



**Family factors and the consumption of fruits and
vegetables among School-age children**

Selawose Alberta Dzadey

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List of acronyms

WHO	World Health Organisation
SCT	Social cognitive theory
TPB	Theory of planned behaviour
ASE	Attitude–Social Influence–Self-Efficacy model
BRFSS	Behavioural Risk Factor Surveillance Survey
HBSC	Health behaviour in school aged children
SPSS	Statistical package for social sciences
ANOVA	Analyses of Variance

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SUMMARY

The consumption of fruits and vegetables are essential for the growth and development of children and this carries on into adulthood. However, fruit and vegetables consumption among children usually do not meet the national recommendations. There is therefore the need to improve the consumption of these food items among children. In order to design an effective intervention program to address this problem, there is the need to identify the factors that tend to influence these health behaviours. Various studies have been undertaken to establish the relationship between demographic factors and fruit and vegetable consumption. Others have studied the relationship between family factors and fruit and vegetable consumption among children.

The present study explores the associations between several demographic and family factors, and fruit and vegetable consumption among children. The family factors examined include family structure, parents' emotional support, parents' academic support, family affluence and going hungry to school or bed. The Social Cognitive Theory was used as the theoretical framework with a focus on the environmental factors in the triadic reciprocity approach of the theory. The triadic reciprocity approach took into consideration the cognitive, affective and environmental factors having reciprocal effects on each other to produce behaviour. Secondary data, collected for the Health Behaviour in School-age Children (HBSC) study in 2001/2002 was used for the present study. The study had 5023 children consisting of 2554 boys and 2469 girls

from both public and private schools. The age group distributions were 1660 11year olds, 1739 13year olds and 1624 15year olds.

Various statistical analysis techniques including correlation and multiple regression analysis were used in the data analysis. All the variables, age, gender, family structure, parents' emotional support, parents' academic support, family affluence and going hungry to school or bed showed significant relationships with fruit consumption. The findings were similar for vegetable consumption except that family structure was not a significant predictor. Family factors appear to be significant predictors of fruits and vegetable consumption among children although the explained variance of these factors was quite small. Other factors such as accessibility and availability have been found to be influential. The use of other theories as well as a qualitative study is proposed for further studies to help explain the relationships better.

CHAPTER ONE

1.0 Introduction

Fruits and vegetables are essential parts of a healthy diet and consequently a child's development. The World Health Organisation (WHO) recommends a daily intake of at least 400g of fruits and vegetables, excluding potatoes (WHO, 2004). Fruits and vegetables contain lots of vitamins and minerals and serve as important sources of nutrients. Diets rich in them are central in the prevention or reduction of the risk of several diseases including cardiovascular diseases and cancer (Block, Patterson & Subar, 1992). In addition, most fruits and vegetables do not have much energy density and may therefore contribute to maintaining a good body weight compared to other foods (Pesa & Turner, 2001).

Children need adequate vitamins and minerals to develop both physically and mentally. These needs include calcium and vitamin D from dairy products, protein from meat products for building muscles, vitamin C from fruits for a strong immune system, and vitamin B for a healthy nervous system, good digestion and the production of blood (Williams, Bollella, & Wynder, 1995). Healthy diet during childhood that includes fruits and vegetables prevents immediate health problems, such as iron deficiency, anaemia, obesity, eating disorders and dental caries. Healthy diet may also prevent long-term health problems, such as coronary heart disease, cancer, stroke, hypertension and

osteoporosis (Centres for disease control and prevention, 1997; Miles & Eid, 1997; Williams, Bollella, & Wynder, 1995). Patterns of nutrition developed during childhood may persist into adulthood and may influence the present and future health of the child (Engeland, Bjorge, Tverdal & Sogaard, 2003; Kelder, Perry, Klepp, & Lytle, 1994; Patrick et al., 2001). It is increasingly recognised that individuals can make significant contributions to their own health and well-being through the adoption of particular health enhancing behaviours (see Conner & Norman, 1995).

Fruits and vegetables consumption among children usually do not meet national recommendations. In the US, only one in five children consumes five or more servings of fruit and vegetables per day (Krebs-Smith, et al., 1996). In a study by Mokdad, Bowman, Ford, Vinicor, Marks & Kaplan (2001) less than 25% of adults in the US were consuming the recommended goal of 5 servings per day of fruits and vegetables and the mean consumption rate was between 1.5 – 2.5 servings per day. In a Norwegian study by Yngve, et al. (2005), 19.2% of girls and 15.8% of boys reported that they consume the recommended amount of 400g of fruits and vegetables per day. There is thus the need to improve healthy eating among children.

Demographic factors such as gender and age have been observed to be associated with fruits and vegetables consumption. Johansson, Solvoll, Bjorneboe, Aa and Drevon (1998) observed that girls were more likely to

consume fruits and vegetables than boys. Lien Lytle and Klepp (2001) also found differences between various age groups concerning the consumption of these two food groups with consumption decreasing with age. Roos, Lahelma, Virtanen Prattala and Pietinen (1998) found that women's food behaviour was more in accordance with dietary guidelines than that of men. Because of the significant influence of age and gender on the consumption of fruits and vegetables, there is the need to further investigate their effect to better evaluate the inclusion of these factors in intervention programmes.

Considering the role played by fruits and vegetables in diet, it is important that children are encouraged by significant others around them to consume more of these essentials. However, parents and other significant people in the life of children face the challenge of getting children to eat the recommended amount of fruits and vegetables. There is therefore the need to examine influential ways parents and others may use to improve the consumption of fruits and vegetables among children.

Previous studies suggest that, a child's development is usually influenced by the family structure and psychosocial environment. These factors related to the family represent the cultural and psychosocial contexts in which the children live (Rodrigo & Palacios, 1998). The various aspects of family structure and psychosocial environment such as parenting style, parental support and parental bonding may be quite influential on the health behaviour of children.

The influence of parents and family environment on children is suggested to be important and stronger than the influence of peers and others with respect to health behaviours (Helsen Vollebergh & Meeus, 2000). Food consumption patterns and health behaviour of children tend to be strongly predicted by factors related to the family (Witcher, 1997).

Parents are known to shape their children's eating habits in a variety of ways. According to Birch and Fisher (1998), these ways are usually through the choice of an infant feeding method, the foods parents make available and accessible, direct modelling influences, the extent of media exposure in the home, or the way parents interact with children in the eating context. Similarly, according to Nicklas, et al., (2001), parents and child care providers can influence children's eating practices through food modelling and food related parenting style.

Most parents believe that their feeding practices can exert a major influence on children's food preferences (Golberg, Gorn & Gibson, 1978), although previous research suggest that the influence is not necessarily in ways that parents intend (Borroughs & Terry, 1992). The ways in which parents attempt to shape children's eating habits toward desirable dietary outcomes may have unintended consequences for children's eating behaviour. Parents' practices may be especially controlling and may have negative effects on children's eating behaviour. The impacts of parents' own eating behaviour can be very

important. Parents who set a good example through their attitudes and behaviour are more likely to have a positive effect on their children (Jenvey, 2004). It is therefore important for parents to provide a balanced diet for their children at an early age as children tend to observe and imitate what their parents do. Any observation of overeating or under eating for example may be assumed to be the appropriate way to eat.

The influential role of the family on various types of behaviour has been the focus of several studies. The effect of factors such as parental support and family structure on eating behaviour was found to be significant (Birch & Fisher, 1998; Kierkus & Baer 2002). Other studies have also found a relationship between socio-economic status (and family affluence) and fruits and vegetables consumption (Laforge, Greene & Prachaska, 1994; Wardle, Cook, Gibson, Sapochmik & Lawson 2003).

Margen and Neuhauser (1996) looked at the effect of hunger and reported that hunger was associated with inadequate fruits and vegetables consumption. In other words, individuals who were more likely to suffer from hunger were less likely to consume fruits and vegetables.

Families differ in terms of parenting styles, parental support and family eating habits, among others. These factors may influence children's eating habits in general, and the eating of fruits and vegetables in particular. Even though

factors such as the school environment, food advertisements and peer influence have been found to exert some amount of pressure on children in terms of what they eat (Moore & Lutz, 2000). Factors related to the family may also be important. While several family factors have been studied in relation to the consumption of fruits and vegetables, few studies have examined the effect of factors such as parent's emotional support and parent's academic support. Examining the effect of these other family factors on the consumption of fruits and consumption is thus worthwhile.

2.4 Aim of the study

The aim of the study was to examine how family structure and other factors related to the family tend to influence consumption of fruits and vegetables among school children in Norway. To this effect, factors such as family structure, parents' academic support, family affluence, going hungry to bed and parents' emotional support were examined. Demographic factors such as age and gender were also examined.

CHAPTER TWO

2.0 THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 Theoretical framework

According to Creswell (2003), theories provide explanation for relationships between factors in research questions and hypotheses. In view of this it will be very relevant to look at some theories that could be used in explaining the consumption of fruits and vegetables. Evaluation research has demonstrated that theory-driven interventions are more effective than interventions based on other paradigms (Ciliska, et al., 2000). Ciliska et al (2000) suggest that people in public health position or people involved in nutrition interventions need to give priority to interventions that are theoretically based. In addition, Perry (1999) argues that for an intervention to be effective, it is necessary to target the factors that tend to predict behaviour. The identification of important predictive factors that have been verified through theory is therefore important to the development of health behaviour intervention programmes.

Several models have been suggested to explain health behaviour, such as the knowledge–attitude–practice model; social learning theory and health locus of control; the health belief model; the theory of reasoned action; and Bandura's social cognitive theory (Mæland & Aarø, 1993; Conner & Norman, 1995). According to Mæland and Aarø (1993), the most important determining factors for behaviour include social norms, personal expectations and environmental

reinforcements. Perry (1999) reports that theories of health behaviour serve as a framework for explaining why behaviour occurs. Other researchers are also of the view that models of individual health behaviour, such as Theory of Planned Behaviour (TPB) (Ajzen, 1991), the extended Attitude–Social Influence–Self-Efficacy model (ASE model) (Kok, Schaalma, DeVries, Parcel & Paulussen, 1996) and The Social Cognitive Theory (SCT) (Bandura, 1986) can serve as guides for survey on fruits and vegetables consumption, for example. This study employed The Social Cognitive Theory to examine the consumption of fruits and vegetables among children.

2.2 Social Cognitive Theory (SCT)

Bandura's (1986) Social Cognitive Theory (SCT) has been widely used in health behaviour research and can serve as a useful theoretical framework when investigating factors associated with fruits and vegetables consumption such as is addressed in this study. Social cognitive theory also addresses the socio-structural determinants of health as well as the personal determinants (Bandura, 1998). The theory favours the model of causation and explains behaviour in terms of triadic reciprocal causality of cognitive, affective and environmental factors (Bandura, 1989). These factors according to Bandura (1986) interact and influence each other in a bidirectional way. The theory further explains that these influences are not necessarily equal in strength but that some may be stronger than some and may not occur at the same time. It

may take more time for a causal factor to show its influence and elicit a reciprocal effect.

Bandura (1986) further mentions that people's thoughts, beliefs and feelings affect their behaviour thus human expectations, beliefs, emotions and cognition are developed and shaped by social influences that also send information and activate a reaction through modelling, instruction and social persuasion. The theory further explains that people are both products and producers of their environment.

The theory distinguishes between three environmental structures; the imposed, the selected and the constructive environments. With the imposed environment, the individual has little control over his surrounding. In contrast, the selected environment is the choice of associated activities by an individual. The constructive environment constitutes social environments and institutional systems people construct through their generative efforts (Bandura, 1999). According to Bandura (1999) all three components interact in a reciprocal manner. These components are the personal, behavioural and environmental factors. Social cognition, the main theme of the theory, is concerned with how individuals make sense of social situations (Conner & Norman, 1995). SCT postulates that behaviour, including dietary behaviour, is the result of environmental factors (such as easy access to fruit and vegetables or observation of significant others performing the behaviour) and personal

factors such as preferences or self-efficacy (Bandura, 1986; Baranowski et al, 1997; Kristal, Glanz, Tilley, & Li, 2000).

Concerning environmental factors, the family is suggested to be an important source of influence on children's diets (Birch & Fisher, 1998). Parents are normally responsible for the environment at home. In the examination of environmental influences of children's fruit and vegetable consumption, parents are found to influence their children's consumption through factors such as parents' own consumption (modelling) and accessibility of fruit and vegetable at home. In line with previous studies, the eating behaviour of children is usually a socializing behaviour where parents, other adults and siblings' eating behaviour tend to affect the development of children's preferences and eating behaviour (Birch & Fisher, 1998). The social context in which children's eating patterns develop is therefore important as children may imitate or model the eating behaviour of the people in that environment.

Models can have powerful effects on food eating habits especially when the model is similar to the observer, or is seen as particularly significant in the child's life (Birch, 1980). According to Bandura (1986), day caregivers could provide opportunities for expanding the availability and accessibility of fruits and vegetables and for fostering preferences for these food items through role modelling.

In a study involving third grade children in the United States, Reynolds et al. (1999) gathered data on five predictors including availability, modelling, nutrition education, motivation (self efficacy, outcome expectancies, food preferences) and knowledge to analyse a model which was based on the Social Cognitive Theory and on the literature in nutrition education. The concepts of SCT were found to be among the most influential factors.

In a study that also involved children in the US, Perry, *et al.* (2004) examined whether a cafeteria based intervention would increase fruits and vegetables consumption of elementary school children. Participants were randomly assigned to either an intervention or a control group. The theoretical background of the study was based on the Social Cognitive Theory (SCT) and a health behaviour planning model that emphasised changes in socio-environmental factors. The focus of Perry and colleagues' (Perry et al., 2004) study was on environmental factors which are known to be strong predictors of young people's behaviour and also in line with the author's argument, are appropriate targets for intervention. The main aim of the intervention study was to increase the opportunity to eat a variety of fruits and vegetables during school lunch as well as to institute school support for children to eat fruits and vegetables during lunch. The authors observed significant consumption differences between the 2 groups of up to 17% increased servings for the intervention group at lunch based on the theory.

An earlier study by Perry et al., (1998) entitled 5 a day Power Plus Intervention was guided by the social learning theory. This intervention, which was aimed at improving fruits and vegetable consumption among school children, had four components which were behavioural curricula in classrooms, parental involvement, school food service changes and industry support and involvement. In addition, psychological factors were measured through a parents' survey. Fruits consumption increased generally among the children and both fruits and vegetables consumption increased among girls. Understanding the determinants of the behaviour such as parents' emotional support, academic support among other family factors could help improve the consumption of fruits and vegetables.

2.2 Review of related Studies

Few studies have reported the reliability of family factors determining fruit and vegetable consumption among children. These include studies by Bimbaum, et al., (2002), Cullen, et al., (2001), and Domel, et al., (1996). In a study of environmental influences on dietary behaviour among children, Hearn, et al., (1998) examined the influence of several psychological, social, and demographic factors on consumption of fruits and vegetables. The authors noted that children's fruits and vegetables consumption was related to the availability and accessibility of these food items at home and school. In addition, fruits and vegetables preferences among children were significant

predictors of their consumption. Hearn et al. (1998) thus concluded that interventions that alter children's food preferences may be more effective than other strategies pursued to date. However, to do this, factors that tend to influence the formation of children's food preferences must be examined.

Neumark-Sztainer, Story, Resnick & Blum (1996) examined the relationship between family connectedness and the consumption of fruits and vegetables and found that the two factors were significantly related. The higher the family connectedness the higher family members' fruits and vegetables consumption was. In addition female respondents were more likely to consume these foods than their male counterparts. The age of the respondents was not significantly related to the consumption of fruits and vegetables with both young and old respondents showing similar consumption rate.

On parents' emotional support, Birch and Fisher (1998) reported that stringent parental controls may lead to preferences for some types of food and to the rejection of others. According to the authors, this can occur when well-intended, concerned parents assume that children need help in determining what, when, and how much to eat. The attempt to restrict and control children's eating habits and body weight to prevent obesity thus may produce the very problem parents are attempting to avoid as bad eating habits are rather developed. Hertzler (1983) noted that parents' feedback to children about eating vegetables is usually associated with children's preferences for

vegetables. The feedback received by the children from their parents influenced how much they ate. Birch and Fisher (1998) found that children's preferences for certain foods increased after the foods were used as rewards for performing a non-food-related task. These restricted foods are typically unhealthy foods that are high in sugar, fat and energy and that parents would like to see consumed in smaller amounts and on fewer occasions. Restricting children's access to foods actually may promote the over consumption of those foods (Birch & Fisher, 1995).

In a study by Bere and Klepp (2004), a significant amount of the variance in 6th and 7th graders' fruits and vegetables intake was explained by several factors related to preferences and accessibility to fruits and vegetables. In addition, children's fruits and vegetables intake correlated with parents' respective intake. Woodward, et al., (1996) also reported that 12 to 15-year-old pupils' preferences for particular fruits and vegetables (apple, orange, potato and tomato) were associated with their usage of those food items at home.

Previous studies suggest that parents provide the environment in which predisposition for food preferences are expressed (Birch & Fisher, 1998). The food environments parents provide tend to shape children's preferences and food acceptance patterns. Birch & Fisher (1998) argue that food acceptance patterns are mediated primarily by the patterns of preference that children have

developed through exposure. The early exposure that children have to fruits and vegetables and to foods high in energy, sugar, and fat may play an important role in establishing a hierarchy of food preferences and selection (Birch & Fisher, 1998). Thus, in spite of the significant influence of availability and accessibility, the social environment created by parents may also be important in food preferences and selection.

Also significant to the present study is the extent to which hunger may influence the consumption of fruits and vegetables, which tends to be unclear due to the way hunger has been defined and measured in some studies (e.g. as “the uneasy or painful sensation caused by a lack of food” and, next, as “the recurrent and involuntary lack of access to food” (Anderson, 1990). However, Margen and Neuhauser (1996) examined the relationship between hunger and frequency of fruits and vegetables consumption and found a significant relationship between the two where respondents who went hungry consumed less fruits and vegetables compared to those who did not go hungry.

Although, the social cognitive theory does not lay much emphasis on the effect of demographic factors such as age and gender, these factors are considered important determinants of health behaviours including fruits and vegetables consumption. Previous studies (e.g., Blaker, Solvoll & Lund-Larsen, 1988; Johansson, Solvoll, Bjorneboe, Aa & Drevon, 1998) suggest that dietary differences exist between Norwegian men and women between 16-79 yrs.

Similarly, Johansson and Andersen (1998) reported differences in intake of fruit and vegetables by gender. In their study, two nation-wide surveys were conducted among a random sample of 1,564 18-year-old students and 3,144 16-79-year-olds. The findings indicated that, consumption of fruits and vegetables was lower among men than women but increased with age in both genders. Moreover, in a study that involved several European countries, Klepp *et al* (2005) noted that the consumption of fruits and vegetables among girls was higher than among boys.

Lien, Lytle and Klepp (2001) undertook a study on the stability of eating behaviours during the transition from adolescence into early adulthood in a study that employed data from the Norwegian Longitudinal Cohort Study on Health Behaviours, Lifestyle and Self-reported Health of adolescents. At baseline, the study involved 885 14year old participants. At the end of the study when participants were 21 years old, their number had dropped to 521. The findings indicated that frequencies in the consumption of fruits tended to decrease as participants grew older. Specifically, the prevalence of consumption of fruits among boys dropped from 53% at age 14 to 20% at age 21. The trend was similar for girls as their daily consumption dropped from 59% at age 14 to 29% at age 21. Regarding eating of vegetables, daily consumption reduced by almost 50% from age 14 to 21 for both boys and girls. This finding is consistent with the findings reported by Lytle, Seifert, Greenstein and McGovern, (2000) who also found significant gender

differences in the frequency of fruits consumption. However, they found no gender difference for vegetables.

Neumark-Sztainer, Story, Resnick and Blum (1996) examined the prevalence of fruits and vegetables consumption among adolescents and the effect of several factors including several socio-demographic factors. Data from the Minnesota Adolescent Health Survey was used and involved 36,284 adolescents in grades 7-12. The results indicated that inadequate consumption of fruits and vegetables was common among the study population, supporting the findings of other studies mentioned earlier. Socio-economic status was found to be related to consumption of fruits and vegetables in that almost twice as many adolescents of low socio-economic group reported inadequate fruits and vegetables consumption compared to their counterparts in the high socio-economic group. This finding is consistent with findings of earlier studies (e.g., Laforge, Greene & Prochaska, 1994; Sweeting, Anderson & West, 1994). According to Neumark-Sztainer et al (1996), there is the need for interventions that have programmes targeting those in the highest risk group for inadequate consumption, particularly those from low socio-economic backgrounds. However, Laforge, Greene and Prochaska (1994) suggest that while socio-economic status may be related to the consumption of fruits and vegetables, differences in reported consumption of fruits and vegetables may be explained partly by several factors such as methodology and response rate, seasons of survey administration, regional differences and promotional campaigns.

2.3 Relevance of the study

Among children, eating habits are not yet established as in adults. This means that eating habits among children can be changed. In order to design effective interventions to increase the amount of vegetables and fruits consumed by children and adolescents, information concerning factors that tend to explain consumption patterns is needed. Such information is largely lacking from European population groups (Pérez-Rodrigo & Aranceta, 2001, Hung, et al, 2004). More research is therefore needed to systematically investigate the possible determinants of fruits and vegetables consumption among children. The present study is expected to contribute to a better understanding of family factors that tend to influence the consumption of fruits and vegetables among children in Norway, which could in turn inform intervention programmes.

2.4 Research questions

The following research questions are pursued in this thesis.

- To what extent does the consumption of fruits and vegetables among children vary with family structure?
- How is parental emotional support associated with children's consumption of fruits and vegetables?
- To what extent does parents' academic support have an influence on children's fruits and vegetables consumption?
- How is family affluence associated with the consumption of fruits and vegetables?
- Are children who go to school or bed hungry less likely to eat fruits and vegetables than their counterparts in a different condition?

2.5 Operational definition of terms

- **Children:** For the purpose of this study, the term 'children' stands for all human beings under the age of 18 years as defined by the Convention on the Right of the Child (UNICEF 1989).
- **Family structure:** This term denotes parenting arrangement in the child's primary household. That is whether the child is living with one parent, both parents or other adults.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Research design

The present study employed data from the 2001/2002 Health Behaviour in School-age Children (HBSC) Study. The HBSC study provides a numeric description of trends, attitudes and opinions of school-age children regarding several health behaviours. Although the 2001/2002 survey had a cross-sectional approach, the HBSC study is modelled to simulate a longitudinal study as similar data are collected again after a couple of years. There were three age cohorts of samples with a 2-year interval between each cohort. The study involved several countries, but for this thesis, the Norwegian data was used.

3.2 Population

The population for the 2001/2002 HBSC survey comprised school children with age cohorts 11, 13 and 15. In most European countries such as Norway, children in each cohort are likely to be in the same school class. However, this is not always the case. Thus in the present study, actual age (which ranged from 10 to 18) rather than class was used as the grouping variable. The population also included children from private and public schools. In the 2001/2002 HBSC survey, 95% of the eligible target population was assumed to be covered ensuring a reasonable national representation.

3.3 Sample size

Cluster sampling technique was used in selecting the sampling units, which were the school classes or the schools in the absence of a sampling frame of school classes. This administratively, is suggested to be more efficient than the simple random sampling (Hoshaw-Woodard, 2001; Kalton, 1983). The cluster sampling technique is more efficient because it allows overcoming the constraints of costs and time associated with a much dispersed population. The 2001/2002 Norwegian study sampled a total of 5023 respondents. The sample was made up of 2554 boys and 2469 girls. The age group distribution of these respondents was 1660 11year olds, 1739 13 year olds and 1624 15 year olds with mean ages of 11.5, 13.5 and 15.5 respectively (Curie et al 2004). Of the selected school classes, about 25% did not participate in the study. Reasons for non-response were mainly because a school did not want to participate or pupils were absent from school. The final sample size for the Norwegian data was 1500, a response rate of 75% out of an initial sample size of 2,000 15-year olds.

3.4 Data collection instrument

In the HBSC survey, an international standard questionnaire was used. This instrument was designed through the collaborative research network of HBSC members from the participating countries. The questionnaire was made up of

two main sections: a core section which comprised sets of questions on demographic, behavioural and psychological aspects of health and a second optional section, which included questions related to specific research questions. Countries were made to choose the optional packages that were of special interest to them. Questions or items used in the present study are presented in appendix C. To ensure reliability and validity across countries, the questionnaires were translated from English to the various languages and by different translators back to English. Further, pilot studies were conducted in all participating countries to assess whether questions were understood correctly.

3.5 Data collection procedure

The Norwegian data, used in this thesis, was collected in December 2001. The timing was strategic to be able to reach school children with mean ages of about 11.5, 13.5 and 15.5 due to the academic calendar and the intake of children in school. Administration of the questionnaire took place within the classroom, administrated by teachers and in some cases by research assistants. Both school and students were assured of anonymity of their responses. The data was treated confidentially and no one outside of the research staff had access to the respondents' questionnaires. International guideline and instructions for administration were followed.

3.6 Ethical concerns

Creswell (2003) argues that it is important for researchers to anticipate ethical issues that may arise during the process of a study. For this study, ethical approval in the various countries was obtained before data was collected. Participation was voluntary. The personnel involved in the fieldwork were fully trained and international guidelines were followed. The data was checked and cleaned and deviations from international standards were documented. When using existing data, ethical concerns are more important during statistical analyses, interpretation and reporting of findings (Bailan, 1977). Data was analysed as in the database and were not altered in anyway since altering any data will be a violation of ethical principles.

3.7 Measurement of variables

3.7.1 Fruits consumption

Fruits consumption was measured by using one item: 'how many times in a week do you eat fruits?' The responses were on a seven point scale (1) never, (2) less than once a week, (3) once a week, (4) 2-4 days a week, (5) 5-6 days a week, (6) once a day, every day, and (7) Every day, more than once

3.7.2 Vegetables consumption.

Like fruits consumption, consumption of vegetables was measured with one item, 'how many times in a week do you eat vegetables?' Responses to this

item were also given on a seven point scale (1) never, (2) less than once a week, (3) once a week, (4) 2-4 days a week, (5) 5-6 days a week, (6) once a day, every day, and (7) Every day, more than once.

3.7.3 Family structure

The variable family structure was a composite variable that was constructed from four items which assessed who lives with the child in the main home. The four items are as follows: Mother in main home; Father in main home; Stepmother in main home; and Stepfather in main home. A family structure variable was constructed with the following 3 main categories of responses - 1) Living with two parents including step-parents, 2) Living with one parent and 3) Not living with any of the parents.

3.7.4 Parents' emotional support

The following items were used to assess parents' emotional support: 'How easy is it for you to talk to the following persons about things that really bother you?' 'Father', and 'mother'. These items had a five point response scale which was (1) very easy, (2) easy, (3) difficult, (4) very difficult, and (5) do not have or see. Very easy and easy were recoded as (1) easy, while difficult and very difficult were recoded as (2) difficult. The category, do not know or see, was recoded as missing. For parents' emotional support, a three category

variable was constructed with the following labels: (1) easy to talk to both parents, (2) easy to talk to one parent and (3) difficult to talk to both parents.

3.7.5 Parents' academic support

Parents' academic support was measured as a composite variable using the following five items: (1) If I have a problem at school my parents are ready to help, (2) my parents are willing to come to my school to talk to teachers, (3) My parents encourage me to do well at school, (4) my parents are interested in what happens to me at school and (5) My parents are willing to help me with my homework. All five items had a five-point response scale ranging from (1) strongly agree to (5) strongly disagree. Responses were reverse coded before data analysis to establish positive relationships which are easier to explain. The five items had a Cronbach's alpha of .84 indicating adequate internal consistency.

3.7.6 Hungry to school or bed

“Going hungry to school or bed” was directly measured by a single item: Some young people go to school or to bed hungry because there is not enough food at home. How often does this happen to you? A four-point scale was used in rating the responses: (1) Always (2) Often (3) Sometimes (4) Never.

3.7.7 Family affluence

Family affluence was measured as a composite variable with four items taken from the Family Affluence Scale (FAS) (see Curie, Samdal & Boyce, 2001). The four items are as follows: Does your family own a car, van or truck? Responses were (1) *No*, (2) *Yes one*, and (3) *Yes two or more*; Do you have your own bedroom? Responses were (1) *No*, and (2) *Yes*; During the past 12 months how many times did you travel away on holidays with your family? Responses were (1) *Not at all*, (2) *Once*, (3) *Twice*, and (4) *More than twice*; How many computers does your family own? Responses were (1) *None*, (2) *One*, (3) *Two*, and (4) *More than two*. For data analysis, the items were recoded as follows: Family car (1=0) (2=1) (3=2). Own bedroom (1=0) (2=1). Holidays and Computers each recoded as (1=0) (2=1) (3, 4=2). The composite FAS score, which ranged from 0-7 was further recoded as follows: (1) '0, 1, 2, 3', (2) '4, 5' and (3) '6, 7'.

3.8 Data analyses

Data were first studied and subjected to descriptive analyses. The data was screened for outliers and missing data. There were missing responses to one or more variables for about 7% of respondents. Missing observations were handled with a pairwise deletion procedure. The two dependent variables, consumption of fruits and consumption of vegetables, were analysed

separately. In the descriptive analyses, means, standard deviations and ranges were analysed. The Cronbach's alpha was used to establish reliability in cases where variables were measured with groups of items. Pearson's product moment correlation was used to establish the relationships between the independent variables (i.e., family structure, parents' emotional support, parents' academic support, hungry to bed and family affluence) and the two dependent variables (i.e., consumption of fruits and consumption of vegetables).

Though the scale of the independent variables are ordinal in nature, parametric test was used on the bases of arguments put across by some researchers that parametric test can also be used with ordinal variables since the test apply to numbers and not what those numbers signify (Bryman & Cramer (1997). According to Bryman & Cramer (1997), these parametric tests are applied to determine the difference between scores, adding that we know what these scores indicate, but the test does not and therefore treats the data as interval or ratio scaling.

To examine the extent to which fruits and vegetables consumption are predicted by the independent variables, multiple regression analysis was run. This is because multiple regression analysis can establish the proportion of the variance in the dependent variable that is explained by a set of independent variables. It can also establish the predictive importance of the independent

variables (Allison, 1999; Kahane, 2001). Multiple regression analysis often has the problem of multicollinearity (a statistical occurrence in which two or more independent variables in a multiple regression model are highly correlated). The presence of multicollinearity in a multiple regression analysis can lead to inaccurate findings. Multicollinearity can be identified through correlation analyses (Cohen & Cohen, 1983). Thus, a correlation analysis was run for all the variables of interest before the regression analysis was run. The Statistical Package for Social Science (SPSS) version 14.0 was used in running the analyses.

CHAPTER FOUR

4.0 RESULTS

4.1 Consumption of fruits and vegetables

Looking at the frequency distribution in fruits and vegetable consumption in Fig 1, fruits appear to be consumed more frequently than vegetables. In particular, 2.3% of the respondents never consumed fruits while 4.1% never consumed vegetables; 9.6% consumed fruits less than once a week as compared to 10.3% for vegetables; 11.8% consumed fruits once a day everyday while 13.9% consumed vegetables once a day everyday. For those who consumed fruits and vegetables everyday more than once, the response was 16.3% and 7.6%, respectively. In table 2, with a minimum and a maximum value of 1 and 7, fruits consumption had a relatively higher mean ($mean = 4.5$, $SD = 1.62$) than vegetables consumption ($mean = 4.2$, $SD = 1.54$) and the t-test revealed that the mean difference was significant at $p < .001$. Thus, participants consumed more fruits than vegetables on the average.

4.2 Consumption of fruits by gender and age

In general, females appeared to consume fruits more frequently than males. About 3.6% of males never consumed fruits as against 1.1% of females. For the other frequencies, i.e., less than once a week, once a week, and 2-4 days a week, the frequencies for males were 12.3%, 13.9% and 30.5% respectively, while the corresponding frequencies for females were 7.4%, 10.5% and 28.2%.

The above frequencies were lower for females than for males. However, females tended to score higher on the 5-6 days a week, once a day everyday, and every day more than once categories of fruits consumption (i.e., 18.2%, 14.8% and 19.9% respectively). The corresponding frequencies for males were 16.1%, 9.7% and 13.9% (See table 1a). A chi square test revealed a significant difference between males and females concerning fruits consumption ($\chi^2 = 134.87$ df = 6, $p < .001$).

In addition, age was inversely related to fruits consumption in that younger respondents tended to consume more fruits. In results presented in tables 1a, 2.05% of the male respondents in the age group 10 – 12 years reported they never consumed fruits while the proportions for age groups 13 – 14 and 15 – 18 years were 3.44% and 5.46%, respectively; 10.72%, 11.70% and 14.97% of the age groups 10-12, 13-14 and 15-18, respectively, consumed fruits less than once a week. For once a week consumption of fruits, the corresponding figures were 10.60%, 13.42% and 18.02%. The trend, however, was reversed for the higher frequencies of fruits consumption. For boys that consumed fruits once a day everyday, 10.95% were within the age group 10-12, 10.55% were with 13-14 and 7.23% were within age group 15-18. Similar trends emerged for consumption of fruits everyday more than once, with results of 17.10%, 13.07% and 11.17% for age groups 10-12, 13-14 and 15-18, respectively, for boys.

For girls, 0.51% in the age group 10 – 12 years reported they never consumed fruits while the proportions for age groups 13 – 14 and 15 – 18 years were 1.05% and 1.73%, respectively; 5.71%, 6.89% and 9.49% of the age groups 10-12, 13-14 and 15-18, respectively, consumed fruits less than once a week. For once a week consumption of fruits, the corresponding figures were 7.74%, 10.51% and 13.07%. The trend, however, was reversed for the higher frequencies of fruits consumption. For girls that consumed fruits once a day everyday 15.61% were within the age group 10-12, 15.89% were with 13-14 and 12.82% were within age group 15-18. A similar trend emerged for consumption of fruits everyday more than once, with results of 24.87%, 18.11% and 17.02% for age groups 10-12, 13-14 and 15-18, respectively. Results from a chi square analysis indicated an age difference in general, in fruit consumption with a chi square value of ($\chi^2=93.405$, $df = 12$, $p <.001$)

4.3. Descriptive analysis and correlation between consumption of fruits and predictors

In table 2, descriptive analysis and correlation between study variables are presented. For the correlation with family factors, fruits consumption and family structure was negatively correlated $r = -0.063$, $p < .01$ with children who lived with two parents eating more fruits than their counterparts who lived in different conditions. Similarly, parents' emotional support correlated significantly with fruits consumption $r = -0.096$, $p < .01$ Children who received high emotional support from parents tended to eat more fruits than those who

received less support. Fruits consumption and parental academic support was also related as respondents who received high academic support from parents tended to consume fruits more frequently than those who received low academic support from parents ($r = 0.145, p < .01$). The correlations of fruit consumption with family affluence and, going hungry to school or bed were $r = 0.060, p < .01$ and $r = -0.062, p < .01$, respectively (Table 2).

4.4 Predicting fruit consumption

From the correlation analysis, multicollinearity between study variables was ruled out as all correlation coefficients were by far less than 0.90. A correlation coefficient of 0.90 or greater could be an indication of possible multicollinearity (Kahene, 2001). The strongest correlation was between age and parents' emotional support ($r = 0.23$). Concerning the correlation between fruit consumption and the independent variables, gender had the strongest correlation with the former ($r = 0.158$).

To examine predictors of fruits consumption, a multiple regression analysis was run and the results are presented in table 3a. In model 1, gender and age of respondents were the only variables entered in the analysis. These variables explained only 4.2% of the variance in fruits consumption. In model 2, when family structure, parents' emotional support, parents' academic support, family affluence and going hungry to school or bed were added to the analysis, the explained variance increase to 6.3% (an increase of 2.1%). At a significant

level of $p < .05$, all the independent variables were significantly related to fruits consumption.

In Model 1, gender appeared to be more important than age in predicting fruit consumption because it had the highest beta weight ($\beta = .533$) while that of age was $\beta = -.250$. In Model 2, gender remained the strongest predictor ($\beta = .517$) followed by age with $\beta = -.229$. Among family factors, family structure was the strongest predictor of fruit consumption, with a beta weight of $\beta = -.118$ followed by parent's academic support with a beta weight of $\beta = .103$. Family affluence was least related to fruit consumption ($\beta = .055$). More specifically, females, respondents who received high academic support from parents and those who reported high family affluence were more likely to eat fruits frequently. In addition, older respondents, respondents who experienced low emotional support from parents, respondents who were not living with both parents and those who went hungry to school or to bed were less likely to eat fruits.

4.5. Consumption of vegetables by gender and age

Like fruit consumption, females appeared to consume vegetables more frequently than males. About 5.7% of the male respondents never consumed vegetables as against only 2.6% for females. For the other frequencies – less than once a week, once a week and 2-4 days a week, the proportions for males

were 12.2%, 15.1% and 30.9% respectively, while the proportions for females were 9.0%, 13.8% and 30.2% respectively. Females had lower proportions for these frequencies than males. In contrast, with the higher frequency levels, the proportions for females were higher than the proportions for males (see table 1b). Further analysis revealed gender difference in vegetable consumption with a chi square value of ($\chi^2=61.635$, $df = 6$, $p < .001$).

In table 1b, younger children tended to consume vegetables more frequently than older children. For male respondents, 4.37% in the age group 10 – 12 years reported they never consumed vegetables while the proportions for age groups 13 – 14 and 15 – 18 years were 6.34% and 6.36% respectively. For once a week consumption of vegetables, the corresponding figures were 13.68%, 15.55% and 16.03%. The trend, however, was reversed for the higher frequencies of vegetable consumption. For boys that consumed vegetables once a day everyday, 12.87% were within the age group 10-12, 12.90% were with 13-14 and 11.83% of them were within age group 15-18. A similar trend emerged for consumption of vegetables everyday more than once, with results of 9.31%, 6.80% and 4.58% for age groups 10-12, 13-14 and 15-18, respectively.

For female respondents, 2.42% in the age group 10 – 12 years reported they never consumed vegetables while the proportions for age groups 13 – 14 and 15 – 18 years were 2.80% and 2.84%, respectively; 7.26%, 8.29% and 11.47%

of the age groups 10-12, 13-14 and 15-18, respectively, consumed vegetables less than once a week. The trend, however, was reversed for the higher frequencies of vegetables consumption. For the girls that consumed vegetables once a day everyday, 18.09% were within the age group 10-12, 16.12% were with 13-14 and 14.18% were within age group 15-18. A similar trend emerged for consumption of vegetables everyday more than once, with results of 12.48%, 8.29% and 5.48% for age groups 10-12, 13-14 and 15-18, respectively for girls. Chi square analysis revealed a significant age difference in general, in vegetable consumption ($\chi^2=60.703$ df=12, $p < 0.01$).

4.6. Descriptive analysis and correlation between consumption of vegetables and predictors

A correlation analysis between vegetable consumption and the independent variables in table 2 revealed a relationship between family structure and vegetables consumption ($r = -0.035$, $p < 0.01$) but this association was no longer significant in the regression analysis. Like fruit consumption, children who received high emotional support from parents consumed vegetables more frequently than those who received low emotional support from parents ($r = -0.102$, $p < .01$). Similarly, children who received high academic support from parents consumed vegetables more frequently than those who did not receive such support ($r = 0.175$, $p < 0.01$).

Family affluence and vegetables consumption were significantly related, with the more affluent consuming vegetables more frequently than the less affluent ($r = 0.079$, $p < 0.01$). Regarding the hunger variable, respondents who never went to school or bed hungry consumed vegetables more frequently than those who went to bed hungry ($r = -0.053$, $p < 0.01$).

4.7 Predicting vegetable consumption

In model 1 of table 3b, when only age and gender were entered as independent variables, the explained variance (r^2) was 2%. Gender appeared to be more important than age in predicting vegetable consumption with an associated beta weight of 0.330 as compared to -0.168 for age. In addition to age and gender, the consumption of vegetables was predicted by several family factors such as parents' emotional support and parents' academic support (see table 3b, model 2). Family structure was however, not significantly related to vegetable consumption in the regression analysis when other variables were accounted for ($\beta = -0.050$, $p = 0.203$).

The explained variance increased to 5% in model 2 when family factors were included as independent variables. Parents' academic support had a beta weight of 0.272 , $p = 0.006$, while parents' emotional support and family affluence had beta weights of -0.096 and 0.059 , respectively, all at $p < .001$. Going hungry to school or bed had a beta weight of 0.061 , $p < .05$. Thus female participants, children who received high academic support from parents and

children from affluent families were more likely to eat vegetables frequently. The age of respondents, parents' emotional support and going hungry to school or bed were also associated with the outcome.

CHAPTER FIVE

5.0 DISCUSSION

5.1 Summary of results.

The aim of the thesis was to examine the relationship between family factors and the consumption of fruits and vegetables among school children. The associations with age and gender were also examined. The findings indicated that majority of Norwegian children were not eating the recommended amount of fruits and vegetables. This finding is consistent with earlier findings in Norway (Bere & Klepp, 2004) and the US (Krebs-Smith, Cook, Subar, Cleveland, Friday & Kahle, 1996; Mokdad et al, 2001; Domel et al., 1994). The importance of fruits and vegetables consumption has been made known in previous studies (Block et al., 1992; Centre for disease control and Prevention, 1997; Williams, Bollella & Wynder, 1995). With regards to the findings of the present study, much needs to be done to help increase the consumption of fruits and vegetables.

5.2 Fruits consumption by gender and age

Gender was significantly related to fruit consumption. Specifically, girls consumed fruits more frequently than boys. This finding is consistent with that of Klepp et al (2005). Other earlier research has also observed similar differences between genders (Blaker *et al.*, 1988; Johansson et al., 1998) although the above earlier studies involved participants that were quite older.

Other studies (e.g., Reynolds, Baranowski, Bishop, Farris, Binkley, Nicklas & Elmer, 1999) did not find any gender difference in fruit consumption. According to Laforge, Greene and Prochaska, (1994), these gender differences may be due to factors such as differences in methodology and response rates.

Earlier studies have shown a significant relationship between age and the consumption of fruits. Consistent with Lien, Lytle and Klepp (2001), consumption of fruits decreased significantly with age in the present study. Older children tended to eat fruits less frequently. This finding is quite interesting since one may argue that it should have been the reverse. This is because older children more than younger children are assumed to have acquired information on the benefits of consuming fruits and as a result should be more likely to increase their consumption. Other dietary behaviours such as the consumption of fast food and drinks and sweets that develop as the child grows older may have a negative influence on the consumption of fruits. Findings on the relationship between age and fruit consumption has been unclear. For example, Johansson and Andersen (1998) reported a positive association between age and fruit consumption. However, the above study involved adult participants while participants in the present study were children between the ages of 10 and 18.

5.3 Family factors and fruits consumption

Concerning the relationship between family structure and fruits consumption, children living with both parents were more likely to eat fruits than those either living with one parent or not living with any parent. Children not living with any of their parents consumed the least amount of fruits. According to Conner and Norman (1995), several factors including environmental factors, influence children's dietary behaviour. Family structure, as an environmental factor may thus play a role in children's dietary habits including the consumption of fruits.

In the present study, children who found it easy to talk to both parents were more likely to consume fruits than those who found it easy to talk to only one parent, or difficult to talk to both parents. Thus, parents' emotional support may enhance or promote the consumption of fruits among children. This is in line with the findings of Neumark-Sztainer, Story, Resnick and Blum (1996), who argued that low family connectedness is significantly associated with inadequate fruit consumption among children. In other words, the more a family is connected, the more fruits are consumed by children. Thus when a child experiences a good parental emotional support, such affection may promote healthy behaviours such as the consumption of fruits. However, future studies on how parents' emotional support may impact fruit consumption are needed as findings from previous studies on this relationship are unclear.

The findings of the present study indicated that parents' academic support was significantly associated with fruit consumption among children. Thus, children who received high academic support from parents tended to consume fruits more often. Though family connectedness might express the parent's emotional support. Family connectedness may as well indicate how much parental academic support a child might get. A very connected family may provide more academic support and support during important choices that child will make as well. These choices include dietary choices for example the consumption of fruits that are healthy for growth as well as in the prevention of diseases which leads to a healthier life. Involving parents in school interventional programmes that address children healthy eating habits might prove to be beneficial and significant (Perry, et al 1998).

In line with the study by Wardle, Cook, Gibson, Sapochmik, Shieham and Lawson (2003), going hungry to school or bed was significantly related to the consumption of fruits in the present study in that children who went hungry to school or to bed tended also to eat fruits less frequently. Going hungry to school or to bed may be due to several reasons, which need to be looked at. Examining the root cause of this problem might put nutrition experts in a better position to decide which intervention method would be appropriate to address the problem and its relationship with fruit consumption.

Family affluence was significantly related to fruit consumption with children coming from more affluent families consuming fruits more frequently than children from less affluent families. This finding is consistent with findings of previous studies (e.g. Laforge, Greene & Prochaska, 1994; Sweeting, Anderson & West, 1994; Neumark-Sztainer et al., 1996), where a significant relationship between socio-economic status and fruit consumption has been shown. What then links affluence to consumption of fruits? Is it an issue of availability? Some may argue that the more affluent a parent is, the more he or she stands a better chance of providing more fruits for his or her family; availability thus may lead to increased consumption. It may also be worth arguing that more affluent families also stand a chance of being exposed to all other dietary choices which are both healthy and unhealthy. The association between family affluence and fruit consumption may also be due to food insecurity in less affluent homes as pointed out by Wardle, Cook, Gibson, Sapochmik, Shieham and Lawson (2003).

5.4 Vegetable consumption by gender and age

Gender was significantly related to consumption of vegetables. Girls were more likely to consume vegetables than boys, a finding that was also observed for fruit consumption. Like fruit consumption, findings from previous studies on the association between gender and vegetable consumption have been mixed. While some studies (e.g. Klepp et al 2005; Blaker *et al.*,1988;

Johansson et al.,1998) have reported similar findings as in the present thesis, others have found the contrary (e.g., Reynolds et al., 1999), that is no difference was found between males and females in the consumption of vegetables.

Age appeared to be a determining factor for the consumption of vegetables. Similar to the findings on fruits consumption, there was a negative relationship between age and vegetable consumption in the present study. Specifically, older children were less likely to eat vegetables. This observation is in line with that of Lien, Lytle, and Klepp (2001). However, it is contrary to the findings of other studies (e.g. Johansson & Andersen, 1998) that indicated that vegetable consumption increased with age. It is worth noting that the differences in these findings may be due to the different ages of the participants involved in the various studies. While Johansson and Andersen's (1998) study involved adult participants, Lien, Lytle and Klepp (2001) study and the present study involved adolescents.

5.5 Family factors and vegetable consumption

Among family factors that were used to predict vegetable consumption, family structure was the only factor that was not significantly associated with the outcome. While children who lived with both parents tended to consume more fruits than those living under different conditions, this difference was not found for vegetable consumption. It would seem that vegetables, rather than

fruits are equally consumed by children irrespective of the family structure they belong to. As research on the effect of family structure has been limited, future research addressing this issue is needed to be able to draw more valid conclusions.

Parents' emotional support showed a similar relationship with vegetables consumption as it did with fruits consumption. Children who found it easy to talk to both parents were more likely to consume vegetables than those who found it difficult to talk to one or both parents. This finding is consistent with that of Neumark-Sztainer, Story, Resnick and Blum (1996). Parents' emotional support may thus play an important role in the choices children make including dietary choices. According to Birch and Fisher (1998), the family is an important source of influence on children's diet. Intervention programmes aimed at improving healthy diets among children may be more successful if the parental emotional support is taken into consideration.

Children who received high academic support from parents tended to consume more vegetables than those who did not have much academic support from parents. This finding elaborates the significant effect of parental support in many aspects of the child's life as Bandura's (1986) Social Cognitive Theory portrays through the role of significant others. The relationship between personal factors and environmental factors (such as parental support) is

significant to behaviour. Environmental and personal factors have been found to impact the consumption of fruits and vegetables (Bere & Klepp, 2004).

A significant relationship was observed between children going hungry to school or bed and vegetable consumption. This finding is consistent with other research (e.g. Wardle et. al., 2003). Children who went to school or bed hungry were less likely to eat vegetables, an association that was also found for fruit consumption. The above association has been linked to the general accessibility or inaccessibility to food (Bere & Klepp, 2004; Woodward et. al., 1996). This reason of accessibility could be examined to better address the problem of going hungry to school or bed and consequently improve the consumption of vegetables.

Family affluence was also significantly associated with vegetables consumption among children. This observation has been supported by previous studies such as Laforge et al (1994), Sweeting et al (1994) and Neumark-Sztainer et al (1996). In the present study, the more affluent the child's family was, the higher the level of vegetable consumption. The relationship between family affluence and vegetable consumption may be mediated by availability of vegetables, which could be an important determinant of vegetable consumption. Interventional programmes aimed at improving healthy behaviour in children may be beneficial if they involve the family especially, parents in the programmes (Perry et. al., 2004).

5.6 Limitation

The use of already existing data in itself is a limitation since there was no way to have control over the collection of data. However, the HBSC study used an international highly developed questionnaire and appropriate guidelines and rules for developing questionnaires were strictly followed. The use of cluster sampling procedure in the selection of study participants may mean that responses of participants cannot be considered as independent since pupils within a school class or school can be similar to each other in their responses compared to other pupils in other school classes or schools. This may affect the findings to a degree. However, because most of the factors examined in the present study were family factors, which tend to vary most at the pupil level rather than at the school level, the effect of the cluster sampling on the findings may be minimal.

Also, some terms used in the research were not clearly defined. For example it is difficult to say whether vegetables in this survey included potatoes or not. In addition, the cross sectional nature of this study means that caution is needed when drawing causal inferences from the findings.

5.7 CONCLUSION AND IMPLICATIONS FOR FUTURE RESEARCH AND PRACTICE

5.7.1 Conclusion

Fruits and vegetable consumption have been the focus of many studies, but the current study is among a few that have examined these particular family factors on the consumption of these food items. It was evident that children were not consuming the daily recommended amount of fruits and vegetables. The influence of factors such as family structure, parents' emotional support, parents' academic support, family affluence and going hungry to school or to bed as well as age and gender were examined. The above factors were found to be predictors of fruits and vegetables consumption. The relationship between family structure and the consumption of vegetables in regression analysis was however, not significant.

Findings from this study suggested that girls consumed more fruits than boys. It was also evident that older children tended to consume fruits less frequently. Children living with both parents consumed fruits more frequently than children living in other conditions. Children receiving high academic support from parents and those from more affluent families were also more likely to consume fruits frequently. Children, who went to school or to bed hungry, consumed fruits less frequently. These findings have been supported by previous studies.

Like fruit consumption, vegetable consumption was negatively associated with age. In addition, girls tended to consume vegetables more than boys. Children from more affluent families and those who received high academic support from parents were also likely to consume vegetables more frequently than their counterparts. Children going hungry to school or to bed consumed vegetables less frequently. Family structure was not significantly related to vegetable consumption.

In general, findings from the present study suggest that the factors examined were predictors of fruits and vegetables consumption as most of the associations were significant. The findings of the present study are consistent with findings of some previous studies but contrary to others.

5.7.2 Implications for future research and practice.

The family appears to have an important influence on the health behaviour of children as established in this study and it will thus be beneficial to incorporate the family in intervention programmes that address children's dietary habit such as fruit and vegetable consumption. Although family factors were significantly related to fruits and vegetable consumption, other factors not examined in the present study, such as accessibility and availability have been suggested to be more important as the former only explained 5% to 6% of the variance in the outcomes. Examining the interaction effect between family

factors and accessibilities and availability may reveal other ways in which family factors influence fruits and vegetable consumption among children. The search for other determinants besides those mentioned above is essential. Future studies, especially those with longitudinal designs that would verify the associations examined in the present study are also needed

Furthermore, knowledge of the impact of age on fruits and vegetables consumption could help target the appropriate age groups with the appropriate intervention techniques. Focusing on the changing food behaviours in older children and laying emphasis on the importance of consuming fruits and vegetables to children may help improve consumption and its benefits.

Employing a qualitative procedure in the study of fruit and vegetable consumption to do an in-depth enquiry on possible predictors of these behaviours may be worthwhile. This is because qualitative studies may provide further explanations to associations derived from quantitative studies. Furthermore, using new theories in studying these relationships could serve as an interesting area of study. Exploring new theories in studies to help explain the relationship between family factors and fruits and vegetable consumption such as this study will help broaden the scope of research and could help explain these relationships better.

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APPENDIX A

LIST OF TABLES

Table 1a: Frequency distribution of Fruit Consumption by Age Group and Gender

<i>Age group</i>	<i>Never</i>	<i>Less than once a week</i>	<i>Once a week</i>	<i>2-4 days a week</i>	<i>5-6 days a week</i>	<i>Once a day, every day</i>	<i>Every day, more than once</i>	<i>total</i>	<i>n</i>	<i>χ²</i>	<i>df</i>	<i>sig. (2-sided)</i>
	%	%	%	%	%	%	%					
Boys 10 -12	2.05	10.72	10.60	29.99	18.59	10.95	17.10	100.00	877	134.865*	6	.000
13 - 14	3.44	11.70	13.42	32.22	15.60	10.55	13.07	100.00	872			
15 - 18	5.46	14.97	18.02	29.06	14.09	7.23	11.17	100.00	788			
TOTAL	3.59	12.38	13.87	30.47	16.16	9.66	13.87	100.00	2537			
Girls 10 -12	0.51	5.71	7.74	28.05	17.51	15.61	24.87	100.00	788			
13 - 14	1.05	6.89	10.51	28.74	18.81	15.89	18.11	100.00	856			
15 - 18	1.73	9.49	13.07	27.74	18.13	12.82	17.02	100.00	811			
TOTAL	1.10	7.37	10.47	28.19	18.17	14.79	19.92	100.00	2455			

Note: * Chi square value revealing significant difference between boys and girls in general; Chi square statistics for the age groups in general ($\chi^2 = 93.405$, $df = 12$, $p < .001$).

Table 1b. Frequency distribution of Vegetable consumption by Age Group and Gender

Age groups	<i>Never</i>	<i>Less than once a week</i>	<i>Once a week</i>	<i>2-4 days a week</i>	<i>5-6 days a week</i>	<i>Once a day, every day</i>	<i>Every day, more than once</i>	<i>total</i>	χ^2	df	sig. (2-sided)	
	%	%	%	%	%	%	%	n				
Boys												
10-12	4.37	12.76	13.68	29.89	17.13	12.87	9.31	100.00	870			
13 - 14	6.34	9.79	15.55	32.03	16.59	12.90	6.80	100.00	868			
15 - 18	6.36	14.38	16.03	30.92	15.90	11.83	4.58	100.00	786			
TOTAL	5.67	12.24	15.06	30.94	16.56	12.56	6.97	100.00	2524			
										61.635*	6	.000
Girls												
10-12	2.42	7.26	11.72	27.90	20.13	18.09	12.48	100.00	785			
13 - 14	2.80	8.29	15.54	30.37	18.57	16.12	8.29	100.00	856			
15 - 18	2.84	11.47	14.06	32.06	19.98	14.18	5.43	100.00	811			
TOTAL	2.69	9.01	13.83	30.14	19.54	16.11	8.69	100.00	2452			

Note: * Chi square value revealing significant difference between boys and girls in general; Chi square statistics for the age groups in general ($\chi^2 = 60.703$, $df = 12$, $p < .001$).

Table 2: Correlation Coefficients

Study variables	<i>Descriptive Statistics</i>			<i>Correlation Coefficients</i>								
	Range	Mean	S.D.	2	3	4	5	6	7	8	9	
1.Fruits consumption	1-7	4.528	1.618	0.551	0.158	-0.124	-0.063	-0.096	0.145	-0.062	0.060	
2.Vegetables consumption	1-7	4.217	1.535		0.104	-0.089	-0.035	-0.102	0.175	-0.053	0.079	
3.Gender	1-2	1.491	0.500			0.025	-0.015	0.094	0.033	-0.046	-0.024	
4.Age of respondents	10-18	12.979	1.629				0.024	0.232	-0.144	-0.058	0.026	
5.Family structure	1-3	1.191	0.425					0.098	-0.080	0.058	-0.106	
6.Parents' emotional	1-3	1.531	0.682						-0.298	0.014	-0.084	
7.Parents' academic	5-25	22.386	3.038							-0.103	0.114	
8.Hungry to school or bed	1-4	1.244	0.701								-0.047	
9.Family affluence	4-13	10.241	1.619								-	

****P < 0.01**

Table 3a: Summary of hierarchical regression analyses, by regressing fruit consumption

<i>STEP</i>	<i>Variables Entered</i>	<i>R²</i>	<i>Change Statistics</i>			<i>β</i>	<i>Sig. of β</i>
			<i>ΔF</i>	<i>df</i>	<i>Sig.</i>		
		.042	102.019	(2, 4685)	.000		
1	Gender					.533	.000
	Age*					-.250	.000
2		.063	21.643	(5,4680)	.000		
	Gender					.517	.000
	Age*					-.229	.000
	Family Structure					-.118	.000
	Parents' emotional support					-.079	.000
	Parents' academic support					.103	.037
	Family affluence					.055	.000
	Hungry to school or bed					.097	.004

Note: * Age was entered as a categorical variable – (1) 10 – 12, (2) 13 – 14, (3) 15 – 18

Table 3b: Summary of hierarchical regression analyses: predictors of vegetable consumption.

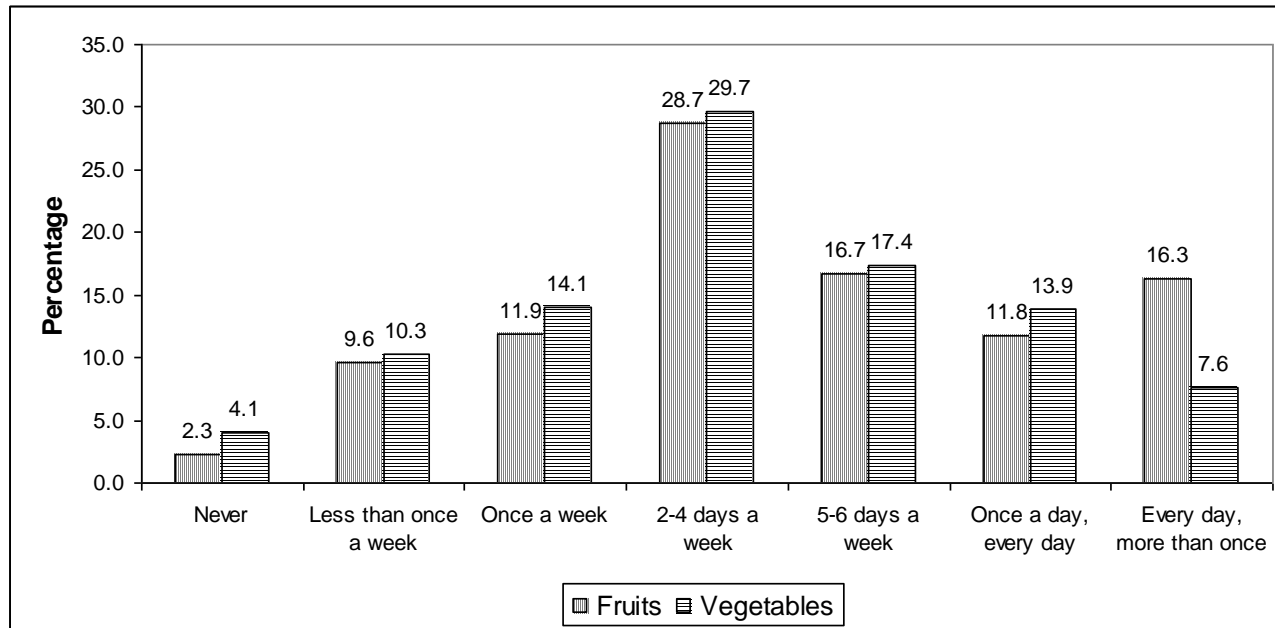
<i>STEP</i>	<i>Variables Entered</i>	<i>R²</i>	<i>Change Statistics</i>			<i>β</i>	<i>Sig. of β</i>
			<i>ΔF</i>	<i>df</i>	<i>Sig.</i>		
		.018	44.887	(2, 4672)	.000		
1	Gender					.330	.000
	Age*					-.168	.000
2		.050	30.276	(5,4667)	.000		
	Gender					.312	.000
	Age*					-.135	.000
	Family Structure					-.050	.203
	Parents' emotional support					-.096	.000
	Parents' academic support					.272	.006
	Family affluence					.059	.000
	Hungry to school or bed					.061	.050

Note: * Age was entered as a categorical variable – (1) 10 – 12, (2) 13 – 14, (3) 15 – 18

APPENDIX B

LIST OF FIGURES

Figure 1. Frequency distribution of Fruit and Vegetable consumption



APPENDIX C

QUESTIONNAIRE FROM THE HBSC (only questions used in this study are listed.)

1. Are you a boy or girl?

1. boy
 2. girl

3. What month were you born? _____

4. What year were you born? _____

12. How many times a week do you usually eat or drink ?

Please tick one box for each line

	1	2	3	4	5	6	7
	never	Less than once a week	Once a week	2-4 days a week	5-6 days a week	everyday	Everyday more than once
Fruits							
Vegetables							

33. Now we'd like to ask you about who you live with. Not everyone lives with both their parents. Sometimes people live with just one parent, sometimes they have two homes or two families. Please fill in column **A** for your **main or your only home**.

A

Please tick all the people who live here.

Adults:

- 1 Mother
 2 Father
 3 Stepmother (or father's girlfriend)
 4 Stepfather (or mother's boyfriend)
 5 Grandmother

- 6 Grandfather
- 7 I live in a foster home or children's' home
- 8 Someone or somewhere else: *please write it down*.....

Children:

Please say how many brothers and sisters live here (including half, step or foster brothers and sisters). Please write in the number or write 0 (zero) if there are none.

How many **brothers**? _____ How many **sisters**? _____

M34. Do you stay here.....

- 1 All the time
- 2 Most of the time
- 3 Half the time
- 4 Sometimes

35. How easy is it for you to talk to the following persons about things that really bother you? Please tick one box for each line

	1	2	3	4	5
	Very easy	Easy	Difficult	Very difficult	Don't have or see these persons
1.Father					
2. Stepfather (or mother's boyfriend)					
3.Mother					
4.Stepmother (or father's girlfriend)					
5.Elder brothers					
6.Elder sisters					
7.Best friend					
8.Friends of the same sex					
9.Friends of the opposite sex					

Does your family own a car, van or truck?

- 1 No
- 2 Yes, one
- 3 Yes, two or more

49. Do you have your own bedroom for yourself?

- 1 No
- 2 Yes

50. During the past 12 months, how many times did you travel away on holiday (vacation) with your family?

- 1 Not at all
- 2 Once
- 3 Twice
- 4 More than twice

51. How many computers does your family own?

- 1 None
- 2 One
- 3 Two
- 4 More than two

53. Some young people go to school or to bed hungry because there is not enough food at home. How often does this happen to you?

- 1 Always
- 2 Often
- 3 Sometimes
- 4 Never

School-related parental support

Sc 1.3. Please show how much you agree or disagree with the following statements.

	1	2	3	4	5
	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1) If I have a problem at school, my parents are ready to help					
2) My parents are willing to come to school to talk to teachers					
3) My parents encourage me to do well at school					
4) My parents are interested in what happens to me at school					
5) My parents are willing to help me with my home work					