared to biochemical measures. While the analysis showed that students' surveys had a lower validity than the biochemical tests, the ratio was still considered acceptable (Stephens and Morin, 1996). According to Health Canada (1999), current smoking is the most comprehensive indicator of the prevalence of smoking. A consensus was developed on a standard set of measures for monitoring tobacco use; "current smoking" includes both daily and non-daily smoking, and requires a lifetime minimum of 100 cigarettes. Personal attitudes toward smoking are determined by providing a list of reasons to check as to why students smoke or do not smoke.

#### **4.32 Physical Activity Survey**

Researchers at the University of Waterloo also developed the questions on the survey concerning physical activity. This survey was administered to students in a high school in suburban Ontario. The physical activity portion of the survey included questions on:

physical activity and inactivity patterns; social determinants of physical activity; perceived benefits of and barriers to physical activity; perceptions of health and physical fitness; program planning for physical activity, body weight issues and self-esteem (K. Bercovitz, personal communication, June 7, 1999). The physical activity survey was developed and pilot tested in the Fall of 1997 with high school students grades 9-13. The questions that addressed perceived intensity and frequency of physical activity were used to create a physical activity index, which classified youth as inactive, low, moderate and high active.

The Perth-Huron advisory committee reviewed both the smoking survey and the physical activity survey and as a group decided which questions would be most appropriate for inclusion in the Stratford Health Behaviour Survey.

#### **4.33 Teacher's Survey**

The teacher's survey was developed to be able to evaluate the strengths and weaknesses of the health behaviour survey. Participating teachers were asked questions regarding their students behaviours while they were completing the survey, as well as how the teachers felt about each of the topics questioned on the health behaviour survey. Teachers were asked how long the survey took to administer and how disruptive this survey was to the classroom setting. Results were analyzed by frequencies. A copy of the teacher's survey can be found in Appendix A.

## 5.0 Data Analysis

Analysis of the data was divided into five separate categories; smoking, physical activity, dietary behaviour, anthropometric status, and interrelationships between health behaviours. Frequencies for all topics were separated by sex. Data collected from the completed surveys were entered into EPI Info, version 6.3 (USD incorporated, Stone Mountain, Georgia). This is a program in which information can be exported into SPSS, version 8 (Chicago, IL). Univariate and multivariate analysis were done using frequencies and the chi-squared test. The chi-squared test is used for the comparison of two proportions in paired or independent samples. The t-test will also be used to examine the differences in means (Colton, 1974). Each of the frequencies being studied were compared to a statistically significance level of  $p < .05$ .

### 5.1 Smoking

The questions on smoking behaviour were selected from the original surveys to determine how many students have tried smoking, their attitudes toward smoking, how many people in each respondent's household besides themselves smoke and whether or not students think that they themselves will smoke in the future. Current smokers were defined as students who answered "yes" to survey questions number 4 and 5 and "no" to number 9. These are students who had tried smoking, had smoked again since the first time and had not quit at the time of the survey. To help determine how often these adolescents smoked, the question "do you usually smoke every week?", was to be answered by choosing "yes", "no", or "I have never smoked". Tobacco purchasing behaviour was of interest to the community as well; students were to answer questions such as "how do you usually get your cigarettes", "how often are you asked your age when you tried to buy cigarettes" and "where do you smoke the most often"? With responses to these questions, the community will be



able to enforce appropriate rules and regulations regarding teenage smoking. Many of the questions regarding smoking also determined possible quitting behaviour. The students were asked “how long ago did you quit smoking”, “how many times in the past year did you try to quit smoking” and “do you plan to quit smoking”? They were also asked “would you join a program if the school offered one to help quit smoking” and “if you were considering getting help to quit, where would you go”? Several questions also considered school rules regarding smoking and whether or not students felt that both teachers and students were following the rules. Responses to these questions showed whether or not students tend to smoke near the school, if the teachers or staff smoked near the school, if there are a clear set of rules regarding smoking, and whether or not students would get into trouble if they are caught smoking in unallowed areas. There were also several questions in the smoking section of the survey which considered the attitudes of students toward smoking including smoke free environments, health problems, and peer pressure toward smoking. Each of these answers were analyzed using frequencies and results were compared by gender.

## 5.2 Dietary Behaviour

The survey questions on eating behaviours were designed specifically for this survey and were included to determine the proportion of students who ate breakfast on a daily basis and who considered themselves to be vegetarian. As well, to determine an intake pattern, one question was asked regarding the consumption of eight different foods. These are the same eight foods being researched for intake patterns in a study being conducted by the Addiction Research Foundation in Ontario and can therefore be used as a comparison for future work in this area. These questions were analyzed by frequencies and separated by gender.

Data collected from the 24-hour recalls were analyzed using the Canada Nutrient Calculation System (Godin London, Inc, London, Ontario, 1997). This software is based on the 1997 Canadian Nutrient File (Health Canada, 1997) and allows for calculation of energy and nutrient intakes based on portion sizes. Energy and nutrient intakes were compared to the Canadian Recommended Nutrient Intakes (RNIs) for adolescents (Health and Welfare Canada, 1990) and the most recent dietary reference intakes (DRI) (Food and Nutrition Board, 1998) were used for intake comparison where available. Unlike survey data, intake patterns and anthropometric measurements were analyzed by age instead of grade level. This is due to the fact that anthropometric measurements and recommended intake levels are developed for specific age groups by Health Canada. Analysis on this information was done on the dietary intake of the total sample and compared by age and sex.

## 5.2 Physical Activity

Survey questions concerning physical activity behaviour were selected to help determine students' participation in regular physical activity. Regular physical activity was defined as vigorous or moderate activity done for at least 30 minutes most days of the week. Analysis focused on the amount of physical activity done in a week and how hard the student works during regular physical activity. Questions regarding sedentary behaviour were included in the analysis, such as how many hours per day were spent watching television, movies, playing computer games, talking on the phone and doing homework. To determine the influence of others there were some questions asked regarding how many people in the student's house as well as how many of their close friends regularly participate in physical activity. Reasons behind why students do or do not participate in regular physical activity, with whom the activities are done, where they usually take place and what time of

the day they are done, were also analyzed. Students' responses to the survey questions will help the school boards review and improve their schools' current situations regarding physical activity. Questions of this nature included "if you were thinking about joining a physical activity program, where would you go to get information?", "are there any physical activities that you would like to participate in next year that are currently available or any that are not currently available"? Students then had the option of identifying their first two choices of preferred physical activity.

There were as well some questions in the physical activity section, which involved body image and perception of weight. Students were asked if they felt that they were "overweight, underweight, or neither", whether or not "they would like to lose, gain, or stay the same weight over the next 12 months, and whether or not they are "concerned, not concerned, very concerned or terrified of gaining weight".

#### **5.4 Anthropometric Status**

Anthropometric data was collected during the 24-hour recall interview. Measuring weight and height with an electronic scale and a measuring tape allowed for the interpretation of obesity measurements. Overweight and obesity result from a complex interaction between genes and the environment characterized by long-term energy imbalance due to a sedentary lifestyle, excessive caloric consumption or both (NIH, 1998). According to the Obesity Guidelines, published in 1998, overweight is defined as a person having a BMI of 25.0-29.9 kg/m<sup>2</sup> and obesity as a BMI of 30 kg/m<sup>2</sup>. The rationale behind these definitions is based on epidemiological data that show increases in mortality with BMIs above 25.0 kg/m<sup>2</sup>. However, the increase in mortality tends to be moderate until a BMI of 30.0 kg/m<sup>2</sup> is reached (NHLBI). According to Himes and Dietz, (1994) the BMI has many

statistical properties especially well suited to adolescent screening for overweight and is significantly correlated with subcutaneous and total body fatness in adolescents. The guidelines for overweight by Adolescent Preventive Services recommend that two categories of BMI be used to assess overweight and obesity. Adolescents whose BMIs 95<sup>th</sup> percentile for age and sex, or whose BMIs are over 30 kg/m<sup>2</sup>, should be considered overweight. Adolescents whose BMIs are 85<sup>th</sup> percentile, but lower than the 95<sup>th</sup> percentile, or less than or equal to 30 kg/m<sup>2</sup>, are considered at risk of overweight (Ellis et al, 1999; Rosner et al 1998; Himes and Dietz; Hammer et al, 1991). Table 5.1 has been duplicated from the guidelines regarding obesity in adolescents. For the purposes of this project, BMI values which define teenagers as being overweight were used.

**Table 5.1 Lower limits of BMI (kg/m<sup>2</sup>) for overweight by age**

Age	BMI (kg/m <sup>2</sup> ) At risk of overweight		BMI (kg/m <sup>2</sup> ) Overweight	
	Males	Females	Males	Females
15	24	24	28	29
16	24	25	29	29
17	25	25	29	30
18	26	26	30	30
19	26	26	30	30

Underweight was determined by using percentiles of body mass index at ≤ 10<sup>th</sup> percentile as assessed by the National Nutrition Survey (Hebebrand et al, 1996; Hammer et al, 1991).

Table 5.2 has been reproduced from Hebebrand et al, and shows the 5<sup>th</sup> and 10<sup>th</sup> percentiles for BMI for boys and girls, aged 15-16 and 18-20.

**Table 5.2 Lower limits of BMI (kg/m<sup>2</sup>) for underweight by age**

Age	BMI (kg/m <sup>2</sup> ) Males		BMI (kg/m <sup>2</sup> ) Females	
	5 <sup>th</sup> Percentile	10 <sup>th</sup> Percentile	5 <sup>th</sup> Percentile	10 <sup>th</sup> Percentile
15-16	17.3	18.1	16.9	17.6
18-20	18.3	19.0	17.6	18.1

The anthropometric data collected from each student in the subgroup was matched up with his or her dietary recall as well as their proper survey responses. Frequencies as well as multivariate analyses were done with this subgroup of 59 students to determine the interrelationships among their health behaviours.

### **5.5 Interrelationships Between Health Behaviours**

It has been found that health behaviours tend to cluster (Kelder et al, 1994). For the purposes of this study, interrelationships of health behaviours were examined using multivariate analysis techniques. Using the survey data, responses by students on their smoking behaviour, daily breakfast consumption patterns, physical activity patterns were examined in relation to television viewing habits, nutrient intake levels, and anthropometric data. As well, survey questions concerning weight and attitudes toward weight were looked at in conjunction with smoking and physical activity behaviour, eating behaviour, nutrient intake and anthropometric status. Questions regarding body image and attitudes toward weight were compared to actual weight status. All of these interrelationships were tested for significance by chi-square or t-tests as appropriate at a significance level of  $p < .05$ . This provides baseline data on Canadian adolescents regarding smoking behaviours, as well as eating and physical activity behaviours.

To study the possibility of underreporting of dietary intake, the ratio of reported energy intake (EI) to basal energy requirements in a fasting and resting state, Basal Metabolic Rate was calculated ( $BMR_{rest}$ ), using actual body weight (Johnson-Down et al, 1997; Black et al, 1991). A mean ratio of  $EI:BMR_{rest} < 1.5$  indicated underreporting of energy intake.

## 6.0 Results

Data were collected in three high schools in the Stratford, Ontario area. Subjects were high school students ranging from grades 9 to OAC, aged 13-19 years. Three hundred and eighteen students answered the Health Behaviour Survey. Based on information from the participating schools, only 10 students refused to complete the survey. Fifty-nine students from one of the three surveyed high schools, participated in individual interviews. Anthropometric information and dietary intake were collected by weight and height measurements and 24-hour dietary recalls. Surveys were administered by teachers in their classrooms. The interviews were conducted by researchers from the University of Guelph and took place in the high school's library.

The intended use of these findings was to determine preliminary data for the development of school programs to promote healthy behaviours. Such programs would target specific grades rather than ages; therefore, survey data will be analyzed by grade. Due to the fact that anthropometric measurements as well as recommended intake levels are developed for certain age groups, the interview data were analyzed by age level. The following tables show the distribution of students who completed the survey and those who were involved in the individual interviews, by age and by grade.

**Table 6.1 Number of subjects for surveys, interviews and anthropometric data by grade**

	<b>Survey Completion</b>	<b>24-Hour Recall</b>	<b>Anthropometric Measures</b>
<b>Grade 9</b>	49		
<b>Grade 10</b>	148	28	28
<b>Grade 11</b>	69	22	22
<b>Grade 12</b>	50	7	7
<b>OAC</b>	2	2	2
<b>Total</b>	318	59	59

**Table 6.2 Number of subjects for surveys, interviews and anthropometric data by age**

<b>Age</b>	<b>Survey Completion</b>	<b>24-hour Recall</b>	<b>Anthropometric Measures</b>
<b>13</b>	1		
<b>14</b>	31		
<b>15</b>	101	16	16
<b>16</b>	98	19	19
<b>17</b>	57	15	15
<b>18</b>	25	7	7
<b>19</b>	5	2	2
<b>Total</b>	318	59	59



## 6.1 Subject Profile

Sex and grade details for the 318 students who completed the survey are in table 6.3. Among those, 53.5% were male and 46.5% were female. The majority of the students were in the 10<sup>th</sup> grade (46.7%) and 31.8% of the students were 15 years old. For the data analyses, the two students who were in OAC are grouped with the students in the 12<sup>th</sup> grade.

**Table 6.3 Survey completion by grade and sex**

	Males		Females		Total	
	%	(n)	%	(n)	%	(n)
Grade: 9	7.2	(23)	8.2	(26)	15.4	(49)
10	24.5	(78)	22.0	(70)	46.5	(148)
11	10.7	(34)	11.0	(35)	21.7	(69)
12	10.7	(34)	5.0	(16)	15.7	(50)
OAC	0.3	(1)	0.3	(1)	0.6	(2)
<b>Total</b>	<b>53.4</b>	<b>(170)</b>	<b>46.5</b>	<b>(148)</b>	<b>99.9</b>	<b>(318)</b>

## 6.2 Survey Findings

### 6.21 Smoking

The survey questions regarding smoking behaviour were selected to determine the smoking status of high school students as well as their attitudes toward smoking, quitting smoking, and accessibility to cigarettes. Less than half (46.2%) appeared to be protected from daily exposure to smoke in the home (Q.6), however, 23.9% reported that one other person in their home smokes daily and 17.9% reported that 2 other people in their home were also daily smokers.

Among the students who have tried smoking, over three-quarters (77.0%) responded “yes” to the question “have you ever tried cigarette smoking (even just one puff)?” (Q.4).

Of these, 86.1% answered “yes” to “Have you ever smoked again since the first time you tried a cigarette?” (Q.5). Over half (57.8%) said that they smoked every week (Q.8).

Current smokers were defined as those who answered “yes” to “Have you ever tried cigarette smoking (even just one puff)?” (Q.4), “yes” to “Have you ever smoked again since the first time you tried a cigarette?” (Q.5), and “no” to “At this time have you quit smoking?” (Q.9). The overall smoking rate was 36.2% (115/318): 40.6% for boys and 31.1% for girls. The prevalence of smoking tended to increase with increasing grade level and with increasing age for both boys ( $\chi^2 = 9.42$ ;  $p < .05$ ) and girls ( $\chi^2 = 13.6$ ;  $p < .01$ ) (Table 6.4).

**Table 6.4 Prevalence of current smokers by grade for boys and girls**

Grade	Boys		Girls	
	No. in grade	Smokers % (n)	No. in grade	Smokers % (n)
9	23	21.7 (5)	26	23.1 (6)
10	78	34.6 (27)	70	20.0 (14)
11	34	52.9 (18)	35	51.4 (18)
12	34	54.3 (19)	16	47.1 (8)

Current smokers were asked “If you smoke cigarettes now, what are your reasons for smoking?” (Q.7a). They were asked to check all answers that applied. Both boys and girls said that the top two reasons for smoking were: “I’m addicted to cigarettes” and “I smoke when I’m stressed out and want to relax” (Table 6.5).

**Table 6.5 Reasons for smoking among high school students (n = 115)**

Reason	Boys (n = 69)	Girls (n = 46)
	%	%
I'm addicted to cigarettes	62.3	63.0
I smoke when I'm stressed out and want to relax	43.5	73.9
I smoke at special events (parties, concerts)	37.7	54.3
My friends smoke	36.2	34.8
It's enjoyable	31.9	45.7
I'm bored, there is nothing else to do	31.9	32.6
It's easy to get cigarettes	24.6	17.4
My brothers and sisters smoke	7.2	13.0
My parents offer it to me	5.8	2.2
I like the image that smoking gives me	2.9	2.2
Someone pressures me into it	2.9	2.2

Students who were currently smoking were asked: "How do you usually get your cigarettes?" (Q.15). The most common responses were "Someone buys them for me" (57.3%), "I buy them" (44.3%), and "I get them from friends" (25.7%). Participants were also asked: "In the past month, when you tried to buy cigarettes, how often were you asked your age?" (Q.16); 19.9% of boys replied never and 3.7% said they were always asked. For girls, 10.1% said that they were never asked and 5.5% said they were always asked. Students who were currently smoking were also asked "How often do you smoke in each of the following places?" (Q.17). More than one response was allowed. The most common place for smokers to smoke were "at parties", followed by "at school, but off school property", and "at home" (Table 6.6).

Table 6.6 Most common locations for smoking (n = 115)

Location	% indicating "often"
Parties	87.8
At school, but off school property	68.7
Home	47.8
Restaurants / Coffee shops	45.2
Walking to and from school	43.5
Mall / Food court	30.4
Community centre / Arena	22.6
At school, on school property	12.2

Students who were not currently smoking were asked: "If you don't smoke now, what are your reasons for not smoking?" (Q.7b). They were asked to check all the possible reasons that applied. The two main reasons were: "I think it may be harmful to my health" and "it is a waste of money" (Table 6.7).

Table 6.7 Reasons for not smoking among high school students (n = 203)

Reason	Boys (n = 101)	Girls (n = 102)
	%	%
I think it may be harmful to my health	73.9	68.6
It is a waste of money	63.0	75.5
I am not interested in smoking	54.3	67.6
I have other things I enjoy doing	45.7	55.9
It will affect my athletic ability	34.8	45.1
I have seen bad examples of what smoking can do	32.6	54.9
I know that my parents would disapprove	17.4	47.1
I think it may be addictive	13.0	39.2
I just experimented with smoking and did not plan to do it again	8.70	19.6
I tried smoking, but I don't like the taste	2.2	23.5
I tried smoking, but I don't like the effect it has on me	2.2	17.6
My friends disapprove of smoking	2.2	18.6

Survey questions 10 to 14 asked smokers about their quitting behaviour. Among those students who have smoked again since their first time trying a cigarette (n = 211), 33.6%

answered “yes” to Q.6, “Have you quit smoking?” Nearly half (46.5%) of those students reported that they quit smoking more than one year ago and of the 115 students who were current smokers, 40.9% had tried more than once, and 28.7% had not tried to quit smoking at all. When asked: “Do you plan to quit smoking cigarettes?” (Q.12), 73.0% of students replied “yes, but I’m not sure when”. If contemplating quitting smoking, students were asked where they would go for help (Q.14). The majority of students (87.8%) responded that they would quit on their own. If the school was to offer a quit smoking program, (Q.13), 82.6% of students responded that they would not join. The most common answer to “Do you think you will smoke cigarettes in the future?” (Q.18) for current smokers, was “might” at 47.0%. The majority of non-smokers (62.6%) responded with “definitely not”.

The survey included several questions regarding smoking at school and in public places. The majority of students (84.3%) responded that they “often see students smoking near the school” (Q.19). Many (55.3%) reported that they did not “often see teachers or staff smoking near the school” (Q.20). Most students (86.8%) agreed that “there is a clear set of rules about smoking for students to follow” (Q.21), and that if a student is caught breaking the smoking rules at school, they get into trouble” (Q.22). The majority of the students (43.4%) indicated that it was usually false that “in this school, many students smoke where they are not allowed to” (Q.23). They also responded that they do not see “many teachers and staff smoking where they are not allowed to” (Q.24). More than three-quarters of the students (84.3%) replied “true” when asked whether or not they “can be fined for smoking on school property” (Q.26). Among all the students who completed the survey, 44.1% reported that they would like their “local government to make all public places smoke-free” (Q.25), 30.8% said that they would not want that to occur, and 25.2% said that they were unsure.

## 6.22 Eating Behaviours

The questions on eating behaviours (Q.29-31) were designed to find out the proportion of students who ate breakfast on a daily basis, how many considered themselves to be vegetarian and to determine the proportion of students who consumed certain foods. Less than half (42.8%) reported eating breakfast on a daily basis. The overall trend shows lower levels of daily breakfast consumption for older male students in the higher grades ( $\chi^2 = 9.05$ ;  $p < .05$ ) (Table 6.8).

**Table 6.8** Frequency of daily breakfast consumption by grade for boys and girls

Grade	Boys (n = 170)		Girls (n = 148)		Total (n = 318)	
	%	(n)	%	(n)	%	(n)
9	56.5	(13)	53.8	(14)	55.1	(27)
10	57.7	(45)	32.9	(23)	45.9	(68)
11	44.1	(15)	22.9	(8)	33.3	(23)
12	29.4	(10)	50.0	(8)	36.0	(18)

Only 2.4% of boys and 8.8% of girls answered “yes” to: “Are you vegetarian?” (Q.30), and 2.4% of boys and 18.2% of girls answered “sometimes” suggesting that they may try to follow a vegetarian diet occasionally. To determine an intake pattern, students were asked whether they ate the following foods (Q.31): red meat, pork, chicken, fish, eggs, milk, cheese and ice cream. There were some differences; boys were more likely to eat red meat ( $\chi^2 = 29.8$ ;  $p < .001$ ), pork ( $\chi^2 = 26.1$ ;  $p < .001$ ) and fish ( $\chi^2 = 24.0$ ;  $p < .001$ ). There was no difference in intake between boys and girls for eggs, milk, cheese and ice cream. Table 6.9 shows the consumption of these foods for both boys and girls.

**Table 6.9 Consumption of selected foods by gender**

Food	Male		Female	
	%	(n)	%	(n)
Red meat	87.1	(148)	59.5	(88)
Pork	92.9	(158)	70.3	(104)
Chicken	95.3	(162)	88.5	(131)
Fish	72.9	(124)	45.3	(67)
Eggs	86.5	(147)	79.1	(117)
Milk	93.5	(159)	87.2	(129)
Cheese	90.6	(154)	89.9	(133)
Ice cream	92.9	(158)	87.8	(130)

### 6.23 Physical Activity

Survey questions were chosen to determine frequency and details of physical activity and student's perspectives towards participation. Overall, 158 students were taking physical education classes (Q.32); 53.5% were boys and 45.3% were girls. Fewer students reported taking physical education courses in the higher grades. The highest proportion of students taking physical education were in grade 9 (85.7%), while approximately 45% of those in grade 10 or 11 took physical education.

**Table 6.10 Students taking physical education classes by grade**

Grade	Boys (n = 170)		Girls (n = 148)		Total (n = 318)	
	%	(n)	%	(n)	%	(n)
9	73.9	(17)	96.2	(25)	85.7	(42)
10	47.4	(37)	44.3	(31)	45.9	(68)
11	67.6	(23)	22.9	(8)	44.9	(31)
12	41.2	(14)	18.8	(3)	34.0	(17)
Total	53.5	(91)	45.3	(67)	49.7	(158)

In response to: "In a typical week, how many times do you participate in regular physical activity? (Q.33), 42.2% of boys said that they participate 6 or more times a week while 34.7%

said that they participate 3-5 times a week. Girls reported participating in physical activity less than boys ( $\chi^2 = 4.79$ ;  $p < .05$ ). Slightly under half (48.0%) said that they participate 3-5 times per week and 27.2% said that they participate only 1-2 times per week. Both boys and girls replied to question 41 “with whom do you usually participate in physical activity?” by saying most often “with friends outside school” (boys 65.9%; girls 56.1%) and then “with friends at school” (boys 48.8%; girls 47.3%). Boys reported (Q.42) that they usually do physical activity at home (40.6%) and at a park or a playing field (31.2%). Girls reported that they participated in physical activity most often at home (43.9%) and at school (39.2%). Boys responded that their primary time spent doing physical activity was after school (61.8%) and on weekends (52.9%). Girls said that their first choice was in the evenings (59.5%) and then on the weekends (55.4%). Boys said that most of their friends participate in regular physical activity while the majority of girls (51.4%) said that only a few of their friends participate in regular activity.

Students were asked “If you do participate in physical activity, why do you?” (Q.39). More than one response was allowed (Table 6.11). The most popular reasons were “for fun and enjoyment”, “to get in good shape” and “to improve my health”. One area of concern for girls was that 50% of them indicated that they participated in physical activity “to control or lose weight”, which is significantly different from the boys’ response (4.7%) to that same question ( $\chi^2 = 16.0$ ;  $p < .01$ ).



Table 6.11 Reasons for participating in physical activity

Reason	Boys (n = 160)	Girls (n = 141)
	%	%
For fun and enjoyment	68.8	77.0
To get into good shape	61.8	75.7
To improve my health	54.1	67.6
To be better at sports	37.6	41.2
To feel good about myself	36.5	61.5
To compete/win	32.4	25.7
To take a break from school or Homework	31.8	40.5
To learn new things	28.8	35.1
To meet new people	28.8	40.5
To be part of a team	28.4	31.8
To relax and reduce stress	23.5	41.2
To be with family and/or friends	22.4	34.5
Because physical education is required	8.8	8.8
Pressure from family and friends	4.7	3.4
To control or lose weight	4.7	50.0

The students were asked: "If you were thinking about joining a physical activity program, where would you go to get information?" (Q.44). The top three choices for both boys and girls were "teachers/coaches", "friends" and "the recreation centre". Students were also asked to check reasons for not participating in regular physical activity (Q.40). The main reasons were "lack of time", "dislike physical/health education classes" and "lack of athletic ability". Girls also indicated "self-conscious" and "lack of self-discipline/motivation".

To determine sedentary patterns, the students were asked "In a typical day, how many hours do you spend watching TV, movies, playing computer/video games, or talking on the telephone?" (Q.36a); 54.1% of boys and 58.1% of girls reported that they spend 2-3 hours per day watching TV. Both boys (58.8%) and girls (52.7%) responded that they spend less than one hour per day doing homework (Q.36b).

Students were asked how active they were compared to others their age, and if they felt that they were getting enough physical activity (Q.51). Compared to other people in the same age group, 32.9% of boys reported that they were more active than their peers, while 40% said that they were just as active. Most girls (56.1%) reported that they were just as active, while 23.7% said that they were less active than their peers. More than half the boys (58.8%) felt that they got enough physical activity (Q.52); however, only 37.8% of girls felt the same way. The majority of both boys (70.0%) and girls (58.1%) said that they felt that they were “neither overweight nor underweight” (Q.47). Less than half of the boys (39.4%) indicated that they would like to “gain weight” and more than half of the girls (60.8%) said that they wanted to “lose weight” over the next 12 months (Q.48). The majority of the boys (64.1%) said that they were “not concerned” about gaining weight and 28.2% were “concerned”. Among girls, 43.2% were “concerned” and 30.4% were “not concerned” about gaining weight (Q.49). However, 6.1% of girls and 2.4% of boys said that they were “terrified about gaining weight”.

Students were also asked if there were any physical activities that they would like to participate in which are, or are not currently available. They were asked to write down their first and second choice of activity. The top five activities for both boys and girls are listed in table 6.12.

Table 6.12 Top five physical activity choices

Boys		Girls	
Hockey	36	Soccer	26
Basketball	22	Baseball	19
Soccer	22	Volleyball	19
Football	22	Basketball	15
Rugby	19	Kickboxing	14

#### 6.24 Interrelationships among health behaviours reported in the Health Behaviour Survey

The data from the survey were analyzed to determine relationships among smoking, eating behaviours, and physical activity. There was a relationship between smoking status and daily breakfast consumption ( $\chi^2 = 9.91$ ;  $p < .05$ ). Among those who ate breakfast daily, there were three times as many who were non-smokers than smokers (73.5% vs. 26.5%), (Table 6.13). This trend was similar when comparing genders, however significance was only found within boys ( $\chi^2 = 13.3$ ;  $p < .01$ ).

Table 6.13 Daily breakfast consumption and smoking status

	Non-smokers (n = 100)		Smokers (n = 36)	
<b>Daily breakfast Consumption</b>	73.5 %		26.5 %	
	<b>Boys</b>		<b>Girls</b>	
	%	(n)	%	(n)
<b>Daily breakfast Consumption</b>	73.5	(61)	73.6	(39)
	<b>Boys</b>		<b>Girls</b>	
	%	(n)	%	(n)
<b>Daily breakfast Consumption</b>	26.5	(22)	26.4	(14)

Nearly  $\frac{3}{4}$  (71.7%) of the students participated in regular physical activity at least 3 to 6 times per week. There was a relationship ( $\chi^2 = 12.8$ ;  $p < .001$ ) between those students and a greater number of students who consumed breakfast daily compared to the  $\frac{1}{4}$  (28.0%) who engaged only in physical activity 0-2 times per week. Within boys, a relationship ( $\chi^2 = 6.60$ ;

$p < .05$ ) was found when comparing the same levels of physical activity with daily breakfast consumption. A higher level of physical activity was associated with daily consumption of breakfast. There were similar findings for girls ( $\chi^2 = 4.78$  ;  $p < .05$ ). Levels of physical activity and hours spent watching television were related. Boys ( $\chi^2 = 5.03$  ;  $p < .05$ ) who spent more time doing physical activity spent fewer hours per day watching television. This relationship was not found with girls. There was also no relationship found between television viewing and breakfast intake, nor was breakfast intake related to consumption of any of the eight foods questioned. Levels of physical activity did not differ between smokers and non-smokers. Levels of physical activity were however associated with responses to whether or not students wanted to “lose weight”, “stay the same”, or “gain weight” ( $\chi^2 = 13.5$ ;  $p < .01$ ). A higher percentage of students who participated in physical activity 0-2 times per week wanted to lose weight, while the majority of students who participated in more hours of physical activity per week reported that they would like to remain at their current weight. With respect to concern regarding weight gain, the majority of students who participated in fewer hours of activity were “concerned” about gaining weight, while students who participated in at least 3-6 hours per week of activity were “not concerned” about weight gain ( $\chi^2 = 7.64$  ;  $p < .01$ ). Girls who participated in physical activity 0-2 times per week were more likely to want to “lose weight” ( $\chi^2 = 6.11$  ;  $p < .05$ ) and girls who did more activity (3-6 times per week) were happier to “stay the same weight over the next 12 months”. Girls with lower levels of activity were also more “concerned” with weight gain ( $\chi^2 = 4.18$  ;  $p < .05$ ) and girls with higher levels of activity were “not concerned” about weight gain. No relationship was found between smokers and non-smokers on attitudes toward body image.

### 6.3 Individual interviews

Among those who took part in the individual interview process, 59.3% were male and 40.7% were female. The majority of this group was in the 10th grade (47.5%), while grade 11 students comprised 37.3% of the sample (Table 6.14). Most of the students were 15-17 years old (Table 6.15).

**Table 6.14 Individual interviews by grade and sex**

	Males		Females		Total	
	%	(n)	%	(n)	%	(n)
<b>Grade: 10</b>	23.7	(14)	23.7	(14)	47.5	(28)
11	27.1	(16)	10.2	(6)	37.3	(22)
12	6.8	(4)	5.1	(3)	11.9	(7)
OAC	1.7	(1)	1.7	(1)	3.4	(2)
<b>Total</b>	<b>59.3</b>	<b>(35)</b>	<b>40.7</b>	<b>(24)</b>	<b>100</b>	<b>(59)</b>

**Table 6.15 Individual interviews by age and sex**

		Males		Females		Total	
		%	(n)	%	(n)	%	(n)
<b>Age:</b>	<b>15</b>	8.5	(5)	1.9	(11)	27.1	(16)
	16	23.7	(14)	8.5	(5)	32.2	(19)
	17	16.9	(10)	8.5	(5)	25.4	(17)
	18	6.8	(4)	5.1	(3)	11.9	(8)
	19	3.4	(2)	0	(0)	3.4	(2)
<b>Total</b>		<b>59.3</b>	<b>(35)</b>	<b>40.7</b>	<b>(24)</b>	<b>100</b>	<b>(59)</b>

### 6.31 Dietary Intake

Twenty-four hour dietary recalls were collected and analyzed for the subgroup of 59 students. Interviews were conducted during one week, Monday to Thursday so that both weekend and weekday information was collected. The mean and median percentile values for intake of energy, fibre and ten nutrients are listed in table 6.16 and 6.17. Recommended Nutrient Intakes (RNIs) (Health and Welfare Canada, 1990) for adolescents 16-18 years of age and Dietary Reference Intakes (DRIs) (Food and Nutrition Board, 1998) for adolescents 14-18 years were used as comparisons for nutrient intake levels. Carbohydrate intake has been recommended at 55% of total energy intake and fat at 30% of total energy intake (Health and Welfare Canada 1991). Distribution of macronutrient intake for boys and girls is separated in figures 6.1 and 6.2. It has been proposed by the American Health Foundation that the minimum daily intake of dietary fibre for children aged 3-18 be the equivalent of their age + 5grams (Canadian Diabetes Association, 1999; Hampl et al 1998; Saldanha, 1995).

**Table 6.16 Mean and median percentile distribution of energy, fibre and nutrient intake of high school boys (n = 35) aged 16-18 compared to RNIs\* and DRIs\*\*.**

Nutrient		RNI	DRI	Mean (sd)		Median
Energy	(Kcal)	3200		2296	(814)	2143
Protein	(g)	58		80	(34)	77
Vitamin A	(RE)	1000		669	(473)	523
Vitamin C	(mg)	40		111	(93)	119
Niacin	(NE)		16	36	(16.5)	34.4
Riboflavin	(mg)		1.3	2.0	(0.93)	1.88
Thiamin	(mg)		1.2	1.9	(0.93)	1.75
Folate	(mcg)		400	247	(142)	224
Calcium	(mg)		1300	939	(628)	834
Iron	(mg)	10		13.8	(6.0)	12
Zinc	(mg)	12		10.2	(5.6)	8.7
Fibre	(g)	Age + 5g		10.8	(7.65)	8.06

\*Recommended Nutrient Intake for 16-18 year olds (Health and Welfare Canada, 1990).

\*\* Dietary Reference Intakes for 14-18 year olds (Food and Nutrition Board, 1998).

**Figure 6.1 Macronutrient Intake of Boys**



**Table 6.17 Mean and median percentile distribution of energy, fibre and nutrient intake of high school girls (n = 24) aged 16-18 compared to RNIs\* and DRIs \*\***

Nutrient	RNI	DRI	Mean (sd)	Median
Energy (Kcal)	2100		1923 (1007)	1608
Protein (g)	47		62 (34)	56
Vitamin A (RE)	800		905 (512)	603
Vitamin C (mg)	30		117 (110)	86
Niacin (NE)		14	27 (15.9)	22.4
Riboflavin (mg)		1.0	1.6 (1.0)	1.10
Thiamin (mg)		1.0	1.4 (0.79)	1.17
Folate (mcg)		400	191 (132)	163
Calcium (mg)		1300	692 (542)	541
Iron (mg)	12		11.3 (6.0)	8.7
Zinc (mg)	10		8.0 (3.9)	7.7
Fibre (g)	Age + 5g		6.8 (6.27)	5.34

\*Recommended Nutrient Intake for 16-18 year olds (Health and Welfare Canada, 1990).

\*\* Dietary Reference Intakes for 14-18 year olds (Food and Nutrition Board, 1998).

**Figure 6.2 Macronutrient Intake of Girls**





Although there was a wide range of intake for most nutrients, both the mean and the median intakes for many of the nutrients were at or above recommended levels, suggesting that the risk of dietary inadequacy was low for most of the adolescents interviewed. Mean energy intakes were below recommended levels for both boys (-904 kcal) and girls (-277 kcal). For boys, the mean nutrient intakes that were below recommended levels included: vitamin A (-331 RE); folate (-153 mcg); calcium (-361 mg); and zinc (-1.8 mg). All other nutrient intakes were above the recommended levels. For girls, nutrients that were below recommendations were thiamin (-0.4 mg); iron (-0.7 mg); zinc (-2 mg); calcium (-608 mg) and folate (-209 mcg). Vitamin C ( $t = 2.3$ ;  $p < 0.05$ ) and folate intakes ( $t = 2.2$ ;  $p < 0.05$ ) were higher for those who ate breakfast every day compared with those who did not eat breakfast daily. There were no differences in intake found within genders. More relationships regarding level of nutrient intakes will be discussed in section 6.33: Interrelationships between health behaviours, dietary intake and weight status.

### 6.32 Anthropometric Status

The average BMI for males was 23.5 and 22.1 for girls. The highest level of BMI among all students was 34.3. The lowest BMI value for boys was 17.6 and the girls' lowest value was 16.3. Table 6.18 shows the mean anthropometric measurements for both boys and girls and table 6.19 shows the percent of overweight and underweight students compared to the cut off levels for BMI as described in section 5.4: Analysis of Anthropometrics.

**Table 6.18 Mean anthropometric measurements for boys and girls by age**

Age	Weight (kg)		Height (m)		BMI (kg/m <sup>2</sup> )	
	Male	Female	Male	Female	Male	Female
15	69.9	57.3	1.78	2.64	22.0	21.3
16	78.3	58.9	1.77	1.68	24.9	20.8
17	73.4	73.6	1.77	1.66	23.5	26.6
18	65.2	51.6	1.76	1.62	20.9	19.6
19	79.2	-	1.87	-	22.6	-

Approximately ¼, (26%, n = 9) of boys and 16% (n = 4) of girls were considered overweight according to the Guidelines for Overweight by Adolescent Preventative Services (Himes and Dietz 1994). Using the Heberbrand et al (1996) guidelines only 2.9% (n = 1) of boys and 16% (n = 4) of girls were considered to be underweight (Table 6.19).

**Table 6.19 Percent of overweight and underweight students**

	Boys (n = 35)		Girls (n = 24)	
	%	(n)	%	(n)
<b>Overweight</b>	26	(9)	16	(4)
<b>Underweight</b>	2.9	(1)	16	(4)

### 6.33 Interrelationships among health behaviours, dietary intake and weight status

Boys who were current smokers had higher fat intake compared to boys who didn't smoke ( $t = 2.1$ ;  $p < .05$ ). There were no other differences in intake based on smoking status for either gender. There were differences in nutrient intake however, within levels of physical activity among all students regardless of gender. Those who participated in activity 3-6 days per week had a higher intake of protein ( $t = 2.4$ ;  $p < .05$ ); fibre ( $t = 2.3$ ;  $p < .05$ ); calcium ( $t = 2.8$ ;  $p < .01$ ); zinc ( $t = 2.9$ ;  $p < .01$ ); thiamin ( $t = 2.5$ ;  $p < .05$ ); and riboflavin ( $t = 2.7$ ;  $p < .01$ ). Protein intake was higher ( $t = 2.3$ ;  $p < .05$ ) for boys who participated in

physical activity 3-6 times per week compared to those participating in physical activity 0-2 times per week. Other nutrient differences included zinc ( $t = 2.3$  ;  $p < .05$ ), thiamin ( $t = 2.9$  ;  $p < .05$ ), and riboflavin ( $t = 2.1$ ;  $p < .05$ ). Within girls, calcium intake was higher ( $t = 2.8$  ;  $p < .05$ ) for those who participated in activity 3-6 times per week compared to girls who participated 0-2 times per week. Among all students regardless of gender, intakes of calcium were found to be higher ( $t = 2.0$  ;  $p < .05$ ) for students who watched less than 4 hours of television daily. Among boys, those who watched less than 4 hours per day had a higher intake of fat ( $t = 2.2$  ;  $p < .05$ ) than did boys who reported watching television for 4-6 hours per day minimum. Those students also had higher intakes of vitamin C ( $t = 2.3$  ;  $p < .05$ ) and folate ( $t = 2.1$  ;  $p < .05$ ). On the other hand, there were no differences within girls when comparing energy and nutrient intake to hours of television viewing per day.

Among current smokers, there was a mean BMI of 23.3, and among non-smokers, the mean BMI was 22.6. This difference in BMI was not significant when all students were compared ( $t = .64$ ); however, within girls, smokers had a higher mean BMI (23.3) than did non-smokers (21.2) ( $t = 1.2$  ;  $p < .05$ ). Students who ate breakfast daily had a mean BMI of 22.6 while those who did not eat breakfast daily had a mean BMI of 23.1 ( $t = ns$ ). Students who were considered more active, and participated in physical activity 3-6 times per week had a mean BMI of 22.2 compared to those who participated only 0-2 times weekly who had a mean BMI of 24.9 ( $t = 2.2$  ;  $p < .05$ ). However, when the groups were divided by gender, this relationship was found only for girls ( $t = 2.8$  ;  $p < .05$ ). For boys, BMI level was not different when comparing levels of physical activity ( $t = ns$ ). Students who watched less TV had a mean BMI of 22.5 and those who watched more hours of television per day had a BMI of 24.2 ( $t = -1.3$  ;  $ns$ ).

Survey questions on body image were compared to actual BMI values. With respect to gaining weight, students who were less concerned had a lower ( $t = -2.5$ ;  $p < .05$ ) BMI (21.3) than those who were more concerned about weight gain (24.1). Within gender, girls who were concerned about gaining weight had a lower ( $t = -3.5$ ;  $p < .01$ ) BMI (18.9) than did girls who were more concerned about gaining weight (24.0). This was not found when comparing BMI among boys ( $t = ns$ ). Girls who said that they participated in physical activity to control or lose weight had a mean BMI of 22.4 ( $t = 2.1$ ;  $ns$ ) and boys who answered “yes” to the same question had a mean BMI of 26.3 ( $t = 2.1$ ;  $ns$ ). Both boys ( $F = 10.3$ ;  $p < .01$ ) and girls ( $F = 6.3$ ;  $p < .01$ ) had different BMIs when analyzing their responses to the question “In the next 12 months, would you like to lose weight, gain weight or stay the same?” BMI values were also significantly different within sexes (boys:  $f = 9.4$ ;  $p < .01$ ) (girls:  $f = 12.5$ ;  $p < .01$ ) regarding responses to the question “do you think you are underweight, overweight or neither?” Both boys and girls were able to accurately choose when asked the above question.

The mean  $EI:BMR_{est}$  for both boys ( $1.42 \pm 2.04$ ) and girls ( $1.43 \pm 3.12$ ) indicated possible problems with underreporting of energy. Boys in the highest BMI group (26.0-34.9) showed significant evidence of underreporting; their mean underreporting value was 1.03, while boys with a lower BMI (16-22) had an mean value of 1.68, indicative of less incidence of underreporting ( $t = 3.1$ ;  $p < .05$ ). Underreporting within girls was not found to be significant when comparing different levels of BMI. The pattern of decreasing  $EI:BMR_{est}$  with increasing weight was evident in boys ( $f = 7.4$ ;  $p < .01$ ) but not within girls.

The teacher’s surveys showed an overall acceptance of the survey. Three-quarters (75%) of the teachers said that the students were quiet while completing the survey, and 91.7% said that the students were task oriented. The majority of teachers (58.3%) said that

nutrition was “extremely important” when asked about the importance of the topics included in the survey. Physical activity was considered to be “important” by 50% of the teachers and 41.7% said that it was “extremely important”. Smoking was also considered to be “extremely important” by 72.7%. Average time taken to complete the survey according to the teachers was 20.8 minutes, with 15 minutes being the minimum time taken and 30 minutes the maximum. Teachers were asked to rate how disruptive the survey was to their routine; 33.3% said that it was not at all disruptive, and 25% said that it was not more disruptive than expected.

#### **6.4 Summary of Results**

The majority of students who participated in this study were in the 10<sup>th</sup> grade and were 15 or 16 years of age. Current smokers made up 1/3 of the surveyed sample; less than half reported eating breakfast on a daily basis; and boys tended to participate in physical activity more than girls. Interrelationships between health behaviours showed that more non-smokers ate breakfast on a daily basis, and a higher level of physical activity was associated with daily breakfast intake.

The mean and median intake of most nutrients was above the Recommended Nutrient Intake level (Health and Welfare Canada, 1990) and the Dietary Reference Intake level (Food and Nutrition Board, 1998). The mean intake of energy, calcium, folate and zinc was below recommended for both boys and girls. Nine boys and 4 girls were overweight and 1 boy and 4 girls were underweight. Boys showed a higher intake of protein, fibre, calcium, zinc and riboflavin with higher levels of physical activity. Boys who watched more television had a lower fat intake than those who watched less television. Girls who were current smokers had a higher mean BMI than did non-smokers. A possibility of

underreporting of energy or a high level of activity, was found for boys and girls, and a pattern of increased underreporting was found with students who had a higher BMI.

Teachers were pleased with the survey and noted that students were quiet and task oriented while completing it. Teachers also felt that all three health behaviours were of importance in their high school.

## 7.0 Discussion

In the past few years, there have been numerous initiatives in Canada to promote the health and well being of young people (Health Canada, 2000). In 1989, Canada was invited to participate as an associate member of the International Health Behaviour Survey of School Aged Children (HBSC). Surveys were administered every four years to a representative sample of 11, 13 and 15 year olds. This research focused on the health knowledge, attitudes and behaviours of young Canadians, and data from the 1990-1998 surveys were released in January 2000. Health Canada chose ten comparison countries because of similar political or social systems and comparable data files. They were also selected based on the presence or absence of certain health and social policies.

According to Health Canada and the Heart and Stroke Foundation of Canada (1999), behavioural risk factors for heart disease and stroke begin in childhood and adolescence. In 1996-1997, the proportion of youth aged 15-19 who smoked increased to 29%, with a higher prevalence in girls than in boys. Overweight and obesity during late childhood and adolescence is associated with higher morbidity and mortality in adulthood and eating behaviours often originate in childhood and adolescence. A high calorie and fat intake during childhood will often increase the chance of higher cholesterol levels in childhood that track to adulthood. Physically active children and adolescents have higher levels of HDL, lower blood pressure, lower BMIs and lower triglyceride levels. These are all factors associated with a reduced risk for heart disease and stroke (Health Canada). In the HBSC, a full range of individual, social and environmental factors were considered to assist in the development of programs and policies to improve the health of adolescents (Health Canada, 2000). This section will discuss the findings from the Stratford Health Behaviour Survey in

comparison to other Canadian and international data on the health behaviours of adolescents.

## 7.1 Survey Findings

The Stratford Health Behaviour Survey consisted of 52 questions and was separated into 3 categories; smoking, eating behaviours and physical activity. Data for the survey was evaluated by grade in order to provide the Community Advisory Committee and the Perth and Huron County school boards with appropriate information regarding their students.

### 7.11 Smoking

Smoking is the most preventable cause of death and disease in Canada (Health Canada, 1999a). Most adult smokers try their first cigarette by age 18, and most early smokers began smoking between 11 and 12 years of age (McGee and Stanton, 1993). Since the health risks of smoking became public in the 1970s, smoking rates among teenagers slowly declined to an all time low in 1990. In the past decade however, smoking rates have begun to rise (Health Canada, 1999a). Over one third (36.2%) of students interviewed in the Stratford Health Behaviour Survey were current smokers. In comparison, in 1994, the YSS revealed that 24% of Canadian Youth 15-19 were current smokers, a rate significantly lower than the 29% in 1985, but higher than the rate of 21% in 1990 (Adlaf and Bondy, 1996). Health Canada (1999b), through their Canadian Tobacco Use Monitoring found that adolescent smoking is up since 1990 as well; 28% of Canadian teenagers aged 15-19 now smoke. Comparatively, US data show that more than 1/3 of high school students reported using some form of tobacco and more than ¼ were found to be current cigarette smokers when surveyed about their smoking habits (CDC, 2000).



Gender differences in smoking behaviour in the HBSC, the YSS and the CDC surveys were minimal, but prevalence of smoking tended to increase with increasing grade level and age for both boys and girls. According to the CDC (1994), very few people begin to smoke tobacco as adults, almost all first use has occurred by the time people graduate from high school, and the earlier they begin, the more heavily and longer they will smoke as adults.

In an attempt to investigate how to effectively intervene in high schools in order to encourage activities around smoking prevention and cessation, the Health Behaviour Research Group from the University of Waterloo, in 1998 conducted a smoking survey (Manske, personal communications, 1999). This was the same survey used in the smoking sections of Stratford Health Behaviour Survey. There were similar proportions of males and females in both the Waterloo Smoking Survey (WSS) and the Stratford Health Behaviour Survey. The overall percentage of current smokers were the same in both studies (37% vs. 36.2%). There were however, some differences in gender when evaluating current smokers. In the WSS, the proportion of current smokers among boys and girls was 36% and 37%, respectively, while in the Stratford Health Behaviour Survey, the proportion of current smokers was 40.6% among boys and 31.1% among girls. Gender differences could be explained in various ways. It is possible that Stratford, being a smaller, more rural town than the city of Waterloo, would have less stringent rules and more areas available for boys to smoke without being caught. It is also possible, that girls tend to lead a more natural healthy lifestyle in Stratford and don't feel a need to smoke. However, the literature has shown that boys begin smoking earlier than girls do, while more girls end up smoking in the older teenage years (YSS, 1996). This could also explain the slight gender discrepancy shown in the Stratford Health Behaviour Survey.

The Addiction Research Foundation (ARF) defines a smoker as someone who reported cigarette use during the past year (Manske, Personal Communications). The following table shows smoking rates by grade in Ontario from the ARF, conducted in 1995, as well as data from the WSS from 1998 and the Stratford Health Behaviour Survey. In all three surveys, smoking rates increased with increasing grade level. The highest jump, according to the results below, is from students in grade 10 to 11 in the Stratford Health Behaviour Survey. These results also show that most students in Stratford don't tend to start smoking until they reach 11<sup>th</sup> grade. This could be explained by various factors. In a smaller town such as Stratford, it is quite possible that storeowners in the area know which teenagers are of legal age, and which students are not. It is also possible that younger teenagers are more afraid of getting caught smoking than are older students. As well, if their friends don't smoke, it is more likely that they will not take up the habit either. The trend of smoking in the Stratford Health Behaviour Survey is the same that has been found throughout the literature, with a higher prevalence in smoking in the older high school grades.

**Table 7.1 Smoking rates in Stratford, compared with provincial and national surveys**

Grade	Percentage of Smokers (%)		
	Addiction Research Foundation (1995)	Waterloo Smoking Survey (1998)	Stratford Health Behaviour Survey (1999)
9	27.5	28	22.4
10	N/a	34	27.7
11	41.7	42	52.2
12	N/a	45	51.9

Table 7.2 compares percentage of current smokers by gender with the YSS, the WSS and the Stratford Health Behavior Survey. Smoking rates in the Stratford Health Behaviour Survey and the WSS were similar when comparing gender. The YSS Survey had some differences when compared to the other two surveys. The percentage of smokers in the YSS is lower than the percentage of smokers in the other two surveys. In the last ten years, there has been a decrease in the prevalence in smoking in adults, however the increase of smoking in adolescents is quite apparent. This is shown here in the results of the most recent study done in South Western Ontario, the Stratford Health Behaviour Survey. The majority of the students who were surveyed in Stratford were in the 10<sup>th</sup> grade, and this could contribute to the higher male to female ratio of smokers. It has been shown that males tend to begin earlier, and female smokers tend to increase in prevalence throughout the adolescent years.

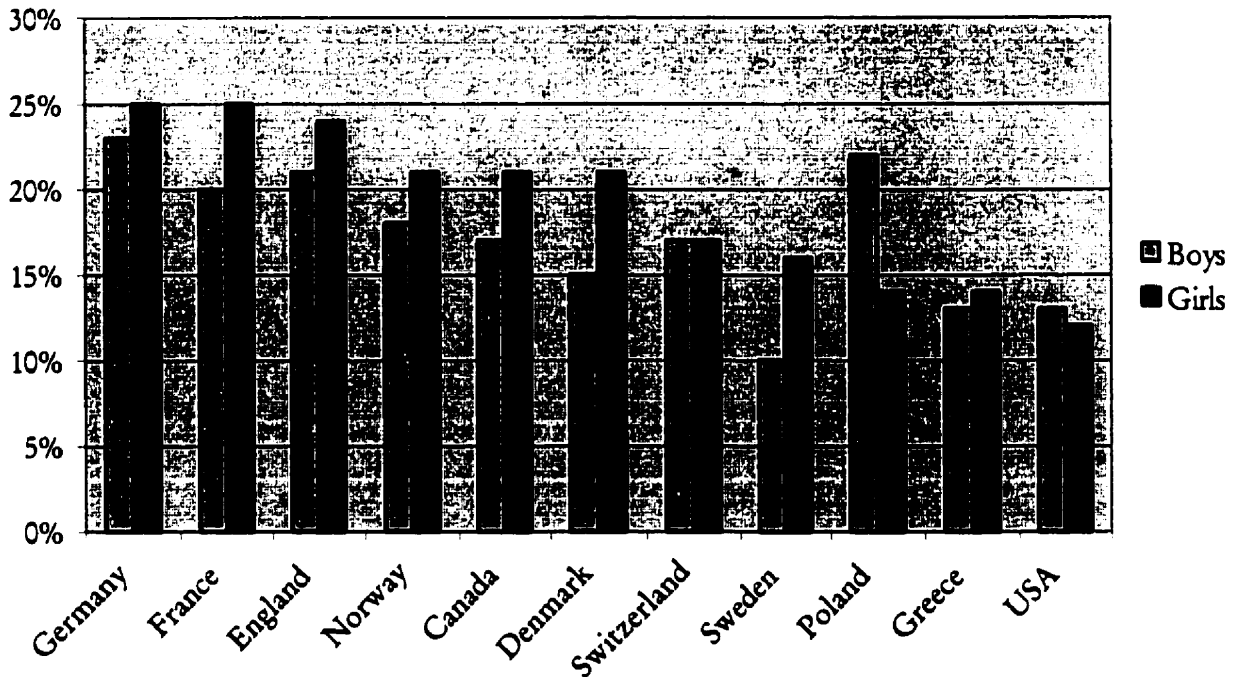
**Table 7.2 Smoking rates in Stratford, compared with provincial and national surveys by gender**

Gender	Percentage of Smokers (%)		
	Youth Smoking Survey	Waterloo Smoking Survey	Stratford Health Behaviour Survey
Male	23	36	40.6
Female	24	37	31.1
Total	24	37	36.2

The Canadian HBSC data showed that in the 10<sup>th</sup> grade, 34% of girls and 28% of boys were smokers. International data reported that in most western countries, more 15 year old girls than boys are daily smokers. The reverse, however, is true in Poland and other Eastern European countries (Health Canada, 2000). Figure 7.1 shows that the percentages

of daily smokers for Canadian 15 year olds are lower when compared to Germany, France, England and Norway, but are somewhat higher when compared to the US.

Figure 7.1 Fifteen year olds who smoked daily by country  
(WHO, 2000)



McGee and Stanton (1993) surveyed New Zealand adolescent smokers. The most popular reasons for smoking within those teenagers were “relaxation”, “friends smoking” and “image”. Researchers in Waterloo also asked students why they chose to smoke, or not smoke. The top three answers for both boys and girls in this survey were the same as responses in the Stratford Health Behavior Survey; “I’m addicted to cigarettes”, “I smoke when I’m stressed out and I want to relax”, and “I smoke at special events or parties”. Top three reasons for not smoking in both the WSS and the Stratford Health Behaviour Survey

were also the same for both boys and girls; “I think it may be harmful to my health”, “I am not interested in smoking” and “it is a waste of money”.

There are now more former smokers aged 15 and older in Canada than there are current smokers (Health Canada, 2000). Most of the smokers surveyed by Health Canada in the 1998 HBSC quit smoking at least one year ago as did most of the students who had quit smoking in both the Stratford Health Behaviour Survey and the WSS. According to Health Canada (1999a), only 8% of smokers aged 15-19 have successfully quit compared to 65% of smokers aged 45 and older. The most common reason for quitting of all ages is concern for their future health, which could explain the low rate of success in young quitters. Kelder et al (1994), also found that students who were current smokers were either unable to or unwilling to quit smoking. As well, of the self-reported quitters, 13% to 46% of young people returned to weekly smoking by the next year's measurement period. Students in both the WSS and the Stratford Health Behaviour Survey responded similarly to questions regarding quitting smoking. The majority of students from both surveys responded “yes, but I'm not sure when” when asked if they were planning on quitting smoking. More than ¼ of students in the WSS said that they would quit on their own, as did nearly 90% of the students who responded to the Stratford Health Behaviour Survey. Finally, approximately 80% of students from both surveys responded “no” to “would you join a quit smoking program if one were offered at your school?” In the Canadian HBSC, smokers aged 15-17 reported that they usually got cigarettes from friends, while smokers who took part in the Stratford Health Behaviour Survey had others buy cigarettes for them, or they purchased them themselves before taking cigarettes from friends. The WSS reported that 45% of all smokers bought cigarettes themselves, and 30% got them from friends. In the YSS, 88% of 15-19 year olds reported easy access to cigarettes (Adlaf and Bondy 1996). Under half (44%)

of the smokers in the WSS were never asked their age, when purchasing cigarettes, and this response was regardless of actual age. Only 11.9% of Students in the Stratford Health Behaviour Survey reported that they were never asked their age when purchasing cigarettes.

Smoking behaviour of youth is strongly influenced by their social circle (Brown and Manske, 1996). The greater number of friends who smoke, and the greater the number of people in the household who smoke influence youth smoking behaviors. Under half of the subjects in Stratford Health Behaviour Study were protected from household smoke. Similarly, just over half (53%) of the students in the WSS had no one smoking in their house every day or almost every day. Brown and Manske (1996) suggested that the strong influence of youth smoking and friends smoking indicate that smoke free regulations where youth congregate such as malls, video arcades and other public places could reduce the number of smoking opportunities for young people. A large portion of the students surveyed in the Stratford Health Behaviour Study reported that “they would like their local government to make all public places smoke-free”. The majority (42%) of the students who took part in the WSS felt the same way, but 27% of the students said that they weren’t sure about making these changes. Recently, Waterloo, Guelph and its surrounding areas have made all public places, including malls, bars, video arcades and bowling alleys smoke-free. It is the intention of these cities to reduce the prevalence of smoking in all age groups. These new regulations will help to reduce the incidence of teenage health problems associated with cigarette smoking.

The young people who participated in the Stratford Health Behaviour Survey the YSS, the HBSC and the WSS have grown up with the knowledge that smoking causes health problems, that it is addictive and that it is very difficult for a smoker to quit (Adlaf and Bondy 1996). As well,  $\frac{3}{4}$  of Canadian youth report being taught about the health effects of

smoking in school (Paglia et al, 1996). The majority, nearly 50% of students in the WSS and the Stratford Health Behaviour Survey, reported that they would “definitely not smoke cigarettes in the future”.

Given the increases in rates of smoking and decreases in the age of onset, the monitoring of smoking among adolescents provides critical information for prevention programs (Adlaf and Bondy, 1996). The data compiled from the Stratford Health Behaviour Survey smoking section are quite similar to data from the YSS, the WSS and Health Canada’s HBSC. This suggests that students in Stratford are often subjected to the same types of peer pressure, stress and curiosity as high school students throughout Canada. There is a strong need for the schools in Perth and Huron Counties, as well as the rest of Canada, to take additional action against smoking in their schools. Smoking prevention and education programs should continue; school board officials and public health professionals should find ways to encourage continued high quality programming. Teachers, schools and parents should determine how much is being done to help students resist peer pressure and other influences, as well as develop a variety of methods to encourage students to quit smoking. Many interventions, which have been specifically geared at smoking cessation, have had little or short term success. An integrated approach that brings together schools, parents, teachers, communities and health professionals are needed to improve the smoking status and other health behaviours of teenagers.

### **7.12 Eating Behaviours**

Healthy eating contributes to physical and emotional well being which, in turn significantly affects many other areas of student’s lives (Health Canada, 2000). Adolescents may not consider the long-term consequences of eating an unhealthy diet, and assume that

they can alter their habits later for better health. For the majority of adults who do not smoke or drink excessively, what they eat is the most controllable risk factor affecting their long-term health (WHO, 2000). While the HBSC did not evaluate nutrient intake of the surveyed students, they did report that in general, girls seem to eat more fruits and vegetables daily, while boys more often drink milk but also consume less nutritious items, such as chips, candy, chocolate and soft drinks.

Breakfast is believed to be a key meal for young people as it prepares the body and mind for daily activities (Health Canada, 2000). According to the CDC (1996), skipping breakfast can adversely affect children's performance in problem-solving tasks. In a study with low-income children in the US, 12% of students reported skipping breakfast the day before the survey (Devaney et al, 1995). Another study reported that 40% of 8<sup>th</sup> and 10<sup>th</sup> grade students eat breakfast on less than 3 days a week (CDC). Canada was the only country involved in the HBSC who asked students a question regarding frequency of breakfast intake. Results from this survey and the Stratford Health Behaviour Survey were identical. More girls ate breakfast daily in all grades and there was a constant decline in the proportion of boys that ate breakfast daily as grade level increased.

There is concern regarding vegetarianism among teenagers. Due to the onset of puberty and increased growth rate, teenagers who follow a vegetarian diet are at an increased risk for insufficient intakes of energy, calcium, iron, vitamins A and D, zinc and protein (NIN Canada, 1990). A study of vegetarian practices in Australia, found that vegetarianism among teenagers is primarily a female phenomenon, ranging in prevalence from 8% to 37% of girls and 1% to 12% of boys (Worsley and Skrzypiec, 1998). Vegetarians made up a very small percentage of the adolescents surveyed in the Stratford Health Behaviour Survey. However, approximately  $\frac{1}{4}$  of the students said that they were sometimes a vegetarian,



implying that they may be following vegetarian eating habits every once in a while, and may be interested in receiving further education on the matter.

There is strong evidence that eating behaviours are established in childhood and adolescence. The best opportunity to develop lifelong eating habits begins with elementary school children and continues with secondary school students. There are still very few data on the eating behaviours of Canadian teenagers. It is however quite apparent from both the HBSC and the Stratford Health Behaviour Survey that daily breakfast intake must be encouraged for high school students, and education should be provided regarding adequate intake of nutrients for boys and girls, vegetarian or non-vegetarian. Section 7.21 on individual interviews and dietary intake will delve further into the actual nutrient intake of the high school students who participated in the Stratford Health Behaviour Study.

### 7.13 Physical Activity

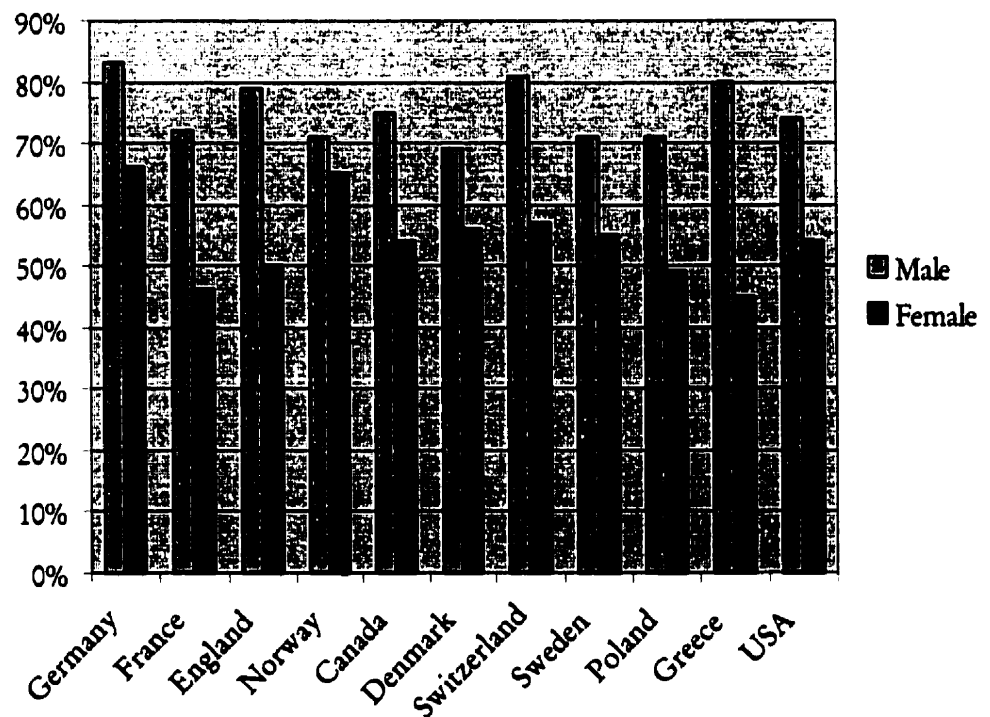
Physical activity has been demonstrated to have protective effects for several chronic diseases including hypertension, coronary heart disease, NIDDM, osteoporosis, colon cancer, anxiety and depression (Dovey et al, 1998; CDC, 1997d; Meyers et al, 1996; Pate, 1994). Adolescence is the time to establish an active lifestyle that can carry over into adulthood (Health Canada, 1999a). In the US, participation in physical activity among adolescents has increased. However, enrollment in daily school physical education classes has decreased for students in grades 9-12 (CDC, 1997d; Pate). Information reported in the Stratford Health Behaviour Survey shows that American and Canadian high school students often engage in the same practices. The majority of students who were enrolled in physical education classes in the Stratford Health Behaviour Survey were in the 9<sup>th</sup> grade. The fact that the Ontario school curricula requires that students only take one physical education

course to graduate may explain the high percentage of students enrolled in physical education courses in the earlier high school grades. It has been debated whether the major decline in physical activity occurs upon leaving school, or when physical education ceases to be a requirement (Allison and Adlaf, 1997). A driver's license, social activities, part time jobs and increased study and homework requirements may also decrease levels of physical activity as teenagers continue through highschool and onto college or university level studies.

The percentage of students participating in physical activity decreased significantly with increasing grade level for both boys and girls in the Stratford Health Behaviour Survey. Dovey et al, (1998) determined that regardless of age, boys spent significantly more time participating in physical activity than did girls. This has been consistent with much of the research regarding physical activity and adolescents (Allison and Adlaf, 1997; CFLRI, 1996; Meyers et al, 1996). According to the CFLRI, differences between boys' and girls' participation become quite pronounced among 13-17 year olds. In the Canadian HBSC survey, students were asked how often they exercise in their free time, outside of school hours. One half to  $\frac{3}{4}$  of girls, and more than  $\frac{3}{4}$  of the boys reported exercising twice or more times per week. To obtain an estimate of weekly cardiovascular activity, students who participated in the HBSC were asked how often and how many hours a week they took part in vigorous activity outside school hours. Figure 7.2 presents the proportion of fifteen-year-olds who exercised twice a week or more across the ten comparison countries. In all countries, boys participated in physical activity more than girls did. More Canadian boys exercised twice or more per week than did boys in Denmark, Norway, France and Poland. However, more boys in Greece, Switzerland and Germany participated in physical activity than Canadian boys. The rates for Canadian boys and US boys were the same. A higher percentage of Canadian girls participated in physical activity than girls in France, England,

Poland and Greece. More girls however in Germany, Norway, Denmark and Switzerland participated in physical activity than did Canadian girls. Similar to the boys, rates of physical activity for Canadian girls and US were the same.

**Figure 7.2 Fifteen year olds who participated in physical activity twice a week or more by country (WHO, 2000)**



Physical activity in late adolescence is more a matter of choice than it is at a younger age, when the school curricula helps to influence activity levels (Dovey et al, 1998). The Stratford Health Behaviour Survey asked students if they were interested in participating in a physical activity that was, or was not presently available at the school they were attending. Both boys and girls top 5 choices were quite similar in their intensity levels. Table 7.3 shows the top five choices for boys and girls in Stratford compared to the top five activities chosen

among teenagers according to the CLFRI in the 1995 Physical Activity Monitor. Previous research has shown that many more boys than girls participate in higher intensity activities, however, the difference between gender and activity in the Stratford Health Behaviour Survey is more related to hours spent doing these activities than the actual activities themselves.

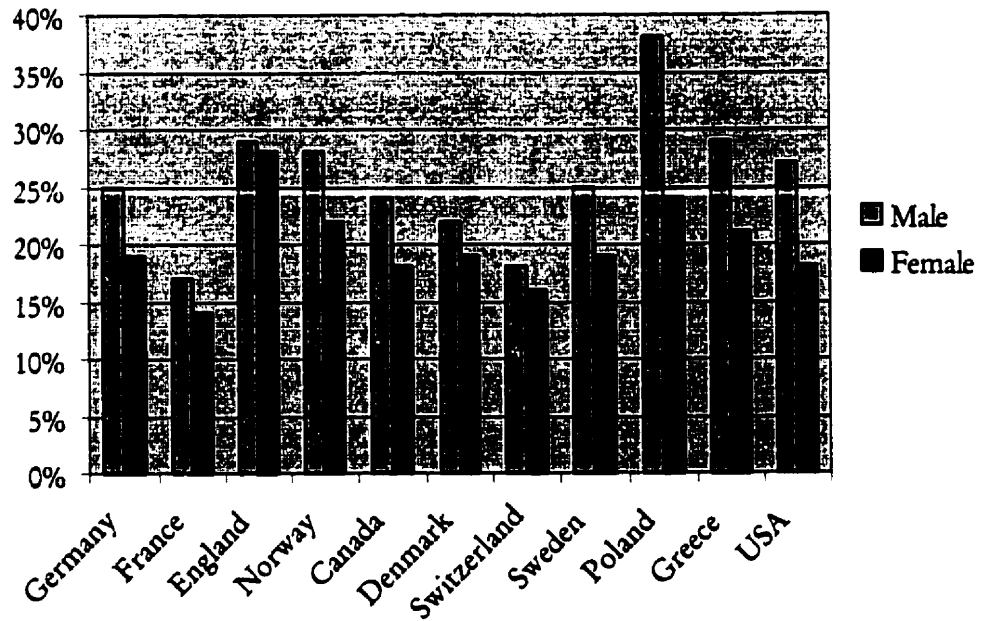
**Table 7.3 Top five physical activity choices among Canadian adolescents**

Canadian Lifestyle and Fitness Research Institute	Stratford Health Behaviour Survey	
	Boys	Girls
Biking	Hockey	Soccer
Swimming	Basketball	Baseball
Skating	Soccer	Volleyball
Basketball	Football	Basketball
Walking	Rugby	Kickboxing

The duration of weekly television viewing is inversely correlated with school performance, even when controlled for IQ, amount of non-school reading, hours spent doing homework, or parental reading habits. Television viewing in children is correlated with between meal snacking, and consumption of foods advertised on television (Dietz and Gortmaker, 1985). Dietz and Gortmaker found that children who watch more television have reduced energy expenditure, because less energy is required to watch television than is required for more energy intense activities such as bike riding or playing tag. The Stratford Health Behaviour study determined sedentary activity by asking students how many hours they spent watching TV, videos, playing computer games or talking on the telephone. The majority of students reported that they spent around 2-3 hours per day participating in sedentary activity. Accordingly, boys who spent more time participating in physical activity spent fewer hours watching television. This relationship however was not found within girls.

Meyers et al (1996) found that girls reported watching more television than boys and that girls tended to watch for longer periods of time. Other research however, has shown that Canadian adolescents have reported an average of 2-3 hours of television viewing per day (Health Canada, 2000). The Canadian HSBC reported that generally 20% to 30% of students watch a significant amount of television, with more males doing so. The proportion of males watching television four or more hours a day was quite similar across grade 6 to 9, with a decrease in hours of viewing in grade 10. This decrease may reflect increasing school workloads; employment at part time jobs and other social interests (Health Canada). Figure 7.3 compares fifteen-year-olds across ten countries who watched 4 or more hours of television per day. Boys reported watching more television than girls in all ten countries, but less than half of all students interviewed watched more than 4 hours of television per day. Canadian boys reported watching more television than boys in France, Denmark and Switzerland, but reported watching less television than Germany, England, Norway, Poland, Greece and the US. Canadian girls reported watching less television than Germany, England, Norway, Denmark, Poland and Greece, but more than France and Switzerland. Girls in the US and Canada reported watching similar amounts of television.

**Figure 7.3** Fifteen year olds who reported watching 4 or more hours of television per day (WHO, 2000)



Adolescent girls are far more likely to be concerned about their appearance, to diet, to take medications, to have headaches, backaches and stomachaches (Health Canada, 2000). In the Stratford Health Behaviour Survey, the majority of both boys and girls reported that they felt neither overweight, nor underweight, but more than half of the girls said that they wanted to lose weight in the next twelve months. Less than half of the girls said that they were “concerned about gaining weight”, but still a small percentage of both girls and boys reported being “terrified about gaining weight”. In the international HBSC, it was discovered that more than half of 15-year-old girls in 16 countries were dieting, or felt like they should be on a diet (WHO, 2000). More girls than boys reported that they needed to lose weight and this proportion increased over grade levels in the HBSC Survey. For boys

there was little change as grade increased, regarding those who were on a diet or those who felt they should be dieting.

Physical activity habits, like smoking and eating behaviours are often determined during adolescence. Research consistently shows that physical activity decreases as adolescents age, especially in girls. While many factors tend to be involved in reducing the hours teenagers spend participating in physical activity, such as part time jobs, homework and driving, it is important to ensure that support is offered to all students at all grade levels to encourage continuous participation in physical activity. Communities can increase the number of sports teams available for teenagers and schools can increase the number of extra curricular activities for all ages. In consultation with students, during and after school activities should be implemented. Sedentary behaviour must be attended to, parents should ensure that their children and adolescents spend more time participating in physical activity than watching television, playing on the internet and talking on the phone. Teenagers need the help of teachers and parents to learn how to accept their own and others body image. Dieting should not be so prevalent in either elementary schools or high schools. Peer pressure is an issue that must be decreased, and parents, teachers and communities can help decrease the consequences of peer pressure. The results from the Stratford Health Behaviour Survey regarding physical activity are quite similar to the results from other surveys done throughout Canada. Adolescents in Perth and Huron counties as well as throughout the rest of Canada must increase the amount of hours they spend participating in regular physical activity. It has been shown that physical activity patterns track from adolescence to adulthood. To be able to decrease the risk of heart disease in these teenagers in the future, proper steps must be taken to ensure a healthy lifestyle.

### **7.14 Interrelationships Between Health Behaviours**

The interrelationships of health behaviours found in the Stratford Health Behaviour survey were similar to those found in past research. Lytle et al (1995) found that by grade 12, weekly smokers had poorer food habits than non-smokers. They also found the highest correlation between higher levels of exercise and healthy eating. Students who had significantly lower prevalence of smoking, scored higher on healthy eating scores as well as exercise and activity scores. According to Lytle et al, overweight girls may feel insecure and are therefore more susceptible to peer pressure; they accordingly may be more likely to smoke. In a study by Halek et al,(1993), there was a relationship found between smokers and increased weight. These researchers found that overweight girls tended to be regular smokers and underweight girls were less likely to have tried smoking.

The Stratford Health Behaviour Survey showed interrelationships between smoking status and daily breakfast consumption, as well as frequency of breakfast consumption and levels of physical activity. Level of physical activity and perception of body image were also interrelated. There were no relationships between television viewing and frequency of breakfast intake, level of physical activity and smoking status, nor with smoking status and perception of body image. Section 7.23 on interrelationships between dietary intake and weight status will provide further information and comparisons regarding interrelationships between health behaviours.



## 7.2 Individual Interviews

“The best predictor for underreporting in adolescents is whether they are assured confidentiality” (Camp et al, 1993). Individual interviews took place with 59 students to determine usual dietary intake of a group of adolescents. Height and weight measurements were also taken to determine anthropometric status by BMI. The following sections will describe the results from the individual interviews, along with Canadian and international comparison data.

### 7.21 Dietary Intake

The risk of inadequate intakes of energy, fibre and 10 nutrients, was estimated by comparing the median intakes of boys and girls to the proper reference data. The Recommended Nutrient Intakes (Health and Welfare Canada, 1990) were used for energy, protein, vitamin A, vitamin C, iron and zinc. The new Dietary Reference Intakes (Food and Nutrition Board, 1998) were used for niacin, riboflavin, thiamin, folate and calcium.

Median energy intakes were less than recommended for both boys and girls. This may not be a concern however, due to the tendency to underreport energy intake (Johnson-Down et al, 1997). Macronutrient intakes (carbohydrate, protein and fat) for both boys and girls were very similar to the recommended intake for Canadians. Fibre intake was well below recommended levels for both genders, as was zinc, calcium, folate and vitamin A. As well, for girls, iron intake was lower than recommended levels. The low fibre intake in this age group is of concern. A proper fibre intake is linked to a reduced risk of several chronic diseases and is often consistent with a lower fat intake and a high intake of fruits and vegetables. Intakes of calcium, folate and iron for girls pose issues regarding risk of deficiency of micronutrients.

Population based surveys have revealed that the diets of many adolescents include a high proportion of energy from high fat foods, such as cheese, butter, milk and ice cream (French et al, 1994). Health Canada surveyed, as a part of the HBSC, students in grades 6, 8 and 10 across Canada regarding dietary intake. Frequency of eating fruit, raw vegetables, cooked vegetables, whole wheat or rye bread, low fat milk, soft drinks, candy/chocolate bars, potato chips and french fries were determined. These foods were not chosen with the intention to provide a comprehensive picture of young people's eating habits, but they were used to provide information on some specific foods that are more or less nutritious (Health Canada, 2000). The HBSC showed that girls ate more nutritious foods on a more regular basis than boys. A greater proportion of boys ate higher salt and higher fat foods and daily consumption of cooked vegetables increased with increasing grade level. For both boys and girls, there was a decline in the proportion of students who ate hamburgers, hot dogs or sausages daily within the older students. The proportion of students eating candy or chocolate bars was similar across grades for both males and females. Comparatively the average dietary fat intake among Americans aged 2 years and over has decreased. The average number of servings of fruits and vegetables and grain products surpassed the year 2000 target and the proportion of the population that has met the dietary guidelines has increased (CDC, 1997d).

There is strong evidence that eating behaviours are established in childhood and adolescence. It is therefore important that children learn and develop healthy eating behaviours early in life. According to the results from the Stratford Health Behaviour 24-hour recalls, teenagers must be educated on the importance of adequate intakes of all nutrients as well as improving healthy eating status. More specifically, zinc intake must be increased through eating more red meat, beans and dairy products. Students should be

educated on alternate sources of calcium. Both schools and parents must encourage increased fruit and vegetable consumption. Fibre intake must be increased by consuming foods such as whole grains, whole-wheat cereals and fruits and vegetables.

Underreporting of energy intake was explored in the Stratford Health Behaviour Survey. The ratio of reported energy intake (EI) to basal energy requirements ( $BMR_{est}$ ) was calculated using actual body weight (Johnson-Down et al, 1997). A mean ratio of  $<1.5$  would be indicative of underreporting in these subjects. Ratios for boys and girls respectively were 1.43 and 1.42 showing a low incidence of underreporting. However, the higher BMI group ( $26.0-34.9 \text{ kg/m}^2$ ) for boys had an EI: $BMR_{est}$  ratio of 1.03, showing a higher incidence of underreporting.

## 7.22 Anthropometric Status

The Expert Committee on Guidelines for Overweight in Adolescent Preventative Services has recommended the use of specific BMI limits for routine screening of overweight and risk of overweight in teenagers (Malina and Katzmarzyk, 1999, Ellis et al, 1999; Himes and Dietz, 1994). The BMI is most popular due to the relative ease and accuracy of the basic measurements, but does have its limitations in measuring weight status of adolescents. The validity of selected cutoff points to identify adolescents with the highest percentage of body fat and relative weight have low sensitivities and high specificities, which minimizes the proportion of adolescents who will be incorrectly considered overweight by the screen (Himes and Dietz). Adolescents whose BMIs are  $\geq 85^{\text{th}}$  percentile, but  $<90^{\text{th}}$  percentile, or over 30, are considered at risk of overweight and according to the Preventative Services Committee, should be referred to a second level of screening. This second level screening includes items that will indicate any additional health risks for the adolescents

already at risk for overweight. If any of the second risk screening items are positive, adolescents should be referred or followed up for in-depth medical assessment. If the second level screening items are negative, no immediate clinical intervention is needed, but these teenagers should be followed up in the second year to evaluate their weight (Himes and Dietz). The pattern of BMI has been shown to be a predictor of long-term obesity in childhood, and to predict morbidity and mortality in adulthood (Hammer et al, 1991).

However, because BMI reflects body mass rather than fatness, some adolescents may have a high BMI due to a relatively large fat-free body mass, rather than excess body fat. This may be caused by high muscularity, high levels of exercise, or large frame size. This must be taken into consideration when trying to determine the risk and presence of overweight in adolescents.

Determination of overweight in the Stratford Health Behaviour Study followed the Guidelines for Overweight by Adolescent Preventative Services. These guidelines differ by sex, and increase with increasing age. Only ¼ of boys and less than that proportion (16%) of girls were considered overweight. The majority of both boys and girls in the Stratford Health Behaviour Study were able to properly predict their weight status when asked if “they felt that they were overweight, underweight or neither”. However, more than half of the girls surveyed reported that they wanted to lose weight over the next 12 months. Pritchard et al (1997), studied perception of overweight in adolescents, in comparison to BMI-weight status. Their study revealed that over ¼ of females reported themselves to be overweight, compared with only 4.7% who were classified as overweight based on BMI weight status. Of the females who considered themselves to be overweight, 84.8% would not be classified as overweight by the BMI. The perceptions of the males were slightly more accurate. Nearly 95% of males were classified as normal or underweight compared with 88.9% who

reported that they were not overweight. Moore (1998) administered an anonymous questionnaire to adolescent girls aged 12 through 23 years and results showed that 67% were dissatisfied with their weight, although only 53% were not within the normal weight group. Only 4% of the sample believed that they were underweight, whereas 12% actually fell into the underweight group. Perception of overweight was also off; 63% believed that they were overweight, but only 40% fell into the overweight group. Excessive weight during late childhood and adolescence is associated with higher morbidity and mortality in adulthood. According to Health Canada (1999a), compared to thin children, obese children have a two-fold increase in the risk of becoming overweight adults, and this risk increases as children age.

Underweight status of adolescents is often related to low BMI due to anorexia nervosa. Hebebrand et al (1991) used percentile values with BMI levels to determine underweight in teenage boys and girls. The weight criterion used for the diagnosis of anorexia nervosa in both genders is between the 5<sup>th</sup> and 10<sup>th</sup> percentile. In the Stratford Health Behaviour Survey, BMI values  $\leq$  10<sup>th</sup> percentile were used to determine underweight. In the sample of students who participated in the Stratford Health Behaviour Survey only 2.9% of the boys were underweight while 16% of the girls were considered the same. The use of BMI centiles for determination of target weights has been recommended previously. The advantage of the use of BMI centiles is that the target weight can be determined in relationship to the BMI distribution of the same aged individuals in the general population (Hebebrand et al). The low number of adolescents in this study who were determined to be underweight is a positive sign. The lowest BMI in the group was 16.3, which is slightly below the 5<sup>th</sup> percentile for females for the comparison populations. Adolescence and early adulthood are the times when exceedingly low body weights tend to occur. In females, the

percentage of body weight composed of fat mass increases by approximately 50% during puberty and adolescence. In males, the BMI increments during these developmental stages are due to increases of fat-free mass, therefore, weight loss tends to affect males earlier than females (Hebebrand et al, 1991). In adolescents, being underweight is associated with a host of cardiovascular problems, osteoporosis and lower energy expenditure. The number of problems that is involved with being underweight can be compared to the number of issues involved with being obese or overweight.

There are many influences involved with the weight status of adolescents. A healthy lifestyle, including a proper dietary intake, and healthy participation in regular physical activity is the first step to ensuring a proper BMI level and weight status for teenagers. In the Stratford Health Behaviour Survey, the majority of students interviewed were at a “good” weight status, according to their BMI. However, families, schools, communities and health professionals must be prepared to provide help and education to teenagers regarding healthy eating and healthy lifestyles. This will help them maintain their proper BMI throughout adulthood.

### **7.23 Interrelationships between dietary intake and weight status**

Boys in the Stratford Health Behaviour Survey who were current smokers had a higher fat intake than non-smokers. Students who participated in higher levels of physical activity had higher intakes of protein, fibre, calcium and certain vitamins. The more hours students spent watching television, the higher their intake of calcium, vitamin C and folate. Unlike other research however, the boys in the Stratford Health Behaviour Survey had a lower intake of fat if they watched more television. Current smokers had a mean BMI of 23.3, while non-smokers had a mean BMI of 22.6.

Clustering of health behaviours has been found to occur in adolescence. Teenagers who smoke, have poor dietary intakes and are inactive have a much higher risk of developing problems such as cardiovascular disease in adulthood. Dietz and Gortmaker (1985) found that children who watched more television experienced a greater prevalence of obesity than children who watched less television. This may be in response to peer discrimination; obese children may in fact spend more time alone and therefore more time watching television than non-obese children. This relationship was also found in the HBSC international survey. Students who watched more television were more likely to consume higher fat foods than those who watch less television. Lytle et al (1995) found that weekly smokers made poorer food choices than non-smokers, and exercise and healthy eating behaviours were highly correlated. Dallongeville et al (1998) reported that smokers have higher intakes of total energy, fat and alcohol than non-smokers and fibre intake is lower in smokers than in non-smokers. Smokers also tend to have lower intakes of vitamin C, E and beta-carotene. Similar relationships have been found over the years in different research regarding clustering of adolescent health behaviours. Physical activity often plays a large role in the initiation of smoking, however, in the Stratford Health Behaviour Survey, physical activity was not related to smoking status in either gender. Students who participated in higher physical activity levels in the Stratford Health Behaviour Survey had lower BMIs, perhaps showing the positive effects of physical activity and lower body weight.

The strong interrelationships between health behaviours found in the Stratford Health Behaviour Survey study show that students in Perth and Huron Counties are similar to high school students throughout the rest of Canada and the United States. However, the majority of interventions that have been specifically targeted to one health behaviour have had little or short-term success. Health behaviours as a whole must be addressed.

Childhood and adolescence is the most important period of time for people to learn and develop healthy lifestyle factors.

“Reductions in morbidity and mortality associated with lifestyle diseases may be achievable if satisfactory nutritional practices are adopted early in life and maintained in the long term” (Gracey et al, 1993).

### **7.3 Study Limitations**

As with any nutritional study, this research is dependent on reliable estimates of food intake. Many past researchers have noted that bias in reporting of energy is a strong contention in food intake studies.

On close inspection, almost all studies of energy intake contain results at the lower end of the range, which seem patently implausible as measures of habitual energy intake when judged against a knowledge of minimal energy requirements. Indeed the mean reported intake from some entire data sets is apparently incompatible with survival (Goldberg et al, 1991).

The limitations of the Stratford Health Behaviour Study are those inherent in the survey itself, the 24-hour dietary recalls used to determine dietary intake and the determination of anthropometric status.

#### **7.31 Health Behaviour Survey**

In general, the largest problem with mail questionnaires is the low response rate (Neuman, 1997). The Stratford Health Behaviour Survey was not subject to that kind of limitation. The surveys were sent out to the three participating schools and teachers



distributed them to their respective classrooms. If it was discovered during the individual interview that a student had not completed the survey, the appropriate people were contacted, and that student was provided with a survey to complete. Also, teachers were available for the students if any questions or issues of the survey arose.

There are many difficulties inherent in measuring smoking, nutrition and physical activity levels, especially in children and adolescents. Prevalence rates for smoking among school children or adolescents can be difficult to assess. Young people may perceive smoking as a forbidden activity and therefore be reluctant to reveal it as a present or a past behaviour or may tend to play down the amount that they smoked (Halek et al, 1993). While Kelder (1994) tracked food choices over time, it was unclear how much these variables related to actual fat, salt and carbohydrate consumption. As well, self-reporting of both food intake and physical activity is always subject to social desirability or repeated testing, which can introduce within or between person variability. The major advantage of the self-report for measures of physical activity is the low cost. These measures can easily be used with large numbers of subjects, and can also easily collect data on physical and social environmental factors. The disadvantages of these procedures include problems associated with recall limitations and subjectivity in response to the instrument (Pate, 1993).

The objective of the Stratford Health Behaviour Study was to get an overview of the general health behaviours of the students in Perth and Huron counties, who are representative of Canadian teenagers. And while it is strongly possible that underreporting of smoking and overreporting of physical activity were factors, results of this study seem to coincide quite reasonably with other Canadian and international research of the health behaviours of teenagers.

According to the results of the teacher's survey, the Stratford Health Behaviour Survey is an acceptable survey to be done in the classroom. One-third of the teachers noted that the survey did not disrupt the class at all. Teachers rated the three topics on the survey as at least "important" and reported that their students were quiet and task oriented while completing the survey. The average time to complete the survey was 20 minutes. Results from the teacher's survey suggest that the Stratford Health Behaviour Survey is an easily done and an appropriate survey to be used in a classroom setting.

### 7.32 24-Hour Recalls

Trained interviewers administered the 24-hour recalls using standardized protocols, thus keeping some of the inherent limitations of this method to a minimum. However, the limitations of a single 24-hour recall must be acknowledged. While the 24-hour recall is quick, easy and inexpensive to administer, at an individual level, it relies on memory and there is a large intra individual variation in intake. It is however, known as the most accurate method of determining intake of a group (Thompson and Byers, 1994)

The most frequently used aids to help subjects estimate portion sizes through 24-hour recalls, are household measures and food models. Household food measures have been found to result in significant under or over estimation of actual portion weights. Thus, household measures are not accurate for individuals but are considered by some researchers to produce acceptable data for group estimations (Young and Nestle, 1995). Data on the food intake of individuals requires an estimation of the amount of each item that is consumed. A portion or serving size is necessary to be able to convert information about food to the consumption of energy and nutrients. The concentrations of energy and nutrients in these portions are determined by comparing them to portions of defined size

and established energy and nutrient content as provided in tables of food composition (Young and Nestle). To help the students make portion size estimations more accurate, visual aids such as calibrated dishes and food models were used to ensure proper estimation of intake. Also, a weekend day was included in the interviews to ensure a better estimate of usual intake.

The possibility of underreporting of energy still existed and therefore the energy to BMR ratio was calculated to determine the actual level of underreporting. According to the energy to BMR ratio, underreporting was a slight possibility, but did not necessarily infringe on the results of the 24-hour recalls.

### **7.33 Anthropometric Status**

Interviewers were trained on proper techniques to measure height and weight of the students they were interviewing. Once weight and height measurements were taken twice and averaged out if necessary, BMIs were calculated. While weight for height represents a statistically valid measure of overweight when it is determined within age groups, when the growth charts for the NCHS were developed, weight for height percentiles were not provided for girls older than 10 years or for boys older than 11.5 years (Dean et al, 1995; Himes and Dietz, 1994; Cole et al, 1995). It is for this reasons that the BMI is the most widely used measurement for determining risk and presence of obesity in adolescents. However, the BMI does have its limitations, which were discussed in section 7.22:

**Anthropometric Status.**

## 8.0 Conclusions and Implications

The relationship between dietary intake, physical activity, cigarette smoking and cardiovascular disease for adults is well known. The health behaviours of teenagers however, are only recently becoming more widely understood. The results of the Stratford Health Behaviour Survey results can be readily compared to other health behaviour surveys studying the same age group.

Population health focuses on the interrelated conditions and factors that influence the health of populations over the life course, identifies systematic variations in the patterns of occurrence, and applies the resulting knowledge to develop and facilitate the implementation of policies and actions to improve the health and well being of these populations (Health Canada, 2000).

The main objective of this study was to determine health behaviours of high school students in Perth and Huron Counties. The majority of the students surveyed do not smoke, they do participate in regular physical activity and their nutrient intake is similar to that recommended for Canadians. There are however some particular areas of concern that have been identified throughout this report. Directions and recommendations for programs and policies regarding the health of adolescents are suggested in this section.

McGee and Stanton (1993) highlight the importance of pre-adolescent programs aimed at preventing early smoking. Factors such as parents, educators, school policies restricting smoking at school and generally reducing the potential for smoking to become part of lifestyle all play a role in reducing early smoking behaviour. Intervention results by Lytle et al (1995), indicated positive community and school intervention effects on youth smoking, physical activity and food choice behaviour.

The home is the optimum setting for the modeling and development of sound values, social skills and personal health practices (Health Canada, 1999b). Children and adolescents learn about healthy eating, the implications of smoking and the benefits of physical activity primarily by examples set by their parents. Schools are also a main forum for teaching and improving the social and behavioural skills of youth. It is often difficult for teachers to diminish the effect of peer pressure in schools and students often have difficulty feeling accepted and respected. Young people are impressed by the media, their friends as well as the communities surrounding them. Parents and teachers need programs and policies available to them to help them in their roles as guides and mentors as they help children develop into healthy adults (Health Canada). The Comprehensive School Health Model, which was formed by the Canadian Association for School Health in collaboration with Health Canada, is based on the idea that health is a prerequisite for learning. This model consists of four components, which ensure that students have the knowledge and skills to maintain and improve their own health. This model is based on the principle that all areas within a school community including the students are involved in identifying needs and developing solutions.

The Heart and Stroke Foundation (Health Canada, 1999a) states that a greater effort must be made to prevent children and adolescents from starting to smoke cigarettes. Policies, programs and legislation are needed to decrease smoking in the young population. Data from smoking studies clearly warrant continued smoking prevention efforts as well as smoking cessation interventions among high school aged children (Kelder et al, 1994). Findings suggest that reducing the prevalence of adolescent obesity is dependent on the adoption of an integrated public health approach, involving schools, community organizations and clinicians (Felts et al, 1996). The findings of Allison and Adlaf (1997)

suggest that programs and policies directed at teenagers need to focus on the critical stages before leaving school. The lower participation rates of adolescents in different physical activities are of concern. Emphasis therefore should be given to (CFLRI, 1995):

- ~ Building children's physical activity skills during childhood and adolescence.
- ~ Recognizing students not only for athletic excellence but also for participation.
- ~ Intervening during adolescence and early adulthood to support an active lifestyle.

Because declining energy expenditure rather than increasing energy intakes appears to be a primary contributor to the increasing prevalence of overweight in adolescents, strategies must encourage the development of physically active lifestyles (Felts et al, 1994). Childhood and adolescence are prime times to develop the necessary skills and habits to continue physical activity for life. Children should engage in frequent activity sessions daily, and adolescents should engage in 3 or more sessions per week of activities that last at least 20 minutes and that require moderate to vigorous levels of exertion (CFLRI, 1995).

Most interventions specifically targeted at individual risk behaviours have had little or short term success. An integrated and systematic approach that recognizes the role of the family, the school and the community is necessary. A caring, supportive system involving the school, the home and the community must be available to help teenage boys and girls through the difficult transition of the adolescent years (Health Canada, 1999b).

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**APPENDIX A**

**Parent Information Letter**

**Parent Permission Form**

**School Health Survey**

**Teacher's Survey**

## PARENT INFORMATION LETTER

### Measuring Eating Behaviour to Help Plan and Evaluate School Health Survey

#### Avon Maitland District School Board and Huron Perth District Catholic School Board

This letter describes a research study being conducted at your son/daughter's school through the University of Guelph and the University of Waterloo.

**Purpose:** The purpose of the study is to determine the proportion of high school students who smoke, are inactive, and have unhealthful eating behaviours.

The results of the study will inform the community advisory group which has representatives from the Avon Maitland School Board, the Huron Perth Catholic School Board and the Perth District Health Unit. Together we will develop a proposal for a comprehensive school health project for the county.

**Process:** Students will complete a paper and pencil survey of eating behaviours, physical activity and smoking in class.

**Time:** The survey will take about 20 minutes.

**Privacy:** The written survey will be anonymous. We will request that students not put their name on the survey. All surveys will be placed in a large envelope and gathered by the teacher.

This project has been reviewed and received ethics clearance through the Office of Human research at the University of Guelph. We will appreciate your cooperation in permitting your son or daughter to join the research. If you do not wish your child to participate, please call the school. As well, your child may decline to participate on the day of the survey. There is no penalty of any kind if he/she does not participate or if you or your son or daughter decide to subsequently withdraw from the study.

A final report of our findings will be prepared for the schools. If you have any questions and/or would like more information about this project, please call:

Dr. Susan Evers (University of Guelph) at 519 824-4120, ext 3780.

## PARENT INFORMATION LETTER

### Measuring Eating Behaviour to Help Plan and Evaluate School Health Survey and Interview

#### Avon Maitland District School Board and Huron Perth District Catholic School Board

This letter describes a research study being conducted at your son/daughter's school through the University of Guelph and the University of Waterloo.

**Purpose:** The purpose of the study is to determine the proportion of high school students who smoke, are inactive, and have unhealthful eating behaviours.

The results of the study will inform the community advisory group which has representatives from the Avon Maitland School Board, the Huron Perth Catholic School Board and the Perth District Health Unit. Together we will develop a proposal for a comprehensive school health project for the county.

**Process:** Students will complete a paper and pencil survey of eating behaviours, physical activity and smoking in class. Students with permission will also participate in an interview to find out what they ate during the previous 24 hours. This interview will be conducted by a research assistant from the University of Guelph. Once the dietary interview is completed we would like to measure your child's height and weight. We will ask your child to remove his/her shoes.

**Time:** The survey will take about 20 minutes. The interview will also take 20 minutes.

**Privacy:** The written survey will be anonymous. We will request that students not put their name on the survey. All surveys will be placed in a large envelope and gathered by the teacher. The individual interviews will take place in a separate room in the school. No names will be used; all information will be kept confidential. The researchers are the only persons who will have access to the information.

This project has been reviewed and received ethics clearance through the Office of Human research at the University of Guelph. We will appreciate your cooperation in permitting your son or daughter to join the research. There is no penalty of any kind if he/she does not participate or if you or your son or daughter decide to subsequently withdraw from the study. All students must return a signed permission form in order to participate in the interview.

**Information and Withdrawal:** Either you or your son/daughter may withdraw at any time, even if you agree to participate now. You or your son or daughter may also withdraw at any time before or during the interview by advising the interviewer of your decision.

Please complete the permission form and have your son or daughter bring it on the day of the research activities. A student will not be permitted to participate in the interview if he/she does not have the form when he/she arrives. If you have any questions about the interview and/or would like more information about this project, please call:

Dr. Susan Evers (University of Guelph) at 519 824-4120, ext 3780.



## PARENT CONSENT FORM

### Measuring Eating Behaviour to Help Plan and Evaluate School Health

By signing this form, I give permission for my child (print name) \_\_\_\_\_, to participate in the above study. I understand that my child's participation in this study is entirely voluntary.

I understand the purpose of the study as described on the attached letter.

If I agree that my child can participate, he/she will be asked to attend one interview session lasting approximately 20 minutes.

All information collected will be kept in locked cabinets at the University of Guelph, accessible only to the researchers.

My child may refuse to participate or may withdraw from the study at any time without consequences by indicating her/his wish to the researcher.

If I have any questions I can call Dr. Susan Evers at the University of Guelph (519) 824-4120, ext 3780.

I have received a copy of this form for my records.

I consent to my child's participation in this study by signing below.

Signature of parent \_\_\_\_\_ Date \_\_\_\_\_

## SCHOOL HEALTH SURVEY

University of Guelph & University of Waterloo

c/o Avon-Maitland District School Board & Huron-Perth Catholic District School Board

These questions are about the health and attitudes of students like yourself. Read each question carefully and be as honest as you can when you answer the questions. The information you give will be kept completely secret and confidential. Your answers will only be seen by researchers at the University of Guelph and University of Waterloo. Your teachers, principal, parents, etc. will not see your answers. The survey is anonymous so please do NOT put your name on any of the pages.

For each question please mark your answer by making a dark pencil mark that fills the circle completely. Fill in only one (1) circle for each question unless the instructions tell you to do something different.

Today's Date		
MONTH	DAY	YEAR
<input type="radio"/> Jan		199
<input type="radio"/> Feb		
<input type="radio"/> Mar		
<input type="radio"/> Apr		
<input type="radio"/> May		
<input type="radio"/> Jun		
<input type="radio"/> Jul		
<input type="radio"/> Aug		
<input type="radio"/> Sep		
<input type="radio"/> Oct		
<input type="radio"/> Nov		
<input type="radio"/> Dec		

1. What grade are you in?

- 9     10     11     12     OAC

2. How old are you?

- 13 years or younger                       17 years  
 14 years     18 years  
 15 years     19 years  
 16 years    or older

3. Are you male or female?

- Male  
 Female

Please read each sentence below carefully and write the correct letter for each question on the line. Print clearly

First letter of your middle name (if no middle name, write "Z") \_\_\_\_\_

First letter of the month you were born in \_\_\_\_\_

First letter of you gender: "m" for male and "f" for female \_\_\_\_\_

First letter of the name of the street where you live \_\_\_\_\_

First letter of your mother's first name (if unknown, write "X") \_\_\_\_\_

The next questions are about smoking and attitudes of students like yourself. Please read each question carefully and answer as honestly as you can.

4. Have you ever tried cigarette smoking (even just one puff)?

- Yes       No

5. Have you ever smoked again since the first time you tried a cigarette?

- Yes  
 No  
 I have never smoked

6. Not counting yourself, how many people in your home smoke every day or almost every day?

- 0                       1  
 2                       3  
 4                       more than 4

7. Please answer ONE of either 7(a) or (b)

a) If you smoke cigarettes now, what are your reasons for smoking? FILL IN ALL THAT APPLY

- I'm addicted to cigarettes  
 I smoke when I'm stressed out and want to relax  
 I like the image smoking gives me  
 It's easy to get cigarettes  
 My friends smoke  
 It's enjoyable  
 My brothers and sisters smoke  
 I smoke at special events (parties, concerts)  
 I'm bored, there is nothing else to do  
 My parents offer it to me  
 Someone pressures me into it  
 Other: \_\_\_\_\_

b) If you DON'T smoke now, what are your reasons for not smoking? FILL IN ALL THAT APPLY

- I think it may be harmful to my health  
 I tried smoking, but I don't like the taste  
 I think it may be addictive  
 I just experimented with smoking and did not plan to do it again  
 I am not interested in smoking  
 I tried smoking, but I don't like the effect it has on me  
 I know that my parents would disapprove  
 It will affect my athletic ability  
 I have seen bad examples of what smoking can do  
 My friends disapprove of smoking  
 I have other things I enjoy doing  
 It is a waste of money  
 Other: \_\_\_\_\_
8. Do you usually smoke every week?  
 Yes  
 No  
 I have never smoked - please go to Question 18.
9. At this time, have you quit smoking?  
 Yes  
 No
10. How long ago did you quit smoking?  
 I am still smoking  
 less than 2 weeks ago  
 between 2 weeks and 6 months ago  
 between 6 months and one year ago  
 more than one year ago
11. How many times in the past year have you tried to quit smoking?  
 I have not smoked in the last year  
 I have tried to quit smoking once in the last year  
 I have tried to quit smoking more than once in the last year  
 I have not tried to quit smoking in the last year

12. Do you plan to quit smoking cigarettes?

- I have already quit
- Yes, within one week
- Yes, within 30 days
- Yes, within six months
- Yes, within one year
- Yes, but I'm not sure when
- No, I do not plan to quit smoking

13. Would you join a quit smoking program if one was offered at your school?

- Yes
- No
- I do not smoke cigarettes anymore

14. If you were thinking about quitting, where would you go to get help?

- a self-help program
- I would ask my friends
- a group program
- I would quit on my own
- my doctor
- a teacher or guidance counsellor

15. How do you usually get your cigarettes?

- I buy them
- Someone buys them for me
- I get them from my friends
- I get them from home
- Other: \_\_\_\_\_
- I do not smoke

16. In the past month, when you tried to buy cigarettes how often were you asked your age?

- I do not buy cigarettes
- Never
- Less than half the time
- About half the time
- More than half the time
- Always or almost always

17. How often do you smoke in each of the following places?

	Often	Sometimes	Never
at home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
walking to or from school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
at school but off school property	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
at school on school property	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
at the mall food court	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
in restaurants/coffee shops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
at parties	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
community centre / arena	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
other: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. Do you think you will smoke cigarettes in the future?

- I definitely will not smoke cigarettes
- I probably won't smoke cigarettes
- I might smoke cigarettes or I might not smoke cigarettes
- I probably will smoke cigarettes
- I definitely will smoke cigarettes

	True	Usually true	Usually false	False
19. I often see students smoking near this school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. I often see teachers or staff smoking near this school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. In this school there is a clear set of rules about smoking for students to follow.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. If a student is caught breaking the smoking rules at this school, they get into trouble.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23. In this school many students smoke where they are not allowed to.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24. In this school, many teachers and staff smoke where they are not allowed to.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

25. Would you like your local government to make all public places (e.g. malls, restaurants, arcades, etc.) smoke-free?

- Yes
- I'm not sure
- No

26. You can be fined for smoking on school property.

- True
- I'm not sure
- False

27. How likely do you think it is that smoking leads to health problems for people who smoke?

- Very likely
- Somewhat likely
- Somewhat unlikely
- Very unlikely
- I don't know

28. If your friends smoke, you are more likely to smoke too.

- True
- I'm not sure
- False

The following questions are about the eating habits of students like yourself. Please read.

29. How often do you have something for breakfast?

- Every day
- Some days
- Rarely
- Weekends only
- Never

30. Are you a vegetarian?

- Yes
- No
- Sometimes
- Don't know

31. Do you eat any of the following food?

- red meat (beef, lamb)
- pork, ham, processed meats (e.g. hot dogs, salami)
- chicken, turkey
- fish
- eggs
- milk, milk products
- cheese
- yoghurt, ice cream

These questions are about your participation in regular physical activity. Regular physical activity means vigorous or moderate activity done for at least 30 minutes most days of the week. For example, you could play sports for 30 minutes or do a combination of

32. Are you taking a Physical Education course at school this year?

- Yes
- No

33. In a typical week, how many times do you participate in regular physical activity?

- 0 times
- 1-2 times
- 3-5 times
- 6+ times (everyday)

34. How hard are you usually working when you participate in regular physical activity?

- Normal breathing rate
- Breathing heavier than normal, still able to talk while exercising
- Strenuous exercise, breathing so heavy that it is difficult to talk while exercising

35. How do you usually get to and from school? (Choose up to 2 answers that best apply)

- Walk
- Car
- Bus
- Other (specify): \_\_\_\_\_
- Bike
- Roller blades/skateboard
- Run

36. In a TYPICAL DAY, how many hours do you spend:

a) Watching T.V., movies, playing computer / video games, or talking on the telephone?

- None
- Less than 1 hour
- 2-3 hours
- 4-5 hours
- More than 6 hours

b) Doing homework

- None
- Less than 1 hour
- 2-3 hours
- 4-5 hours
- More than 6 hours

37. How many of your closest friends participate in regular physical activity?

- None of them
- A few of them
- Most of them
- All of them

38. Not counting yourself, how many people in your home participate in regular physical activity?

- None of them
- A few of them
- Most of them
- All of them

39. If you **DO** participate in physical activity, why do you participate in regular physical activity?

- To be better at sports
- Because physical education is required
- To compete/win
- To improve my health
- To learn new things
- For fun and enjoyment
- To relax and reduce stress
- To meet new people
- To feel good about myself
- To get in good shape
- To be with family and/or friends
- To be part of a team
- To control or lose weight
- Pressure from family or friends
- To take a break from school or homework
- Other (specify): \_\_\_\_\_

40. If you **DON'T** participate in regular physical activity, what are your reasons for not participating?

- Dislike physical/health education classes
- Dislike co-ed classes
- Dislike coach/phys. ed. teachers
- Lack of athletic ability
- Lack of energy, too tired
- Lack of friends to "work-out" with
- Dislike change rooms (e.g., dirty, smelly, etc.)
- Too expensive
- Lack of time
- Self-conscious, embarrassed, lack of confidence
- Lack of programs or facilities
- Physical activity is boring
- Too competitive
- Lack of encouragement from family, friends or teachers
- Fear of injury, getting hurt
- Lack of self-discipline or motivation
- Sweating, body odour, messes up hair
- Don't want to gain muscle mass
- Rather watch T.V. or hang out with friends
- Injury, illness, disability
- Other (specify): \_\_\_\_\_

41. With whom do you usually participate in regular physical activity? (Choose up to **TWO** answers that best apply)

- I do not participate in physical activity
- By myself
- With friends at school
- With friends outside of school
- With family
- Other (specify): \_\_\_\_\_

42. Where do you usually participate in regular physical activity? (Choose up to **TWO** answers that best apply)

- I do not participate in physical activity
- Home
- Private club (e.g. , tennis club, dance studio)
- Park/playing field
- Outside using no special facility
- Community facility (e.g. arena, swimming pool)
- School
- Other (specify): \_\_\_\_\_

43. When do you usually participate in regular physical activity? (Choose up to **TWO** answers)

- I do not participate in physical activity
- Before school       In the evening
- After school       On weekends
- Other (specify) \_\_\_\_\_

44. If you were thinking about joining a physical activity program, where would you go to get information? (Choose only **ONE** answer)

- Teacher/Coach       Doctor/health professional
- School athlete       Recreation Centre
- Family       Boyfriend/girlfriend
- Friends       Newspaper / Magazines / Internet
- TV/Radio
- Other: \_\_\_\_\_

45. Are there any physical activities which you would like to participate in next year that are currently available?

- Yes → if yes,  
1st choice: \_\_\_\_\_  
2nd choice: \_\_\_\_\_
- No

46. Are there any physical activities which you would like to participate in next year that ARE NOT currently available?

- Yes → if yes,  
1st choice: \_\_\_\_\_  
2nd choice: \_\_\_\_\_
- No

47. Do you think you are:

- Underweight  
 Neither underweight nor overweight  
 Overweight

48. Over the next 12 months, would you like to:

- Lose weight  
 Stay the same weight  
 Gain weight

49. With respect to gaining weight, are you:

- Not concerned     Very concerned  
 Concerned         Terrified

50. Which of the following best describes how you usually feel about yourself?

- Happy                       Unhappy  
 Somewhat happy         Somewhat unhappy

51. Compared to other persons your age, would you say you are:

- More active  
 Less active  
 Just as active

52. Do you feel that you get enough physical activity?

- Yes  
 No  
 Unsure



## TEACHER SURVEY

### School Health Survey

**Avon Maitland District School Board and Huron Perth Catholic District School Board**

**Teacher: Please answer the following questions and place the sheet on student surveys before returning to the office.**

Thank you for administering the survey.

1. Students in this class are in grades (circle all that apply):

9      10      11      12      13

2. While completing the survey, students were (Please circle the best response):

1	2	3	4	5
<i>Quiet</i>		<i>Usual Noise Level</i>		<i>Very Noisy</i>
1	2	3	4	5
<i>Interrupted many times</i>				<i>Never Interrupted</i>
1	2	3	4	5
<i>Task oriented</i>				<i>Off Task</i>

3. Please indicate your assessment of the importance of the topics included in this survey for the health of adolescents. NOTE: while only a small number of classes are completing the nutrition measures, we would still appreciate your assessment of the importance of this topic.

***Nutrition***

<i>Extremely important now</i>				<i>Not important now</i>
1	2	3	4	5

***Physical Activity***

<i>Extremely important now</i>				<i>Not important now</i>
1	2	3	4	5

**Smoking***Extremely  
important now*

1

2

3

4

*Not important  
now*

5

4. How long did it take to administer the survey from start to finish (to distribute, complete and collect)? \_\_\_\_\_ minute
5. As a teacher administering this survey, please rate how disruptive this survey was to your routine.

1

2

3

4

5

*Not at all  
disruptive**Not more  
disruptive than  
expected**Extremely  
disruptive*

Please suggest how we might improve administering this survey in classrooms in the future. We welcome your ideas and concerns. All responses will be treated confidentially.

**APPENDIX B****24-Hour Recall Form****Growth Measures Form****Measurement of Height Equipment Instructions****Measurement of Weight Equipment Instructions****24-Hour Recall and Weight and Height Measures Instructions**

**Perth County Comprehensive School Health Project: 24-Hour Dietary Recall**

**First letter of student's middle name (if none, use Z)** \_\_\_\_\_ **Date of Interview** \_\_\_\_\_  
**First letter of the month the student was born** \_\_\_\_\_ day mon yr  
**First letter of student's gender (M = male; F = female)** \_\_\_\_\_  
**First letter of the name of the street where the student lives** \_\_\_\_\_  
**First letter of the first name of the student's mother (unknown = X)** \_\_\_\_\_

**Date of Birth** \_\_\_\_\_ **Interviewer:** \_\_\_\_\_  
 day mon yr

Time of day	Place	Food or drink	Description	Amount	Code	CANDAT (for office use only)		
						Meal Code	Food Code	Amount



## Perth County Comprehensive School Health Project

### GROWTH MEASURES

First letter of student's middle name (if none, use Z) \_\_\_\_\_  
 First letter of the month the student was born \_\_\_\_\_  
 First letter of the student's gender (M = male, F = female) \_\_\_\_\_  
 First letter of the name of the street where the student lives \_\_\_\_\_  
 First letter of the first name of the student's mother (unknown=X) \_\_\_\_\_

Date of Birth \_\_\_\_ - \_\_\_\_ - \_\_\_\_  
                                     Day   Month   Year

Date of Interview \_\_\_\_ - \_\_\_\_ - \_\_\_\_  
                                     Day   Month   Year

<b>Measure</b>	<b>Average</b>
<b>Height</b>	
#1 ____.	_____ cm
#2 ____.	
#3 ____.	
<b>Weight</b>	
#1 ____.	_____ lb
#2 ____.	
#3 ____.	

Record to nearest 0.1 cm; repeat if #1 and #2 differ by >0.5 cm

#2 \_\_\_\_.

#3 \_\_\_\_.

Record to nearest 0.5 lb; repeat if #1 and #2 differ by >0.5 lb

#2 \_\_\_\_.

#3 \_\_\_\_.

## **Standardized Protocol: Measurement of Height**

### **Equipment: Microtoise Modified Tape Measure**

#### **Masking Tape**

- 1- Locate a wall to which the Microtoise Tape can be mounted. Choose a wall without a baseboard and an area without carpet.
- 2- Pull the tape out to its fullest length and release it. Use masking tape to fix the end of the tape to the wall. Make sure that the tape is completely vertical.
- 3- Check the window on the head-bar to see that the red line is in line with the black zero line.
- 4- The child should be wearing light clothing so that you can more clearly see his/her posture. The child should not wear shoes. If the child is wearing a barrette or a ponytail, near the top of their head, it should be removed.
- 5- With the child's head below the head bar, have him/her stand straight with his/her eyes looking straight ahead. The imaginary line running from the small flap of skin in the front part of the child's ear to the top of the cheekbone, just below the eye socket, should be parallel to the floor.
- 6- Make sure that the child's feet are together and flat on the floor; knees are straight, and shoulder blades, heels and buttocks are in contact with the wall. You may need to hold the child's heels so that they do not leave the ground. It is not necessary that the child's head touches the wall.
- 7- The child's arms should hang loosely by the sides, with palm facing the thighs.
- 8- Ask the child to take a deep breath and stand tall. Their back should be straight and the shoulders should be relaxed.
- 9- Lower the head bar until it touches the top of the child's head.
- 10- Take the height measurement at maximum inspiration with your eyes level with the head bar. You may need to kneel to do this.
- 11- Record the measurement to the closest 0.1 cm. If the reading falls between two values, record the lowest of the two.
- 12- Follow the above steps to repeat the measurement. If the two measurements are very different (ie differences of 0.5 cm or more), repeat the measurement a third time. Record all height measures on the record sheet.

## **Standardized Protocol: Measurement of Weight**

### **Equipment: Wonderscale**

- 1- Place the scale on a hard flat surface.
- 2- Turn the scale on. It automatically adjusts to zero.
- 3- Explain to the child that you want to find out how much he/she weighs.
- 4- The child should be wearing light indoor clothing and have shoes removed.
- 5- Have the child stand unassisted with both feet centred on the scale. The child should be standing still and looking straight ahead.
- 6- Record the body weight to the nearest 0.5 lb.
- 7- Repeat the above steps one more time. If the two measurements are very different (ie, 0.5 lb or more) weigh the child once more. Record all weight measures on the record sheet.



## School Health Survey

### Standardized Protocol for 24 Hour Recall Interview

#### Food Recall Kit

Each kit contains the following items:

##### Food Models

Mounds (XS,S,M,L,J)

Balls (S,M,L,J)

Surface Areas (circles, squares)

Wooden Thickness Indicator

Wooden Pie Wedge

Wooden Meat Shapes

Spoons: teaspoon and tablespoon (heaped and level)

Nutrition Canada calibrated mug, 2 glasses, 1 bowl

250 ml measuring cup

Ruler

Before you begin the recall, explain why we need to know what they ate on the previous day and that we cannot tell whether their diet provides enough nutrients because we are only looking at one day, but, with the information from other students we will find out if the group of students are getting enough nutrients.

#### 1. Introduction to the recall and developing rapport

Explain that you will be asking them to recall the foods and beverages they ate or drank in the last 24 hours. Emphasize that this information is very important to the study and that you will help them remember what was eaten by using different food models. You could say "In the next few minutes, I would like you to recall what you ate and drank yesterday. It is very important that you remember as much as you can and in as much detail as possible. I will try to help you remember the small details, and I've got a set of food models (you need a good imagination!) to help you remember the amount that you ate.

#### 2. Define 24 hour time period

Define the 24 hour period very clearly. If, for example, you are interviewing on Wednesday, you would say "the time from midnight Monday to midnight Tuesday".

#### 3. Midnight snacking and wake up time

Ask if he/she had anything to eat or drink after midnight the night before. Then ask when he/she woke up and what was the first thing he/she had to eat or drink.

#### 4. List food and beverages consumed and portion sizes

Write down the time, place and everything eaten during this time period. Record approximate portion sizes and a brief description of the foods and drinks. Each food should be listed separately.

e.g. cheese sandwich - 2 slices white bread  
1 tsp margarine  
1 slice processed cheese  
1 leaf lettuce

#### 5. Details - food description and amount

Once you have recorded all the food and beverage items eaten in each meal or snack, probe for more details about each item:

- (i) Detailed description including preparation and cooking methods, brand name, etc.
- (ii) Amount. Show the food models and emphasize that they are only guides. Record quantities as gram (g), millilitre (ml), fluid ounce (fl. oz.), weight ounce (wt. oz.), or household measure (eg. teaspoon (tsp.), tablespoon (tbsp)). Record foods such as hot dogs, sausages, bananas, other fruits, buns, and bread as a single unit - 1 banana, 1/2 apple, 2 slices of bread, 3 slices of bacon, etc.

#### 6. Repeat procedure to cover the rest of the day

Once you have enough detail, ask about the next time he/she had something to eat or drink. Be careful not to refer to specific meals (eg. breakfast, lunch, or dinner) but say "what did you eat next?" instead. Repeat steps 4 and 5 to get detailed information about the description and amount of each food/beverage.

#### 7. Recap

At the end of the interview, read back what you have recorded and ask the student to correct any mistakes that have been made.

### 8. Scan for missing items

Scan the 24 hour recall for these main types of food:

<u>food type</u>	<u>Examples</u>
milk and milk products	cheese, yoghurt and ice cream
bread and cereal	rice, spaghetti, macaroni, bread
fruit and vegetables	bananas, berries, orange juice, apples, tomatoes, lettuce, potatoes
meat and alternates	fish, eggs, poultry, peanut butter, tofu, chick peas

Politely ask about any missing types of food. eg. "Did you have any milk with any of your meals?"

### 9. Ask about supplement use

"Did you have a vitamin or mineral pill yesterday? Record the brand name (eg. Life brand multivitamins plus iron) and number of pills taken.

### 10. Is this typical?

Ask if this is a normal day. If not, ask why it wasn't.

### 11. Be sure to thank the students for their time and cooperation.

## RECORDING

Please refer to the 24 hour recall form.

### 1. Time of day when the food/beverage consumed

This information is recorded in the first column. The time is recorded only once for that particular meal/snack. A new time must be recorded at each distinct meal/snack period. Leave a space or draw a line to separate each meal or snack.

### 2. Place where food/beverage was consumed

The location (eg. home, restaurant) where the food or beverage was eaten.

### 3. Food or Drink Description

Record what the student had to eat or drink in the third column (e.g. cheese) and a description of the food/beverage in the fourth column (e.g. cheddar). Get as much detail as possible by *probing* for more information as listed below:

<b>meat:</b>	<ol style="list-style-type: none"> <li>1. kind of meat</li> <li>2. method of cooking</li> <li>3. was it commercially prepared</li> </ol>
<b>fish/seafood:</b>	<ol style="list-style-type: none"> <li>1. kind of fish (e.g. cod, tuna)</li> <li>2. fresh/frozen/canned</li> <li>3. method of cooking</li> <li>4. commercially prepared</li> </ol>
<b>poultry:</b>	<ol style="list-style-type: none"> <li>1. kind of poultry</li> <li>2. method of cooking</li> <li>3. white or dark meat</li> <li>4. meat + skin or meat only</li> <li>5. commercially prepared</li> </ol>
<b>fats:</b>	<ol style="list-style-type: none"> <li>1. kind (butter, margarine, oil, lard)</li> <li>2. brand name, if possible</li> </ol>
<b>milk products:</b>	<ol style="list-style-type: none"> <li>1. kind of dairy product (eg. milk, cream, )</li> <li>2. % fat (eg. 2% milk, 1% cottage cheese)</li> </ol>
<b>cheese:</b>	<ol style="list-style-type: none"> <li>1. type (eg. cheddar, cream, mozzarella)</li> </ol>
<b>bread/rolls:</b>	<ol style="list-style-type: none"> <li>1. type (rye, whole wheat, white)</li> <li>2. size: standard or unusual (should then use food models)</li> <li>3. topping/condiments (butter, margarine, jam, etc.)</li> </ol>
<b>baked goods:</b>	<ol style="list-style-type: none"> <li>1. type (cake, cookie, pie, cinnamon bun, danish, etc.)</li> <li>2. iced or not</li> </ol>
<b>cereal/pasta/rice:</b>	<ol style="list-style-type: none"> <li>1. type (e.g. oatmeal, white rice)</li> <li>2. brand name of cereals</li> <li>3. milk added?</li> </ol>
<b>vegetables:</b>	<ol style="list-style-type: none"> <li>1. fresh/frozen/canned</li> <li>2. method of cooking</li> <li>3. topping (butter, etc.)</li> </ol>
<b>fruits:</b>	<ol style="list-style-type: none"> <li>1. fresh/frozen/canned</li> <li>2. type of syrup (heavy,light) if canned</li> <li>3. sweetened/unsweetened</li> </ol>
<b>beverages/soup:</b>	<ol style="list-style-type: none"> <li>1. size of can or bottle</li> <li>2. fruit juice: sweetened/unsweetened</li> <li>3. pop: diet or regular</li> </ol>

4 soups: mixed with milk or water

**take-out foods:**

1. restaurant name
2. food/beverage name
3. size of portion
4. condiments added (e.g. ketchup, mustard)

**candies, etc.:**

1. brand name
2. size or amount

**mixed dishes:**

1. product name

#### 4. Portion sizes

Record the amount of food or beverage consumed in the fifth column under "AMOUNT".

**Household Measures:** Record the amount of food or beverage consumed in household measures. The units can be weight in ounces (wt. oz.), fluid ounces (fl. oz.), or millilitres (ml).

**Standard Measures:** Any food items that have standard measures (bread, egg) should be recorded as such. If they are not a standard size, a model should be used to estimate size. If recording quantities in household measures using the calibrated dishes, record as included in this kit:

#### QUANTITY / DISH

**NOTE:** Dish name must correspond with calibrated dish names. To avoid confusion, clearly indicate (with a check mark) at the top of the page that calibrated dishes (and the measures) are being used. Use a (cal) subscript the first time the calibrated dishes are used. If the kit dishes are also used, they can be identified by a (kit) subscript.

eg.     1/2 glass <sub>(cal)</sub>  
           1/3 cup <sub>(kit)</sub>

#### 5. Codes

If the food models are used to help with portion size, record them according to the "Mold Codes", listed below:

#### QUANTITY / MOLD / SIZE or THICKNESS

eg.     2 MO-S  
           1/2 BA-M  
           C-E, TH 4  
           S-MM, TH 1

The best model for particular food items is:

**BALLS** meat balls, potatoes, ice cream

**MOUNDS** raw/cooked vegetables, pasta, rice, salads

**SURFACE AREA (circles, squares)** meats, fish, poultry, cakes, squares, cookies, crackers

**THICKNESS INDICATOR (or RULER)** meats, cheese, cake

**PIE WEDGE** pie, pizza

**SPOONS** peanut butter, jam, sugar, condiments

### Mold Codes

**MOUNDS:** MO-XS (extra-small)  
MO-S (small)  
MO-M (medium)  
MO-L (large)

**BALLS:** BA-S  
BA-M  
BA-L  
BA-J (jumbo)

**TEASPOON:** tsp-H (heaped)  
tsp-L (level)

**TABLESPOON:** TBS-H  
TBS-L

**WEDGES:** WE-D (8 " pie)

**SURFACE AREA MODELS:** Surface area models may be used alone (when appropriate) or with the thickness indicator or ruler to estimate thickness. The model is identified as a circle (C), a square (S) and the size is identified by a letter.

**Circles** C-E  
C-M  
C-CC  
C-MM  
C-G  
C-H

**Squares**      S-E  
                     S-M  
                     S-CC  
                     S-MM  
                     S-G  
                     S-H

**Thickness Indicator:** Each layer represents 1/8 inch or 3 mm. Record the thickness (in number of layers or with a ruler) after the mold description.

eg. S-M, TH 4      (means "square size M, 4 layers thick")  
    C-H, 3 in      (means "circle size H, 3 inches thick")