LAUREA
UNIVERSITY OF APPLIED SCIENCES
Prime Mover

PEDIATRIC NUTRITIONAL GUIDANCE IN THE PRIMARY PREVENTION OF CORONARY HEART DISEASE

Eyob Fesseha, Hermon

2013 Otaniemi

Laurea University of Applied Sciences
Otaniemi

PEDIATRIC NUTRITIONAL GUIDANCE IN THE PRIMARY PREVENTION OF CORONARY HEART DISEASE

Hermon Eyob Fesseha
Degree Programme in Nursing
Bachelor's Thesis
February, 2013

Laurea University of Applied Sciences **Abstract**
Otaniemi
Degree Programme in Nursing

Hermon Eyob Fesseha

PEDIATRIC NUTRITIONAL GUIDANCE IN THE PRIMARY PREVENTION OF CORONARY HEART DISEASE

Year 2013 Pages 65

Unhealthy diet and childhood obesity are the leading causes of early coronary heart disease (CHD) in paediatrics. However, pediatric nurses were found to have a lack of knowledge about childhood obesity, as well as confidence regarding their role in educating children about obesity.

The purpose of this paper was to present an updated literature review of recently published data regarding nursing interventions to prevent the development of premature CHD among children by providing nutritional guidance to children and their families.

In gathering materials for this systematic literature review, a search of CINAHL, MEDLINE and COCHRANE databases was conducted for the time frame of January 2000 to September 2012. Twelve studies that met the specified inclusion criteria were included.

The findings suggest that the risk factors for CHD are already present in overweight children and transfers into adult life. This evidence supports the urgent need for early and primary interventions. Dietary modification is the major intervention component to prevent CHD through halting childhood obesity. The core message of dietary intervention focuses on low consumption of saturated fat (30-35%), sugar-sweetened drinks/foods, and salt and high consumption of fruit, vegetables and fibers.

A multi-professional team, competent to implement a multi-sector intervention approach targeting all the intervention components, is required to prevent CHD by tackling childhood obesity. The literature shows that identifying the appropriateness of dietary intervention in childhood-obesity-prevention and examining the sustainability of the interventions using long-term research studies require further research.

Keywords: Paediatric nursing, Nutritional guidance, Coronary heart disease, Primary prevention, Intervention,

Table of Contents

1 INTRODUCTION

A recent occurrence is the realization that environmental factors, including dietary factors, are of importance in many of the chronic degenerative diseases (such as obesity, cardiovascular diseases, cancer, and diabetes), which are the major causes of ill health and death in affluent societies (Mann & TrusWell 2007). Cardiovascular diseases (CVD) are the leading cause of mortality in most industrialized and some developing countries. Several projections suggest that coronary heart disease (CHD) will become an increasingly important health issue in the developing countries as well and that the majority of cases and deaths worldwide will be in developing rather than developed countries (Mann & Truswell 2007). However, in the United States it has been proved that CVD accounts for more deaths than all other causes combined (Coulston, Rock & Monsen 2001).

The incidence of CVD has dramatically increased among obese children and adolescents, and it comprises one of the most pressing health problems of the 21st century. Early development of paediatric CHD and the association of being overweight/obese as a child with CHD in adulthood have been a great concern for many healthcare professionals. A growing body of evidence suggests that as the prevalence of childhood obesity increases there is potential for an increase in the prevalence and earlier onset of coronary artery disease (Raghuveer 2008; Kavey, Daniels, Lauer, Atkins, Hayman,& Taubert 2003; Lu, Jiang, Chou, Hor, Lay, & Wang 2008).

Several epidemiological studies have demonstrated an increase in the prevalence of obesity and the phenomenon of being overweight in childhood. Montoya & Lobo (2011) reported that 17% of children in the United State between ages of 2 and 9 years are obese. Similarly, Lipshultz (2005) documented that nearly 23% of Americans have a body mass index of 30 or higher, raising their risks of chronic diseases. However, this dramatic increase in the prevalence of overweight/obesity is not restricted to the United States. The World Health Organization has provided an alarming report that there are recently more than one billion overweight adults worldwide, of whom at least 300 million are clinically obese, and approximately 22 million children younger than 5 years of age are believed to be overweight (Lambiase 2009).

The major risk factors for CHD include cigarette smoking, elevated total and low-density lipoprotein (LDL) cholesterol levels, overweight and obesity. However, these risk factors are modifiable by diet and lifestyle changes (Coulston et al 2001). Particularly, dietary modification was found to be the most important in the treatment of people who have already developed CHD (Montoya & Lobo 2011). The American Academy of Paediatrics guidelines advocate a heart-healthy diet for all children through lifestyle modifications as well as nutritional counselling and guidance from nurses and nutritionists (Hockenberry & Wilson 2009).

Nursing professionals need to play an important role in screening, assessing, educating and supporting overweight or obese children in order to minimize CHD risk factors (Hockenberry & Wilson 2009). Likewise, nurses are required to comprehensively understand that children who are overweight have a health problem and are at risk of developing other long-term health problems (Betz 2000) such as CHD, cancer, diabetes, and musculoskeletal disorders (Wofford 2008; Montoya & Lobo 2011). Nurses, therefore, have the competence to provide educative guidance regarding dietary changes, physical activity and behavioural modifications as a primary intervention approach (Tucker 2009). Early and intense intervention is key to the prevention of future cardiovascular disease (Hockenberry & Wilson 2009).

Parent involvement as agents of change for childhood obesity prevention has been designated as vital progress by a number of studies (Wofford 2008; Betz 2000; Frenn, Heinirich, Dohmen & prusznski 2011; Tucker 2009). Betz (2000) reported that parents have a foremost role in establishing their children's lifelong dietary and exercise patterns. Similarly, Wofford (2008) stated that positive family modeling is vital to the establishment of lifelong health habits. For his part, Lipshultz (2005) noted that reducing disability and death from cardiovascular diseases in childhood is influenced by the child's and family's adherence to treatment guidelines. Moreover, Betz (2000) and Wofford (2008) recommended that community-based comprehensive weight-management programs are needed for childhood obesity prevention.

Several researches have been published which outline the alarming rate of childhood obesity and the need for primary intervention. However, only few researches have investigated the role of nurses in the primary prevention of childhood obesity and premature coronary heart disease. This paper therefore highlighted the primary interventions that a nurse can deliver to children and their families in order to inhibit the progress of premature CHD. The purpose of this systematic literature review is to describe the cortex of supplying nutritional guidance to children and their families as a primary method for preventing CHD. The study concentrated on nutritional aspects as a preventative process in the treatment of CHD. In addition, the study found that a multi-sector intervention approach involving family members, community and schools can play a profound role in the prevention of childhood obesity. Moreover, this study incorporated the fact that childhood obesity is associated with greater risk of CHD in adulthood.

2 THE PURPOSE STATEMENT AND RESEARCH QUESTIONS

Purpose statement

Primarily, this review aimed to present updated knowledge of recently published data regarding paediatric nutritional guidance provided by nurses for the primary prevention of coronary heart disease. Secondarily, it aimed to explore the appropriateness of providing nutritional guidance in minimizing the risk of coronary heart disease in children.

In accordance with the Cochrane handbook for systematic literature review on the specific ranges for identifying purpose statements (htpp://Cochrane-handbook.org/) this present paper aimed at enhancing the quality of knowledge of the topic at hand.

Research questions

1. What evidence exists to support nursing professionals to provide nutritional guidance to paediatric clients and their families in order to primarily prevent coronary heart disease incidences?
2. Is the provided nutritional intervention appropriate to prevent early coronary heart disease in children?

Precise answers to these questions might help children to maintain their BMI within the normal range and have an improved quality of life. They might also alleviate the life of many obese children and reduce family worries. The importance of these research questions is highlighted by the fact that the number of over-weight/obese children is rapidly increasing and becoming an epidemic issue in many countries. The reason for linking the concept of nutritional guidance and obesity with coronary heart disease is due to my personal interest in the area of cardiology.

3 DEFINITIONS OF THE KEY CONCEPTS

3.1 Paediatric Nursing

The term “pediatric nursing” in the present paper refers to nursing care delivered to both the child and the family. The main purpose of paediatric nursing is to improve the health care for children. Paediatric nurses are involved in every aspect of a child’s and family’s growth and development. The philosophy of family-centered care focuses on the family as the constant target of a child’s life. Therefore, nurses are called upon to empower and enable families through various ways to display their current abilities and competencies and to acquire new ones to meet the needs of their child’s health. Similarly, health care professionals must respect, encourage, motivate, support and enhance the strength and competence of the family by developing a partnership with the parents. (Hockenberry & Wilson 2009)

To best understand the family as a system it is necessary to work with and through the various factors that affect family life. Conceptualization of families as interrelated components assists the nurse to understand the impact of change in family members on family health and vice versa. Each person has a position or status in the family structure and plays culturally and socially plays a defined role in interaction within the family. Likewise, each family has its own tradition and values and sets its own standards for interaction within the family and outside the group. Thus, the ecological model of family systems indicates that a nurse should consider the relationship between family members as well as the family’s relationship to its surroundings (Hockenberry & Wilson 2009).

Providing family-centered care (FCC) means that clinicians incorporate into caregiving the knowledge and conviction that family is the constant in children’s lives; children are affected by and affect those with whom they have a relationship; and by including the family in the processes, children will receive higher quality care (Herrison 2010). The establishment of a therapeutic relationship between care provider, patient and family is the essential foundation for providing high-quality family-centered care (Hockenberry & Wilson 2009). Nurses should maintain open communication and multilateral interaction with their clients. A systematic review emphasized that nurses must make a deliberate effort to establish a relationship with parents to foster understanding of children’s and family’s needs in matters concerning illness and hospitalization (Herrison 2010).

Adopting FCC as the philosophy of care for paediatric nursing serves to provide a framework for paediatric nurses to take on the responsibility and the goal of caring for infants and children in ways that support and promote not only physical health but also healthy emotional and psychological development that occurs in the context of the family (Harrison 2010). By progressing in this manner nurses implement the holistic approach of care provision demonstrated in Roy’s adaptation model (Roy & Andrews 1991). The role of a paediatric nurse can be summarized as assessing and

intervening in family life, collaborating with families and other professionals, providing anticipatory guidance and family education, performing ethically plausible health-based decisions, and researching and building a knowledge base for family health promotion (Bomar 1996, Seedhouse 2009). Since nurses have ongoing interaction with family members throughout the early life of children, they are in the forefront of assessing and identifying youth at risk of becoming or who are overweight (James, Connelly, Gracia, Mareno & Baietto 2010).

3.2 Nutritional Guidance

According to Maslow's hierarchy of needs, food and nutrition rank on the same level as air in the basic necessities of life (Dudek 2007). Nutrition concerns the food people eat and how their bodies use it. Obviously, individuals might have their own definition of what nutrition means to their life. Williams (2001) indicates that many people are only concerned with food insofar as it relieves their hunger or satisfies their appetite—not wether it supplies their bodies with all the elements of good nutrition.

Healthy nutrition is essential in the maintenance of good health throughout one's entire lifespan. The amount and type of food to be consumed might depend on the developmental stage of an individual and the presence of diet-related chronic diseases such as CHD, obesity and diabetes. All the energy needed for growth and repair of the body, for muscular activities of all kinds and for all the work done by cells comes from the metabolism of carbohydrate, fat, and protein (Wiseman 2002). Assessing the nutritional status of a child is crucial to rule out diet-related disorders. Height and weight are used to indirectly assess undernutrition or overnutrition among children. The result of height and weight are used to calculate body mass index (BMI) from which the relative risk of health problems related to weight can be estimated.

After assessing the nutritional status of the patient a nurse is required to provide instrumental guidance as a part of nursing intervention. Guidance in paediatric nursing attempts to cover several internal and external aspects within the client. It is critically important for a nurse to accomplish her duty in promoting health, preventing illness and alleviating suffering thereby ensuring her client's holistic well-being (Roy & Andrews 1991; Fry & Johnstone 2008). Similarly, it is essential for a nurse to consider the external resources of the client (Roy & Andrews 1991). For instance, the involvement of family members in their child's health care is a crucial aspect in the provision of paediatric nutritional guidance.

Nursing guidance can be implemented through a variety of ways. Providing initial information and advice to the parent about their child's health care is an important step towards ensuring that a client feels secure in the relationship and is adequately informed of what is happening. Supporting, educating, and encouraging clients are also considered as other methods for supplying nursing guidance (Smeltzer, Bare, Hinkle & Cheever 2010). In this ways a nurse can educate and encourage

obese and over weight children to have a healthy diet and practice regular exercise. The present review mainly focused on dietary intervention and particularly on the positive impact of macronutrients to prevent the progression of premature coronary diseases among children. In addition, nutritional guidance in this context implies personal guidance given by a nurse to clients, over and above what is required by national guidelines.

3.3 Primary Prevention of Coronary Heart Disease and Obesity

The present paper attempts to discuss the concept of childhood obesity as it is the major co-morbidity for the development and progression of premature coronary heart disease. Primary prevention in this review implies the act of health care provided in primary care settings excluding medical interventions.

A recent explosion in the number of cardiovascular risk and undetected subclinical cardiovascular pathology cases has swept across the globe. Nearly 70% of adult Americans are overweight or obese (Kones 2011). Likewise, (Kones 2011) reported that the prevalence of visceral obesity stands at 53% and continues to rise. Childhood and adolescence are critical periods for the development of obesity as this is the time when a body's cells are multiplying rapidly (Williams 2001).

Obesity develops from many interwoven factors- including personal, physical and genetic factors (Williams 2001). Mann and TrustWell (2007) defined obesity as a condition in which the fat stores (adiposity) are excessive for an individual's height, weight, gender, and race to an extent that produces adverse health outcomes. Obesity is one of the major diet-related risk factors for cardiovascular disease (Couluston at el 2001) especially for the development of CHD (Mann & TrustWell 2007).

Coronary heart disease (CHD) also referred to as coronary artery disease is the most prevalent type of cardiovascular disease in affluent countries. The basic pathological lesion underlying CHD is the atheromatous plaque, which bulges on the inside of one or more coronary arteries that supply blood to the heart muscle-myocardium (Mann &TrustWell 2007). The pathological progress of atherosclerosis begins as fatty streaks of lipids that are deposited in the intima of arterial wall. Some research findings proposed that these lesions commonly begin in childhood and develop throughout adulthood (Smeltzer et al 2010).

The development of atherosclerosis over many years involves an inflammatory response which begins with injury to the vascular endothelium. The injury may be initiated by smoking, hypertension, genetic factors, and environmental factors (Smeltzer et al 2010). Eventually, the injury develops into lesions, called atheromas or plaques that protrude into the lumen of the vessel narrowing it and obstructing blood flow. This impediment to blood flow is usually progressive, causing an inad-

equate blood supply to the cardiac muscle cells, depriving them from getting the amount of oxygen needed for their survival. This condition is known as ischemia. Cardiac ischemia may result in persistently low cardiac output and heart failure where the heart cannot support the body's needs for blood. A decrease in blood supply from CAD/CHD may even cause the heart to abruptly stop beating—an event known as sudden cardiac death (Smeltzer at el 2010).

Numerous studies have documented the health consequences associated with childhood obesity, including type 2 diabetes mellitus (T2DM), metabolic syndrome, hyperandrogenism, hypertension, heart disease, asthma, sleep disorders, non-alcoholic fatty liver disease, gallbladder disease, Blount's disease, and pseudotumor cerebri (Montoya & Lobo 2011; Porter, Thrasher, & Krebs 2011; Betz 2000), joint problems, depression, low self-esteem, eating disorders (Trucker 2009) and social discrimination (Montoya & Lobo 2011). A number of researchers have noted that the stigmatization directed at obese children by their peers, parents, educators, and others is pervasive and often unrelenting.

To reduce the prevalence of CHD in children, many epidemiological researches have provided an empirical result on the primary prevention of CHD through various methods. Mann & TrusWell (2007) reported that lifestyle modification is undoubtedly the most effective means of reducing CHD risk in high-risk populations and individuals. Reviewing the same issue Lambiase (2009) noted that targeting reductions in sedentary behaviour may be an effective modality in treating paediatric overweight.

Implementing a behavioural modification for weight management through increasing energy output, promoting physical activity, and controlling eating habits results in lower the risk of becoming over weight or obese. These personal modifications therefore prevent CHD development. In his view of CHD prevention Kone (2011) noted that at any one time, 55% of the population is on a weight-loss diet, and almost all fail. Pointing to the inactivity of the population Kone (2011) added that only fewer than 15% of adults or children exercise sufficiently, and over 60% engage in no vigorous activity. Therefore, in order to minimize early development of CHD among children, it is advisable that all parents get sufficient knowledge on sedentary life modifications from health professionals, and apply it in practice. Nurses should endeavour to provide high quality nutritional guidance and advice on life style modifications.

4 METHODS

This paper aimed to enhance the knowledge of nutritional guidance to be provided by nursing professionals in order to avoid premature coronary heart disease among children. The study utilized systematic literature review to collect data. According to the Cochrane handbook for systematic reviews of intervention a systematic literature review should attempt to collate all empirical evidence that fits pre-specified eligibility criteria in order to answer a specific research question (htpp://Cochrane-handbook.org/).

The rationale for applying this particular research method in the present topic is grounded firmly in several premises. Firstly, it helps to identify the effectiveness, appropriateness and meaningfulness of providing nutritional guidance to children and families to avoid CHD; secondly, it summarizes existing evidence and thereby establishes a precise knowledge on the topic of interest; thirdly, it attempts to conceptualize the entire scope of the thesis topic by referring to different research studies, rather than just one isolated piece of research. Lastly, it provides evidence-based knowledge by analysing several research studies from a holistic point of view (Aveyard 2010; Joanna Briggs Institute 2011; Kitchenham 2004; htpp://Cochrane-handbook.org/).

The literature search was performed primarily in collaboration with a librarian in order to ensure objectivity. To facilitate searching an electronic search strategy was developed. In addition, a manual search was performed to collect important articles for the topic. Admittedly, this review excluded grey literature because its analysis might have been beyond the scope of the thesis (Aveyard 2010).

4.1 Literature Review Protocol

A thorough and comprehensive review protocol was developed to ensure the quality of the literature review, and to reduce any possible biases (Joanna Briggs Institute 2011). The protocol was checked and modified by the thesis supervisor. The review protocol consists of six components which are; searching strategy, selection criteria, quality assessment, data extraction, data analysis, and data synthesis.

Searching strategy

A specific mnemonic PICo (Population, the phenomena of Interest, and the Context) has been developed for qualitative reviews to adequately perform systematic review questions, and searching structure (Joanna Briggs Institute 2011). The present topic clearly indicated that the population

was “Paediatrics” the phenomenon of interest was “Nutritional guidance in the primary prevention of CHD” and the context was “primary health settings and schools”.

The major key words were paediatric nursing, nutritional guidance, and coronary heart disease; and the minor key words were family, children, obesity, and primary prevention and intervention. A search structure model (see figure 1) was developed by relating the major and minor keywords in order to retrieve information of direct relevance to the research topic. For a precise and comprehensive search, the MeSH database was used to find synonyms for the major and minor key words. Three databases; CINAHL, MEDLINE, and COCHRANE were thoroughly searched for relevant articles from the years 2000 to 2012 (see table 1 pp. 14). When searching the CINAHL and MEDLINE databases eight search terms were developed from the major and minor keywords. Each search term consisted of one major/minor keyword linked by the command “OR” with its synonyms. The search was limited by seeking peer reviewed articles and articles that target on children ages 2-18 years. The eight search terms were named S1, S2, S3, S4, S5, S6, S7 and S8. The search terms were then linked to each other with the commands “OR” or “AND” (see figures 2 and 3 pp. 15, 16). The linking strategy used in figures 2 and 3 is summarized in table 2. The result yielded 492 articles from CINAHL and 422 articles from MEDLINE. The searching strategy developed for the COCHRANE database was slightly different from the one used for the CINAHL and MEDLINE databases. This paper combined the major and minor keywords with commands “OR” and “AND” as follows: “Coronary heart disease **AND** child and adolescent **AND** nurs* **OR** guidance **AND** nutrition” and the search yielded 208 articles. To achieve a thorough and comprehensive searching strategy, a supplementary search was done manually. The manual search focused on the most used nursing journals and on the reference list of the articles found in the search.

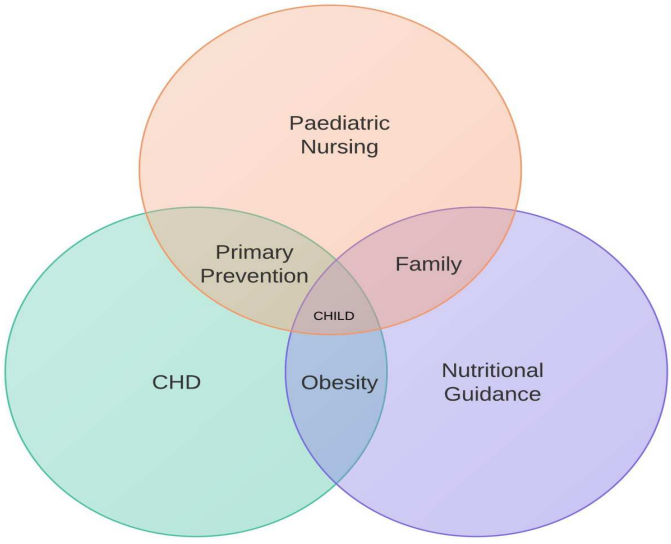


Figure 1. Searching structure. CHD; Coronary Heart Disease

Table 1. Searching strategy

Databases	Search Terms	Limitations	Result
CINAHL	Search 1 (S1): coronary artery disease **OR** coronary atherosclerosis **OR** coronary heart disease Search 2 (S2): Patient education **OR** counselling **OR** guidance **OR** primary prevention OR teach* Search 3: (S3): Nutrition **OR** nutrition therapy **OR** nutrition policy **OR** nutrition disorder **OR** nutrition science Search 4 (S4): Pediatric nursing **OR** nurse **OR** primary care nursing **OR** school nursing **OR** nurs*	Peer reviewed 2000-2012 Age group Preschool 2-5 Child 6-12 Adolescent: 13-18	492
MEDLINE	Search 5 (S5): Obesity **OR** overweight **OR** body weight **OR** weight reduction **OR** BMI Search 6 (S6): Child health **OR** child care **OR** child nutrition disorder **OR** adolescent nutrition disorder **OR** child/adolescent behaviour disorder Search 7 (S7): Family nursing **OR** family practice **OR** family counselling **OR** family health **OR** caregivers Search 8 (S8): family practice **OR** obesity **OR** intervention **OR** care **OR** prevention **OR** atherosclerosis		422
COCHRANE	Coronary heart disease **AND** child and adolescent **AND** nurs* **OR** guidance **AND** nutrition	2000-2012	208
MANUAL	Reference lists, and common nursing journals	2010-2012	37

Figure 2. CINAHL searching and linking strategy

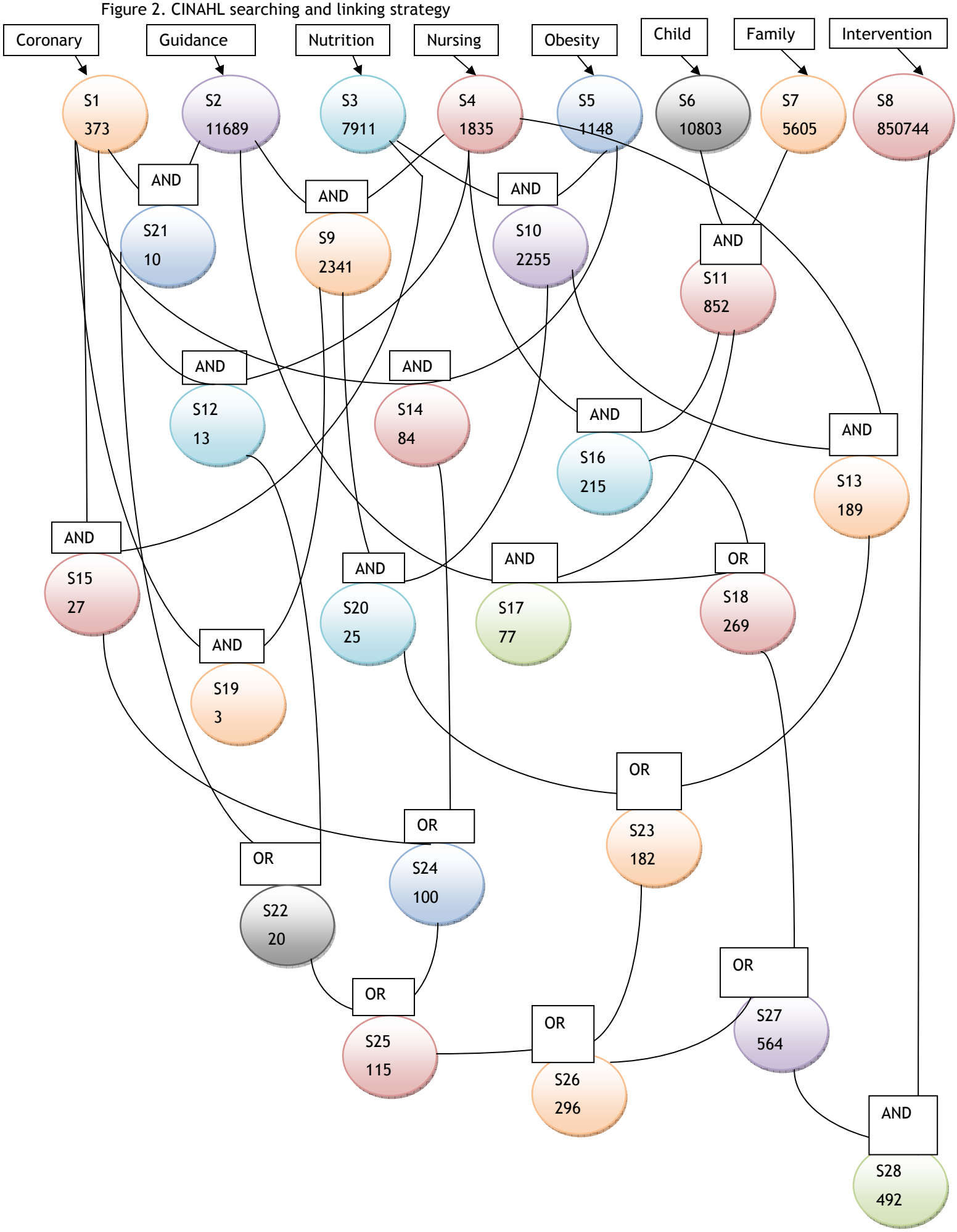


Figure 3. Medline search and linking strategy

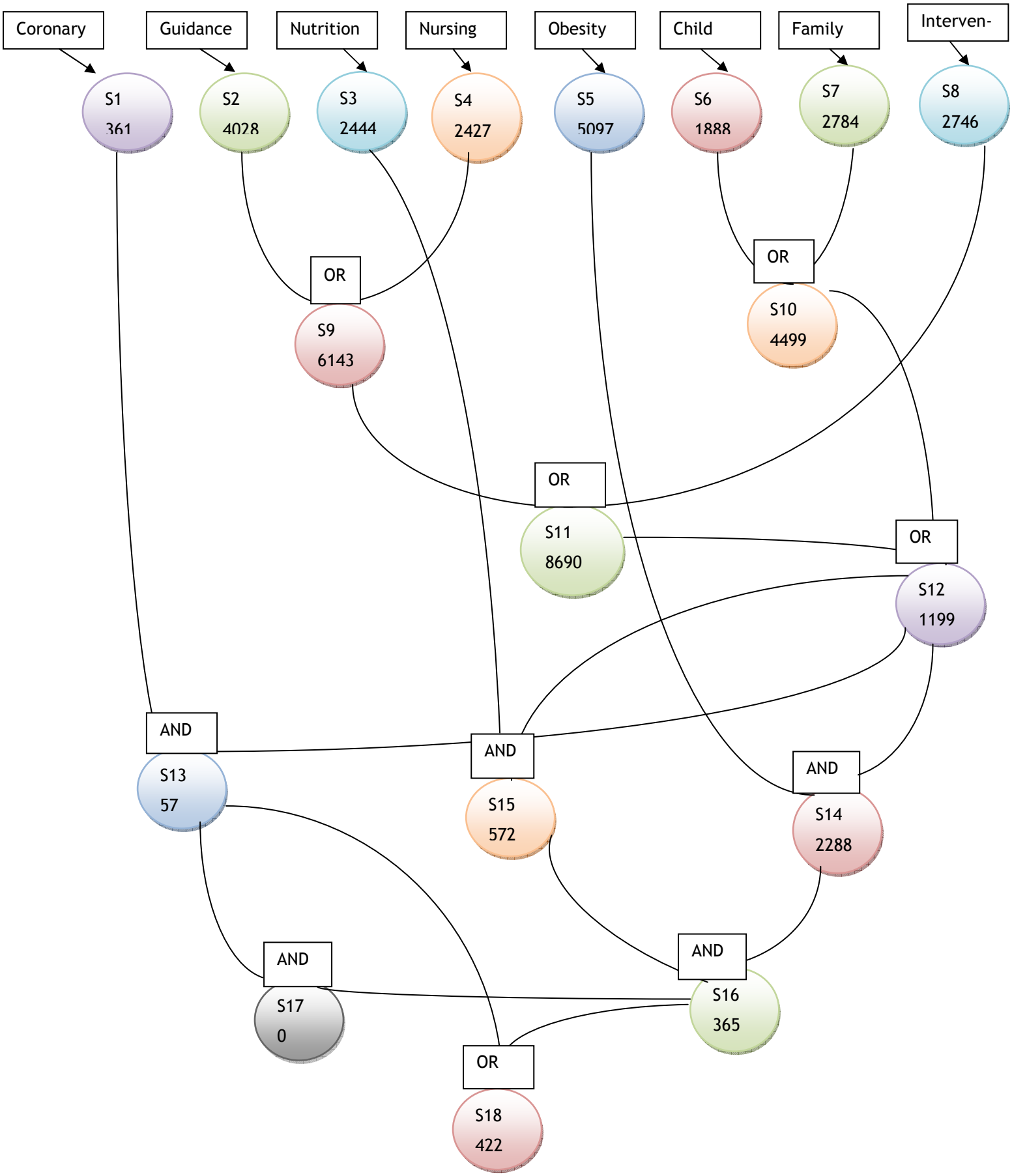


Table 2. The Linking strategy used in figures 2 and 3 can be summarized as following:

CINAHL	MEDLINE
S2 AND S4 → S9	S2 OR S4 → S9
S3 AND S5 → S10	
S6 AND S7 → S11	S6 OR S7 → S10
S1 AND S4 → S12	
S4 AND S10 → S13	S8 OR S9 → S11
S1 AND S5 → S14	
S1 AND S3 → S15	S11 OR S10→ S12
S4 AND S11 → S16	
S2 AND S11 → S17	S12 AND S1 → S13
S16 OR S17 → S18	
S1 AND S9 → S19	S12 AND S5 → S14
S9 AND S10 → S20	
S1 AND S2 → S21	S12 AND S3 → S15
S12 OR S21 → S22	
S13 OR S20 → S23	S15 AND S14 →S16
S14 OR S15 → S24	
S22 OR S24 → S25	S16 AND S13 → S17
S25 OR S23 → S26	
S18 OR S26 → S27	
S8 AND S27 → S28	

Selection Criteria

The first selection was based on the title, followed by selection based on the abstract, the full text, the inclusion and exclusion criteria, and finally the selection was carried out based on the quality of the articles (htpp://Cochrane-handbook.org/; Joanna Briggs Institute 2011; Kitchenham 2004). The study attempted to develop a very tight inclusion and exclusion criteria as the number of achieved results was huge and beyond the scope of the thesis (Aveyard 2010). For instance, in the beginning the time frame for searching was 2000-2012, but later it was changed to 2010-2012 to reduce the number of studies. In addition, the study decided to logically accept research studies conducted only in the United Kingdom (UK), United State of America (USA) and Finland (however, this criterion was invalid for review studies in order to minimize the presence of generalization biases). Figure 4 briefly reveals the selection process and the criteria used for rejecting studies. The numbers in brackets represent rejected articles; moving from left to right the first represent the number of articles rejected from CINAHL, the second from MEDLINE, the third from COCHRANE and the fourth from MANUAL SEARCH.

Figure 4. Selection criteria

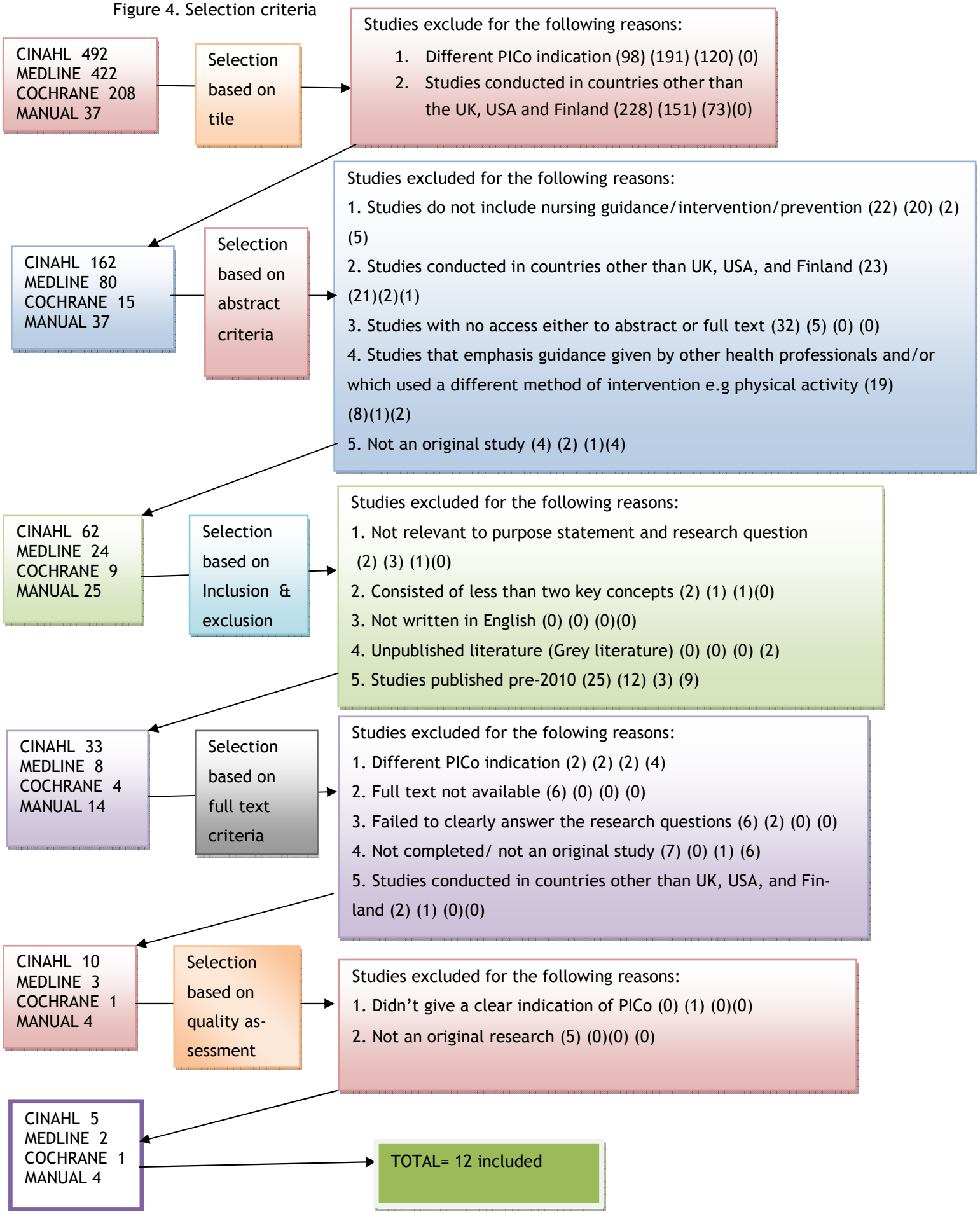
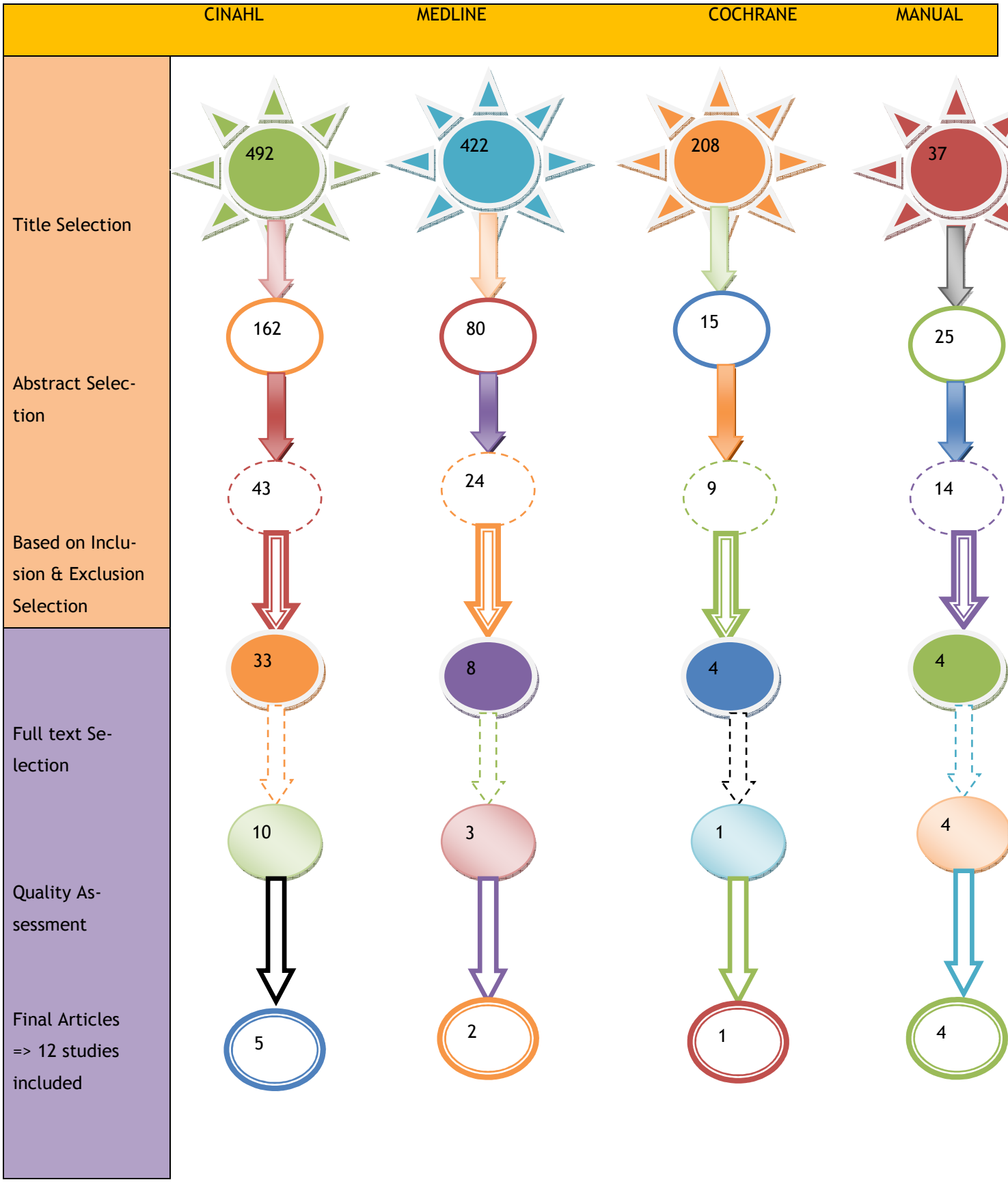


Figure 5. Flowchart of data selection



Quality Assessment

The present study set two criteria to assess the quality of the filtered articles. Articles were rejected because I) they had no clear description of PICo and II) they were not original studies. This study utilized no quality appraisal form as they might have been beyond the capability of the writer to handle. Instead, this paper relied on the supervisor's help to ascertain the quality of the included articles. The name of the authors and the source of the study of all the included articles were checked with the thesis supervisor to ensure they were from a reliable source and of high quality (Aveyard 2010).

Data Extraction

The completed data selection process resulted in 12 articles published between the year 2010 and 2012 that have satisfied the inclusion criteria of the present review study (As shown in Figure 2). In this paper, data from each study were extracted into the categories of the pre-specified frameworks (htpp://Cochrane-handbook.org/). The pre-specified frameworks were collected and filtered from the recommendation of various relevant articles read during the planning phase. The pre-specified frameworks served as starting point to which additional domains were added as data extraction continued and the frameworks were developed further. For instance, at the beginning of the planning phase there were six pre-specified frameworks, (Prevalence of disease, Paediatric nursing as the target group, Primary prevention as the first option, Nutritional guidance as the best option, Parent involvement as essential, and Childhood obesity as a great risk for CHD in adulthood) which morphed into merely two themes (Nurses' understanding of coronary heart disease and primary intervention and prevention and intervention of CHD) during the data extraction phase. In order to avoid data extraction bias the present review extracted data in a very flexible and developmental manner (htpp://Cochrane-handbook.org/).

Data Analysis

A deductive content analysis was applied to create categories, sub-categories and codes from the two major themes established during the data extraction phase (see tables 3 and 4 pp. 21,22). When developing the themes, categories, sub-categories and codes, the writer took pains to ensure that they were clearly linked to the aforementioned categories, sub-categories and codes (Burns & Grove 2011). Likewise, the writer critically considered that the themes, categories, sub-categories and codes were appropriate and adequate to answer the research questions of this systematic literature review (Burns & Groves 2011). The individual findings of the 12 included studies were thoroughly analyzed and collated into the developed categories, sub-categories and codes according to their similarities (Burns & Grove 2011). A condensation method was utilized to assign the findings into categories, sub-categories and codes in order to preserve the core meaning of the findings (Graheheim &Lundman 2004; Burns & Grove 2011)

Table 3. Data extraction and analysation of nurses' understanding of CHD

Theme	NURSES' UNDERSTANDING OF CORONARY HEART DISEASE						
Category	ONSET		DIAGNOSIS		HEALTH CONSEQUENCES	OBESITY	
Sub-category	Prevalence	Pathology of atherosclerosis	Examination	Risk factors	Public health problems	Association of obesity with CHD	Childhood obesity track to adulthood
Codes	Document-ed for the first time in the 1950s Incidence among the young on increase	Fatty steak ↓ Fibrous plaque ↓ Tissue necrosis ↓ Plaque rapture ↓ Vessel occlusion	Non-invasive techniques Ultrasound CIMT Vasculature CT	↓HDL ↑ LDL ↑ BP ↑ BMI ↑ CPR Sedentary life-style Tobacco smoke exposure Obesity	Higher rate of hospitalization Intervention disa-bilities Premature deaths	Increased prevalence of childhood obesity is associated with in-creased inci-dences of early onset of CHD	There is a strong association be-tween childhood obesity and CHD in later life The current epidemic of childhood obesi-ty increase the rate of coronary artery disease in youth and adults

Table 4. Data extraction and analysation of primary prevention and intervention of CHD

Theme	PRIMARY PREVENTION AND INTERVENTION OF CORONARY HEART DISEASE						
Category	EARLY PREVENTION	NURSING GUIDANCE					
Sub-category	Intervention starting from childhood	Dietary Intervention	Nursing Assessment	Psycho-social Impact	Appropriateness of dietary intervention	Parent Involvement	Multi-sector Intervention
Codes	At the age of 1year Effective intervention if initiated from childhood	↓ Fat ↓Sugar ↓ Salt ↓ Energy dense foods and drinks ↑ Fruit and Vegetables ↑ High-fiber items Balanced amount of protein, dairy products and micronutrients	Weight BMI BMI- percentile Waist circumference Skinfold thickness Family history	Based on child's own perception being overweight or obese result in social discrimination and social inequality which may lead to poor self-esteem and eventually depression Nurses' prestige has an impact on obesity-related education Broad social and cultural changes are needed to prevent childhood obesity	Most of the included studies reported a significantly effective dietary intervention outcome at a short-term follow-up, however, in some studies the effectiveness slightly decreased in a long-term follow-up Most of the studies reported the effectiveness of dietary intervention when used in combination with other intervention alternatives (e.g. physical activity, behaviour change)	Positive parent-child communication and environment Educating parents to cook healthy meals on a limited budget Motivating parents to participate in childhood-obesity-prevention programs Parents are the primary agent in childhood obesity prevention	Nurse-based intervention, Family-based intervention (interpersonal characteristics, feeding style, family demands, family income), School-based intervention (modeling the school menu, planning nutritional education in the curriculum, arranging after-school obesity prevention programs), Community-based intervention (food available in schools, and other institutional cafeterias, presence of vending machines, and fast food, lack of access to physical activity facilities), and government-based intervention (policies regarding food, education, urban design, marketing)

Data Synthesis

Once themes, categories, sub-categories and codes were established, the present study conducted a meta-aggregation method to document findings. The writer endeavoured to avoid personal interpretation in order to eliminate subjective bias (Joanna Briggs Institute 2011). Likewise, this paper avoided re-interpretation of the findings in order to preserve their original form (Joanna Briggs Institute 2011). In this phase of the study the writer focused on the findings of the 12 included studies and selected specific elements that answer the research questions of this review (Burns & Grove 2011).

4.2 Ethical Considerations

This section discusses the ethical argumentations of the performance of this present study and of the 12 included studies. In addition, it presents some of the ethical dilemmas faced while doing the research.

Ethical consideration on the performance of this literature review

As ethical research is important to generate a sound foundation of evidence-based practice for nursing, this present review authentically endeavoured to conduct ethically plausible research by ensuring accuracy of data; by avoiding fabrication, falsification and plagiarism; by genuinely following the established review protocol, and by implementing the concept of trustworthiness throughout the entire thesis process (Polit & Beck 2004; Christians 2011; Burns & Grove 2011). Since data for this study was acquired through previously published work, no patient or hospital data were accessed. Therefore, written consent and institutional ethical review were not required for this research. Data collection was performed following a detailed research protocol. The protocol was developed according to the information obtained from the following sources: (htpp://Cochrane-handbook.org/; Joanna Briggs Institute 2011; Kitchenham 2004). This protocol ensures the credibility and transparency of the methodology used. It explicitly and briefly reveals the stages taken and provides detailed information on data collection, selection criteria, data extraction and data analysis. In the data collection phase this literature review carried out a thorough search of the CINAHL, MEDLINE and COCHRANE databases to ensure the rigour of the methodology. In addition, manual search from the main nursing journals and reference lists was conducted, assuring the comprehensiveness of the study. Furthermore, the layout of the selection criteria (Shown in figure 2) was partially adopted from the journal of Hoitotiede, which is considered one of the major nursing journals in Finland. The study avoided re-interpretation of the findings to preserve their original form and thereby ensure the accuracy of the achieved data (Joanna Briggs Institute 2011). For the above mentioned reasons the writer is convinced that this study is reliable, repeatable and ethically plausible.

Ethical issues affecting the choice of studies to be included in this review

In general all the included studies were conducted in a manner that avoided the exposure of clients to unnecessary or badly designed research, upheld the clients' right to autonomy and confidentiality, and ensured the provision of adequate and understandable information on which clients could base their decision for informed consent (Tarling & Crofts 2002; Burns & Grove 2011). According to (Tarling & Crofts 2002; Waters, de Silva-Sanigorski, Hall, Brown, Campbell, Gao, Armstrong, Prosser & Summerbell 2011) it is crucial to include measures of harm and unintended consequences in evaluations targeting dietary interventions in order to ensure that interventions are safe and appropriate. However, only 2 of the 12 included studies reported no adverse outcome post-intervention (Waters, et al 2011; Magnussen, Niinikoski, Juonala, Kivimaki, Ronnemaa, Viikari, Simell &Raitakari 2012). The remainder reported that the intervention was appropriate and effective results were achieved, with no details about unintended consequences. Principally, most of the included research studies were therapeutic studies as the benefit out weighted the risk after the intervention (Burns & Grove 2011).

Ethical dilemmas

The most challenging ethical dilemma of this review study was the question of whether to report relevant data from the introductory part of the 12 included studies or not. In the methodological section the writer stated that the data would only be gathered from the findings of the included studies. However, when reporting the findings the writer found highly relevant data mentioned in the introductory section of the included studies. Including these data might have made this study unethical as the writer did not follow her methodological plan, but excluding such data would have been a great loss for the development of this study.

In addition, this study faced another ethical issue when the writer incorporated important figures from previously published researches without asking the permission of the researchers. The writer does not know if doing so is ethically plausible or not. On the other hand, the writer is more concerned with the importance of these figures in strengthening the quality of the present study and facilitating the understanding of the reader. Excluding these figures could have reduced the feasibility of this study and that is why the writer decided to include them anyway.

5 FINDINGS

The present paper sought to seek evidence that would support nursing professionals in their endeavour to deliver nutritional guidance to children and their families in order to prevent the development of premature coronary heart disease among children. The completed searching and selection strategies resulted in 12 articles; five from CINAHL, two from MEDLINE, one from COCHRANE and four from manual search. Appendix 1 summarizes the elements of each study's research design including target population and age of the participants enrolled, dietary interventions and programme activities, and intervention outcome. The current study developed two major themes (nurses' understanding of coronary heart disease and primary intervention and prevention of coronary heart disease) to document the findings of the 12 logically accepted articles. Of the 12 articles two studies provided a comprehensive description of coronary heart disease and targeted children aged 2-18 years. Almost all the included studies addressed dietary intervention as the main intervention component in childhood obesity prevention targeting children aged 2-18 years. Two studies reported parents as an essential agent in childhood obesity prevention and its CHD consequences. One review study comprehensively reported the impact of childhood obesity on the cardiovascular system. Four studies documented nurses' perceptions and nursing interventions in childhood obesity prevention through a lifestyle modification. Explicitly, a review study reported dietary interventions according to child's age including children ages 0-5 years, 6-12 years and 13-18 years. One study admitted the use of computer-assisted tool to improve the assessment and management of childhood obesity. Finally a review study targeting children at elementary school reported a multisector intervention approach to effectively prevent childhood obesity and hence CHD incidences. Generally, all the included studies reported a significant post-intervention result. (See table 5 pp. 40)

5.1 Nurses' Understanding of Coronary Heart Disease

The presence of cardiovascular risk factors among the pediatric population has become a modern phenomenon, and therefore continues to be the leading cause of morbidity and mortality throughout the world (Zalesin, Franklin, Miller, Peterson, McCullough 2011). Likewise, the prevalence of the direct modulator for the development and progression of CHD-obesity (Zalesin et al 2011) has tripled among children over the past two decades (Stines, Perman, & Sudharshan 2011). As a result children who are obese are at risk of developing conditions in childhood that used to be found mainly in adults; for example the onset of hypertension, fatty liver, non-alcoholic steatohepatitis, obstructive sleep apnea, high cholesterol, and type 2 diabetes (Stines al et 2011).

5.1.1 Onset of Coronary Heart Disease

The early-life origin of atherosclerosis was documented for the first time in the 1950s, at which time autopsy studies on casualties of the Korean and Vietnam wars, showed a 45-77% prevalence of atherosclerosis of coronary arteries, which was suggested to have its origin already in childhood (Magnussen et al 2012; Raghuveer 2010). Consequently, several large prospective observational studies were initiated in the 1970s and 1980s to examine the importance of childhood CVD risk factors and lifestyle to the development of atherosclerosis (Magnussen el at 2012). The Bogalusa study, which involved a long-term follow-up of a racially diverse population sample, showed that the atherosclerotic lesions in the coronary arteries were elevated in youth with multiple atherosclerosis-promoting risk factors (Raghuveer 2010).

The pathology of atherosclerosis is explicitly addressed by one of the included studies. According to Raghuveer (2010) the earliest manifestation of atherosclerosis is a furring of arteries (fatty streak), which progresses over time to form a fibrous plaque. Over years this plaque increases in size and may lead to tissue necrosis, or bleeding or even plaque rupture. The enlarged plaque narrows the lumen of the vessel resulting in either slow occlusion of the vessel or sudden occlusion of a distal vessel due to plaque embolization (Raghuveer 2010).

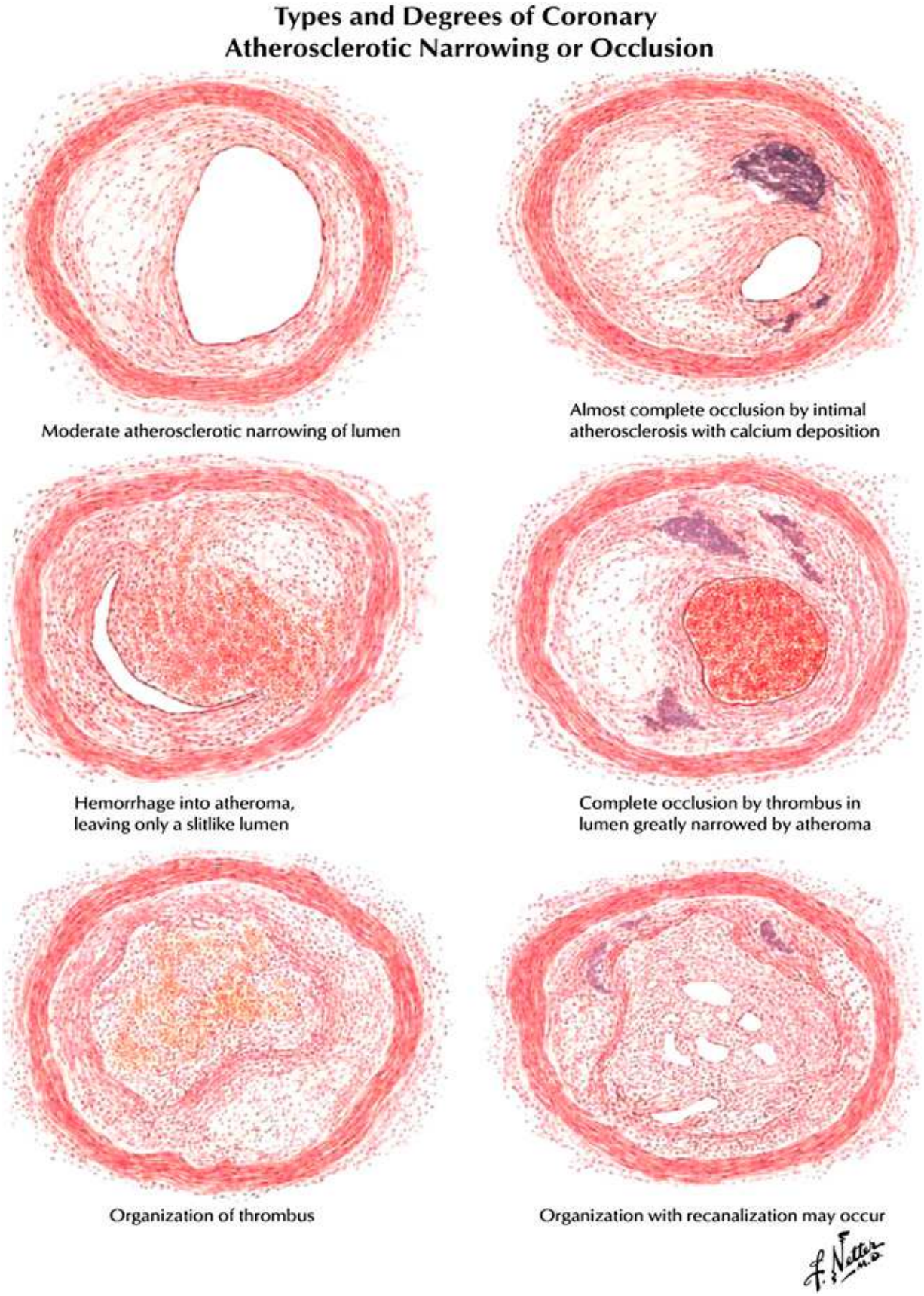


Figure 6. A cross-section of an artery, showing the development of atherosclerosis. (Raghuveer 2010).

5.1.2 Diagnosis of Coronary Heart Disease

This part discusses recently developed tools to examine CHD and most frequently reported modifiable and non-modifiable risk factors for CHD development.

The advancement of non-invasive techniques which include the ultrasound assessment of carotid artery intima and media thickness (CIMT) (Raghuveer 2010), arterial elastic properties, and computer tomography to measure coronary artery calcification are of utmost value in monitoring vasculative dysfunction in children and youth (Magnussen el at 2012). In addition, the conventional measurements that define overweight and obesity (i.e. BMI, weight, waist circumference and waist-to-hip ratio) represent surrogate markers for adiposity and thereby CHD (Zalesin et al 2011; Waters et al 2011). Raghuveer (2010) suggested that as clinical atherosclerotic cardiovascular disease is not manifested in obese children, assessment of subclinical markers of atherosclerosis and vasculature may help in the evaluation of the progress of atherosclerosis, in further stratification of risk, and in monitoring the effect of intervention. Figure 7 is the Ultrasound images of the right common carotid artery (CCA), the bifurcation, and the external and internal carotid arteries. The 10-mm-wide box contains the region of interest where the carotid artery intima-media thickness (IMT) is measured, with the reading depicted on the right.

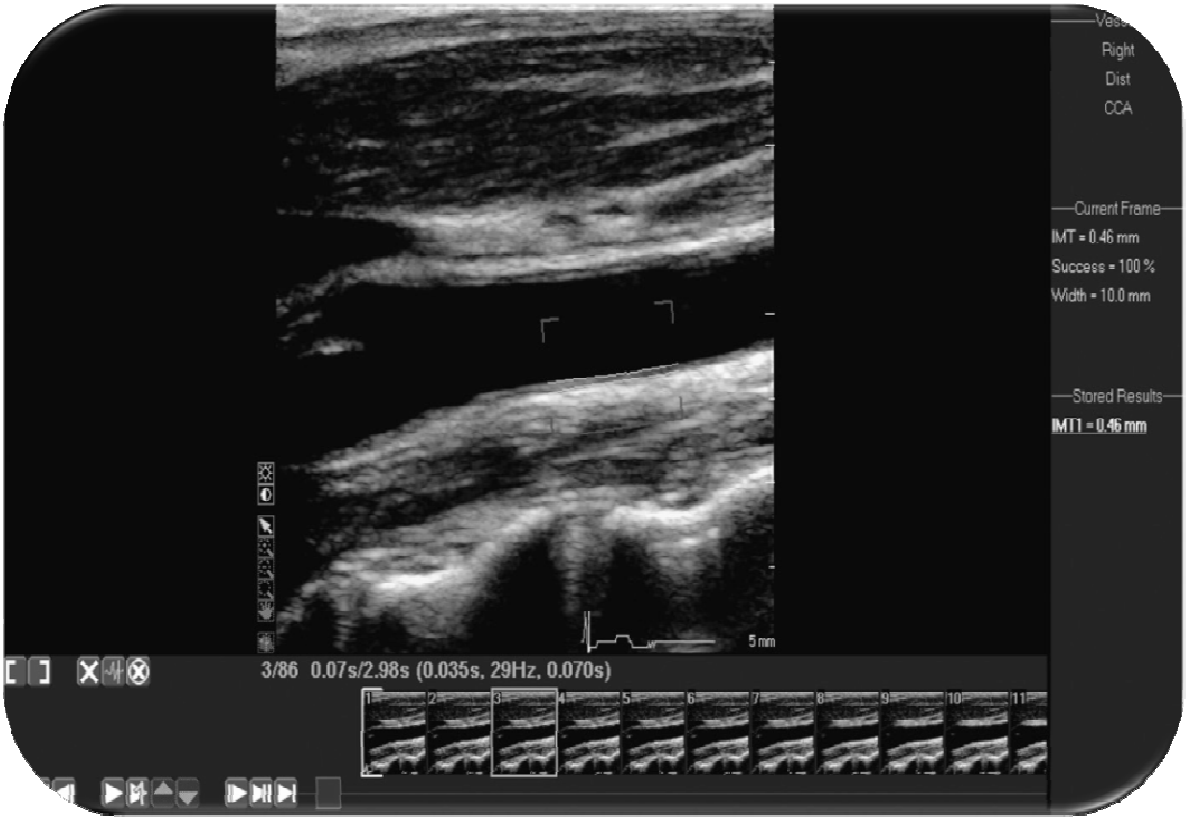


Figure 7. Ultrasound images of the carotid arteries. (Raghuveer 2010).

In a review of an on-going population-based prospective study, Magnussen et al (2012) found significant evidence in the 21- and 27-year follow-up of a Finns youth study that revealed tracking for biological and lifestyle risk factors including high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol, triglycerides, markers of cholesterol metabolism, body mass index, health-conscious and less health-conscious dietary patterns, systolic blood pressure, C-creative protein and physical activity. Likewise, Raghuveer (2010) added that sedentary lifestyle and tobacco smoke exposure are also independent risk factors for accelerated atherosclerosis. Moreover, (Zalesin et al 2011) identified obesity as a dependant and independent modulator of coronary artery disease. The main factors contributing to childhood obesity include lack of physical activity, unhealthy eating patterns, or combination of the two (Stines et al 2011), genetic predisposition and the child's environment (DiNapoli, Sytnyk, & Waddicor 2011).

5.1.3 Health consequences of coronary heart disease

Poor cardiovascular health is a leading cause of disease and, along with childhood-onset obesity, constitutes a pressing public health problem in the United States and many other countries, which include developing countries (Raghuveer 2010). Pediatric epidemiological studies have shown that high total cholesterol, high BMI and high LDL cholesterol in childhood are associated with an increased carotid artery intima-media thickness (CIMT), a marker of atherosclerosis and heart disease in adulthood (Raghuveer 2010). In her 2010 review Raghuveer concluded that childhood-onset obesity and its associated comorbidities have an average effect on vasculature, which results in premature onset and accelerated progression of atherosclerosis that lead to higher rates of hospitalization, intervention, disabilities and premature deaths in the coming decades as the current cohort of obese children ages.

5.1.4 Childhood obesity and Coronary heart disease

The growing prevalence of obesity has created a global public threat (Zalesin al et 2011) especially its dramatic increase among children and adolescents in the United States (Coleman et al 2012; Vaczy, Seaman, Peterson-Sweeney & Hondorf 2011; Knowlden & Sharma 2012) opened the eyes of many health care professionals. For youth the prevalence of obesity- defined as a BMI (weight in kilograms divided by height in meter squared) at or above the 95^{th} percentile for age and sex- is 10% for children aged 2 to 5 years and 15% for 6 to 19-year-olds (Zalesin et al 2011). In the United State, it is estimated that obesity causes an excess of 300,000 deaths annually, and potentially reduces lifespan by as much as 5 to 20 years in the morbidly obese (Zalesin et al 2011). In England an estimated 16.2% of boys and 11.5% of girls aged two to ten years, and 14.0% of boys and 15.3% of girls aged 11-15 years are overweight; additionally an estimated 13.7% of boys and 15.2% of girls aged two to ten years, and 19.7% of boys and 15.4% of girls aged 11-15 are obese (O'Connor 2011). Similarly, the rate of childhood obesity is increasing in developing countries. The main reason be-

hind the alarming increase in the prevalence of obesity in emerging and developing nations (Zalesin et al 2011, Stines et al 2011) is due to the failure to adapt to rapidly changing nutritional and lifestyle factors (Raghuveer 2010). Raghuveer (2010) reported that an increase in the incidence and an early onset of coronary artery disease is expected because of the increased prevalence of childhood obesity. Likewise, Zalesin et al (2011) highlighted that obesity appears to accelerate established coronary artery disease.

The rising level of obesity in children and adolescents is due to various contributing factors comprising human biology, eating and physical activity behaviours, people's beliefs and attitudes, broader economic matters (price of food and drink), environmental factors (availability of energy dense food and drinks) and social factors (social acceptability of being overweight and obese) (O'Connor 2011). According to Zalesin et al (2011) obesity is positioned as the only central and reversible cardiovascular risk factor that can favourably influence all the other associated factors such as hypertension, increased triglycerides, decreased HDL-C, increased LDL-C, metabolic syndrome, diabetes, RAAS/SNS (renin-angiotensin-aldestrone system/ sympathetic nervous system), and hs-CRP (high-sensitivity C-reactive protein) (see figure 8 pp 31).

To tackle an increase in obesity level in children and adolescents, all the contributing factors should be taken into account rather than addressing one single factor such as diet or physical activity (O'Connor 2011). Overweight and obesity portends metabolic and cardiovascular consequences, placing an individual at risk for premature coronary heart disease morbidity and mortality (Zalesin et al 2011; Waters et al 2011). In addition, in a cross-sectional quantitative study, nurses mentioned asthma, sleep apnea, high cholesterol, high blood pressure, kidney stones, type 2 diabetes, low self-esteem and poor academic functioning as the main health consequence of childhood obesity (DiNapoli et al 2011). Potentially, many of the obesity-associated health complications are partially remediable or preventable with treatment education, and lifestyle modification (Zalesin et al 2011).

Figure 8. Obesity as the major mediator of CHD. (Zalesin et al 2011).

Childhood obesity as risk for coronary heart disease in adulthood

Considerable evidence supports increased morbidity and mortality in adults with a history of childhood obesity (Raghuveer 2010). Data collected in the Young Finns Study clearly demonstrate that exposure to high levels of CVD risk factors in childhood from the age of 12 years onward shows consistent and significant association with later preclinical changes in adulthood (Magnussen el at 2012). Explicitly, Raghuveer (2010) asserted that there is a strong association between childhood obesity and early-onset of dyslipidaemia, hypertension, and insulin resistance which track into and worsen in adult life because obese children are more likely to become obese adults. Likewise, in her 2011 review O'Connor outlined that a high intake of saturated fat raises cholesterol levels and is linked to heart disease in later life. A British study that involved a 57-years follow-up of a cohort also confirmed this and also that cardiovascular mortality was increased when childhood BMI was higher than the 75th percentile (Raghuveer 2010). In other words childhood obesity substantially raises the risk of obesity in adulthood, which augments CHD morbidity and mortality risks for future generations (Zalesin et al 2011).

Indeed, many of the cardiovascular consequences that characterize adult-onset obesity are preceded by abnormalities that begin in childhood (Waters et al 2011). Especially poor diet and poor physical activity in childhood but particularly in adolescence can lead to life-threatening conditions such as heart disease, obesity, type 2 diabetes, osteoporosis and some forms of cancer e.g. bowel cancer (O'Connor 2011). Certainly, O'Connor (2011) reported that obese children have already been shown to have changes associated with vascular disease in adults, such as elevated cholesterol level. Similarly, the dietary patterns established in childhood not only track into adulthood but are also associated with CVD risk factors and preclinical atherosclerosis in adulthood (Magnussen el at 2012). Raghuveer (2010) for his part concluded that the current epidemic of childhood obesity will further increase the rate of coronary artery disease in youth and middle-aged adults, and it is estimated that the prevalence of coronary artery disease may increase by 5-16% by the year 2035.

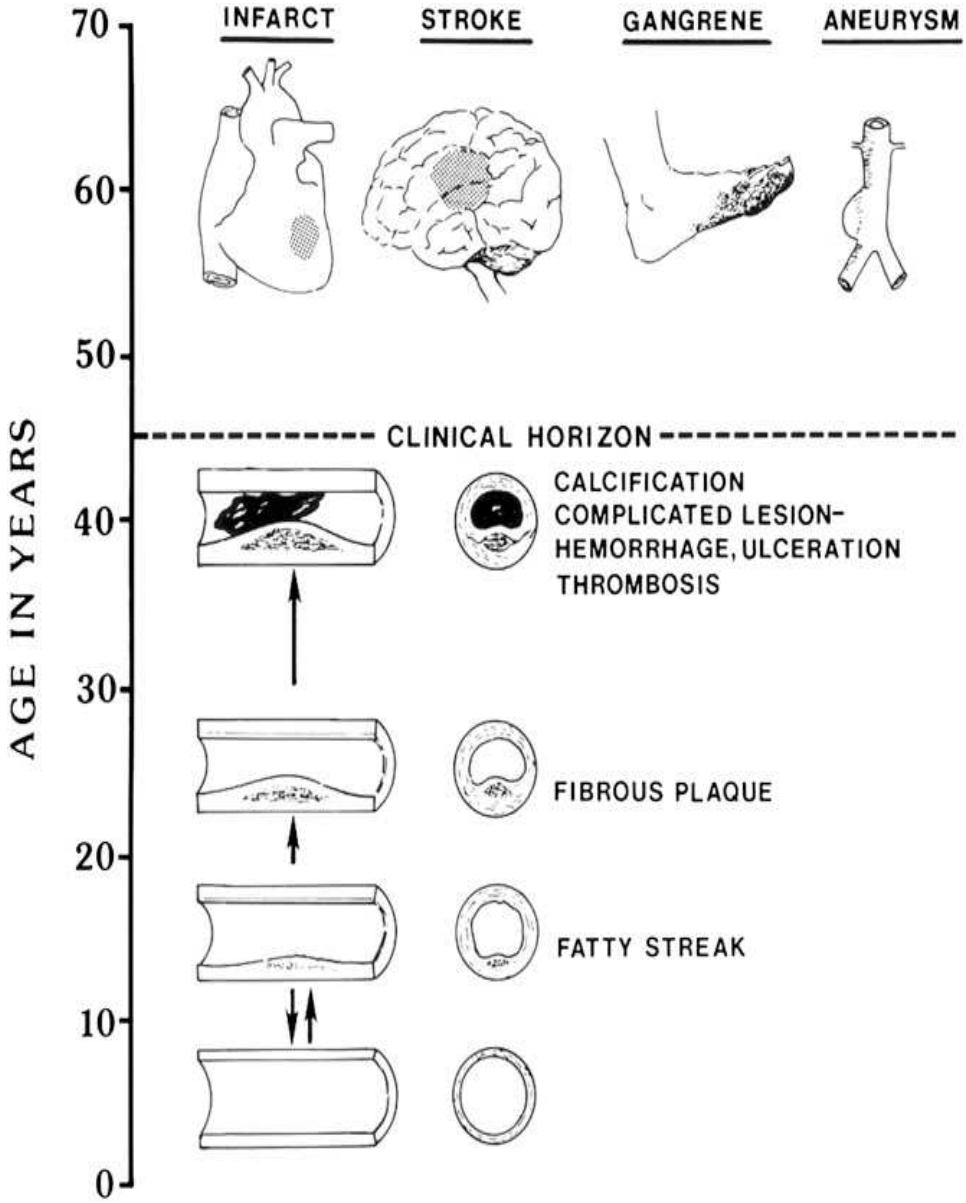


Figure 9. The natural history of atherosclerosis. (Raghuveer 2010).

5.2 Primary Intervention and Prevention of Coronary Heart Disease

This section reveals the importance of early intervention and prevention of coronary heart disease. In addition, it describes various nursing interventions to guide children into a healthy lifestyle.

5.2.1 Early Prevention

Special Turku Coronary Risk Factor Intervention Project (STRIP) shows that it is feasible to start prevention of atherosclerosis at the age of 1 year because at that age most children have stopped using infant food and have begun to consume more or less the same foods as older children and adults, including cow milk (Magnussen et al 2012). Similarly, observational studies from the STRIP and Young Finns studies reported that prevention of atherosclerosis by means of lifestyle modifications could be effective if initiated in childhood (Magnussen et al 2012) because the final phase of atherosclerotic process is by mid-adulthood (Raghuveer 2010).

Since obesity is a potential modifiable mediator of cardiovascular morbidity and mortality, effective treatment and prevention interventions should have a profound and favourable impact on public health (Zalesin et al 2011; Waters et al 2011) in which the preventive care for adult weight begins in childhood (O'Connor 2011) in the home, the school, and the community (Stines et al 2011).

5.2.2 Nursing Guidance

Childhood obesity can cause physical, social, psychological and emotional health problems (Vaczy et al 2011) and is linked to obesity later in life and poor health outcomes as an adult (Waters et al 2011). Consequently, the Kaiser Permanente Southern California (KPSC) pediatric weight management initiative worked to create awareness in pediatricians and other primary care providers about the importance of child and adolescent overweight and obesity as a health concern, and to assist health care professionals in documenting and managing the problem (Coleman et al 2012). Likewise, the "Passport to health" tool developed by four nurse practitioners, two nurses, a nutritionist, and one physician attempt to encourage health providers to assess and work with families around the issues of weight management and physical activity (Vaczy et al 2011). Specifically, O'Connor (2011) recommended that with the rise in childhood obesity, nutrition is of particular significance and community nurses should have an understanding of the nutritional needs of schoolchildren.

5.2.2.1 Nursing Assessment of Coronary Heart Disease

To determine weight/nutritional status i.e. underweight, healthy weight, overweight, obese a commonly used methods such as BMI cut-offs that are age and gender specific and percentile-based cut-offs (Waters et al 2011; Stines et al 2011) can be employed. According to the Center for Disease Control (CDC) "overweight" is defined as a body mass index (BMI) at or above the 85th percentile

and lower than the 95th percentile, and "obesity" is defined as a BMI at or above the 95th percentile for children of the same age and sex (Stines et al 2011). Pediatric nurses therefore can use BMI, waist circumference and waist-to-hip ratio to screen children and adolescents for both overweight and obesity and thereby assess the risk of developing coronary heart disease (Stines et al 2011, Zalesin et al 2011). The Kaiser Permanente Southern California (KPSC) initiative study, that aimed at evaluating the effectiveness of computer-assisted decision tools for the diagnosis and management of child and adolescent obesity made several enhancements to the electronic medical record (EMR) system and found that the use of correct diagnosis codes for overweight and obesity increased remarkably for all age group and weight categories by approximately 50% within the year 2007 to 2010 (Coleman, Hsii, Koebnick, Alpern, Bley, Yousef, Shih, Trimble-Cox, Smith, Porter, & Woods 2012). Consequently, exercise and nutrition counselling rates increased significantly across all age groups of overweight and obese from 1% in 2007 to 50% in 2010 (Coleman et al 2012). For more details about the enhancement of EMR refer to figure 11.

5.2.2.2 Dietary Intervention

Dietary changes were reported in all of the included studies, with Magnussen's 2012 dietary counselling aiming at a child's fat intake of 30-35% of daily energy, cholesterol intake <200mg/day, and high protein and carbohydrate intake (vegetables, fruits, berries and whole grain products). In order to avoid any diet-related harm to participants, the STRIP study aimed at changing the quality of fat rather than the quantity because changing fat quality is a more effective way of improving the serum lipid level in children than changing its amount. The result showed no difference in height, weight or BMI between the intervention and control group at 7 months to 14 years of age, indicating that low intake of saturated fat did not lead to growth alteration in the intervention group post-intervention. Likewise, no cognitive impairment was reported post-intervention. (Magnussen et al 2012)

In a review study Raghuveer (2010) reported that weight reduction (among other interventions) in obese children is associated with improvements in clinically measurable risk factors such as LDL cholesterol, triglycerides, insulin concentrations, and blood pressure and an improvement in HDL cholesterol. Zalesin et al (2011) reviewed that modifying LDL-Cholesterol is the major treatment goal for CHD risk reduction.

Waters et al (2011) concluded that the most positively effective diet-related intervention components include increased nutrition knowledge; improved eating and food preparation practices; high consumption of fruit and vegetables and a reduced intake of sweetened/carbonated drinks, energy-dense snack foods, sweet foods, and total fat intake. As an early intervention and prevention for childhood obesity, the Jumpin' Jaguars program of UKCOM (University of Kentucky College of Medicine) arranged nutritional education which was taught by nursing students, along with a field trip to

the Farmers' Market to learn about different fruit and vegetables and gardening practices. (Stines et al 2011)

The passport to health tool is in the shape of a pyramid and has colour coding that corresponds to the weight zones on the Center for Disease Control and Prevention (CDC) growth charts, with coloured zones to identify healthy or unhealthy weight status (see figure 10). Its goal was to promote systematic identification of overweight and obese children by health care providers and to facilitate counselling on nutrition and physical activity. The tool includes a daily goal section with the numbers 5-2-1-0 in column, which illustrates five fruits and vegetables, a 2 hour limit on screen time, 1 hour of activity and zero sugar-added drinks. The result of this program indicated an improvement in the documentation of weight status and in the time spent (approximately 93%) on teaching about healthy nutrition and lifestyle with overweight and obese children. (Vaczy et al 2011)

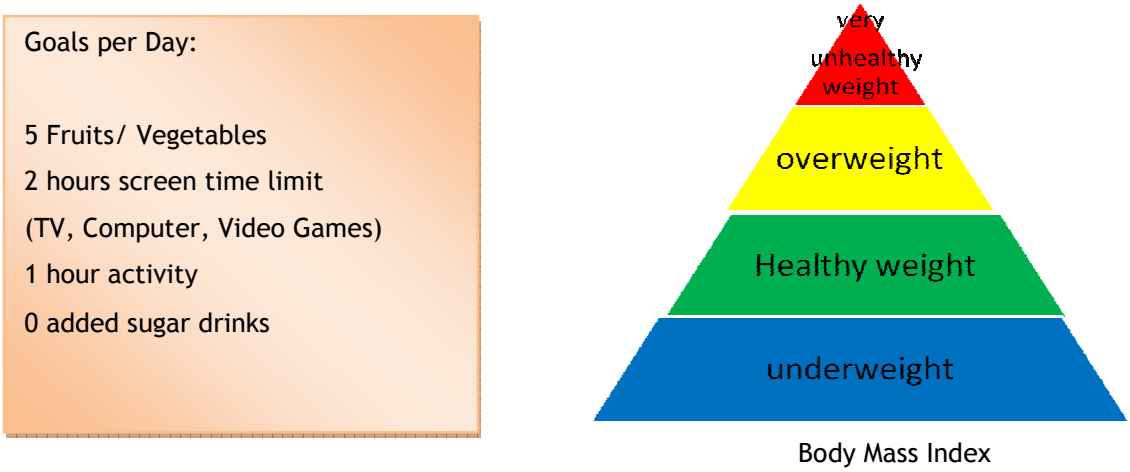


Figure 10. Passport to Health Tool. (Vaczy et al 2011).

In a cross-sectional quantitative study which aimed to identify pediatric registered nurses' (RN) perception of childhood obesity only 3 RNs of 33 RNs reported they were very well prepared to educate children about healthy lifestyle and food choices. In addition, the study reported that when nurses were asked to rate the importance and frequency of providing education about obesity to patients and families teaching about healthy eating got the highest score (52%) compared to other intervention components. The most frequent barriers that nurses encountered when providing obesity-related education were lack of time, lack of educational materials, lack of knowledge concerning obesity in general or lack of information specifically related to proper nutrition, and lack of parental motivation. (DiNapoli et al 2011)

A quasi-experimental controlled pilot study that focused on school menu modeling by providing on the one hand more high-fiber items such as whole grains, fresh fruits and vegetables and fewer

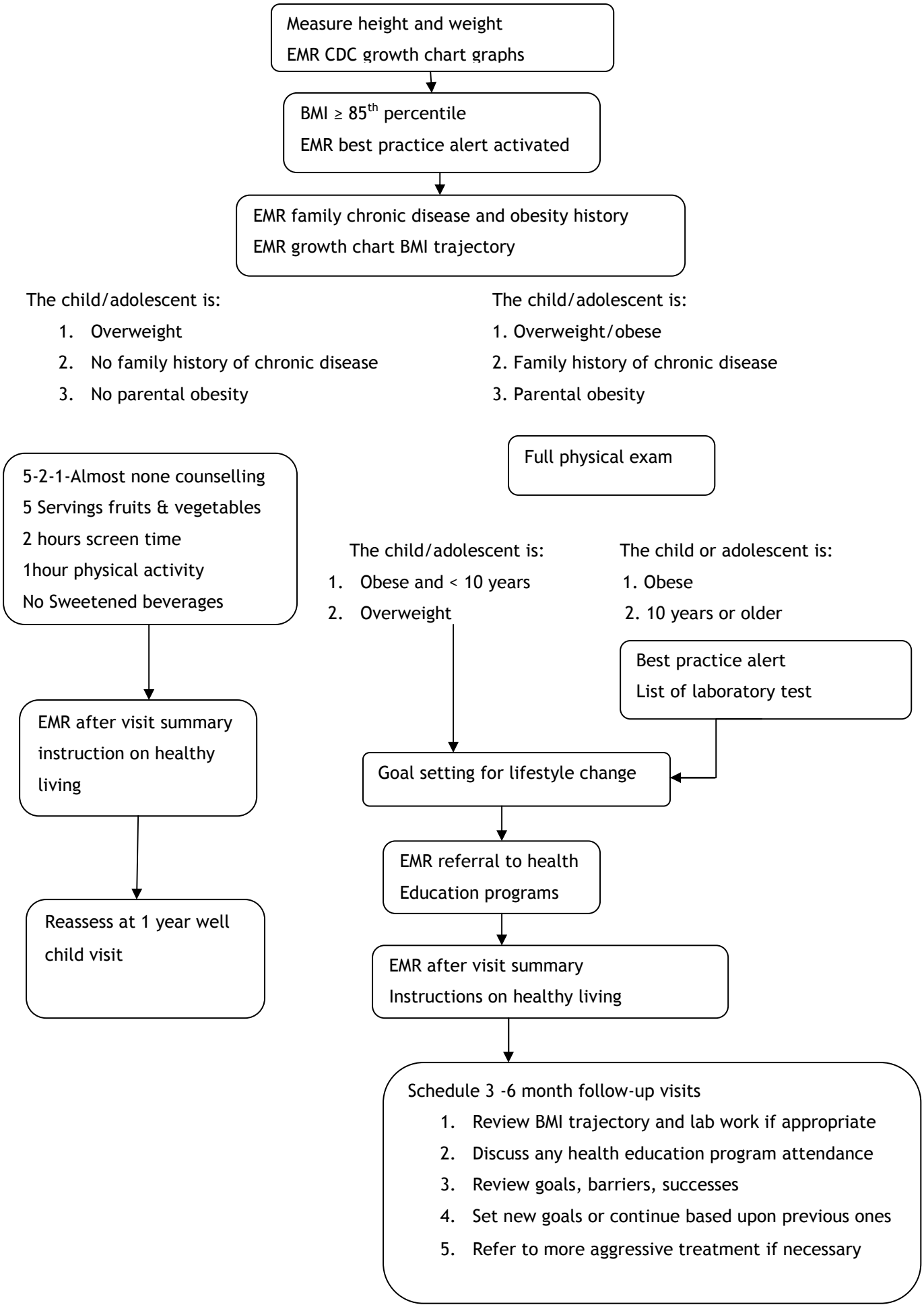
items with high-glycemic effects such as high sugar cereals and processed floor goods, lower amounts of total, saturated and trans fats together with nutritional education on the other (included in the school curriculum) reported a greater decrease in the BMI percentile among the intervention children than among those in the control group. In addition, the study reported a significant improvement in blood pressure and academic scores in intervention group post-intervention. Essentially, the study focused on substituting healthier ingredients for less healthy ones rather than banning child-friendly foods to avoid undesired impacts. (Hollar, Lombardo, Lopez-Mitnik, T Hollar, Almon, Agatston & Messiah 2010)

According to Golley, Hendrie, Slater, & Corsini (2010) the general healthy eating and food choices were the most frequently targeted nutrition behaviours (e.g. consumption of fruit and vegetables and reduction in the intake of soft drinks, followed by energy or nutrient intake (e.g. fat or kilojoule intake), menu planning/food procurement (e.g. low-fat meal practices) and child-feeding behaviours.

Knowlden and Sharma concluded in their 2012 review of family and home-based interventions targeting children aged 2 to 7 years, that the important behaviours to target while preventing childhood obesity are physical activity, consumption of five cups of fruits and vegetables each day, replacement of sugar-sweetened beverages with sugar-free beverages, and limitation of computer/ TV screen time to no more than 2 hours per day. Magnussen et al (2012) outlined that infrequent fruit or vegetable consumption in youth is associated with accelerated intima-media thickness (IMT) progression and pulse wave velocity in adulthood.

O'Connor (2011) suggested that as children at the age of five require high energy for physiological growth, they should be encouraged to eat a healthy balanced diet which consists of fruits, vegetables and starchy foods, as well as some protein-rich foods, milk and dairy products (low-fat versions where possible are recommended, such as skimmed, semi-skimmed or 1% fat milk, as food from this food group can be high in saturated fat), and a small amount of food high in fat and sugar. According to the British Nutrition Foundation, O'Connor (2011) specifically documented that two thirds of a child's diet should comprise a balance between bread, rice, potatoes, pasta and other starchy foods as well as being rich in fruits and vegetables. The researcher added that most of the remaining third of the diet should be made up of milk and dairy foods (e.g. 200ml of milk, 150g of yogurt, or 30g of cheese) meat, fish, eggs, beans and other non-dairy sources of protein (O'Connor 2011). In order to prevent high blood pressure in childhood and later in adult life O'Connor (2011) suggested a salt intake of between 3g and 5g/day for children aged four to six and seven to ten years respectively, and 6g/day in children aged 11-15 years. For their part Waters et al (2011) found a significant beneficial effect on blood pressure, heart rate, blood lipid, and cardiovascular fitness after dietary intervention for children aged 6 to 12 years.

Figure 11. Schematic of the KPSC pediatric weight management initiative (Coleman et al 2011)



5.2.2.3 Psycho-social Impact

Unfortunately, in western countries, there is a perception that individuals are personally responsible for their weight, and those who are obese are associated with negative personal traits of laziness, lack of self-discipline and passivity (DiNapoli et al 2011). According to Waters et al (2011) the main modulator for CHD- obesity is inextricably linked to the degree of relative social inequality, with greater social inequality associated with a higher risk of obesity in most developed countries than in developing countries. Several studies documented the association of socioeconomic position, indexed by an individual's occupational social class, income, or education, with cardiovascular mortality in USA and Europe with Finland having the highest rate of ischemic heart disease mortality compared to the European average (Magnussen et al 2012).

Overweight and obesity are known to have a significant impact on both physical and psychological health (Waters et al 2011). Based on children's own perception the most immediate consequences of being overweight is social discrimination, which may result in poor self-esteem and lead to depression (Stines et al 2011; DiNapoli et al 2011). In addition, DiNapoli et al (2011) reported that the presence of societal stereotypes and nurses' own weight have an impact on obesity-related education. The Jumpin' Jaguars program implemented by the University of Kentucky College of Medicine (UKCOM) included psychiatry residents as partners to offer lessons to student participants on the topic of positive behaviour, good choice as well as positive self-image (Stines et al 2011). In the STRIP study Magnussen et al (2012) reported that counselling was given based on the child's age and cognitive ability; in which more dietary information and suggestions were given directly to a child older than 7 years.

A wide variety of obesity prevention programs have been developed to effect a culturally-relevant intervention method that addresses diversity of the study and to prevents health inequalities; one study developed culturally specific curriculum for African American girls and their mothers that included education about food labels, shopping and food preparation using foods and recipes identified by participants (Waters et al 2011). Likewise, Raghuveer (2010) suggested that broad social and cultural changes that support healthy lifestyles within families and communities need to be implemented to tackle the epidemic of childhood obesity and its cardiovascular consequences.

In their 2010 review Golley et al concluded that behaviour change techniques that consist of five categories (identify and motivate readiness to change, facilitate motivation to change, provide relevant information and advice/facilitate behaviour change, build self efficacy and independence, and help prevent and manage relapse) are most effective in childhood obesity prevention. A small number of obese children with the most serious atherosclerosis-promoting risk factor abnormalities may need clinic-based behavioural intervention (Raghuveer 2010). In conclusion, several obesity prevention programs suggest that comprehensive strategies to increase the healthiness of children's

diet and their physical activity levels, coupled with psycho-social support and environment change are most promising (Waters et al 2011).

5.2.2.4 Appropriateness of the dietary interventions

A great number of the included studies reported the appropriateness of dietary modification when used in combination with other intervention components such as physical activity and behavioural change. A study reviewed by Waters et al (2011) found that after a two-year intervention period, children (aged 0-5 years) in both the basic intervention group (health-service-based) and the reinforced intervention group (health-service-based + kindergarten-based) exhibited significantly lower prevalence of overweight (BMI $\geq 90^{th}$ percentile) than those in the control group. Conversely, in children aged 6-12 the interventions conducted in education settings had significantly effective mean size compared to interventions given outside education settings (e.g. home, community). In addition, a significantly lower saturated fat intake, energy intake and percentage protein intake were reported post-intervention. As for the intervention group aged 13 to 18 significant positive dietary changes (lower intake of fat and sugar-sweetened beverages) post-intervention were recorded (Waters et al 2011). Similarly, the quasi-experimental controlled pilot study that aimed at school-based obesity prevention through diet modification, physical activity and nutritional education reported a statistically significant improvement in BMI, blood pressure, and academic scores in the intervention children versus those in the control group (Hollar et al 2010). However, this review study lacks the strength to draw a conclusion about the effectiveness of dietary intervention as an independent intervention component because most of the included studies targeted dietary intervention in combination with physical activity, behavioural change, and/or medical treatments.

5.2.2.5 Parent Involvement

Portraying the essentiality of parent involvement in childhood obesity prevention, Waters et al (2011) reported that home environment through parental engagement is the most effective intervention arena for children aged 0-5 years. In addition, involving the parents and caregivers is essential for success if children are to sustain at home the healthy and active lifestyle learned at school (Stines et al 2011). In the STRIP project families were educated and encouraged to gradually change their child's diet toward better fat composition (Magnussen et al 2012). Likewise, in the Jumpin' Jaguars program of UKCOM, parents were educated how to cook healthy meals on a limited budget, and were encouraged to purchase fresh fruits and vegetables from farmer's markets (Stines et al 2011). Additionally, they were actively involved in promoting the program (Stines et al 2011).

According to the review study of Golley et al (2010) 7 of 17 studies engaged parents as the primary agent of change for childhood-obesity prevention programs. In addition, fourteen of the 17 family

intervention studies examined one or more determinants of lifestyle behaviours such as parent characteristics (e.g. knowledge of obesity), parent and child interaction (e.g. feeding practices), environmental measures (e.g. food availability), and predictor of behaviour (e.g. self-efficacy) (Golley et al 2010). In their review of family and home-based interventions, Knowlden & Sharma (2012) found that children in the parent-only intervention group achieved a significant higher reduction in percent overweight compared with children in the child-only intervention group. Knowlden & Sharma (2012) therefore concluded that interventions aimed at preventing childhood obesity should focus on improving physical activities, and nutritional behaviours, with parents viewed as the primary agent of change.

5.2.2.6 Multi-sector intervention

Effective prevention of CVD as any chronic condition that has modifiable precursors arising from childhood requires a life-course health policy with strategies to implement positive long-term outcomes not only at the level of health-care professionals, but also at the level of individuals, families and communities, including legislative policy changes influencing schools, the food industry and living environment (Magnussen et al 2012; Hollar et al 2010). Similarly, Raghuveer (2010) reported that broad social, cultural, legislative, and policy changes that support healthy lifestyle within families and communities need to be implemented to decrease the prevalence of childhood obesity and its cardiovascular consequences in communities.

Waters et al (2011) reported nurse-based and home-based intervention as the most effective intervention arenas for children aged 0 to 5 years while for children aged 6 to 18 years school-based and community-based interventions are seen to bring about better outcomes. O'Connor (2011) suggested that school-based interventions can be used to educate children about healthy eating and provide them with the skills to make appropriate food choices and develop a positive attitude to personal diet. Reflecting the strong influence of schools in the health of children Hollar et al (2010) concluded that schools, as key institutions for the socialization of children and hubs of community-wide activity, are ideal locales for organizing obesity-prevention programs. Furthermore, the program of Jumpin' Jaguars of UKCOM for childhood obesity prevention reported partnering with the school was vital, but also involving the community was important in the planning process for expertise in health and fitness (Stines et al 2011). According to Hollar et al (2010) successful multi-level approaches to address the public health problem of childhood obesity include interpersonal characteristics (e.g., feeding style, family demands), community characteristics (e.g., food available in schools, and other institutional cafeterias, presence of vending machines, and fast food, lack of access to physical activity facilities), and governmental influences (e.g., policies regarding food, education, urban design, marketing).

Table 5. Major themes discussed in the included studies

Findings	Magnussen et al 2012	Coleman et al 2012	Knowlden & Sharma 2012	Zalesin et al 2011	DiNapoli et al 2011	Vaczy et al 2011	O'Connor 2011	Waters et al 2011	Stines et al 2011	Hollar et al 2010	Golley et al 2010	Raghuveer 2010
Prevalence of childhood obesity has dramatically increased		X	X	X	X	X	X	X	X	X	X	X
Accurate measurements of BMI, BMI percentile, and waist circumference		X		X		X		X	X			X
Childhood obesity track to adulthood with increased CHD risk	X			X	X		X					X
The risk factors of CHD are already present in obese children				X			X	X				X
Early intervention required	X		X	X	X	X			X			X
Dietary intervention	X	X	X	X	X	X	X	X	X	X	X	X
Psycho-social impact of obesity					X	X		x	X			
Parent involvement as essential	X		X			X	X	X	X		X	
Multi-sector intervention (home, school, community & government)	X						X	X	X	X		X

6 DISCUSSION

In this bachelor thesis the writer aimed to present an up-to-date evidence-based knowledge about nutritional guidance to be provided by nursing professionals in the primary prevention of coronary heart disease amongst children. A systematic literature review was conducted to collect relevant studies that answer the research questions. A total of 12 research studies that met the pre-specified eligibility criteria were included. Data extraction was carried out based on pre-specified frameworks. This review study utilized meta-aggregation approach to document the findings.

6.1 Summary of the Main Findings

The present research reviewed 12 studies aimed at preventing obesity and CHD in children aged 2-18 years. The purpose of this study was to describe the current literature on nursing intervention to prevent coronary heart disease through dietary modifications. The accepted 12 studies were heterogeneous in study population (age of children enrolled), content and outcome of the intervention and methodology used. All the included studies reported the importance of dietary intervention in childhood obesity prevention. Lower consumption of saturated fats, sugar-sweetened soft drinks and energy dense foods, ampler use of vegetables, fruit, fibers, berries and whole grain products showed a significant weight, blood pressure and cholesterol level reductions post-intervention among the intervention groups. The dietary intervention of most obesity prevention programs focused on changing the quality of unhealthy diet (e.g. saturated fats) than the quantity in order to ensure that interventions are safe and appropriate. Consequently, no adverse events were reported in any of the 12 reviewed articles. Most interventions applied a combination of dietary and physical activity approaches to prevent obesity. Some included behaviour change theory and medical treatment in combination with dietary modifications. Even though one review study targeted diet intervention as an independent intervention component; yet this review lacks the strength to draw a direct conclusion about the effectiveness of dietary intervention when used alone.

Three recently published review studies explicitly addressed the problem of coronary heart disease among children and the impact of obesity in cardiovascular diseases (Magnussen et al 2012; Raghuveer 2010; Zalesin et al 2010). However, pediatric nurses were found to have lack of knowledge about childhood obesity as well as confidence regarding their role in educating patients about obesity (DiNapoli et al 2011; Small et al 2009). Principally, pediatric nurses are responsible for assessing the risk factors of CHD and providing the appropriate education through establishing realistic goals with children and their families. Nurses need to discuss nutritional issues, including the proper content and amount appropriate to the child for the prevention and treatment of obesity (Esenay, Yigit & Erdogan 2010). Likewise, nurses are expected to provide evidence-based guidance to prevent early CHD development. The intervention should include the entire family of high-risk patients because close family members of obese and high-risk patients can be at increased risk

of developing CHD due to genetic factors and shared family lifestyle (Berra et al 2011). DiNapoli et al (2011) concluded that the quality of care that obese and overweight children receive to prevent CHD incidences is dependent on the nurses' knowledge, perception, and attitudes about childhood obesity.

Some of the included studies reported errors in overweight and obesity diagnosis, which might be due to lack of knowledge regarding the assessment of BMI in children and lack of appropriate tools for measurement. It is necessary for pediatric nurses to represent BMI levels relative to a child's age and sex peer (Kiess, Marcus &Wabitsch 2004). It is equally important to utilize the achieved BMI results obtained and other valid medical examinations to identify children at higher risk of developing CHD. Computer-assisted tools can substantially improve the identification, diagnosis, and counselling for overweight or obese children and adolescents (Coleman et al 2012).

The included studies were of interventions conducted in educational settings, home environment, children's clinics and community settings. This evidence indicates the need for various intervention sectors to tackle the epidemic of childhood obesity which if untreated might eventually lead to premature CHD development. Essentially, educational settings were found to be the most effective intervention sectors for children aged 6 to 18 years (Waters et al 2011). This may be because children aged 6 to 18 years spent most of their time at school, and are more likely to follow the instructions given by teachers. In addition, the school nurse is in a position to identify children at risk of becoming obese and is able to conduct more targeted lifestyle changing efforts. Likewise, the relationship school nurses have with students and families offers advantages in terms of recruitment to obesity-prevention programs, and adherence to the given health-related guidelines (Broussard, Bryan & Beller 2012). That notwithstanding, the result of two review studies (Golley et al 2010; Knowlden & Sharma 2012) targeting home-based childhood obesity intervention remind us of the importance of engaging and encouraging parents as a part of a multi-level approach in promoting healthy weight and lifestyle behaviour to children. This is borne out by another study that focused on the eating habits of Finnish school children, which concluded that a regular daily rhythm and common dinners within the family on weekdays is associated with better eating habits and other health-related factors (Raulio, Pietikäinen & Prättälä 2007).

The majority of the included studies were implemented for less than 12 months. Thus, the evidence of short-term effectiveness reviewed in this study gives the ground to conclude that short-term interventions aiming at dietary modification, physical activity and behavioural modification through a multi-sector intervention approach can significantly reduce BMI level and the comorbidities of CHD. However, further long-term intervention could yield very valuable information on the sustainability of effects, and this paper encourages researchers to collect such data. Accordingly, Golley et al (2010) suggested that home environment with in the parents involved is likely to enhance the long-term impact and sustainability of obesity prevention efforts.

Interestingly, a study conducted in Finland targeting children ages 10 to 11 years, found a negative association between sleeping time and being overweight/obese. The study showed that sleeping less is associated with a more frequent consumption of fast foods and sweets and lower consumption of fruits and vegetables. However, the study pointed for more research to explain and support the result. (Westerlund, Ross & Ray 2006)

6.2 Trustworthiness of the Study

This study conducted a systematic literature review to collect up-to-date data that can be used to prevent coronary heart disease amongst children by providing nutritional guidance. To ensure reliability and validity and to avoid any possible biases, this study referred to the Cochrane-handbook for systematic literature review and the Joanna Briggs Institute (2011) to create a literature review protocol. The review protocol was developed in the planning phase of this study and consisted of all the necessary stages needed while doing research. The writer created a separate document under the name of "rough planning" to gather essential elements to be considered while progressing with the thesis as well as for keeping references. A number of research books were used to help the writer understand the process of conducting a systematic literature review as it was not covered in detail during research lectures. Essentially, a book written by Aveyard (2010) under the name of "doing a literature review in health and social care" helped the writer to comprehensively understand the concept and process of systematic literature review. The writer spent more than seven months doing this research. The methodology section was the most challenging and time consuming part of this systematic literature review. A comprehensive and thorough searching strategy was carried out to ascertain the inclusion of relevant while reliable sources. The reliability of this study can be measured through the reliability of the included research studies. The quality of the accepted studies was evaluated by checking the names of the authors, their occupation and the publishers, together with the thesis supervisor. The 12 included studies were published between the years 2010 to 2012 portraying an up-to-date knowledge of the study at hand. In addition, the majority of the included studies were review studies of randomized control trails (RCT) and meta-analysis. This indicates that the achieved data are more objective and evidence-based.

6.2.1 Strengths of this study

Nurses are expected to deliver, and patients expect care that is based on up-to-date clinically relevant knowledge (Moule & Goodman 2009). The present study therefore applied a systematic literature review to appraise and synthesize currently published studies to achieve evidence-based knowledge and practice on the topic at hand. In addition, this study attempted to enrich itself with systematic reviews that undoubtedly assure the credibility and generalization of the study. The incredibly performed review protocol enabled the study to include a number of relevant and currently published studies. In addition, the review protocol warrants the validity, applicability and

replicability of this study. Collecting primary data was the major interest of this study. Many of the included articles were review studies of RCT and meta-analysis, making this study more objective and strongly evidence-based (Burn & Grove 2011). Meta-aggregation was used and re-interpretation was avoided to ensure the accuracy of the findings and to preserve the original form of the findings (Joanna Briggs Institute 2011). Admittedly, tutorial supervisions have also played a role in strengthening this study. Likewise, the writer participated in thesis consultation workshops in order to gain a deep understanding of the kind of research required to underpin a thesis of this type.

6.2.2 Limitations of this study

Although this systematic literature review achieved its aims and the research questions were clearly answered, yet there were some unavoidable limitations. The greatest limitation of this study was to get full access to relevant articles. Though many other university libraries (e.g. Terkko library, Diakin library) were visited and consulted, yet this review missed many importantly relevant and newly published studies. The very strict and tight selection criteria (see Figure 2), especially the geographical restraints limit the generalization of this study. However, a large number of review studies were included to balance this bias. According to (htpp://Cochrane-handbook.org/; Joanna Briggs Institute 2011; Kitchenham 2004) data extraction in systematic literature review should be extracted and reviewed by two researchers separately. However, this was not done in the present paper as the writer of this study did not collaborate with anyone.

The study used no appraisal forms to assess the quality of the included articles which might have left some quality-related biases in it. Several epidemiological studies suggest that dietary intervention should at least be combined with physical activities to produce favourable behavioural outcome in obese children (Stevens 2010). However, the present study merely focused on dietary intervention as a separate intervention component, because addressing and integrating more than one intervention approach might have been beyond the ability of the writer. Consequently, this limits the ability of the present paper to draw a conclusion about the appropriateness of dietary intervention to minimize CHD incidences as many of the included studies addressed dietary intervention in combination with other intervention approaches.

As the writer of this review is a novice researcher the presence of unmentioned and/or unnoticed study weaknesses and limitations may quiet likely exist. Likewise, the approach to the identification, critique and bringing together of the literature may not be as thorough as that of a more experienced researcher (Aveyard 2010). Finally, time restraints and lack of financial resources most likely have limited the study as well.

6.3 Implications for Practice

This systematic literature review revealed several implications for practice. There is substantial evidence suggesting that the quality of care that obese and overweight children receive to prevent CHD incidences is dependent on the nurses' knowledge, perception, and attitudes about childhood obesity (DiNapoli et al 2011). Pediatric nurses especially school nurses are the proximal personnel to determine children at risk of developing CHD. Assessment of BMI, BMI percentile and waist circumference are the main basic markers of obesity and CHD. Certainly, computer-assisted decision tools can help pediatric nurses to perform accurate assessments and diagnosis about childhood obesity and its comorbidities (Coleman et al 2012). Non-invasive examinations can also be used to rule out CHD progression (Magnussen et al 2012).

Nurses can spearhead exercise and nutrition-based programs offered by schools, hospitals and community to decrease the epidemic of childhood overweight and obesity. By providing educational focusing on nutrition and exercise nurses empower not only children but also their families to improve daily lifestyle choices with respect to food consumed and activities chosen to lose weight and to sustain weight loss (Speroni, Tea, Earley, Niehoff, Atherton 2008). In addition, pediatric nurses can establish strong collaboration with other healthcare professionals to provide multi-level and multi-sector intervention approaches. Moreover, pediatric nurses should be up-to-date with the recently published nutritional guidelines such as CHILD 1diet. As nurses routinely see patients with cardiovascular diseases, they are well poised to be advocates for nutrition and exercise programs to decrease risk factors for CHD and ultimately to maintain healthy weights for a lifetime.

6.4 Implications for research

In the future, one of the greatest challenges in the health sector will be the increasing number of obese and inactive people in the population (Marcussen 2007). Yet, there has been little evidence to support nurses' action to prevent CHD in children by fighting childhood obesity. Intervention strategies (e.g. online services for overweight children and their parents, healthy weight referral services for children of all ages, and in-home nurse visitation for healthy lifestyle counselling) may ultimately increase nurses' access to support services and enhance care of overweight children (Small et al 2009). Some of the included studies reported psycho-social impact due to childhood obesity; however, only a few of them attempted to provide psycho-social intervention; which was the major research gap evident from this review. Therefore, psycho-social interventions along with behaviour changing theories or models have to be researched in more details in the future. This study failed to completely address the appropriateness of dietary intervention as an independent intervention component in the prevention of childhood obesity because all of the included studies combined dietary intervention with other interventions.

Thus, more research might be needed to determine which of the intervention components (dietary intervention, physical activity or behavioural change) is most effective in childhood obesity prevention, and to determine if merely one intervention component can produce a significant outcome. The present study indicated that short-term childhood-obesity-prevention interventions can generate effective result. However, to maintain sustainability of the intervention high-powered, long-term studies are warranted.

7 CONCLUSION

Overweight children are at increased risk of having adverse levels of CHD risk factors, atherosclerosis, and CHD in adulthood (Kiess et al 2004; Freedman, Khan, Dietz, Srinivasan, & Berenson 2001). A total of 12 studies were reviewed in this paper to provide a quality of evidence for pediatric nurses to prevent CHD development by halting the epidemic of childhood obesity through dietary modifications. To prevent childhood obesity all the contributing factors should be taken into account. A combination of intervention components including dietary modifications, physical activity and behavioural changes are warranted to provide an effective result. Likewise, a multi-sector intervention approach encompassing a nurse-led intervention together with home, school, community and governmental-based interventions yields promise of successful outcome.

Nurses' role

Nurses are the health personnel working most closely with children and families in the primary and secondary healthcare systems. Cardiovascular nurses are encouraged to become fully informed of newly published evidence-based integrated guidelines (e.g. CHILD 1 diet, American Heart Association (AHA) guidelines) of healthy lifestyle, and advocate for their implementation across healthcare settings (Hayman & Himmelfarb 2012). In primary care settings cardiovascular nurses have an opportunity to take a leading role in treating obesity (Himmelfarb 2012). Obesity is a serious risk factor for CHD, on a par with high blood cholesterol, physical inactivity and cigarette smoking. Identifying children at risk of developing CHD is the major duty of the nurse. Routine measurement of BMI, skinfold thickness, and blood pressure (BP), and other necessary assessment need to be carried out during child's visit at maternity clinic, public healthcare centers and hospitals. Computer-assisted decision tools can help pediatric nurses to perform accurate assessments and diagnosis about childhood obesity and its comorbidities (Coleman et al 2012). Interventions should confront all the contributing factors including dietary, physical activity, behaviour and sedentary lifestyle. The treatment should be given in a shared responsibility with the child (according to his/her cognitive ability) and the parents (Magnussen et al 2012). Nurses are required to encounter clients as a whole person and provide guidance on proper diet, regular exercise, behavioural modification, healthy lifestyle, appropriate medical interventions, and social and psychological support. In addition, a nurse is needs to emphasize the total dietary picture to clients by specifying calorie re-

strictions and providing a dietary recommendation of healthy nutrients. Furthermore, it is under the duty of the pediatric and public health nurses to develop effective educational programs that aim at preventing childhood obesity and hence CHD. Conclusively, several studies suggest that a focus should be placed on helping children to attain and maintain appropriate weight to prevent future adverse health consequences mainly CHD (Baker, Olsen & Sorensen 2007)

Risk Assessment of Coronary Heart Disease

Risk factors for coronary heart disease such as hypertension, dyslipidemia, impaired glucose tolerance and vascular abnormalities are already present in overweight children (Baker et al 2007; Hayman 2011). Early identification of children at higher risk for developing CHD is in the hands of the public health sector. A regular monitoring of BMIs and BP in children and adolescents, together with intensive counselling about healthy nutrition, exercise and lifestyle should be the main topics to be handled by the public health nurse and school nurse. Likewise, nurses should be alerted that the cholesterol levels are maintained within a normal range e.g. total cholesterol level < 200mg/dl, LDL-C <70mg/dl, HDL-C >60mg/dl and triglycerides <150mg/dl (American Heart Association 2012). Several researches debate on whether to screen or not to screen hyperlipidemia among children. So far the updated version of the American Academy of Pediatric (AAP) guide the targeted and not the universal approach to screening of high-risk populations including children and adolescents with a family history of high cholesterol and heart disease, and those with unknown family history. Substantial evidence has accumulated in the past decades linking childhood obesity with a number of cardiovascular-related co-morbidities including adverse changes in major risk factors for CHD and adverse changes in cardiac structure and function (Hayman 2011). This evidence supports the urgent need for the prevention and management of obesity early in the life cycle (Small et al 2009).

Early intervention of Coronary Heart Disease

As many adverse health behaviours and risk factors that accelerate the development and progression of atherosclerosis begin in childhood, a growing body of evidence underscores the importance of cardiovascular health promotion and risk reduction beginning early in life. Recommendations for dietary modifications have been suggested to start even from breastfeeding (Magnussen et al 2012; Hayman & Himmelfrab 2012). Effective prevention and intervention approaches require an integrated system, which needs to include dietary management with a diet high in fiber and low in saturated fat and sugar, increased childhood physical activity levels for play and recreation, behavioural management, and teaching parents skills to help them foster their healthy eating behaviours in their children.

Dietary intervention

Diet and lifestyle-related factors may be responsible for the geographic distribution of cardiovascular diseases (CVD) and mainly CHD incidences. A systematically conducted review study reported the positive effects of a Mediterranean diet over CVD, and concluded that such information could be used for population recommendations as a part of a correct lifestyle (primary prevention) and as well as in a secondary prevention setting they may be used in conjunction with conventional drug therapy (Torre, Chiaradia, Ricco, Piscitelli & Ricciardi 2007). Since that publication the potential beneficial effects of Mediterranean dietary patterns on longevity and health outcomes have become a source of much interest and investigation (Rees, Hartley, Clarke, Thorogood & Stranges 2012). A cohort study showed that a 1-unit increase in Mediterranean diet score (scale from 0-18 units) was associated with a 6% reduced risk of CHD, with similar risk estimates by sex (Rees et al 2012). Likewise, several observational studies have shown greater longevity and quality of life, as well as reduced mortality and morbidity from CVD, cancer, and other nutrition-related diseases with greater adherence to a Mediterranean dietary pattern (Rees et al 2012). In their 2012 review protocol Rees et al proposed that at least two components from the following list is required to reach their definition of a Mediterranean style diet:

1) High monounsaturated/saturated fat ratio (use of olive oil as main cooking ingredient)
2) Low to moderate red wine consumption
3) High consumption of legumes
4) High consumption of grains and cereals
5) High consumption of fruits and vegetables
6) Low consumption of meat and meat products and increased consumption of fish
7) Moderate consumption of milk and dairy products

According to the reviewed studies targeting on dietary intervention and other manually searched relevant studies, the present paper summarizes the tips for healthy nutrition in table 7. The abbreviation used in table 7 can be expanded as following: CHILD, cardiovascular health integrated lifestyle diet; E, energy; M, months; PUFA, polyunsaturated fatty acid; SAF, saturated fatty acid; Y, years.

School-based intervention

The school provides an important setting for the promotion of a healthy and active life. According to the Basic Education Act in Finland (2003) promotion of school well-being and health is one of the main tasks of comprehensive schools (Rigoff 2007). School nurses are faced with the physical, psychological, social, and emotional effects of childhood obesity, and therefore are in a pivotal position to engage in programs that can begin to reverse, or at the very minimum, stabilize the constantly rising obesity rates (Broussard et al 2012). By working with interdisciplinary teams, the school nurse can make a distinct impact on the success of such programs through improving the health of students by encouraging them to eat healthily and be physically active (Broussard et al

2012). From the reviewed studies targeting school-based intervention, the following activities can be concluded as most beneficial in childhood obesity prevention programs:

- Instruction on healthy eating and physical activity integrated into the regular curriculum. In other words teaching children about good nutrition, the benefits of daily physical activities and lifestyle modifications to help them understand the importance of making healthy life-style choices and to motivate them to make these changes in their own lives.
- Modeling school menus and arranging after school activities
- Creating a multi-media set of educational and instructional materials, highlighting healthy nutrition and physical activities
- Arranging visits to farm markets and allowing children to practice growing fruits and vegetables

Multi-sector intervention

As has been indicated by several studies, a multi-level (individual, parent, community, and governmental) collaboration is required to successfully address the epidemic of childhood obesity. Predominantly, the client needs to fully understand the risk factors, health consequences and prevention methods of obesity; and he/she should be motivated and ready to change (Golley et al 2010). Parent involvement is an important component of obesity-prevention interventions. Parents have a foremost role in establishing their children's lifelong dietary and exercise patterns. Accordingly, understanding parental views about their children's weight is a key step for designing effective weight-prevention strategies (Esenay et al 2010). In a prospective study of Dutch society, it was reported that family consultation on their child's behaviour remained as strong in 2001 as it used to be in 1987 (Cardol 2007).

As the centre of children's socialization the school is the ideal locale for organizing obesity prevention programs (Hollar et al 2010). States and local authorities should be encouraged to provide more opportunities for safe, community-based physical activity programs, such as walking and biking paths, and the broader use of existing facilities, such as the school swimming pool. Governmental activities need to include appropriate policies regarding food, education, and marketing (Hollar et al 2010). In addition, it is the main responsibility of the government to encourage and fund the series of activities under childhood-obesity-prevention programs arranged at schools and/or in public health settings.

Table 7. Summary of dietary intake for children aged 0-18 years. (Hayman & Himmelfrab 2012; Schenker 2012; http://www.heart.org; http://pediatrics.about.com/od/nutrition/a/child-1.htm)

Birth to 12 M	**1-5 Y**	**6-12 Y**	**13-18 Y**	**Overweight/obese with high cholesterol level**
Support breast feeding as optimal as age 12 M if possible. Add formula if breastfeeding decrease or stops before the age of 12 M. **Limit total fat intake to 40-60% E for infant aged 0-6 M, and for those aged 6-24 M the amount of fat depends on the % E of total fat in breast milk** **Don't overfeed infants and young children — they can usually self-regulate the amount of calories they need each day.**	Age 12-24 M may change to cow's milk with percentage fat per family and pediatric care provider. After age 2 Y, fat-free milk for all; juice ≤4 oz/d; transition to CHILD 1 diet by age 2 Y. CHILD 1 diet works to: • Limit or avoid sugar-sweetened drinks and avoid trans fats • Encourage kids to drink water and fat-free unflavored milk • Encourage high-fiber foods • Limit sodium and avoid foods high in salt • Encourage daily physical activity at least 60 minutes a day • Keep total fat intake between 30 to 35 percent of calories, with most fats coming from sources of polyunsaturated and monounsaturated fatty acids, such as fish, nuts and vegetable oils. • Limit SFA to 8% E, total PUFA to 11% E and cholesterol intake to less than 300 mg each day • Teach healthy eating habits • Encourage a diet rich in fruits, vegetables, low-fat or fat-free milk and other dairy products, whole grains, fish, poultry, beans, nuts and seeds, and lower in sweets and added sugars, fats, and red meats • Teach children about appropriate portion size	Reinforce CHILD 1 diet messages as needed Teach children about portions sizes and practicing regular exercise Children shouldn't be forced to finish meals if they aren't hungry	Obtain diet information from child and use to reinforce healthy diet and limitations and provide counselling as needed. • Encourage eating breakfast every day, eating meals as a family, and limiting fast-food meals • Limit SFA to 8% E, total PUFA to 11% E	• only 25% to 30% of calories from fat • less than or equal to 7% of calories from saturated fat • about 10% of calories from monounsaturated fat • less than 200 mg/d of cholesterol • avoid trans fats as much as possible

The constant barrage of information and advertising directed at parents and especially children about food, beverages and clothing have dramatically influenced the lifestyle of many children. Accordingly, several epidemiological studies reported that, worldwide, children are becoming overweight or obese at progressively younger age (Baker et al 2007). In addition, overweight and obese children have been identified as being at higher risk of developing CHD in adulthood (Magnussen et al 2012). The result of this review study highlights the need for multi-professional team work focusing on a multi-sector intervention approach including all the intervention components to prevent CHD through tackling childhood obesity. Halting childhood obesity results in a significant reduction of premature CHD incidences among children and in later life. Given the enormous health risks associated with childhood obesity, some studies suggested that it might be beneficial to include this content with sufficient details in the curricula of pediatric nursing education programs and in the nursing text-books for students and professionals.

"Good nutrition plays an essential role in health maintenance"

REFERENCES

Aveyard,H. 2010. Doing a literature review in health and social care. 2nd edition. England: Mc Graw Hill

Bates, S. & Coren, E. 2006. Systematic map no.1: the extent and impact of parental mental health problems on families and the acceptability, accessibility and effectiveness of interventions. London: SCIE.

Baker,J., Olsen,L. & Sorensen,T. 2007. Childhood body-mass index and the risk of coronary heart disease in adulthood. The New England Journal of Medicine. Vol 357 No. 23.

Betz,C.L. 2000. Childhood obesity: Nursing prevention and intervention approach is needed. Journal of Paediatric nursing. Vol 15, No. 3.

Broussard,L., Bryan,C. & Beller,D. 2012. Kids on geaux: an interdisciplinary, community-based child weight management program. NASN School Nurse. Vol 27 No. 72.

Burns,N. & Grove,S. 2009. The practice of nursing research. Sixth edition. Texas : Elsevier.

Burns,N. & Grove,S. 2011. Understanding nursing research. Fifth edition. Texas: Elsevier.

Cardol,M. 2007. Family influence on individual consultation behaviour is as important as in 1987. European Journal of Public Health. Vol 17, Suppl 2.

Christians, C. 2011. Ethics and politics in qualitative research. The sage handbook of qualitative research. Lons Angeles: Sage.

Coleman,K., Hsii,A., Koebnick,C., Alpern,A., Bley,B., Yousef,M., Shih,E., Trimble-Cox,K., Smith,N., Porter,A. & Woods,S. 2012. Implementation of clinical practice guidelines for pediatric weight management. Journal of Pediatrics. Vol 160, No.6.

Coulston,A., Rock,C. & Monsen,E. 2001. Nutrition in the prevention and treatment of disease. San Francisco : Academic Press.

DiNapoli,C., Sytnyk,E. Waddicor,C. 2011. Pediatric nurses' perception, attitudes, and knowledge of childhood obesity at an academic medical center. Journal of Bariatric Nursing and Surgical Patient Care. Vol 6, No. 3.

Dudek,S. 2007. Nutritional essentials for nursing practice. New York : Lippincott.

Esenay,F., Yigit,R. & Erdogan,S. 2010. Turkish mothers' perception of their children's weight. Journal for Specialists in Pediatric Nursing. Vol 15 No. 2.

Frenn,M., Heinrich,A., Dohmen,C.S., & Pruszynski,J.E. 2011. What can parents do to reduce youth obesity. Journal of Paediatric Nursing. Vol 26, No. 428-434.

Fry,S. & Johnstone,M. 2008. Ethics in Nursing Parctice. Blackwell publishing:Hong Kong.

Golley,R., Hendrie,G., Slater,A. & Corsini,N. 2011. Intervention that involves parents to improve children's weight-related nutrition intake and activity patterns- what nutrition and activity targets and behaviour change techniques are associated with intervention effectiveness. Obesity Reviews. Vol 12, No. 114-130.

Graneheim,U.& Lundman,B. 2004. Qualitative content analysis in nursing research. Nurse Education Today. Vol 24, No. 105–112.

Harrison,T. 2010. Family-centered paediatric nursing care. Journal of Paediatric Nursing. Vol 25, No. 335-343. Elsevier.

Hayman,L. & Himmelfarb. 2012. Cardiovascular health promotion and risk reduction in children and adolescents. Journal of Cardiovascular Nursing. Vol 27, No. 3.

Hemingway, P. 2009. Evidence-based Medicine: What is a systematic review. Second edition. Hayward group Ltd, UK.

Hockenberry,M.J. & Wilson,D. 2009. Essentials of paediatric nursing. Canada: MOSBY.

Hollar,D., Lombardo,M., Lopez-Mitnik,G., Almon,M., Agatston,A., Messiah,S. & Hollar,T. 2010. Effective multi-level, multi-sector, school-based obesity prevention programming improves weight, blood pressure, and academic performance, especially among low-income, minority children. Journal of Health Care for the Poor and Underserved. Vol 21, No. 2.

James,K., Connelly,C., Gracia,L., Mareno,N. & Baietto,J. Ways to enhance children's activity and nutrition (WE CAN)- A pliot study with Latino mathers. 2010. Journal for Specialists in Pediatric Nursing Vol 15, No 4.

Kavey, W., Daniels,S., Lauer,R., Atkins,D., Hayman,L.& Taubert,K. 2003. American Heart association guidelines for primary prevention of atherosclerotic cardiovascular disease beginning in childhood. American Heart Association. Vol 107, No. 1562-1566.

Kitchenham,B. 2004. Procedures for performing systematic reviews. Kelee University, UK.

Knowlden,A. & Sharma,M. 2012. Systematic review of family and home-based interventions targeting pediatric overweight and obesity. Obesity Reviews. Vol 13, No. 499-508.

Kones,R. 2011. Primary prevention of coronary heart disease. Journal of Drug Design Development and Therapy. Vol 5, No. 325–380.

Lambiase,M. 2009. Treating paediatric overweight through reductions in sedentary behaviour. Journal of Paediatric Health Care. Vol 23, No. 1.

Lipshultz,S.E. 2005. Realizing optimal care for children with cardiovascular disease. Progress in Paediatric Cardiology. Vol 20, No. 71-90.

Lu,J., Jiang,D., Chou,S., Hor,C., Lay,J. & Wang,H. 2008. Prevalence of obesity and its association with cardiovascular disease risk factors in adolescent girls from a college in central Taiwan. Journal of Medical Science. Vol 24, No. 3.

Magnussen,C., Niinikoski,H., Juonala,m., Kivimaki,M., Ronnemaa,T., Viikari,J., Simell,O. &Raitakari,O. 2012. When and how to start prevention of atherosclerosis. Pediatric Nephrol. Vol 27, No. 1441-1452.

Mann,J. & Trustwell,S. 2007. Essentials of human nutrition. United states: Oxford University Press.

Montoya, C. & Lobo, M.L. 2011. Childhood obesity. Journal of Paediatric Nursing. Vol 26, No. 465-473.

Marcussen,J. 2007. Outdoor programmes for obese people-mental and social perspectives. European Journal of Public Health. Vol 17 Suppl 2.

Moule,P. & Goodman, M. 2009. Nursing research. Los Angeles : Sage.

Munro, S., Lewin, S., Smith, H., Engel, M., Fretheim, A. & Volmink, J. 2007. Adherence to tuberculosis treatment: a qualitative systematic review of stakeholder perceptions. PLOS Medicine. Vol 4(7), No. e238.

Noyes, J. & Popay, J. 2007. Directly observed therapy and tuberculosis: How can a systematic review of qualitative research contribute to improving services? A qualitative meta-synthesis. Journal of Advanced Nursing. Vol 57(3), No. 227-43.

O'Connor,A. 2011. Promoting healthy eating and an active lifestyle in schoolchildren. Journal of Nursing Standard. Vol 25, No. 48.

Okoli,C. & Scabram,K. 2010. A guide to conducting a systematic literature review of information systems research. Sprouts: Working Papers on Information Systems. Vol 10 No. 26.

Polit, D. & Beck, C. 2004. Nursing research, principle and methods. Philadelphia: Lippicott Williams & Wilkins.

Porter,R., Thrasher, J., & Krebs, N.F. 2011. Implementing a paediatric obesity care guideline in a freestanding children's hospital to improve child safety and hospital preparedness. Journal of Paediatric Nursing. Vol 11, No. 005.

Raghuveer,G. 2010. Lifetime cardiovascular risk of childhood obesity. The American Journal of Clinical Nutrition. Vol 91, Suppl: 1514S-9S.

Raghuveer,G. 2008. Assessment of atherosclerotic cardiovascular risk and management of dyslipidemia in obese children. Jornal of Progress in Paediatric Cardiology. Vol 25, No. 167-176.

Raulio,S., Pietkäinen,M. & Pättälä,R. 2007. Eating habit of Finnish school children during school day. European Journal of Public Health. Vol 17 Suppl 2.

Rees,K., Hartley,L., Clarke,A., Thorogood,M. & Stranges,S. 2012. Mediterranean dietary pattern for the primary prevention of cardiovascular disease (Protocol). The Cochrane library 2012, issue 4.

Rigoff,A. 2007. Indicators for health-promotion capacity in Finnish comprehensive schools in 2007. European Journal of Public Health. Vol 17 Suppl 2.

Roy, C. & Andrews, H. 1991. the Roy adaptation model. California: Appleton & Lange.

Schenker,S. 2012. UK recommendations for dietary fat: should they be reassessed in light of the recent joint FAO/WHO recommendation. Journal of Nutrition Bulletin. Vol 37 pp 37-46.

Seedhouse,D. 2009. Ethics the heart of health care. Third edition. Hong Kong: Wiley Blackwell.

Small,L., Anderson,D., Sidora-Arcoleo,K. & Grance-Cleveland,B. 2009. Paediatric nurse practitioner's assessment and management of childhood overweight/obesity. Journal of Paediatric Health Care. Vol 23, No. 4.

Smeltzer,S., Bare,B., Hinkle,J. & Cheever,K. 2010. Medical-Surgical Nursing. Philadelphia: Lippincott Williams &Wilkins.

Smith, L.K., Pope, C. & Botha, J.L. 2005. Patients' help-seeking experiences and delay in cancer presentation: a qualitative synthesis. Lancet: 366(9488): 825-31.

Speroni,K., Tea,C., Earley,C., Niehoff,V. & Atherton,M. 2008. Evaluation of a pilot hospital-based community program implementing fitness and nutrition education for overweight children. Journal for Specialists in Pediatric Nursing. Vol. 13, No. 3.

Stevens,C. 2010. Obesity prevention interventions for middle school-age children of ethnic minority. Journal for Specialist in Pediatric Nursing. Vol 15, No. 3, pp 233.

The Joanna Briggs Institute. 2011. Systematic review;Protocol; Effectiveness; Qualitative; Economic; and methods. Australia.: The Joanna Briggs Institute.

Torre,G., Chiaradia,G., Ricco,A., Piscitelli,M. & Ricciardi,W. 2007. The protective effects of Mediterranean diet on cardiovascular disease. European Journal of Public Health. Vol 17 Suppl 2.

Tucker,S.J. 2009. Parents as agents of change for childhood obesity prevention. Journal of Paediatrics and Child Health. Vol 19: S2.

Vaczy,E., Seaman,B. & Peterson-Sweeney,K. 2011. Passport to health: an iinovative tool to enhance health lifestyle choices. Journal of Pediatric Health Care. Vol 25, No 1.

Waters,E., Silva-Sanigorski,A., Hall,B., Brown,T., Cambell,K., Gao,Y., Armstrong, R., Prosser,L. & Summerbell,C. 2011. Interventions for preventing obesity in children. The Cochrane library 2011, Issue 12.

Westerlund,L., Roos,E. & Ray,C. 2007. Association between sleeping habits and food consumption among 10-to-11-year-old children in Finland in 2006. European Journal of Public Health. Vol 17, Suppl 2, pp 133.

Williams,S.R. 2001. Basic nutrition & Diet Therapy. Chaina: Mosby.

Wiseman,G. 2002. Nutrition & Health. London: Taylor & Francis.

Wofford,L.G. 2008. Systematic review of childhood obesity prevention. Journal of Paediatric Nursing. Vol 23, No.1.

Woodman, J., Lorenc, T., Harden, A. & Oakley, A. 2008. Social and environmental interventions to reduce childhood obesity: a systematic map of reviews. London: EPPI-Centre.

Zalesin,K., Franklin,B., Miller,W., Peterson,E. & McCullough,P. 2011. Impact of obesity on cardiovascular disease. Journal of Medical Clinic of North America. Vol 95, No. 919-937.

ELECTRONIC SOURCES

American Heart Association. 2012. What are high blood cholesterol and triglycerides? http://www.heart.org/answerbyheart. Accessed on 21.7.2012

Cochrane Handbook of systematic review. htpp://Cochrane-handbook.org/). Accessed on 28 Agust 2012

Forward,L. & Hobby,L. 2002 A practical guide to conducting a systematic review.Vol 98, Iss 02 , pp 36 (www.nursingtimes.net). Accessed on 05.07.2012

http://pediatrics.about.com/od/nutrition/a/child-1.htm. Accessed on 15.12.2012

http://www.heart.org/HEARTORG/GettingHealthy/Dietary-Recommendations-for-Healthy-Children_UCM_303886_Article.jsp. Accessed on 15.12.2012

Social Care Institute for Excellence. 2006. The conduct of systematic research reviews for SCIE knowledge reviews. http://www.scie.org.uk/publications/researchresources/rr01.pdf. Accessed on 10.09.2012.

APPENDICES

Appendix 1. Summary of each study's research design including target population and age of participants, context of interest or intervention, and the appropriateness of intervention.

Author, Year, Country and Title	Target population/age of children	Intervention	Intervention result and appropriateness	Study design
Magnussen 2012 Finland *When and how to start prevention of atherosclerosis*	Children and adolescents of various ages	Fat intake of 30-35% of daily energy, cholesterol intake <200mg/day, high protein and carbohydrate intake An early and multi-sector intervention is needed to prevent CHD progression Counselling was given to families, however children above 7 years old were receiving direct counselling	Dietary intervention did not lead to neither growth alteration nor cognitive impairment to the intervention group There was no difference in height, weight and BMI between the intervention group and control group at post-intervention follow-ups	Review of ongoing population-based, prospective study (STRIP and Young Finnis Study)
Raghuveer 2010 USA Lifetime cardiovascular risk of childhood obesity	Children and adolescents of various ages	Weight reduction through diet and behavioural modifications An early and various clinical-based, social, cultural and community-based changes should be implemented to halt the epidemic of childhood obesity and its cardiovascular consequences	Weight reduction intervention was significantly effective to improve clinically measurable risk factors such as LDL cholesterol, HDL cholesterol, blood pressure and insulin concentration	Review study
Zalesin 2011 USA Impact of obesity on cardiovascular disease	All ages	Reducing the lipid/lipoprotein markers through dietary modification and medical treatment	Treatment of lipid/lipoprotein markers may decrease systematic inflammation, improve endothelial dysfunction, and stabilize and promote regression of atherosclerotic	Review study

			plaque , which all serve to reduce cardiovascular event rates and total mortality	
Waters 2011 UK Intervention for preventing obesity in children	Pre-school age 0-5 Children 6-12 Adolescent 13-18	The intervention focused on dietary modification, physical activities and behavioural changes The essentiality of parent involvement was mentioned in children aged 0 to 5 years	Combinations of intervention components (e.g dietary modification and physical activities) yield effective results. There were significantly positive outcomes in short-term follow-up, however, the outcome didn't sustain for long-term. For school aged children, intervention implemented within the school showed effective result.	Review of 55 RCTs & CCTs studies
Coleman 2011 USA Implementation of clinical practice guidelines for pediatric weight management	Children and adolescent 2 to 17 years old	Computer-assisted overweight and obesity assessment which increased significantly the rate of exercise and nutrition counselling	Computer-assisted decision tools to standardize pediatric weight management with concurrent education of pediatricians can substantially improve the identification, diagnosis, and counselling for overweight or obese children and adolescents	Large scale implementation study (Action-based study)
Stines 2011 USA Nurse practition-	Children in elementary school	An after-school program that assisted children who are at highest risk of becom-	Significantly effective resut	Perspective study

er-coordinated childhood obesity early intervention and prevention program		ing obese to understand better healthy eating habits and active lifestyle choices while having fun. Parents were educated how to cook healthy meals with a limited budget		
Vaczy 2011 USA Passport to Health:an innovative tool to enhance healthy lifestyle choices	Children ≥ 2 years	The intervention aimed at improving weight assessment, dietary habit (daily section of five fruits and vegetables, 2 hours screen time limit, 1 hour of activity and zero sugar-added drinks) and physical activity The program "Passport to health" disseminated information about healthy diet habits and lifestyle modification to families	Significant improvement in the identification and documentation of weight status	Study program (Action based)
DiNapoli 2011 USA Pediatric nurses' perception, attitudes, and knowledge of childhood obesity at an academic medical center	Children Age not reported	The study aimed to identify nurses perception of childhood obesity and their knowledge to educate both patient and families about healthy lifestyle and food choices 27 registered nurses (RNs) out of 33 RNs provided obesity-related education to both the patient and family	The majority of the RNs were somewhat knowledgeable about childhood obesity, but only a small percentage reported that they were extremely knowledgeable Only 3 RNs out of 33 were very well prepared to provide obesity-related education to patient and family	A cross-sectional quantitative study including 33 RNs
Hollar 2010 USA	Children at elementary	The intervention included, modified dietary offerings,	Statistically significant improvements in BMI,	Quasi-experimental

Effective multi-level, multi-sector, school-based obesity prevention programming improves weight, blood pressure, and academic performance, especially among low-income, minority children	school	nutrition/lifestyle educational curricula, physical activity component, and wellness projects	blood pressure, and academic scores were reported in intervention versus controls	controlled pilot study 2 years study
Golley 2011 Intervention that involve parents to improve children's weight-related nutrition intake and activity patterns-what nutrition and activity targets and behaviour change techniques are associated with intervention effectiveness	Children Age not reported	Dietary modification focusing on decreasing intake of fat and sugar, increasing intake of fruits ,vegetables and carbohydrates Positive parent-child communication and environment Physical activity CHD risk factors	Effective interventions included energy intake/density and food choices intervention, And great parental involvement	Review of 17 studies
Knowlden 2012 USA Systematic review of family and home-based interventions targeting pediatric overweight and obesity	Children aged 2 to 7 years	The intervention focused on physical activity, consumption of five cups of fruits and vegetables each day, replacement of sugar-sweetened beverages with sugar-free beverages, and limitation of screen time to no more than 2 h per day.	Almost all the included studies reported effective intervention	Review of 9 studies

		Parents as the primary agent of childhood obesity prevention		
O'Connor 2011 UK Promoting healthy eating and an active lifestyle in schoolchildren	Children and adolescents Age not reported	The intervention focused on dietary modification (high fruit and vegetables; low salt, fat, and energy dense foods and drinks; balanced amount of protein, dairy products, micronutrients such as vitamin D, iron, magnesium and zinc; and fiber	Recommendations	Review

Appendix 2. Planning the argumentation, the first draft developed on 05.05.2012 (This draft was later modified and corrected)

Introduction (area of study)	Paediatric nutritional guidance and primary prevention of CHD
Key concepts	Paediatric nursing, nutritional guidance, primary prevention of CHD & obesity
Research question	What kind of nutritional guidance should a nurse provide to paediatric clients and their family to primarily prevent CHD incidences?
Purpose of the research	To examine various ways of providing nutritional guidance to paediatric clients and their family on the prevention of CHD from nursing perspectives.
The problem that I will tackle	Unhealthy diet is leading to the early development of CHD among children and adolescent
What the literature says about this problem	Unhealthy diet and childhood obesity are the leading causes of early CHD in paediatric clients
How I will tackle this problem	Educative guidance should be given to children and their family to prevent CHD prevalence
What method I will use	Systematic literature review
How I will implement my solution	Public health nurses, school nurses and RNs are responsible for educating children and their family to eat healthy diet and practice regular exercise
What results I will expect	This approach will significantly improve the understanding of the community toward CHD and its prevention, and eventually, guides them to choose healthier diet in their every day life

Appendix 3. Self-evaluation of the thesis