

THE DEVELOPMENT, IMPLEMENTATION AND EVALUATION OF A
MULTI-COMPONENT NUTRITION EDUCATION INTERVENTION TO
PROMOTE HEALTHY EATING AMONG TWO LEBANESE
ADOLESCENT SAMPLES FROM CONTRASTING SOCIOECONOMIC
STATUS

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Abstract

The aim of this study was to develop, implement and evaluate the effectiveness of a behavior based, theory driven multi-component nutrition education intervention promoting healthy eating among two (17 to 19 year old) Lebanese adolescent samples from contrasting socioeconomic statuses. The effects of the intervention were examined in a quasi-experimental control design trial among two hundred and nine adolescent males and females from Beirut, Lebanon: one hundred and ten belonged to a high socioeconomic status (HSES) population and ninety nine belonged to a low socioeconomic status (LSES) population of adolescents. There were four study groups: two intervention and two control. The intervention groups received twelve nutrition lessons, one hour each, involving class based teaching, print materials and activities delivered by a dietitian. Intervention Mapping protocol was applied and constructs from the Social Cognitive Theory were used for the development of the intervention. At baseline and after the intervention, food frequency questionnaires (FFQ) were administered and three 24-Hour Dietary Recalls were used to examine dietary practices and nutrient intakes while semi-structured interviews were conducted to gain insight to underlying determinants of food choice. Quantitative data were analyzed using Mann Whitney U Test and Chi-Square analysis. Post intervention, adolescents in both the HSES and LSES intervention groups showed a significant improvement ($p < 0.05$) in some dietary practices and nutrient intakes; however, the impact was higher in the HSES group. In both intervention groups, positive changes were observed in some personal determinants of food choice but none were noted for external factors. These results propose that the developed nutrition education intervention is a promising instrument to promote healthy eating among similar groups of Lebanese adolescents; however, further research is needed for interventions that specifically target LSES groups.

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Chapter 1: Research Context

1.1 Introduction

Nutrition plays an important part in building healthy bodies and maintaining a positive health status throughout different stages in the life cycle. There is a worldwide concession that there exists a link between poor nutrition and food choices on the one hand and decreased productivity, poor health and chronic illness on the other hand. The focus is especially on children and adolescents where statistics show that poor quality of diet along with decreased activity have been manifested by under-nutrition, micronutrient deficiency, overweight and obesity, and eating disorders; conditions which are shown to have an impact on some of the chronic diseases that appear in adulthood. Studies show that poor eating habits established early in life may transfer into adulthood; therefore, interventions aimed at encouraging healthy eating in children and adolescents through their designated school curriculum may constitute a stepping stone towards fulfilling the desired effect of promoting life-long health promotion and disease prevention later in life. In order to design effective interventions that address healthy eating in adolescents, the determinants of food choice need to be identified and matched with relevant intervention strategies grounded in a theoretical framework that may most likely produce positive changes in these mediators. The findings of research conducted in the USA and Europe have established that adolescents belonging to low socioeconomic groups have a less healthy diet than their high socioeconomic counterparts, yet relatively little research has focused on identifying healthy eating

determinants and the development and evaluation of interventions targeting that group specifically.

This dissertation examines the dietary practices, nutrient intake and determinants of food choice in two different socioeconomic status groups of Lebanese adolescents and uses these findings for the development of a theoretically-based intervention targeting the promotion of healthy eating in these adolescents. It reports on the development, implementation and evaluation of the intervention for each group.

1.2 Background

In Lebanon, life expectancy at birth is 66 years for men and 70 years for women, and infant (0-1 years) mortality is estimated at 28 deaths per 1000 infants. In comparison with statistics of other countries in the MENA (Middle East and North Africa) region (Turkey, Jordan, Syria, Saudi Arabia and Greece), Lebanon's health status indicators seem average. However, relative to countries with comparable levels of health expenditure (Argentina, France, Germany, Switzerland, and Canada), health outcomes are below average.

Major morbidity and mortality in Lebanon include low birth weight and perinatal mortality among infants, upper respiratory tract infection, diarrhoea, accidental injuries and behavioural problems among children. Among adolescents, major morbidity and mortality is attributed to accidental injury, drug and alcohol abuse, and mental health problems (World Bank, 2000); while among adults circulatory diseases, hypertension, cardiovascular disease, obesity, diabetes and

cancer are responsible for most mortality and morbidity (Baba and Adra, 1998; Nakkash et al., 2003; Salti, et al., 1997; Tabbara, 2001; World Bank, 2000).

In Lebanon, while there is little data available and/or accessible that links health to socioeconomic status, there is an estimation of the number of people living in poverty or the “working poor”. Its current population is estimated to be around 4.2 million. There is an estimated one million poor. This means that the poor make up 20 to 30 per cent of the population (*Lebanon*, 1996).

The absolute poverty line (defined in Lebanon as the income at which a family of five can support its basic needs of food, health, education, housing and clothing) was estimated at 618 (US Dollars) per month. The extreme poverty line (defined in Lebanon as the income level at which a family of 5 can meet only its food requirements) was estimated at 306 (US dollars) per month, in 1993. Considering these figures, 28 percent of Lebanese families are living under the poverty line while 7.25 percent of these are living below the extreme poverty line (*Lebanon*, 1996). Therefore, this implies that around one million Lebanese live in poverty while 250,000 of them live in extreme poverty. These statistics are for the year 1993 and may have changed today with the increase in living costs that Lebanon has witnessed since.

Poverty in Lebanon is characterized by a low educational level, discrimination against women, limited access to health care facilities, overcrowding and poor sanitation. Chronic and recurrent diseases are common, and the incidence of physical handicaps, mental retardation, or sickness related death is higher than

the national average because of the high health costs, negligence and lack of proper public awareness (Haddad, 1996).

In Lebanon, the majority of health services are curative in nature. Most of the country's hospitals belong to the private sector since the provision of health services by the government has witnessed a dramatic decline during the period of civil war (1975 to 2000), which took a toll on the financial capacities of the public sector. It is estimated that most of the Lebanese Ministry of Health's budget goes towards medical intervention by purchasing hospital-based services from the private sector.

The available statistics show that the overall expenditure on health (mostly curative) in 1997 was in the range of 1.5 billion US dollars, which represented 10 percent of the GDP. Public spending on medical health is increasing at a rate of several percentage points above real GDP growth. Therefore, a national strategy for health reform is needed; the cornerstone of which would be re-orientation of health expenditure towards more cost effective alternatives such as health promotion and prevention programs (Ammar et al., 1998).

In hope of achieving this, the Ministry of Health has sought the help of non-governmental organizations (NGOs) (through contractual agreement) for the establishment of a Public Health Centers network. Results from this collaboration are yet to be evaluated (Ammar et al., 1998).

A new Lebanese school curriculum (since 1995) has incorporated nutrition education (via integrating concepts and information about nutrition into taught material) starting from the elementary school and continuing until secondary school

(Grade 12). Nutrition is first introduced in elementary school (Grade 2, Grade 4 and Grade 5). It is incorporated in the curriculum under the subject matter “Man and Health”. At the intermediate level, nutrition is taught in Grades 7 and 9 within the “Life Sciences”. In secondary school, it is taught within the Biology curriculum in varying intensities; strongest in the Life Sciences major and weakest in the Economics major. For the Humanities and Economics sections, it is introduced in Grade 12, while for the General Sciences and Life Sciences sections, in Grade 11 (NCERD, 1995).

Therefore, students commencing first year university level study, at the freshman and sophomore levels, should have studied about nutrition, at some level, in school. The key questions are: (1) whether these adolescents have retained any of the nutritional concepts and information which have been incorporated into the school curriculum, (2) how this has affected healthy eating related determinants, and (3) how these have impacted on their daily life food choices.

1.3 Purpose of the Study

The aim of this study is to conduct a research project in Beirut, Lebanon that examines, by using interviews and a multi-component questionnaire specifically set up to suit the purpose of the research, the determinants of food choice, dietary practices and nutrient intake of the 17 to 19 year old adolescent population belonging to contrasting socioeconomic statuses. This will be carried out in order to fulfil two purposes; the first is to investigate the adequacy of the target groups’ diets, as compared to international dietary recommendations set by the World Health Organization (WHO), and identify problem nutrients.

International recommendations will be used since none have been developed for Lebanon. The second purpose is to generate data that may be of assistance in gaining insight into important determinant factors that may be affecting the selected group's food choice.

Based on the findings, a theory-based nutrition-related intervention will be developed and administered in an attempt to induce a positive change in the above nutrition related determinants and food choice.

An evaluation of any change in the above mentioned factors of the targeted groups after implementation of the intervention will also be conducted. Any differences between the findings from the different socioeconomic groups will also be examined.

1.4 Key Terms

In this study the term “high socioeconomic status adolescents” is used rather generally to distinguish those adolescents as a group studying at private educational institutions that require paying high tuition fees. Here in Lebanon HSU is among the universities with highest tuition fees. “Low socioeconomic status adolescents” refers, again generally, to those attending educational institutions that provide free education. DA is subsidized by board members and donations from charitable donations contributors.

1.5 Significance of the Study

Information on food consumption patterns in Lebanon is scant. Nutritional studies at the national level are lacking, and any available information on dietary habits and how they relate to health has been a result of targeted research that is sample specific. Available studies have shown a shift from the typical Lebanese diet, which is based on breads, cereals, fruits and vegetables, towards a more Westernized diet with an increase in fat, milk and animal protein, specially in the Lebanese young and adult population (Baba, 1998; Baba, 2000) . Consequently, diet related non-communicable diseases such as obesity, hypertension, coronary heart disease, diabetes and cancer are increasing in a fast manner due to change in dietary habits and lifestyle (Baba, 2000; Baba and Adra, 1998; Nakkash et al., 2003; Salti et al., 1997).

None of the Lebanese nutrition studies specifically targets adolescents (Baba, 1998; Baba, 2000). However, worldwide concern, nowadays, is directed towards the nutritional practices of children and adolescents, since good nutrition early in life is needed for optimal growth and development and can lead to healthy adulthood by decreasing the risk of certain nutrition-related health problems such as obesity, cardiovascular disease, cancer and osteoporosis (WHO, 2003).

This age group is given importance in international nutrition literature since adolescence marks a period of dramatic change at the physical, hormonal, cognitive and emotional levels in an individual's life. During this heightened period of growth, nutritional demands increase, thus creating special nutritional needs at the adolescent stage (Delisle, et al., n.d.; Spear, 2002; Story et al., 2002). Recently,

there is an emerging pattern of chronic diseases being manifested among the adolescent and young population especially in developing countries (Darnton-Hill et al., 2004; Schneider, 2000). This is reason for concern since evidence suggests that the development of risk factors that lead to many non-communicable diseases (NCD) are rooted in childhood and adolescence and carried on to adult life (Darnton-Hill et al., 2004; WHO, 2003).

Consequently, it seems necessary to examine childhood and adolescent nutritional patterns and intake in order to help identify possible risk factors for diseases later in life. It is also important to explore key influences on food choice in order to establish effective intervention components such as providing nutritional knowledge and helping in eating behaviour modification through nutrition education.

Furthermore, socioeconomic differences, among other factors, such as that exhibited in public versus private educational institutions, may be one of the risk factors for inadequate food intake patterns or unhealthful weight-control practices. Therefore, it is important to identify the relevant determinants of food choice for adolescents coming from different socioeconomic backgrounds in order to be able to develop interventions that focus on key areas significant for each group.

In the absence of similar research on Lebanese adolescents, a study which addresses nutrition in adolescence in Lebanon is much needed in an attempt to primarily identify where this group stands in comparison to the set international nutritional recommendations, and to identify what type of determinants need to be addressed in nutrition education interventions targeting these adolescents.

1.6 Scope of the Study

The study was conducted in Beirut, the capital of Lebanon. It targeted samples of 17 to 19 year old adolescent students undertaking first year university level education at two differing socioeconomic status institutions. The data was collected through questionnaires and semi-structured interviews administered to both the experimental and control groups.

1.7 Organization of the Dissertation

This thesis is divided into six chapters. Chapter one presents background information on the relationship between nutrition, adolescence and health. It puts forward the role of nutrition education intervention in promoting health and disease prevention. It also provides an overview of the Lebanese health sector and available nutrition education components in the curriculum. The purpose and the significance of the study are explained.

Chapter two presents the literature on nutrition transition and its effect on health, adolescent dietary practices and international nutrition recommendations and guidelines. It includes a review of the literature on determinants of food choice, health behaviour theories and strategies for developing effective nutrition education interventions with examples of those targeting children and adolescents that have elicited positive outcomes. Additionally, a conceptual framework emerging from the literature is linked with the research objectives.

Chapter three explains the research design and the model planning and theoretical underpinning used for the development, implementation and evaluation

of a nutrition education intervention targeting adolescents. Issues of validity and ethics are explored. Data collection methods and statistical analysis methods are explained.

Chapter four presents the collected data and organizes them with regards to the pre and post intervention phases, quantitative and qualitative nature and by theme.

Chapter five explains the data in light of the available literature. Emerging themes are presented particularly where differences with respect to socioeconomic status are noted. Limitations of the study are also discussed in this chapter.

Chapter six presents conclusions of the study as well as suggestions for further research.

Chapter 2: Literature Review

2.1 Introduction

This chapter creates a conceptual framework for understanding the relationship between health, nutrition and underlying factors that affect food choice and healthy eating. It provides a rationale for targeting adolescents in nutrition interventions. It also includes a critical review of literature about currently used health behaviour theories and health promotion planning models for developing interventions that may be effective in inducing a positive change in determinants of food choice and consequently dietary behaviour; in that it offers guidance for the development of the intervention included in my study.

The literature reviewed examines globalization and its world wide effects on changing nutrition practices, and consequently health. It also draws on available nutrition research conducted in various countries, in an attempt to examine the relationship between dietary practice and health and how it has evolved, and by doing so seeks to establish the importance of promoting healthy eating, particularly during adolescence since food choice and dietary habits during this time period may continue later on to adulthood, thus impacting health in the adult years.

Through examining the various nutrition recommendations in a number of countries, this literature review attempts to establish that, in general, these focus on similar issues and to convey that although there is an abundance of such information and guidelines, healthy eating recommendations are not necessarily being followed. By doing so, it therefore aims to show that factors other than

knowledge seem to play a role in influencing food choice and that these may be addressed through behaviour based nutrition education interventions. An overview of health promotion and health education is included in this review to help identify nutrition education as part of the whole picture of promoting health.

This literature review also aims at showing that in order to design effective nutrition education interventions, the determinants of food consumption and dietary behaviour patterns need to be identified, as well as suitable intervention strategies that can effectively change such mediators or determinants. It explores how these factors may differ with varying socioeconomic status where adolescents are concerned. Currently used health behaviour theories and health promotion planning models for developing interventions are described and critiqued.

Studies of recently conducted effective nutrition education interventions conducted in the school setting are included in this chapter in order to demonstrate that such interventions may prove successful in eliciting dietary change and that school may be an appropriate setting for administering them.

2.2 Globalization, Nutrition Transition and Health

2.2.1 Globalization

The term “Globalization” refers to an ongoing process of global integration; it has originated as a result of the industrial revolution that took place in the 19th Century in industrial countries (such as the UK). As a result of globalization, the nature of human interaction has been evolving and changes leading to global interdependence and integration with respect to politics, economics, society and

culture, environment and technology have been taking place (Tullao, 2002; Yach and Betcher, 1998).

Over the last decade, many countries worldwide have been experiencing globalization at an accelerated rate. While this, on the one hand, has a positive component in terms of economic processes and the development of global institutions, epidemiological studies of various populations globally have identified a negative impact of globalization, namely on the health and nutritional status of individuals (Tullao, 2002). This is intensified when the effect of industrialization, urbanization and economic development is coupled with it and becomes particularly apparent where developing countries and countries in transition are concerned (WHO, 2003; Yach and Betcher, 1998). It follows that with the improvement in food availability, standards of living and access to services and mechanization; there is an emerging phenomenon of un-healthy dietary habits and decrease in physical activity across all age groups (Uusitalo et al., 2002; WHO, 2003; WHO, 2004). Individuals, nowadays, have less time for preparation of healthy foods, are provided with a wide range of ready made meals that are high in fat and salt and low in fibre. Similarly, less time is available for exercise and physical activity; with the widespread of mechanization and computerization, sedentary lifestyles have become common. All these put together, formulate a combination of risk factors that are directly related to the increase in diet induced chronic diseases.

2.2.2 Nutrition Transition

Nutrition is the study of foods and the substances that they contain in relation to their action in the body and the effect they might have on health. Good nutrition is essential for survival, growth, development and performance and productivity. It is, therefore, one of the pre-requisites to health and well being (WHO, 2002). Adequate sources of energy and of essential nutrients are necessary for the maintenance of health throughout the life cycle. Among other factors, deficits of essential nutrients or energy sources can lead to certain health conditions (protein energy malnutrition, stunting, micronutrient deficiency, poor pregnancy outcomes etc.); in addition to that, excessive or inappropriate consumption of some nutrients may also lead to adverse health conditions (obesity, heart disease, diabetes etc.) (US Department of Health and Human Services, 1980).

Much of nutrition research in current years has been directed towards finding relationships between diet-the foods and drinks ingested-and non-communicable diseases associated with morbidity and mortality such as obesity, coronary heart disease, diabetes, stroke, some types of cancer and hypertension (Webb, 1995). By examining the link between diet and chronic diseases, researchers are continuously working to unveil information about changes in dietary practices that might lead to disease prevention and health promotion (USDA, 1998; Webb, 1995).

The industrial revolution which has been taking place over the last two centuries in most countries around the world has caused large shifts in the dietary, physical activity and nutritional status patterns of populations worldwide (Popkin, 2002; Swinburn et al., 2004; Uusitalo et al., 2002; WHO, 2002; WHO, 2003). Collectively, these changes are referred to as the nutrition or dietary transition which is defined by Schneider (2000) as “a basic dietary change brought about by an increase in the amount of or a change in the type of food produced, processed, stored, transported and otherwise made available to the population” (p. 955).

The nutrition transition has resulted in major shifts in diet composition and the convergence of dietary patterns worldwide towards high fat, high sugar, high salt, high energy density and low fibre intake; also known as the ‘Western diet’. Consequently, in many countries, ethnic and traditional foods are being replaced by Westernized fast foods, processed foods, soft drinks and increased animal product consumption (such as meat) (Swinburn et al., 2004, WHO, 2003, WHO, 2004).

In developing countries (such as North Africa and the Middle East), the availability of cheap vegetable fat and hence an increase in its consumption is also among the emerging factors leading to the nutrition transition exhibited. Therefore, although the dietary practices in industrialized countries have shifted towards an increase in animal fat consumption, vegetable fat is the cheaper alternative in developing countries- where income is lower (Drewnowski and Popkin, 1997; Uusitalo et al., 2002).

Of concern is the fact that the nutrition transition is taking place at an accelerated rate in developing countries and countries of transition (e.g. Brazil)

than was the case for developed countries; the dietary changes that took one or two centuries to become significantly noticeable in Western countries are happening within a period of several decades in the developing part of the world (Popkin, 2002; Uusitalo et al., 2002). This trend is leading to a twofold burden in developing poor countries where infectious diseases still prevail as causes of death and disease (WHO, 2004). Furthermore, in some countries, the globalization and urbanization phenomena have taken place in such a short period of time that the outcomes of under-nutrition such as stunting now co-exist with NCD such as obesity especially in the adolescent population (Schneider, 2000; Darnton-Hill et al., 2004).

The synergistic increase in urbanization complicates matters further since it leads to alteration in dietary preferences (Schneider, 2000; Darnton-Hill et al., 2004). With the transition from rural to city life, a transition towards easily prepared, processed and ready-made meals also arises. This leads to a shift towards high energy density, high fat and high sugar refined products. This is mainly due to the faster pace of city life and to the increase in female participation in the labour force leading to less time available for meal preparation and reliance on ready made convenient foods (Tullao, 2002; Uusitalo et al., 2002).

In the Arab Middle East region, changes in food consumption patterns may be characterized by a shift from traditional diets high in fruits, vegetables and complex carbohydrates towards those high in energy dense and sugar based foods, mainly in high socioeconomic status countries. Whereas, in low socioeconomic countries, diets are still characterized as being energy deficient with high dependence on cereals; however, of concern is the fact that in the large cities of

these poor countries, a dietary transition similar to that observed in the richer countries in the region has taken place (Musaiger, 2002).

In Lebanon, most nutrition research is based on clinical studies. Information on food consumption patterns is scant; however, several studies have shown a shift from the typical Lebanese diet, which is based on breads, cereals, fruits and vegetables, towards a more Westernized diet with an increase in fat, milk and animal protein, specially in the Lebanese young and adult population (Baba, 2000; Baba and Adra, 1998; Nakkash et al., 2003). Therefore, though these studies have not been conducted on a national level, the data provided suggests that a nutrition transition has taken place in Lebanon.

2.2.3 Health Consequences of Nutrition Transitions

Health consequences of the nutrition and dietary transitions in progress are manifested through the increasing rate of chronic diseases, also referred to as non-communicable diseases (NCD) that are emerging in countries worldwide. Unhealthy diets along with a decrease in physical activity are considered among the causal factors for chronic diseases; they play a major role as significant factors leading to morbidity and mortality globally (Popkin, 2002; Schneider, 2000; Uusitalo et al., 2002; WHO, 2003; Darnton-Hill et al., 2004).

Non-communicable diseases are currently the main causes of death and disability in the world. They are responsible for 59% of the 57 million deaths that occur annually and for 46% of the global burden of disease (WHO, 2004). Chronic diseases include coronary heart disease (CHD), diabetes, obesity, some types of cancer and bone and joint diseases. The aetiology of non-communicable diseases is

complicated and overlapping with some factors considered as risk factors to other diseases in the same category (e.g. obesity and diabetes can be risk factors for coronary heart disease). Most of the risk factors that have been associated with non-communicable diseases may be attributed to an unhealthy diet, such as blood cholesterol, hypertension, obesity, and high alcohol intake. These are all diet related and their effect can be prevented or decreased by changes in dietary practices and increased physical activity (Darnton-Hill et al., 2004; Tullao, 2002; WHO, 2003; WHO, 2004).

The prevalence of chronic diseases is rapidly increasing in the world thus posing an enormous public health burden. This becomes more pronounced in developing countries where the majority of the non-communicable caused deaths worldwide take place; in 1998, 77% of the total number of deaths attributed to non-communicable diseases world wide occurred in developing countries (Tullao, 2002; Uusitalo et al., 2002; WHO, 2003).

In the Middle East, historical and current data on population dietary patterns, activity and body composition is either very scarce or lacking which makes the assessment of various nutritional issues and nutrition transition difficult and makes the whole picture, in these countries, incomplete (Popkin, 2002). Previous studies conducted in Arab countries included one study that investigated emerging trends in dietary practices of the Egyptian population; it suggested that new trends include an increase in the consumption of fast food, sweets, candy and soft drinks thus indicating an occurring nutrition transition (Hassan-Wassef, 2004).

Nevertheless, available studies from different countries in the Middle East provide evidence of a rapid increase in non-communicable diseases such as obesity in Egypt, Morocco and Iran (Benjelloun, 2002; Galal, 2002; Ghasseimi et al., 2002). Studies by Galal (2002), Benjelloun (2002) and Ghasseimi et al. (2002) document obesity as a public health concern with emerging associated nutrition related non-communicable diseases (NR-NCD) such as diabetes and hypertension. Musaiger (2002) indicates that coronary heart disease is emerging as a major health problem in countries from the Arab Middle East region and supports this with data from countries such as Iraq, Jordan, Syria and those in the Gulf region. This draws attention to the fact that nutrition-related non-communicable diseases, which have long been the cause of death and disability in industrialized countries have now become so in developing countries as well (Alwan, 1997; Popkin, 2002).

Since epidemiological studies at a national level are lacking, only a few studies have been carried out in Lebanon concerning nutrition transition and the prevalence of NCD, and researchers gain insight to emerging trends through targeted research that is sample specific. Available research in Lebanon (Nakkash et al., 2003; Tabbara, 2001) indicates that despite the great toll of the civil war (1975-1990) on aspects of life, an epidemiological shift due to globalization has taken place. As a result non-communicable diseases have replaced infectious diseases as the primary cause of morbidity and mortality in Lebanon. High on the list of causes of death are circulatory diseases (60%) and cancer (15%) (Nakkash et al., 2003). Other highly prevalent non-communicable include hypertension, diabetes and obesity as the leading causes of morbidity in the country (Baba and

Adra, 1998; Nakkash et al., 2003; Salti et al., 1997). An additional documented risk factor to health in Lebanon is tobacco smoking where 44% of men and 24% of women are smokers (Nakkash et al., 2003; Salti, et al., 1997; Tabbara, 2001).

The study by Baba and Adra (1998) supported by WHO and the Lebanese Ministry of Health investigated the rate of obesity in Lebanon among both males and females across all ages. Their results showed a relatively high prevalence of obesity due to a change in dietary habits towards increased consumption of dietary fat. This can be a contributing factor to the increasing prevalence of diabetes as one of the leading public health problems in Lebanon (Salti et al., 1997). There is also indication of high prevalence of some types of cancer and coronary heart disease with an increase in its underlying risk factors such as hypertension and hypercholesterolemia (Nakkash et al., 2003; Tabarra, 2001).

2.3 Adolescent Dietary Patterns and Chronic Disease

WHO defines adolescence as the period extending between the ages of 10 and 19 years, and youth as the period between 15 and 24 years of age. Therefore, young people are those of ages 10 to 24 years. Although this age group has relatively low mortality rates, young people must be educated and empowered in order to help them make informed decisions concerning their present and future health (Dhillon and Phillip, 1994; Kemm and Close, 1995).

Adolescence is a vulnerable and complex phase of development in an individual's life. In addition to rapid biological changes, this period is also characterized by transitions at the cognitive and socio-cultural levels (Hoelscher et al., 2002; Lytle, 2002). During this interval in their life span, adolescents face new

discoveries and issues such as experimentation with drugs and alcohol, driving, violence and sexual activity. These various situations that adolescents experience during their transition to adulthood affect their health behaviour which includes eating habits and nutritional health (Floyd, 2003; Hoelscher et al., 2002; Lytle, 2002). It is also important to keep in mind that adolescence is a period of rapid growth in which there is a high demand for nutrients: 20% of total growth in height and 50% of adult weight gain occurs during this period; therefore, healthy eating during this time is essential for the prevention of several health concerns such as under-nutrition, micronutrient deficiency, overweight and obesity, and eating disorders (Neumark-Sztainer, 2002; Webb, 1995; WHO, 2002). Moreover, studies validate the positive impact of good nutrition on the potential learning ability of students, which is ultimately manifested in better school performance; an additional reason why healthy eating habits should be encouraged during that age period (ADA, 2003; Perez-Rodrigo and Arancita; 2001).

Recent surveys in the United States have identified that adolescents' diets are often inadequate if compared to national guidelines. A large portion of these adolescents consume a diet with excess amounts of fat, sugar and salt with a simultaneous less than recommended amount of fruits, vegetables, grains, calcium and iron (American Dietetic Association, 2003; American School Health Association, 1997; Hoelscher, 2002; Neumark-sztainer, 2002; Wilkinson-Enns et al., 2003).

Within the U.K., as well, there is evidence of inadequate dietary behaviour, a sign of which is the increase in the prevalence of children and adolescent obesity,

as well as, a threefold increase in adult obesity as compared to statistics from 1980 (Jebb et al., 2003; Sahota et al., 2001). Results from the National Diet and Nutrition Survey (NDNS) show that many of the UK population consume a diet poor in fruits, vegetables and oily fish resulting in an insufficient intake of several vitamins, minerals and omega-3 fatty acids as compared to the Recommended Dietary Allowance (RDA) in the UK. On the other hand, the NDNS results manifest that many people in the UK consume a high fat, high salt and low fibre diet due to their busy lifestyle which hinders the preparation of healthy meals. Of particular concern are young people aged 19 to 24; they seem to consume the least amount of fruits and vegetables daily (Reed Business Information Ltd., 2004).

Similar trends of poor nutrition and dietary practices have also been demonstrated for adolescents in other countries in Nordic, Middle and Northern Europe (Paulus et al., 2001; Samuelson, 2000). A Syrian study, investigating the dietary practices of Syrian children and adolescents residing in the capital Damascus and its suburbs elicited findings that suggest a low consumption of fruits and vegetables among the studied groups (Bashour, 2004).

Furthermore, differences in dietary patterns between low and high socioeconomic status (SES) groups of children and adolescents have been illustrated in studies from the USA, UK, Finland and the Netherlands such that adolescents belonging to low SES (LSES) groups exhibited a less favourable or less healthy diet than their peers who belong to higher SES (HSES) (Buttriss, 2000; Casey et al., 2001; Martens et al., 2006; Roos et al., 2004). This may indicate that

adolescents belonging to LSES groups may be at a higher risk of nutrition related disease than those from HSES groups.

Inadequate dietary patterns developed during childhood and adolescence may play a part as an increased risk for several adult chronic diseases (Hoelscher et al., 2002; Masui et al., 2002; Neumark-Sztainer et al., 2002; Reed Business Information Ltd, 2004). It is this growing awareness of the probable relationship between the diets of children and adolescents and adult-onset diseases that has brought about an increased interest in the dietary practices of young people. In addition to that, once established early in life, eating patterns tend to remain consistent throughout an individual's adult life, thus emphasizing the need for promotion of healthy eating practices at an early age (Auld et al., 1999; Blom-Hoffman and DuPaul, 2003; Rockett and Colditz, 1997).

Food choices and dietary habits are influenced by the different life stages that people pass through; therefore they undergo many changes from childhood to adulthood (Lake et al., 2004). Adolescence marks a period of dramatic change at the physical, hormonal, cognitive and emotional levels in an individual's life. During this heightened period of growth, nutritional demands increase, thus creating special nutritional needs at the adolescent stage (Delisle, et al., n.d.; Spear, 2002; Story et al, 2002). The nutrients that are of concern for this age group include: protein, minerals (mainly Iron and Calcium) and Vitamins (B-vitamins as well as vitamin D, A, C and E) (Delisle et al., n.d; Spear, 2002).

Although all minerals are needed in large quantities during adolescence, Calcium and Iron are two minerals that are often shown to be consumed in low

quantities (Delisle et al., n.d.). Calcium is needed in adolescence for the development of skeletal mass; however, low intake coupled with increased consumption of soft drinks contribute to lower availability of calcium in the adolescent girls' diets (Delisle et al., n.d.; Spear, 2002; Whitney and Rolfes, 2002; Worthington-Roberts and Williams, 2000).

Iron requirements also intensify in this period. They are greatest with the onset of sexual maturation in boys and the beginning of the menstrual cycle in girls. In addition, anemia may result in decreased growth and impaired immunity (Delisle et al., n.d.; Spear, 2002; Whitney and Rolfes, 2002; Worthington-Roberts and Williams, 2000).

As for vitamins, B vitamins are needed for energy release and tissue synthesis, vitamins A, C and E are required for new cell growth and vitamin D is required for skeletal growth, which are all heightened processes in adolescence (Spear, 2002; Whitney and Rolfes, 2002; Worthington-Roberts and Williams, 2000).

In addition to increased physical growth, the adolescent is considered nutritionally vulnerable due to two other factors as well: increased autonomy and busy schedules (whether due to work, study or socializing) which lead to changes in food patterns that can affect food intake and therefore nutrient needs (Spear, 2002; Whitney and Rolfes, 2002; WHO, 2003).

Dietary patterns of this age group are characterized by a decrease in intake of fruits, vegetables, milk, fruit juice (Story et al., 2002) and an increase in the consumption of soft drinks, fast foods, and in skipping meals (often breakfast

and/or lunch and girls more than boys). Since most meals are consumed away from home, adolescents mainly get their meals from vending machines, franchise restaurants, grocery stores or self service restaurants (Lake et al., 2004; Spears, 2002; Sjoberg et al., 2003; Whitney and Rolfes, 2002). Meals offered at these locations are usually characterized with a high fat content and with a low mineral and vitamin value.

As adolescent boys and girls move towards late adolescence, they tend to become less physically active, which if coupled with the previously mentioned dietary risk factors can increase prevalence of NCD in this age group and later on in adulthood (Spears, 2002; WHO, 2003). Similarly, a recent national Lebanese study by Hwalla et al (2005) on children and adolescents identified an increasing prevalence of overweight and obesity in the studied population associated mainly with decrease in physical activity.

Recently, there is an emerging pattern of chronic diseases being manifested among the adolescent and young population especially in developing countries (Darnton-Hill et al., 2004; Schneider, 2000). This is reason for concern since evidence suggests that the development of risk factors that lead to many NCD are rooted in childhood and adolescence and carried on to adult life (Darnton-Hill et al., 2004; WHO, 2003).

International trends in adolescent nutrition are not fully known since published research does not reflect the whole global picture accurately. The literature, particularly from developing countries such as the case in Lebanon, portrays mostly the work of individual researchers and not always governmental,

epidemiological population studies (Nakkash et al., 2003; Schneider, 2000). In general, the problems that are affecting adolescents as a result of the nutrition transition phenomenon include malnutrition, deficiency of minerals and vitamins and nutrition related chronic diseases such as obesity (Delisle et al., n.d.; Spear, 2002).

The increase in adolescent obesity is prevalent worldwide and has become of major concern (Delisle et al., n.d.; Schneider, 2000). As stated earlier, this is mainly attributed to the nutrition transition which led to a shift in nutritional practices towards a high fat, high sugar and high energy density diet and to a shift in activity patterns where a decrease in physical activity is prominent in this age group and is further aggravating the problem (Delisle et al., n.d.; Hwalla et al., 2005; Schneider, 2000; WHO, 2003).

The literature suggests that early nutrition has an effect on health later in life; however, it is becoming more and more difficult for adolescents to practice healthy eating with the increase in un-healthy snacks that are constantly being marketed to this portion of individuals (Darnton-Hill et al., 2004). Even though adolescents, through health and science education in schools, may have gained a sense of what to eat and what to avoid in order to remain in good health, they may face certain barriers (such as lack of time) that prevent them from putting their knowledge into practice. Having fun and outings with friends are often associated with junk food, whereas healthy food is usually associated with more mundane activities such as staying home and having meals with family (Shepherd et al, 2001; Spears, 2002; Darnton-Hill, 2004).

2.4 Healthy Eating and Dietary Guidelines

Healthy eating or healthy diet may be defined as achieving the right balance of different foods, which in turn means eating the right amounts and best combination of foods that contain specific nutrients, also referred to as healthy foods (Shepherd et al., 2001). McKeivith (2004) defines healthy diet as that which “is likely to include a wide variety of different foods (in appropriate quantities) so adequate intakes of all nutrients are achieved” (p. 51). The risk of chronic diseases may be decreased by healthy nutrition considerations and adopting healthy lifestyle habits such as exercise (Rimal et al., 2000). Following a healthy diet not only may reduce the risk of chronic diseases, but may also reduce the risk of overweight and obesity which are considered as predisposing risk factors to NCD (Shepherd et al., 2001).

Where children and adolescents are concerned, adequate nutrition is also important for their physical, psychological and mental health. Good nutrition is needed for the development of healthy bone and muscle, consumption of the right amounts of nutrients, maintenance of good dental health and promotion of cognitive development (Delisle et al., n.d.; Shepherd et al., 2001; Spear, 2002).

Over the years, there has been an increase in the availability of nutrition information, both through the private and public sectors, with the aim of promoting healthy eating (Rimal et al., 2000). Promotion of healthy eating is usually involved with activities that are designed to promote healthy dietary intake whether the intervention encompasses nutrition education or not (Shepherd et al., 2001).

Private sources of nutrition information usually include that which is provided by health professionals (doctors, nutritionists, nurses etc.), as well as information found on certain brands of foods which are provided by the manufacturers of certain products. As for the public information, this usually consists of the nutritional recommendations, dietary guidelines and food guide pictorial representations provided to the population (Rimal et al., 2000).

Advice concerning eating behaviour and food choices and preparation has existed for the past hundred years, if not more considering that which has been mentioned in philosophical and religious books. In the beginning of the twentieth century, nutrition has been recognized as a science on its own and recommendations have been based in relation to health and medical conditions. However, there has been a shift between the focus of nutrition in the early 20th Century, where it was mainly concerned with prevention of deficiencies, and nutrition in the late twentieth century up until today where the main focus is towards the prevention of chronic diseases and its primary risk factors such as obesity, hypertension etc. (Schneeman, 2003).

Nutritional recommendations are presented in the form of dietary guidelines and corresponding dietary pictorial representations that usually translate the advice into practical food choices. Several countries in Europe (UK, Germany, Finland, Ireland and Greece), North America (USA and Canada), Australia, Pakistan, the Gulf region and Asia (Korea, Philippines, Malaysia, Singapore) have developed their own dietary guidelines and/ or pictorial representations according to the specificity of their population and the foods consumed.

Since different cultures usually have diverse food availabilities, preferences and dietary patterns, it is expected that guidelines, and consequently food pictorial representations differ from one country to the other (Painter et al, 2002). Although the different guidelines worldwide are comparable in content, several differences (which are discussed further on) were observed in both the guideline statements and the food guide representation (ADA website; Painter et al., 2002).

With respect to the dietary guidelines, the main message that is emphasized across different countries is to reduce fat, sugar and salt while at the same time increase fruits, vegetables and whole grain cereals. The guidelines worldwide also emphasize the importance of variety in food choice, keeping a healthy weight and taking part in physical activity. Some of the variations that I have observed are in relation to the Finnish and the German dietary guidelines where potatoes are specifically mentioned in one of the guidelines and where fish is also pointed out as a low fat meat that should be consumed often (National Nutrition Council, 1999; German Nutrition Society, 2001). Interestingly, the Finnish and the British dietary guidelines do not mention anything about alcoholic beverages whereas all other guidelines advise their intake in moderation (National Nutrition Council, 1999; Health Development Agency, undated). Canadian dietary guidelines have an additional advice on limiting caffeine which is not found elsewhere (Office of Nutrition Policy and Promotion, 2002). American guidelines, the WHO dietary guidelines for European countries as well as the guidelines for the Gulf region have a statement about safety of food (FNIC, 2005; Musaiger et al., 2006; WHO, 2003). The dietary guidelines recently developed for the Gulf region additionally advise

individuals to drink adequate amounts of water and fluids on a daily basis and have a recommendation about decreasing tobacco smoking and the effect of second hand smoking; none of the other reviewed dietary guidelines included such a component (Musaiger et al., 2006). The Pakistani dietary guidelines also include a recommendation about water and fluid intake, additionally they propose that preferred foods should be those that are fresh or home made foods; these guidelines are unique in the inclusion of this last component (National Institute of Health in Islamabad, 2006).

Where pictorial guidelines are concerned, different countries use different schematic diagrams for food grouping; the USA uses the food guide pyramid (FNIC, 2005), the UK uses the plate (Health Development Agency, undated) whereas in Canada the representation is denoted by a rainbow like diagram (Office of Nutrition Policy and Promotion, 2002). Again, these are all similar in the recommended number of servings from the various food groups. Slight variations might exist from one country to the other in terms of number of food groups and/or number of recommended servings from each food group. An example to that is in the case of Malaysia where there are only four food groups whereas in most countries, there are five (Painter et al., 2002).

The Greek recommendations have the most divergence from the other country guidelines (advice about vitamin and mineral supplements is given and also advice about snacks and method of eating) and the food guide pyramid is divided in a different way than all other pictorial representations: it is more detailed in that it

depicts which foods should be consumed on a daily basis and which on a weekly or monthly basis (Ministry of Health and Welfare, n.d.).

2.5 Health Promotion

Health promotion could be described as any planned or deliberate activity aimed at fostering health through cooperation between various stakeholders to enable people to take part and be involved in creating appropriate conditions that maintain or enhance well being and therefore health. Kubolk (1997) defined health promotion as activities undertaken by health professionals to promote health in their clients and that include health education and counselling. It was also described by Laffrey (1990) as behaviour directed towards achieving a greater level of health and by Pender (1996) as behaviours that increase the well being of either an individual or a group.

Nutbeam (1986) goes a step further by setting apart health promotion and disease prevention; considering each as an activity on its own. He defines disease prevention as means of conserving health, not improving it, where the medical field is involved with high risk groups. Conversely, he considers health promotion as an activity concerned with the whole population, with the goal of enhancing health. According to Nutbeam (1986), although the two are separate, they are complementary.

The US Department of Health and Human Services (1978, 1979, 1980) also makes a distinction between disease prevention and health promotion; nevertheless, disease prevention, here, is regarded as part of health promotion, and its aim is to protect people from disease- a threat to health. On the other hand, health promotion

targets people who are basically healthy and tries to develop actions aimed at shaping community and individual lifestyles, such as to maintain and improve health and well being.

Kemm and Close (1995) see health promotion as the stem of all activities that are planned in order to prevent disease or to promote positive health. In this definition, disease prevention and health promotion are considered as two activities with one goal: improving health.

Health promotion at its simplest involves improving people's health and keeping them healthy. The area or domain for health promotion is quite wide. Health promotion used in its fullest sense goes beyond medical care to quality of life, making choices, prevention, education, policy, and individuals and communities. Ideally, it should be achieved at the level of the individual and that of the community as a whole taking into account equity, social and contextual issues, in order to be able to address all groups of people (Naidoo and Wills, 2000; Pike and Forster, 1995).

If grouped together, all these definitions would fall under the WHO definition of health promotion which first took shape in the conference held at Alma Ata and resulted in the Alma Ata Agreement (WHO, 1978) with its slogan "Health for All by the Year 2000". The Alma Ata appeared to be a major stepping-stone towards health promotion. In summary, it stated that health inequalities were unacceptable and that work should be done on both an economic and social level for achieving health. It also stressed that individuals should be involved in their achievement of health, which could be brought about by health education. The

Ottawa Charter (WHO, 1986), on the other hand, gave more importance to the need of building a “healthy public policy”. According to the Ottawa Charter, health promotion is “the process of enabling people to increase control over, and to improve, their health” (Stanhope and Lancaster, 2000, p. 292), and it should combine both individual and community level strategies including, in order of priority, five major aspects: building a health promoting public policy, creating supportive environments, strengthening community action, developing personal skills, and reorienting health services. For individuals or communities to achieve their goal of health, they must become aware of and learn how to make use of the social and personal resources available within their environment (Naidoo and Wills, 2000; Stanhope and Lancaster, 2000).

It can always be in doubt that health education and health policy must work hand in hand for the achievement of health promotion leading to wellness and health (Tones and Tilford, 1994). Among the main concerns of health policy may be reducing differentials in socioeconomic status, which as indicated by many reports (for example The Black Report and The Health Divide) and by many countries’ experience (Japan, Sweden, Norway) (Wilkinson, 1992) to be a cornerstone – along with education- to achieving effective health promotion (Tones and Tilford, 1994).

2.6 Health Education

Formal education strives to be a planned systemic process, which seeks to present the learner with all necessary and relevant information about a subject matter. At the same time, it focuses on arousing interest and curiosity to encourage

questioning and criticism, with the intention of producing changes in the knowledge, attitude and behaviour of the learner. Education aims at helping individuals make choices autonomously (Bunton and Macdonald, 1992; Kemm and Close, 1995; Seedhouse, 2001).

Health education involves both promoting and teaching health such that all individuals have good education about important health issues and are able to make the most of the information they acquire, in order to improve their health (Seedhouse, 2001; WHO, 1988). It is different from health information. While information is part of health education, the latter goes further to address factors that relate to health behaviour, such as the availability of resources, community leadership and its effectiveness, social support (whether from family members or others) and self-help skills (WHO, 1988).

Health education is concerned with the quality of life and with the promotion of physical, mental and social well being of the individual. Health education includes provision of knowledge, development of skills and attitudes and values which will help in making right and good choices for the rest of someone's life. A technical definition of health education by Tones and Tilford (1994) states that it is "an intentional activity which is designed to achieve health related learning i.e. some relatively permanent change in an individuals capability or disposition. Effective health education may thus produce changes in knowledge and understanding or ways of thinking; it may influence or clarify values; it may bring about some shift in belief or attitude; it may facilitate the acquisition of skills; it may even affect changes in behaviour or lifestyle" (Tones and Tilford, 1994, p. 11).

Health education may also be defined in a simpler manner as any combination of learning experiences designed to make adaptation of health conducive behaviour easier (Stanhope and Lancaster, 2000). Therefore, it is the part of health care which is involved with promoting healthy behaviour (WHO, 1988).

Global trends in health education have identified the importance of addressing self esteem, personal skills and social support in developing healthy lifestyles rather than solely providing information to people in the hope that they will change their behaviour in the light of the knowledge they acquire (Nutbeam, 1998; Pike and Forster, 1995). Therefore, one of the major sought outcomes of health education would be the empowerment of people such that they can take better care of their health and their lives.

Nutrition education may be considered as part of health education since it aims at encouraging healthy eating practices in the course of promoting life long health.

2.7 Health Behaviour and Behavioural Change

Models and theories that aid in explaining the relationship between health beliefs and health related behaviour can help health promoters and educators understand what makes individuals adopt certain behaviours and how they respond to health education (Kemmm and Close, 1995; Jackson, 1997; Naidoo and Wills, 2000). This would make it easier to transform knowledge about behaviour into strategies useful for developing effective measures and interventions to help individuals make changes towards a healthier lifestyle (Kemmm and Close, 1995; Naidoo and Wills, 2000; Redding et al., 2000).

Health Education Theories

Many theories and models relevant to health behaviour exist. DeBarr (2004) conducted a review of health education theories and models currently used in intervention studies found in the literature since the year 2003. She proposed that the identified health theories/models may be grouped under three categories: individual health behaviour, interpersonal health behaviour and staged models and theories. Group intervention also referred to as social systems theories may be considered as an additional category although it is more specifically concerned with social marketing (DeBarr, 2004).

The individual health behaviour theories, as the name indicates, aim at exploring health behaviour at the individual level with the premise that intention is independent of others' actions. Examples of these are the Health Belief Model (Strecher and Rosenstock, 1997) and Theory of Reasoned Action (Ajzen, 1988, 1991), later on developed into the Theory of Planned Behaviour (Ajzen, 1991).

Interpersonal health behaviour models, although they do share some concepts with the individual health theories (such as self-efficacy in Social Learning Theory and Theory of Planned Behaviour), move a step further in that they consider the effect of other factors on health behaviour such as environment (Social Cognitive Theory) (DeBarr, 2004). These models include Bandura's (1986) Social Cognitive Theory and the Theory of Interpersonal Behaviour (Triandis, 1994).

Stage theories build on the notion that among the factors that affect how people respond to health education is their stage of development implying that

individuals at different stages in life should be targeted with different intervention methods (Bunton and Macdonald, 1992). These theories follow or predict the progress of behaviour change in reference to various stages or phases that individuals are at. Examples of such theories and models include the Trans-theoretical Model (Prochaska, 1994) and the Precede-Proceed (Green and Kreuter, 1991). The latter is more comprehensive and involves program planning that starts off with a needs assessment followed through to outcome evaluation (DeBarr, 2004).

Social marketing is an approach used to influence the behaviour of the targeted audience for health benefit. It draws on marketing techniques and differs from health education in that it goes a step further beyond empowering individuals to positive reinforcement of behaviour in order to improve the welfare of society (US Department of Health and Human Services, 2005).

According to DeBarr (2004), the theories that were most used in health education studies during the time period considered were the Trans-theoretical Model (also known as the Stages of Change Model), Theories of Reasoned/Action and Planned Behaviour and the Social Cognitive Theory/Social Learning Theory. Additionally, the Health Belief Model is one of the most frequently cited in the literature (Redding et al., 2000). Therefore, these four theories will be discussed in further detail.

Trans-theoretical Model

The Transtheoretical/Stage of Change Model was developed by Prochaska and colleagues during their work on addictive behaviours (Prochaska and DiClemente, 1983).

This theory proposes that six stages of change exist: precontemplation, contemplation, preparation, action, maintenance and termination (Prochaska et al., 1994). Precontemplators are in a denial stage with no current intention to change. Contemplators develop an awareness of the problem and begin seriously thinking of changing behaviours during a six month time period. In the Preparation phase, one develops a detailed plan of action. The Action phase involves the adoption of the new behaviour or modification of a pre-existing one. The Maintenance stage is considered to be more difficult than the former stage, at this point one is in an ongoing process to keep the acquired behaviour on course. The Termination stage may be considered as part of the maintenance stage where the behaviour change is well maintained over time and the individual becomes less vigilant of the pre-existing problem. As such, each stage requires different strategies and intervention activities should be tailored to an individual's stage of change in order to produce the desired outcomes. The Trans-theoretical/Stage of Change Model acknowledges and prepares individuals to consider that there is interplay between the different stages and one might face setbacks in the process of attempting behaviour change. When this occurs, and it is expected, one re-enters the cycle of change until maintenance is achieved. In their separate analysis of the Transtheoretical/Stage of Change Model, Bunton and colleagues (2000), Bridle and colleagues (2005) and

Lenio (2006) include examples of criticism that this theory has received. One is the notion proposed by Bandura (1997) that human behaviour is multi-dimensional and thus may not be categorized into discrete stages and that individuals do not all start at the same stage. Another criticism by Kraft and colleagues (1999) includes concerns about the six month time frame specified in the contemplation stage; whether people plan change that far into the future is questionable. Macnee and McCabe (2004) question the applicability of this theory in unique populations and Bridle and colleagues (2005) its efficacy with certain target behaviours more than others. Additionally, Sutton (2001) raises concerns about the methods used to measure the stages of change.

Theory of Reasoned Action/Planned Behaviour

The Theory of Planned Behaviour (Ajzen, 1991) builds on the Theory of Reasoned Action (Ajzen and Fishbein, 1980) which posits that people act the way they do for a specific reason and thus human behaviour may be predicted through examining behavioural intentions which in turn are influenced by one's attitude towards the behaviour and by subjective norms. The Theory of Planned Behaviour encompasses an additional component, perceived behavioural control or self-efficacy, as an answer to criticisms of the Theory of Reasoned Action in that it does not take into account behavioural influences that are beyond the control of an individual. Therefore according to the Theory of Planned Behaviour, behaviour is influenced by intention. Intention is influenced by subjective norms, attitudes and self-efficacy. Subjective norms involve an individual's perception of significant others' beliefs about his ability to adopt the change in behaviour. Attitudes are

formulated in relation to values that individuals develop in relation to behaviours and are influenced by beliefs about those behaviours (in other words: expectations related to performing the behaviour and how much these expectations are valued). According to the Theory of Planned Action, anything that changes key beliefs may in turn lead to an increased likelihood of a change in behaviour. Although this theory may be used to detect the determinants of certain behaviours, it does not offer much guidance on how to change these determinants in order to elicit behaviour change (Hobbis and Sutton, 2005). Moreover, the majority of Theory of Planned Behaviour research has focused mainly on explaining and predicting behavioural intention rather than on behaviour itself (Redding et al., 2000) and on informing health behaviour change interventions (Hardeman et al., 2002; Hobbis and Sutton, 2005). According to the systematic review of Hardeman et al (2002), most Theory of Planned Behaviour based interventions' attempts to change beliefs rely on providing information. Keeping in mind that information alone is not sufficient to elicit behavioural change; Hobbis and Sutton (2005) argue that this may limit the efficacy of the intervention since participants may not share similar beliefs regarding a particular behaviour. A way around this would be to identify and target beliefs of each participating individual. This would entail that each participant receives a different version of the intervention (Hobbis and Sutton, 2005). Nevertheless, this may prove difficult to implement, time consuming and costly when large population groups and communities are being targeted.

Social Cognitive Theory/Social Learning Theory

Social Cognitive Theory focuses on both the underlying determinants of behaviour and methods to promote behavioural change. Bandura introduced the concepts of modelled behaviour and re-enforcement to Social Learning Theory in 1963 and self-efficacy in 1977 (Pajares, 2002). Bandura's (1982) Social Cognitive Theory hypothesizes that personal and environmental factors interact with behaviour in a dynamic and reciprocal relationship, where personal factors include skills, self-efficacy and outcome expectancies and environmental factors include reinforcement, modelling and availability. In 1986, Bandura added the concept of reciprocal determinism to his theory hypothesizing that personal factors (the characteristics of a person), behaviour and environmental factors (within which the behaviour is performed) interact together in a continuous triadic reciprocity such that any change in one of the factors impacts on the other two (Pajares, 2002; Redding et al., 2000). Each of the previously mentioned constructs of Social Cognitive Theory is associated with several key concepts with regard to influences on behaviour. At the level of the individual, these include personal characteristics such as personality, cognitive factors (for example, attitude, beliefs, knowledge) and skills; emotional coping or the ability to apply strategies in response to emotional stimuli (such as fear, anxiety); behavioural capacity which involves having the knowledge and the skills to perform a certain behaviour; self-efficacy or perceived behavioural control under various situations, which has been identified as an important link between knowledge, skills, attitude and behaviour (Baranowski, 1992); expectations or the beliefs that an individual has about the outcome of a

behaviour; self-regulation which the ability to manage a behaviour; observational/experiential learning which refers to learning either by observing the behaviours of significant others (modelling) or through trial and error (experience) and re-enforcement where the consequences of the behaviour may act as motivators or barriers to trying it again. At the level of the environment, influences on behaviour include those that are physical, social, cultural, economical, political or situational in nature and perceptions of an individual regarding the environment is referred to as situation, in Social cognitive Theory (DeBarr, 2004; Pajares, 2002; Redding et al., 2000). From the perspective of the Social Cognitive Theory, most behaviours can be modified since they are learned responses; this theory therefore places emphasis on modelling and learning both cognitive and behavioural skills for generating behavioural change (Redding et al., 2000).

Therefore, health behaviour change is made easier when the individual is informed about risks and benefits of specific behaviours, has the opportunity to develop and become proficient in skills needed to translate the knowledge into practice and receives social support (Bandura, 2004). Social support can be categorized into emotional support (such as love and empathy), instrumental support (the provision of tangible services), informational support (the provision of needed information to tackle problems) and appraisal support (the provision of self-evaluation needed information) (Parker et al., 2004). By primarily utilizing behavioural techniques, the Social Cognitive Theory has been shown to be successful in promoting change (Hobbis and Sutton, 2005). One criticism of this theory is that it has been mainly used in designing interventions for individuals who

already wish to change their behaviour and thus may be more effective with motivated individuals (Hardeman et al., 2002).

The Health Belief Model

This model proposes that several factors affect whether or not people change their behaviour: first, evaluation of their own susceptibility to a certain condition, second how serious the consequences of the condition would be, then, whether a change in behaviour would prevent the condition, and finally, whether the benefits of the change exceeds the costs of taking action (comparing to the perceived benefits with the barriers to the change in behaviour- a cost-benefit analysis) (Kemm and Close, 1995; Naidoo and Wills, 2000; Redding, 2000). This model has been criticized for its lack of weighting for different factors (Kemm and Close, 1995; Naidoo and Wills, 2000). Additionally, the first step involved in this model depends on how much individuals believe they are susceptible to a certain condition; in general, it has been recognized that individuals tend to under-estimate their susceptibility to risks (Redding et al, 2000). Nevertheless, the Health belief Model may be helpful in identifying and targeting particular health problems which individuals consider themselves at risk of. It may also shed light on the range of factors involved (Kemm and Close, 1995; Naidoo and Wills, 2000).

2.8 Applying Theory to Practice

The large number of relevant theories and the differences in the nature of their theoretical information, among other factors, may render theory informed health education practice difficult (Jackson, 1997). Different theoretical frameworks are suitable and practical in different situations; therefore choosing a

theory that suits the situation at hand should be given enough thought. Guidelines for choosing a theory include selecting a theory that matches the unit of practice (for example individuals, organizations), that have been tested in similar populations and settings (Hochbaum et al., 1992; Van Ryan and Heaney, 1992), consistent with characteristics of the target behaviour (Hochbaum et al., 1992). Additional guidelines provided by the US Department of Health and Human Services (2005) state that a useful theory is that which makes assumptions about the units of analysis or change, the topic and the behaviour to be addressed that are logical, consistent with everyday observations, similar to those used in previous successful programs and supported by past research in the same area.

Brugs and colleagues (2005) believe that it is not enough to use theories that identify determinants of behaviour change and that theories that offer guidelines of how these determinants may be modified should be employed. Additionally, similar to Rothman (2004), they highlight the importance of the problem-driven approach in designing effective interventions. The problem driven approach is believed to allow tackling potential determinants of behaviour change that are both internal and external to the individual. Therefore, the use of concepts from different relevant theories in order to solve a problem may prove more beneficial than utilizing the perspective of single-theory used in most theory-driven studies; it is proposed that no single theory is sufficient for developing behaviour change strategies given the multitude and diversity of determinants of behaviour change (Brugs et al, 2005; Jackson, 1997; Nieuwenhuijsen et al., 2006). As such the proposed shortcomings of one theory may be reduced by using constructs from

several theories in tandem in the hope of improving intervention outcomes (Hobbis and Sutton, 2006).

Rothman (2004) states that designing effective interventions requires theories that are both accurate as well as practical. Therefore, it may not be enough to depend on theories that describe what factors affect individuals' behaviours, and guidance about how to use this information in order to elicit change in behaviour may be needed as well. Keeping these practical needs in mind, it may be expected that interventionists are more likely to rely on behavioural theories that specify the determinants of behaviour and offer guidance on how to achieve behavioural change (Rothman, 2004) such as the Social Cognitive Theory (Bandura, 1986). Redding and colleagues (2000) propose that the Social Cognitive Theory may be the most comprehensive among existing theories. It is a theory that predicts behaviour while at the same time offers an approach to behaviour change (Redding et al., 2000). Similarly, Bandura (2004) argues in favour of his theory in that while most health behaviour models are concerned with predicting health behaviour, social cognitive theory goes a step further in that it offers both predictors and principles of how to change health behaviour.

The social cognitive theory is the most frequently used behavioural-based theory in nutrition education interventions (Contento et al., 1995) especially when adolescents are targeted (Hoelscher et al., 2002). In their recent review of literature of nutrition interventions, Sahay and colleagues (2006) reported that those that elicited positive outcomes were predominantly based on constructs from the Social Cognitive Theory.

2.9 Program Planning

Until recently, little has been written about how to develop successful health behaviour change programs. Since the publication of the PRECEDE-PROCEED model (Green and Kreuter, 1999) (section 2.7), Intervention Mapping (Batholomew et al., 1998, 2001; Cullen et al., 1998) and work by Perry (1999) on theory driven healthy behaviour change programs and other planning models (Brug et al., 2005), the importance of theory-based and systematic planning of interventions has been identified. Planning models help practitioners develop programs step by step using theories to explain and address health problems (US Department of Health and Human Services, 2005). According to such planning models (Figure 2.1, p.47), the first step in program planning is the identification of prevalent health problems that are worth addressing given available resources. In the second step, the behavioural risk factors related to the health problem need to be identified. The third step involves recognizing the mediators or the determinants of these risk factors. Subsequently, the determinants should be translated into interventions which are then implemented such that the target population is reached as best as possible.

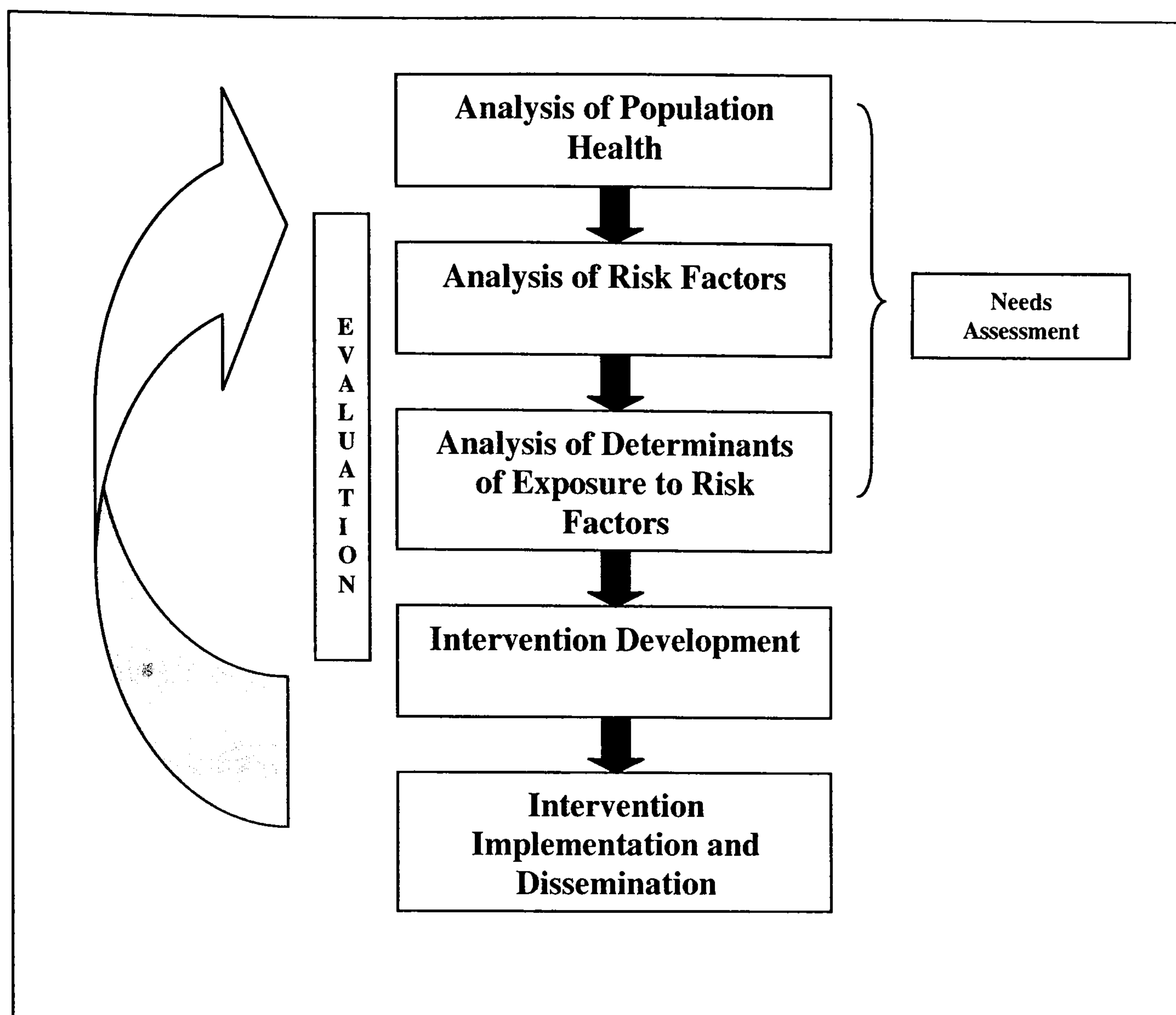


Figure 2.1 A Model for Planned Promotion of Population Health (Brug et al., 2005)

Models that have been recently used in designing nutrition interventions targeting adolescents (Lytle and Perry, 2001; Wind, 2006) include the work of Bartholomew and colleagues (1998; 2001) and Cullen and colleagues (1998) on Intervention Mapping and the techniques described by Perry (1999) and have provided much needed guidance in the systematic approach to such intervention planning. These two will be discussed in more detail.

Intervention Mapping

Intervention mapping is a step-wise approach to program planning that combines behavioural theory and empirical data for the development and implementation of health promotion interventions. Five steps are included in the Intervention Mapping framework (Table 1; Appendix C); each step requires carrying out several specific tasks in order to provide a base for the step that follows (Appendix D).

Before beginning the Intervention Mapping process, a needs assessment should be completed in order to specify the overall goal of the project specified. The needs assessment provides knowledge about the problem and the population. It can be accomplished through literature review, review of epidemiological data collected previously, or through baseline data collected specifically for the project under study (Bartholomew et al., 1998); it is proposed that this last method will yield the most relevant information (Hoelscher et al., 2002).

Step 1: Proximal Program Objectives

This first step specifies who (the population) and what (desirable behavioural and environmental outcomes) will change as a result of the intervention. The products of this step are matrices that cross-link behavioural or environmental performance objectives and changeable determinants of internal or external conditions. In the matrix created from the personal determinants, each cell should contain learning objectives that answer the question, “What do the participants need to do with regard to a specific determinant in order to perform the health related behaviour/performance objective?”. In the matrix created from the

external determinants, each cell should contain change objectives that answer the question, “What should change in the environment in order for the participants to achieve the performance objectives?”. The learning and change objectives become the most immediate objectives to be addressed by the intervention and serve as a guide for step 2: selecting the program methods and strategies.

Step 2: Theoretical methods and Practical Strategies

In this step, appropriate methods based on behavioural theories are matched to each of the proximal program objectives specified in step 1. The question to ask in step 2 is “How can change in the determinant be influenced in order to accomplish the learning and change objectives?”. Subsequently strategies to apply the chosen theoretical methods to the target population are determined taking into consideration their delivery feasibility and how well accepted will they be by the participants.

Step 3: Program Design

In this step, the overall plan for the design and the delivery of the intervention is produced, including intervention material. At this point, the proposed strategies and program components are pre-tested in the context of their proposed use. Contacts between the interventionist and implementation site gatekeepers should be carried out in this stage and timetables set.

Step 4: Adoption and Implementation

Here, an implementation plan is developed specifying implementation objectives, methods and strategies in order to fully prepare those that will be involved in the implementation process of the program. Once this has been done, the intervention is carried out.

Step 5: Monitoring and Evaluation

In the last step, a plan for evaluating the impact of the intervention on determinants, behaviour, environmental conditions specified in the intervention is developed and evaluation tools are created. The matrices previously developed for the proximal program objectives are used to develop appropriate measurement items specific for each.

Techniques by Perry (1999)

Perry (1999) suggests that 10 steps are involved in developing health behaviour change programs (Table 2; Appendix C):

Steps 1 and 2: Identifying the problem and a rationale for Intervention

Steps 1 and 2 involve selecting health behaviours for intervention and subsequently providing a rationale for those selected; therefore, this may be considered as part of the needs assessment. In step 2, three questions should be answered: (a) How does the behaviour affect health? (b) What is the epidemiology of the behaviour? (c) What is the aetiology of the behaviour? The product of this step is a more in-depth evaluation of the selected behaviours in step 1 and requires empirical evidence and knowledge of factors that are believed to predict behaviour

(determinants). Using theories in this step will help in explaining the aetiology of the behaviour.

Step 3: Creating an Intervention Model for Predictive Factors

In this step the target group and setting for delivery are specified. Subsequently, the predictive factors or determinants from step 2 that are believed to influence the health behaviours of the target population are identified.

Steps 4 and 5: Writing and Targeting Intervention Objectives

The intervention objectives describe how components in the intervention will attempt to affect the different determinants of behaviour. Each determinant should have at least one intervention objective. Step 5 involves refining the intervention objectives such that they are applicable to the participants and in the setting of choice.

Step 6: Determining the Programs or Channels for Implementing Intervention Objectives

This step involves determining which channels will be used for and who will be involved in the program implementation (For example, curriculum, family). Therefore, this relies heavily on the chosen target population and evidence based research.

Step 7: Creating the Program Activities

This involves creating activities that match the intervention objectives. Material can be based on pre-existing ones that have been previously used in other programs and are thought to meet the intervention objectives or they may be

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specially designed for the program keeping in mind the specified channels for program implementation from step 6.

Step 8: Constructing the Program

In this step, developing, piloting and revising the activities as well as meetings with gatekeepers of the administration site and training sessions for involved personnel are conducted.

Step 9: Implementing of the Intervention

After the completion of the processes specified in step 8, the intervention is conducted in the chosen setting.

Step 10: Maintaining Health Behaviour Programs

This step involves evaluating the intervention program by constructing evaluation instruments in order to assess the effectiveness of the program in addressing behaviour changes in the targeted participants.

Both of above frameworks for the two health promotion planning models are similar in that they are systematic and provide guidance on how to identify and choose changeable determinants of health behaviour; however, the techniques provided by Perry (1999) seem less specific on how these changes should be induced and how the determinants may be translated into effective interventions using behaviour theory. Intervention Mapping provides a clearer framework of how the selection of intervention goals, the choice of intervention strategies and the development of intervention tools should be carried out. It also gives guidance on the implementation and the evaluation of the intervention. Furthermore, the

matrices that are constructed in Intervention Mapping give it an additional advantage in that they facilitate the process of matching theory to the changeable determinants and make it easier to develop educational strategies as well as appropriate measurement tools that correspond to the specified proximal objectives. In general, it appears that the framework that Intervention Mapping provides for using information in a systematic sequence of steps and tasks for intervention development may prove helpful for program planners, especially those who have not had much experience in the field, in that it renders the complex task of integrating theory and empirical data in the development, implementation and evaluation of interventions more manageable.

2.10 Determinants of Adolescent Food Choice

It is important to examine key influences on health behaviour as a step towards developing effective interventions. This is done in order to identify potential determinants of behaviour change that should be addressed in the course of designing the program as well as to facilitate the choice of the theoretical framework that will be used.

It is the interaction between complex internal and external factors inherent to each individual that affects the likelihood that people would adopt new behaviours resulting in healthy diets. Food choice and eating patterns in adolescence may be affected by several factors that may be divided under three broad categories: individual factors which are also referred to as internal factors, factors within the community and factors in the society; the last two may be also termed external factors.

In a literature review conducted by Jenkins and Horner (2005) to examine factors that influence eating patterns, findings suggested that these include mainly hunger, food appearance and time. Other factors identified by these authors include convenience, home and school availability, influences by parents and the media, cost, preference, taste and "lack of concern about healthy eating". Croll and colleagues (2001), in a study of US adolescents' perceptions of healthy eating, suggested that although adolescents have good nutritional knowledge, there are other factors that influence their food choice. These include barriers such as time, availability, lack of concern (for healthy eating), convenience of and taste preference for less healthy choices. This is also similar to findings by Giskes and colleagues (2005) in a study on Australian adolescents where barriers to healthy eating included mostly taste and convenience as well as "breaking long established habits of unhealthy eating" and to findings by Wills (2005) and Spear (2002) where the main barrier to healthy eating was time and adolescents felt that time constraints promoted skipping meals and snacking.

Jenkins and Horner (2005) also identified that lack of adult support and modelling whether at school or at home also impede translating nutritional knowledge into practice. Similarly, Wills (2005) identified that moving away from parents and their influence lead to the consumption of convenience foods and for those who still lived at home, family eating practices and food availability still influenced their eating behaviour.

Additionally, family was shown to have both a positive and negative effect on adolescent eating patterns (Jenkins and Horner, 2005); such that an increase in

the frequency of adolescents' participation in family meals was associated with higher fruits and vegetables. Alternatively, families with working mothers or parents with busy schedules may lead to less parental supervision with regard to adolescent eating practices and less time available for the preparation of healthy meals which may in turn encourage the development of unhealthy dietary patterns. This is in line with findings by Giskes and colleagues (2005) where parents and family as well as peers were listed as barriers to healthy eating. Wills (2005) also reported that meeting new people and peer groups was often associated with a shift in food choice from the more conventional home cooking to the high fat junk food and alcohol consumption, a riskier food choice. Some respondents even reported eating foods to fit in with peers even when they were not hungry and even if the foods were not consistent with what they would normally eat. Young women reported that they felt the need to lose weight or to be thin in order to fit in with peers. Similarly, Spear (2002) suggested that adolescents often associate junk food with enjoyable activities such as being out with friends while healthful foods are viewed as boring and are often associated with un-pleasurable activities such as staying at home or staying with parents. Hill (2002) also relates the nutritional autonomy exhibited during adolescence to the type and quantity of foods eaten. During this time, adolescents may try to dissociate themselves from parents and seek social support more from peers, thus their search for autonomy leaves them exposed to experimentation with new foods and dietary practices.

Adolescents eating practices in schools are influenced by what they get with them from the home and availability of healthy food choices in school (Jenkins and Horner, 2005). Price and availability of healthy foods in shops or schools were also barriers cited by Giskes and colleagues (2005). Another study that has suggested availability as one of the barriers that impedes healthy eating in adolescents was conducted in the US on adolescents belonging to low socioeconomic status (LSES) families by Evans and colleagues (2006). Here, interviewees frequently stated that they ate what was available to them in any given setting. Of the barriers mentioned in interviews, lack of availability of healthy food choices was mentioned most by participants which may imply that this was distinctive of the low socioeconomic status (LSES) group of adolescents under investigation. Other barriers identified in that same study included bad taste of healthful foods, social pressure to eat unhealthful foods, unappealing look of healthful foods, and lack of variety (Evans et al., 2006).

In a study by Keim et al. (1997) on factors that influence the consumption of fruits and vegetables of a group of young people in the US, it was suggested that taste and appearance more than health perceptions affected their intake. Taste was also identified as the predominant personal factor that affected the consumption of calcium rich foods in a study by Lee and Reicks (2003) on Asian American adolescents belonging to low socioeconomic status (LSES) groups. In that same study, intake was also associated with availability of dairy products in the home. Other factors also included role modelling by parents or peers: adolescent girls who witnessed one of their parents consuming milk or who were encouraged by peers

and/or parents to do so reported doing so more often and thus had a higher calcium intake.

Other barriers identified in the literature reviewed included weight loss practices and the lack of knowledge about diet-disease relationships and nutrient composition of foods (Giskes et al., 2005) and the widespread of convenience food restaurants that offer affordable, fast foods in an attractive atmosphere for adolescents and their peers (Jenkins and Horner, 2005). Healthy eating was also considered as time consuming and unavailable or limited in fast food restaurants by some adolescents while others considered unhealthy foods more available and less time consuming in terms of preparation (Croll et al., 2001).

Interviewed US adolescents in a study by Croll and colleagues (2001) suggested that the place where food is consumed affects whether it is healthy or unhealthy such as eating at home was often related to eating healthy foods while eating with friends and peers was related to eating unhealthy foods. Some adolescents described healthy foods as those that parents would like to eat and others showed apathy towards healthy food consumption because they were still young.

By studying a group of Finnish adolescents, Roos and colleagues (2004) identified that determinants of food choice seem to differ with setting: at home and in school, it is the socioeconomic status (SES) of the family that is more influential whereas eating with peers is more associated with lifestyle. There is a trend of adolescents staying home for a longer period of time; therefore, this may implicate that the diets of adolescents may be more influenced by familial factors than by

peers. In general, the authors conclude that socioeconomic status (SES) is still a more influential factor on food choice and eating behaviour of adolescents than lifestyle. Therefore although familial factors may have a weakened influence on other adolescent health behaviours, it stills plays a significant role where eating behaviour is concerned (Roos et al., 2004).

In line with findings from the above studies, Neumark-Sztainer and colleagues (1999) suggest that the primary factors that affect US adolescent food choice (those that the adolescent considered as most influential) include hunger or cravings, taste and appeal of the food, time availability of both adolescents and parents and convenience of the food. Secondary factors include food availability, parental influence, perceived benefit of the food and situational factors such as time and place. Other factors include cost, habit, influence on body image, mood, media and the adoption of a vegetarian lifestyle.

A study by Cusatis and Shannon (1996) examining the diets of US adolescents in relation to factors that may have an influence on their food choice suggested that self efficacy for making healthy food choices was among the factors that predicted the consumption of high fat and sugar where a negative correlation existed between the two. In this study, there was a positive relationship between consuming foods in the cafeteria and high fat and sugar intake for both male and female adolescents. A similar relationship existed between consumption of foods at fast food restaurants and dietary fats for girls.

Perceived self-efficacy was also reported as a key factor in the eating behaviour of adolescents in a UK study by Gracey et al (1996). Additionally, misconceptions that the participating adolescents in this study had regarding certain nutrition-related information posed difficulties in translating nutritional advice into food choices. Gracey and colleagues (1996) proposed that nutritional health promotion targeting adolescents should involve increasing self-efficacy as well as family involvement which is also needed to ensure healthy food availability at home. They also suggest that foods be the focus of nutrition education interventions since the participants exhibited lack of knowledge about foods rather than nutrients.

Results from a study by Oygard and Rise (1996) elicited that attitude (calculation of personal pay-offs) was a more determining factor of behavioural intention than both perceived norms and self efficacy. The study also indicated that beliefs about appearance (weight, shape) were shown to strongly influence behavioural intention and thus should be addressed in nutritional messages. Health beliefs (related to heart disease and cancer) also had influence on behaviour intention, in this study, but to a lesser extent.

In a study by Hart and colleagues (2003) on 7 to 11 year old in the UK, findings suggested that factors that affect children's food choice include motivation and understanding of dietary guidelines and recommendations. In general children feel unmotivated to eat healthily because they do not associate themselves with the health issues related to healthy eating and view them as pertaining to adults. In that same study, findings demonstrated that high socioeconomic status (HSES) children were more informed about nutrition-related health issues than their low

socioeconomic status (LSES) counterparts and that food likes and dislikes were dominant in the process by which children chose foods to eat. Therefore, for this age group it may be more beneficial to incorporate the factors of taste and preference into nutrition guidelines and interventions.

Evans and colleagues (2006) reported that when the low socioeconomic status (LSES) participants in their study were asked about motivators to eat healthy when at home, at school or when out with friends, elicited answers could be divided under three main headings: better taste and appearance of healthy foods, availability of healthy food choices and “more emphasis from role models and peers to eat more healthful food”. Some adolescents reported that if an older, respected and admired person (role model) suggested a healthy food choice; then they are more likely to comply. Peer influence was also among the mentioned motivators such that if a group leader suggested eating healthy foods; then, other members of the group would more probably act accordingly.

This part of the literature review of studies examining determinants of adolescent food choice suggests that factors other than knowledge seem to play a role in adolescents' dietary choices; these are summarized in the next paragraph. Furthermore, as acknowledged by Jenkins and Horner (2005), it appears that there is a need for additional studies that target low socioeconomic status (LSES) adolescents in order to identify determinants of nutrition-related behaviour change specific to such groups and subsequently develop better suited interventions. The study by Giskes and colleagues (2005) investigated whether differences in determinants existed between different socioeconomic groups; they suggested that

low socioeconomic status (LSES) adolescents investigated in their study put more emphasis on convenience and family factors such as availability of certain foods in the household as barriers to healthy eating than the high socioeconomic status (HSES) adolescents. Low socioeconomic status (LSES) interviewees also considered their present dietary habits as barriers to changing to healthier eating more than those in the high socioeconomic status (HSES) group. Another study identified for targeting low socioeconomic status (LSES) adolescents was that conducted by Evans et al. (2006) where when low socioeconomic status (LSES) adolescents were asked to list motivators to healthy eating in different settings, better taste and appearance of healthy foods, availability of healthy food choices and “more emphasis from role models and peers to eat more healthful food” were the most frequently cited factors. However, this latter study did not include a comparison between socioeconomic groups. Therefore, not only is there a need for studies that target low socioeconomic status (LSES) adolescents, but those that compare and contrast determinants between different socioeconomic status groups are much needed as well.

Key influences on adolescent healthy eating may be divided under three broad categories: individual, the community and the society. Individual factors include knowledge, attitude and skills as well as age (as the adolescent age increases, he/she become more responsible for meal preparation) and personal taste. Adolescent eating patterns are also influenced by the social environment surrounding them; therefore, with increase in age, the family and home factors’ effect decreases and there is an increase in peer influence over which foods are

consumed. Socioeconomic status, as well as the physical environment within the community (for example, limitation of choice of food retailers, availability of fast food outlets) also influences food choices and thus healthy eating of adolescents.

The different factors at work in influencing adolescent eating behaviour identified from the above section may be outlined as follows:

- 1- Individual Influences: food preferences, taste and sensory perception of food, health and nutrition awareness, meanings of food (for example autonomy, fun), self efficacy and hunger.
- 2- Lifestyle: time and convenience, cost, dieting/weight loss.
- 3- Social environmental factors: family, demographic characteristics (socioeconomic status), peers, role models.
- 4- Physical environmental settings: school, fast food restaurants and convenience stores.

2.11 Nutrition Education

Because of the importance of nutrition in the prevention of disease and promotion of health, as well as, in growth and development, there seems to be a need for nutrition intervention and education in order to promote healthy eating habits for adolescents. Encouraging young people to adopt healthy eating practices can prove beneficial in reducing the incidence of diet-related diseases later in life (Hill et al., 1998; Manios et al., 2002).

However, with all the available nutritional awareness programs, guidelines and recommendations, it would have been expected that a shift (towards the positive) in dietary practices should have taken place; the increased availability of nutritional information, and although it has increased knowledge about the importance of a healthy diet, has not exhibited a significant impact on actual dietary behaviour of individuals (Rimal et al., 2000). Previous studies have demonstrated that although knowledge constitutes a pre-requisite to behaviour change, does not necessarily lead to behaviour change (Hoelscher et al., 2002; Sahay et al., 2006). The literature reviews by Hoelscher and colleagues (2002) and Sahay and colleagues (2006) of published nutrition interventions establish that while knowledge based interventions have been successful in increasing knowledge about nutrition-related issues, in general, they have not been effective in eliciting changes in nutrition-related behaviours. On the other hand, in these two literature reviews, behavioural theory-based interventions were found to exhibit more successful results in dietary behaviour change than those that were knowledge based. Furthermore, in my review of available literature, among the identified attributes of successful intervention programs, use of behavioural theory was recognized as a key element (Blanchette and Brug, 2005; Contento et al., 1995; Hoelscher et al., 2002; Klepp et al., 2005; Knai et al., 2006).

Nutrition Education in Schools

Nutrition education in schools may be an effective method for increasing children and adolescents' knowledge and awareness of the link between health and nutrition while aiming at improving attitudes and skills that promote healthy eating

(American School Health Association, 1997; Perez-Escamilla et al, 2002). It is not only cost effective, since it would take place as part of the school curriculum, but it would also target a large number of children and young people for a relatively long period of time (Blom-Hoffman and DuPaul, 2003; Perez-Rodrigo and Aranceta, 2001).

Research has shown that school based nutrition education, which encompasses a broad range of activities that are directed towards improving eating behaviours, is able to improve eating habits and health status of children and adolescents (ADA, 1997; American School Health Association, 2003; Rodrigo-Perez and Arancita, 2001). Evidence suggests that well-managed nutrition education programs in schools can, at a relatively low cost, contribute to improved nutrition well being through behaviour changes. The main goal of nutrition education is to help students adopt healthy nutritional behaviours in an environment that encourages healthy eating (WHO, 1998).

Children and Adolescent Focused Nutrition Intervention Studies

An example of successful school based nutrition education interventions is the Child, Adolescent Trial for Cardiovascular Health CATCH (Kelder et al., 2005) where the results from the main trial of the CATCH intervention indicated that it was successful in decreasing self-reported fat consumption in 3rd through 5th grade US students by employing age appropriate curricula that address psychosocial factors and skill building with an added school environment component to train food service employees in developing low salt and low fat school lunch menus. Furthermore, the main outcomes of the CATCH trial which included a significant

reduction of student fat consumption was maintained in a three year follow up study (Kelder et al., 2005).

The effect of school nutrition education on fruit and vegetable consumption was studied by Perry et al. (1998), Foerster et al. (1998) and Nicklas et al. (1997), among others. The intervention by Perry et al. (1998) targeted fourth and fifth grade US students and used constructs from the Social Cognitive Theory: classroom education as well changes in the school foodservice menus and parental involvement were carried out. The results indicated a positive impact on fruit and vegetable intake of students in the intervention group. Foerster et al (1998) also targeted fourth and fifth graders in the US. This intervention included classroom education plus community media resources and resulted in an increase in daily fruit and vegetable intake servings as well as in an increase in the perceived benefits of fruits and vegetables in the experimental group of students. Nicklas et al. (1998) carried out a school based intervention on US high school students with the goal of increasing nutrition knowledge, positive attitudes, awareness and fruit and vegetable consumption. They combined classroom nutrition education with a school wide media campaign, school meal modification and parental involvement. Results showed an increase in knowledge, awareness as well as in fruit and vegetable daily intake.

Findings from a school based intervention trial on low income young US adolescents (7th grade) testing various multi-component levels (control, environmental component, environmental plus education, and environmental plus peer plus education components together) suggested that the group which received

the highest level of exposure showed the greatest improvement in consumption of fruits and vegetables and choice of low fat foods. This was followed by the group that received environmental plus classroom components (Birnbaum et al., 2002).

In the UK, a whole school approach intervention conducted by Anderson et al (2005) on groups of 6 to 7 and 10 to 11 year old adolescents was successful in increasing fruit but not vegetable intake in the intervention group. Their understanding of the term "healthy" also changed significantly; in post tests new concepts were used by the intervention group such as energy, strength and healthy heart.

Saksvig et al (2005) carried out a school based intervention on Native Canadian adolescents aged 7 to 14 year old. A classroom and an environmental component were used. The results exhibited an increase in knowledge about foods low in fat, overall health knowledge, dietary self-efficacy, and with meeting the dietary fibre intake recommendation.

The above studies indicate that nutrition education may play an important role in producing a positive impact on healthy eating practices and food choice determinants. The reviewed literature demonstrated that nutrition intervention studies are lacking in Lebanon. Health promoters and nutrition educators should consider the benefit of such programs in their goal for reducing nutrition related disease and ameliorating future health.

2.12 Conclusion

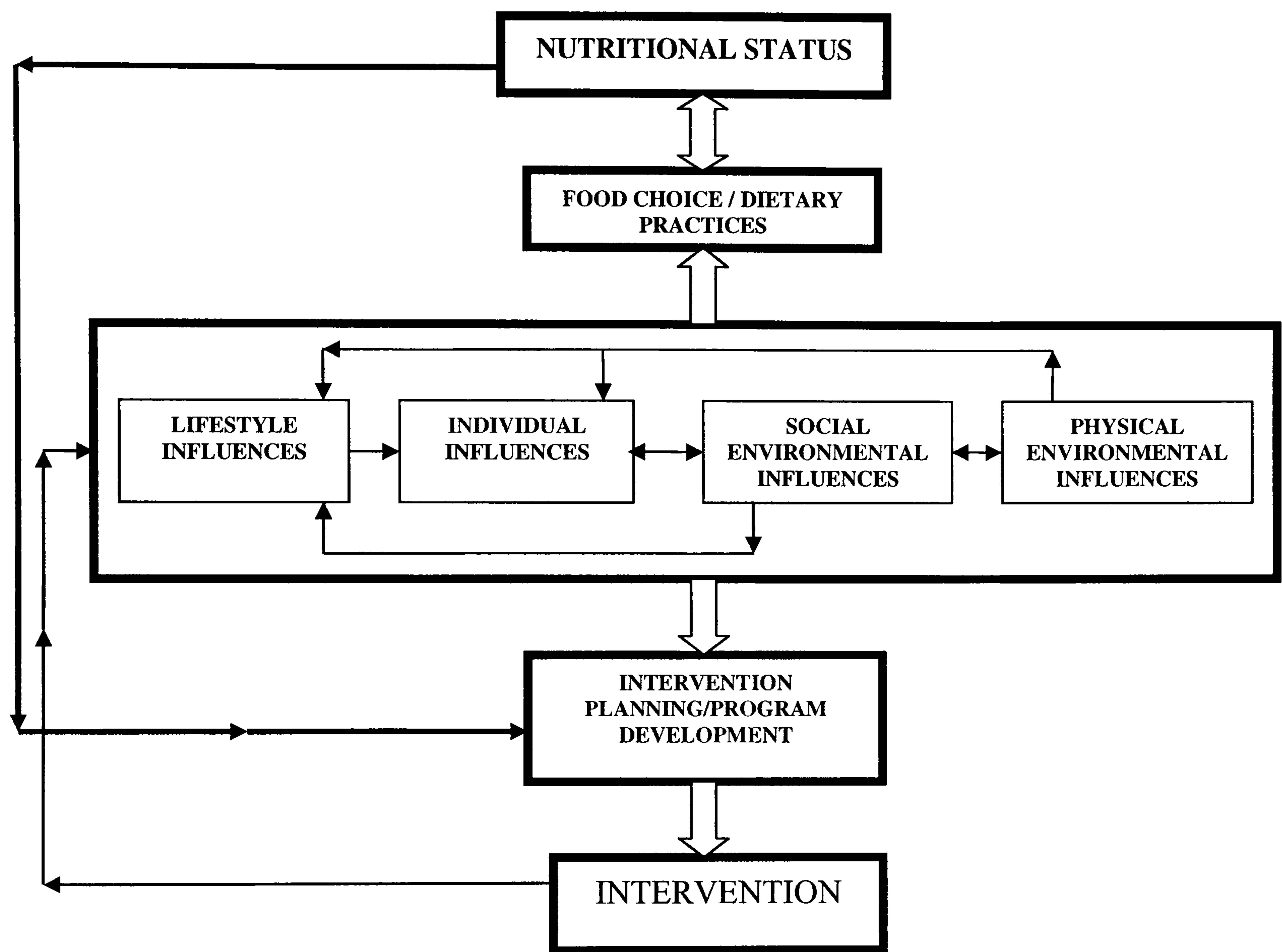
This literature review presented indicates that with the progression of the globalization process and the resulting nutrition transition, an increase in the prevalence of chronic diseases (or non-communicable diseases; NCD) is exhibited worldwide. The risk factors associated with non-communicable diseases such as hypertension, high cholesterol and obesity (among others) are mainly diet related and can be prevented through healthy nutrition practices and physical activity. This emphasizes the role of healthy eating in preventing morbidity and mortality in present time and stresses the importance of the promotion of good nutrition practices conducive to the health of populations around the world. Advocating healthy diet and physical activity to adolescents is of importance since it is a period of increased nutritional demands and of establishing life-long habits. Moreover, targeting low socioeconomic groups may be of added significance since they may exhibit less healthy dietary practices than their high socioeconomic counterparts. Theory-driven behaviour based multi component nutrition education in schools may prove cost-effective and successful in influencing child and adolescent dietary practices.

The reviewed literature encompasses many examples of nutrition interventions. Those that elicited positive outcomes were theory based and behaviour rather than knowledge oriented. Empowering individuals through multi-component nutrition education can produce improved eating behaviours and therefore better health.

In Lebanon, there is implication of an ongoing nutrition transition which has shifted the dietary practices of adults and young adults away from the typical Lebanese towards a more Westernized diet. The Lebanese studies presented in the literature review suggest that there is a need for preventive rather than curative measures for the emerging NCD such as heart disease, obesity and diabetes, among others. Thus, I argue that nutrition education that is behavioural-theory based can play an important role in improving current and future health, especially, if it implemented in a school setting and directed towards the Lebanese adolescent population where studies and data are scarce.

The conceptual framework (Figure 2.2, p.69) that evolved from this chapter facilitated shaping my research questions in relation to my objectives (Chapter 3). Furthermore, this literature review has helped fulfilling steps in the planning model presented in Figure 2.1 (p.47). The section on current trends in dietary practices and nutritional status of adolescents helped in carrying out the first three steps thus providing basis for the needs assessment. The sections on applying theory to practice, program planning facilitated the development of my intervention and the section on determinants of adolescent food choice and that on health behaviour theory offered guidance for choosing my theoretical framework as well as questionnaire and interview questions to be used at baseline and in the evaluation of outcome measures. These sections as well as the section on dietary guidelines and recommendations helped in the developing appropriate nutrition education strategies and materials. As data were collected and analyzed, additional input was provided for the use in my program development.

Figure 2.2: Conceptual Framework



Chapter 3: Methodology

3.1 Introduction

This chapter describes the primary methods used in this study. It demonstrates why the quasi-experimental control design was selected in this context and discusses my decision to include both quantitative and qualitative data collection techniques for baseline assessment and for exploring outcomes of the intervention. It describes the selected population and samples, the reliability and validity of the study, measurement of variables, instrumentation and piloting procedures and outcomes. It also includes mapping of the theory based intervention as well as data analysis techniques. Ethical issues are identified and discussed.

3.2 Key Research Questions

This study is divided into two phases (Figure 3.1, p.71): the first phase attempts to answer three key questions that are related to part of the research objectives. Addressing these questions will provide baseline information on the dietary status of the target group of adolescents, their dietary patterns and the main determinants affecting their food choice and food-related behaviour. Answers to these first three questions, along with the literature review in chapter two, will help build the basis for phase two. Phase two focuses on two questions: the first is related to choosing the best suited theoretical underpinning and the planning model for the development, administering and measuring the outcome evaluation of the intervention. The second question in phase two addresses the impact of the intervention on the key determinants, dietary practices and nutritional status of the

targeted adolescents, thus at the same time examining the effectiveness of the developed intervention.

Figure 3.1: Key Research Questions and Objectives

OBJECTIVES	RESEARCH QUESTIONS	
To investigate the adequacy of the diet of the targeted adolescents.	<ul style="list-style-type: none">• What is the nutrient intake of the targeted group of adolescents?• What are the dietary practices of the targeted group of adolescents?	PHASE ONE
To identify key determinants of food choice of the targeted adolescents.	<ul style="list-style-type: none">• What are the nutrition-related determinants affecting the food choice of the targeted group of adolescents?	
To develop a nutrition education intervention.	<ul style="list-style-type: none">• What is the theoretical underpinning and the program planning model best suited for the intervention development based on the findings from phase one?	PHASE TWO
<ul style="list-style-type: none">• To examine the effect of the intervention on the identified key determinants, nutritional status, and dietary practice of the targeted adolescents.• To explore differences in outcome results between the two contrasting socioeconomic groups of targeted adolescents.	<ul style="list-style-type: none">• What is the impact of the intervention on the identified key determinants, nutritional status and dietary patterns of each of the two differing socioeconomic groups of the targeted adolescents?	

3.3 Research Design

This study examines determinants of food choice and healthy eating as well as dietary patterns and nutrient intakes in groups of adolescents from varying socioeconomic status at baseline with the attempt of constructing an effective nutrition education intervention targeting adolescents. The goal is to explore how the intervention impacts the preceding parameters in program participants and whether it does so to a greater extent than in a control group. It then investigates the factors that may have played a part in the outcome results. Comparison of results between the contrasting socioeconomic status groups will be carried out as well.

While there is no golden rule for choosing a research design, a decision has to be made of which to apply depending on the type of research questions, the possibilities available for choosing a target population and samples, and consequently the best fitted methods of research and techniques of data collection that best suit the purpose of the research (Burgess, 1993; Cohen et al., 2001).

Factors that had to be taken into consideration here, and affected the choice of research methodology and design and determined when and how my data would be collected were my particular research questions, the particular samples of students that are available to be studied as well as my allocated resource (time) for the preparation and delivery of the educational materials, and for their analysis. It was also important to check whether the approach chosen for the investigation process produced reliable and valid data (Burgess, 1993).

3.3.1 Experimental and Non-Experimental Research Designs

Experimental approaches attempt to test for cause and effect where all causes of variation in the effect being measured are held constant except the variable under investigation (Coolican, 1999; Coolican, 2003; Gorard, 2001). On the other hand, non-experimental research is not concerned with cause and effect; it is research directed towards identifying relationships between variables (Coolican, 2003). Therefore, my research project encompasses both the experimental and non-experimental research design since it investigates the effect of an intervention on selected experimental variables and attempts to uncover underlying factors that may influence outcome results.

3.3.1.1 The Quasi-Experiment Control Design

The basic design of my study has the characteristics of a quasi-experiment. This is a variation of the classic or true experiment where the population is randomly divided into an experimental group and a control group (Burgess, 1993; Coolican, 2003). Quasi-experiments have all the makings of a true experiment in that they have treatments, outcomes and control and experimental units; the difference is that they do not employ random assignment. Consequently, comparisons are made between non-equivalent groups that may differ in many ways in addition to the presence of the treatment that is being tested (Cook and Campbell, 1979). To reduce the effect of the between groups differences (other than those that may be due to the effect of the treatment), the control group is initially matched to the experimental group with respect to variables that may affect the outcome being assessed (Burgess, 1993; Coolican, 2003). This is in agreement

to the situation for my research study in that the control groups will be matched to the experimental groups with respect to age, gender distribution, socioeconomic status and year of study at the institution.

The quasi-experiment is often used by researchers who are forced to deal with pre-existing groups due to cost (time and resources) and/ or accessibility issues (Coolican, 2003). For example, the researcher who is conducting the research in a classroom setting may not be able to assign students randomly to experimental and control groups (Burns, 2000). This is the case in my study: the population of choice comprises of university and vocational school students enrolled on particular courses as part of that particular year's academic timetable and the research will be conducted in a classroom setting to facilitate the administration of the nutrition educational intervention; therefore, randomization will not be possible, and matched control groups will be used.

3.3.1.2 Surveys

The survey is probably the most used research method in educational research; its purpose is to gather data at a particular instant in time. Usually, a survey can be used with the intention of either describing the characteristics of a certain population (a descriptive survey), or explaining and comparing relationships between certain conditions (an explanatory survey) (Burns, 2000; Cohen and Manion, 1994).

For the purpose of my study, a nutrition survey will be used and it will serve a descriptive role in phase one by providing baseline information on nutritional issues that may exist. It will also be used for assessing the nutritional

intake and dietary practices of the participants pre and post the intervention (Gibson, 1990). At a later stage, my study will assume an explanatory nature since it will explore conditions that have a bearing on the intervention outcome.

3.4 Establishing Validity

The literature takes account of several types of validity including construct, internal and external validity. The first is concerned with whether the study measures what it is intended to measure, the second is related to whether the outcome was indeed caused by the intervention or treatment and the third is associated with generalizability of findings and mainly depends on the method of sampling used (Belnaves and Caputi, 2001; Birch, 1997; Burns, 2000; Malim and Heiman, 2001; Robson, 1997).

In my study, the main concern is that of construct and internal validity since the findings are not intended for generalization specially that a non-probability sampling method will be used.

3.4.1 Construct Validity

Construct validity will be addressed by using method triangulation where different methods of data collection will be employed and methodological triangulation where the same method of data collection will be used on varying occasions (here, during the piloting stage) (Belnaves and Caputi, 2001; Burns, 2000).

Triangulation

I will use method triangulation in an attempt to overcome biases that stem from employing only one type of methodology (Burgess, 1993) as well as to fill in gaps in the data collected (Burgess, 1993; Cohen et al., 2001). Triangulation is often employed when human behaviour is being studied in the pursuit of a given objective. It gives the researcher insight to studying human behaviour from more than one standpoint and provides a clearer understanding about human behaviour and of the situations in which human beings interact (Cohen et al., 2001). My interest is in both measurable changes in nutrition-related parameters following an intervention as well as in phenomena that are not directly observable such as perceptions which may help in depicting factors that affect nutrition behaviour and changes thereof. Therefore, I have chosen to use both qualitative and quantitative data collection techniques in order to improve the accuracy of the data collected in my research project. Using contrasting methods of data collection (questionnaires and interviews) in both phase one (where the collected data will be used as basis for developing the intervention) and phase two of my study (where the collected data will be used for investigating the intervention outcomes) will lessen the likelihood of misinterpretation and increase the validity of and confidence in my obtained results (Cohen et al., 2001).

Combining methods of research in my study will serve other purposes than triangulation (where different methods are used for the same research problem). This approach will help in gaining insight or exploring different aspects of the same research objective: I will use semi-structured interviews to explore various issues

that have a bearing on the dietary practices of my sampled adolescents in an attempt to unravel factors (such as perceptions and willingness to change) that may affect their food choice so that these may be addressed in the intervention. Additionally, semi-structured interviews will be conducted pre and post intervention which will give me a chance to investigate whether these determinants have been influenced (by the intervention). Therefore, by combining different methods of data collection, I will seek to add breadth and depth to the analysis (Brannen, 1992).

3.4.2 Internal Validity

Internal validity in quasi-experiments is often limited since researchers can not be sure that the exhibited result is solely due to the intervention (Burns, 2000; Heiman, 2001; Robson, 1997). Nevertheless, quasi-experiments are widely used in research and while their results are suggestive, more confidence in an assumption may be acquired through replication (Heiman, 2001). In my research design, I will improve internal validity by attempting to control the effect of external factors (other than the intervention) by selecting samples of adolescents (experimental and control) possessing similar age, socioeconomic status and level of education, by using reliable instrumentation and by comparing change in the values obtained pre and post intervention between the experimental and the control group.

3.5 Sampling

The population of my study consists of adolescents, aged 17 to 19 years old, who are studying either for a university degree or its equivalence, living in Beirut, Lebanon and belonging to contrasting socioeconomic status groups. Non-probability sampling will be used in my research project. Factors that affected the choice of my sampling strategy were the sample size (discussed in the next section), the representativeness of the sample and access to the sample (Cohen et al., 2001). Since the aim of my research project is not to generalize results but rather to explore the effect of a particular intervention and to investigate the various factors that may facilitate or hinder its success in eliciting dietary change, the use of non-probability sampling is justified (Burns, 2000; Malim and Birch, 1997). Moreover, a convenience sample will be chosen since this is the most accessible to me. In convenience sampling, the nearest individuals (i.e. to whom the researcher has easy access) are chosen as participants, and the same process is followed until the desired number of participants in the sample is fulfilled (Burns, 2000; Cohen et al., 2001; Coolican, 1999; Coolican, 2003). My research will be conducted in part on students at a private university where I teach and in another part on students at a vocational school to which I was permitted access (Burns, 2000); both institutions are located in Beirut, Lebanon. Matched control groups within each institution will be chosen for comparison of results.

Sample Size

Since generalizing the research findings is not intended, a large sample is not needed (Malim and Birch, 1997; Robson, 1997); I will use a sample size of thirty or more since this is recommended in experimental research (Balnaves and Caputi, 2001). My HSU samples will consist of students attending different sections of the same course being taught by a colleague during a given semester of study. The DA samples will be comprised of adolescents undertaking vocational courses chosen on the basis of similar characteristics with respect to age, level of education and gender.

3.6 Ethical Issues

Ethical issues may arise at any point during the course of a research project (Cohen et al., 2001). Ethical considerations were made at an early stage during the preparation for my study (Robson, 1997). Several principles will be taken into consideration: protocols within each institution will be followed (gatekeepers at each institution will be asked of what procedures need to be followed for gaining access in their pertaining institutions), debriefing of gatekeepers and participants will be carried out (this is further discussed below), informed consent will be obtained from the participating adolescents, confidentiality will be respected and anonymity will be promised upon request from the participating institutions (Burns, 2000; Cohen et al., 2001; Robson, 1997). The procedures followed during the course of my study will not intentionally expose participants to risks (Burns, 2000) and their identity and their safety (both emotional and physical) will be protected (Denzin and Lincoln, 2005). Anonymity of the participants will be insured by

coding: each will be designated by a number code during the analysis and findings will be reported at the group level.

The coordinator of the program of study, where the research will be conducted, at HSU, was consulted early on in the project and was informed orally about the purpose of the research and what it involves at each stage. I also met with and gained consent for my research project from the assistant director of the DA institution; a formal letter (Appendix B) was requested and provided.

My research will be of the overt not the covert type (Cohen, 2001; Gregory, 2003). The participants will be informed of the nature, purpose, what is involved, how the data will be collected, how obtained information will be used and their right to choose not to participate in or to withdraw at any time during the study (Gregory, 2003). The consent of participants should be obtained for conducted research in order to give subjects the freedom of choice and of self-determination (of whether to participate in the research or not); a letter of informed consent (Appendix A) will be presented to the participants before the onset of the study (Burgess, 1993; Gregory, 2003) as a cover page of the questionnaire to be used. Consent on one hand protects the rights of the participants and gives the right to withdraw at any time they choose, and on the other hand protects the researcher (should anything go wrong in the research) (Cohen et al., 2001).

Information in the letter of consent is simple, clear and easily understood by participants (Burgess, 1993; Cohen, 2001). The sampled adolescents are around eighteen years old; therefore, they were considered to be capable of assessing the situation and able to make judgment concerning the matter; their consent to

participate and the consent of gatekeepers at their educational institutions was considered enough.

Additionally, I will brief the sampled adolescents about the purpose of the study and the confidentiality and anonymity of the collected information before each interview session at every stage (phase one and phase two) in order to make sure that the respondents are fully aware of what the research is about and how the gathered data will be employed.

The director of DA institution asked for the name of the institution to appear in the dissertation whereas, the coordinator at HSU preferred that a fictional name be used. Information other than that needed for purpose of writing up my research project will not be collected nor made public (Robson, 1997). For the HSU participants, this is discussed further in the section about piloting the questionnaire. As for the DA group, questions about the level of education and occupation of the parents were omitted since these were intended for socioeconomic status verification (which I could alternatively infer from the name of the school previously attended- which is also an item on the questionnaire- and the fact that they were attending DA) since I assumed that these may be sensitive issues for this group and may make the participants in these samples needlessly feel uncomfortable.

Guidelines for research ethics (British Educational Research Association (BERA), 1992; British Psychological Association, 1992; British Psychological Society, 1995; ESRC, 2005) propose that the researcher should be impartial and that the reported research results are precise, truthful and objective. Validity of the

collected data will be verified by triangulation. Since my research project involves an intervention administered in different institutions, caution will be taken to replicate the exact procedures within each group of participants and not to favour or give special treatment to one group over the other (Burns, 2000). Objectivity will be maintained by not allowing prior personal assumptions, preconceived notions or personal judgment to influence teaching or collecting and interpreting data.

3.7 Methods of Data Collection

This section describes the methods that will be used for the collection of both the quantitative and the qualitative data in this research. Data collection will be carried out in the two phases of my study: assessment of nutrient intake and dietary practices (nutrition assessment) as well as information on determinants that may help explain food choice of the adolescent groups under study will be collected both pre and post intervention. Nutrition assessment is used to evaluate an individual's health in terms of nutrition. It is essential when trying to plan effective interventions, since it gives information about the different nutritional problems that exist in a certain population (Hoelscher et al., 2002; Whitney and Rolfes, 2002). The relationship between diet and health could be better understood through dietary assessment which allows for nutrition surveillance (Bogle et al., 2001).

Special nutrition instruments, namely a questionnaire (FFQ) and 24-Hour Dietary Recalls (24-Hour DR) - a form of semi-structured interviews, will be employed in order to explore the dietary practices, behaviours and the nutrition related knowledge, attitude and skill of the selected sample. Whereas, semi-structured interviews will be used to allow participants' input on specific issues (for

example, their understanding of healthy foods and what they perceive as facilitators or barriers to healthy eating) which may help in better understanding the different factors that play a role in their food choice and dietary practices.

3.7.1 Methods of Data Collection in a Nutrition Survey

Collection of data, when conducting a survey, can be done in one of two ways: the first is through a cross-sectional approach where as the name indicates, a cross section of the population is selected and one or more variables are measured for the particular group. The second is the longitudinal approach where collecting data from the same group of individuals takes place over a long period of time, for example several years (Burns, 2000). I will use a cross-sectional approach for my data collection since I am more interested in investigating nutrition related parameters of participating adolescents at baseline (and thus use this information to formulate the nutrition education unit) (Gibson, 1990) and in exploring whether a change will take place after administering the intervention rather than in monitoring the group under study over a long period of time (which is the case of the longitudinal approach).

Many studies in the literature have used nutritional surveys as means of gaining insight to the dietary knowledge and practices of individuals, identifying risk factors associated with poor eating habits and exploring barriers to healthy eating (Brady et al., 2000; Capps et al., 2002; Frank et al., 1992; Kearney and McElhone, 1999; Masui et al., 2002; Neumark-Sztainer et al., 2002; Rockett and Colditz, 1997). The nutritional status of a selected population may be assessed by use of a cross-sectional survey. Usually, by using such a survey method, subgroups

at risk can be identified, and the extent of nutritional problems can be explored in order to help in allocating resources to assist these subgroups with certain nutritional needs; consequently, improving the overall health of the population (Gibson, 1990).

I will use a nutrition survey that will assess nutritional status as well as explore underlying determinants food choice and healthy eating both pre and post the intervention.

3.7.1.1 Nutritional Assessment Methods

Nutritional assessment can be carried out using several methods: dietary, laboratory, anthropometric or clinical.

Laboratory, anthropometric and clinical methods are expensive and require the use of sophisticated laboratory tests and instruments. They are habitually employed for the assessment of advanced stages of nutritional imbalance; whereas, dietary methods are commonly used for the identification of any nutritional deficiencies that may exist at primary stages and to assess whether dietary intake is in compliance with set dietary standards.

Information about food habits, food beliefs and cultural practices, among others, may also be considered among the variables that affect the nutritional status and can be included in the nutritional assessment methods (Gibson, 1990). Therefore, I will be conducting dietary nutritional assessment in my study since it better serves the objectives and the resources of my research.

Dietary Nutritional Assessment

Dietary nutritional assessment entails evaluating the quality and quantity of food and drink consumption of individuals in the specific sample being studied (Gibson, 1990). Major methods for obtaining information about food consumption include retrospective, prospective, or a combination of the two.

The prospective approach is that where either a method of direct observation, or that of recording food as it is eaten is used to obtain the sought after information. This process often puts a burden on the subject and the assessor; therefore, making participation rates lower. Prospective instruments rely on the subjects being literate and may give invalid results in the instance where subjects might change their food pattern because of the awareness that their dietary intake is being monitored or simply to ease the recording process (make it easier on themselves) (Webb, 1995; Whitney and Rolfes, 2002). Using the prospective approach in my research project will not be feasible since direct observation will not be possible because the participants eat and drink at various times and locations; additionally, given the busy schedule of adolescents I believe that asking them to record their food intake throughout the day will place a burden on them which may compel them to provide erroneous information.

On the other hand, retrospective techniques rely on the memory of the subject in recalling foods eaten previously; these include Food Frequency Questionnaires (FFQ) and several types of dietary histories (among which is the 24-Hour Dietary Recall) (Shils et al., 1994).

There is no ideal way for collecting dietary information, and the methods are many; it is what is most useful given a certain hypothesis, population and what resources and personnel are available. Keeping that in mind, researchers often look for techniques with least respondent burden. The FFQ and the 24-Hour Dietary Recall methods are characterized among the dietary assessment tools with reasonable respondent burden, which in turn assures more compliance (Solomons and Valdes-Ramos, 2002; Yanek, 2001). Given the low respondent and assessor burden of these two tools and the fact that they are time and cost effective, they will be the methods of choice to be used in collecting the nutritional data in phases one and two of my project.

3.8 Instrumentation

3.8.1 Questionnaires

As mentioned earlier, the questionnaires will serve two purposes in my research: collecting baseline information to be used for the construction of the intervention as well as assessing the effect of the intervention. Therefore, they will be administered pre and post the intervention, in class, and then the data will be coded and the results will be reported statistically. The questionnaire to be used for the purpose of my research will be of the self-administered type. It will be divided into several sections, each pertaining to a specific topic: nutrition knowledge, skills, attitude, beliefs and food consumption; the final section will be part of the nutritional assessment techniques that will be employed and is also termed a food frequency questionnaire (FFQ).

Questionnaires are time and effort efficient and a variety of techniques exist for coding and statistical analysis (Burns, 2000). However, they run the risk of producing superficial data since straightforward questions, often used in questionnaire, do not allow for richness of data and may produce results that do not convey the reality of the issues being examined (Gillham, 2004; Robson, 1997). Using other methods of further data collection, such as the case in my study, will help put together a clearer view of the issues under study (Gillham, 2004).

I will use the Food Frequency Questionnaire (FFQ) because it is among the often used among available tools employed for the assessment of dietary intake, and because it will be possible to compare the coded information with that from the 24-Hour Dietary Recalls to increase the validity of results (this is discussed further, later on in this chapter).

Food Frequency Questionnaires are favoured by researchers because of their cost and time effectiveness. These types of questionnaires are used to describe individuals' dietary patterns and habitual dietary intake and provide quick and inexpensive means of examining diet-disease associations (Drewnoski and Hann, 1999; George et al, 2004; Subar et al., 1995; Thomson, 2003). The FFQ could also be used for measuring dietary change in context of dietary intervention. The ability of this assessment method to capture changes in intake over time is an important aspect to consider when choosing a dietary assessment instrument, especially when intervention tools are being tested (Thomson, 2003). Thus it will be a useful tool in my research.

Much of the early research for the development of the FFQ as an assessment tool was conducted in the 1960's and 1970's. Traditionally, the FFQ was designed for the purpose of describing food habits and dietary patterns and not for quantifying or analyzing nutritional intake (Kubena, 2000; Solomons and Valdes-Ramos, 2002; Torheim, 2001; Zulkifli et al., 1992). The FFQ is usually made up of a pre-specified list of foods or food groups where respondents are asked to report the portion size and frequency of consumption of the listed foods (Flegal, 1999; Wengreen, 2001). The FFQ determines the average frequency of consumption of listed food items in reference to a specified period in the past (week, month, several months, or a year) (Schatzkin et al., 2003; Zulkifli and Yu, 1992). The food list used may consist of foods that contribute to specific nutrients (for example, fat, calcium, iron), or it may be comprised of foods that contribute to a majority of nutrients (food groups) (Zulkifli and Yu, 1992).

FFQ that enquire about serving size as well as frequency of consumption are able to give estimates of nutrient intake (Zulkifli and Yu, 1992). Portion size is usually reported as a choice of three ranges: small, medium, or large (Schatzkin et al., 2003). The FFQ that I will use will not enquire about portion sizes since my concern is directed more towards investigating changes in dietary pattern and the frequency of the consumption of certain food products rather than specific nutrient intake.

Participation in FFQ is usually high because burden on respondents is low. If compared to other dietary assessment methods, the FFQ requires little

specialized interviewer training and could also be self administered, or conducted by mail or phone which translates to lower costs (Zulkifli and Yu, 1992).

3.8.1.1 Designing the questionnaire

The questionnaire consists of seven sections. It elicits information regarding participants' biography, nutrition related knowledge, skills, beliefs, attitudes and dietary practices and patterns. Questions included in the questionnaire have been adapted from an instrument used by the United States Institute of Health to test the nutritional knowledge and practices of the US population. I have used the questions as a framework and have included questions about foods pertaining to the Lebanese culture and popular foods consumed by adolescents in Lebanon, previously obtained through 24-Hour dietary Recalls from a group of Lebanese adolescents that have similar characteristics to my sample. I have also added questions that inquire about the socio-economic status of the participants; these are in the form of questions that ask about the level of education and the occupation of parents and the name of previously attended schools.

Depending on several factors, such as research questions, study design and funding, questionnaires can take different formats. They can be long or short, interviewer or self administered, easy or complex; all factors that may affect response rates. When such questionnaires are being constructed, maximizing response rates should be considered since they are important for the success of the research being conducted (Subar et al., 2001). I designed the questionnaire to have clear and simple language and the questions were constructed using un-complicated and clear wording in order to lessen response errors. The questionnaire was also

translated into Arabic to accommodate participants who did not speak English well.

Respondents answered by ticking one choice on a Likert scale.

3.8.1.2 Piloting the questionnaire

I conducted a pilot for the prepared questionnaire in order to identify the time needed for completion and to detect any unclear questions with the intent of modifying them before administering the questionnaire to the sample being studied. Piloting relates also to validity because it is intended to generate rigor (Balnaves and Caputi, 2001).

As a first stage, I tried out the questionnaire on five university students who have similar characteristics to my target samples (17 to 19 years of age, two males and three females, two belonged to a high socioeconomic status group and three to a lower socioeconomic status group). They were volunteering students: those who belonged to the high socioeconomic status group were selected from a colleague's class at HSU while the others were students that I knew through friends. Each questionnaire took around forty minutes to complete. After receiving comments about the ambiguity of certain questions, I re-phrased some of the questions to make them clearer.

As a second stage, I administered the improved questionnaire to seventeen first year 17 to 19 year old students in a colleague's class at HSU; again these were volunteers and were chosen because they represented a similar sample on which part of my research is to be conducted. The questionnaire was administered in class; there were nine males and seven females.

I was present while the students were completing the questionnaire and I have recorded the following comments:

1- Referring to the question about “father’s occupation”, I received some vague answers such as “retired” or “businessman” etc; therefore, this question was made more specific by providing different profession categories for the respondents to choose from.

2- It came to my attention that some of the students were of non-Lebanese origin (two from Saudi Arabia and one from Syria), so a question asking about nationality was added since my focus is on Lebanese adolescents.

3- For the question asking about the number of siblings, two students asked whether that includes themselves. This question was later on excluded from the questionnaire because I felt that it was not significant for the scope of my study.

4- For the question inquiring about the school that students attended previously, I was unfamiliar with some of the schools that students reported attending; therefore, I added more specific questions about the schools: private versus public, in which region or city. Also, some of the students said that they had attended several schools before seeking further education, so I decided to ask about just the last school attended before starting university or vocational learning.

5- Referring to questions 5, 10 and 11 on the questionnaire (about fibre, saturated fat and cholesterol), two students asked what these are (i.e. they have not heard of them before). Therefore, at first, I was contemplating adding an additional “I don’t know” choice to these questions. However, I was skeptical about this,

since it is my opinion that this would be the easiest choice for them to choose. Consequently, I kept these questions as is.

6- Three students asked about the meaning of the word “moderation” used in questions 23 and 24 on the questionnaire (these two questions ask about salt and sugar); however, this word is actually part of the inquiry, thus, the question was not rephrased.

7- For questions 41 to 44, one student asked whether he should choose between the letters (a, b, c, d), or between the choices that are next to each other on the same line. This was specified in more detail in the instructions.

8- Several students found that questions 18, 25 to 29 a little confusing. Nevertheless, after inquiring about what they thought of as confusing, it became apparent that it was not the question itself that was ambiguous but rather the fact that they did not have the correct information about the issues under question that confused them. The questions were not changed.

9- Referring to question 87 on the questionnaire which asks about smoking habits, one student reported that he had quit smoking a couple of days ago and asked whether he should answer the question or not. Another student said that she smokes “Nargileh” or Hubble Bubble and also asked if she should report that or not. Therefore, this question was discarded since after further contemplation, it seemed to me that it was not needed for my research.

A third pilot of the final version of the questionnaire (Appendix E) was carried out and is discussed, in detail, further on in this chapter.

3.8.1.3 Reproducibility and Validity of the questionnaire

Precision of the FFQ

Precision, referred to as reproducibility or reliability, is the degree to which repeated measure of the same variable yields the same result or similar value (Gibson, 1990; Shils et al., 1994). Precision of any dietary assessment method generally relies on several factors: the population being studied, the inter and intra individual dietary variations of the population, the dietary assessment tool being used, the nutrient being evaluated and the time within which assessment is being made (season and day of the week) (Gibson, 1990).

In order to determine the precision of a certain dietary assessment technique, a test-retest is usually used where the same instrument is employed on the same sample after the elapse of a pre-selected period of time. Influence from the previous test could be avoided, if the re-test is employed after a sufficient time interval. After using the test-retest method, the instrument would be considered precise if the two tests yield similar results. Nevertheless, it should be taken into consideration that inconsistent results could be obtained due to true variation in daily intake of the sample under study (for example, due to season, economy, day of the week) (Gibson, 1990).

As for the FFQ, it has been shown that this type of dietary assessment tool exhibits sufficient reproducibility by several researchers, even when the test-retest was conducted with a one year time difference (Wengreen et al., 2001; Zulkifli and Yu, 1992).

The reproducibility of questionnaire to be used in my research was assessed by means of a test-retest procedure, and comparison of the obtained results was carried out using the Pearson Correlation statistical test. The first questionnaire (FFQ1) was completed in October 2004 and the second (FFQ2) in January 2005; approximately three months apart. The questionnaire was administered in a class of 37 first year university students of HSU. The criteria used for selection of this sample included age of the students (17-19 years of age; being first year university students), agreement to take part in the study and accessibility. These are the same conditions that will be used later on in the research sampling procedure.

A consent form was distributed to each student in the chosen sample (Appendix A); additionally, they were assured by their instructor that their choice to participate in this study would not affect their grade in any manner. Responses were coded and the data was analyzed to explore the consistency between results obtained from FFQ1 and FFQ2 using SPSS 12.0 statistical package. A statistician was consulted for this data analysis.

Complete data for the questionnaire reproducibility test was available for 27 subjects (73% response rate). Ten subjects either failed to fill out FFQ2 (because they did not attend class on the day of the FFQ2 administration) or submitted incomplete questionnaires (FFQ2). These were excluded from the analysis.

The reproducibility of the questionnaire as determined by Pearson Correlation for each section is illustrated in Table 3.5 (p. 147). Statistical significance for the analysis was set up at $p < 0.05$. No significant differences were

seen for almost all of the item pairs in FFQ1 and FFQ2, thus indicating reliability of the instrument. For section B (Knowledge of Nutrition Guidelines) Pearson Correlation coefficients ranged between 0.369 and 1.000. For section C (Knowledge of Diet-Disease Relationships) the range of coefficients was between 0.100 and 0.928. For section D (Knowledge of Nutrient Sources /Skills of Selecting Foods), Pearson Correlation coefficients ranged between 0.146 and 0.953. For section F (Nutritional Beliefs), coefficients ranged between 0.231 and 0.978. For section G (Dietary Practice), the range was between 0.050 and 0.980.

Using Pearson Correlation to compare data collected from FFQ1 and FFQ2, results imply that the developed questionnaire is highly reproducible, as indicated in Table 3.5 (p.147).

Validity of the FFQ

Validity is the degree to which a certain dietary assessment tool measures what it was (constructed) set out to measure (Gibson, 1990). To establish validity, by definition, requires that an accurate measure of dietary intake be available. Unfortunately, there seems to be no ideal dietary method which can be used for calibration of other instruments and thus validate their use for a particular purpose in a survey. A common validation procedure used is the comparison of mean values for a group of individuals using two different dietary assessment methods (Willet, 1990).

Validation can be established by comparison to one or more methods that are assumed to have higher validity. Comparing estimates from different methods to those obtained from FFQ have yielded inconsistent findings on validity;

however, research on the subject suggests that although FFQ may not be a good indicator of absolute amounts of nutrients (when compared to other dietary assessment methods), it can prove useful for classifying individuals by rank, identifying groups at extremes of intake and monitoring trends in dietary patterns over time (Briefel et al., 1992; Zulkifli and Yu, 1995). This instrument can also be useful for identifying dietary diversity in a given population and in linking dietary intake with knowledge, attitude and behaviour with respect to diet and health (Briefel et al., 1992). This is consistent with the purpose for which I have used the FFQ in my study.

Validity of the FFQ approach has been documented in many studies by comparisons with more detailed dietary assessment methods and with biochemical indicators of dietary factors (Barret-Connor, 1991; George, 2004; Jain et al., 1996; Pesks et al., 2000; Willet, 2001).

In order to increase its validity, a FFQ must be designed such that the food list used encompasses as many of the foods habitually consumed by the population in question as possible. This should be done in order to capture the overall diet (George, 2004). It is important that all relevant food sources be included in order to ensure that the food list used does not pose any limitations and thus be a source of underestimation (Zulkifli and Yu, 1992). The foods included in my FFQ were based on findings from 24-Hour Dietary Recalls conducted and analyzed prior to designing the questionnaire in order to ensure that the majority of ethnic foods and habitually consumed foods by Lebanese adolescents were included. Additionally, the FFQ was further validated during the piloting process by comparing its results

on dietary patterns with those obtained from 24-Hour Dietary Recalls collected concurrently. 24-Hour Dietary Recall interviews are often used for the validation of other dietary assessment techniques such as the Food Frequency Questionnaire (FFQ) (Shils et al, 1994; Wengreen et al., 2001; Willet, 1990; Yanek et al., 2001;). When used in tandem, they can give a good idea about any existing nutritional problems; they can also be used to measure change in dietary patterns after nutritional intervention has been employed.

3.8.1.4 Administering the Questionnaire

The questionnaires were administered twice: at the beginning and at the end of the Spring semester 2005 (i.e. pre and post intervention). They were used for both the experimental and the control groups concurrently. Questionnaires were administered to the participating adolescents in class in my and their instructors' presence. They were then coded and the data was transferred to SPSS 12.0 statistical package for analysis.

3.8.2 The 24-Hour Dietary Recall

The 24-Hour Dietary Recall is one of the most popular and inexpensive methods for obtaining dietary information (Shils et al., 1994; Wengreen et al., 2001). It is relatively rapid and attempts to measure the quantities of different types of food and drink ingested either twenty four hours preceding the interview or it could be started at breakfast of a particular day and proceed from there on (Gibson, 1990; Willet, 1990). When using this instrument, usually individuals are not only asked to recall all food and drink ingested within the previous twenty four hours, but detailed description of quantities (estimated according to household measures),

cooking methods and brand names-if possible-are also requested (Gibson, 1990; Neuhouser et al., 2000).

Several factors are already known to affect the success of the 24-Hour Dietary recall: memory and cooperation and communication ability of the subjects and the skill of the assessor in obtaining information. Generally, these recalls are done by a nutritionist or a trained individual, in order to help the interviewees remember details by use of food models (helpful for estimation of portion size) or prompt questions which may act as memory aids (Conway, 2004; Gibson, 1990; Neuhouser et al., 2000; Wengreen 2001; Willet, 1990). After collection of data, nutritional intake can be calculated using food composition tables or software (Gibson, 1990; Neuhouser et al., 2000).

The 24-Hour Dietary Recall is often used in epidemiological studies where the dietary intake of a large number of subjects needs to be assessed in a quick and inexpensive manner, and where precision at the individual level is not essential (i.e. it is the overall dietary pattern of the sample that is being studied) (Webb, 1995; Whitney and Rolfes, 2002). Where nutritional epidemiology is concerned (relating diet to disease), this method is of importance for giving information about the general pattern of dietary consumption, and it is therefore important for setting the stage for the use of more durable instruments like the FFQ, which is widely used in epidemiological studies. Its presumed within-individual (intra-individual) stability allows for the assessment of relationships between nutrition and disease or health outcomes. Also, portion size aside, it can give valuable information about the diversity of the diet of a given population; consequently, serving as a screening

device for other instruments that are to be used (for example a 24-Hour Dietary Recall may be carried out as a first step in designing a food frequency questionnaire when nothing is known about common foods consumed in a certain population) (Kubena, 2000; Solomons and Valdes-Ramos, 2002); which was the case in my study, as mentioned earlier.

Solomons and Valdes-Ramos (2002) believe the 24-Hour Dietary Recall method to be the dietary assessment instrument which is most used in developing countries. Furthermore, this technique is considered as the method of choice for collecting information in large nutritional surveys in the United States (U.S.). It has been used by both the US Department of Health and Human Services and the US Department of Agriculture as a key tool for assessing dietary patterns in the US population (Novotny et al., 2003).

The 24-Hour Dietary Recall can be used for several purposes and for giving different types of information. Because of day to day variation in dietary intake, a single 24-Hour Dietary Recall does not provide good information about an individual's intake; consequently, when this method is applied only once, and only one day's intake is obtained, results are not enough to estimate the average intake of an individual. However, they can be used for quantification of dietary intake at the group level, and information on dietary practices and general eating patterns which are characteristic of the population studied could be derived (Block, 1982; Kubena, 2000; Larkin et al., 1991; Mahan and Arlin, 1992; Solomons and Valdes-Ramos, 2002). Research has shown that the single 24-Hour Dietary Recall method yields valid estimates of mean intakes when used for a group of 50 individuals or

more (Bogle, 2001; Magarey, 2003). Appropriate applications of single recalls are usually for the assessment of average dietary intakes of a sample, the comparison of nutrient intakes within groups over time and it can also be useful for evaluating the effectiveness of dietary interventions at a group level (Willet, 1990; Solomons and Valdes-Ramos, 2002).

When multiple recalls are collected, usually over a period of three to twenty days taking into account both weekdays and weekend days, this method is considered as a reliable tool for evaluating the adequacy of individuals' diets, thus allowing for inter-individual estimates of consumed nutrients to be representative of the overall nutritional intake (Block, 1982; Gibson, 1990; Shils et al., 1994; Solomons and Valdes-Ramos, 2002; Yanek et al., 2001). Repeated, preferably non-consecutive 24-Hour Dietary Recalls, account for any day-to-day variation in individual diet, thus allowing for the dietary classification of individuals to be assessed (Kubena, 2000; Larkin, 1991).

For the purpose of my research, three non-consecutive 24-Hour Dietary Recalls will be collected (two week days and one weekend day) for each participant in the targeted sample. This will be done to make sure that the investigated groups' diets are representative of the adolescents' dietary practices being studied and to even out day to day variations. I will conduct the 24-Hour Recall interviews since I am a certified dietician in my country, experienced in recall data collection and analysis. The training and the communication skills of the assessing dietician are among important factors that may affect obtaining information and the success of the 24-Hour Recall data collection: the assessor should be knowledgeable in

portion size estimation, cooking methods, brand names and use of specific prompt questions that will help interviewees remember details of what has been ingested-all in a fairly short time of about ten to fifteen minutes.

A standardized interview protocol will be used. As a first step, I will inform each participant that the data being collected will be for research purposes only, and each will be assured that the obtained information will not be used for judging individual diets, but rather for identifying a general eating pattern within a group. I will then ask each interviewee to give a quick list of foods, in any order, eaten during the previous 24 hour period. After that, I will use trigger questions to probe for any food items that might have been left out (i.e. forgotten). Next, I will ask the participant to group the listed foods into eating occasions (for example breakfast, lunch, snack etc.) or eating locations (for example at home, in a restaurant, at a friend's house etc.). Then, starting with the first food item on the list, I will ask detailed questions about portion size, method of preparation or cooking and brand names. As a final step, I will perform, together with the participant, a review of all the listed foods, amounts consumed, method of preparation and any additional details provided in order to confirm that the obtained information is correct and complete. Each 24-hour recall interview will be allocated 10 to 15 minutes; this is so based on my experience as a dietician. At the end of each interview, I will thank the participant for taking part in the study and will inform him/her that two additional recalls, to be scheduled later on, will be needed. I will calculate the number of servings from each food group as well as means and standard deviations

of nutrients of interest using the Nutrition IV software program for windows which is commonly used in professional nutritional analysis.

3.8.2.1 Precision of the 24-Hour Dietary Recall

Reproducibility of a 24-Hour Dietary Recall can be measured by repeat interviews within a preset time in such a way that the subsequent interview is not too close to the former as to be influenced by it nor too far away as to affect memory (Gibson, 1990; Willet, 1990).

Because of inter and intra subject variation, estimates for individuals from single recalls, may be susceptible to misrepresentation of actual individual intake. Therefore, obtaining several 24-Hour Dietary Recalls for the same individual increases the precision of results. On the other hand, if single measurements are to be used; then, the sample size should be large (fifty or more) in order to give precise information about the group being studied (Gibson, 1990; Shils et al., 1994). Precision, with respect to the results obtained from the 24-HR Dietary Recalls, in my study will be obtained by collecting three non-consecutive recalls from each participating adolescent.

3.8.2.2 Validity of the 24-Hour Dietary Recall

With the exception of the elderly, 24-Hour Recall Methods yield similar results when actual intakes are compared to recalled intakes of energy and several other nutrients (Gibson, 1990). It is considered as a valid tool for estimating usual intakes of groups and for assessing dietary patterns (Bogle et al., 2001; Magarey and Bannerman, 2003).

3.8.2.3 Conducting the 24-Hour Dietary Recall Interviews

The 24-Hour Dietary Recalls followed a standardized interview protocol (discussed previously) usually employed in this type of semi structured interviews. The interviews were conducted within the setting of the educational institution that the students belong to. Each participant was interviewed individually in an office provided by a colleague in the case of the (HSU) conducted interviews and in an office provided by the Dar Aytam (DA) institution in the case of the vocational school. This ensured privacy and encouraged the interviewees to talk freely. Data from respondents were recorded manually and then transferred onto a special computer program for dietary analysis: Nutrition IV.

3.8.3 Semi-structured Interviews

I will use semi-structured interviews to help get information from those closest to the issues being investigated; it will be used to gain further insight into the determinants of food choice as part of the needs assessment and what is it that affects changes, or lack thereof, that will occur after applying the intervention tool (Brannen, 1992). This type of interviewing borrows techniques from both the structured and the unstructured interviews: semi-structured interviewing allows subjects to express themselves more openly than they would on a questionnaire or any other type of standardized method of data collection (Flick, 1998) since it permits the participants or interviewees to express in their own words their perspectives on situations and personal experiences (Burns, 2000; Taylor and Bogden, 1984). Nevertheless, this type of interviewing gives the encounter a guide

or direction to focus on relevant issues to the study (Burns, 2000; Taylor and Bogden, 1984).

In my study, this type of interviewing will allow for further probing of how the interviewed adolescents perceive healthy nutrition and the factors that affect their dietary choice while at the same time focusing on issues that are of concern to my research. This chosen method is among the most feasible and efficient taking into account the time frame and expense and human resource restrictions of my research project (Marshall and Rossman, 1995).

My interviewees will answer a list of pre-set questions and will be allowed to freely elaborate on them (Burns, 2000). A tape recorder will be used to tape the conversations so that all details given by respondents will be taken account of; participant consent will be obtained beforehand, and the interviewees will be briefed about the purpose and confidentiality of the recording sessions (Marshall and Rossman, 1995).

The results of interviews are thought of as trustworthy and believed to produce true and accurate information about the life and personal experiences of the interviewees. Even though, a relationship does develop between researcher and interviewee, it is believed that this does not offset or bias the results (Denzin and Lincoln, 2005).

However, interviews do have limitations (Brannen, 1992). The element of personal interaction between the researcher and the interviewee may give rise to a couple of issues. The participants may feel un-easy sharing information with the interviewer or may not give truthful answers for one reason or the other (for

example by offering pleasing or socially accepted answers) (Brannen, 1992; Denzin and Lincoln, 2005). This problem of invalidity may be overcome by comparing the interview information obtained from different respondents in the same situation, which will be the case in my study (Cohen and Manion, 1994; Denzin and Lincoln, 2005).

Another problem lies in the assumption that the interviewer may be unable to engage respondents with conversations that are long enough to allow further exploration (Brannen, 1992). This may be due either to lack of expertise and skill (Brannen, 1992; Denzin and Lincoln, 2005), or other factors such as familiarity with local language (Brannen, 1992). During the interview sessions with individual participants, phrases and words will be used to encourage them to elaborate. Further explanation or examples will be offered if interviewees indicate that they did not understand certain questions. In order to encourage interviewees to speak freely, they will be allowed to express concerns and their responses to open ended questions will be accepted without appearing judgmental or as the expert (Simons, 1981) so as not to destroy or influence a relationship of trust established with participants (Burns, 2000). The questions will be translated to Arabic to accommodate the vocational school interviewees who do not have proper command of the English language.

3.8.3.1 Designing and Piloting the semi-structured interview questions

Until recently, semi-structured interviews of this type have not been commonly used in nutrition related research; moreover, when they were used in nutritional studies, they have been employed to investigate specific issues and not to investigate the effect of an intervention (Blaxter and Paterson, 1983; Calnan, 1990; Croll, 2001; Keane and Willets, 1996; Povey et al., 1998). Therefore, I have tried to include questions that are of interest to me and that best serve the research questions of my thesis.

The questions (Appendix F) were constructed based on the results obtained from the questionnaires and the 24-Hour Dietary Recalls after piloting the nutrition intervention. It was clear at that point that although the sampled adolescents had a fair level of nutrition related knowledge, attitudes, beliefs and skills; it was not fully translated into healthy nutrition practices. Therefore, the interview questions aimed at gaining a better understanding of the underlying factors leading to that by inquiring about how interviewees viewed healthy foods and healthy eating, its affect on their health as adolescents, barriers and motivators to healthy eating and their self-efficacy in choosing a healthy diet in particular settings. Therefore, the questions will be proceed from general to more specific topics thus easing the interviewees into the subject matter (Flick, 1998). The Interviews will be conducted pre and post the intervention in order to explore changes in responses that may have been influenced by the nutrition education unit.

The questions were tried on five high school graduates from different socioeconomic status to check for clarity of the questions and the estimated

interview time. Some thought that the questions were a test of their knowledge and that there were right and wrong answers; therefore, this issue will be clarified further for the participants at the onset of the interviews. Others were not sure about the meaning of some of the questions, thus I discarded the use of technical nutrition terms and substituted them with specific examples.

3.8.3.2 Administering the interview questions

Similar to the 24-Hour Dietary Recalls, the semi-structured interviews were conducted (for both groups of sampled adolescents) in a one-to-one manner in an office. Interviewees answered a list of pre-set questions and freely elaborated on them (Burns, 2000). In contrast to the methods employed in the recall interviews, a tape recorder was used to tape the conversations so that all details given by respondents were taken account of; participant consent was obtained beforehand (Marshall and Rossman, 1995).

During the interview sessions with individual participants, phrases and words were used to encourage them to elaborate. When interviewees indicated that they did not understand certain questions, I offered further explanation or examples. Facial expressions, eye contact and smiling were used to put the interviewees at ease and show interest. I did not give any judgmental comments so as to encourage them to speak freely.

The vocational school participants were reluctant to open up at first for fear that their answers will be viewed by their school principals; these needed further reassurance of the confidentiality and anonymity of the interviews. These same interviewees were more ready to answer the interview questions post intervention.

This may be due to the fact that they became surer of the purpose of the study and more confident that their answers will not be revealed.

3.8.4 Developing the Nutrition Education Intervention

For the purpose of developing the nutrition education intervention to be used in my study, I have used the method of Intervention Mapping (Bartholomew et al., 1998, Cullen et al., 1998). This approach uses a step-wise process that combines behaviour-based theory and evidence-based data for the development and implementation of health promotion programs. It provides guidance for producing a framework that relates identified health behaviour determinants and selected program objectives with specific educational strategies and methods.

Needs Assessment

A needs assessment provides knowledge about the problem and the population and should be used as the starting point of the intervention mapping. In the absence of national Lebanese nutritional surveys and similar studies to my own in Lebanon, the literature review (Chapter 2) and data collected in the piloting stage of my study project will constitute the basis for developing my nutrition education intervention.

Reported data obtained from the various sections of the piloted questionnaire (FFQ1 administered to both the experimental and control groups) indicate that most participants had a good knowledge of the dietary guidelines, had good information concerning health problems related to calcium deficiency, being overweight, excess intake of fat and cholesterol, but most had poor awareness of

health conditions related to decreased intake of fibre, and over-consumption of sugar. Results obtained also suggest that most subjects had poor knowledge of the food guide pyramid recommendations; however, most had enough skill to differentiate between foods that are high in fat and those that are in low fat; those that are high in saturated fat and those that are low in saturated fat; those that are high in cholesterol and those that are low in cholesterol, but most were unable to pick out all the foods that are high in fibre. Most participants had some nutrition beliefs that support healthy eating; nevertheless, some misconceptions did exist; these need to be addressed. Most subjects had positive nutrition attitudes except where calcium, eating out and weight issues are concerned.

Obtained data suggest that the participants' diet was low in vegetables, fibre and milk and milk products.

Based on the above results, and on the premise that I am interested in influencing nutrition related parameters as well as dietary behaviour, my nutrition education unit was produced.

3.8.4.1 Proximal Program Objectives

Selection of Performance Objectives

In this step of intervention mapping, performance objectives are listed; this involves stating what the targeted individuals need to participate in for them to achieve the specific behaviours or what specific changes in the environment must be carried out as a result of the program. The performance objectives for the intervention in my study are listed in Table 3.1 (p. 110).

Table 3.1. Performance Objectives
* To assess and improve adequacy of one’s own current diet and to recognize un-healthy dietary practices
* To become able to compare and contrast similar food products with respect to their nutritional value as part of a healthy diet.
* To become able to formulate a healthy diet including ethnic foods.
* To be able to identify common misconceptions about fibre, milk and fast food.
* To be able to reduce the effect of barriers on personal food choice.
* To be able to make healthy food choices in different settings.

Specifying Determinants of the Performance Objectives

The possible determinants of the specified performance objectives that I considered are most amenable to change were selected based on the literature review (Chapter 2), findings from the questionnaires, semi-structured interviews and constructs from the Social Cognitive Theory.

Personal determinants included awareness of dietary and food recommendations and own intake, self-evaluation, skills and self-efficacy for choosing healthy foods and formulating a healthy diet, and beliefs and attitudes towards specific foods and availability of healthy food choices. External determinants considered were exposure to mass media and role modelling.

Differentiating the Target Population

In this step of intervention mapping performance objectives and determinants are re-visited in order to decide if they are to be modified according to variables (such as age, psychological development, previous exposure to change and socioeconomic status) characteristic of subgroups. In my study the target group was defined as 17 to 19 year old adolescents who were further differentiated into those belonging to contrasting socioeconomic status. Baseline data collection revealed that there existed several differences between the two subgroups: level of nutrition and healthy eating knowledge and awareness of its relation to health and disease prevention seemed lower in the low socioeconomic status subgroup, misconceptions related to cholesterol and perceptions of one's own dietary health additionally existed in this group, negative attitude to taste, availability of healthy food and time needed for preparation while positive attitude to change were suggested to be predominant in low socioeconomic status participants and self-efficacy was higher in the high socioeconomic status subgroup.

With these variations between subgroups in mind, it was my belief that the proximal objectives and determinants do not need to be differentiated between the two socioeconomic status groups; however, these dissimilarities may be addressed by giving more weight to certain components in the intervention when it is administered to the low socioeconomic status group (for example with regard to awareness of diet-disease relationships, more time will be allocated in the teaching modules and participants will be engaged in an in-class discussion of specific examples of family members or acquaintances that they may identify with).

Developing a Matrix of Proximal Program Objectives

A matrix of learning objectives was created for my intervention by combining performance objectives and relevant determinants which I considered may be realistically addressed within the context of my research project (Table 3.2, p.113).

Table 3.2 Matrix of Learning Objectives Arranged by Personal Determinants

Performance Objectives	Personal Determinants					
	Awareness	Skills	Self-efficacy	Self-Evaluation	Attitude	Beliefs
To assess and improve adequacy of one’s own current diet and to recognize un-healthy dietary practices	Adolescents are aware of and understand the relationship between health and food and the dangers of unhealthy eating					
	Adolescents are familiar with and understand dietary guidelines, food groups and serving size and their relation to healthy eating.	Adolescents can formulate a healthy daily menu.	Adolescents feel confident that they can assess and improve own diet.	Adolescents evaluate own diet and recognize un-healthy dietary practices.		
To become able to compare and contrast similar food products with respect to their nutritional value as part of a healthy diet.	Adolescents are aware of and understand the importance of food labels and how to read them.	Adolescents can read food labels.				
		Adolescents can use food labels to evaluate the nutritional value of various food products.				
To become able to formulate a healthy diet including ethnic foods.	Adolescents are aware and understand the nutritional benefits of habitually consumed ethnic foods.	Adolescents can fit ethnic foods into the dietary recommendations of the food guide pyramid.				

Table 3.2 (continued)		Matrix of Learning Objectives Arranged by Personal Determinants				
Performance Objectives	Personal Determinants					
	Awareness	Skills	Self-efficacy	Self-Evaluation	Attitude	Beliefs
To be able to identify common misconceptions about fibre, milk and fast food.	Adolescents are aware of common misconceptions.				Adolescents have positive attitudes towards fibre and milk consumption.	Adolescents have correct beliefs about fibre, milk and fast food consumption.
To be able to reduce the effect of barriers on personal food choice.	Adolescents are aware of what influences their food choice.	Adolescents can identify determinants of own food choice.			Adolescents have positive attitudes towards barriers to healthy eating such as time, availability and taste.	
		Adolescents develop skills to overcome barriers to healthy food choice.				
To be able to make healthy food choices in different settings.	Adolescents are aware that a typical fast food meal is high in fat.	Adolescents develop skills to cut fat content in fast food meals.				
	Adolescents are aware of the availability of healthy food choices on and off campus.	Adolescents develop skills to choose healthy foods from menus and shops.	Adolescents feel confident that they can make healthy food choices in habitually frequented restaurants and shops.		Adolescents have positive attitudes towards healthy food choice availability on and off campus.	
		Adolescents develop skills to fit fast food choices into healthy daily diet.				

Table 3.2 (continued)		Matrix of Change Objectives for External Determinants		
Performance Objectives	External Determinants			
	Role Modelling	Media Support	Availability and	
Accessibility				
To assess and improve adequacy of one's own current diet and to recognize un-healthy dietary practices.	Celebrities act as role models for adolescents	Media documentary on fast food facts and issues.		
To be able to reduce the effect of barriers on personal food choice.			Educational institution cooperates to increase availability and accessibility of healthy foods on campus (DA group only)	
To be able to make healthy food choices in different settings.		Media documentary on fast food facts and issues.		

3.8.4.2 Methods and Strategies

Nutrition interventions that are behaviourally based have been proven to be more effective than knowledge based interventions in eliciting dietary behaviour change among adolescents (Hoelscher et al., 2002). A literature review of nutrition education interventions by Hoelscher and colleagues (2002) and by Sahay and colleagues (2006) indicated that behavioural theory-based interventions were more successful in eliciting dietary change since they highlight specific desirable behaviours and put emphasis on motivators and skills that are needed to employ these behaviours (Hoelscher et al., 2002). I have used constructs from Bandura's (1982) Social Cognitive Theory which hypothesizes that personal and environmental factors interact with behaviour in a dynamic and reciprocal relationship, where personal factors include skills, self-efficacy and outcome expectancies and environmental factors include reinforcement, modelling and availability. Therefore, health behaviour change is made easier when the individual is informed about risks and benefits of specific behaviours, has the opportunity to develop and become proficient in skills needed to translate the knowledge into practice and receives social support (Bandura, 1982; Bandura, 2004). My intervention includes components that address nutrition knowledge and awareness, self efficacy, skills and modelling. Based on the data obtained in phase one, I decided that the learning objectives should focus on improving nutrition related attitudes, correcting misconceptions, decreasing the consumption of fast food and increasing fibre and calcium in the diet.

Selecting Suitable Theoretical Methods and Strategies

Suitable methods and strategies were selected to address each learning objective in Table 3.2 (p.113). A method is a generalized technique which is theoretically or empirically based that is used to influence the selected determinant of behaviour (Bartholomew et al., 1998). Choosing the theoretical method may often be achieved by responding to the question “How can change in the determinants be influenced to accomplish the proximal program objectives?” (Bartholomew et al., 1998, p. 555). Examples of useful methods often used in nutrition education include role modelling, skill building, self-assessment, guided practice and reinforcement, self-evaluation and self-assessment (Kok et al., 2004; Hoelscher et al., 2002; Contento et al., 1995; Cullen et al., 2004).

A strategy is the tool or the practical way by which the theoretical methods are delivered to the targeted group of individuals. Examples of strategies often used to carry out chosen methods such as self-monitoring, modelling and skill practice include diaries, role-model stories and role playing, respectively (Bartholomew et al., 1998).

Strategies that have been proposed to be effective in raising awareness to personal relevance and in encouraging individuals to adopt healthy eating behaviours are self-monitoring and feedback (Madsen et al. 1993; Brug et al., 1999; Oenema and Brug, 2003). It is suggested that for an individual to become aware of a personal risk factor, it should be preceded by knowledge that a health risk factor is associated with a specified behaviour and that the behaviour is prevalent (Weinstein, 1988). Brug and colleagues (1995, 1998) propose that the estimation of

one's own dietary intake and comparing it to set recommendations or to that of others may be an effective strategy of self assessment or self-evaluation.

Bandura (1986, 2004) indicates that in order to perform a behaviour, an individual must first know what should be done and how it may be carried out. This is also referred to as behavioural capability. Suggested strategies for addressing behavioural capabilities include skills training in order to promote mastery learning. Among the strategies proposed for increasing self-efficacy are self-monitoring or record keeping and receiving feedback on that for re-enforcement. Role modelling refers to observational learning where one learns through others' experiences and behaviours. It is often through observing credible others that this may be achieved. Reinforcement-in this case positive reinforcement- increases the chance that a person may repeat certain behaviours. It may be in the form of external rewards such as praise or verbal encouragement or they may be in the form of internal rewards such as what an individual does to reward himself (Bandura, 1986; 2004).

Taking the above into account, the following table (Table 3.3, p.119) which summarizes the theoretical methods and strategies that were considered suitable to reach the learning objectives in my intervention, was developed.

Table 3.3 Theoretical methods matched with practical strategies, identified for the intervention program.

Determinant	Methods from theory	Strategy	Tools/Materials
Knowledge/Beliefs	Passive learning/providing information	Providing written and verbal information	Information in print materials (hand outs) Power point presentations Media documentary
	Active processing of information	Evaluating understanding	Activity worksheets
Awareness	Self-monitoring and feedback	Monitoring of own behaviour Comparison to set recommendations	Food diary Activity worksheets Group discussions In-class demonstration
Skills	Guided practice	Skills training	In-Class Hands-on activities Worksheets Group discussions Formulating menus Practice reading and comparing food labels
		Providing feedback	
Role Modelling	Observational learning	Providing information on credible role models performing the targeted behaviour	Group discussions Activity worksheet about famous people’s healthy eating practices
Reinforcement	Repetition and feedback	Providing feedback Evaluation of change processes Analysis of difficult situations	Activity Worksheets Group discussions Media documentary
Self-Evaluation	Self monitoring and feedback	Individualized feedback	Take home assignments
Self efficacy	Self evaluation and feedback	Individualized feedback	Discussion barriers/difficult situations, possible solutions Take home Assignments In-class hands-on activities
			In-Class Hands-on activities Worksheets Group discussions Formulating menus Practice reading and comparing food labels
	Guided practice	Skills training	
		Providing feedback	
Attitude	Reinforcement	Providing feedback	Activity Worksheets
	Decisional Balance	Association of attitude object with other positive stimuli	Role model stories Group discussions
	Reinforcement	Providing feedback	Activity worksheet
	Role modelling	Providing information	Media documentary

While designing the instructional program of my intervention the following was taken into consideration: the material is organized in a logical manner, each lesson builds on previous ideas and progresses from what is familiar or may have been already encountered to the less familiar and new ideas, moves from the general to the more specific that is it tailors to the targeted group of adolescents' needs. Skills training introduces one skill at a time and builds on previously acquired skills. Content that is perceived interesting and relevant to every day situations encountered by the adolescents is used and each learning experience is followed by an immediate hands on activity that involves problem solving and feedback (Achterberg and Miller, 2004; Braxton et al., 1997; Seels, 1997; Wilson and Cole, 1992).

Delivery strategies reported to be effective in nutrition education include hands-on learning, repetition and ample opportunity to participate in discussion and interactive activities (Birkett et al., 2004; Edward and Evers, 2001; Hartman et al., 1994; Holston et al., 2004; Macario et al., 1998). In addition, demonstrations, hand outs and active involvement in analyzing one's diet have been reported among teaching methods that work (Macario et al., 1998; Meloy, 1998; Randall et al., 1995). Other nutrition education strategies that are recommended are those that avoid medical terms and employ practical action steps which clarify abstract nutrition concepts (Hartman et al., 1994; Loughrey et al., 2001). These factors were all taken into account when activities for the intervention were being selected.

3.8.4.3 Program Design

Guided by table 3.2 (p.113) and table 3.3 (p.119) intervention tools and activities were developed such that they fitted the methods and learning objectives identified in earlier sections and that were applicable given the time, setting and financial restraints of my research project. These were activities that I have either customized from other existing educational components which I usually use in my teaching or which I have developed having taught and worked with adolescents of the same age group as my sample for over a period of ten years both in academia and dietetic practice. The program was meant to be applicable in both high socioeconomic status and low socioeconomic status subgroups with little adaptation and was arranged into two components: the first was a classroom component comprising of educational material for adolescents supplemented with worksheets and guided hands on activities for in and out of the classroom; the second was an environment component (only for the low socioeconomic status subgroup) where the DA institution increased the availability and accessibility of healthy food in the on campus food service facility. Table 3.4 (p. 132) shows the selected strategies related to the learning objectives and modifiable determinants.

The aim of the designed intervention sessions was to provide relevant nutrition education in a simple, practical and fun format. The twelve sessions featured information and activities based on findings from the baseline data collected and involved determinants that affected eating behaviours and situations that the targeted adolescents encounter in their daily lives. Each of the sessions focused on one or more determinants of food choice and entertaining activities

were developed to reinforce each lesson. The take home assignments were used as means of evaluating whether participants achieved the learning objectives.

The first two lessons of the intervention aimed at raising the awareness and information processing of the targeted adolescents with respect to the relation of diet and disease, dietary guidelines and recommendations and healthy food choice.

The third and sixth lessons used guided practice in order to help train the adolescents in skills needed to formulate daily menus that are consistent with healthy eating and that incorporate ethnic foods. During the piloting of the intervention, this activity was carried out with each adolescent formulating a written menu and receiving feedback from the instructor. However, this resulted in replication of the menus and in the development of very basic menus that did not allow for variety. Therefore, in the final version of the intervention; actual food products were brought into the classroom and the adolescents worked in groups to plan the daily menus using the provided items. This allowed for more interaction among the group members and for the development of several healthy daily menus illustrating that a healthy diet may include different varieties of food products.

The take home assignment, following lesson three, required that the adolescents self-monitor their diet for 24-hours and self-evaluate their food intake according to the food guide pyramid recommendations. They, then, received feedback from the instructor. This activity aimed at raising the awareness of the participants with regards to any personal un-healthy dietary practices and at helping them identify risk behaviours which they may choose to change. The feedback

evaluation the adolescents received was intended to help improve their feeling of self-efficacy.

The fourth lesson included a guided activity where adolescents evaluate famous peoples' diets. This served as role modelling as well as reinforcement for the dietary guidelines and recommendations.

In this lesson, similar to lessons one and two, awareness and information processing pertaining to food labels is addressed. This was followed by guided practice activities, lesson five, similar to lesson three, and an at-home assignment after which they receive feedback from the instructor. These activities were intended to train the adolescents in skills needed to choose healthy packaged foods and fit them into their diet as well as to help improve their self-efficacy in doing so. In the piloted intervention, food labels were discussed and only in-class activities in the form of hand outs were carried out. In the final version of the intervention, the packaged food items brought into class as well as the take-home assignment gave a chance for the adolescents to practice what was theoretically learned and get feedback from the instructor. This aimed at skill training in and improving their sense of self-efficacy for reading and using food labels.

Lessons seven to ten aimed at facilitating the choice to eat healthy by helping adolescents to identify personal misconceptions and barriers to healthy eating and by guiding them to the possibility of personal choice in ways to overcome these barriers.

Lessons eleven and twelve build on the previous three lessons. They aimed at raising the awareness of the adolescents that fast food is high in energy and fats,

that fast foods may fit into a healthy diet and at reinforcing the dietary guidelines and recommendations of the food guide pyramid. Additionally, the adolescents were given a chance to practice healthy eating while dining out, to report their experience in class and to receive individualized feedback from the instructor. This aimed at helping adolescents acquire a positive attitude to as well as improving their skills and self-efficacy in choosing healthy foods on and off campus.

The media documentary on fast foods was intended to reinforce the relationship between food choice and disease as well as fast food facts. It was also aimed at helping participating adolescents discover how multi-media may influence their food choice. A detailed description of the different lessons, the context in which they were administered and pertaining activities is presented below.

Session1: Education Worksheet on the relationship between health and food

The difference between communicable and non-communicable diseases is explained to students. A worksheet is distributed to students. Each student is asked to write a list of all the diseases that he /she has heard of. Then students are asked to categorize them into communicable and non-communicable diseases. A list of non-communicable diseases is developed from the students answers and is written on the classroom black board. The students are asked to raise their hands if they know anyone which has any of the diseases. Afterwards the students are asked to take notice that each person in the class room knows someone with at least one of the listed diseases; therefore coming to the conclusion that these diseases are common in the community as well as within each family.

After that, the students are asked to comment on what they think the cause of each of the diseases is and are then made aware that most communicable diseases have a relationship to dietary practices and un-healthy eating, thus concluding that diet has an essential role both in the prevention and the treatment of common communicable diseases.

Session 2: Education worksheet on the food guide pyramid and dietary guidelines

Handouts about the dietary recommendations and the food guide pyramid are distributed to students in the class room. Each of the dietary recommendations is discussed with feedback from the students as to the reason why they believe each recommendation is included. Each of the recommendations is then related back to the diseases depicted in session one.

As a second step, the students are asked to put away the dietary recommendations hand out; they are then asked to recite all the recommendations. This activity serves as a tool to introduce the importance of the food guide pyramid as a pictorial representation which may be easily remembered and in turn facilitate following the dietary recommendations. This is explained as being similar to a music video which makes a song more popular and easy to remember than just listening to it on the radio. Each of the recommendations is then related to the food guide pyramid. The shape of the pyramid and the different food groups are discussed in class. Examples from the different food groups are elicited and a list of the different portion sizes from each group is distributed to the students.

An in-class activity is performed: students are given a daily menu and are asked to evaluate it according to the food guide pyramid in terms of number of portions from each food group. Students are asked to comment on how healthy they thought the menus were and how they may be improved.

Session 3: In Class Activity

Different food items are provided to the students in class. Several choices from each food group are made available to the students. The students are divided into groups of five. Each group is asked to use the different foods for the formulation of a one day healthy menu in accordance with the food guide pyramid. The different groups then present their menu and explain the reason behind their choices. The instructor gives feedback on each group's performance and makes students aware that different foods may constitute a healthy diet depending on personal preferences.

The students are then given a take home assignment where they have to record their food intake for 24-hours and then evaluate their intake with respect to the recommendations of the food guide pyramid. Each student has to comment, in writing, on the type and amounts of foods consumed and what he/she thinks is missing or is in excess in his/her diet. Each student has to depict what he thinks are un-healthy dietary practices and recommend how his/her diet may be improved.

Each student is given feedback on the take home assignment; if a student was unable to complete the task successfully, he is given a chance to repeat the assignment after a one on one meeting with the instructor to clarify any un-clear issues.

Session 4: Role Modelling/Food Label

In-class activity: articles about two famous people's daily dietary intake are distributed to students in class. One of the celebrities is a known female actress and the other a famous race car driver; they were chosen because of their healthy lifestyle. Students are asked to assess the diets of these celebrities according to the food guide pyramid and comment on how healthy the provided daily menu for each celebrity was. This activity was used to reinforce evaluating food intake and guidelines of the food guide pyramid. The activity is used to depict the two famous figures as role models of healthy eating.

Food label reading is introduced in class. How to read a food label and the importance of the different components of a food label is discussed. The different uses of a food label are explained to the students.

The in-class activity in session three is repeated but this time additional packaged food items are provided. This is done to elicit the aim of food labels and how they may be used to enable individuals to compare and to include different packaged food products into a healthy diet.

In class activity: Each student is given a food label and is asked to comment on whether the food product is healthy or un-healthy with regards to the information provided on the food label.

At home assignment: each student is asked to choose a packaged food product that he/she habitually consumes and then comment on it.

Adolescents receive feedback on their assignments. Students who do not perform well on the assignment are given a chance to repeat it after a one on one meeting with the instructor to clarify un-clear issues.

Session 5: In-class activity

Students are divided into groups of four or five. Each group is provided with similar food products with different brand names. They are asked to depict which is healthier and explain the reason behind their choice. Students are given feedback on their product choice. Students are made aware that the more energy dense a food is, the less of it fits into a healthy diet. A discussion of how the less healthy food products may be included as part of a healthy diet by making changes in the day's food choice.

Session 6: Ethnic foods

An in-class discussion is made in class where students are asked to name as many ethnic foods as they can remember. Students are then asked to break down the different composite ethnic dishes into the food components that fit into the food guide pyramid. Feedback from the students is then obtained as to how they would evaluate the ethnic recipes as part of healthy diet. This activity demonstrates that the Lebanese recipes which are based on vegetable and whole grain products are healthy especially if they are prepared with moderate amounts of olive or vegetable oil. The activity also reinforces the recommendations of the food guide pyramid.

Sessions 7 and 8: Misconceptions and attitudes- Nutrition IQ Game

Nutrition IQ Game: the students are divided into two groups. They are handed out a list of common misconceptions compiled by the instructor. Students from each group have to comment on each statement with True or False and explain the reason behind their choice. The team who gets the most number of correct answers wins.

Answer sheets are then distributed to the students and each of the misconceptions is discussed with emphasis on how the students may recognize misleading statements.

This game raises the awareness of students of common misconceptions that exist and emphasizes the importance of certain food products such as fibre and milk through a discussion of students' views and beliefs regarding the importance of these food products.

Sessions 9 and 10: Determinants of Food Choice

A discussion of how individuals make their food choices is initiated in class by the instructor. Feedback from the students is asked for by the instructor. A list of all mentioned determinants is compiled on the black board. Students are then asked to place each under headings: individual, environmental and social. The students are then handed out a worksheet with all the determinants and they are asked to individually think about and write down the different determinants which each thinks plays a part in his/her food choice.

Each student is then given a chance to share, with the rest of the students, why he/she thinks these are the determinants that influence his/her food choice.

Students are asked to think of ways to change their eating habits by targeting specific determinants. Feedback is given by the instructor on how certain barriers to healthy eating may be overcome as well as by other students on ways they think may be effective in changing certain determinants of food choice. This activity enables students to recognize that food choice is determined by different factors that may be changed and that different individuals in a similar group may be under the influence of similar determinants. This activity also provides students with practical tools to use for changing un-healthy eating habits.

Session 11: Dining Out

The session begins with the instructor inquiring how often students dine out. Students are asked to raise their hands when if they dine out once, twice, three, four times or more times per week. This is used to demonstrate to the students that adolescents dine out quite often. Handouts that list the typical energy and fat content of popular fast foods are distributed in class. The different items are discussed and students are asked whether they have consumed the item during the previous week. This is followed by an in-class visual demonstration of how much fat some fast food items contain using teaspoons of butter. This is followed by a discussion of fats and how they fit into a healthy diet. The handouts are then revisited in order to depict ways to decrease the fat and energy content of typical fast food meals. Alternative ways are discussed of how fast food may be part of a healthy daily menu.

The students are then handed out photocopies of menus from different restaurants and fast food establishments that exist in the surrounding area of the

campus. An in-class activity is carried out: students are divided into groups of four or five and each group participates by formulating a healthy meal from the menu, sharing their choice with the other students and explaining why in their opinion this is a healthy combination. Feedback and reinforcement is provided by the instructor. This activity helps students identify that healthy choices may be made in all types of fast food establishments and that eating healthy does not indicate that they are unable to frequent popular hang out food establishments.

The students are asked to practice what was discussed in class by consuming a meal at a fast food restaurant and sharing their experience with the class in a following session; whether they were able to choose healthy or whether they changed other components of their daily intake.

Session 12: Facilitating Overcoming Barriers

Students are asked about their restaurant activity and various issues that they encountered while making their food choice. Students receive feedback from the instructor and any queries are answered and discussed among the students with feedback and reinforcement from the instructor. Components of a healthy diet and the food guide pyramid are revisited.

Multi-media session

This session is not carried out during class hours. A convenient time for both the instructor and the adolescents in the experimental group is agreed upon during which a documentary on fast food facts and issues is viewed. A discussion of the movie is then carried out after the viewing. The documentary aims at revisiting fast food facts and the consequences of unhealthy eating.

Table 3.4 Selected Educational Strategies Related to Learning Objectives and Modifiable Determinants

Learning Objectives	Determinants						
	Awareness	Skills	Self-efficacy	Self-Evaluation	Re-enforcement	Attitude	Beliefs
Adolescents are aware of and understand the relationship between health and food and the dangers of unhealthy eating	Education worksheet on relationship between health and food						
Adolescents know and understand dietary guidelines, food groups and serving size and their relation to healthy eating.	Education worksheet on Food Guide Pyramid and Dietary Guidelines						
Adolescents can formulate a healthy daily menu.		Adolescent are provided with different food items and are asked to formulate a healthy menu for one day using the various food items					
Adolescents evaluate own diet and recognize un-healthy dietary practices.				Adolescents are given a take home assignment in which they have to write down what they eat and evaluate their diets according to the food guide pyramid and dietary recommendations			

Table 3.4 (continued) Selected Educational Strategies Related to Learning Objectives and Modifiable Determinants

Learning Objectives	Determinants					
	Awareness	Skills	Self-efficacy	Self-Evaluation	Re-enforcement	Attitude
Adolescents feel confident that they can assess and improve own diet.			Adolescents receive feedback and encouragement on the take home assignment			
Adolescents know and understand the importance of food labels and how to read them.	Education worksheet on Food Label Reading					
Adolescents can read food labels.		Each adolescent is a given a food product label and asked to report on the information provided by the food label- in-class activity				
		Each adolescent is asked to report on the information provided by the food label on a habitually consumed product- at-home assignment.	Adolescents receive feedback and encouragement on the take home assignment			

Table 3.4 (continued) Selected Educational Strategies Related to Learning Objectives and Modifiable Determinants

Learning Objectives	Determinants					
	Awareness	Skills	Self-efficacy	Self-Evaluation	Re-enforcement	Attitude
Adolescents can use food labels to evaluate the nutritional value of various food products.		Adolescents are divided into groups of four; different brand names of similar food products were provided to each group and each was asked to compare and contrast the sets of food products in order to decide which was healthier.	Adolescents receive feedback and encouragement in class.			
Adolescents are aware of and understand the nutritional benefits of habitually consumed ethnic foods.	Education worksheet					
Adolescents can fit ethnic foods into the dietary recommendations of the food guide pyramid.		Guided activity: a list of ethnic foods is provided to students and they are asked to sort out the foods with respect to components of the food guide pyramid		Guided activity: a list of ethnic foods is provided to students and they are asked to sort out the foods with respect to components of the food guide pyramid		

Table 3.4 (continued) **Selected Educational Strategies Related to Learning Objectives and Modifiable Determinants**

Learning Objectives	Determinants						
	Awareness	Skills	Self-efficacy	Self-Evaluation	Re-enforcement	Attitude	Beliefs
Adolescents are aware of and understand common misconceptions.	Education worksheet						
Adolescents have positive attitudes towards fibre and milk consumption.						Nutrition IQ: Game and Handout	
Adolescents have correct beliefs about fibre, milk and fast food consumption.							Nutrition IQ: Game and Handout
Adolescents are aware of what influences their food choice.	Education worksheet: the various determinants of food choice are discussed in class. Each student gives examples and they are divided under individual, environmental, social.						
Adolescents can identify determinants of own food choice.		Guided activity: Each adolescent is asked to write down what he thought were most influential on his food choice.		Guided activity: Each adolescent discusses why he chose particular determinants.			

Table 3.4 (continued) Selected Educational Strategies Related to Learning Objectives and Modifiable Determinants

Learning Objectives	Determinants						
	Awareness	Skills	Self-efficacy	Self-Evaluation	Re-enforcement	Attitude	Beliefs
Adolescents develop skills to overcome barriers to healthy food choice.		Classroom discussions of ways in which each student may change some of the determinants; feedback and recommendations from peers.					
Adolescents have improved attitudes towards barriers to healthy eating such as time, availability and taste.						Adolescents receive feedback and input from instructor on practical ways to overcome barriers to healthy eating.	
Adolescents are aware that a typical fast food meal is high in fat.	In-class visual demonstration of how much fat some types of fast food items contain using teaspoons of butter.						
Adolescents develop skills to cut fat content in fast food meals.		Education worksheet and guided activity.					
Adolescents are aware of the availability of healthy food choices on and off campus.	Education worksheet: I Can Eat Healthy Wherever I Dine						

Table 3.4 (continued) **Selected Educational Strategies Related to Learning Objectives and Modifiable Determinants**

Learning Objectives	Determinants						
	Awareness	Skills	Self-efficacy	Self-Evaluation	Re-enforcement	Attitude	Beliefs
Adolescents develop skills to choose healthy foods from menus and shops.		Guided Activity: menus from different outlets/restaurants around the educational institution are collected and distributed to adolescents. They are then discussed. Adolescents are divided into groups and asked to pick out healthy items from the menus suitable different meal types (lunch, dinner etc.).					
Adolescents feel confident that they can make healthy food choices in habitually frequented restaurants and shops.			Guided Activity: adolescents are asked to consume a dinner meal at a restaurant or fast food establishment and report the following day, in class, about the experience.				

Table 3.4 (continued) **Selected Educational Strategies Related to Learning Objectives and Modifiable Determinants**

Learning Objectives	Determinants						
	Awareness	Skills	Self-efficacy	Self-Evaluation	Re-enforcement	Attitude	Beliefs
Adolescents have positive attitudes towards healthy food choice availability on and off campus.						Adolescents receive feedback with regards to restaurant activity. They are asked to discuss their feelings of how easy or hard it was.	
Adolescents develop skills to fit fast food choices into healthy daily diet.		Guided activity: different ways to include fast food choices are discussed and applied to own diet.			In the guided activity the various components of healthy diet according to the food guide pyramid are re-visited.		

Table 3.4 (continued) Selected Strategies Related to Modifiable External Determinants

Learning Objectives	External Determinants		
	Role Modelling	Media Support	Availability and Accessibility
Celebrities act as role models for adolescents	Guided Activity: Articles about famous people who eat healthy are distributed to students for them to assess according to the food guide pyramid		
DA adolescents find healthy food choices at food service facility on campus			Educational institution cooperates to increase availability and accessibility of healthy foods on campus (DA group only)
To be able to make healthy food choices in different settings.		Media documentary on fast food facts and issues.	

Piloting the Intervention

During the intervention pilot, nutrition education was provided to the experimental target group over a period of 12 weeks (12 sessions). A control group was matched for age, accessibility and acceptance to participate in the study. In the control group, no nutrition education was provided.

Preliminary results indicated only a small change in the tested nutritional parameters after the instruction of the intervention unit, mostly in relation to knowledge. Therefore, some of its components were reconsidered; additional hands on activities that address attitude, skills and self-efficacy were added and a multi-media resource (Super Size Me documentary) that focuses on the widespread and the health effects of fast food consumption was incorporated in the intervention. Table 3.4 (p. 132) displays the improved intervention and includes the selected strategies that were used in relation to the learning objectives and modifiable determinants.

3.8.4.4 Adoption and Implementation

In this step developing an implementation plan for the intervention is carried out. This involved meetings with gatekeepers at both institutions in order to arrange for the schedule and the duration of the intervention program and sessions. Since I personally conducted the different components of the intervention, there was no need to meet with teachers or provide guidance on how the materials are to be used. However, in the DA institution various meetings with the director of health services were conducted in order to plan and implement a new healthy food choice menu at the food services facility on site.

Administering the intervention

Nutrition education was provided to the experimental target group, separately within each socioeconomic status setting, over a period of 12 weeks in the form of 12 one hour sessions. A control group was matched for age, accessibility and acceptance to participate in the study. In the control group, no nutrition education was provided.

The intervention unit was administered in class and was in the form of power point presentations, handouts and group discussions and activities. At HSU I took over a colleague's class while at DA special after class sessions were convened for the purpose of the study.

Instruction in the HSU sample was conducted between the months of October 2005 and January 2006 and between the months of January 2006 and April 2006 in the DA sample.

The same material was used for both HSU and DA samples; however, it was translated into Arabic for the sake of the DA participants since most of the students were not proficient in English.

3.8.4.5 Monitoring and Evaluation

This task involves developing an evaluation plan and creating evaluation instruments to assess the effect of the intervention. The matrix developed in step one in intervention mapping allows the creation and use of tools and constructs that can measure changes in the specific performance objectives and their determinants.

Evaluation in my project was based on questionnaires, 24-Hour Dietary Recalls and semi-structured interviews.

3.9 Data Analysis

3.9.1 Quantitative Data Analysis

The questionnaires were reviewed when received. I checked for completeness such that questionnaires with five or more missing answers were discarded.

Information about commonly used available statistical tools for the processing, analysis and presentation of results were reviewed (Blaikie, 2003; Braise and Braise, 2003; Burns, 2000; Heiman, 2001; Robson, 1997). Since the questions in my questionnaire are of the close ended type, they were coded and transferred onto SPSS statistical package for Windows version 12.0.

Descriptive statistics in the form of frequencies were used in order to synthesize and report data at baseline and post intervention. At baseline, data collected from the experimental group and the control group (within each socioeconomic status group) was statistically compared in order to verify that they were starting off at the same level. Differences between pre and post results (experimental versus control) were then used to investigate the effect of the nutrition intervention. Differences were used in order to reduce the effect of external factors (other than those taken account for in the study: age, socioeconomic status) that may have influenced results. Chi-Square statistical test was used for investigating change in nominal data, while the Mann-Whitney U Test

was used for continuous data. Mann Whitney was used since the sample was not normally distributed to begin with and failed to assume normal distribution after Log Transformation. Significance was set at $p < 0.05$.

3.9.2 Qualitative Data

3.9.2.1 24-Hour Dietary Recalls

The data recorded from the 24-Hour Dietary Recalls was transferred onto a computer program (Nutrition IV) specially used for the analysis of this type of information. Means and standard deviation as well as number of servings from each food group were used to validate results obtained from the FFQ. The Mann Whitney U Test was used to explore changes between differences of pre and post intervention results (experimental versus control groups).

3.9.2.2 Semi-structured Interviews

In qualitative data analysis, researchers relate their interpretations of the data to the questions they are trying to address and also to existing theories in the field. Feldman (1995) argues that in qualitative studies, the difficulty of analysis lies in “learning how to get away from pre-established interpretations” (p. 64) such as those by other researchers in the field and attempt instead to gain new understandings that the data provide of the studied phenomena. The researcher is encouraged to find the meanings that certain behaviours and attitudes generate, that is, the “underlying reality” (Feldman, 1995, p. 65).

Analyzing data is done by organizing and arranging it in categories of concepts that seem to belong in groups and that are relevant to the study focus. It

involves summarizing and reporting the data to reveal relationships and structures and “identify patterned regularities” and even single instances that help the researcher understand what is beyond the data (Wolcott, 1994, p. 33). Burns (2000) refers to that as the inductive method where hypotheses are grounded in the data and “should be truer to life than those generated through deduction” (p. 434).

Categories are concepts that emerge from the collected data. The literature review developed earlier by the researcher may serve as a guideline to come up with categories that help in data coding (Brannen, 1992). They describe and convey the “problems, issues, concerns, and matters that are important to those being studied” (Strauss and Corbin, 1998, p. 114). Researchers name categories according to the focus of the research and the research context. Researchers read the transcripts of data and identify concepts relevant to their research focus then the numerous concepts are grouped under more explanatory categories that describe the different patterns that the researcher sees in the data (Strauss and Corbin, 1998).

The researcher is cautioned that while pre-establishing categories for data to collect may help in focusing the study, it may lead to discarding of unusual data which may prove valuable to the research (Brannen, 1992). Not every participant fits a pattern completely, but words of one respondent and words of many are both important (Strauss and Corbin, 1998).

Transcribing and Preparation of Data

Preparing the qualitative data for my semi-structured interview analysis was done in two steps: first I started by writing up the texts from the tape recorded interviews; then, I typed these on word processor. This procedure was followed since my responses were a combination of English and Arabic, thus, I found it easier to translate and double check the translation using this approach. Every one hour of recording time needed approximately eight hours for transcribing, translating and typing.

Each interview session was dated and the name of the interviewee, the name of the institution and whether the interview was conducted pre or post intervention were included.

Throughout the interviews, I had noted some of the actions and attitudes of the interviewees during the process; these were recorded afterwards and were typed for later use during analysis.

Coding and Analysis

Reading and re-reading the data will help the researcher become familiar with the data (Marshall and Rossman, 1995). Prior to the conducting the interviews, I did not formulate a pre-set list of categories of data to collect. I preferred to identify themes as they emerged in the course of the responses to the interview questions since I was interested not only in recurrent but also in unusual or atypical data as well (Brannen, 1992; Strauss and Corbin, 1998; Wolcott, 1994).

As patterns and themes in the data were identified, I used colour coding to high light them. Re-reading the coded texts helped me to decide on different categories that are important to my research questions and to group recurring similar concepts under the relevant categories (Marshall and Rossman, 1995 and Strauss and Corbin, 1998).

I tabulated the results, and the frequency of occurrence of different concepts under each category was recorded (Marshall and Rossman, 1995; Robson, 1997). This made it easier for me to identify the key features and trends of the concepts being investigated as well as variations, which was important in order to investigate changes between pre and post intervention results as well as differences among the contrasting socioeconomic status groups of adolescents being studied.

3.10 Conclusion

Using a quasi-experimental research design and applying multi-method data collection served the purpose of developing and exploring the effect of a multi component nutrition education intervention and factors that affect the outcome results in the sampled group of adolescents. However, data collection methods and producing and refining the intervention proved to be time and effort consuming.

**Table 3.5. Reproducibility of the Food Frequency Questionnaire:
Pearson Correlation Coefficient (p<0.05) (n=27)**

Section B- Knowledge of Nutrition Guidelines	Pearson Correlation Coefficient
In your opinion, how important is it to maintain a healthy weight?	0.552
In your opinion, how important is it to eat a variety of food?	1.000
In your opinion, how important is it to choose a diet with plenty of bread, cereal or pasta?	0.003*
In your opinion, how important is it to choose a diet with plenty of fruits & vegetables?	0.654
In your opinion, how important is it to drink milk/dairy products everyday?	0.994
In your opinion, how important is it to eat an adequate amount of fibre each day?	0.754
In your opinion, how important is it to choose a diet that is low in fat?	0.369
In your opinion, how important is it to choose a diet that is low in saturated fat?	0.752
In your opinion, how important is it to choose a diet that is low in cholesterol?	0.564
In your opinion, how important is it to use salt in moderation?	0.771
In your opinion, how important is it to use sugar in moderation?	0.668
Section C- Knowledge of Diet –Disease Relationship	
Do you know of any health problems related to not eating enough calcium?	0.513
Do you know of any health problems related to being overweight?	0.928
Do you know of any health problems related to eating too much fat?	0.484
Do you know of any health problems related to eating too much cholesterol?	0.573
Do you know of any health problems related to not eating enough fibre?	0.573
Do you know of any health problems related to eating too much sugar?	0.100

Table 3.5 (continued)	
Do you know of any health problems related to eating too much salt?	0.785
Section D- Knowledge of Nutrient Sources/ Skills of Selecting Foods	
Rank the following in the correct order	0.780
Some people read the nutrition label before buying a food product	0.734
You get nutrition information mostly from	0.342
Based on your knowledge, which has more fat?	
Baked Potato or Fried potato	0.317
Turkey mortedella or hotdog	0.812
White cheese or yellow cheese	0.336
Yogurt or sour cream	0.476
Chicken or meat	0.559
Ketchup or Mayonnaise	0.313
Sorbet or ice cream	0.845
Based on your knowledge, which has more saturated fat?	
Steak or liver	0.243
Margarine or Butter	0.363
Egg white or Egg yolk	0.726
Skim milk or whole milk	0.655
Based on your knowledge, which has more cholesterol?	
Steak or liver	0.728
Margarine or Butter	0.423
Egg white or Egg yolk	0.672
Skim milk or whole milk	0.953
Based on your knowledge, which has more fibre?	
Meat or Fruit	0.641
White Bread or Brown Bread	0.293
Orange juice or apple juice	0.312
Lettuce or Beans	0.386
Crackers or popcorn	0.146

Table 3.5 (continued)	
Section E: Nutritional Beliefs	
Eating a variety of food each day, probably gives you all the vitamins and minerals you need	0.458
Only fats are fattening	0.427
Fast foods are high in salt and fat	0.276
A fat that is a solid is usually high in saturated fat	0.905
Cholesterol is only found in animal products	0.632
Skipping meals is a good way to lose weight	0.978
Eating at least one source of iron each day is important for good health	0.834
A person needs to drink milk only during childhood	0.231
Starchy foods like bread, potatoes and rice make people fat	0.792
What you eat can make a big difference in your chance of getting a disease	0.557
In your opinion, the foods that you are eating now	0.944
Section F: Nutrition Attitude	
I have no time to prepare healthy meals	0.905

Table 3.5 (continued)	
It is too hard to find good healthy meals at the university	0.292
There are many recommendations about healthy ways to eat, it's hard to know what to believe	0.612
Decreasing the fat content of my diet would	0.221
It would be easy for me to reduce the amount of fat in my diet	0.070
Increasing the fibre content of my diet would be	0.160
It would be easy for me to increase the amount of fibre in my diet	0.888
I find the nutrition information on foods in the supermarket to be very helpful	0.844
I enjoy food too much to worry about its fat content	0.282
I enjoy food too much to worry about my weight	0.419
I am still too young to worry about getting good amount of calcium in my	0.454
<u>Section G: Dietary Practice</u>	
How many meals do you eat per day	0.558
Do you skip any meals	0.258
If you do skip meals, which one?	0.745

Table 3.5 (continued)	
If you skip meals, why?	0.849
Where do you eat most of your meals?	0.630
How often do you eat fast foods?	0.856
How often do you eat French fries?	0.980
How often do you eat a mankoushe?	0.424
How often do you sweets?	0.145
How often do you eat salty snacks?	0.160
How often do you eat bread?	0.261
How often do you eat pasta, rice and potatoes?	0.653
How often do you drink milk or yogurt?	0.224
How often do you eat cheese or labneh?	0.522
How often do you eat red meat?	0.691
How often do you eat chix	0.991
How often do you eat fish?	0.767
How often do you eat eggs?	0.613
How often do you eat beans, lentils or peas?	0.686
How often do you eat hotdogs or mortedella?	0.840
How often do you eat cooked vegetables in preparation of dishes?	0.423

Table 3.5 (continued)	
How often do you eat raw vegetables alone or in salads?	0.300
How often do you eat fruits?	0.050
How often do you drink fruit juice?	0.380
How often do you drink soft drinks?	0.446
How often do you drink coffee or tea?	0.744
Do you add salt to your food?	0.427
How many spoons of sugar do you use per day?	0.191

- Significant Difference Between FFQ1 and FFQ2

Chapter 4: Data Presentation and Analysis

4.1 Introduction

This chapter includes the results obtained through the different methods of data collection that I have employed in my study. It presents data from the questionnaires and the semi-structured interviews in the form of narratives and tables.

The data was collected in two phases: pre-intervention and post intervention. The data is presented on an institution basis such that I state the name of the institution and relevant data from the each phase is grouped in subdivisions related to the method of data collection used. In the two institutions, data about demographic characteristics of the participants, nutrition related knowledge, skills, attitude, beliefs and dietary practices was collected through questionnaires distributed to the sampled adolescents of both an experimental and a control group. Dietary intake was estimated using 24-Hour Dietary Recall interviews. I also collected data about factors that affect healthy eating and food choice through interviewing the same students from the two institutions during both phase one and phase two of the study.

4.2 HSU

4.2.1 Demographic Characteristics of Participants (Gender and Age)

The HSU sample consisted of 110 participants (67 females and 43 males). Of these, 74 (46 females and 28 males) were assigned to the experimental group

and received the nutrition educational intervention; the remainder 36 (21 females and 15 males) were assigned to the control group and did not receive any educational material. The mean age of the participating adolescents was 19.58 ± 1.66 years (Table 4.1).

The experimental group and control group were matched for age, socioeconomic status and gender. Chi square statistical test showed that the two groups did not differ in terms of baseline gender distribution within each group 0.699 (p<0.05); the Mann-Whitney statistical test showed no significant difference between the control and experimental groups in age at baseline 0.545 (p<0.05). Socioeconomic status was assumed similar in both groups since they attended the same university and paid comparable tuition fees.

Table 4.1 Demographic Characteristics of HSU Study Participants

<u>Variable</u>	
Mean Age (±SD)	19.58±1.66 Years
Gender (%)	
Male	39
Female	61
Condition (%)	
Experimental	67
Control	33

4.2.2 Dependant Variables - Phase One – Pre Intervention

4.2.2.1 Questionnaires

At baseline, knowledge of dietary guidelines, knowledge of diet related diseases, food selection skills, nutritional beliefs and nutritional attitudes in the experimental group and the control group were similar as determined by the Mann-Whitney non-parametric statistical test and Chi-Square ($p < 0.05$) (Table 4.2, p.156). For section B (Knowledge of Nutrition Guidelines) coefficients ranged between 0.049 and 0.969 where a significant difference between experimental and control groups was observed with respect to importance of choosing a diet with plenty of fruits and vegetables. For section C (Knowledge of Diet-Disease Relationships) the range of coefficients was between 0.069 and 1.000. For section D (Knowledge of Nutrient Sources /Skills of Selecting Foods), the Chi-Square test results ranged between 0.000 and 0.966 where a significant difference was reported with respect to differentiating between the fat content of yellow and white cheese. For section E (Nutritional Beliefs), coefficients ranged between 0.088 and 0.992. For Section F (Nutritional Attitude), coefficients ranged between 0.004 and 0.954. In this section, the difference was noted with respect to attitude towards decreasing the fat content of diet.

Table 4.2 Comparison of FFQ Pre-Tests HSU- Mann Whitney Test (p<0.05)

Section B- Knowledge of Nutrition Guidelines	
In your opinion, how important is it to maintain a healthy weight?	0.170
In your opinion, how important is it to eat a variety of food?	0.078
In your opinion, how important is it to choose a diet with plenty of bread, cereal or pasta?	0.848
In your opinion, how important is it to choose a diet with plenty of fruits & vegetables?	0.049*
In your opinion, how important is it to drink milk/dairy products everyday?	0.080
In your opinion, how important is it to eat an adequate amount of fibre each day?	0.641
In your opinion, how important is it to choose a diet that is low in fat?	0.969
In your opinion, how important is it to choose a diet that is low in saturated fat?	0.835
In your opinion, how important is it to choose a diet that is low in cholesterol?	0.956
In your opinion, how important is it to use salt in moderation?	0.659
In your opinion, how important is it to use sugar in moderation?	0.218
Section C- Knowledge of Diet –Disease Relationship	
Do you know of any health problems related to not eating enough calcium?	0.069
Do you know of any health problems related to being overweight?	0.720
Do you know of any health problems related to eating too much fat?	0.609
Do you know of any health problems related to eating too much cholesterol?	0.754
Do you know of any health problems related to not eating enough fibre?	1.000
Do you know of any health problems related to eating too much sugar?	0.538
Do you know of any health problems related to eating too much salt?	0.771
Section D- Knowledge of Nutrient Sources/ Skills of Selecting Foods	
Rank the following in the correct order	0.449
Some people read the nutrition label before buying a food product	0.064
You get nutrition information mostly from	0.098
Based on your knowledge, which has more fat?	
Baked Potato or Fried potato	0.580
Turkey mortedella or hotdog	0.966
White cheese or yellow cheese	0.000*
Yogurt or sour cream	0.442
Chicken or meat	0.447
Ketchup or Mayonnaise	0.054
Sorbet or ice cream	0.204
Based on your knowledge, which has more saturated fat?	
Steak or liver	0.237
Margarine or Butter	0.756
Egg white or Egg yolk	0.905
Skim milk or whole milk	0.723
Based on your knowledge, which has more cholesterol?	
Steak or liver	0.242
Margarine or Butter	0.694
Egg white or Egg yolk	0.705
Skim milk or whole milk	0.051
Based on your knowledge, which has more fibre?	
Meat or Fruit	0.790
White Bread or Brown Bread	0.072
Oranges or orange juice	0.112
Lettuce or Beans	0.771

Table 4.2 (continued) Comparison of FFQ Pre-Tests HSU- Mann Whitney Test (p<0.05)	
Crackers or popcorn	0.700
Section E: Nutritional Beliefs	
Eating a variety of food each day, probably gives you all the vitamins and minerals you need	0.088
Only fats are fattening	0.635
Fast foods are high in salt and fat	0.629
A fat that is a solid is usually high in saturated fat	0.992
Cholesterol is only found in animal products	0.542
Skipping meals is a good way to lose weight	0.415
Eating at least one source of iron each day is important for good health	0.128
A person needs to drink milk only during childhood	0.101
Starchy foods like bread, potatoes and rice make people fat	0.135
What you eat can make a big difference in your chance of getting a disease	0.537
In your opinion, the foods that you are eating now	0.099
Section F: Nutrition Attitude	
I have no time to prepare healthy meals	0.485
It is too hard to find good healthy meals at the university	0.931
There are many recommendations about healthy ways to eat, it's hard to know what to believe	0.692
Decreasing the fat content of my diet would	0.004*
It would be easy for me to reduce the amount of fat in my diet	0.511
Increasing the fibre content of my diet would be	0.374

Table 4.2 (continued) Comparison of FFQ Pre-Tests HSU- Mann Whitney Test (p<0.05)	
It would be easy for me to increase the amount of fibre in my diet	0.943
I find the nutrition information on foods in the supermarket to be very helpful	0.654
I enjoy food too much to worry about its fat content	0.919
I enjoy food too much to worry about my weight	0.725
I am still too young to worry about getting good amount of calcium in my diet	0.954

Baseline data showed that participants belonging to both the experimental and the control groups had good knowledge of the dietary guidelines (Table 4.3).

Table 4.3 Reported Frequencies of Perceived Importance of Dietary Guidelines-FFQ1 Control and Experimental - Section B

Question		Very Important (VI)	Somewhat Important (SI)	Not Too Important (NTI)	Not at all Important (NAI)	Don't Know
In your opinion, how important is it to maintain a healthy weight?	C	69.0	31.1	0	0	0
	E	81.7	14.1	4.2	0	0
In your opinion, how important is it to eat a variety of food?	C	78.6	19.1	2.4	0	0
	E	63.4	28.2	8.5	0	0
In your opinion, how important is it to choose a diet with plenty of bread, cereal or pasta?	C	27.5	30.0	35.5	7.5	0
	E	22.9	37.1	30.0	10.0	0
In your opinion, how important is it to choose a diet with plenty of fruits & vegetables?	C	77.5	15.0	2.5	5.0	0
	E	57.7	28.2	14.1	0	0
In your opinion, how important is it to drink milk/dairy products everyday?	C	56.1	39.0	2.4	2.4	0
	E	43.8	35.6	19.2	1.4	0

Table 4.3 (continued) Reported Frequencies of Perceived Importance of Dietary Guidelines-FFQ1 Control and Experimental -Section B						
Question		Very Important	Somewhat Important	Not Too Important	Not at all Important	Don't Know
In your opinion, how important is it to eat an adequate amount of fibre each day?	C	43.6	35.9	20.5	0	0
	E	48.6	34.3	12.9	4.3	0
In your opinion, how important is it to choose a diet that is low in fat?	C	41.5	41.5	14.6	2.4	0
	E	44.3	34.3	17.1	4.3	0
In your opinion, how important is it to choose a diet that is low in saturated fat?	C	41.5	39.0	14.6	4.9	0
	E	42.9	39.7	12.7	4.8	0
In your opinion, how important is it to choose a diet that is low in cholesterol?	C	61.0	26.8	9.8	2.4	0
	E	62.0	22.5	11.3	4.2	0
In your opinion, how important is it to use salt in moderation?	C	39.0	46.3	12.2	2.4	0
	E	41.4	32.9	21.4	4.3	0
In your opinion, how important is it to use sugar in moderation?	C	42.9	38.1	16.7	2.4	0
	E	32.4	40.8	22.5	4.2	0

Knowledge of diet related diseases was also high among both groups with the exception of diseases related to fibre and sugar consumption (Table 4.4, p.160).

Table 4.4 Reported Frequencies of Perceived Knowledge of Diet-Disease Relationship-FFQ1 Control and Experimental -Section C

Question		Yes	No
Do you know of any health problems related to not eating enough calcium?	C	81.0	19.0
	E	64.9	35.1
Do you know of any health problems related to being overweight?	C	64.3	35.7
	E	67.6	32.4
Do you know of any health problems related to eating too much fat?	C	78.6	21.4
	E	74.3	25.7
Do you know of any health problems related to eating too much cholesterol?	C	59.5	40.5
	E	62.5	37.5
Do you know of any health problems related to not eating enough fibre?	C	35.7	64.3
	E	35.7	64.3
Do you know of any health problems related to eating too much sugar?	C	16.7	83.3
	E	12.5	87.5
Do you know of any health problems related to eating too much salt?	C	50.0	50.0
	E	47.1	52.9

The participating adolescents also showed good food selection skills although they scored lower when asked to identify high fibre foods than when asked to differentiate between high and low fat, saturated fat and cholesterol containing foods (Table 4.5, p. 161).

Table 4.5 Reported Frequencies of Perceived Knowledge of Nutrient Sources/Skills of Selecting Foods-FFQ1
Control and Experimental - Section D

Question		Frequency
Based on your knowledge which has more <u>fat</u> :		
Fried Potato	C	95.2
	E	97.2
Baked Potato	C	4.8
	E	2.8
Based on your knowledge which has more fat:		
Hot Dog	C	77.5
	E	77.1
Turkey Mortedella	C	22.5
	E	22.9
Based on your knowledge which has more fat:		
White cheese	C	29.3
	E	4.3
Yellow cheese	C	70.7
	E	95.7
Based on your knowledge which has more fat:		
Yogurt	C	10.5
	E	15.9
Sour cream	C	89.5
	E	84.1
Based on your knowledge which has more fat:		
Chicken	C	21.4
	E	15.7
Meat	C	78.6
	E	84.3
Based on your knowledge which has more fat:		
Mayonnaise	C	100.0
	E	91.5
Ketchup	C	0
	E	8.5
Based on your knowledge which has more fat:		
Ice-cream	C	73.8
	E	83.8
Sorbet	C	26.2
	E	16.2

Table 4.5 (Continued) Reported Frequencies of Perceived Knowledge of Nutrient Sources/Skills of Selecting Foods-FFQ1 Experimental and Control - Section D		
Based on your knowledge which has more <i>saturated fat</i> :		
Liver	C	80.0
	E	69.6
Steak	C	20.0
	E	30.4
Based on your knowledge which has more saturated fat:		
Butter	C	63.2
	E	66.2
Margarine	C	36.8
	E	33.8
Based on your knowledge which has more saturated fat:		
Egg white	C	21.1
	E	22.1
Egg yolk	C	78.9
	E	77.9
Based on your knowledge which has more saturated fat:		
Skim milk	C	29.7
	E	26.5
Whole milk	C	70.3
	E	73.5
Based on your knowledge which has more <i>cholesterol</i> :		
Liver	C	62.5
	E	73.4
Steak	C	37.5
	E	26.6
Based on your knowledge which has more cholesterol:		
Butter	C	68.4
	E	72.1
Margarine	C	31.6
	E	27.9
Based on your knowledge which has more cholesterol:		
Egg yolk	C	78.9
	E	81.9
Egg white	C	21.1
	E	18.1

Table 4.5 (Continued) Reported Frequencies of Perceived Knowledge of Nutrient Sources/Skills of Selecting Foods-FFQ1 Experimental and Control - Section D		
Based on your knowledge which has more cholesterol:		
Whole milk	C	100.0
	E	90.0
Skim milk	C	0
	E	10.0
Based on your knowledge which has more <i>Fibre</i> :		
Fruit	C	82.9
	E	80.9
Meat	C	17.1
	E	19.1
Based on your knowledge which has more Fibre:		
Brown Bread	C	94.7
	E	82.4
White Bread	C	5.3
	E	17.6
Based on your knowledge which has more Fibre:		
Orange Juice	C	33.3
	E	49.3
Apple	C	66.7
	E	50.7
Based on your knowledge which has more Fibre:		
Beans	C	44.7
	E	41.8
Lettuce	C	55.3
	E	58.2
Based on your knowledge which has more Fibre:		
Popcorn	C	31.6
	E	35.3
Crackers	C	68.4
	E	64.7

The nutritional beliefs of both groups conveyed a good understanding of nutritional information with the exception of beliefs related to weight loss and milk consumption (Table 4.6, p. 164). The participants in both control and experimental groups exhibited positive attitudes towards most of the nutritional issues included

in that section. Nevertheless, the results showed that their enjoyment of foods eaten surpassed weight control concerns and that calcium intake was not perceived as an important issue at that age (Table 4.7, p. 165).

Table 4.6 Reported Frequencies of Perceived Nutrition Beliefs-FFQ1 Control and Experimental (Section E)

Question		Strongly Agree	Somewhat agree	Somewhat Disagree	Strongly Disagree
Eating a variety of food each day, probably gives you all the vitamins and minerals you need	C	69.0	28.6	2.4	0
	E	52.7	43.2	4.1	0
Only fats are fattening	C	21.4	21.4	50.0	7.1
	E	17.6	36.5	36.5	9.5
Fast foods are high in salt and fat	C	69.0	28.6	2.4	0
	E	74.3	20.3	5.4	0
A fat that is a solid is usually high in saturated fat	C	32.5	47.5	17.5	2.5
	E	31.0	50.7	16.9	1.4
Cholesterol is only found in animal products	C	19.5	22.0	34.1	24.4
	E	10.0	44.3	27.1	18.6
Skipping meals is a good way to lose weight	C	57.1	21.4	14.3	7.1
	E	47.3	28.4	18.9	5.4
Eating at least one source of iron each day is important for good health	C	38.1	6.0	11.9	2.1
	E	48.6	47.3	2.7	1.4
A person needs to drink milk only during childhood	C	81.0	7.1	9.5	2.4
	E	64.9	20.3	12.2	2.7
Starchy foods like bread, potatoes and rice make people fat	C	2.4	35.7	38.1	23.8
	E	5.4	20.3	37.8	36.5
What you eat can make a big difference in your chance of getting a disease	C	64.3	28.6	4.8	2.4
	E	58.1	33.8	6.8	1.4
In your opinion, the foods that you are eating now	C	9.5	54.8	26.2	9.5
	E	5.4	44.6	32.4	17.6

Table 4.7 Reported Frequencies of Perceived Nutrition Attitudes-FFQ1 Control and Experimental - Section F

Question		Strongly Agree	Somewhat agree	Somewhat Disagree	Strongly Disagree
I have no time to prepare healthy meals	C	19.0	23.8	33.3	23.8
	E	16.2	16.2	43.2	24.3
It is too hard to find good healthy meals at the institution	C	9.5	23.8	38.1	28.6
	E	2.8	33.3	34.7	29.2
There are many recommendations about healthy ways to eat, it's hard to know what to believe	C	7.3	19.5	58.5	14.6
	E	9.6	20.5	45.2	24.7
It would be easy for me to reduce the amount of fat in my diet	C	23.8	47.6	16.7	11.9
	E	19.4	44.4	27.8	8.3
It would be easy for me to increase the amount of fibre in my diet	C	19.0	61.9	14.3	4.8
	E	23.3	52.1	20.5	4.1
I find the nutrition information on foods in the supermarket to be very helpful	C	31.7	48.8	19.5	0
	E	36.1	47.2	12.5	4.2
I enjoy food too much to worry about its fat content	C	14.6	19.5	41.5	24.4
	E	6.8	27.0	44.6	21.6
I enjoy food too much to worry about my weight	C	21.4	26.2	28.6	23.8
	E	9.6	37.0	34.2	19.2
I am still too young to worry about getting good amount of calcium in my	C	50.0	38.1	9.5	2.4
	E	54.8	24.7	12.3	8.2

Table 4.7 (Continued) Reported Frequencies of Perceived Nutrition Attitudes-FFQ1 Control and Experimental - Section F

Question		Be harmful to my health	Be beneficial to my health	Have no effect on my health
Decreasing the fat content of my diet would be	C	26.2	59.5	14.3
	E	11.1	84.7	4.2
Increasing the fibre content of my diet would be	C	19.0	71.4	9.5
	E	19.4	61.2	19.4

Dietary practices of both the experimental and the control groups were also similar at baseline as determined by the Mann Whitney statistical test ($p<0.05$) (Table 4.8). For section G (Dietary Practice), the coefficient range was between 0.039 and 0.939. Significant difference was reported only for the frequency of egg consumption.

Table 4.8 Comparison of FFQ Pre-Tests HSU- Mann Whitney Test ($p<0.05$)

Section G: Dietary Practice	
How many meals do you eat per day	0.095
Do you skip any meals	0.957
If you do skip meals, which one?	0.797
If you skip meals, why?	0.290
Where do you eat most of your meals?	0.117
How often do you eat fast foods?	0.322
How often do you eat French fries?	0.404
How often do you eat a mankoushe?	0.605
How often do you sweets?	0.521
How often do you eat salty snacks?	0.325
How often do you eat bread?	0.153
How often do you eat pasta, rice and potatoes?	0.292
How often do you drink milk or yogurt?	0.217
How often do you eat cheese or labneh?	0.197
How often do you eat red meat?	0.814
How often do you eat chicken?	0.819
How often do you eat fish?	0.086

Table 4.8 (Continued) Comparison of FFQ Pre-Tests HSU- Mann Whitney Test (p<0.05)	
How often do you eat eggs?	0.039*
How often do you eat beans, lentils or peas?	0.884
How often do you eat hotdogs or mortedella?	0.488
How often do you eat cooked vegetables in preparation of dishes?	0.316
How often do you eat raw vegetables alone or in salads?	0.939
How often do you eat fruits?	0.666
How often do you drink fruit juice?	0.807
How often do you drink soft drinks?	0.431
How often do you drink coffee or tea?	0.189
Do you add salt to your food?	0.313
How many spoons of sugar do you use per day?	0.360

*Significant Difference Between FFQ1 Control and FFQ1 Experimental

4.2.2.2 24-Hour Dietary Recalls

Three 24-Hour Dietary Recalls were collected from each participant via face to face interviews. Applying the Mann Whitney statistical test (p<0.05) indicated that baseline nutrient intakes of participants in the experimental group were similar to those in the control group (Table 4.9, p.168). The coefficient range was from 0.016 to 0.917, where significant difference was reported for number of fruit servings per day.

Table 4.9 Comparison of Recalls Pre-Tests HSU- Mann Whitney Test (p<0.05)

Variables	
Fat	0.917
Carbohydrates	0.715
Protein	0.604
Vitamin A	0.833
Vitamin C	0.195
Calcium	0.095
Iron	0.872
Calories	0.495
Milk	0.273
Bread	0.281
Fruit	0.016*
Vegetable	0.255
Meat	0.588
Fat	0.839
Fibre	0.320
% Protein	0.612
% Fat	0.778
% Carbohydrates	0.924

*Significant Difference Between FFQ1 Control and FFQ1 Experimental

Initial mean nutrient and food group intakes are listed in Table 4.10. When compared to WHO nutrient intake recommendations, the diets of the participating adolescents at baseline were low in fast food, breads and cereals, milk, legumes, adequate in meats, milk products, proteins, vegetables, fruits, sweets and salty snacks, but had an excess of fat, soft drinks and caffeine containing beverages. At the nutrient level, HSU adolescents’ diets were low in Vitamin A, calcium and fibre (Table 4.10, p.169).

Table 4.10 Baseline Nutrient Means-HSU

Variables	Mean	Std. Deviation
Fat (g)	80.85	± 44.64
Carbohydrates (g)	216.39	±138.92
Protein (g)	60.86	± 32.51
Vitamin A (RE)	747.10	±1012.91
Vitamin C (mg)	123.07	±153.28
Calcium (mg)	541.77	±369.71
Iron (mg)	11.38	±7.81
Calories (Kcal)	1815.89	±899.26
Milk (Exchange)	0.41	±0.82
Bread (Exchange)	7.36	±5.72
Fruit (Exchange)	2.79	±5.64
Vegetable (Exchange)	1.99	±2.10
Meat (Exchange)	4.83	±3.54
Fat (Exchange)	12.80	±7.98
Fibre (g)	13.12	±8.18
% Protein (Of Total Calories)	13.85	±4.90
% Fat (Of Total Calories)	39.65	±10.86
% Carbohydrates (Of Total Calories)	47.80	±27.66

4.2.2.3 Semi-Structured Interviews

Perceptions of Healthy Eating/Defining a Healthy Diet

The term “healthy food” gave rise to many definitions by the interviewees. A common description used was “high in fruits and vegetables” indicating that was the first thing that came to their minds. Another classification that was used repeatedly was related to health, “something that gives good health”, “something that is healthy”; this may be due to the use of the word “healthy” in the initial question. “Low in fat” was another term that some of the interviewees thought of as synonymous to “healthy foods”. “Beneficial to the body”, “that causes no harm” and “good for the body” were terms that gave a positive attribute to the meaning of

“healthy food”. Others related the term to the quantity of the food consumed and to maintaining weight and being on a diet. Other frequent explanations included a mention of “eating a variety of foods” and some of the examples given took account of specific food categories like “milk and milk products”, “high in proteins/meats”, or generally stated that healthy foods “contain vitamins” (Table 4.11).

Table 4.11 Perceptions of Healthy Eating/Defining a Healthy Diet

Q1: When I say healthy food what does that term mean to you?	No. of Respondents
High in fruits and vegetables	15
Something that is healthy and gives good health/ Something that is good for the health	13
Low in fat	12
Good for the body/Good for us/Beneficial to the body/ Nutritious to the body/ That the body needs	7
Eating in moderation/ Not in big quantities	6
Something that has fibres/ High in fibres	6
Something that has proteins/ High in proteins	6
Contains vitamins	5
Eating a variety/ From every kind of food	4
Has Calcium/ E.g.: milk and milk products	4
E.g.: Meats	4
Something that is not harmful/ Will cause no harm	3
Prevents disease and weight gain	2
Diet Regimen	2
Should include carbohydrates	2
Things that are fresh and natural	2
Low in sugar	2
E.g.: Soup	2

- HSU- Experimental- PRE-INTERVENTION (N=47)

Awareness/Perceptions of the Importance of Healthy Eating During Adolescence

Most of the interviewed students believed that healthy foods are important at this particular stage in their lives; whereas, a few considered that it was not important or “not necessary” at their age because they “burn energy”, but that it is important for them to eat healthy later on, when they grow older.

Perceived Benefits of Healthy Eating During Adolescence

Reasons why interviewees thought it was important to eat healthy foods focused mainly on the notion that eating healthy is important for health, whether at the time being or for later on in the future. The idea of growth; that they were “still growing” and that they needed healthy foods for “proper growth” was also evident from the various justifications given by the interviewed students. The Prevention from disease” was yet another explanation given for the importance of healthy food during adolescence (Table 4.12).

Table 4.12 Awareness/Perceptions of the Importance and Benefits of Healthy Eating During Adolescence

Q2: Do you feel at your age it’s important to eat healthy food? Why?	No. of Respondents
Yes	24
Of-course/ Very important	17
Because we are still growing/ We need it for proper growth	17
Because it affects health later on/ For the future/ For when I get older/ For when I grow up	11
To maintain good health/ Stay healthy	11
Because it prevents from diseases	6
Not important/ It’s not necessary/ It’s not important	3

- **HSU- Experimental- PRE-INTERVENTION (N=47)**

Belief whether own diet is healthy (Self-Evaluation)

A number of interviewees believed that their diet was not healthy all the time or “sometimes healthy”. Others believed that their diets were not healthy. Whereas, there were some who thought that their dietary pattern was healthy or at least it was so half of the time. A few answers were limited to the use of the term “it depends”, without further explaining what it depends on (Table 4.13).

Table 4.13 Belief whether own diet is healthy (Self-Evaluation)

Q3: Do you think your diet is healthy?	No. of Respondents
Not all the time/ Sometimes/ Not all of it/ Not that much	16
No	14
Yes	10
It depends	2
Fifty- fifty	2

- HSU- Experimental- PRE-INTERVENTION (N=47)

Belief of how diet can become healthier

The interviewed students believed that they were consuming too much fast food, and that they should eat less of it so that their diet becomes healthier. In the opinion of some, they should decrease their intake of soft drinks, fats and fatty foods as well as chocolate and sweets. “Increasing the amount of fruits and vegetables” was another illustration of how some of the interviewees thought their diets may be improved. Others viewed organizing the timing of meals and not skipping meals as an important point towards improvement. Eating at home more often was also considered as one way to make diet healthier (Table 4.14, p.173).

Table 4.14 Belief of how diet can become healthier

Q4: In your opinion, what should you change to make your diet healthier?	No. of Respondents
I should decrease fast food/ junk food/ take away food/ restaurant food	19
I should eat more (increase) fruits and vegetables	9
I should pay attention to the timing of meals/organize my meals	6
I should decrease soft drinks	5
I should eat less (decrease) fats/fatty foods/ foods that contain oil	4
I should eat less chocolate/ sweets	4
I should eat at home more often	3
I should eat more fibre	2
I should increase my calcium intake	2
I should eat less carbohydrates	2

• HSU- Experimental- PRE-INTERVENTION (N=47)

Willingness to change diet (Intention)/Attitude towards change

While some showed varied levels of willingness to change their diet, if they find out that what they are eating at the moment were not healthy, or that they were at least willing to try as much as they can, others refused the idea because they stated that they “can’t change”, “it’s too difficult to change”, that nothing is bothering them at the moment or that they were convinced their diet “is fine”. A couple of students were not sure because they “live alone and rely on fast food” (Table 4.15).

Table 4.15 Willingness to change diet (Intention)/Attitude towards change

Q5: If I tell you the food you are eating is not healthy, on a scale of 1 to 10, how willing will you be to change your diet?	No. of Respondents
6/10	7
8/10	6
10/10	6
9/10	5
7/10	5
I would not change because nothing is bothering me right now (weight gain or health problems)/ because I eat well/ because my food is fine	5
I will try as much as I can	4
I would not change/ I can not change/ It’s difficult	3
I’m not sure I can because I live alone and rely on fast food	2
It depends if I’m convinced; then, I would immediately change	2

• HSU- Experimental- PRE-INTERVENTION (N=47)

Influencing/Motivating Factors

The most prevailing theme in this category was disease, “if something happened to my health”, “if I get sick”, “so that I don’t get sick”, “to prevent disease later on”, “if what I am eating causes disease”, “if what I’m eating causes harm”. Weight concerns such as weight gain and fear of “becoming fat”, or “if it helps me lose weight”, were also among the influencing factors. Future health was also mentioned as a factor. Taste, “if I like the taste”, was considered as a convincing factor to change the diet by two interviewees (Table 4.16).

Table 4.16 Influencing Factors

Q6: What would be the most important reason (or factor) that would make you (convince you to) try changing what you eat?	No. of Respondents
Disease/ If something happened to my health/ If I get a disease/ If I get sick	7
If what I’m eating causes harm/ is un-healthy/ is bad for my health	4
If what I am eating causes disease/ so that I don’t get sick	3
For my health later on	3
Weight gain/ if I get (become fat) fat	4
Weight loss/ if it helps me lose weight	2
To prevent disease later on	2
For my health	2
If I like the taste	2

• HSU- Experimental- PRE-INTERVENTION (N=47)

Perceived ability to carry out a change (self-efficacy)/Limiting or facilitating factors

Perceived ability to carry out a change in dietary pattern among interviewees varied; most were very sure that they would be able to do so, “positive”, “I have a strong will power”, “I can do it”, “10/10”, whereas others were less sure. For some, it depended whether they had the right motive or whether the healthy food was to their liking.

Most interviewees believed it to be easier to eat healthy at home because “healthy food is available”, “my mom cooks healthy food”, “my parents have healthy food”. Those that found it would be hard to, or could not, eat healthy food when out with friends did so because “there are no healthy foods in restaurants”, they would be “tempted by fast food”, “no one forces you (to eat healthy), “you can choose whatever you like”, or because of peer pressure (Table 4.17).

Table 4.17 Perceived ability to carry out a change/Limiting or facilitating factors

Q7: How sure are you that you will indeed be able to change? Where do you feel it is easier for you to eat healthy food, at home, at university or when you are out with friends?	No. of Respondents
7/10	7
8/10	4
10/10	3
5/10	3
6/10	2
4/10	2
I am sure I can do it/ positive/ I have a strong will power/ I would have to	11
Not very sure/ sometimes I might succeed	2
If I have the motive	2
It depends if I like the food	2
I can't because I live alone/ I wouldn't change	2
It is easiest at home because healthy food is available/ because my parents have healthy food/ because my mom cooks healthy food	33
When out with friends it is hard (I can't) because I would tempted by fast food/ because in restaurants there are no healthy foods/ because no one forces you, you can choose what you like/ because of peer pressure	22
I can eat healthy everywhere/ I know what to choose	7

- HSU- Experimental- PRE-INTERVENTION (N=47)

4.2.3 Dependent Variables - Phase Two – Post Intervention

4.2.3.1 Questionnaires

After the intervention, participants in the experimental group had a significant increase in some variables as compared to the control group as determined by the Mann Whitney statistical test ($p < 0.05$). For section B (Knowledge of Nutrition Guidelines) coefficients ranged between 0.174 and 0.747. For section C (Knowledge of Diet-Disease Relationships) the range of coefficients was between 0.002 and 0.702. The changes were reported in the diseases related to overweight, fat and cholesterol. For section D (Knowledge of Nutrient Sources /Skills of Selecting Foods), the Mann Whitney test results ranged between 0.018 and 0.802 where a significant difference was noted with respect to fat content of food. For section E (Nutritional Beliefs), coefficients ranged between 0.179 and 0.888. For Section F (Nutritional Attitude), coefficients ranged between 0.036 and 0.737. In this section, the difference was observed with respect to attitude towards fat and fibre consumption.

There were no observed differences with respect to dietary practice. The Mann Whitney test results ranged from 0.028 to 0.950 indicating a significant change only in the amount of sugar consumed post intervention (Table 4.18, p.177).

Table 4.18 Comparison of Change of Pre and Post Tests Between Experimental and Control -HSU- FFQ Mann Whitney Test (p<0.05)

Section B- Knowledge of Nutrition Guidelines	
In your opinion, how important is it to maintain a healthy weight?	0.174
In your opinion, how important is it to eat a variety of food?	0.469
In your opinion, how important is it to choose a diet with plenty of bread, cereal or pasta?	0.586
In your opinion, how important is it to choose a diet with plenty of fruits & vegetables?	0.728
In your opinion, how important is it to drink milk/dairy products everyday?	0.454
In your opinion, how important is it to eat an adequate amount of fibre each day?	0.467
In your opinion, how important is it to choose a diet that is low in fat?	0.279
In your opinion, how important is it to choose a diet that is low in saturated fat?	0.243
In your opinion, how important is it to choose a diet that is low in cholesterol?	0.747
In your opinion, how important is it to use salt in moderation?	0.684
In your opinion, how important is it to use sugar in moderation?	0.269
Section C- Knowledge of Diet –Disease Relationship	
Do you know of any health problems related to not eating enough calcium?	0.104
Do you know of any health problems related to being overweight?	0.002*
Do you know of any health problems related to eating too much fat?	0.044*
Do you know of any health problems related to eating too much cholesterol?	0.049*
Do you know of any health problems related to not eating enough fibre?	0.162
Do you know of any health problems related to eating too much sugar?	0.702
Do you know of any health problems related to eating too much salt?	0.115
Section D- Knowledge of Nutrient Sources/ Skills of Selecting Foods	
Rank the following in the correct order	0.148
Some people read the nutrition label before buying a food product	0.176
Based on your knowledge, which has more fat?	
Baked Potato or Fried potato	0.590
Turkey mortedella or hotdog	0.148
White cheese or yellow cheese	0.018*

Table 4.18 (continued) Comparison of Change of Pre and Post Tests Between Experimental and Control -HSU- FFQ Mann Whitney Test (p<0.05)	
Yogurt or sour cream	0.392
Chicken or meat	0.195
Ketchup or Mayonnaise	0.169
Sorbet or ice cream	0.152
Based on your knowledge, which has more saturated fat?	
Steak or liver	0.734
Margarine or Butter	0.097
Egg white or Egg yolk	0.461
Skim milk or whole milk	0.237
Based on your knowledge, which has more cholesterol?	
Steak or liver	0.212
Margarine or Butter	0.802
Egg white or Egg yolk	0.529
Skim milk or whole milk	0.233
Based on your knowledge, which has more fibre?	
Meat or Fruit	0.626
White Bread or Brown Bread	0.379
Oranges or orange juice	0.183
Lettuce or Beans	0.429
Crackers or popcorn	0.319
Section E: Nutritional Beliefs	
Eating a variety of food each day, probably gives you all the vitamins and minerals you need	0.290
Only fats are fattening	0.353
Fast foods are high in salt and fat	0.458
A fat that is a solid is usually high in saturated fat	0.204
Cholesterol is only found in animal products	0.669

Table 4.18 (continued) Comparison of Change of Pre and Post Tests Between Experimental and Control -HSU- FFQ Mann Whitney Test (p<0.05)	
Skipping meals is a good way to lose weight	0.756
Eating at least one source of iron each day is important for good health	0.385
A person needs to drink milk only during childhood	0.300
Starchy foods like bread, potatoes and rice make people fat	0.179
What you eat can make a big difference in your chance of getting a disease	0.515
In your opinion, the foods that you are eating now	0.888
Section F: Nutrition Attitude	
I have no time to prepare healthy meals	0.190
It is too hard to find good healthy meals at the institution	0.401
There are many recommendations about healthy ways to eat, it's hard to know what to believe	0.487
Decreasing the fat content of my diet would	0.036*
It would be easy for me to reduce the amount of fat in my diet	0.201
Increasing the fibre content of my diet would be	0.043*
It would be easy for me to increase the amount of fibre in my diet	0.199
I find the nutrition information on foods in the supermarket to be very helpful	0.456
I enjoy food too much to worry about its fat content	0.737
I enjoy food too much to worry about my weight	0.171
I am still too young to worry about getting good amount of calcium in my	0.145
Section G: Dietary Practice	
How many meals do you eat per day	0.241
Do you skip any meals	0.072
If you do skip meals, which one?	0.830
If you skip meals, why?	0.941
Where do you eat most of your meals?	0.255
How often do you eat fast foods?	0.124
How often do you eat French fries?	0.829

Table 4.18 (continued) Comparison of Change of Pre and Post Tests Between Experimental and Control -HSU- FFQ Mann Whitney Test (p<0.05)	
How often do you eat a mankoushe?	0.710
How often do you sweets?	0.505
How often do you eat salty snacks?	0.211
How often do you eat bread?	0.670
How often do you eat pasta, rice and potatoes?	0.383
How often do you drink milk or yogurt?	0.703
How often do you eat cheese or labneh?	0.950
How often do you eat red meat?	0.147
How often do you eat chicken?	0.230
How often do you eat fish?	0.143
How often do you eat eggs?	0.572
How often do you eat beans, lentils or peas?	0.311
How often do you eat hotdogs or mortedella?	0.480
How often do you eat cooked vegetables in preparation of dishes?	0.508
How often do you eat raw vegetables alone or in salads?	0.753
How often do you eat fruits?	0.704
How often do you drink fruit juice?	0.756
How often do you drink soft drinks?	0.108
How often do you drink coffee or tea?	0.547
Do you add salt to your food?	0.581
How many spoons of sugar do you use per day?	0.028*

*Significant Difference Between dFFQ Control and dFFQ Experimental

4.2.3.2 24-Hour Dietary Recalls

After the intervention, there were changes in the mean nutrient intakes of the experimental group and coefficients of the Mann Whitney statistical test ranged from 0.019 to 0.909. Only the change in mean carbohydrates reached significant levels. Similarly, changes in the mean number of servings from the various food groups were only significant for the fruit group (Table 4.19); however, fruit intake remained adequate.

Table 4.19 Comparison of Change of Pre and Post Tests Between Experimental and Control HSU- Recalls Mann Whitney Test (p<0.05)

Variables	
Fat	0.541
Carbohydrates	0.019*
Protein	0.085
Vitamin A	0.841
Vitamin C	0.085
Calcium	0.841
Iron	0.068
Calories	0.084
Milk	0.070
Bread	0.909
Fruit	0.002*
Vegetable	0.747
Meat	0.057
Fat	0.975
Fibre	0.605
% Protein	0.703
% Fat	0.168
% Carbohydrates	0.219

*Significant Difference Between dRecalls Control and dRecalls Experimental

4.2.3.3 Semi Structured Interviews

Perceptions of Healthy Eating/Defining a Healthy Diet

The term “healthy food” gave rise to many definitions by the interviewees. The description used most commonly was “high in fruits and vegetables”. Another classification that was used repeatedly was related to fats, “low in fat”. “Follows a pattern”, eating “certain amount of servings”, “eating in moderation” was yet another definition given. “Contains all the nutrients”, “has all that the body needs” was also considered by some interviewees as defining to the term “healthy food”. Other frequent explanations included a mention of “eating a variety of foods” and some of the examples given took account of specific food categories like “high in carbohydrates”, “high in proteins/meats”, or generally stated that healthy foods “contain vitamins”. Others related the term to the food guide pyramid, “foods that follow the food guide pyramid”. Healthy foods were also described as foods that are “good for health”, “give health”, “good for the body”, “beneficial to the body”, and by some the term was considered as foods “that don’t cause disease”, “that don’t harm the body”. Some related the term to maintaining weight and being “not fattening”. “Home cooked foods” and “not fast foods” were also cited by some students. “High in fibres”, “low in sugar and salt”, “has calcium” and “gives energy” were also among the definitions given of the term “healthy food” (Table 4.20, p.183).

Table 4.20 Perceptions of Healthy Eating/Defining a Healthy Diet

Q1: When I say healthy food what does that term mean to you?	No. of Respondents
High in fruits and vegetables	19
Contains all the nutrients/ has all that the body needs	6
Low in fat	11
Follows a pattern/ certain amount of servings/ eating in moderation	9
Something that has proteins/ High in proteins	5
Contains vitamins	5
Eating a variety/ From every kind of food	5
High in carbohydrates	5
That give health/that are good for health	4
Follows the food guide pyramid	4
Good for the body/Good for us/Beneficial to the body	3
Something that has fibres/ High in fibres	3
Has Calcium and Iron	2
Prevents disease and weight gain	2
Does not cause weight gain/ Not fattening	2
Not fast food/ home cooked food	3
Low in sugar and salt	3
That doesn't cause disease/ that don't harm the body/absence from disease	3
Gives energy	2

• HSU- Experimental- POST-INTERVENTION (N=43)

Awareness/Perceptions of the Importance of Healthy Eating During Adolescence

Most of the interviewed students believed that healthy foods are important at this particular stage in their lives; whereas, a few considered that it was not important or “not necessary” at their age.

Perceived Benefits of Healthy Eating During Adolescence

Reasons why interviewees thought it was important to eat healthy foods focused mainly on the idea of health whether for now or for later on “because it affects health”, “for health later on”, “for when I grow older”. The concept that eating healthy is important for growth; that they were “still growing” and that they needed healthy foods for “proper growth was also evident from the various answers

given by the interviewed students. “Prevention from disease” later on or for the future was yet another explanation given for the importance of healthy food during adolescence (Table 4.21).

Table 4.21 Awareness/Perceptions of the Importance and Benefits of Healthy Eating During Adolescence

Q2: Do you feel at your age it’s important to eat healthy food? Why?	No. of Respondents
Yes	13
Of course/ Very important	26
Because we are still growing/ We need it for proper growth/ the body is still being built	8
For good health later on	6
To maintain good health/ Stay healthy/for good health	8
Because it prevents from diseases later on	4
Not important/ It’s not necessary/ It’s not important/ No	4
For now and later on/ what I eat affects me later on	4
Essential for the body and everything	2
To maintain weight and shape	2

- HSU- Experimental- POST-INTERVENTION (N=43)

Belief whether own diet is healthy (Self-Evaluation)

A number of interviewees believed that their diets were not healthy. Others believed that their diet was not healthy all the time or “sometimes healthy”, “not that much”. Whereas, there were some who thought that their dietary pattern was healthy, healthy “now”, “it’s becoming healthier” (after the intervention) or most of it is healthy (Table 4.22).

Table 4.22 Belief whether own diet is healthy (Self-Evaluation)

Q3: Do you think your diet is healthy?	No. of Respondents
Not all the time/ Sometimes/ Not all of it/ Not that much/not always/ not necessarily/ not that much	15
No/ not very healthy	19
Yes/ It’s becoming healthier/now, yes/most of it	7

- HSU- Experimental- POST-INTERVENTION (N=43)

Belief of how diet can become healthier

“Increasing the amount of fruits and vegetables” was one illustration of how some of the interviewees thought their diets may be improved. The interviewed students believed that they were consuming too much fast food, and that they should eat less of it so that their diet becomes healthier. In the opinion of some, they should decrease their intake of fats and fatty foods as well as chocolate and sweets. Others viewed organizing the timing of meals and not skipping meals as an important point towards improvement. Eating at home more often and eating more home cooked meals was also considered as one way to make diet healthier (Table 4.23).

Table 4.23 Belief of how diet can become healthier

Q4: In your opinion, what should you change to make your diet healthier?	No. of Respondents
I should decrease fast food/ junk food/ take away food/ restaurant food	14
I should eat more (increase) fruits and vegetables	17
I should pay attention to the timing of meals/organize my meals	7
I should decrease soft drinks	3
I should eat less (decrease) fats/fatty foods/ foods that contain oil	11
I should eat less chocolate/ sweets	8
I should eat at home more often/eat more home made foods	5
I should increase my calcium intake	3
I should decrease salt	2
I should eat more proteins	2
There’s nothing to change	2

• HSU- Experimental- POST-INTERVENTION (N=43)

Willingness to change diet (Intention)/Attitude towards change

While some showed varied levels of willingness to change their diet, if they find out that what they are eating at the moment were not healthy, others refused the idea because they stated that they are “used to this food”, or “like good tasting food”. A number of interviewees said that they have already changed their diet and

“now it is healthy”. A couple of students explained that they could not change because they “live alone and rely on fast food”, while a couple needed to be convinced before attempting any changes, “it depends if I’m convinced; then, I would immediately change” (Table 4.24).

Table 4.24 Willingness to change diet (Intention)/Attitude towards change

Q5: If I tell you the food you are eating is not healthy, on a scale of 1 to 10, how willing will you be to change your diet?	No. of Respondents
8/10	9
7/10	6
6/10	5
5/10	4
10/10	3
4/10	3
9/10	2
I would not change because I’m used to this food/ I like good tasting food	4
I have already changed my diet and now it’s healthy	4
I can’t because I live alone and rely on fast food	2
It depends if I’m convinced; then, I would immediately change	2

- HSU- Experimental- POST-INTERVENTION (N=43)

Influencing/Motivating Factors

The most prevailing theme in this category was disease, “if something happened to my health”, “if I get sick”, “if I face health problems”. “For health” and weight concerns such as weight gain and fear of “becoming fat”, “the way I look” or “if it helps me lose weight”, were also among the influencing factors. Future health was also mentioned as a factor. Living at home or with parents, “if my parents were living with me”, “if my mother was cooking the food”, was considered as a convincing factor to change the diet by two interviewees (Table 4.25, p.187).

Table 4.25 Influencing/Motivating Factors

Q6: What would be the most important reason (or factor) that would make you (convince you to) try changing what you eat?	No. of Respondents
Disease/ If something happened to my health/ If I get a disease/ if I face health problems	8
For my health	4
Weight gain/ if I get (become fat) fat/ the way I look	4
Weight loss/ if it helps me lose weight	4
It's difficult/it's hard/ I like good tasting- junk food	3
If my parents were living with me/ if my mother was cooking the food	2

• **HSU- Experimental- PRE-INTERVENTION (N=47)**

Perceived ability to carry out a change (self-efficacy)/Limiting or facilitating factors

Perceived ability to carry out a change in dietary pattern among interviewees varied; most were very sure that they would be able to do so once they take the decision. Some thought it was hard to do so because they live alone, while others stated that they have already changed their diet, “my diet is healthy now”, or have visited a dietician.

Most interviewees believed it to be easier to eat healthy at home because “healthy food is available”, “my mom cooks healthy food”, “my parents have healthy food”. Those that found it would be hard to, or could not, eat healthy food when out with friends did so because “there are no healthy foods in restaurants”, they would be “tempted by (crave) the fast food”, because where they go out to forces upon them what food to eat, because of peer pressure or because they would feel “strange” or “different” if they ate healthy food (when out with friends) (Table 4.26, p.188).

Table 4.26 Perceived ability to carry out a change (self-efficacy)/Limiting or facilitating factors

Q7: How sure are you that you will indeed be able to change? Where do you feel it is easier for you to eat healthy food, at home, at university or when you are out with friends?	No. of Respondents
9/10	3
8/10	3
7/10	3
6/10	3
I can do it everywhere once I take the decision	8
It's hard because I live alone	5
My diet is healthy now/ I went to a dietician/ I changed	4
It is easiest at home because healthy food is available/ because my parents have healthy food/ because my mom cooks healthy food	29
When out with friends it is hard (I can't) because I would tempted (crave) by fast food/ because in restaurants there are no healthy foods/ because of peer pressure/ I would feel different or strange if I eat healthy food	21
At university, it's easier because at home I eat more/ All I do is eat, at home	3

• HSU- Experimental- POST-INTERVENTION (N=43)

4.3 Dar Aytam (DA)

4.3.1 Demographic Characteristics of Participants (Gender and Age)

The Dar Aytam sample consisted of 99 participants (50 females and 49 males). Of these, 47 (26 females and 21 males) were assigned to the experimental group and received the nutrition educational intervention; the remainder 52 (24 females and 28 males) were assigned to the control group and did not receive any educational material. The mean age of the participating adolescents was 17.51 ± 1.34 years (Table 4.27, p.189).

The experimental group and control group were matched for age, socioeconomic status and gender. Chi square statistical test showed that the two groups did not differ in terms of baseline gender distribution within each group 0.362 (p<0.05); the Mann-Whitney statistical test showed no significant difference

between the control and experimental groups in age at baseline 0.609 ($p<0.05$). Socioeconomic status was assumed similar in both groups since they belonged to the same educational institution and boarding school.

Table 4.27 Demographic Characteristics of DA Study Participants

<u>Variable</u>	
Mean Age (\pm SD)	17.51 \pm 1.34 Years
Gender (%)	
Male	49.5
Female	50.5
Condition (%)	
Experimental	47.5
Control	52.5

4.3.2 Dependant Variables - Phase One – Pre Intervention

4.3.2.1 Questionnaires

At baseline, knowledge of dietary guidelines, knowledge of diet related diseases, food selection skills, nutritional beliefs and nutritional attitudes in the experimental group and the control group were similar as determined by the Mann-Whitney non-parametric statistical test ($p<0.05$) (Table 4.28, p.190). For section B (Knowledge of Nutrition Guidelines) coefficients ranged between 0.056 and 0.994. For section C (Knowledge of Diet-Disease Relationships) the range of coefficients was between 0.100 and 0.918. For section D (Knowledge of Nutrient Sources /Skills of Selecting Foods), the Mann Whitney test results ranged between 0.072 and 0.905. For section E (Nutritional Beliefs), coefficients ranged between 0.021 and 1.000 where a significant difference was reported for belief about saturated fat.

For Section F (Nutritional Attitude), coefficients ranged between 0.025 and 0.884. In this section, the difference was noted with respect to attitude towards fibre consumption.

There were no reported differences with respect to dietary practice. The Mann Whitney test results ranged from 0.050 to 0.936 (Table 4.28).

Table 4.28 Comparison of FFQ Pre-Tests DA- Mann Whitney Test (p<0.05)

Section B- Knowledge of Nutrition Guidelines	
In your opinion, how important is it to maintain a healthy weight?	0.423
In your opinion, how important is it to eat a variety of food?	0.891
In your opinion, how important is it to choose a diet with plenty of bread, cereal or pasta?	0.778
In your opinion, how important is it to choose a diet with plenty of fruits & vegetables?	0.075
In your opinion, how important is it to drink milk/dairy products everyday?	0.237
In your opinion, how important is it to eat an adequate amount of fibre each day?	0.056
In your opinion, how important is it to choose a diet that is low in fat?	0.067
In your opinion, how important is it to choose a diet that is low in saturated fat?	0.994
In your opinion, how important is it to choose a diet that is low in cholesterol?	0.309
In your opinion, how important is it to use salt in moderation?	0.490
In your opinion, how important is it to use sugar in moderation?	0.493
Section C- Knowledge of Diet –Disease Relationship	
Do you know of any health problems related to not eating enough calcium?	0.887
Do you know of any health problems related to being overweight?	0.882
Do you know of any health problems related to eating too much fat?	0.882
Do you know of any health problems related to eating too much cholesterol?	0.882
Do you know of any health problems related to not eating enough fibre?	0.100
Do you know of any health problems related to eating too much sugar?	0.918
Do you know of any health problems related to eating too much salt?	0.882
Section D- Knowledge of Nutrient Sources/ Skills of Selecting Foods	
Rank the following in the correct order	0.098
Some people read the nutrition label before buying a food product	0.658
You get nutrition information mostly from	0.040*
Based on your knowledge, which has more fat?	
Baked Potato or Fried potato	0.593
Turkey mortedella or hotdog	0.818
White cheese or yellow cheese	0.914
Yogurt or sour cream	0.072
Chicken or meat	0.361
Ketchup or Mayonnaise	0.317
Sorbet or ice cream	0.184
Based on your knowledge, which has more saturated fat?	
Steak or liver	0.708
Margarine or Butter	0.905
Egg white or Egg yolk	0.300
Skim milk or whole milk	0.476

Table 4.28 (continued) Comparison of FFQ Pre-Tests DA- Mann Whitney Test (p<0.05)	
Based on your knowledge, which has more cholesterol?	
Steak or liver	0.780
Margarine or Butter	0.274
Egg white or Egg yolk	0.315
Skim milk or whole milk	0.423
Based on your knowledge, which has more fibre?	
Meat or Fruit	0.184
White Bread or Brown Bread	0.697
Oranges or orange juice	0.129
Lettuce or Beans	0.408
Crackers or popcorn	0.348
Section E: Nutritional Beliefs	
Eating a variety of food each day, probably gives you all the vitamins and minerals you need	0.179
Only fats are fattening	0.686
Fast foods are high in salt and fat	0.482
A fat that is a solid is usually high in saturated fat	0.021*
Cholesterol is only found in animal products	0.092
Skipping meals is a good way to lose weight	1.000
Eating at least one source of iron each day is important for good health	0.583
A person needs to drink milk only during childhood	0.221
Starchy foods like bread, potatoes and rice make people fat	0.082
What you eat can make a big difference in your chance of getting a disease	0.034*
In your opinion, the foods that you are eating now	0.782

Table 4.28 (Continued) Comparison of FFQ Pre-Tests DA- Mann Whitney Test (p<0.05)

Section F: Nutrition Attitude	
I have no time to prepare healthy meals	0.884
It is too hard to find good healthy meals at the institution	0.696
There are many recommendations about healthy ways to eat, it's hard to know what to believe	0.167
Decreasing the fat content of my diet would	0.810
It would be easy for me to reduce the amount of fat in my diet	0.428
Increasing the fibre content of my diet would be	0.025*
It would be easy for me to increase the amount of fibre in my diet	0.812
I find the nutrition information on foods in the supermarket to be very helpful	0.497
I enjoy food too much to worry about its fat content	0.867
I enjoy food too much to worry about my weight	0.825
I am still too young to worry about getting good amount of calcium in my	0.317
Section G: Dietary Practice	
How many meals do you eat per day	0.462
Do you skip any meals	0.841
If you do skip meals, which one?	0.767
If you skip meals, why?	0.933
Where do you eat most of your meals?	NA
How often do you eat fast foods?	0.290
How often do you eat French fries?	0.150
How often do you eat a mankoushe?	0.544
How often do you sweets?	0.771

Table 4.28 (continued) Comparison of FFQ Pre-Tests DA- Mann Whitney Test (p<0.05)	
How often do you eat salty snacks?	0.050
How often do you eat bread?	0.204
How often do you eat pasta, rice and potatoes?	0.548
How often do you drink milk or yogurt?	0.088
How often do you eat cheese or labneh?	0.262
How often do you eat red meat?	0.936
How often do you eat chicken?	0.740
How often do you eat fish?	0.523
How often do you eat eggs?	0.720
How often do you eat beans, lentils or peas?	0.126
How often do you eat hotdogs or mortedella?	0.572
How often do you eat cooked vegetables in preparation of dishes?	0.818
How often do you eat raw vegetables alone or in salads?	0.642
How often do you eat fruits?	0.874
How often do you drink fruit juice?	0.525
How often do you drink soft drinks?	0.544
How often do you drink coffee or tea?	0.094
Do you add salt to your food?	0.370

*Significant Difference at baseline

Initial analysis of the data collected from the pre-intervention questionnaires showed that the participating adolescents had good knowledge of the dietary guidelines (Table 4.29, p.194).

**Table 4.29 Reported Frequencies of Perceived Importance of Dietary Guidelines-FFQ1 Control and Experimental -
Section B**

Question		Very Important	Somewhat Important	Not Too Important	Not at all Important	Don't Know
In your opinion, how important is it to maintain a healthy weight?	E	80.9	19.1	0	0	0
	C	74.0	26.0	0	0	0
In your opinion, how important is it to eat a variety of food?	E	63.8	29.8	2.1	0	4.3
	C	63.5	34.6	1.9	0	0
In your opinion, how important is it to choose a diet with plenty of bread, cereal or pasta?	E	31.9	40.4	25.5	0	2.1
	C	31.4	39.2	21.6	0	7.8
In your opinion, how important is it to choose a diet with plenty of fruits & vegetables?	E	85.1	12.8	0	0	2.1
	C	69.2	30.8	0	0	0
In your opinion, how important is it to drink milk/dairy products everyday?	E	76.6	21.3	2.1	0	0
	C	67.3	23.1	7.7	0	1.9
In your opinion, how important is it to eat an adequate amount of fibre each day?	E	42.6	42.6	4.3	0	10.6
	C	28.8	38.5	15.4	0	17.3
In your opinion, how important is it to choose a diet that is low in fat?	E	63.8	21.3	12.8	0	2.1
	C	44.2	34.6	15.4	0	5.8
In your opinion, how important is it to choose a diet that is low in saturated fat?	E	48.9	17.0	23.4	0	10.6
	C	38.5	42.3	11.5	0	7.7
In your opinion, how important is it to choose a diet that is low in cholesterol?	E	57.4	17.0	12.8	0	12.8
	C	45.1	27.5	9.8	0	17.6

Table 4.29 (continued) Reported Frequencies of Perceived Importance of Dietary Guidelines-FFQ1 Control and Experimental -Section B

Question		Very Important	Somewhat Important	Not Too Important	Not at all Important	Don't Know
In your opinion, how important is it to use salt in moderation?	E	55.3	34.0	4.3	0	6.4
	C	48.1	38.5	9.6	0	3.8
In your opinion, how important is it to use sugar in moderation?	E	51.1	27.7	14.9	0	6.4
	C	52.9	37.3	7.8	0	2.0

Table 4.30 depicts that at baseline, the participants had poor knowledge of diet-disease relationships and of the recommendations of the food guide pyramid.

Table 4.30 Reported Frequencies of Perceived Knowledge of Diet-Disease Relationship-FFQ1 of Control and Experimental -Section C

Question		Yes	No
Do you know of any health problems related to not eating enough calcium?	E	10.6	89.4
	C	11.5	88.5
Do you know of any health problems related to being overweight?	E	8.5	91.5
	C	7.7	92.3
Do you know of any health problems related to eating too much fat?	E	8.5	91.5
	C	7.7	92.3
Do you know of any health problems related to eating too much cholesterol?	E	8.5	91.5
	C	7.7	92.3
Do you know of any health problems related to not eating enough fibre?	E	0	100.0
	C	5.8	94.2
Do you know of any health problems related to eating too much sugar?	E	4.3	95.7
	C	3.8	96.2
Do you know of any health problems related to eating too much salt?	E	8.5	91.5
	C	7.7	92.3

Both groups had good skills in choosing foods that are low in fat and saturated fat, and cholesterol, but their skills were poor when asked to differentiate between low and high fibre foods (Table 4.31).

Table 4.31 Reported Frequencies of Perceived Knowledge of Nutrient Sources/Skills of Selecting Foods-FFQ1
Experimental and Control - Section D

Question		Frequency
Based on your knowledge which has more <i>fat</i> :		
Fried Potato	E	97.0
	C	94.3
Baked Potato	E	3.0
	C	5.7
Based on your knowledge which has more fat:		
Hot Dog	E	61.5
	C	64.5
Turkey Mortedella	E	38.5
	C	35.5
Based on your knowledge which has more fat:		
White cheese	E	7.4
	C	6.7
Yellow cheese	E	92.6
	C	93.3
Based on your knowledge which has more fat:		
Yogurt	E	0
	C	11.5
Sour cream	E	100.0
	C	88.5
Based on your knowledge which has more fat:		
Chicken	E	25.8
	C	37.0
Meat	E	74.2
	C	63.0

Table 4.31 (continued) Reported Frequencies of Perceived Knowledge of Nutrient Sources/Skills of Selecting Foods-FFQ1 Experimental and Control - Section D		
Based on your knowledge which has more fat:		
Mayonnaise	E	96.9
	C	100.0
Ketchup	E	3.1
	C	0
Based on your knowledge which has more fat:		
Ice-cream	E	73.1
	C	88.0
Sorbet	E	26.9
	C	12.0
Based on your knowledge which has more <i>saturated fat</i> :		
Liver	E	54.8
	C	50.0
Steak	E	45.2
	C	50.0
Based on your knowledge which has more saturated fat:		
Butter	E	89.7
	C	88.9
Margarine	E	10.3
	C	11.1
Based on your knowledge which has more saturated fat:		
Egg white	E	19.2
	C	32.0
Egg yolk	E	80.8
	C	68.0

Table 4.31 (continued) Reported Frequencies of Perceived Knowledge of Nutrient Sources/Skills of Selecting Foods-FFQ1 Experimental and Control - Section D		
Based on your knowledge which has more saturated fat:		
Skim milk	E	9.1
	C	4.2
Whole milk	E	90.9
	C	95.8
Liver	E	24.0
	C	27.3
Steak	E	76.0
	C	72.7
Based on your knowledge which has more cholesterol:		
Butter	E	88.2
	C	78.1
Margarine	E	11.8
	C	21.9
Based on your knowledge which has more cholesterol:		
Egg yolk	E	65.5
	C	77.8
Egg white	E	34.5
	C	22.2
Based on your knowledge which has more cholesterol:		
Whole milk	E	90.3
	C	83.3
Skim milk	E	9.7
	C	16.7

Table 4.31 (continued) Reported Frequencies of Perceived Knowledge of Nutrient Sources/Skills of Selecting Foods-FFQ1 Experimental and Control - Section D

Based on your knowledge which has more *Fibre*:

Fruit	E	66.7
	C	81.3
Meat	E	33.3
	C	18.8

Based on your knowledge which has more Fibre:

Brown Bread	E	35.0
	C	40.9
White Bread	E	65.0
	C	59.1

Based on your knowledge which has more Fibre:

Orange Juice	E	56.0
	C	34.6
Apple	E	44.0
	C	65.4
Beans	E	20.7
	C	29.7
Lettuce	E	79.3
	C	70.3

Based on your knowledge which has more Fibre:

Popcorn	E	36.4
	C	50.0
Crackers	E	63.6
	C	50.0

The nutritional beliefs of both groups conveyed a good understanding of nutritional information with the exception of beliefs related to cholesterol and milk consumption (Table 4.32). With respect to nutrition attitudes, the participants exhibited negative attitudes towards meal preparation and the ability of finding healthy meals at the institution. Additionally, they illustrated that their enjoyment of food exceeded the importance of choosing low fat foods and weight control. The majority perceived the calcium content of their diet as a low priority at their age (Table 4.33, p.201) and (Table 4.34, p. 202).

Table 4.32 Reported Frequencies of Perceived Nutrition Beliefs-FFQ1 Control and Experimental - Section E

Question		Strongly Agree	Somewhat agree	Somewhat Disagree	Strongly Disagree
Eating a variety of food each day, probably gives you all the vitamins and minerals you need	E	66.0	34.0	0	0
	C	55.8	34.6	9.6	0
Only fats are fattening	E	21.3	23.4	29.8	25.5
	C	22.0	16.0	34.0	28.0
Fast foods are high in salt and fat	E	38.3	44.7	12.8	4.3
	C	45.1	41.2	9.8	3.9
A fat that is a solid is usually high in saturated fat	E	55.3	31.9	8.5	4.3
	C	32.7	44.9	6.1	16.3
Cholesterol is only found in animal products	E	13.3	31.1	20.0	35.6
	C	24.0	30.0	28.0	18.0
Skipping meals is a good way to lose weight	E	27.7	10.6	21.3	40.4
	C	15.7	15.7	39.2	29.4
Eating at least one source of iron each day is important for good health	E	58.7	19.6	6.5	15.2
	C	50.0	24.0	20.0	6.0

Table 4.32 (continued) Reported Frequencies of Perceived Nutrition Beliefs-FFQ1 Control and Experimental - Section E					
A person needs to drink milk only during childhood	E	74.5	4.3	8.5	1.8
	C	60.8	13.7	9.8	15.7
Starchy foods like bread, potatoes and rice make people fat	E	12.8	4.3	12.8	70.2
	C	13.5	9.6	26.9	50.0
What you eat can make a big difference in your chance of getting a disease	E	19.1	27.7	17.0	36.2
	C	25.0	46.2	11.5	17.3
In your opinion, the foods that you are eating now	E	19.6	32.6	17.4	30.4
	C	17.3	34.6	26.9	21.2

Table 4.33 Reported Frequencies of Perceived Nutrition Attitudes-FFQ1 Control and Experimental - Section F

Question		Strongly Agree	Somewhat agree	Somewhat Disagree	Strongly Disagree
I have no time to prepare healthy meals	E	34.0	14.9	27.7	23.4
	C	26.3	15.8	28.9	28.9
It is too hard to find good healthy meals at the institution	E	35.6	20.0	11.1	33.3
	C	31.4	14.3	22.9	31.4
There are many recommendations about healthy ways to eat, it's hard to know what to believe	E	14.9	0	31.9	53.2
	C	5.4	8.1	51.4	35.1
It would be easy for me to reduce the amount of fat in my diet	E	61.7	25.5	6.4	6.4
	C	28.9	50.0	10.5	10.5
It would be easy for me to increase the amount of fibre in my diet	E	31.9	38.3	17.0	12.8
	C	35.1	43.2	10.8	10.8
I find the nutrition information on foods in the supermarket to be very helpful	E	45.7	21.7	15.2	17.4
	C	44.7	42.1	2.6	10.5
I enjoy food too much to worry about its fat content	E	44.7	17.0	25.5	12.8
	C	36.8	21.1	28.9	13.2
I enjoy food too much to worry about my weight	E	44.7	17.0	19.1	19.1
	C	42.1	13.2	26.3	18.4

Table 4.33 (continued) Reported Frequencies of Perceived Nutrition Attitudes-FFQ1 Control and Experimental - Section F					
I am still too young to worry about getting good amount of calcium in my	E	57.8	17.8	11.1	13.3
	C	42.1	18.4	23.7	15.8

Table 4.34 Reported Frequencies of Perceived Nutrition Attitudes-FFQ1 Control and Experimental - Section F

Question		Be harmful to my health	Be beneficial to my health	Have no effect on my health
Decreasing the fat content of my diet would be	E	21.7	60.9	15.2
	C	23.7	52.6	23.7
Increasing the fibre content of my diet would be	E	6.5	69.6	23.1
	C	15.8	65.8	18.4

4.3.2.2 24-Hour Dietary Recalls

Three 24-Hour Dietary Recalls were collected from each participant via face to face interviews. Applying the Mann Whitney statistical test (p<0.05) indicated that baseline nutrient intakes of participants in the experimental group were similar to those in the control group (Table 4.35, p.203). The coefficient range was from 0.039 to 0.997, where significant difference was detected for the percentage of daily protein.

Table 4.35 Comparison of Recalls Pre-Tests DA- Mann Whitney Test (p<0.05)

Variables	
Fat	0.979
Carbohydrates	0.591
Protein	0.782
Vitamin A	0.588
Vitamin C	0.291
Calcium	0.324
Iron	0.330
Calories	0.752
Milk	0.437
Bread	0.694
Fruit	0.732
Vegetable	0.795
Meat	0.368
Fat	0.997
Fibre	0.690
% Protein	0.039*
% Fat	0.533
% Carbohydrates	0.247

*Significant Difference Between FFQ1 Control and FFQ1 Experimental

Initial mean nutrient and food group intakes are listed in Table 4.36 (p.204). When compared to WHO nutrient intake recommendations, the diets of the participating DA adolescents were low in energy, low in fast food, milk and milk products, meats, legumes, vegetables, fruit juice, protein and soft drinks. They were adequate in breads (but low in other cereals), fruits and fat; they were also characterized with excess in salty snacks, salt and caffeine containing beverages such as coffee and tea. At the nutrient level, the DA group’s diet was low in vitamin A, calcium, iron and fibre. (Table 4.36, p. 204).

Table 4.36 Baseline Nutrient Means- DA

Variables	Mean	Std. Deviation
Fat	51.99	±40.23
Carbohydrates	208.69	±97.26
Protein	42.17	±27.98
Vitamin A	306.16	±412.63
Vitamin C	62.55	±55.03
Calcium	460.80	±350.90
Iron	6.75	±5.33
Calories	1452.03	±784.04
Milk	0.26	±0.53
Bread	4.86	±3.95
Fruit	1.71	±1.48
Vegetable	1.24	±1.21
Meat	1.94	±2.87
Fat	8.68	±7.09
Fibre	11.80	±7.13
% Protein	11.17	±3.46
% Fat	30.24	±9.03
% Carbohydrates	58.63	±9.52

4.3.2.3 Semi-Structured Interviews

Perceptions of Healthy Eating/Defining a Healthy Diet

The term “healthy food” was perceived to have different meanings to different interviewees. A definition that was repeated often was related to healthy food being good or beneficial to the body. Another description used was “high in fruits and vegetables”. Others related healthy foods to specific food categories like “milk and milk products”, “should include carbohydrates”. Some interviewees thought it was more related to giving the body energy and strength, whereas, some defined it as “foods that are nutritious”. “Foods that have protein”, “eating a variety

of food”, “foods that are necessary for growth”, “foods that have iron” and “stews” were also among the definitions offered. A couple of interviewees explained that healthy foods mean eating a “variety of foods” and a couple did not know what healthy foods were nor did they have any examples (Table 4.37).

Table 4.37 Perceptions of Healthy Eating/Defining a Healthy Diet

Q1: When I say healthy food what does that term mean to you?	No. of Respondents
Beneficial to the body/ good to the body	22
High in fruits and vegetables	18
Has Calcium/ E.g.: milk and milk products	17
Should include carbohydrates/ E.g.: rice, pasta , bread, potatoes	12
Foods that give strength to the body/give energy	5
Foods that are nutritious	5
Something that has proteins/ meats	4
Contains vitamins	2
Eating a variety of food	3
Foods that are necessary for growth	3
Foods that have Iron	3
Yakhnee (stews)	3
Moloukieh	2
Lentils	2
I don't know	2

- Dar Aytam- Experimental- PRE-INTERVENTION (N=38)

Awareness/Perceptions of the Importance of Healthy Eating During Adolescence

Most of the interviewed students believed that healthy foods are important at this particular stage in their lives (Table 4.38, p.207).

Perceived Benefits of Healthy Eating During Adolescence

Reasons why interviewees thought it was important to eat healthy foods focused mainly on the notion that eating healthy is important for growth; that they were “still growing” and that they needed healthy foods for “proper growth”. Some

believed that it was important to eat healthy foods in order to maintain weight. “Prevention from disease” was yet another explanation given for the importance of healthy food during adolescence. A group of interviewees reasoned that it was important in order to “maintain our body” while others said that healthy food is needed so that “the body would not grow up to be weak”. Two replied that it is beneficial to the body (Table 4.38).

Table 4.38 Awareness/Perceptions of the Importance and Benefits of Healthy Eating During Adolescence

Q2: Do you feel at your age it’s important to eat healthy food? Why?	No. of Respondents
Yes	17
Of course/ Very important	20
Because we are still growing/ We need it for proper growth	12
To maintain weight	6
Because it prevents from diseases	5
To maintain our body	4
So the body wouldn’t grow up to be weak	3
To maintain good health/ Stay healthy	2
Beneficial to the body	2

- Dar Aytam- Experimental- PRE-INTERVENTION (N=38)

Belief whether own diet is healthy (Self-Evaluation)

A number of interviewees believed that their diet was healthy. Others believed that their diets were not healthy all the time, “not all of it”, “some of it”. Whereas, there were some who thought that their dietary pattern was not healthy. A few answered that their diets were mostly healthy, “most of it” (Table 4.39, p.207).

Table 4.39 Belief whether own diet is healthy (Self-Evaluation)

Q3: Do you think your diet is healthy?	No. of Respondents
1- Yes	12
2- No	10
3- Not all the time/ Sometimes/ Not all of it/ some of it is healthy	10
5- Mostly/Most	3

• Dar Aytam- Experimental- PRE-INTERVENTION (N=38)

Belief of how diet can become healthier

Some of the interviewed students believed that they shouldn't change anything and that their diets were already healthy. In the opinion of some, they should decrease their intake of fried foods. Others viewed organizing the timing of meals and not skipping meals as an important point towards improvement. Decreasing the amount of bread in the diet and decreasing the quantity of food ingested, eating stews more often, increasing the intake of milk and milk products and of fruits and vegetables were also considered among ways to make diet healthier. A couple mentioned eating less chocolate and chips (Table 4.40).

Table 4.40 Belief of how diet can become healthier

Q4: In your opinion, what should you change to make your diet healthier?	No. of Respondents
Nothing to change/ My diet is healthy/the food that I am eating is healthy	8
I should eat less (decrease) fried foods	4
I should pay attention to the timing of meals/organize my meals/ not skip meals	3
I should decrease bread	3
I should eat at yakhnee more often	3
I should increase milk and milk products	3
I should decrease the amount of food I eat/ the quantity	3
I should eat more (increase) fruits and vegetables	3
I should eat less chocolate	2
I should eat less chips	2

• Dar Aytam- Experimental- PRE-INTERVENTION (N=38)

Willingness to change diet (Intention)/Attitude towards change

Some said that they were willing to change for sure while others stated that they would change “a lot” if they find out that their diet is not healthy. Others explained that they would try whereas a group of interviewees replied that they would try but that they “can’t” change the foods that they like (Table 4.41).

Table 4.41 Willingness to change diet (Intention)/Attitude towards change

Q5: If I tell you the food you are eating is not healthy, on a scale of 1 to 10, how willing will you be to change your diet?	No. of Respondents
5/10	4
10/10 (I would change immediately)	3
7/10	2
6/10	2
I would try, but I can’t change the foods that I like	4
I would try	4
If my food is not healthy; then, I would change a lot (10/10)	2

- Dar Aytam- Experimental- PRE-INTERVENTION (N=38)

Influencing/Motivating Factors

The most prevailing theme in this category was weight concerns such as weight gain, or maintaining weight. Health was also considered as a factor. Some did not know what would convince them. Others considered themselves as “content that way” and that nothing would convince them of changing their diet. “If my body develops a certain disease or deficiency” and “if I see someone get sick” were among the factors that interviewees thought of as factors that would influence a change in dietary habits (Table 4.42, p.209).

Table 4.42 Influencing/Motivating Factors

Q6: What would be the most important reason (or factor) that would make you (convince you to) try changing what you eat?	No. of Respondents
To prevent weight gain/ maintain weight	5
For my health	4
I don't know	4
I don't think anything could convince me/ I'm content that way	3
If my body develops a certain disease or deficiency	2
If I see someone get sick/ harmed by the un-healthy food	2

• **Dar Aytam- Experimental- PRE-INTERVENTION (N=38)**

Perceived ability to carry out a change (self-efficacy)/Limiting or facilitating factors

Perceived ability to carry out a change in dietary pattern among interviewees varied; some were very sure that they would be able to do so, “I am sure”, “10/10”, whereas others were felt that they can carry out the if they take the decision to do so. For some, it depended whether they whether the healthy food was to their liking, “if I like the food”, “depends on the type of food”. Some of the students interviewed felt that it was hard to change the way that they eat because they were “used to eating this way”, “used to certain foods. “I would try” and “I would make the effort” were among the answers given, as well.

A group of interviewees felt change would be hard because the “food is set” whether at the institution or at home and they had to eat “what is available”. Others considered it hard because they could not stop themselves from buying certain foods (like chocolates) when they saw them at the shop or because they felt that they could not stop themselves from eating the things that they like (Table 4.43, p.210).

Table 4.43 Perceived ability to carry out a change (self-efficacy)/Limiting or facilitating factors

Q7: How sure are you that you will indeed be able to change? Where do you feel it is easier for you to eat healthy food, at home, at university or when you are out with friends?	No. of Respondents
10/10 (I am sure)	6
6/10	2
If I decide, I can do it / I have a strong will power	6
It depends if I like the taste/ depends on the type of food	5
It's hard because I am used to eating this way/used to certain foods	3
The difficulty is that the food is set (at the institution or at home), we have to eat what is available	3
I would make the effort/ I would try	2
I can't resist buying chocolates and stuff when I see them in the shop/ there are things I like that I can't stop eating	2

• **Dar Aytam- Experimental- PRE-INTERVENTION (N=38)**

4.3.3 Dependant Variables - Phase Two – Post Intervention

4.3.3.1 Questionnaires

After the intervention, participants in the experimental group had a significant increase in some variables as compared to the control group as determined by the Mann Whitney statistical test ($p<0.05$). For section B (Knowledge of Nutrition Guidelines) coefficients ranged between 0.097 and 0.956. For section C (Knowledge of Diet-Disease Relationships) the range of coefficients was between 0.003 and 0.481. The changes were related to an increased knowledge of diseases related to calcium, overweight, fat and salt. For section D (Knowledge of Nutrient Sources /Skills of Selecting Foods), the Mann Whitney test results ranged between 0.105 and 0.830. For section E (Nutritional Beliefs), coefficients ranged between 0.015 and 0.960. In this section, a change for the better was observed regarding beliefs about cholesterol and relationship between food consumption and disease. For Section F (Nutritional Attitude), coefficients ranged

between 0.011 and 0.990. In this section, attitude towards dietary recommendations improved whereas the experimental group's attitude towards increasing fibre consumption declined.

There were no observed changes with respect to dietary practice except for French fries frequency of consumption and the amount of coffee or tea consumed per day such that post intervention, the experimental group decreased the intake of both. Coefficient ranges, in this section, were between 0.003 and 0.989 (Table 4.44).

Table 4.44 Comparison of Change of Pre and Post Tests Between Experimental and Control -DA- FFQ Mann Whitney Test (p<0.05)

Section B- Knowledge of Nutrition Guidelines	
In your opinion, how important is it to maintain a healthy weight?	0.615
In your opinion, how important is it to eat a variety of food?	0.602
In your opinion, how important is it to choose a diet with plenty of bread, cereal or pasta?	0.610
In your opinion, how important is it to choose a diet with plenty of fruits & vegetables?	0.898
In your opinion, how important is it to drink milk/dairy products everyday?	0.624
In your opinion, how important is it to eat an adequate amount of fibre each day?	0.743
In your opinion, how important is it to choose a diet that is low in fat?	0.956
In your opinion, how important is it to choose a diet that is low in saturated fat?	0.097
In your opinion, how important is it to choose a diet that is low in cholesterol?	0.353
In your opinion, how important is it to use salt in moderation?	0.690
In your opinion, how important is it to use sugar in moderation?	0.303
Section C- Knowledge of Diet –Disease Relationship	
Do you know of any health problems related to not eating enough calcium?	0.036*
Do you know of any health problems related to being overweight?	0.013*
Do you know of any health problems related to eating too much fat?	0.003*
Do you know of any health problems related to eating too much cholesterol?	0.112
Do you know of any health problems related to not eating enough fibre?	0.164
Do you know of any health problems related to eating too much sugar?	0.481
Do you know of any health problems related to eating too much salt?	0.006*

Table 4.44 (continued) Comparison of Change of Pre and Post Tests Between Experimental and Control -DA- FFQ Mann Whitney Test (p<0.05)	
Section D- Knowledge of Nutrient Sources/ Skills of Selecting Foods	
Rank the following in the correct order	0.599
Some people read the nutrition label before buying a food product	0.390
You get nutrition information mostly from	NA
Based on your knowledge, which has more fat?	
Baked Potato or Fried potato	0.942
Turkey mortadella or hotdog	0.647
White cheese or yellow cheese	0.316
Yogurt or sour cream	0.150
Chicken or meat	0.256
Ketchup or Mayonnaise	0.505
Sorbet or ice cream	0.105
Based on your knowledge, which has more saturated fat?	
Steak or liver	0.830
Margarine or Butter	0.539
Egg white or Egg yolk	0.263
Skim milk or whole milk	0.693
Based on your knowledge, which has more cholesterol?	
Steak or liver	0.186
Margarine or Butter	0.735
Egg white or Egg yolk	0.207
Skim milk or whole milk	0.784
Based on your knowledge, which has more fibre?	
Meat or Fruit	0.298

Table 4.44 (continued) Comparison of Change of Pre and Post Tests Between Experimental and Control -DA- FFQ Mann Whitney Test (p<0.05)	
White Bread or Brown Bread	0.622
Oranges or orange juice	0.145
Lettuce or Beans	0.670
Crackers or popcorn	0.477
Section E: Nutritional Beliefs	
Eating a variety of food each day, probably gives you all the vitamins and minerals you need	0.702
Only fats are fattening	0.258
Fast foods are high in salt and fat	0.109
A fat that is a solid is usually high in saturated fat	0.766
Cholesterol is only found in animal products	0.024*
Skipping meals is a good way to lose weight	0.606
Eating at least one source of iron each day is important for good health	0.960
A person needs to drink milk only during childhood	0.372
Starchy foods like bread, potatoes and rice make people fat	0.176
What you eat can make a big difference in your chance of getting a disease	0.015*
In your opinion, the foods that you are eating now	0.390
Section F: Nutrition Attitude	
I have no time to prepare healthy meals	0.606
It is too hard to find good healthy meals at the institution	0.681
There are many recommendations about healthy ways to eat, it's hard to know what to believe	0.011*
Decreasing the fat content of my diet would	0.056
It would be easy for me to reduce the amount of fat in my diet	0.158
Increasing the fibre content of my diet would be	0.046*

Table 4.44 (continued) Comparison of Change of Pre and Post Tests Between Experimental and Control -DA- FFQ Mann Whitney Test (p<0.05)	
It would be easy for me to increase the amount of fibre in my diet	0.177
I find the nutrition information on foods in the supermarket to be very helpful	0.802
I enjoy food too much to worry about its fat content	0.669
I enjoy food too much to worry about my weight	0.868
I am still too young to worry about getting good amount of calcium in my	0.990
Section G: Dietary Practice	
How many meals do you eat per day	0.236
Do you skip any meals	0.596
If you do skip meals, which one?	0.582
If you skip meals, why?	0.428
Where do you eat most of your meals?	NA
How often do you eat fast foods?	0.614
How often do you eat French fries?	0.003*
How often do you eat a mankoushe?	0.095
How often do you sweets?	0.455
How often do you eat salty snacks?	0.128
How often do you eat bread?	0.848
How often do you eat pasta, rice and potatoes?	0.664
How often do you drink milk or yogurt?	0.205
How often do you eat cheese or labneh?	0.295
How often do you eat red meat?	0.208
How often do you eat chix	0.682
How often do you eat fish?	0.732

Table 4.44 (continued) Comparison of Change of Pre and Post Tests Between Experimental and Control -DA- FFQ Mann Whitney Test (p<0.05)	
How often do you eat eggs?	0.989
How often do you eat beans, lentils or peas?	0.144
How often do you eat hotdogs or mortedella?	0.527
How often do you eat cooked vegetables in preparation of dishes?	0.875
How often do you eat raw vegetables alone or in salads?	0.374
How often do you eat fruits?	0.756
How often do you drink fruit juice?	0.666
How often do you drink soft drinks?	0.053
How often do you drink coffee or tea?	0.024*
Do you add salt to your food?	0.838
How many spoons of sugar do you use per day?	0.409

*Significant Difference Between dFFQ Control and dFFQ Experimental

4.3.3.2 24-Hour Dietary Recalls

After the intervention, there were changes in the mean nutrient intakes of the experimental group. The Mann Whitney statistical test coefficient ranged from 0.002 to 0.875. Changes that reached significant levels were those of carbohydrates, vitamin C, iron and percent protein; the experimental group showed an increased intake for the first three; whereas, the increase in percent protein was significant for the control group although both groups showed an increase in this parameter. Changes in the mean number of servings from the various food groups were significant for the milk and bread groups; both groups showed an increase in

daily servings of milk but only the change in the control group reached significant levels. For the number of servings of the bread and cereals, only the experimental group exhibited an increase in daily consumption. Moreover, it is worth noting that the experimental group showed an increase in the intake of protein, fat, vitamin A, calcium, calories and in the number of daily servings of meat without reaching significant levels. The daily consumption of fruits, vegetables and fibre decreased in both control and experimental groups without reaching significance; however, this decrease was less pronounced for the experimental group (Table 4.45).

Table 4.45 Comparison of Change of Pre and Post Tests Between Experimental and Control -DA- Recalls Mann Whitney Test (p<0.05)

Variables	
Fat	0.186
Carbohydrates	0.019*
Protein	0.769
Vitamin A	0.136
Vitamin C	0.043*
Calcium	0.875
Iron	0.025*
Calories	0.064
Milk	0.001*
Bread	0.002*
Fruit	0.545
Vegetable	0.292
Meat	0.871
Fat	0.159
Fibre	0.052
% Protein	0.050*
% Fat	0.606
% Carbohydrates	0.247

*Significant Difference Between dRecalls Control and dRecalls Experimental

4.3.3.3 Semi Structured Interviews

Perceptions of Healthy Eating/Defining a Healthy Diet

A definition of the term “healthy food” that was repeated often by interviewees was related to it being good or beneficial to the body and beneficial to health. Another description used was “high in fruits and vegetables”. Others related healthy foods to specific food categories like “milk and milk products”, “should include carbohydrates”, “something that has proteins”. “Foods that give health” and “foods that maintain health” were also used as definition. Some interviewees thought it was more related to giving the body energy and strength, whereas, some defined it as “foods that are nutritious”. “Foods that contain vitamins”, “foods that are low in fats”, “foods that are necessary for growth” and “stews” were also among the definitions offered. A couple of interviewees explained that healthy foods mean eating foods that “follow the food guide pyramid” and a couple as foods that prevent disease (Table 4.46).

Table 4.46 Perceptions of Healthy Eating/Defining a Healthy Diet

Q1: When I say healthy food what does that term mean to you?	No. of Respondents
Beneficial to the body/ beneficial to health	18
High in fruits and vegetables	16
Has Calcium/ E.g.: milk and milk products	14
Should include carbohydrates/ E.g.: rice, pasta , bread, potatoes	10
Something that has proteins/ meats	6
Foods that give us health/ maintain health	5
Foods that give strength to the body	4
Contains vitamins	3
Foods that are nutritious	3
Foods that are necessary for growth	3
Foods that are low in fat	3
Yakhnee (stews)	2
Foods that follow the food guide pyramid	2
Prevent disease	2

• Dar Aytam- Experimental- POST-INTERVENTION (N=40)

Awareness/Perceptions of the Importance of Healthy Eating During Adolescence

Most of the interviewed students believed that healthy foods are important at this particular stage in their lives (Table 4.47, p.219).

Perceived Benefits of Healthy Eating During Adolescence

Reasons why interviewees thought it was important to eat healthy foods focused mainly on the notion that eating healthy is important for growth; that they were “still growing” and that they needed healthy foods for “proper growth”. Some believed that it was important to eat healthy foods in order to “maintain good health” and “stay healthy”. Among the reasons mentioned was that it is important to eat healthy food “because it’s only to a certain age that we build the body”. “Prevention from disease” and “prevention from disease later on” were yet another explanation given for the importance of healthy food during adolescence. A group of interviewees reasoned that it was important in order to “maintain our weight” while others said that healthy food is important for all ages, “throughout life”. Two replied that it is beneficial to have strength later on when they grow up (Table 4.47, p.219).

Table 4.47 Awareness/Perceptions of the Importance and Benefits of Healthy Eating During Adolescence

Q2: Do you feel at your age it's important to eat healthy food? Why?	No. of Respondents
Yes	24
Of course/ Very important	14
Because we are still growing/ We need it for proper growth	17
To maintain good health/ Stay healthy	10
Because it's only to a certain age that we build the body	5
To maintain weight	3
It's important for all ages/ throughout life	3
To prevent diseases later on	2
Because it prevents from diseases	2
To have strength later on/ when I grow up	2

• Dar Aytam- Experimental- POST-INTERVENTION (N=40)

Belief whether own diet is healthy (Self-Evaluation)

A number of interviewees believed that their diets were not healthy all the time, “not all of it”, “some of it”, “not much”. Whereas, there were some who thought that their dietary pattern was not healthy. A few answered that their diets were healthy. “Maybe”, “sort of”, “almost” and “mostly” healthy were how some interviewees viewed their diet (Table 4.48).

Table 4.48 Belief whether own diet is healthy (Self-Evaluation)

Q3: Do you think your diet is healthy?	No. of Respondents
Not all the time/ Sometimes/ Not all of it	16
No	7
Yes	7
Maybe	3
Sort of/ Almost/Mostly/Most	3
Not much	2

• Dar Aytam- Experimental- POST-INTERVENTION (N=40)

Belief of how diet can become healthier

For some interviewed students, they believed that they shouldn't change anything and that their diets were already healthy. In the opinion of some, organizing the timing of meals and not skipping meals was important for their diet to become healthier. Others viewed decreasing their intake of fat as an important point towards improvement. Decreasing the amount of chips, eating stews more often and increasing the intake of milk and milk products were also considered among ways to make diet healthier. Other ways to improve dietary practice included increasing the consumption of fruits and vegetables, improving the quality of food, eating a variety, eating less sweets and increasing meat in the diet (Table 4.49).

Table 4.49 Belief of how diet can become healthier

Q4: In your opinion, what should you change to make your diet healthier?	No. of Respondents
Nothing to change/ My diet is healthy/the food that I am eating is healthy	9
I should pay attention to the timing of meals/organize my meals/ not skip meals	6
I should eat less (decrease) fats	5
I should eat less chips	5
I should eat at yakhnee more often	3
I should increase milk and milk products	3
Improve the quality of food	2
I should eat more (increase) fruits and vegetables	2
I should eat less sweets	2
I should a variety	2
I should increase the amount of meat	2

• Dar Aytam- Experimental- POST-INTERVENTION (N=40)

Willingness to change diet (Intention)/Attitude towards change

Some said that they were willing to change for sure, “immediately”, “10/10” while others varied in the degree of willingness. Others stated that they would change if they find out that their diet is not healthy. A couple stated that they would try (Table 4.50).

Table 4.50 Willingness to change diet (Intention)/Attitude towards change

Q5: If I tell you the food you are eating is not healthy, on a scale of 1 to 10, how willing will you be to change your diet?	No. of Respondents
10/10 (I would change immediately)	9
7/10	5
5/10	5
8/10	4
9/10	4
6/10	3
6/10 (If I am convinced that my food is not healthy)	3
I would try	2

- Dar Aytam- Experimental- POST-INTERVENTION (N=40)

Influencing/Motivating Factors

The most prevailing theme in this category was fear of sickness, “if I get sick”, “if I see how the unhealthy food is damaging my body”. Others considered weight gain and maintaining weight as triggering factors. “If I have proof”, “if the doctor tells me” and “if the person telling me is older and knows better” were among the factors that interviewees thought would influence a change in dietary habits. Some felt that a lot of the things mentioned in class made them “stop and think” before eating something. “if my health improves on the new way” was also on the list of factors. A couple said that they did not know what would motivate them to change (Table 4.51, p.222).

Table 4.51 Influencing/Motivating Factors

Q6: What would be the most important reason (or factor) that would make you (convince you to) try changing what you eat?	No. of Respondents
If I get sick/ see how the un-healthy food is damaging my body	5
To prevent weight gain/ maintain weight	4
If I have proof/ if the doctor tells me to/ If the person telling me knows better and is older than I am	3
A lot of things that you spoke of in class made stop and think before eating	2
I don't now	2
If my health improves on the new way	2

• Dar Aytam- Experimental- POST-INTERVENTION (N=40)

Perceived ability to carry out a change (self-efficacy)/Limiting or facilitating factors

Perceived ability to carry out a change in dietary pattern among interviewees varied; some felt sure that they can do it. Others felt that they can carry out a change if they take the decision to do so. “I would try” and was among the answers given, as well. Some of the interviewed students said that they could not change.

A group of interviewees felt that there would be no difficulties or barriers that would face them. Another group said that the difficulty was whether they like the taste (of the healthy food), “if I like something or not”. For some, change is hard because they would not be able to stop the things that they like or eat less of them. Others thought that change would be hard because the “food is set” whether at the institution or at home and they had to eat “what is available”. “I don’t have the time” was also a barrier to changing dietary practice that two interviewees mentioned (Table 4.52, p. 223).

Table 4.52 Perceived ability to carry out a change (self-efficacy)/Limiting or facilitating factors

Q7: How sure are you that you will indeed be able to change? Where do you feel it is easier for you to eat healthy food, at home, at university or when you are out with friends?	No. of Respondents
8/10	7
7/10	2
6/10 (depending on my situation/ how I am living)	2
5/10 to 6/10	2
If I decide, I can do it / When I take the decision, I can do it	10
I can do it	9
No difficulties/ no barriers	9
The difficulty is if I like the taste/ if I like something or not	8
The difficulty is stopping the things that I like (eating less of them)/ I can't stop things that I like	6
I can try	4
I can't	3
The difficulty is that the food is set (at the institution), we have to eat what is available	2
The difficulty is the availability of the foods at home/ I have to eat what is available/ what my mom prepares for the whole family	2
The difficulty is that I have no time	2

• Dar Aytam- Experimental- POST-INTERVENTION (N=40)

4.4 Summary of Findings

The findings suggest that, at baseline, the both the HSU and DA group of adolescents’ diets were inadequate when compared to nutrition recommendations and guidelines. The former group’s diet was low in bread and cereals, milk and legumes, vitamin A, calcium and fibre. It was higher than recommended in fat, soft drinks and caffeine containing beverages. The latter group’s diet was low in energy, milk and milk products, meats, legumes, vegetables, protein, vitamin A, calcium, iron and fibre. It had excess amounts of salty snacks, salt and caffeine containing beverages.

Post intervention, findings suggest that both groups’ diets exhibited a positive improvement towards healthy eating. The HSU experimental group’s diet

exhibited a significant ($p<0.05$) decrease in table sugar and a significant increase in carbohydrates (breads and cereals). Other detected changes for this group included an increase in milk product consumption although this trend did not reach significance ($p<0.05$). The experimental DA group's diets showed significant ($p<0.05$) increase in carbohydrates (bread and cereals), vitamin C and iron. Other changes elicited were increases in protein (mean and percent), fat, vitamin A, calcium, energy and meat; however this trend did not reach significance ($p<0.05$).

Pre intervention, with regards to nutrition related determinants, findings from the quantitative data suggests that both the HSU and DA adolescents in my study had good knowledge of the dietary guidelines. The HSU group also showed good knowledge of diet-disease relationships and food guide recommendations while the DA group exhibited poor knowledge of the latter two parameters. Additionally, both groups exhibited some nutrition related misconceptions: for the HSU group, it was in relation to beliefs about weight loss and milk consumption while for the DA group it with regards to cholesterol and weight loss. Qualitative baseline findings indicate that the definition of a healthy diet and healthy eating were different for each group. None of the participants offered a complete description of what may be considered a healthy diet; however, the HSU adolescents showed better knowledge of the components of a healthy diet than the DA group. Additionally, none of the adolescents in my study gave reference to the dietary recommendations or the food guide pyramid, at baseline. The majority of the interviewed adolescents from both HSU and DA groups believed healthy eating as important for their age group; and different explanations were proposed for its

perceived benefits to adolescence within each group. The quantitative data suggests that adolescents in both groups had poor skills for differentiating between high and low fibre foods. The findings suggest that the HSU adolescents had more positive nutrition related attitudes than the DA group. Participants in both groups had varied levels of willingness to change their diet; however, the findings suggest that the DA group of adolescents were more willing to change their dietary habits if they found out that their intake was not healthy. The qualitative data proposes different barriers to healthy eating in both groups; taste, availability and habit were those most cited by the DA adolescents while living alone, peer pressure, time and convenience were those most prevalent for the HSU group. Most of the DA participants perceived their diet as healthy while most of the HSU participants believed their diet to be un-healthy. The findings propose that adolescents in both groups believed that decreasing the consumption of certain unhealthy foods and increasing that of healthy foods would improve their over all diet. Participants from both groups elicited different factors that would motivate them to eat a healthier diet, and adolescents in the HSU group perceived themselves more capable of dietary change than those belonging to the LSES participants.

Following the intervention, the findings indicate positive changes in some of the targeted determinants. The quantitative data suggests a significant ($p < 0.05$) improvement in the knowledge of nutrition related diseases for both the HSU and the DA groups. Adolescents in the DA group additionally showed a positive change in the knowledge of the food guide recommendations; however, this did not reach statistical significance ($p < 0.05$). For the HSU group of adolescents, there was no

change in beliefs and misconceptions; however, for the DA participants, the data findings propose a significant ($p<0.05$) improvement with regards to cholesterol and relationship between food consumption and disease. Post intervention, the qualitative data indicates that although the definition of a healthy diet and healthy eating that was provided by the participants in both groups was still not a complete description of what may be considered a healthy diet; however, both the HSU and DA adolescents showed better knowledge of the components of a healthy diet by including elements from the dietary recommendations and food guide pyramid and by giving reference to health and disease prevention in their definition. The majority of the interviewed adolescents from both HSU and DA groups still believed healthy eating as important for their age group; and different explanations were proposed for its perceived benefits to adolescence within each group; however, the findings suggest that post intervention, both groups had an increased awareness with regards to the relationship between diet and health. The quantitative data suggests that adolescents skills for differentiating between high and low fat foods significantly ($p<0.05$) improved whereas no change was reported for skills in differentiating between high and low fibre foods for the HSU experimental group. On the other hand, a positive change in the skills of the DA group was observed but did not reach significance ($p<0.05$). The post intervention qualitative data findings also suggest that both the HSU and DA adolescents had more positive nutrition related attitudes and the quantitative data findings suggest that HSU participants elicited a significant ($p<0.05$) positive change with regards to attitudes related to fat and fibre consumption while the DA group exhibited an improved attitude towards

dietary recommendations and showed a decrease in negative attitude in relation to time available for healthy meal preparation; however, the latter did not reach statistical significance. Qualitative data findings after the intervention propose that the willingness to change dietary practices improved for both the HSU and the DA group of adolescents; some HSU students visited a dietician and took the step of changing their diet towards a healthier one. The findings also suggest that most of the HSU and DA participants believed their diet was not healthy all the time. The findings from qualitative data collected post-intervention propose that adolescents in both groups still believed that decreasing the consumption of certain unhealthy foods and increasing that of healthy foods would improve their overall diet. Barriers and motivators of healthy eating did not exhibit noticeable changes after the intervention; however, adolescents in both the HSU and the DA groups perceived themselves more capable of dietary change than was elicited in pre-intervention findings.

Chapter 5: Discussion of Findings

5.1 Introduction

This chapter addresses the key research questions of my study (Chapter 3) and builds on the data from chapter four. Since data was collected pre and post the intervention, the discussion is divided into two parts: phase one referring to pre-intervention findings at baseline and phase two referring to post intervention outcome findings. Each research question is stated and findings from my study and from the reviewed literature will be related to each.

5.2 Phase One (Pre-intervention)

A primary step in developing effective interventions has been suggested to be knowledge of the problem and the population under research which can also be referred to as a needs assessment (Brug et al., 2005) (Figure 2.1, p.47). For the development of nutrition education interventions following the Intervention Mapping program development approach, one of the pre-requisite factors is gathering and assessing information on the baseline nutrient intake and dietary patterns of the targeted population. In my study this has been done in part through the literature review in chapter two; however, with the absence of large scale studies and national epidemiological surveys examining the above parameters in the adolescent population in Lebanon, it was not possible to obtain a clear picture of current dietary patterns and nutrient intake in Lebanese adolescents. Therefore, baseline data was collected specifically for this research project in order to acquire the relevant information.

5.2.1 What are the dietary practices and nutrient intakes of the adolescents under investigation?

In my study, data addressing the dietary practices and nutrient intakes of the high socioeconomic group of adolescents (HSU) and those of the low socioeconomic group of adolescents (DA) were each collected and assessed separately. Comparisons were then made between the findings obtained from each group.

Upon assessing the diets of the HSU (high socioeconomic) adolescents, the results exhibited that they were low in fast food, breads and cereals, milk, legumes, adequate in meats, milk products, proteins, vegetables, fruits, sweets and salty snacks, but had an excess of fat, soft drinks and caffeine containing beverages. At the nutrient level, HSU adolescents' diets were low in Vitamin A, calcium and fibre.

The diets of DA adolescents were low in energy, low in fast food, milk and milk products, meats, legumes, vegetables, fruit juice, protein and soft drinks. They were adequate in breads (but low in other cereals), fruits and fat; they were also characterized with excess in salty snacks, salt and caffeine containing beverages such as coffee and tea. At the nutrient level, the DA group's diet was low in vitamin A, calcium, iron and fibre.

The above findings indicate that both groups (the low socioeconomic and the high socioeconomic) are consuming diets that are on the one hand poor in certain components such as milk and milk products while on the other hand containing higher than recommended amounts of other components such as fats

and salt. These findings are similar to a range of studies in the US, Nordic, Middle, Southern and Northern Europe and the United Kingdom that illustrate adolescents' diets as often inadequate if compared to national guidelines (American Dietetic Association, 2006; American School Health Association, 1997; Amorim Cruz, 2000; Cassazza and Ciccazzo, 2006; Gallagher, 2000; Gregory et al., 2000; Hassapidou and Fotiadou, 2001; Hoelscher, 2002 ; Paulus et al., 2001; Samuelson, 2000 ; Story et al., 2002

WHO, 2005; Wilkinson et al., 2003).

Fat, Sugar and Salt

The diets of adolescents living in US and most of Europe are characterized with excess amounts of fat, sugar and salt (American Dietetic Association, 2006; American School Health Association, 1997; Amorim Cruz, 2000; Cassazza and Ciccazzo, 2006; Gallagher, 2000; Gregory et al., 2000; Hassapidou and Fotiadou, 2001; Hoelscher, 2002; Paulus et al., 2001; Samuelson, 2000; Story et al., 2002; WHO, 2005; Wilkinson et al., 2003). Therefore, findings from my study are similar to those in that they suggest that the HSU group of adolescents' diets contain excess fats and those of the DA group are high in salt. On the other hand, unlike studies in the reviewed literature, both of the sampled groups' diets showed adequate intakes of sugar.

Fruits and Vegetables

Studies in the conducted literature review indicate that the intake of this food group is lower than recommended for many adolescents in the US and most of Europe (American Dietetic Association, 2006; American School Health Association, 1997; Cassazza and Ciccazzo, 2006; Gallagher, 2000; Gregory et al., 2000; Hoelscher, 2002 ; Paulus et al., 2001; Samuelson, 2000;

Story et al., 2002; WHO, 2005; Wilkinson et al., 2003). Additionally, a recent Syrian study investigated the dietary practices of Syrian children and adolescents residing in the capital Damascus and its suburbs; findings suggest a low consumption of fruits and vegetables among the studied groups (Bashour, 2004). On the other hand, studies in Greece, as in other Southern European countries, suggest that adolescents in these countries seem to preserve a high intake of fruits and vegetables; according to these authors, this may be attributed to the fact that this is one of the characteristics of the Mediterranean type diet (Amorim Cruz, 2000; Hassapidou and Fotiadou, 2001). Both the HSU and the DA group of adolescents in my research project showed a poor consumption of vegetables. However, of interest is that they both showed adequate intake of fruit.

The findings from the above adolescent studies conducted in the European countries (belonging to the Mediterranean region) propose an interesting similarity to those from my own study with respect to fruit intake; however, there is a disparity to my own findings in that although Lebanon is a country that is located in the Mediterranean region, the studied Lebanese adolescents did not seem to have

maintained the high intake of vegetables which the diet of that region is so famous of. This issue is discussed further at the end of this section.

Fibre

Recent studies have shown that adolescents in the US and in various countries in Europe are consuming poor amounts of fibre (American Dietetic Association, 2006; Buttriss, 2000; Gallagher, 2000; Hoelscher et al., 2002; Neumark-sztainer, 2002; Story et al., 2002; WHO, 2005) this may be related to a low intake of fibre rich foods such as fruits, vegetables, legumes and whole grains. All the adolescent participants in my study consumed diets that are low in fibre; therefore, this is consistent with the trend observed in the reviewed literature. This may be attributed to the fact that they also elicited poor consumption of vegetables, legumes and whole grain cereals. It is noteworthy, however, that when the intake of fibre (gr.) is corrected for energy intake (that is the differences in energy intake of the two groups is taken into account), results suggest that the low socioeconomic status adolescents' consumption of fibre is higher than that of the high socioeconomic status group with respect to each group's energy intake. This may be related to the fact that the DA group were found to consume higher amounts of fruits than the HSU group.

Milk, Milk Products, Soft Drinks, Caffeinated Beverages and Calcium

Studies in my literature review have depicted a decrease in the adolescent intake of the mineral calcium in recent years (American Dietetic Association, 2006; Hoelscher et al., 2002; Gallagher, 2000; Neumark-sztainer, 2002; Story et al., 2002; WHO, 2005). This has also been observed in the diets of the adolescents that I have

targeted. Researchers attribute this to a change in the type of beverages consumed in this age group where a decrease of milk and milk product and a rise in soft drink and other beverages' consumption has been observed (American Dietetic Association, 2006; Buttriss, 2000; Casazza and Ciccazzo, 2006; Neumark-sztainer, 2002; Story et al., 2002; WHO, 2005;). A recent population study in Egypt has also shown a rise in soft drink consumption as an emerging dietary trend among Egyptians (Hassan-Wassef, 2004). While my findings indicate that both the low and the high socioeconomic status adolescents are consuming a diet that is low in milk thus contributing to their lower than recommended intake of calcium, only the HSU group exhibited an excess intake of soft drinks while findings from the DA group did not show that. However, both groups elicited a higher than recommended intake of caffeine containing beverages mainly coffee and tea which may also be substituting milk as a drink.

Iron

As is the case for calcium, adolescent diets in the US and countries around Europe have been observed to be low in iron (American Dietetic Association, 2006; Hassapidou and Fotiadou, 2001; Hill, 2002; Hoelscher et al., 2002; Neumark-sztainer, 2002; Story et al., 2002). The same trend was observed for the adolescents in my research study where the diets of the low socioeconomic group of adolescents had lower than recommended intake levels of the mineral iron. Furthermore, when the difference in energy level between the two groups was accounted for, results demonstrated that the intake of this mineral in the low socioeconomic group of adolescents is one third less as compared to the high

socioeconomic group's intake. This follows that the diets of the DA group elicited a poor intake of meats, particularly, red meat which is considered as one of the primary sources of iron. The HSU group's dietary pattern, alternatively, indicated adequate intakes of meats.

Fast food, Sweets and Salty Snacks

The literature that I have reviewed indicated that across the US and in countries Europe, there is a trend of increased fast food and energy dense food (such as sweets and salty snacks) consumption in the diets of adolescents (American Dietetic Association, 2006; Amorim Cruz, 2000; Hassapidou and Fotiadou, 2001; Hoelscher, 2002; Neumark-sztainer, 2002; Story et al., 2002; WHO, 2005). The Egyptian study investigated emerging trends in dietary practices of the Egyptian population but did not focus on adolescents per se; nevertheless, it suggested that new trends include an increase in the consumption of fast food, sweets and candy (Hassan-Wassef, 2004). Although the dietary patterns of the low socioeconomic group of adolescents that I studied showed some similarity to those indicated in the reviewed studies in that they exhibited an excess in salty snacks (such as chips), neither this group nor the high socioeconomic group in my sample elicited an excess of fast food consumption nor an excess of sweets consumption.

Findings from the above section suggest that the adolescents belonging to the two socio-economically different groups of sampled adolescents are engaging in un-healthy dietary practices leading to deficiencies or excess in some nutrients; this is similar to trends reported by many studies internationally, within the same context, in the reviewed literature (American Dietetic Association, 2006; Amorim

Cruz, 2000; American School Health Association, 1997; Cassazza and Ciccazzo, 2006; Gallagher, 2000; Gregory et al., 2000; Hassapidou and Fotiadou, 2001; Hoelscher, 2002; WHO, 2005; Samuelson, 2000; Paulus et al., 2001; Story et al., 2002; Wilkinson et al., 2003) . Nevertheless, the fact that the sampled adolescents in my study have not exhibited an excess of energy intake, high consumption of fast food or sweets and that their diet was adequate in fruits may suggest that their dietary consumption pattern does not strictly adhere to the Western diet (Chapter 2) although some of its characteristics were manifested such as low fibre intake in both groups, high fat and soft drink consumption in the HSU group and high salty snack intake in the low socioeconomic status group. Therefore this proposes that ethnic and traditional foods in the Lebanese adolescents' diet may still play a significant role and have not been largely replaced by Westernized food products. Furthermore, the former suggests that a nutrition transition (Chapter 2) may not have fully taken place for this age group in Lebanon specially that my sampled adolescents live in the Capital Beirut and nutrition transitions are often more prevalent in urban cities rather than rural communities (Chapter 2).

Variations Between Different Socioeconomic Groups

The differences in dietary patterns between the low and high socioeconomic status groups, which are exhibited in my study, have been also demonstrated in previous studies. A US study by Casey et al. (2001) comparing dietary patterns of contrasting socioeconomic status of 0 to 17 year olds demonstrated that low socioeconomic status children consumed fewer calories, carbohydrates and less fruit than their high socioeconomic status counterparts. Similarly, the low

socioeconomic group of adolescents in my study showed a lower energy intake than the high socioeconomic status group; however, in contrast to Casey et al. (2001), the adolescents in the DA group exhibited a higher intake of fruits than those in the HSU group. Buttriss (2000) has also demonstrated that there exist differences between the dietary practices of low socioeconomic status and high socioeconomic status British 4 to 18 year olds such that those belonging to households from the former group exhibited significantly lower mean intakes of protein and total carbohydrates and had poorer mean daily intakes of vitamin C and calcium than those belonging to HSES households. This is consistent with findings from my study where mean daily intakes of vitamin C (although adequate) and protein were lower in the DA group as compared to the HSU group. In that same study, fat intake (g/day) increased with increasing SES. This trend was exhibited in my study as well. Additionally, according to Martens et al. (2006), Dutch 12 to 14 year old adolescents belonging to LSES groups have a less favourable or less healthy diet than their peers who belong to higher SES; this was also demonstrated by Roos et al. (2004) in a study involving 15 year old Finnish boys and girls from different SES groups. Alternatively, Gallagher (2000), in a study on 13 to 14 year old adolescents in the UK, suggested that the low socioeconomic status group showed a higher intake of energy, fat and sugar (g/day) as compared to the high socioeconomic status group, and they had higher intakes of B6 and vitamin C and the girls had higher intakes of mono-unsaturated fatty acids. However, that same study concluded that both groups' diets were too high in fats, sugars and low in fibres, iron and calcium; which was contradicting to previous research that

suggested that low socioeconomic children and adolescents' diet were less adequate than their high socioeconomic counterparts.

5.2.2 What are the nutrition-related determinants affecting the targeted adolescents' food choice and healthy eating?

According to Intervention Mapping (Bartholomew et al., 1998; 2001) as well as other health behaviour change models such as the PRECEDE-PROCEDE (Green and Kreuter, 1998) and the techniques devised by Perry (1999), one of the pre-requisite steps to developing interventions is finding out what are the relevant changeable determinants that impact the targeted behaviour. This would facilitate the identification of the learning and performance objectives of the intervention. There are several methods, mentioned in the literature (Barthelomew et al., 1998; Hoelscher et al.; 2002, Lytle and Perry, 2001), on the methods by which the determinants of behaviour may explored; examining the relevant literature may be sufficient if a topic has been extensively researched. My literature review (chapter 2) has provided guidance on what are the mediators of nutrition-related behaviour in adolescent eating practices in countries such as the US and Europe; however, there have been no studies conducted in Lebanon investigating this issue. Therefore, I have included questions in my questionnaire and conducted semi-structured interviews to explore this issue in relevance to my targeted samples using constructs from the Social Cognitive Theory and the Theory of Planned Behaviour as guidelines. These two theories were chosen because many of the health behaviour determinants of adolescent food choice identified by studies in the literature can be related to one or both of the above mentioned theories (Croll et al.,

2001; Cusatis and Shannon, 1996; Evans et al., 2006; Giskes et al., 2005; Neumark-Sztainer et al., 1999; Story et al., 2001).

5.2.1.1 Nutrition Knowledge

Findings from the quantitative data collected in my study have indicated that both the HSU (high socioeconomic group) and the DA (low socioeconomic group) adolescents had good knowledge of the dietary guidelines; this is similar to findings by Temple et al. (2006) who demonstrated that the nutrition related knowledge of 11 to 16 year old South African adolescents was high but did not translate to healthy eating. However, in my study, while the HSU adolescents additionally showed good knowledge of diet related diseases and of the recommendations of the food guide pyramid, the DA participants had poor knowledge of all the diet-disease relationships under investigation and of the food guide pyramid recommendations. These results are in contrast to previous findings from studies in the literature that suggested that there is no difference in the nutritional knowledge and understanding between low socioeconomic (LSES) and high socioeconomic (HSES) 13 to 14 year old adolescents in the UK (Gallagher, 2000); however, they are similar to findings by Hart et al. (2002) who illustrated differences in nutrition knowledge and awareness in 7 to 11 year old UK school children from various socioeconomic status (Hart et al., 2002). Other available studies from the US, illustrate that adolescents, in general, have a low level of nutritional knowledge and healthy eating practices (Casazza and Ciccazzo, 2006; Plummer, 2000), which is not the case in my study, but they have a favourable attitude towards learning about healthy eating (Casazza and Ciccazzo, 2006). A New Zealand study investigating the effect of adolescent/parental interaction and

environmental factors that affect fruit and vegetable consumption in 13 to 16 year old of both high socioeconomic and low socioeconomic groups demonstrated that while all the participating adolescents were aware that fruits and vegetables were “good for you”, they had little knowledge of specific benefits of fruits and vegetables (Hill et al., 1998). This may explain the results obtained in my study regarding the group of low socioeconomic adolescents: although they did show a good level of nutrition knowledge, they were poorly informed about the link between nutrition recommendations and their implication on health; this point is elaborated further in an upcoming section (on page 250) which explores these adolescents’ own views on the perceived benefits of healthy eating during adolescence where only two of the interviewees mentioned health. This suggests that it is not enough to provide nutrition information per se, and that the significance of the dietary guidelines and recommendations on health should be made clear to adolescents so that they gain an understanding of the various diet-disease relationships that exist.

Perceptions of Healthy Eating/Defining a Healthy Diet

The international literature is limited in research investigating the perceptions of a healthy diet and healthy eating among adolescents (Croll et al., 2001; House et al., 2006), more so in research that compares results from contrasting socio economic status (SES). Therefore by using qualitative measures to examine what adolescents define as a healthy diet and comparing the findings between the sampled groups in my study, I have added a new perspective to the investigation of adolescent nutrition education and its effectiveness.

The semi-structured interviews in this section have added insight to what the sampled adolescents actually retained from nutrition education they may have received previously (for example in school) with regard to the recommendations and guidelines without being presented with options to choose from. An acceptable definition of healthy food/healthy eating would be “(consuming) foods that are conducive to good health and disease prevention by following the nutrition guidelines and food guide recommendations that emphasize the consumption of low fat and saturated fat, low sugar, low salt, high fibre foods as well as adequate amounts of a variety of foods that are rich in essential vitamins and minerals such as milk and milk products and iron rich foods”. In my study, when adolescents were asked for a definition of the term “healthy food”, it gave rise to many definitions by the interviewees.

A common description used by HSU adolescents was “high in fruits and vegetables” indicating that was the first thing that came to their minds. This may be due to the fact that fruits and vegetables are usually depicted as healthy foods by parents, who are usually identified by adolescents as the primary source of health information (Hill et al., 1998), or another explanation may be that nutrition information provided through the media in Lebanon focuses mainly on increasing the consumption of fruits and vegetables for their high fibre, low energy density and benefit in the prevention of several diseases such as obesity, heart disease and cancer.

This definition is similar to that presented in previous research on U.S. rural adolescents (Williams et al., 2006) and those attending grades 7 to 12 from three

public schools in Minnesota, USA (Croll et al., 2001), which showed that most of those sampled defined healthy diet as a diet that is high in fruits and vegetables. Comparable definitions of healthy eating and healthy foods have been found in studies conducted on adults in the UK (Blaxter and Paterson, 1983; Keane and Willets, 1996; Povey et al., 1998) and on Australian children and adolescents (aged 7 to 17) (O'Dea, 2003); where the emergent definitions included “fruits and vegetables” or reference to recommended intakes of specific food groups such as fruits and vegetables in the case of 13 to 15 year old Australian adolescents (Giskes et al., 2005).

On the other hand, for the DA adolescents, “high in fruits and vegetables” came second where most defined “healthy food” as something which is “beneficial to the body” or “good to the body” which gave a positive attribute to the meaning of “healthy food”. HSU interviewees did use the terms “beneficial to the body”, “that causes no harm” and “good for the body”; however, they did so to a lower extent (1/6th of the HSU group). Mention of this has been cited in one previous research study by Croll et al. (2001) where some of the participating adolescents defined healthy eating in terms of its benefits: “gives energy”, “good for you”.

Another classification that was used repeatedly as a definition of healthy foods by the HSU adolescents in this study was related to health, “something that gives good health”, “something that is healthy”. None of the DA adolescent group used such a definition, at baseline. No such definitions were used by studied groups in the reviewed literature. The variation presented here between the high socioeconomic group and the low socioeconomic group may be linked to the

findings from the questionnaire since the latter showed poor knowledge of diet-disease relationships at baseline.

“Low in fat” was another term that some of the HSU interviewees thought of as synonymous to “healthy foods”, this is also similar to results obtained by Williams et al. (2006), by House et al. (2006) from a study on second and third dietetics and non-dietetics Canadian university students and by Giskes et al. (2006) where interviewed 13 to 15 year old Australian adolescents mentioned low fat food choices as being healthier than their full fat counterparts. Again, for the DA intervention group, no such definition was employed.

Other frequent explanations incorporated general terms referring to the quantity of the food consumed (“in moderation”, “not in big quantity”), used by the HSU group only, and the variation in types of foods ingested, “eating a variety of foods” or “from every kind of foods”; this was used more frequently by the HSU rather than the DA adolescents. Using such terms that relate healthy food to quantity and variation in the diet is in line with other studies on adults rather than adolescents, in the literature (Calnan, 1990; Keane and Willets, 1996; Povey et al., 1998), on young adults by House et al. (2006) and on Australian adolescents by Giskes et al. (2005). Similarly, in a study by Croll et al. (2001), when asked to define healthy eating, adolescents used general terms such as eating nutritious foods and eating right, balanced, varied foods, eating foods in moderation and eating from all the food groups.

Some of the interviewed HSU adolescents included examples of specific food categories like “high in fibre”, “milk and milk products”, “high in

proteins/meats”, or generally stated that healthy foods “contain vitamins” or are “fresh and natural foods”. None of the DA adolescents mentioned “high in fibre” whilst defining the term “healthy food”; however, the food categories that were most recurrently cited as examples of healthy food were “milk and milk products”, “carbohydrates” and “proteins and meats”. Other commonly used definitions by this intervention DA group referred to specific characteristics: “foods that give strength and energy to the body”, “foods that are nutritious” and “foods that are necessary for growth”. Other researchers have reported similar definitions where “foods that contain vitamins” and “fresh foods that are natural” were obtained from adults in the UK (Calnan, 1990; Povey et al., 1998), and milk and meat were among healthy foods mentioned by children and adolescents in a study by O’Dea (2003). Additionally, recent studies on nutrition related perceptions and attitudes have indicated that adolescents commonly use specific food and nutrient examples in their definitions of healthy eating and healthy food such as carbohydrates, protein, fibre, calcium, iron and water, but with less frequency (Giskes et al., 2005) and tofu, natural foods, specific vegetables, greens, corn, celery, juice, peanut butter, fluids and vitamins (Croll et al., 2001).

With regard to specific diet characteristics as a definition to healthy foods, many adolescents in the Giskes et al. (2005) study considered eating according to recommendations or following the food guide pyramid as healthy; fresh, natural or unprocessed foods were also cited by some adolescents as constituents of a healthy diet. On the other hand some adolescents in that same study chose to cite what they think as unhealthy dietary practices such as skipping meals with a particular

reference to breakfast (Giskes et al., 2005). None of the participants in my current study gave reference to the recommendations, the food guide pyramid nor was there mention of unhealthy dietary practices when asked about their definition of healthy foods. This is similar to results obtained by Croll et al. (2001) where "following the food guide pyramid" was rarely mentioned in the definition of eating behaviours that contribute to healthy eating. Of interest is the fact that in the Giskes et al. (2005) study, adolescents who did not cite governmental nutrition guidelines with reference to healthy eating and healthy foods were those belonging to a low socioeconomic group: by comparing results obtained from respondents of different socioeconomic status, the main differences observed were such that the low socioeconomic group of adolescents did not mention dietary recommendations, nutrient intakes or dairy products as often as their high socioeconomic status counterparts in reference to healthy eating which may indicate a lower level of awareness pertaining to the dietary recommendations-this may indicate that low socioeconomic status adolescents are not as exposed to nutrition information as are high socioeconomic status adolescents (Giskes et al., 2005).

The fact that none of my participants referred to dietary recommendations in their definition of healthy eating may be attributed to the lack of national governmental guidelines that address nutrition in Lebanon; this may suggest that Lebanese adolescents do not associate themselves with the available international nutritional recommendations. James (2004) introduced this issue, although he focused on adults and not adolescents, in his study which investigated the influence of culture among other factors that may affect determinants of dietary choices made

by African Americans adults. His findings showed that the interviewed participants felt that nutrition messages were not targeted to them since they did not include any of their traditional cultural foods and that at times some thought they "were being asked to conform to the dominant culture eating habits". More research focusing on adolescents with regard to this matter is now needed globally.

Definitions like “prevents weight gain”, “diet foods”, “prevent disease”, “low in sugar”, which were used by the HSU group, were also in line with previous research (Giskes et al., 2005; House et al., 2006). Nevertheless, some of the replies to this question, in my study, could not be traced back to the work of other researchers such as the mention of specific dishes as an example of healthy food; here, “stews”, “lentils” and “Moloukieh”- a commonly eaten Lebanese vegetable and chicken stew- as examples of healthy food by the DA group, and the mention of “soup”, by the HSU group.

A couple of DA interviewees did not know what healthy foods were nor did they have any examples; this was not exhibited in the HSU group nor was it referred to in the literature. This point may further support Giskes and colleagues' (2005) view that adolescents belonging to low socioeconomic groups may not be receiving as much nutrition-related information as their high socioeconomic counterparts.

In general, findings from my study indicate that the HSU adolescents were more aware and knowledgeable of components of a healthy diet (low in fat, low in sugar, high in fibre, high in milk products) than were the DA adolescents especially since two of the latter group stated that they did not know what healthy foods were.

While such a variation is supported by Giskes and colleagues (2005) on Australian adolescents and by Hart and colleagues (2003) on British children, Gallagher (2000) in a study on UK adolescents and Temple and colleagues (2006) on South African adolescents from contrasting social backgrounds suggested that there was no difference in nutrition knowledge and understanding of dietary guidelines between low socioeconomic and high socioeconomic status groups of adolescents.

The dissimilarity with regard to nutrition-related knowledge between the two sampled groups in my study may be due to the variation in nutrition education that was provided to each group in school (Private versus Public schools) indicating that, in Lebanon, either nutrition topics are better taught at private schools or that they are taught in a larger dose than in public schools. The fact that the high socioeconomic adolescents in my research study were able to identify that healthy foods are needed for the prevention of disease and for health and those belonging to the low socioeconomic status group were not able to do so, further emphasizes that there is a missing component linking diet to disease that the latter group may not have been introduced to. This suggests that nutrition education in school does have an impact on nutrition related knowledge in adolescence, but that there may be some groups who need more targeted intervention. Nevertheless, none of the interviewed adolescents had a complete definition of healthy food/healthy eating and none mentioned nutrition recommendations which may be due to the fact that, in Lebanon, none are available and nutrition education whether in school or through the media often relies on guidelines set either by the WHO or by the USA. As such, traditional foods are not included in the recommendations and this may

render them difficult to use and be followed by the Lebanese population. This is further supported by findings from a study by James (2004) on African American adults who felt that nutrition messages do not target them since they do not include any of their traditional cultural foods.

Awareness/Perceptions of the Importance of Healthy Eating During Adolescence

Most of the HSU and DA interviewed adolescents believed that healthy foods are important at this specific stage in their lives; whereas, only a few (three out of forty seven interviewees) from the HSU intervention group, but none of the DA, considered that it was not important or “not necessary” at their age because they “burn energy”, but that it is important for them to eat healthy later on, when they grow older. This is similar to results obtained by Croll and colleagues (2001) and by Jenkins and Horner (2005) where when adolescents were asked whether they view healthy eating as important, there were some who considered it as important at their age, while others in the group showed apathy towards healthy food consumption because they believed that they were still young and thus it was not a priority.

Perceived Benefits of Healthy Eating During Adolescence

Reasons why HSU interviewees thought it was important to eat healthy foods focused mainly on the notion that eating healthy is important for health, whether at the time being or for later on in the future; this was less so in the DA group (2 out of 38), thus further emphasizing the findings obtained from the questionnaire about nutrition knowledge which suggest that the DA adolescents

have less knowledge of the diet and health relationship than do the HSU adolescents.

The idea of growth; that they were “still growing” and that they needed healthy foods for “proper growth” was also among the frequent justifications given by both the HSU and DA interviewed adolescents. None of the reviewed studies referred to such findings. The notion of relating healthy eating to proper growth needs further investigation. A possible explanation may be that nutrition education in schools emphasizes the idea that proper nutrition is needed for building the body for example drinking milk in order to grow healthy bones. Another assumption may be related to the social structure of the Lebanese family where most adolescents live with their parents until they finish university, find a job or in some cases until they marry; this may affect the perception of adolescents about themselves and may lead them to think of themselves more of growing children than adults. Roos and colleagues (2004) have identified that in Finland, there is such a similar trend of adolescents living at home for longer periods of time thus indicating that familial factors remain significant determinants of eating behaviour for those who do.

“Prevention from disease” was yet another explanation given, by both groups, for the importance of healthy food during adolescence. Additionally, some DA interviewees believed that it was important to eat healthy foods in order to maintain weight, while others from the same group reasoned that it was essential in order to “maintain our body”, that healthy food is needed so that “the body would not grow up to be weak” or that it is “beneficial to the body”. The previous results are in agreement with those from research by Evans et al. (2006) on low

socioeconomic 10 to 14 aged African American adolescents in the US where reasons cited by participants for why they thought healthy eating as important were fitness, disease prevention and weight control. House et al. (2006), in a study on 18 to 24 year old Canadian university students, also revealed similar findings: long term health, more energy and weight control were cited among the reasons why participants deemed healthy food important. Additionally, Strolla et al. (2006) conducted a study that targeted low income Spanish adults residing in the US; their results illustrated that the major reasons why members of this group were interested in healthy eating were: setting good example for family members especially children, and controlling diseases such as diabetes, hypertension and cholesterol.

Since the DA group mentioned disease prevention as a reason for eating healthy foods during adolescence in this part of the interview, this may suggest that although they are unaware of specific diet disease relationships as indicated from the previous section examining the perceived benefits of healthy eating, they are conscious that there exists a relationship between food choice and disease in general. Nevertheless, it seems that they had more information about the negative effects of unhealthy food practices than they did about the positive attributes of healthy foods since only two attributed healthy eating to health; this is similar to findings by Hill et al. (1998) on determinants of fruit and vegetable consumption in a group of adolescents in New Zealand where the interviewed participants had little knowledge of the specific benefits of fruits and vegetables, but they knew that they were in general “good for you”; although it was not restricted to low socioeconomic status adolescents.

It is of interest that, while my study proposes that the majority of the interviewed adolescents deem healthy eating as important at this stage of their life, mainstream research suggests that adolescents view themselves as healthy individuals, which probably decreases their concern for future health and their priority for healthy eating and nutrition. In the literature, authors often report that adolescents perceive themselves as healthy and think of health issues as something to worry about later in life (Croll et al., 2001; Glariz et al., 1998; Neumark-Sztainer et al., 1999; Story et al., 2002). Therefore, my findings concerning this issue may suggest that the HSU and DA group of adolescents in my study may be interested in learning about healthy eating more than studies in the literature have indicated. Further investigation of this issue is needed.

5.2.2.2 Nutrition Related Skills

Results from the quantitative data collected in my study, indicated that the participating adolescents both from HSU and DA have good skills in choosing foods that are low in fat and saturated fat, and cholesterol, but their skills were poor when asked to differentiate between low and high fibre foods (Table 4 and Table 4.2, chapter 4). These results are different from those suggested by Gracey et al. (1996) where young Australian adolescents (mean age 15.8 years) showed poor skills in differentiating between low and high fat foods (Gracey et al., 1996). This suggests that adolescents may face a difficulty when attempting to translate nutrient knowledge into food choices indicating that nutrition education should include more food based than nutrient based information and advice. In general, previous

studies say little about the issue of nutrition related skills; this may suggest that further investigation is needed in this area.

5.2.2.3 Nutrition Related Beliefs

The adolescents' nutritional beliefs, as per findings from the questionnaires, of both the HSU and DA samples, conveyed a good understanding of nutritional information with the exception of beliefs related to weight loss and milk consumption for HSU participants and of beliefs related to cholesterol and milk consumption for the DA participants. While beliefs regarding milk and cholesterol consumption have not been investigated in the reviewed studies, they have been examined in relation to weight loss issues particularly in female adolescents. Hill (2002) proposes that teen-age girls are more often than not dissatisfied with their bodies and follow unhealthy dietary practices such as meal skipping, fasting and vomiting, believing that this will lead to weight loss. A major finding from a study by Yannakoulia and colleagues (2004) on 11 to 15 year old adolescents was that the desire to lose weight and dieting were very prevalent among Greek adolescents indicating that they may be involved in un-healthy dietary practices leading to lower than recommended intakes of essential micronutrients. Samuelson (2000) proposed that dieting is common among Nordic adolescent girls aged 11 to 18 years and those belonging low socioeconomic groups are more likely to have irregular meal patterns in their attempt to lose weight. Therefore, this suggests that misconceptions about weight loss practices should be addressed more rigorously in female adolescents in an attempt to discourage un-healthy practices that may compromise their health.

5.2.2.4 Nutrition Related Attitudes

The adolescents in the HSU sample exhibited positive attitudes towards most of the nutritional issues included in that section except for the issue of calcium intake. On the other hand, DA participants scored lower on the same section under discussion; they exhibited negative attitudes towards calcium intake, fat intake and weight issues with respect to enjoyment, the time available for meal preparation and their ability of finding healthy meals at the institution. While attitude per se has not been well investigated, in the literature that I have reviewed, as a determinant of health behaviour of adolescents, Neumark-Sztainer and colleagues (1999) have identified it among the secondary factors that have a bearing on US adolescent food choice. Moreover, several studies (Rosin et al.; 1992; Shepherd, 1998; Shepherd and Stockley, 1985; Tuorila and Pangbom, 1988) have examined attitude in relation to intention: one of the main constructs of the Theory of Planned Behaviour. This will be discussed further in the next section.

5.2.2.5 Intention/Willingness to Change

Findings from the qualitative data in my study demonstrated that while HSU and DA interviewees showed varied levels of willingness to change their diet, if they find out that what they are eating at the moment were not healthy, or that they were at least willing to try as much as they can, some HSU adolescents refused the idea because they stated that they “can’t change”, “it’s too difficult to change”, that nothing is bothering them at the moment or that they were convinced their diet “is fine”. A couple of HSU interviewees were not sure because they “live alone and rely on fast food” and two stated that they would immediately change if

they were convinced. In general, the DA adolescents had more positive attitude to dietary change, “I would change immediately”, “I would change a lot”, and only one tenth of the adolescents in this intervention group replied that they would try but that they “can’t” change the foods that they like.

The reviewed literature (Rosin et al., 1992; Shepherd and Stockley, 1985; Tuorila and Pangbom, 1988) has indicated that attitude was a better predictor of behaviour intention than subjective norms. In addition, Oygard and Rise (1996) in a study aimed at predicting the intention of young Norwegian adults (ages 23 to 26 years) proposed that attitude (such as calculation of personal pay- offs) was a more determining factor of behavioural intention than both perceived norms and self efficacy. The study also indicates that beliefs about appearance (weight, shape) were shown to strongly influence behavioural intention and thus should be addressed in nutritional messages. Health beliefs (related to heart disease and cancer) also had influence on behaviour intention but to a lesser extent (Oygard and Rise, 1996).

Taking the above into consideration, it appears that adolescents’ behavioural intentions, in my study, did rely on attitude, especially for the HSU group: “it’s too difficult”, “nothing is bothering me right now”, “if I am convinced”, “my food is fine” more than on self-efficacy “I live alone, so I rely on fast food” or social norms which were not mentioned by any of the interviewees. The varying willingness to change dietary practices, that was exhibited in both groups, may also be a result of the mention of health in the question, “if you find out that your diet is not healthy”, since health has been depicted as a weak

influence on behaviour intention by Oygard and Rise (1996) and health perception as a weak indicator of fruit and vegetable consumption by Keim and colleagues (1997) who investigated the relationship between perceptions about fruits and vegetables and their inclusion in the diet of 18 to 24 year olds in the USA. In addition, previous studies have suggested that adolescents were unconcerned about healthful eating, indicating that health may not be a motivator for change in adolescent dietary patterns (Chapman and Maclean, 1993; Croll et al., 2001; Horacek and Betts, 1998).

Interestingly, although the findings from the quantitative data have proposed that the HSU adolescents have a more positive nutritional attitude than the DA group, further investigation through the semi-structured interviews showed contradictory findings. The qualitative data suggests that the DA adolescents were more willing to change their dietary habits than HSU adolescents since the former demonstrated more positive attitude towards dietary change: while HSU participants cited attitudes such as “it’s too difficult”, “nothing is bothering me right now”, “if I am convinced”, “my food is fine” and “I have no time”, DA adolescents were mostly willing to change where only some stated that they would try but that they “can’t” change the foods that they like. This contradiction may be explained in that although the DA group of adolescents may have a negative attitude towards specific issues related to dietary practice, they may at the same time have a positive attitude to the general idea of changing their diet if they know that their health is at stake- as stated in the question inquiring about intention in the semi-structured interviews- keeping in mind that attitude was not investigated per

se in the interviews. On the other hand, this discrepancy may be attributed to the nature of the questions investigating attitude included in the questionnaire indicating that more attitude sensitive scales should have been employed. Moreover, this variation points out the importance of qualitative investigation in similar studies employed in the development of specific nutrition programs and interventions.

5.2.2.6 Taste, Time, Convenience and Availability

Findings from my quantitative data suggest that both the HSU and DA samples considered that calcium intake was not perceived as an important issue at their age. Additionally, the majority of the DA participants illustrated that their enjoyment of food exceeded the importance of choosing low fat foods as well as weight control concerns.

Similarly, the qualitative data in my study brought up the issues of taste with additional findings emphasizing time, convenience and availability as determinant barriers of healthy food choice.

For the HSU interviewees, the main barrier to healthy food choice was living alone which in turn affected time available for meal preparation and reliance on convenience foods, “I can’t because I live alone/ no time to prepare meals”, “I live alone and rely on fast food”, and to a lower extent, taste was also seen as a barrier for healthy eating in this group, “if I like the food”. Similarly, taste was identified by Lee and Reicks (2003) as a factor that influenced the intake of dairy products in a study on Asian American adolescents from low socioeconomic status groups. Research by Neumark-Sztainer and colleagues (1999) on US adolescents

and by Giskes and colleagues (2005) on Australian adolescents similarly suggested that among the primary factors (those that the adolescent considered as most influential) that affected food choice were taste and appeal of the food, convenience of the food (Giskes et al., 2005; Neumark-Sztainer et al., 1999) and time availability of both adolescents and parents (Neumark-Sztainer et al., 1999). Secondary factors included food availability, parental influence, perceived benefit of the food and situational factors such as time and place (Neumark-Sztainer et al., 1999). Other studies also proposed that eating at college or work, busy schedule (Story, et al., 2002), taste and convenience (Keim et al., 1997; Neumark-Sztainer, 1999; Peregrin, 2006; Story et al., 2002) are among the major influences on adolescent food choice.

For the DA group, interviewees felt change would be hard primarily because they felt that they could not stop themselves from eating the things that they like, because they could not stop themselves from buying certain foods (like chocolates) when they saw them at the shop or that it depended on the taste of the new/healthy food. Therefore, this suggests that, here, taste was the most influential factor influencing food choice. Additionally, some adolescents in this group indicated that habit was a barrier to changing dietary practices because they were used to “eating this way” or to “certain foods”. Availability issues were also brought up by this group: the “food is set” whether at the institution or at home and they had to eat “what is available”, as such, the family was perceived as a barrier to healthy eating. In contrast, for the HSU adolescents in my study, healthy eating was considered easiest to practice in the home setting because “healthy food is

available”, “my mom cooks healthy food”; therefore the family was more of a facilitator.

Parents and family factors such as availability of healthy foods in the home setting were emphasized as barriers rather than facilitators to healthy eating by low socio economic status adolescents in a study by Giskes et al. (2005) who compared barriers to healthy eating in a group of Australian adolescents from contrasting socioeconomic status groups. In a study by Evans and colleagues (2006) investigating the determinants of healthy eating in a group of US low socioeconomic adolescents, the interviewed adolescents also considered family factors such as availability of, or lack there of, certain foods in the household as barriers to healthy eating. Similarly, Lee and Reicks (2003) identified that consumption of calcium rich foods by a group of low socioeconomic status Asian American adolescents was associated with the availability of dairy products in the home. In that same context, studies investigating barriers to eating more fruits and vegetables in US and UK adults, revealed that there was a difficulty of attempting changes alone when meals were being shared by various family members or when the family does not like fruits and vegetables (John and Ziebland, 2004; Strolla et al., 2006). In a study on 18 to 74 year old UK participants by Haslam et al. (2000), lack of healthy foods at home and school and not being able to influence food choices at home were among the barriers that were cited.

Therefore, my findings suggest that while taste was the primary barrier to healthy eating followed by availability and habit for the adolescents in the DA

group, living alone was the main barrier followed by time and convenience and to a much lower extent taste for the HSU group of adolescents.

5.2.2.7 Belief whether own diet is healthy (Self-Evaluation)/ Belief how diet can become healthier

Almost half of the DA interviewees believed that their diets were healthy or that some of it is healthy, while more than half of the HSU respondents perceived their diet as unhealthy either as a whole or in some ways or during sometimes. This proposes that the former group of adolescents may have poor knowledge and skills of how to evaluate their food consumption as compared to available recommendations and guidelines, specially that they showed less awareness of what constitutes a healthy diet and healthy eating when compared to their high socioeconomic counterparts, in an earlier section.

It is worth noting that available research concerned with the evaluation of adolescents' diets relies mostly on analysis performed by professionals and not by the adolescents themselves. (Anderson et al., 2005; Dwyer et al., 2001; Fulkerson et al., 2004; Gallagher, 2000; Gregory et al. 2000; Hoelscher et al., 2002; Neumark-Sztainer et al., 1996; Robinson et al., 1999; Schneider, 2000; Spear, 2002). Therefore, adolescents may very well assume that their diets are healthy, while in reality they are not. My study is distinctive in that, on the one hand, it inquires about the participants' perceptions of their own diet, while on the other hand; additional data is collected in order to make a professional evaluation of dietary intake with the help of a dietician (the researcher). This may prove valuable in that

it can help explain why available nutrition recommendations and guidelines have not elicited significant positive changes towards healthy eating (Chapter 2). Individuals, in general, may be less interested in nutrition information and dietary change strategies if they are un-aware of the relationship between health and dietary practices, and if they believe that their diets are healthy to begin with.

The reviewed literature does not produce studies that inquire about adolescents' own perceptions of their diet; therefore this makes my study unique regarding this aspect. Being able to evaluate one's individual diet may constitute a first step towards dietary change since individuals who perceive their diets as healthy, when actually they are not, may feel less interested and motivated in following dietary recommendations and guidelines. In addition, my review of the nutrition education literature on adolescents implies that knowing what one eats and comparing it to a set standard may lead to nutrition-related behaviour change (Burnett et al., 1989; Howison et al., 1988; White and Skinner, 1988). More recent studies on this issue in adolescent groups were not identified; however, a study within the same context by Povey and colleagues (1998) on adults, and not adolescents, in the UK inquired, using open ended interviews, whether the participants viewed their diets as healthy or unhealthy; showed that more people thought their diets to be unhealthy than those who perceived it as healthy; furthermore, some assumed their diets to be healthy when they actually were not. It seemed that those who classified their diets as unhealthy did so on the basis of the amount of fast food that they did or did not consume. This was considered as a barrier to healthy eating which is worth further exploration (Povey et al., 1998).

Although previous studies investigating adolescents' views of their own diet have not been found, some studies suggest that adolescents may evaluate their health according to their health related behaviour such as smoking and dietary practices (Dowdell and Santucci, 2004; Lowry et al., 1996; Wade and Vingilis, 1999; Vingilis et al., 2002). Studies on Swedish and Danish adults have indicated that poor dietary quality was associated with poor self-rated health status (Manderbacka and Lundberg, 1996; Osler et al., 2001). In contrast, a recent study on 11 to 18 year old US adolescents indicated that, in general, there is no relationship between dietary behaviour and perception of own health status; however, findings from that study indicated that adolescents may perceive vegetable intake as an indicator of health status (Goodwin et al., 2006).

Belief how diet can become healthier

In my current study, it seems that adolescents thought that by decreasing certain unhealthy foods (for example, fast food, chocolate, fatty foods etc.) and by increasing healthy foods (such as fruits and vegetables) consumption, they would be able to improve their diets and make them healthier. HSU adolescents put more emphasis on reducing fast food, increasing the consumption of fruits and vegetables followed by organizing and paying attention to the timing of meals, decreasing soft drinks, fatty foods and sweets, eating at home more often, increasing the fibre and calcium content of their diet and decreasing carbohydrate intake. The DA group of adolescents focused more on decreasing fried foods, organizing and paying attention to meal timing as well as avoiding meal skipping. This was followed by decreasing the amount of bread, chocolate and chips

consumed as well as the quantity of food intake, increasing stews, milk and milk products and fruits and vegetable consumption. Therefore, within each group, different weight was allocated to different foods. Although only a small number of HSU interviewees (n=3) considered that by “eating at home more often”, they would be improving their diet, this is worth looking into because it signifies a positive connotation between healthy food and home cooked foods (home cooked foods are healthy). Since Lebanese home cooking still, to a large extent, comprises of vegetable based stews, salads and fruits, encouraging adolescents to eat home cooked food more often should be considered when nutrition interventions are being developed for the Lebanese population.

Based on the previous, it may be suggested that individuals may self rate their diets with respect to their consumption of what they perceive as healthy or unhealthy food choice, be it true or not.

Several studies in the reviewed literature have identified what foods adolescents regard as healthy or un-healthy; findings from these elicited similar results to my own. O’Dea (2003) in a study investigating the perceived benefits of and barriers to healthy eating in US children and adolescents has identified foods that are viewed by the studied adolescents as un-healthy; these included candy, chocolate, soda, fast foods and fried foods. Foods viewed in the same study as healthy included mostly fruits, vegetables, juice, pasta, rice, milk, cheese, and less frequently meat, chicken and water (O’Dea, 2003). This is also in accordance to unhealthy foods mentioned by participants in studies by Croll and colleagues (2001) and Giskes and colleagues (2005).

Similar findings to the above, with respect to definition of unhealthy foods, were also obtained from studies in the literature on adults. In the UK (Calnan, 1990; Povey, 1998), for adult men and women, as well as for impoverished women in Australia (Santich, 1994), fast food, processed food, food with additives, sweet food, food which is low in nutritional value and as eating too much were given as definitions. Healthy foods, in those studies as well as others, carried various definitions (as mentioned earlier): “fruits and vegetables”, “balance”, “moderation”, “variety”, “fresh and natural” and “contains vitamins and minerals” (Blaxter and Paterson, 1983; Calnan, 1990; Keane and Willets, 1996, Povey et al., 1998) and “home cooked foods” (Calnan, 1990; Santich, 1994) , were among those given by respondents.

5.2.2.8 Influencing/ Motivating Factors

There is scarcity of research concerning what would motivate adolescents to eat healthily. The literature investigated (Lytle and Fulkerson, 2002; Neumark-Sztainer et al., 1999; Spear, 2002; Story et al., 2002; Wills, 2005) mostly cites barriers such as time, convenience, cost, peer pressure and accessibility, rather than motivators. Seven studies examining motivating factors towards either various components of a healthy diet or healthy eating were allocated in recent literature. Only two of these targeted adolescents (Evans et al., 2006; Lee and Reicks, 2003) and while one focused on healthy eating (Evans et al., 2006) the other examined factors that affect consumption of milk and milk products (Lee and Reicks, 2003). The other studies either targeted young adults (House et al., 2006; Keim et al., 1997): Keim and colleagues (1997) examined motivators of fruit and vegetable

consumption rather than healthy eating; or adults (Buttriss, 1997; Haslam et al., 2000; Strolla et al., 2006).

The DA and HSU groups of participants each gave more importance to various motivators for eating healthy. On the one hand, becoming diseased or ill-health was the main motivator to eating healthy mentioned by the HSU adolescents followed by weight issues then future health, prevention of disease in the future and taste. On the other hand, weight control was the most cited motivating factor by the DA group of adolescents followed by maintaining health and getting sick or seeing someone else they know get sick. None of the DA adolescents mentioned future health, while other participants in this group stated that nothing would motivate them to eat healthily or that they did not know what would.

One of the similarities between my findings in this matter and those from the reviewed literature was regarding the mention of taste. In a study by Keim et al. (1997) and when perceptions of young adults (18 to 24) in the US were correlated with their intake of fruits and vegetables, it appeared that those who had positive views ("tasty", "looks good") regarding sensory characteristics of fruits and vegetables were more likely to consume them. Additionally, in a study conducted by Evans et al. (2006) in the USA using focus groups in order to investigate the barriers to and facilitators for healthy eating in adolescents belonging to low socioeconomic status groups, when 10 to 14 year old adolescents were asked about motivators to eat healthily when at home, at school or when out with friends, better taste and appearance of healthy foods was one of the themes under which obtained

answers could be classified. It is noteworthy, that although taste was identified as a motivator in my study, it was mentioned by only by a small number of the HSU participants and by none of those belonging to the DA group.

Other themes related to the results on adolescent motivating factors to eat healthily by Evans and colleagues (2006) in a study on adolescents belonging to low income families in the USA included availability of healthy food choices and “more emphasis from role models and peers to eat more healthful food”. Some adolescents, in that same study, reported that if an older, respected and admired person suggested a healthy food choice; then they were more likely to comply. Peer influence was also among the motivators mentioned, in that same study, such that if a group leader or popular member of the group suggested eating healthy; then, other members of the group would more probably act accordingly (Evans et al., 2006). Similarly, Lee and Reicks (2003) investigating the factors that influence the consumption of calcium rich foods in Asian American adolescents belonging to low socioeconomic status (LSES) groups, one of the factors identified was related to role modelling by parents or peers: adolescent girls who witnessed one of their parents consuming milk or who were encouraged by peers and/or parents to do so reported doing so more often and thus had a higher calcium intake. My study did not elicit similar findings in that respect (role modelling).

In the UK, Buttriss (1997) investigated factors that act as facilitators or as barriers to healthy eating in adults (not adolescents) from various socioeconomic status groups; the view points of consumers and those of nurses and physicians, on the subject, were compared. Surveying doctors and nurses showed that those felt

that ill health of their patients or of one of their family members to be the major motivator to change dietary habits (Buttriss, 1997); although this is in line with findings from my current study (“disease”, “if I get sick”, “if what I am eating causes harm/is bad for my health”), my results were obtained from the view points of the adolescents themselves. From the consumer's point of view, in Buttriss’ (1997) study, there were several motivators that were identified in descending order: improve general health, personal health reasons, weight loss, articles in magazines, media coverage and pressure from a family member. Some of these findings (improve general health, weight loss) are consistent with my present results.

In a study by Strolla and colleagues (2006) on low income Spanish adults living in the US, the identified motivators to healthy eating were to be healthier and prevent disease, weight loss and looking better, feeling better , being a good role model for one’s own family and feeling good about one’s own self. Again, here, of the identified motivators, only those related to health, prevention of disease and weight loss issues were similar to my own.

Moreover, in a study by Haslam et al. (2000) on Leicestershire 18-74 year old participants, in the UK, weight control was the primary motivator for dietary change as was elicited from in depth interviews, this is similar to findings from my study; although the DA group perceived this factor more of a motivator than did the HSU group.

Of the reviewed studies in the literature, only that of House and colleagues on Canadian university students (18 to 24 year old) mentioned “future health” as a

motivator for eating healthy, as was the case for a small number of HSU adolescents only. Nevertheless, in that study, there was no mention of participants who were content the way they were or who did not know what would be a motivator for them to adopt healthier eating practices, as findings from the DA group in my study indicated.

The above suggest that nutrition education emphasizing weight related benefits of healthy eating and healthy foods may be more effective when low socioeconomic adolescent groups are being targeted. Unlike results from the studies in the literature, some DA students stated that they were unaware of the factors that would motivate them to eat healthy which provides further evidence of the need for tailored nutrition messages and interventions targeting low socioeconomic status groups.

5.2.2.9 Perceived Behavioural Control/Self-Efficacy

For both the HSU and DA groups, perceived ability to carry out a change in dietary pattern varied; however, the findings seem to suggest that more HSU adolescents than DA students perceived themselves able to change their dietary behaviours into healthier ones that promote healthy eating stating that they were sure they can do it and that they know what foods to choose. For some of the HSU and DA adolescents interviewed, dietary change depended whether they had the right motive or whether they took the decision to do so. For others, it depended whether the healthy food was to their liking: “if I like the food”, “depends on the type of food”, “depends if I like the taste”. Some of the students interviewed felt that it was hard to change the way that they eat because they were “used to eating

this way”, “used to certain foods”, DA group, or “because I live alone”, HSU group. Additionally, “I would try” and “I would make the effort” were among the answers given by DA adolescents interviewed.

While the reviewed literature did not encompass studies that specifically investigated differences in perceived behavioural control between adolescents from contrasting socioeconomic groups, self-efficacy has been proposed by some earlier studies as an important predictor of dietary behaviour (Slater, 1989; Shannon, 1990). More recent studies on US adolescents did emphasize the importance of self-efficacy as a mediator for healthy eating (Cusatis and Shannon, 1996; Story et al., 2002). The study by Cusatis and Shannon (1996) examining the diets of US adolescents in relation to factors that may have an influence on their food choice suggested that self efficacy for making healthy food choices was among the factors that predicted the consumption of high fat and sugar where a negative correlation existed between the two. Story and colleagues (2002) conducted a literature review with the aim of understanding the different factors at work in influencing adolescent eating behaviour, again, here; findings suggested that perceived self-efficacy was positively correlated with healthy eating behaviour. Similarly, Omidv and colleagues (2003), in their study of psychosocial correlates of fruit and vegetable consumption in Iran, identified that self-efficacy was strongly correlated with both fruit and vegetable intake: adolescents with low self-efficacy scores were more likely to have low intakes of both fruits and vegetables. Perceived self-efficacy was also reported as a key factor in the eating behaviour of adolescents in a UK study by Gracey and colleagues (1996) investigating the relationship of

nutrition-related knowledge and beliefs on dietary behaviours in teenage school students.

Setting, Family, Peers

Most HSU interviewees believed it to be easier to eat healthily at home because “healthy food is available”, “my mom cooks healthy food”, “my parents have healthy food”. In a study on US adolescents, Cusatis and Shannon (1996) emphasized the role of including other family members in adolescent targeting nutrition interventions since snacks and meals at home are usually prepared by parents which more often than not are concerned with their children's nutrition. Alternatively, a literature review about influences on adolescent eating behaviour by Jenkins and Horner (2005) illustrated that family may have both a positive and negative effect on adolescent eating patterns; such that an increase in the frequency of adolescents' participation in family meals was associated with higher fruits and vegetables consumption. On the other hand, families with working mothers or parents with busy schedules may translate to less parental supervision with regard to adolescent eating practices and less time available for the preparation of healthy meals which may in turn encourage the development of unhealthy dietary patterns (Jenkins and Horner, 2005). Also, Croll et al. (2001) suggested that adolescents have good nutritional knowledge; however, lack of adult support and modelling, whether at school or at home, are among the factors that impede translating knowledge into practice. Nevertheless, interviewed adolescents, in that same study, suggested that the place where food is consumed affects whether it is healthy or unhealthy: eating at home was often related to eating healthy foods and some

adolescents described healthy foods as those that parents would like them to eat. Similarly, Wills (2005) in a UK study examining food and dietary practices of adolescents during the transition from secondary school to new social context, be it university or work, and their determinants identified that moving away from parents and their influence lead to the consumption of convenience foods and for those who still lived at home, family eating practices and food availability still influenced their eating behaviour. Additionally, by studying a group of Finnish adolescents, Roos and colleagues (2004) identified that determinants of food choice seem to differ with setting: at home and in school, it is the socioeconomic status (SES) of the family that is more influential whereas eating with peers is more associated with lifestyle.

Of the HSU interviewees, those that found it would be hard to, or could not, eat healthy food when out with friends did so because of several reasons: “there are no healthy foods in restaurants/at university”, they would be “tempted by fast food”, “no one forces you (to eat healthy), you can choose what you like”, “you can choose whatever you like”, or because of peer pressure.

Studies in the literature show similar findings: Wills (2005) proposed that meeting new people and peer groups was often associated with a shift in food choice from the more conventional home cooking to the high fat junk food and alcohol consumption, a riskier food choice. Some respondents even reported eating foods to fit in with peer groups even when they were not hungry and even if the foods were not consistent with what they would normally eat (Wills, 2005). Moreover, research shows that young people and adolescents often associate junk

food with time spent with peers or friends and having fun (Croll et al., 2001; Spear, 2002; Wills, 2005), and that among the community factors that are shown to affect dietary patterns is the widespread of convenience food restaurants that offer affordable, fast foods in an attractive atmosphere for adolescents and their peers (Jenkins and Horner, 2005).

In addition, research (Dwyer, 2001; Story et al., 2002) conveys that adolescents have more autonomy and control over their life than children. When this is translated to food practices, it shows that they have more access to foods outside the home, that they are more likely to experiment with different food choices and they are more likely to snack than eat regular meals. Hill (2002) also relates the nutritional autonomy exhibited during adolescence to the type and quantity of foods eaten. During this time, adolescents may try to dissociate themselves from parents and seek social support more from peers, thus their search for autonomy leaves them exposed to experimentation with new foods and dietary practices.

Furthermore, the end of school teaching brings with it a sense of freedom where less parental and teacher interference and surveillance prevail (Wills, 2005); this is notable in the present study through comments given by HSU adolescents, “no one forces you (to eat healthily)”, “you can choose whatever you like”.

On the other hand, almost half of the HSU interviewees indicated that a major barrier to healthy eating when dining out is that “there is no healthy food in restaurants”; however, the literature reviewed so far, has not produced many studies that investigate adolescents’ perceived availability of healthy food choices in fast

food restaurants. Nevertheless, Croll et al. (2001) had reported that some adolescents considered that healthy foods were unavailable or limited in fast food restaurants while others considered unhealthy foods more available and less time consuming in terms of preparation which played a role in their food choice. This may signify that more effort should be done in order to help adolescents identify healthy foods that are available and accessible to them outside the home.

As for the influence of setting on the eating practices of the DA interviewees, these frequently stated that they ate whatever was made available to them in any given setting, whether at home or when at the institution. This is consistent with the study by Evans and colleagues (2006) that suggested availability as one of the barriers that impedes healthy eating in adolescents belonging to low socioeconomic status (LSES) families in the US. In that same study, of the barriers mentioned in interviews, lack of availability of healthy food choices was mentioned most by participants which may imply that this was distinctive of the low socioeconomic status (LSES) group of adolescents under investigation. It is noteworthy that none of the participants in the DA group mentioned peer pressure. The latter may be related to the findings of Roos and colleagues (2004) where low socioeconomic status Finnish adolescents' food choice was reported to be more influenced by socioeconomic status than lifestyle as compared to their high socioeconomic status counterparts, where the opposite was indicated.

In general, my findings suggest food choice and healthy eating practices are indeed associated with internal and external determinants. The HSU participants

may have perceived themselves more capable of dietary change than the DA adolescents. This may be attributed to the fact that HSU interviewees had better nutrition-related knowledge and awareness of the diet-health relationship, conveyed a higher level of self-efficacy and self-evaluation than adolescents in the other group. Additionally, DA participants felt that the availability of healthy foods whether at the institution or at home played a big part of what they eat or don't eat; this may have constituted a feeling of decreased control over their own diets. Nutrition education, therefore, should incorporate specific "how to" guidelines and recommendations to help adolescents choose healthy foods even when living on a budget, and it should also involve parents and other stakeholders because of their role in making healthy foods available in various settings.

It is noteworthy that while peer pressure when dining out was cited by HSU adolescents as one of the major barriers to healthy eating, DA adolescents perceived taste as the major barrier. This is more reason as to why nutrition education should be tailored to the needs of different targeted group.

5.3 What is the theoretical framework best-suited to address the identified key determinants of nutrition related behaviour?

Findings from the above sections indicate that the factors that play a part in determining the food choices and dietary patterns of the studied groups of adolescents may be divided under four main categories: individual, social environmental, physical environmental and lifestyle. The relevant personal determinants were nutrition and health knowledge and awareness, beliefs, attitude and perceived benefits of healthy eating, taste, habit, motivating factors, self-

efficacy, self-evaluation and intention. At the social environmental level, the key influences were family and peers while at the physical environmental level it was setting and availability that played a major role. Lifestyle determinants that had significant influence were time and convenience. The findings from the semi-structured interviews suggest that within each category of key influences, some differences may exist with respect to variation in the socioeconomic status of the adolescents under investigation.

The semi-structured interviews had a twofold benefit: not only did they highlight key determinants of healthy eating, but they also gave insight to why and under what circumstances these act as barriers or facilitators. For example, the home environment has been elicited by many studies as both a facilitator and a barrier to healthy eating (Cusatis and Shannon, 1996; Jenkins and Horner, 2005); however, from my present study, issues such as availability of healthy food in the home specially for the low socioeconomic status group proposes the home setting as a barrier for that group.

Qualitative measures such as those used in my study may provide valuable information on the views of the population being studied concerning the determinants that have been identified through the literature review (Bartholomew et al., 1998). However, they do not provide conclusive evidence on the relative importance of these determinants within each group nor between groups.

Nevertheless, qualitative data derived from the views and thoughts of the adolescents themselves provides a starting point for the development of interventions that are more targeted for the specific needs of those adolescents in

particular. Shepherd and colleagues (2001), in their systematic review of research on barriers to and facilitators of young people's healthy eating practices, suggested that using such methods could be used as a basis for any future efforts to promote healthy eating in this group.

Baranowski and colleagues (1997; 1999) and Brug and colleagues (2005) propose that in order to improve the probability of behaviour change outcomes, an intervention should be adapted to the mediators influencing the behaviour. My findings indicate the need for developing a nutrition-related intervention that is tailored to individual, social environmental, physical environmental and lifestyle determinants. However, given my available resources, I had to narrow them down to those that I perceived most realistic for me to pursue and most amenable to change in the conditions that I was working under (such as setting and time frame).

Therefore, Phase one of this study indicated that my intervention should focus on personal determinants that include awareness of dietary and food recommendations and own intake, self-evaluation, skills and self-efficacy for choosing healthy foods and formulating a healthy diet, and beliefs and attitudes towards specific foods. While at HSU the availability of healthy food choices could not be targeted directly since this would mean involving parents and food services establishments, it could be targeted indirectly by addressing adolescents' attitude towards the availability of healthy food choices on and off campus and by teaching adolescents skills that would help them to pick out healthier food choices in any given setting. On the other hand, I was given the chance to target the availability of healthy food choices both indirectly using the previous method as well as directly

at the food service cafeteria in the DA institution by taking on menu planning for the on-site offered meals upon the request of the director of the DA institution. At the social environmental level, while peers and family could not be addressed, the determinants considered, here, were exposure to mass media and role modelling.

The same intervention components were used in both the HSU and the DA institutions (with the exception of menu planning in the DA); however, differences that were identified in food choice determinants between the high socioeconomic status and the low socioeconomic status groups were accounted for by allocating more time to various components as I thought necessary (for example more time was allocated for the health and nutrition-related awareness component in the DA group).

The findings from phase one, refining the list of determinants and the literature reviewed (Chapter 2) elicited that the Social Cognitive Theory may be the best suited for developing my intervention. This was discussed in more detail in chapter 3.

5.4 Phase Two (Post Intervention)

5.4.1 What is the impact of the nutrition intervention on the chosen key determinants?

The intervention resulted in noticeable positive changes in some, but not all of the targeted mediators of dietary patterns and intake. These outcomes differed between the two socio-economically different groups of targeted adolescents. While there is scarcity in the literature reviewed on intervention studies that report on the effect of developed interventions on changes in the mediating factors that affect nutrition-related behaviour, I have failed to locate any studies that compare

these changes with respect to socioeconomic status in adolescents. Therefore, the following section discusses the observed changes in the determinants that have been elicited in my intervention and relates it to studies in the literature where these are available.

5.4.1.1 Nutrition Knowledge

Following the intervention, quantitative data findings indicated that participants in the HSU experimental group of adolescents showed a significant improvement ($p < 0.05$) in the knowledge of nutrition related diseases (diseases related to overweight, fat and cholesterol), skills (differentiating between low and high fat foods) and attitudes (toward fat and fibre consumption) sections.

For the DA sample, after the intervention, participants in the experimental group showed statistically significant changes in the following sections: knowledge of nutrition related diseases (experimental group showed pronounced improvement in the knowledge of diseases related to calcium, overweight, fat and salt); additionally, there was an improvement in the knowledge of the recommendations of the food guide pyramid, however, the change was not significant ($p < 0.05$); beliefs (cholesterol food sources and relationship between food consumption and disease; where the experimental group showed a change for the better) and attitudes: attitude towards dietary recommendations improved; there was also a non-significant ($p < 0.05$) decrease in the negative attitude related to time available for healthy meal preparation. The skills of differentiating between low and high fibre foods of the DA experimental group also showed a positive change but not to a level of statistical significance.

Post intervention, qualitative data revealed that “high in fruits and vegetables” was still the most common description used by HSU adolescents when asked about the meaning of “healthy foods”; however, a new definition emerged “contains all the nutrients/ has all that the body needs” which came second. Other new definitions included “follows a pattern/certain amount of servings”, “follows the food guide pyramid”, “has iron”, “not fast food”, “home cooked food”, “low in salt” and “gives energy”. These results may indicate improved nutrition related knowledge of these adolescents and realization that healthy eating has more to it than choosing healthy foods (“follows a pattern/certain amount of servings”), which led to the ability of providing more specific definitions and perceptions of what constitutes healthy food and healthy eating. The fact that some of them specifically referred to the food guide pyramid may imply that they have become more aware of set recommendations and guidelines for healthy food choice. The study by Croll et al. (2001) had pointed out that one of the interesting outcomes of their conducted interviews was that very few of the participants made reference to the food guide pyramid in the definition of eating behaviours that contribute to healthy eating.

On the other hand, for the DA adolescents, “high in fruits and vegetables” still came second where most defined “healthy food” as something which is “beneficial to the body” or “beneficial to health”; the latter was not used pre intervention.

Additional reference to health and to prevention of disease was made by the DA group, post intervention: “foods that give us health/maintain health” and

“prevents disease”; there was no mention of these previously. The fact that DA participants have moved from a more general definition of healthy foods (beneficial to the body) to making the link between healthy foods, health and the prevention of disease may imply that they have become more aware of and have started to understand the relationship between these three parameters as was also proposed by the quantitative data findings. Moreover, DA adolescents, like HSU adolescents, introduced new descriptions of healthy foods as “foods that are low in fat” and “foods that follow the food guide pyramid”; again, these were not used prior to receiving the nutrition education intervention and suggest that their knowledge of nutrition related recommendations and dietary guidelines has improved.

Additionally, the fact that none of the DA interviewees, post intervention, answered “I don’t know” further emphasizes an improvement in their understanding of healthy eating.

My above findings are similar to other studies in the literature in that noticeable positive changes in knowledge have been elicited by Giskes and colleagues (2005) and by Powers and colleagues (2005) after implementation of interventions aimed at improving dietary behaviour. Similarly, Anderson and colleagues (2005) have identified an increase in knowledge related to fruits and vegetables in an intervention aimed at improving fruit and vegetable intake in 4 to 18 year olds in the UK. These authors also reported that after their intervention, the understanding of the term "healthy" also changed significantly; in post tests new concepts were used by the intervention group such as energy, strength and healthy heart.

Awareness/Perceptions of the Importance and Benefits of Healthy Eating During Adolescence

Post intervention, as pre-intervention, most of the HSU adolescents believed healthy foods to be important at their particular age; nevertheless, the concept that healthy food is important not only at the present but also for the future was more apparent post intervention: “because it prevents from diseases later on”, “for now and later on” and “what I eat affects me later on”. None of the reviewed studies elicited definitions of healthy foods in terms of their long term advantages; again, Croll et al. (2001) have commented that although some adolescents in their qualitative study defined healthy eating in terms of its benefits, very few described long term benefits of eating healthy foods. It is important for adolescents to realize that healthy foods and healthy eating should be incorporated in their diet at an early age in order maintain health later on during adulthood since dietary practices during that period in life has been speculated to have an effect on future health.

In addition to the reasons offered by the HSU interviewees pre intervention, new explanations as to why it is important to eat healthy foods included that it is “essential for the body and everything” and that it is important in order “to maintain weight and shape”.

Post intervention, all of the DA interviewed adolescents believed that healthy foods are important at this specific stage in their lives, as was the case at baseline. Reasons why DA interviewees thought it was important to eat healthy foods still focused mainly on the notion that eating healthy is important for growth; however, more interviewees thought that healthy food is important in order to

“maintain health” and “stay healthy” than was the case pre intervention. Other new ideas included: “because it is only to a certain age that we build the body”, “it is important for all ages/throughout life”, “to prevent disease later on” and “to have strength later on/when I grow up”. Therefore, this indicates that like the HSU interviewees, DA participants became more aware that healthy foods are not only important for their present well being, but for their future health as well.

The above findings indicate that the intervention was effective in improving some aspects of nutrition related knowledge and the awareness of diet disease relationships as well as the health benefits of healthy eating practices. Nevertheless, many of the parameters in this section did not show significant positive change post intervention. This may be attributed to the fact that a lot of the participants started off with relatively high nutrition related knowledge and awareness at baseline; thus significant improvements in these would be less expected than for those areas where pre intervention scores were lower.

Post intervention both the low socioeconomic status and the high socioeconomic status adolescents showed improved knowledge of food choices conducive to healthy eating and improved understanding of the existing nutrition recommendations and guidelines. However, the findings suggest that the low socioeconomic group of adolescents may have exhibited a more pronounced improvement specially that at baseline, they showed a lower level of knowledge with respect to these nutrition related parameters as compared to the high socioeconomic group.

5.4.1.2 Nutrition Related Skills

After implementation of the nutrition intervention, quantitative findings elicited that the HSU adolescents showed an improvement in nutrition related skills (differentiating between low and high fat foods). The skills of differentiating between low and high fibre foods of the DA experimental group also showed a positive change but not to a level of statistical significance

The fact that the adolescents under study exhibited only modest change in nutrition related skills may indicate that they had difficulty in translating their increased knowledge into healthy food choices and as such more food based rather than nutrient based education should have been included in the intervention as proposed by Gracey and colleagues (1996). Additionally, at baseline, many adolescents in both intervention groups scored relatively high with regards to nutrition related skills which may have rendered any positive significant change in this area less apparent.

5.4.1.3 Nutrition Related Attitudes

Findings from the quantitative data collected indicated that both the HSU and DA groups showed a positive change in nutrition related attitudes: HSU adolescents showed more positive attitudes towards fat and fibre consumption; whereas, DA adolescents attitude towards dietary recommendations improved. There was also a non-significant ($p < 0.05$) decrease in the negative attitude related to time available for healthy meal preparation for the DA group.

Intention/Willingness to Change

Findings from the semi-structured interviews suggest that while HSU interviewees still showed varied levels of willingness to change their diet, if they find out that what they are eating at the moment were not healthy, one tenth indicated that they “would not change” because they “were used to this food” or because they “like good tasting food” and another one tenth stated that they “have already changed” their diet and “now it is healthy”. Prior to the intervention one tenth had pointed out that they “would not change” because “nothing is bothering” them whether weight or health-wise, because they “eat well” or because their “food is fine”; there were no such responses post intervention which may denote an increased awareness that their diet was not as healthy as they initially thought it was and a more positive attitude to healthy eating, in general. Other statements that were used before the intervention, to denote willingness to change the diet, which were not employed afterwards, included: “I would try as much as I can” and “I would not change”, “I can not change” and “it is difficult” indicating a more positive nutrition related attitude for the HSU group, post intervention.

The DA group also showed an increased willingness to change their dietary intake. None of the interviewees stated that they “would try but can not change the foods” that they “like”. This proposes that the DA adolescents have exhibited a positive change in nutrition related attitude. These results may suggest that the intervention had a noticeable impact with regard to attitude of the DA group and that adolescents in this group have taken the first step towards dietary change since research has indicated that self-efficacy and attitude were important predictors of

behavioural intention (Oygard and Rise, 1996; Rosin et al., 1992; Shannon, 1990; Shepherd, 1988; Slater, 1989; Tuorila and Pangbom, 1988).

Post intervention, HSU adolescents' emerging attitudes included: "it is difficult", "it is hard", "I like good-tasting food", "I would not change because I am used to this food"; this may suggest that they may have tried to practice dietary change. John and Ziebland (2004) have indicated that after their intervention for promoting fruit and vegetable intake in British adults, participants who engaged in dietary change became more aware of additional barriers to fruit and vegetable consumption than those identified prior to the intervention. "If I like the taste" which was previously considered as a convincing factor to elicit change was not used post intervention by any of the adolescents in the HSU experimental group. Additionally, none of the HSU experimental group maintained that they were "not very sure", if they "have the motive" or that "it depended" whether or not they "like the food" as limiting factors to dietary change, post intervention. None made reference to sensory attributes of healthy foods such as taste which proposes that for this group, the intervention was successful in demonstrating that healthy food does not imply reduced pleasurable taste. On the other hand, a few adolescents in this group made reference to habit, "I would not change because I am used to this food", linking it to their un-willingness to change current dietary practices.

Therefore, in general, the intervention has elicited improved nutrition related attitude and consequently intention to change dietary related behaviour in both the high socioeconomic status and the low socioeconomic status groups; however, it appears that success may have been more in the HSU group rather than

in the DA group since although the latter have demonstrated a more positive attitude to healthy eating after the intervention, some HSU adolescents actually took the additional step of changing their diet towards a healthier one.

5.4.1.4 Nutrition Related Beliefs

Only the DA group of adolescents showed a positive change in beliefs which was related to cholesterol food sources and relationship between food consumption and disease. Adolescents in both the high socioeconomic status and low socioeconomic groups had started off with misconceptions about weight loss issues, milk consumption and cholesterol. The changes shown were only in one of these issues and only in the DA group; this suggests that nutritional and dietary misconceptions and myths may be hard to change and further investigation is needed with regard to factors that influence them and the ways in which they should be effectively tackled.

5.4.1.5 Belief whether own diet is healthy (self-evaluation)/ Belief how diet can become healthier

Post intervention, findings from the semi-structured interviews showed that the majority of the HSU experimental group still believed that their diet was not healthy all the time, “not all of it”, “not that much”, “not always”, “not necessarily” or “sometimes healthy” or that their diets were simply not healthy; however, seven out of the forty three interviewees stated that their diet is “becoming healthier” or “now, yes” indicating a change for the better has occurred after administering the nutrition intervention.

Previously, almost half of the DA interviewees considered their dietary pattern as healthy; however, after the intervention most thought of their diets as either not healthy or “not all the time”, “not all of it”, “not much” or “maybe” indicating that the nutrition education that they have received has improved their self-evaluation skills and allowed them to become more critical of their dietary intake.

Belief how diet can become healthier

The adolescents in both groups still believed that reducing the consumption of un-healthy foods and increasing that of healthy foods would result in an overall improvement in their diets.

Most of the HSU adolescents’ beliefs about what they should change in order for their diets to become healthier remained the same. However, additional suggestions appeared after the intervention: “I should decrease salt”, “I should eat more proteins” and “there is nothing to change”; the last being related to the fact that some had already changed their diets towards a healthier one. Additionally, eating at home more often or consuming more home made foods was cited more frequently by these adolescents as compared to pre intervention findings.

One quarter of the DA interviewees still believed that their diets were already healthy and that they should not change anything. However, post intervention, some DA adolescents stated that in order to obtain a healthier diet, they should “eat less fat”, “improve the quality of food” that they are consuming, “eat a variety” and “increase the amount of meats” in their diet, none of this was

mentioned before. This follows that they have become more aware of healthy and unhealthy dietary practices and therefore are able to evaluate their diets better.

The findings, here, suggest that both the low socioeconomic status and the high socioeconomic status adolescents have started to give their diets more thought and have become more capable in depicting un-healthy versus healthy personal dietary practices. The intervention has proven more effective in this area in case of the HSU, high socioeconomic, group such that a number of students actually elicited a positive change in dietary practices. This is further discussed in section 5.5 on page 304 of this chapter.

5.4.1.6 Influencing/ Motivating Factors

As was the case pre intervention, for the HSU group, among the most prevailing motivators for healthy eating were current and future health and disease prevention, “if something happened to my health”, “if I get sick”, “so that I don’t get sick”, “to prevent disease later on”, “if what I am eating causes disease”, “if what I’m eating causes harm”, while weight concerns and the fear of “becoming fat”, “the way I look” or “if it helps me lose weight”, were among the less frequent influencing factors cited. A new motivating factor for the HSU group was “if my parents were living with me/if my mother was cooking the food”. Therefore, this proposes that the intervention seems to have failed in exhibiting an impact in this area for this group.

As for the DA group, the qualitative data collected indicated that post intervention this group showed a shift in the order of motivating factors elicited pre-intervention. The most frequently cited factor, post intervention, was disease

prevention, “if I get sick/if I see how the un-healthy food is damaging my body”. This was followed by weight concerns. Additionally, a new motivating factor was mentioned: “if I have proof/if the doctor tells me/if the person telling me knows better and is older than I am”. This is similar to the findings from the study by Evans and colleagues (2006) investigating the perspective of low socioeconomic status adolescents in the USA on barriers to and motivators for healthy eating. These authors indicated that some adolescents in their study reported that if an older, respected and admired person suggested a healthy food choice; then they were more likely to comply.

Additionally, findings from this part of the interview elicited that none of the DA interviewed adolescents in this group mentioned that nothing would convince them or that they were content the way they are (as was reported pre-intervention); although, two participants still did not know what would motivate them to change their dietary practices.

Interestingly, a few interviewees belonging to the low socioeconomic group stated that a lot of the things that were discussed in class made them stop and think before eating. This is noteworthy and indicative that the intervention may have had a positive impact with regard to increasing the awareness and self-evaluation skills of these participants thus giving them incentive to positively change dietary practices or at least consider the impact of the foods that they are consuming.

5.4.1.7 Perceived Behavioural Control/Self-efficacy

Here, again, perceived ability to carry out a change in dietary pattern varied among participants within each group. However, it is noteworthy that one tenth of

the HSU interviewees stated that their “diet is healthy now” and that they have visited a dietician and changed the way they eat, as an outcome of the nutrition education that they had received.

As compared to the previous findings (pre-intervention), the DA interviewees appeared to be more assertive of their ability to eat healthy, post intervention, with some stating that there are “no difficulties” or “no barriers” and others “depending on my situation” or “how I am living”.

The increase in self-efficacy elicited post-intervention in both groups of adolescents are similar to results obtained by Saksvig and colleagues (2005) who indicated that exposure to their intervention lead to an increase in dietary self-efficacy.

5.4.1.8 Availability

Availability issues were still found post-intervention for the DA group. These adolescents still frequently stated that they had to eat whatever is available to them whether at home or at the institution and that they had to eat whatever their mom prepares for the whole family.

For the HSU adolescents, post intervention findings suggest that healthy eating was still considered easiest to practice in the home setting because “healthy food is available”, “my mom cooks healthy food”; therefore the family was more of a facilitator.

Therefore, targeting the availability factor indirectly (HSU group) through addressing the adolescents’ attitude towards this issue and teaching them skills for

making healthier food choice in different settings did not prove effective. Moreover, using the preceding approach as well as increasing the availability of healthy foods in the DA food service facility did not show any positive changes with respect to this determinant either. This implies that environmental factors such as increasing the availability of healthy foods at home as well as involving family members in certain intervention components may be more effective in promoting healthy eating in different settings.

As for the other previously identified determinants in phase one of my study, although these were not specifically targeted in the intervention, the following sections elicit whether there were any detected differences in these factors, post intervention.

Taste, Time, Convenience and Habit

For the HSU interviewees, the main barrier to healthy food choice remained the same: living alone which in turn affected time available for meal preparation and reliance on convenience foods, “I can’t because I live alone/ no time to prepare meals”, “I live alone and rely on fast food”, and to a lower extent, taste was also seen as a barrier for healthy eating in this group, “if I like the food”.

Findings from the DA semi-structured interviews post intervention indicated that to some, stopping the foods that they like was still considered a difficulty or barrier to dietary change, while to others it was lack of time with some stating that they can’t change; the former two were new issues that arose after the intervention, thus indicating here, again, similar to findings by John and Ziebland (2004) that some of the adolescents in this group may have attempted change and

identified new barriers to healthy eating that they had not considered before. Two factors were not mentioned post intervention: “it depends if I like the taste/depends on the type of food” and “it’s hard because I am used to eating this way/used to certain foods”, thus there was no reference to habit as a barrier post intervention. Therefore, although staying away from foods that they like was still an issue for these adolescents, they appeared more receptive to trying new healthy foods.

Setting, Family and Peers

Post intervention, most HSU interviewees still believed it to be easier to eat healthy at home because “healthy food is available”, “my mom cooks healthy food”, “my parents have healthy food”. Additionally, there were some who stated that “at university, it is easier because at home I eat more/ all I do is eat, at home”. Moreover, of the reasons why they considered dining out with friends to be a barrier to healthy eating, “I would feel different or strange if I eat healthy food” (when out with friends) emerged as a new justification.

For the DA group, post intervention, family was still viewed as a barrier because of the availability issues mentioned previously.

Findings from this section suggest that my intervention did elicit changes in several of the targeted determinants in both the low socioeconomic and the high socioeconomic status experimental groups. Positive change was apparent for the nutrition related knowledge and awareness regarding nutrition recommendations, perceptions of the relationship between diet, health and disease. There was also noticeable positive change of attitude, intention, nutrition related beliefs and self-efficacy. As for the motivating influences, these remained the same; although for

the DA group, there was a change in the order of the frequently mentioned motivating factors where health was the most mentioned post intervention as compared to pre intervention where weight concerns were mentioned most. Furthermore, availability and setting issues did not exhibit any change.

5.4.2 What is the impact of the intervention on the dietary practices and nutrient intakes?

Findings from data collected after implementing the intervention indicate that it was successful in positively changing some but not all the food and nutrient related parameters under investigation. The effects differed between the low socioeconomic group of targeted adolescents and the high socioeconomic group.

HSU adolescents exhibited a significant decrease in table sugar consumption. There were also changes in some of the mean nutrient intakes of the HSU experimental group, but only the positive change in mean carbohydrates reached significant levels. Changes in the daily serving's consumption from the milk group also showed an increasing trend but this did not reach significant levels.

For the DA sample, post intervention, there was a significant decrease in the consumption of French fries. There were also changes in the mean nutrient intakes of the experimental group; changes that reached significant levels were those of carbohydrates, vitamin C, iron and percent protein; the experimental group showed an increased intake for the first three; whereas, the increase in percent protein was significant for the control group although both groups showed an increase in this parameter. Changes in the mean number of servings from the various food groups were significant ($p < 0.05$) for the bread and cereals group and the adolescents

exhibited an increase in daily consumption; there was also a significant increase in daily servings of milk and milk products. Moreover, it is worth noting that the experimental group showed an increase in the intake of protein, fat, vitamin A, calcium, calories and in the number of daily servings of meat without reaching significant levels.

Strolla et al. (2006) suggest that there have been few nutrition interventions mentioned in the literature that specifically target low socioeconomic status groups; the majority of such interventions mostly address middle-income groups. Therefore, this poses some difficulty for comparing and contrasting dietary outcomes of my study to those available in the reviewed literature. An additional challenge lies in the fact that the various previously conducted studies incorporate different objectives, sample size, methodology and intervention constructs which render their findings more difficult to link to my own. In my discussion, I have drawn on those that are most recent within the reviewed literature; the intervention planning model and theoretical framework of these will be mentioned where these were made available by the authors.

Some of the changes in dietary practices and mean nutrient intakes proposed post intervention, in my study, are similar to outcome findings of intervention studies in the literature. The intervention by Martens et al. (2006) for promoting healthy eating in 12 to 14 year old low socioeconomic Dutch adolescents reported that, in general, their intervention resulted in a slight beneficial effect related to fruit intake and fat rich snacks and results showed positive improvements with regard to saturated fat intake and vitamin C. The latter

is similar to my findings concerning the DA, low socioeconomic status, group where the adolescents showed a significantly increased intake of vitamin C. Powers and colleagues (2005) used constructs from the Social Cognitive Theory to develop their intervention targeting a group of second and third grade students in the USA; their findings suggested that their intervention was successful in increasing dairy, fruits and vegetables consumption. My study outcomes showed similar results with respect to increase in milk consumption in the DA group and the HSU group; although in the latter it did not reach significance. A UK study on secondary school students by Parker and Fox (2001) showed that over all, there were no significant changes in school-based eating at the end of the intervention. However, positive changes for consumption of fruit and non-fried potato and for high-fibre bread were achieved at an early stage but not sustained. Similar findings, with respect to decreased consumption of French fries in the DA group, were elicited in my study.

Other previous studies in the literature elicited various findings, none of which were similar to mine. Outcomes of an intervention targeting 12 to 14 year old Native Canadian adolescents using psychosocial constructs (namely self-efficacy and knowledge) were associated with increasing dietary fibre intake (Saksvig et al., 2004). Results from the main trial of the CATCH intervention indicated that it was successful in decreasing self-reported fat consumption in 3rd to 5th grade US students (Kelder et al., 2005). A study on US 18 to 24 year old college students demonstrated that the used intervention, which was specifically constructed with the aim of increasing fruit and vegetable intake, significantly increased fruit and vegetable consumption by one serving per day in the

experimental group as compared to the control (Richards et al., 2006). Similar results were demonstrated by John and Ziebland (2006) in a study on UK adults, by Anderson et al. (2005) on groups of 6 to 7 and 10 to 11 year old adolescents in Scotland and by the TEENS trial using constructs from the Social Cognitive Theory conducted by Birnbaum et al. (2002) on 7th grade US students with the added outcome of improved choice of low fat foods; although the results of the latter were not sustained over a long period of time. Additionally, Richards and colleagues (2006) reported that by using motivational interviewing and web based materials as well as newsletter in their intervention on 18 to 24 year old US college students, increase in fruit and vegetable intake was observed. No increase in fruit and vegetable intake was elicited in my study. This may be attributed to the fact that fruit intake was initially adequate in both the DA and HSU groups, at baseline.

The variation of my findings vis-à-vis previous studies may be ascribed to several factors: the majority of the reviewed previously constructed nutrition education interventions targeting children and adolescents addressed increasing fruit and vegetable consumption and were carried out in and involved the school setting (Martens et al., 2006; Parker and Fox, 2001; Powers et al., 2005; Richards et al., 2006; Perry et al., 1998; Nicklas et al., 1998; Resnicow et al., 1998; Foerester et al., 1998); whereas, my study tackled several nutrition related parameters and was conducted in a wider setting which did not permit taking up environmental changes. Additionally, parental influence and participation which influence children and adolescent dietary patterns, as was indicated by the literature previously cited in this chapter, were not addressed in my study. Age may have

been an additional factor conducive to the observed differences: none of the reviewed studies involved adolescents of the same age group targeted in my study.

An additional factor that may have played a part in my intervention outcomes may be related to the duration of the intervention. In their review of a range of nutrition intervention studies found in the literature, Hoelscher and colleagues (2002) have indicated that although it was difficult to establish the most effective dose of nutrition education to elicit changes in dietary behaviour, in general, those that were not effective in producing positive changes in nutrition related behaviour were those that provided fewer hours of education. My intervention lasted for a period of three months and twelve educational units were implemented, however, it is noteworthy that while all the studies included in Hoelscher and colleagues' (2002) review were conducted in a school setting and educational components were administered by the teachers (after receiving training), my sample consisted of an older age group (17 to 19 year olds) and the units were implemented by a trained nutritionist (myself). Therefore, this renders the effect of duration on my intervention outcomes hard to assess.

In general, although university and colleges may represent the final opportunity for implementing nutrition education interventions targeting adolescents, it may prove more effective to address younger adolescents in a school setting since environmental factors such as availability may be addressed and parents can be involved and since research proposes that food preferences are usually established in mid-adolescence (Kelder et al., 1994).

5.5 Main Findings

Determinants of Food Choice and Healthy Eating Behaviour/Dietary Practices

Two of the objectives of my study were to examine the baseline dietary practices and nutrient intakes as well as key determinants of food choice and healthy eating in Lebanese adolescents from differing socioeconomic status by using both quantitative and qualitative methods of research. This was carried out in order to explore the nutritional status of these participants and whether there exists a variation between mediators affecting healthy eating practices of the low socioeconomic group and the high socioeconomic group. This was carried out in order to provide basis for the development of the intervention.

The findings suggested that both groups' diets needed improvement which was consistent with other studies in the literature (Chapter 2). However, the sampled adolescents in my study retained an adequate intake of fruits which although contradictory to international mainstream research findings, has been indicated in studies conducted on adolescents from European countries in the Mediterranean region (Chapter 2) (Lebanon also lies in that region).

The literature review provided a broad range of determinants which may be categorized as individual, social environmental, physical environmental and lifestyle factors. However, narrowing these down to those that I felt were most realistic to target given my resources identified that my intervention should focus on individual factors such as knowledge and awareness, self-evaluation, skills, beliefs, attitudes, self-efficacy, and intention; social environmental factors such as

role modelling and media exposure and physical environmental factors such as availability; this still encompassed a wide range of determinants.

Findings from this part of the study suggested that different mediators may indeed have different affects on dietary practices depending on the socioeconomic status of the adolescent group under study.

The triadic interaction between personal factors, environmental factors and behaviour are highlighted by constructs from the Social Cognitive Theory (Bandura, 1986) (Chapter 2) while intention (which in turn is influenced by attitude among other factors) and self efficacy are the basic components of the Theory of Planned Behaviour (Ajzen, 1991) (Chapter 2). Moreover, these were the two theories most mentioned in adolescent intervention studies in the literature review. Based on this, I decided to develop my intervention based on constructs from the Social Cognitive Theory since it was my opinion that some constructs from the Theory of Planned Behaviour were encompassed in the former theory (self-efficacy), and that intention may be targeted indirectly through changes in attitude. Additionally, the Social Cognitive Theory offers more guidance on how to change health behaviour than other existing theories; these may be more beneficial for predicting determinants.

Development of the Intervention

My intervention was developed following the Intervention Mapping protocol (Bartholomew et al., 1998; 2001) and addressed the above identified determinants. The development processes as well as the contents of the intervention are described in Chapter 3. The same intervention was used in both socioeconomic

status groups of adolescents with slight variations that have been discussed earlier in this chapter.

Intervention Mapping proved very helpful in the development of the intervention components: not only did it give a stepwise systematic guidance, but the developed matrices made it possible to detangle complex tasks rendering them more manageable. Furthermore, it gave assistance on how to induce change in the determinants using practical strategies as well as on how to evaluate the outcomes of the intervention (Chapter 3).

Implementation and Evaluation of the Intervention

My study outcomes imply that the nutrition education intervention employed was effective in improving the nutrition related knowledge and awareness of related health issues, attitudes, self-efficacy and willingness to change of the two studied groups. However, findings suggest that although the intervention targeted availability issues in an indirect manner in HSU and both directly and indirectly at DA, it failed to have an affect on this determinant suggesting that more direct ways should be included in the intervention components (in the case of HSU adolescents) and that family may be a more important determinant of healthy eating than other mediators that affect the environment (in the case of the DA adolescents). Furthermore, there was no way of evaluating the possible effect of mass media component and the role modelling components included in the intervention on elicited changes or outcome trends.

Moreover, the fact that a number of HSU participants did actually change their diets by seeking professional help of dieticians, and that there was a trend

indicating positive dietary changes in the DA group with notable improvement in self-efficacy, illustrates that the nutrition intervention used in this study is promising and may be effective in producing change in dietary behaviour. However, this also suggests that using the same intervention in both groups with just little variation with respect to the time allocated for each component may have negatively affected the results elicited in the DA group. Therefore, further investigation is needed in order to develop a more targeted intervention, particularly when low socio economic status adolescents are involved.

5.6 Limitations to the Study

During the course of my research, there were several factors which may pose as limitations to the study. The first of these lies in the fact that my samples were non-random convenience samples and that the research design was of the quasi-experimental control type. Consequently, the chosen samples are not representative of the population of 17 to 19 year old adolescents in Lebanon and the findings can not be generalized; although, they may be transferable to similar situations and replication may build further confidence in the study conclusions.

Another limitation is that my study was of the cross-sectional and not longitudinal type. The latter would have allowed monitoring the sampled adolescents over a long period of time, thus making it possible to explore whether the effect of the nutrition intervention is long term and what bearing it has on the adult health of those sampled in the study.

For the DA group, it was the gatekeepers at the institution who chose participating adolescents. They may have used various criteria for their choices

such as individuals who were high achievers, who were more disciplined in class than others, who were more interested in the subject matter and thus volunteered to take part or whose time schedules permitted their participation. I was not informed of these criteria; therefore, it was not possible to identify whether and how participants differed from non-participants. This may have affected the baseline characteristics of my low socioeconomic status sample as well as the intervention outcome findings in that group of adolescents.

Self reported data by the subjects may have lead to some degree of error that can not be controlled, which in turn may have influenced my findings.

One drawback of addressing a wide range of potentially important determinants was elicited during the course of my study in that questions (whether in the questionnaire or the semi-structured interviews) that addressed each construct had to be assessed with only a few questionnaire items or questions included in the interviews. Therefore, although these items were selected based on the literature review, piloting, and testing reliability and validity, more precision of the used scales (questionnaire) may have been achieved by including more items per construct; however, this would imply that more time would be needed for completion of the questionnaires and the interviews thus risking the compliance of both the institutions and the participants. Alternatively, fewer determinants could have been examined.

Duration and intensity of the intervention may also have had a bearing on the nutrition education outcomes. The intervention was administered in the form of twelve one hour per week sessions over a period of twelve weeks. The instruction

time and frequency was determined by gatekeepers' (at HSU and DA) assent and feasibility to include the nutrition education sessions within their specified curriculum.

An additional limitation deals with some factors that were not included in the intervention construct namely, environment (family and educational institution), goal setting and availability. These were difficult to address given the time frame and resources available; this may have influenced outcome findings.

A final limitation of the study concerns the lack of control over some extraneous variables that may have influenced findings such as time of day during which the nutrition education was administered and the data was collected and additional sources of nutrition information that the participants may have acquired for example through the media or through personal triggered interest in the subject matter.

5.7 Conclusion

In general, outcome results from administering of my intervention suggest that it has a potential for positively affecting nutrition related behaviour since there was indication of a trend for positive changes in nutrient intake and dietary practices post intervention, especially for the low socioeconomic status adolescents, even though some of these did not reach significant levels. Furthermore, dietary change was observed for some adolescents in the high socioeconomic status group such that several adolescents did actually visit a dietician and commenced dietary change. Therefore, these findings propose that targeting determinants of nutrition-related behaviour change using constructs from the Social Cognitive Theory as a

framework may prove beneficial in developing multi-component interventions for adolescents. However, more research should be conducted towards identifying which changes in determinants were most closely linked to the elicited change in behaviour especially when developing programs that are specific for low socioeconomic status groups of adolescents is being considered.

Chapter 6: Conclusions and Suggestions for Further Research

6.1 Conclusions

This thesis deals with the development, implementation and evaluation of an intervention that promotes healthy eating in 17 to 19 year old Lebanese adolescents belonging to contrasting socioeconomic status groups. The objectives of my research focused on four key issues: exploring the dietary practices and nutrient intakes of the targeted adolescents at baseline; gaining insight into determinants that affect the food choice and healthy eating of these adolescents using quantitative and qualitative methods; developing a multi component nutrition education intervention that addresses the identified key determinants that are most amenable to change given my available resources; exploring the short-term effect of the intervention on the targeted determinants as well as the dietary patterns and nutrient intakes within each group of the participating adolescents .

Following are the conclusions related to the above objectives.

Baseline Dietary Practices, Nutrient Intakes and Identified Determinants

Through my research project I was able to verify that although my sampled adolescents had received nutrition education through the national Lebanese curriculum in school, both the HSU and DA adolescents were engaging in some unhealthy food choices leading to inadequate nutrient intake thus their diets were in need of improvement; this is consistent with the literature on the dietary practices and nutrient intake of adolescents (Chapter 2). However, the findings portray that, similar to studies by Amorim Cruz, (2000) and Hassapidou and Fotiadou (2001),

both groups elicited an adequate fruit intake which may convey that their diets may have retained some of the characteristics of the Mediterranean diet. Furthermore, it is noteworthy that both the high socioeconomic status and low socioeconomic status adolescents did not exhibit an excess intake of fast food as suggested by the reviewed international literature. This may indicate that although Lebanese adolescents may be engaging in un-healthy food choice practices with similar characteristics to the Western diet (such as low milk consumption in both groups and high fat intake for the high socioeconomic status group); the nutrition transition has not fully taken place for this age group, in Lebanon.

My findings proposed that, similar to other studies in the literature (Chapter 2) the key determinants of food choice among the Lebanese adolescents in this study included personal factors such as awareness of dietary and food recommendations and own intake, self-evaluation, skills and self-efficacy for choosing healthy foods and formulating a healthy diet, beliefs and attitudes towards specific foods, taste and habit. Other influences included social environmental factors such as family and peers as well as lifestyle factors such as convenience and time. In the physical environment, issues of availability of healthy foods at home and other settings were indicated by the findings from my study.

Additionally, my results suggested that different mediators may indeed have different effects on dietary practices depending on the socioeconomic status of the adolescent group under study. This has been previously identified by another study (Giskes et al., 2005); however, this issue is under-researched in the literature. In my study, such variations were mostly apparent with regards to awareness of the diet-

related disease relationship, perceived benefits of healthy eating during adolescence, nutrition related attitude and willingness to change dietary practices. The influence of external factors such as setting, family and peers also differed between the two socioeconomic status groups that I studied.

My findings indicated the importance of obtaining personal views of the participating adolescents as a starting point for developing interventions addressing healthy eating in this group; this has been also suggested by Shepherd and colleagues (2001). This may help identify the missing link between available nutrition recommendations and interventions and their effectiveness in eliciting positive change towards healthy eating. Individuals, in general, may be less likely to pay attention to nutrition information and dietary change strategies if they are un-aware of the relationship between health and dietary practices, and if they believe that their diets are healthy to begin with. My study proposed that the focus should be particularly on examining the sampled adolescents' own perceived benefits of healthy eating and perceptions of whether their own diets were healthy (in my study many thought their diet was healthy when in reality it was not).

Development of the Nutrition Intervention

The Intervention Mapping framework proved to be useful in guiding the development of my intervention by clarifying the conceptual basis for the intervention as well as facilitating decisions with regard to choosing the determinants to be targeted and selecting strategies to positively change them. This was also suggested by Wind (2006).

Implementing and Evaluating the Intervention in Both Groups

Findings suggest that the intervention used in my study was successful in eliciting positive changes in some of the targeted determinants, namely individual factors, in both groups, which is similar to results of several studies in the literature (Chapter 2 and Chapter 4); however, it was not associated with changes related to the external factors that have been identified such as family, peers, availability and setting. Therefore, more research should be conducted towards developing programs that address these factors.

The nutrition intervention in this study was effective in producing positive changes in dietary behaviour towards healthy eating; this is consistent with findings from other studies in the literature (Chapter 2 and Chapter 4). Positive trends related to dietary practice and nutrient intake were apparent post intervention for the low socioeconomic status adolescents, even when statistical significance was not reached. Moreover, a number of HSU participants did actually change their diets by seeking professional help of dieticians.

However, the above also suggested that using the same intervention in both groups with just little variation with respect to the time allocated for each component may have negatively affected the results elicited in the DA group. Therefore, further investigation is needed in order to develop a more targeted intervention, particularly when low socio economic status adolescents are involved.

Using constructs from the Social Cognitive Theory as a framework proved beneficial in developing the multi-component intervention targeting the adolescents in my study. This gave me a chance to demonstrate that theoretically based,

behaviour oriented interventions may be more effective in eliciting dietary change than those that are knowledge based as was also proposed by Hoelscher and colleagues (2002) and Sahay and colleagues (2006).

The use of qualitative research methods have proved to be useful for gaining better understanding of important factors that influence the Lebanese adolescents' food choice in my study. In turn this allowed the developed intervention to be tailored to specific identified determinants and examine changes thereof afterwards. The importance of using such an approach in nutrition education research for developing effective interventions has been indicated in the literature by authors such as Neumark-Sztainer and colleagues (1999), Shepherd and colleagues (2001) and Wind (2006).

6.2 Suggestions for Further Research

This same study could be repeated on a larger randomly selected sample in order improve the external validity of the findings. A longitudinal approach would allow the assessment of outcome results on the adult health of the respondents. Increased instruction time and frequency are recommended if consent of gatekeepers is secured.

Since my study explored various factors that may affect nutrition related attitudes, beliefs, skills as well as dietary practices among adolescents belonging to contrasting socioeconomic status groups, the findings may be used as a springboard for the development of future interventions addressing subgroups of adolescents.

There is a need for further research directed towards approaches in nutrition education in low socioeconomic status populations specifically targeting adolescents. The use of both quantitative and qualitative research methods in nutrition studies could broaden the understanding of individuals' perceptions and dietary practices which may allow the development of more effective nutrition education.

Interventions that address factors such as family, school and fast food establishments could help target barriers and facilitators present in the environment that affect adolescent eating patterns. Research directed towards exploring various levels of individual intention for dietary change may prove helpful in constructing more cost and time effective interventions.

Further investigation of the discrepancies between what dietitians and nutritionists believe about their clients' dietary practices and factors that affect them and the clients' own points of view may allow for more effective intervention.

Findings from my study have suggested that the developed intervention has potential in eliciting positive changes both in dietary practices and their determinants; however, this is only part of the whole picture: although my study was able to suggest why the intervention may be considered successful (specially in the case of the high socioeconomic group), it is not clear which change in determinant(s) had the greatest impact. Furthermore, although speculations can be made, more insight is needed into which (observed change in mediators) works better in each of the socioeconomic groups of adolescents targeted. Further, research and the use of special analysis models are needed now in these areas.

6.3 Conclusion

Findings from my study indicated that using Intervention Mapping for developing a nutrition education intervention based on constructs from the Social Cognitive Theory and addressing behaviour change in Lebanese adolescents from differing socioeconomic status groups has been effective in producing positive changes in personal determinants, dietary practice and nutrient intake. Further research is needed for the development of interventions that also address external determinants; the differences observed in my study outcomes between the high and the low socioeconomic status Lebanese adolescents propose that the latter should be targeted more specifically when interventions are being developed.

Appendix A

Questionnaire Cover Page

INTRODUCTION

The following is a questionnaire that inquires about food choices and practices. It is part of an ongoing research that will hopefully help in improving the nutritional practices of young people.

The information that you will give will be strictly confidential and anonymous (no names will be listed). This questionnaire will not be part of your grade or affect it in any way.

It is important that the answers that you give are really representative of *your* own ideas and of the food practices that *you* carry out in your life.

I would appreciate your collaboration; please read the following consent form.

Thank you,

Maya Nabhani Zeidan

Consent Form

I agree to participate as a subject in this study. I understand that I will be involved in answering questions about my nutrition knowledge, attitudes and food practices.

I understand that my participation is totally voluntary and I may stop participating at any time. All my answers will be kept confidential. My name will not appear on any of the results. Only group results will be reported.

I understand that there are benefits about participating in this project. I will be providing professionals with insight into adolescent nutrition knowledge and behaviour in relation to nutrition education.

I have read and understand this consent form.

Name.....

Date.....

Signature.....

Appendix B

Letter to Dar Al-Aytam

Dear Madam,

In reference to our prior meeting in October, 2005, with regards to conducting research in Dar Al-Aytam, please find below a brief explanation of the research and its possible benefits to Dar Al-Aytam.

I am conducting a PhD research that inquires about the food practices and choices of adolescents on one hand, and that aims at improving dietary practice via nutrition education, on the other hand. Therefore, I hope that your institution will be kindly willing to participate in this research since the purpose of this study falls under the nutrition education campaign that Dar Al-Aytam is currently involved in.

Additional benefits may include the information pertaining to nutrition and health that students will receive throughout the research, as well as an opportunity for your esteemed institution to have a preview of the efficacy of nutrition intervention, since the research involves pre/post evaluation of the impact of the nutrition education that will be provided to students.

Dar Al-Aytam will be mentioned in the research as a much thanked participating institution.

Sincerely,

Maya Nabhani Zeidan

Appendix C

Table 1. Intervention Mapping

• Step 1: Defining proximal program objectives
• Step 2: Delineating intervention methods from theory and translating methods into practical strategies
• Step 3: Designing the program and producing intervention materials
• Step 4: Planning for program adoption and implementation
• Step 5: Creating evaluation plans and instruments

SOURCE: Hoelscher et al (2002).

Table 2. Ten Steps in Developing Health Behaviour Change Programs

• Step 1: Selecting health behaviours for a community- wide program
• Step 2: Providing a rationale for selecting a health behaviour
• Step 3: Creating an intervention model of predictive factors
• Step 4: Writing the intervention objectives
• Step 5: Ensuring that the intervention objectives are applicable to the target population
• Step 6: Determining which types of programs are most applicable
• Step 7: Creating program components from intervention objectives
• Step 8: Constructing the health behaviour program
• Step 9: Implementing community-wide health behaviour programs
• Step 10: Maintaining health behaviour programs

SOURCE: Perry (1999).

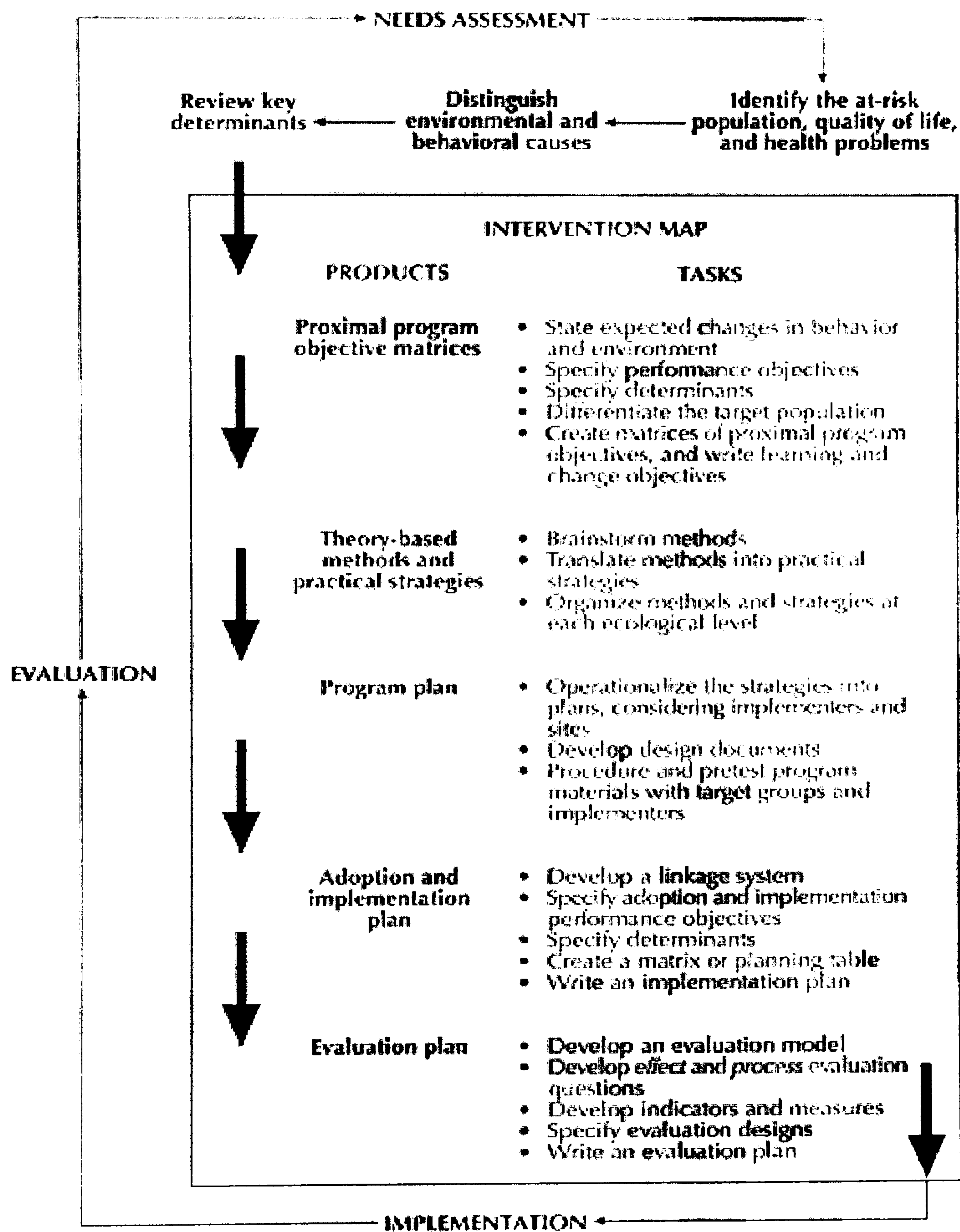
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Appendix D

The Intervention Mapping Protocol
(Bartholomew et al., 2001)



Appendix E

QUESTIONNAIRE

Section A: Biography

PLEASE ANSWER THE FOLLOWING QUESTIONS TO THE BEST OF YOUR KNOWLEDGE

- **Year of Birth:**
- **Place of Birth:**
- **Weight:**
- **Height:**
- **Gender:** ☐ **Female**
 ☐ **Male**
- **Nationality:** ☐ **Lebanese**
 ☐ **Other (Please Specify).....**
- **Home Address:**
- **School that you attended before university:**
- **Years spent at the above school:**
- **Address of school:**
- | <u>Father's Occupation</u> | <u>Mother's Occupation</u> |
|--|-----------------------------------|
| <input type="checkbox"/> Liberal Profession (Self Employed) | <input type="checkbox"/> |
| <input type="checkbox"/> Employee in a Private Company | <input type="checkbox"/> |
| <input type="checkbox"/> Government Employee | <input type="checkbox"/> |
| <input type="checkbox"/> Manager in a Private Company | <input type="checkbox"/> |
| <input type="checkbox"/> Government Official | <input type="checkbox"/> |
| <input type="checkbox"/> National Security Services (Army...) | <input type="checkbox"/> |
| <input type="checkbox"/> Merchant or Tradesman | <input type="checkbox"/> |
| <input type="checkbox"/> Household Occupation | <input type="checkbox"/> |
| <input type="checkbox"/> Searching for Work | <input type="checkbox"/> |
| <input type="checkbox"/> Retired | <input type="checkbox"/> |
| <input type="checkbox"/> Deceased | <input type="checkbox"/> |
| OTHER (Please Specify)..... | |

- Mother's Education:** ☐ **High School**
☐ **Technical School (BT/TS)**
☐ **University (BA/ BSc.)**
☐ **Graduate (MA/ MSc.)**
☐ **Post Graduate (PhD/ Doctor of Medicine)**

- Father's Education:** ☐ **High School**
☐ **Technical School (BT/TS)**
☐ **University (BA/ BSc.)**
☐ **Graduate (MA/ MSc.)**
☐ **Post Graduate (PhD/ Doctor of Medicine)**

Section B: Knowledge of Nutrition Guidelines

PLEASE CHECK ONLY ONE ANSWER FOR EACH FOLLOWING QUESTION:

1- Have you studied about nutrition and/ or healthy eating at your school?

☐ Yes

☐ No

If YES:

In which grade did you study about nutrition and/or healthy eating?

☐ Elementary

☐ Intermediate

☐ Secondary

☐ Don't know

2- How would you rate your knowledge about nutrition and/ or healthy eating?

☐ Excellent

☐ Very good

☐ Good

☐ Not so good

- 3- In your opinion, how important is it to maintain a healthy weight?
- ☐ Very important
 - ☐ Somewhat important
 - ☐ Not too important
 - ☐ Not at all important
 - ☐ Don't know
- 4- In your opinion, how important is it to eat a variety of food?
- ☐ Very important
 - ☐ Somewhat important
 - ☐ Not too important
 - ☐ Not at all important
 - ☐ Don't know
- 5- In your opinion, how important is it to choose a diet with plenty (a lot) of bread, cereal, rice and pasta?
- ☐ Very important
 - ☐ Somewhat important
 - ☐ Not too important
 - ☐ Not at all important
 - ☐ Don't know
- 6- In your opinion, how important is it to choose a diet with plenty (a lot) of fruits and vegetables?
- ☐ Very important
 - ☐ Somewhat important
 - ☐ Not too important
 - ☐ Not at all important
 - ☐ Don't know
- 7- In your opinion, how important is it to drink milk and/or eat dairy products such cheese, labneh and yogurt everyday?
- ☐ Very important
 - ☐ Somewhat important
 - ☐ Not too important
 - ☐ Not at all important
 - ☐ Don't know

8- In your opinion, how important is it to eat an adequate (a sufficient) amount of fiber everyday?

- ☐ Very important
- ☐ Somewhat important
- ☐ Not too important
- ☐ Not at all important
- ☐ Don't know

9- In your opinion, how important is it to choose a diet that is low in fat?

- ☐ Very important
- ☐ Somewhat important
- ☐ Not too important
- ☐ Not at all important
- ☐ Don't know

10- In your opinion, how important is it to choose a diet that is low in saturated fat?

- ☐ Very important
- ☐ Somewhat important
- ☐ Not too important
- ☐ Not at all important
- ☐ Don't know

11- In your opinion, how important is it to choose a diet that is low in cholesterol?

- ☐ Very important
- ☐ Somewhat important
- ☐ Not too important
- ☐ Not at all important
- ☐ Don't know

12- In your opinion, how important is it to use salt in moderation?

- ☐ Very important
- ☐ Somewhat important
- ☐ Not too important
- ☐ Not at all important
- ☐ Don't know

13- In your opinion, how important is it to use sugar in moderation?

- ☐ Very important
- ☐ Somewhat important
- ☐ Not too important
- ☐ Not at all important
- ☐ Don't know

Section C- Knowledge of Diet-Disease Relationship

14- Do you know about any health problems related to not eating enough Calcium?

- ☐ Yes
- ☐ No

If YES, please list any problems you know of: -----

15- Do you know about any health problems related to being overweight ?

- ☐ Yes
- ☐ No

If YES, please list any problems you know of: -----

16- Do you know about any health problems related to eating too much fat?

- ☐ Yes
- ☐ No

If YES, please list any problems you know of: -----

17- Do you know about any health problems related to eating too much cholesterol?

☐ Yes

☐ No

If YES, please list any problems you know of: -----

18- Do you know about any health problems related to not eating enough fiber?

☐ Yes

☐ No

If YES, please list any problems you know of: -----

19- Do you know about any health problems related to eating too much sugar?

☐ Yes

☐ No

If YES, please list any problems you know of: -----

20- Do you know about any health problems related to eating too much salt?

☐ Yes

☐ No

If YES, please list any problems you know of: -----

Section D- Knowledge of Nutrient Sources/ Skills of Selecting Foods

21- Rank the following items using numbers 1-3 (1 = group which we should eat from in largest quantity everyday, 3 = group which we should eat from in least quantity everyday, 2 = group which falls between):

..... Fat Group (oil, butter, sweets.....)

..... Protein Group (meat, chicken, fish, milk and milk products...)

..... Carbohydrates (bread, potatoes, pasta, beans, fruits, vegetables....)

22- Some people read the nutrition label before buying a food product:

☐ This is a lot like me

☐ This is in some way like me

☐ This is not at all like me

☐ I don't know how to read a food label

23- You get information about nutrition mostly from:

- ☐ Nutritionist
- ☐ Scientific Magazines
- ☐ Nutrition Books
- ☐ Regular Magazines
- ☐ TV
- ☐ Internet

24- Based on your knowledge, which has more fat?

- a. ☐ Fried Potato or ☐ Baked Potato
- b. ☐ Hot dog or ☐ Turkey Mortadella
- c. ☐ White Cheese or ☐ Yellow Cheese
- d. ☐ Yogurt or ☐ Sour cream
- e. ☐ Chicken or ☐ Meat
- f. ☐ Mayonnaise or ☐ Ketchup
- g. ☐ Icecream or ☐ Sorbet

25- Based on your knowledge, which has more saturated fat?

- a. ☐ Liver or ☐ Steak
- b. ☐ Butter or ☐ Margarine
- c. ☐ Egg white or ☐ Egg yolk
- d. ☐ Skim milk or ☐ Whole milk

26- Based on your knowledge, which has more cholesterol?

- a. ☐ Liver or ☐ Steak
- b. ☐ Butter or ☐ Margarine
- c. ☐ Egg white or ☐ Egg yolk
- d. ☐ Skim milk or ☐ Whole milk

27- Based on your knowledge, which has more fiber?

- a. ☐ Fruit or ☐ Meat
- b. ☐ Brown bread or ☐ White bread
- c. ☐ Orange juice or ☐ An apple
- d. ☐ Beans or ☐ Lettuce
- e. ☐ Popcorn or ☐ Crackers

Section E: Nutritional Beliefs

PLEASE INDICATE YOUR OPINIONS ABOUT THE FOLLOWING STATEMENTS:

28- Eating a variety of food each day, probably gives you all the vitamins and minerals that you need.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

29- Only fats are fattening.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

30- Fast foods are high in salt and fat.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

31- A fat that is a solid is usually high in saturated fat.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

32- Cholesterol is only found in animal products.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

33- Skipping meals is a good way to lose weight.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

34- Eating at least one source of Iron each day is important for good health.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

35- A person needs to drink milk only during childhood:

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

36- Starchy foods like bread, potatoes and rice make people fat.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

37- What you eat can make a big difference in your chance of getting a disease, like heart disease or cancer.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

38- In your opinion, the foods that you are eating now are healthy, so there is no reason for you to make any changes in your eating habits.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

Section F: Nutrition Attitude

PLEASE CHOOSE THE BOX THAT YOU FEEL MOSTLY REPRESENTS YOUR ATTITUDE TOWARDS EACH FOLLOWING STATEMENT

39- I have no time to prepare healthy meals.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

40- It's too hard to find good healthy meals at university.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

41- There are many recommendations about healthy ways to eat, it's hard to know what to believe.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

42- Decreasing the fat content of my diet would:

- ☐ Be Harmful to my health
- ☐ Be Beneficial to my health
- ☐ Have no effect on my health

43- It would be easy for me to reduce the amount of fat in my diet.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

44- Increasing the fiber content of my diet would be:

- ☐ Be Harmful to my health
- ☐ Be Beneficial to my health
- ☐ Have no effect on my health

45- It would be easy for me to increase the amount of fiber in my diet.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

46- I find the nutrition information on foods in the supermarket to be very helpful.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

47- I enjoy food too much to worry about its fat content.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

48- I enjoy food too much to worry about my weight.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

49- I am still too young to worry about getting a good amount of Calcium in my diet.

- ☐ Strongly agree
- ☐ Somewhat agree
- ☐ Somewhat disagree
- ☐ Strongly disagree

Section G: Dietary Practice

PLEASE ANSWER THE FOLLOWING QUESTIONS TO THE BEST OF YOUR KNOWLEDGE.

50- How many meals do you eat per day?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ Other, Please specify-----

51- Do you skip any meals?

- ☐ Always
- ☐ Most of the time
- ☐ Sometime
- ☐ Rarely
- ☐ Never

52- If you do skip meals, which one?

- ☐ Breakfast
- ☐ Lunch
- ☐ Dinner

53- If you do skip meals, why?

- ☐ Not enough time
- ☐ Irregular hours at university
- ☐ Trying to lose weight
- ☐ Other, Please specify.....

54- Where do you usually eat most of your meals?

- ☐ At home
- ☐ At the university cafeteria
- ☐ At a restaurant
- ☐ At a fast food chain (McDonald's, Pizza Hut, Sandwich Snack)
- ☐ I bring food with me from my home
- ☐ Other, Please specify.....

THINK ABOUT WHAT YOU USUALY EAT WHEN YOU ANSWER THE FOLLOWING QUESTIONS

55- How often do you eat fast food (like hamburgers and pizza)?

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

56- How often do you eat French fries? (Include those used in sandwiches)

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

57- How often do you eat a Mankousheh?

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

58- How often do you eat sweets ? (like chocolate, doughnuts cookies, cake etc..)

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

59- How often do you eat salty snacks (like chips, pretzels, crackers...)?

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

60- How often do you eat bread? (Include bread for sandwiches and bread you eat with meals)

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

61- How often do you eat pasta, rice and /or potatoes?

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

62- How often do you drink milk or yogurt?

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

63- How often do you eat cheese or labneh? (Include cheese and labneh in sandwiches)

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

64- How often do you eat red meat? (Include the meat used in stews)

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

65- How often do you eat chicken? (Include chicken used in dishes such as lasagna)

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

66- How often do you eat fish?

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

67- How often do you eat eggs?

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

68- How often do you eat beans, lentils or peas?

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

69- How often do you eat hotdogs or mortadella?

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

70- How often do you eat cooked vegetables used in the preparation of dishes (such as spinach, Mloukhieh, Koussa, eggplant, Loubyeh, cabbage, warak inab etc....)

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

71- How often do you eat raw vegetables, alone or in salads (such as tomato, lettuce, cucumber, green pepper, carrots, asparagus etc....)

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

72- How often do you eat fruits?

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

73- How often do you drink fruit juice?

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

74- How often do you drink soft drinks (Pepsi, 7-up etc)?

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

75- How often do you drink coffee or tea? (Include Arabic coffee, American coffee and Nescafe)

- ☐ Never
- ☐ Less than once a WEEK
- ☐ 1-3 times a WEEK
- ☐ 4-6 times a WEEK
- ☐ Once a DAY
- ☐ 2 times a DAY
- ☐ 3 or more times a DAY

76- Do you add salt to your food?

- ☐ Always
- ☐ Most of the time
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

77- How many spoons of sugar do you use per day (in coffee and tea)?

- ☐ 1
- ☐ 2-3
- ☐ 4-6
- ☐ More than 6
- ☐ I don't use sugar

Appendix F

Interview Questions

- 1- When I say healthy foods, what does that term mean to you? Definition.
- 2- Do you feel that at your age it is important to eat healthy foods? Why or why not?
- 3- Do you think that your current diet-the foods that you are currently consuming-is healthy?
- 4- What would you change? It might be something that you would want to increase the consumption of, or something you would want to eat less of.
- 5- If I were to tell you that analysis of your food intake shows that your current diet is not healthy (if you found out that it's not healthy), on a scale of 1 to 10 (where 1 is the least score and 10 is the highest score), how willing (how seriously would you consider) would you be to try to change your diet?
- 6- What would be the most important factor (reason) that would make you consider changing the way (or what) you eat?
- 7- If you decide to change what you eat (towards a more healthy diet), how sure are you that you will be able to eat more healthy foods? If unable, why?
- 8- How sure are you that you can do so (In your opinion is it easier to do so): at home? At university? When you are out with friends? Why?

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