THE IRISH HEART FOUNDATION

NUTRITION GUIDELINES FOR HEART HEALTH

WITH POLICY RECOMMENDATIONS

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FOREWORD

Cardiovascular disease, which includes coronary heart disease, stroke and other circulatory diseases, places the biggest burden on the health of the world's population and it is predicted that it is likely to stay top of the list until at least 2020. The same is true for Ireland where about 10,000 people die each year from this disease, more than any from other chronic illness.

There have been significant advances in education, prevention and treatment resulting in positive reduction in the number of deaths and disability from cardiovascular disease, in particular, premature deaths (under 65 years). However we are now facing new emerging challenges with the increasing levels of obesity and type 2 diabetes, as well as decreasing levels of activity in the Irish population. These increases, which are also affecting children and young people, may erode the success of the last four decades with the decline in premature deaths and overall deaths from cardiovascular disease.

Dietary influences on cardiovascular disease have been established for many years. These include saturated fat, which influences cholesterol; salt intake, which can increase blood pressure and overall calorie intake, which can lead to weight gain. It is estimated that diet contributes to one third of mortality from cardiovascular disease.

The Irish Heart Foundation has been a leading authority on dietary guidelines for heart health and prevention of cardiovascular disease over the last 40 years. The Foundation first published a policy on nutrition in 1992 and it is now timely that we have considered current scientific evidence and recommendations to produce these Nutrition Guidelines for Heart Health (2007). In addition, the Foundation sets out some policy options at European and national level, which it believes are important priorities for achieving the dietary goals outlined in this document.

As part of its remit, the Irish Heart Foundation's Nutrition Council will continually review the scientific evidence in relation to nutrition and progress on the policy recommendations from these guidelines.

I would like to acknowledge the work and contribution of all Council members, especially Ursula O'Dwyer and the members of the working group in producing this document.

Dr Donal O'Shea
Chair
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SUMMARY

Cardiovascular disease is related to atherosclerosis and is the major cause of premature death. Its mass occurrence relates to lifestyle and physiological factors that, if modified, reduce morbidity and mortality. Individuals with proven vascular disease or identified as being at high cardiovascular disease risk, should be targeted for intensive lifestyle interventions. However, lifestyle intervention should be advised for everyone because of its overall health gain.

Nutrition constitutes a key element in one's lifestyle and nutritional changes can impact many of the known risk factors. The major risk factors include blood lipid abnormalities, hypertension, diabetes, smoking, physical inactivity and obesity.

Although Ireland has witnessed a decline in premature cardiovascular disease over the last 20 years, we had a premature coronary heart disease death rate that exceeded the European Union (EU) average by 90%, prior to enlargement since 2004. Former Soviet and Eastern Block countries that have entered the EU have displaced Ireland from its pedestal as the EU leader in cardiovascular mortality. Nonetheless, our cardiovascular death rate is high despite our stage of development as a society. Stroke incidence has significantly declined. Similar risk factors, including nutrition, are involved in coronary heart disease and stroke.

The aim of these nutrition guidelines is to help reduce the cardiovascular disease risk of the Irish population. The focus is primarily on improving diet and nutrition and acknowledges the need to promote in parallel increased levels of physical activity, thereby addressing many of the public health issues relating to the reduction of blood pressure, obesity, raised lipid profiles and type 2 diabetes.

These guidelines will help health promotion and public health practitioners, dietitians and doctors advise and support individuals generally in terms of nutrition and heart health. In clinical practice the information will provide support for counselling patients in terms of their risk estimation and prevention.

The Irish Heart Foundation published its first policy on nutrition in 1992. This was followed in 1996 with a Consensus Statement on Nutrition and Heart Health supported by key Irish health professionals. Since then, a number of international reports have summarised the most up-to-date evidence on diet and cardiovascular disease Prevention.

There is a large measure of consensus and consistency in the conclusions and recommendations from these expert groups/scientific committees on the population dietary goals for the prevention of cardiovascular disease. Achieving the population goals for the prevention of cardiovascular disease will also reduce risk of other nutrition-related diseases. For effective nutrition education strategies, these population dietary goals are translated into food-based dietary guidelines.

The dietary goals are the recommended average intake level for the population and may require modification for special groups, such as infants and children, pregnant women

and older people and secondary prevention of cardiovascular disease, which are discussed in the main guidelines document. These guidelines also provide a benchmark against which national intakes can be monitored.

The four population goals which are supported by the strongest scientific evidence and which would give the largest public health gain are:

1. **A reduction in intake of saturated fat to less than 10% of dietary energy and a reduction in trans fat to less than 2% of energy**

   Food-Based Dietary Guideline:
   Individuals should limit consumption of foods rich in saturated fats such as butter, dripping, lard, suet, palm oil and foods made with these ingredients, fast food and high-fat meat and dairy products.

   In relation to trans fat, individuals should avoid hard margarines and shortenings and limit consumption of fast food, cakes, biscuits and pastries made with these fats.

   Of particular note is that eating omega 3 fats, from fish and vegetable oils, seems to be particularly appropriate as it provides great protection against fatal cardiovascular accidents. Include oily fish once or twice a week.

2. **An increase in fruit and vegetable intake to be greater than 400grams a day**

   Food-Based Dietary Guideline:
   Individuals should eat five portions of fruit and vegetables every day, choosing citrus fruit and their juices and green leafy vegetables regularly.

3. **A reduction in salt intake to be less than 6 grams a day**

   Food-Based Dietary Guideline:
   Individuals should restrict use of salt in the home and limit consumption of manufactured foods high in salt such as prepared sauces, soups and meals, smoked and cured meats and salt-preserved foods and salty snacks from the top shelf of the Food Pyramid.

4. **A reduction in body mass index (BMI) to less than 25 kg/m^2, however the Irish Heart Foundation would as a first priority set the goal of halting the increase in levels of overweight and obesity in the Irish population**

   Food-Based Dietary Guideline:
   Individuals should eat the right amount of food, using the Food Pyramid as a guide, to achieve and maintain a healthy weight.

Physical Activity Guideline:
Adults should accumulate 30 minutes or more of moderate-intensity physical activity most days (for general and cardiovascular health); To prevent the transition to overweight or obesity 45-60 minutes moderate-intensity most days is recommended and 60-90 minutes per day for weight loss and the maintenance of significant weight loss.

Children should be involved in at least 60 minutes of moderate-intensity physical activity each day.

Policy Recommendations for achieving *Nutrition Guidelines on Heart Health*

Given that the bulk of cardiovascular morbidity and mortality exists in the general population, a public health approach that aims to protect the whole population is needed. The above nutrition guidelines focus on food and nutrient goals. However this approach needs to be translated into action at local, national and European level in order to improve public health nutrition. The policy recommendations in section 7 will inform those involved in planning, budgeting and policy development at all levels.

There are already several national policy documents including Building Healthier Hearts (DOHC, 1998) and the Report of the National Task Force on Obesity (DOHC, 2005) which if fully implemented would help achieve much of the goals identified in this document. The first National Nutrition Policy soon to be published will add further weight and imperative to the two national plans above and with appropriate manpower, management and funding would greatly accelerate achievement of the nutrition goals for heart health

There are different types of policies needed to support the implementation of the above plans.

- Overarching or macro policies which require a shift in thinking away from responsibility being placed exclusively on the individual, to looking at the broader environment, which hugely influences how and what we eat.

- Allied to this shift in thinking is stronger political commitment and the establishment of structures, which would facilitate integrated planning, better co-operation and collaboration across all sectors to influence the environment to provide healthier food choices.

- An important and well-recognised tool, which can influence policy, is the assessment of the impact of all government policies on health.

- In relation to nutrition front and back of pack food labelling would help provide much needed information to guide people to healthier food choices.

- Fiscal polices could promote the healthier choice, however Government need to assess the various options and impact of such policies.

- There are several different polices at EU and national level which can influence the specific dietary goals including reform of the Common Agricultural Policy to take account of the need to produce foods that promote healthy diets.

- Measures to ensure a movement towards the elimination of industrially-produced trans fatty acids from food products.

- Collaboration with industry to reduce salt in processed foods should continue.

- An urgent and immediate challenge is to halt the increase of overweight and obesity and in addition to the approaches outlined above, the establishment of a national research and co-ordinating body to help increase levels of physical activity is identified.

- In relation to children and obesity, policies to control marketing and advertising of foods high in fat, sugar and salt could be tackled immediately.

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1.1 INTRODUCTION

In 1992 the first *Irish Heart Foundation (IHF) Nutrition Policy* was published (Graham *et al*, 1992). This was followed in 1996 with *Nutrition and Heart Health: A Consensus Statement by Organisations in Ireland concerned with Public Health* (Irish Heart Foundation, 1996). These Nutrition Guidelines provide a scientific and nutrition update on cardiovascular disease, (heart disease and stroke) prevention, primary care and secondary care. These guidelines, which are aimed primarily at health professionals, makes recommendations for prevention of cardiovascular disease for both population dietary goals and food-based dietary guidelines. It is important to stress that these recommendations will improve health generally and also help reduce risk of other diseases such as obesity, type 2 diabetes and some cancers.

Since the first Irish Heart Foundation Nutrition Policy, a number of cultural changes have taken place in Ireland, in particular changes in physical activity/inactivity patterns, increasing weight, metabolic syndrome and juvenile type 2 diabetes. The escalation of obesity, now a global phenomenon, affecting both rich and poor countries, is of major concern (Department of Health and Children (DOHC) 2005a). The rapidity of this rising trend, particularly in the youngest section of society, is confirmed from various sources of surveillance and lifestyle data (Irish Universities Nutrition Alliance (IUNA) 2005; Kelleher *et al*, 2003). Such evidence implies that factors outside the individual's immediate, conscious discretion are at play. There are major socio-economic trends in consumption patterns of particular food types more likely to predispose to obesity (Kelleher *et al*, 2003) and in levels of inactivity. Large portion sizes are a possible causative factor for unhealthy weight gain (World Health Organisation (WHO) 2003a) and have been shown to have an influence on weight gain (IUNA, 2001). Modern patterns of eating out and accessing pre-prepared meals can be problematic (DOHC, 2005a).

These factors point to a change in emphasis from the primacy of individual responsibility to environments that support healthy food choices as advocated in the WHO Global Strategy on Diet, Physical Activity and Health (WHO, 2004a). This shift will require a change in attitude and practice, by members of the general public and by those who produce, retail and supply the food products, by healthcare providers as advocates as well as care-givers, by policy makers with the power and influence to effect change and underpinned as necessary by legislation (DOHC, 2005a). A form of 'health proofing' of public policy across national and European bodies and services will also be essential for change.

Background
Since the first Irish Heart Foundation Nutrition Policy, a number of relevant national policy documents have been published by the Department of Health and Children and these are outlined below.

- In 1999 the Department of Health and Children published *Building Healthier Hearts: The Report of the Cardiovascular Health Strategy Group.* This strategy took a settings-based approach around the specific risk factors for cardiovascular disease - smoking, dietary behaviours and physical activity (DOHC, 1999).

- In 2000 a *National Health Promotion Strategy (2000-2005*) was published by the Department of Health and Children (DOHC, 2000). The key nutrition strategic aim of the National Health Promotion Strategy is 'to increase the percentage of the population who consume the recommended daily servings of food and maintain a healthy weight'. Specific objectives to help achieve this included supporting the implementation of the nutrition recommendations in *Building Healthier Hearts*.

- In 2005, the National Task Force on Obesity published their report *Obesity: the Policy Challenges* (DOHC, 2005a).

- In 2007, the *National Nutrition Policy* will be published by the Department of Health and Children (DOHC, In Press).

Other important initiatives include:

- A review of the Healthy Eating Guidelines is being carried out by the Food Safety Authority of Ireland (FSAI) Nutrition Sub-Committee, at the request of the Health Promotion Policy Unit, Department of Health and Children.

- The European Commission have asked the European Food Safety Authority to draw up nutrient-based dietary guidelines and a guide on how to use these to develop Food Based Dietary Guidelines in each Member State.

- The Commission has also produced a Green Paper *Promoting healthy diets and physical activity: a European dimension for the prevention of overweight, obesity and chronic diseases* (European Commission, 2005). A White Paper will be available in 2007.

- The World Health Organisation has published a European Charter on Counteracting Obesity (WHO, 2006a).

- A number of European and international scientific reports have summarised the most up-to-date evidence on diet and cardiovascular disease prevention. These reports are discussed in Sections 1.2 and 1.3.

- Also of major importance are a number of national food consumption surveys, which now provide valuable information on what the Irish population is eating. These are outlined below (see Section 1.2).

1.2 DIET AND CARDIOVASCULAR DISEASE - THE SCIENTIFIC BACKGROUND

Current Concepts in Cardiovascular Disease Development

Numerous avenues of research have brought our understanding of the vascular disease (atherosclerosis) process to an advanced stage in recent years, recognising the life-course influences. Vascular changes can begin as early as uterine life (Barker, 1990) and may be influenced by maternal lifestyle factors in particular maternal nutrition. Post mortem studies have confirmed that atherosclerosis develops throughout life in proportion to age and blood cholesterol levels (PDAY Research Group, 1990). Both genetic and environmental factors are involved. Nutrition is a very important environmental factor in the development of atherosclerosis.

The vascular disease process begins with damage to the endothelium, a layer of cells lining all blood vessels (Davignon and Ganz, 2004). Subsequently, the inner layer of the blood vessels thickens and foam cells (cholesterol-laden macrophages) become evident. These foam cells combine to form lipid pools and recruitment of other inflammatory cells leads to the formation of advanced atherosclerotic plaques in different arteries. These plaques grow at variable rates. When the plaques contain a large lipid pool and a thin fibrous cap, they become vulnerable to rupture (Fuster *et al*, 2005). Rupture of plaques is associated with clot formation locally, which may block off the coronary arteries causing heart attacks. Plaques in other blood vessels may reduce blood flow to the brain, legs, kidneys and intestines. Again, clots may develop on top of these plaques and break off to go to the brain to cause a stroke. Strokes may also occur as a result of bleeding in the brain (Park *et al,* 2001). Nutrition influences many of the steps involved in plaque growth and in the risk of forming blood clots (De Caterina *et al,* 2006).

Other disease processes, which affect the cardiovascular system, are heart failure (the heart is not as effective in pumping blood) and heart rhythm disturbances. Dietary factors can have a marked impact on these conditions. For example, salt and alcohol intake can markedly influence heart failure and dietary caffeine, alcohol, fish and essential minerals (e.g. potassium, calcium and magnesium) may all influence heart rhythms (Katan and Schouten, 2005; Leaf *et al*, 2003; Cleland and Dargie, 1988).

Risk Factors for Cardiovascular Disease

Many factors associated with the development of vascular disease have been identified. These factors are called risk factors and a number of them have been classified as major risk factors for coronary heart disease by the American Heart Association and European bodies (Smith *et al*, 2001, Third Joint Task Force, 2003; Sever *et al*, 2003). The major risk factors include blood lipid abnormalities, hypertension, diabetes, smoking, physical inactivity and obesity. More recently, the importance of other risk factors is slowly being unravelled, for example, raised blood levels of homocysteine, Lp(a), C-reactive protein, as well as coagulation abnormalities. As with all disease processes there are genetic and environmental contributors. Diet is a key component in the environmental contribution to cardiovascular disease.

Dietary Influences on Risk Factors

Nearly all dietary components could be important to disease development but most research to date has explored the contribution of calories, fat, carbohydrates, some proteins, vitamins, salt, and alcohol.

Many of the mechanisms through which diet influences atherosclerosis are secondary to their effect on cardiovascular risk factors. In this regard body weight, sodium, potassium and fat intake all influence blood pressure. Likewise dietary fat, cholesterol and carbohydrate intake profoundly influence lipoprotein composition and lipid levels. Body weight, carbohydrate and fat intake can have a marked effect on blood glucose control. Caloric intake in excess of energy requirements contributes to weight gain. Cholesterol is a dietary component but cholesterol is also made in the liver. The contribution by dietary cholesterol from food is limited.

The Need for Dietary and Lifestyle Changes in Addition to Drug Treatment

Human nature often favours taking the easy option to solve problems. It is therefore not surprising that many individuals consider pharmacological intervention as the only necessary treatment for conditions such as hypertension, hyperlipidaemia and heart failure. However, lifestyle changes not only act synergistically with drugs but also offer additional health benefits.

While medications used in the treatment of hyperlipidaemia predominantly target levels of lipoproteins, diet also influences the composition and size of lipoproteins. In addition, nutrition can have a major influence on the environment in which lipoprotein abnormalities can exert an adverse influence. For example, nutrition also reduces blood pressure, glucose levels, obesity levels and insulin sensitivity all of which would reduce the adverse impact of raised cholesterol. Lipid-lowering drugs do not have these additional beneficial effects. Similarly, anti-hypertensive agents predominantly lower blood pressure without affecting the other factors that increase blood pressure's harmful effects such as cholesterol levels, diabetes and obesity.

In those with heart failure, not addressing fluid and salt intake or taking account of dietary electrolyte levels could have serious adverse effects. In addition, a high alcohol intake could have a negative impact on patient recovery and needs to be addressed.

Intervention in Cardiovascular Disease

Raised blood pressure and Low Density Lipoprotein (LDL) cholesterol levels and low levels of High Density Lipoprotein (HDL) cholesterol are associated with heart disease. Many studies that combined lifestyle and pharmacological interventions to lower blood pressure and LDL levels and raise HDL cholesterol levels have consistently shown a reduction in vascular disease and its complications, stroke and heart attack. These studies

demonstrate that larger changes in blood pressure, LDL and HDL level results in more marked improvements in cardiovascular disease outcome.

European Perspective

The Third Joint Task Force of European and Other Societies on Cardiovascular Disease Prevention have published guidelines on cardiovascular disease prevention in clinical practice (2003). These guidelines state that the rationale to prevent cardiovascular disease is based on the following observations:

- Cardiovascular disease is related to atherosclerosis and is the major cause of premature death.
- Its mass occurrence relates to lifestyle and physiological factors that, if modified, reduce morbidity and mortality.
- Individuals with proven vascular disease or identified as being at high cardiovascular disease risk, should be targeted for intensive lifestyle interventions.

However, lifestyle intervention should be advised for everyone because of its overall health gain.

Nutrition constitutes a key element in one's lifestyle and nutritional changes can impact many of the known risk factors.

The nutritional recommendations of the Third Joint Task Force Report will be reflected in this guideline document. In addition, the British Dietetic Association recommends dietary intervention for all subjects with cardiovascular disease regardless of weight level or lipid status (Mead *et al*, 2006).

Table 1: Recommended European Target Levels (Third Joint Task Force, 2003)

Blood Pressure Targets

High cardiovascular disease risk	< 140/90
Diabetes	< 130/80

Lipid Targets

	General Goals	High Risk and Diabetes
Total Cholesterol	< 5 mmol/l	< 4.5 mmol/l
LDL Cholesterol	< 3 mmol/l	< 2.5 mmol/l

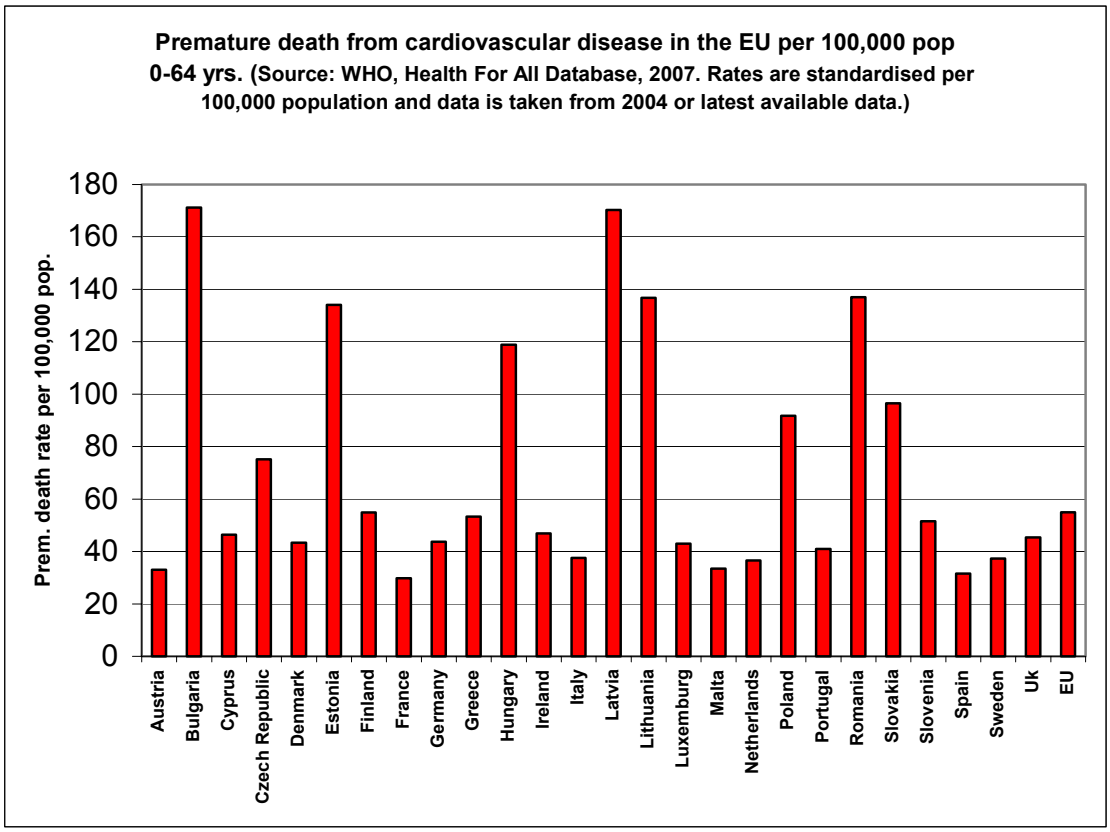
Diabetes Targets

HbA1c	< 6.1 %
Venous Glucose Fasting	< 6.0 mmol/l
Self Monitored fasting Glucose	4.0 – 5.0 mmol/l
Self Monitored post-prandial Glucose	4.0 – 7.5 mmol/l

Current Status of Cardiovascular Disease in Ireland

Although Ireland has witnessed a decline in premature cardiovascular disease over the last 20 years, we had a premature coronary heart disease death rate that exceeded the European Union (EU) average by 90%, prior to enlargement in 2004. Former Soviet and Eastern Block countries that have entered the EU have displaced Ireland from its pedestal as the EU leader in CV mortality. Nonetheless, our cardiovascular death rate is high despite our stage of development as a society. Stroke incidence has significantly declined and stroke mortality is on par with other countries that are currently in the EU. Similar risk factors are involved in stroke and coronary heart disease.

Figure 1: Death rates from cardiovascular diseases in European Union countries for persons aged 0-64 years.

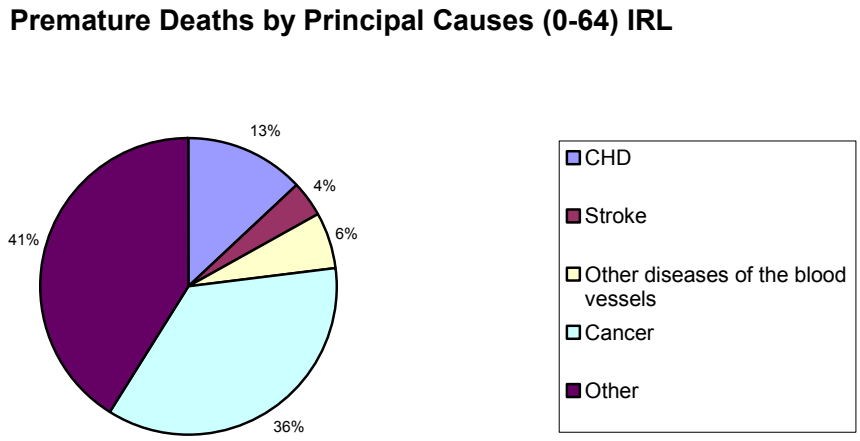


Cardiovascular Disease in Ireland

There is very little data available as regards the occurrence of cardiovascular disease morbidity and mortality in Ireland. Mortality figures are derived from the Central Statistics Office based on ICD codes (International Classification of Disease Codes). A recent study found that between 1985 and 2000, coronary heart disease mortality rates in Ireland fell by 47% in those aged 25-84. Some 43.6% of the observed decrease in mortality was attributed to treatment effects and 48.1% to favourable population risk

factor trends; specifically declining smoking prevalence (25.6%), mean cholesterol concentrations (30.2%) and blood pressure levels (6.0%), but offset by increases in adverse population trends related to obesity, diabetes and inactivity (-13.8%) (Bennett *et al*, 2006).

Figure 2: Principal causes of death in Irish People in 2005 (men and women, all ages, all causes) (Central Statistics Office, 2006).



Morbidity figures are not available but are being accumulated from the Hospital In–Patient Enquiry database.

Risk Factors Profile

The data used here is derived from the Irish Universities Nutrition Alliance North/South Ireland Food Consumption Survey, the Cork and Kerry Survey, the SLAN Survey and Heartwatch.

North/South Ireland Food Consumption Survey – Irish Universities Nutrition Alliance

The Irish Universities Nutrition Alliance carried out a Food Consumption Survey in both the North and South of Ireland (IUNA, 2001). Food intake was determined using a 7-day estimated food record where respondants keep a diary of everything they eat and drink over 7 days. The quantity of food intake is estimated using a photographic food atlas to assign weights to foods, some weighed intakes and weights from packaging. This method provides greater accuracy then the food frequency questionnaire but is also subject to inaccurate reporting.

The report showed that mean daily intakes of protein and fat were higher than current dietary recommendations but mean carbohydrate intakes were lower. More than 75% of adults did not meet the nutritional goal for dietary fibre. While intakes of most vitamins were adequate, women are not meeting the recommendations for calcium and iron.

Few women of reproductive age achieved the folate intake recommended for the prevention of neural tube defects.

The food groups that provide the greatest amounts of energy in the Irish diet are meats, breads, potatoes, dairy products and biscuits/cakes. Protein was provided by meat, dairy products and breads. Meat was also a large source of the fat intake along with spreading fats and oils, dairy products and biscuits/cakes. More than half of the carbohydrate was provided by breads, potatoes, biscuits/cakes, confectionery, and savoury snacks. IUNA have also recently conducted a survey of children's diets (5-12 year olds) in Ireland (IUNA, 2005) and fieldwork has been completed on 13-17 year olds.

Figure 3: Rates of Overweight and Obesity in Males and Females (18-64 years)

	Males	Females
Overweight	46%	33%
Obese	20%	16%

Cork and Kerry Diabetes and Heart Study

In this study 1,473 individuals were invited to attend for a 'study of health and lifestyle' of which 1,018 (70%) participated. Subjects were sampled from 17 general practices in Cork and Kerry between March and August 1998.

Main Findings:
Cardiovascular disease risk factors and glucose intolerance (diabetes mellitus and impaired fasting glucose) are common in the population of males and females between the ages of 50-69 years. Approximately half of the population had blood pressure readings consistent with international criteria for the diagnosis of hypertension but only 38% of these individuals were known to be hypertensive. Eighty percent of the population sample had a total cholesterol concentration ≥5mmol/L (Perry *et al*, 2002).

Figure 4: Mean Cholesterol Levels in Men and Women (50 – 69years)

Age 50 - 69 years	Men (n = 490)	Women (n=528)
Mean Cholesterol	5.61+/- 0.88 mmol/l	6.06 +/- 1.01 mmol/l

Figure 5: Percentage of Population (50 – 69years) with dyslipidaemia

Lipid Levels	Cholesterol > 5 mmol/l	Triglyceride > 1.7 mmol/l	LDLc > 3mmol/l	HDLc < 1.0 mmol/l F < 0.9 mmol/l M
% of Population	82.2 %	29.6 %	74.6 %	4.3 %

Figure 6: Hypertension > 140/90 mmHg Levels in Males and Females

	50 –54 yrs	55 –59 yrs	60 – 64 yrs	65 – 69 yrs	All
Males	39.7 %	52.9 %	55.3 %	55.0 %	50.7 %
Females	25.4 %	44.5 %	46.7 %	57.4 %	43.5 %

Figure 7: Prevalence Rates for Diabetes and Impaired Glucose Tolerance

Diabetes	3.9 % (95% CI 2.9 – 5.4)
Impaired Glucose Tolerance	2.5% (95% CI 1.6 – 3.6)

Figure 8: Rates of Overweight and Obesity in Males and Females 50 – 69years

	Males	Females
Overweight	58%	40%
Obese	24%	24%

The National Health and Lifestyle Surveys (SLÁN)

The Survey of Lifestyle Attitudes and Nutrition (SLÁN) was carried out in Ireland in 1998 and repeated in 2002 (Kelleher *et al*, 1999; Kelleher *et al,* 2003). Both postal surveys used a semi-quantitative food frequency questionnaire to collect information on the Irish diet. The total sample sizes in 1998 and 2002 were 6,539 and 5,992 respectively. On both occasions, a representative cross-section of the Irish population was surveyed, with a sample powerful enough to detect differences according to socio-economic status in key variables.

The survey reported very little change in energy intakes between 1998 and 2002 for the overall population. Males and young adults (aged 18 to 34) consumed more energy than older adults. The intakes were also higher in those with second level education only, rural dwellers and those who live with others.

Protein intakes increased slightly in 2002 with males consuming more protein. Fat intakes increased also during this period with males and those aged 18 to 34 obtaining more energy from fat than females or those in older age groups.

Intakes of fibre were higher among females, those aged between 35 and 54, those who completed secondary education, social classes 1 and 2, rural dwellers and those living with others. Intakes of vitamin C and calcium have increased since 1998. Iron intakes have not changed significantly and women aged between 18 and 34 do not meet the recommended intake for that age group.

Heartwatch

Heartwatch, the National Programme in General Practice for the Secondary Prevention of Cardiovascular Disease in Ireland, commenced in primary care in 2003 with the overall aim of reducing mortality and morbidity from this condition. The programme was agreed by the Department of Health and Children, the Health Service Executive (then Health Boards) and the Irish College of General Practitioners in collaboration with the Irish Heart Foundation. It presently targets about 20% of Irish general practice. Patients with a history of proven myocardial infarction, coronary artery bypass graft or percutaneous transluminal coronary angioplasty are registered in the programme and followed up at quarterly intervals by their own GPs or practice nurses. Data on patients and quarterly continuing care visits is sent from practices to an independent national data centre (Cox, 2006).

Figure 9: Results from Heartwatch for systolic BP, total cholesterol, LDL cholesterol and smoking

Risk factor target improvements: Illustrates percentage of patients who attended six visits with optimum risk factor control			
	1st visit (%)	4th visit (%)	6th visit (%)
Systolic BP	57	62	66
Total cholesterol	84	90	93
LDL cholesterol	67	75	81
Non-smokers	87	89	90

1.3 DIET AND CARDIOVASCULAR DISEASE – THE DIETARY BACKGROUND

Evidence for Action

Recent reports have summarised the most up-to-date evidence on diet and cardiovascular disease prevention. These include:

- Joint World Health Organisation/Food and Agricultural Organisation (WHO/FAO) *Expert Consultation Report on Diet, Nutrition and The Prevention of Chronic Diseases* (2003a);
- Third Joint European Societies' Task Force on Cardiovascular Disease Prevention in Clinical Practice: *European Guidelines on Cardiovascular Disease Prevention* (2003);
- European Heart Network (EHN) report: *Food, Nutrition and Cardiovascular Disease Prevention in the European Region: Challenges for the new Millennium* (2002) and
- *Nutrition and Diet for Healthy Lifestyles in Europe:* the Eurodiet Project (2001).

There is a large measure of consistency in the conclusions and recommendations in these reports on the population dietary goals for the prevention of cardiovascular disease. Population dietary goals, which reflect the characteristics of healthy populations, provide a benchmark against which national intakes can be monitored. Nutrition strategies for cardiovascular health promotion will also reduce risk of other nutrition-related diseases. Population dietary goals are the recommended average intake level for the population and may require modification for special groups, such as infants and children, pregnant women and older people and secondary prevention of cardiovascular disease and people with diabetes (see Sections 4 and 5). However, they also need to be translated into food-based dietary guidelines for effective nutrition education strategies. These Nutrition Guidelines makes recommendations for both population dietary goals and food-based dietary guidelines.

Population Goals

The four population goals which are supported by the strongest scientific evidence and which would give the largest public health gain are:

- A reduction in the intake of saturated fat and trans fat
- An increase in the consumption of fruit and vegetables
- A reduction in the intake of salt
- A reduction in body mass index (BMI).

The Third Joint European Societies' Task Force on Cardiovascular Disease Prevention in Clinical Practice (2003) collated the information from both the Eurodiet report and the European Heart Network report on population dietary goals and the levels of evidence to support them (Table 2).

Table 2: Population Dietary Goals by Level of Evidence (Third Joint Task Force (2003) derived from Eurodiet and EHN reports).

a) Goals* for which scientific evidence is strong and public health gain large

Saturated Fat	Less than 10% of dietary energy from saturated fat
Trans Fat	Less than 2% of energy from trans fats
Fruit & Vegetables	More than 400g/day
Salt	Less than 6g/day
Obesity & Overweight	BMI 20-25 kg/m^2 PAL† of more than 1.75 PAL

b) Goals* for which scientific evidence is moderate and public health gain moderate

Total Fat	Less than 30% of energy
Polyunsaturated Fat	n-6 polyunsaturated fat: 4-8% energy n-3 polyunsaturated fat: 2g/day of linolenic acid and 200mg/day of very long chain fatty acids

c) Goals* for which scientific evidence is weaker and public health gain smaller

Dietary Fibre	More than 25 g/day (or 3MJ) of dietary fibre and more than 55% of energy from complex carbohydrates
Folate from Food	More than 400 μg/day
Sugary Foods	Four or fewer occasions per day. Less than 10% of energy (WHO/ FAO)

* Goals from: European Heart Network's Nutrition Expert Group- Food, nutrition and cardiovascular disease prevention in the European Region: challenges for the New Millennium. European Heart Network, 2002. www.ehnheart.org

Body Mass Index (BMI) is an index of body fatness (weight in kilos/height in $metres^2$)

† Physical Activity Level (PAL) as the ratio of total energy expenditure to estimate basal metabolic rate. A PAL of 1.75 is equivalent to 60 min/day of moderate activity or 30 min/day of vigorous activity.

The WHO/FAO Expert Consultation report also summarises the strength of evidence on lifestyle factors (WHO, 2003a). This is summarised below in Table 3.

Table 3: Summary of Strength of Evidence on Lifestyle Factors and Risk of Developing Cardiovascular Diseases (WHO, 2003a)

Evidence	Decreased risk	No relationship	Increased risk
Convincing	- Regular physical activity - Linoleic acid - Fish and fish oils (EHA and DHA) - Vegetables and fruits (including berries) - Potassium - Low to moderate alcohol intake (for coronary heart disease)	- Vitamin E supplements	- Myristic and palmitic acids - Trans fatty acids - High sodium intake - Overweight - High alcohol intake (for stroke)
Probable	- α-linolenic acid - Oleic acid - Non-starch polysaccharide - Wholegrain cereals - Nuts (unsalted) - Plant sterols/stanols - Folate	- Stearic acid	- Dietary cholesterol - Unfiltered boiled coffee
Possible	- Flavonoids - Soya products		- Fats rich in lauric acid - Impaired foetal nutrition - β-carotene supplements
Insufficient	- Calcium - Magnesium - Vitamin C		- Carbohydrates - Iron

These dietary goals form the basis of the recommendations in these guidelines.

2.0 DIETARY RECOMMENDATIONS

The Food Pyramid is the nutrition education tool used in Ireland. As consumers choose foods and not nutrients, the Food Pyramid is useful in guiding consumers towards healthy food choices.

Foods with similar nutrients are grouped together on the same shelf of the Food Pyramid. The number of servings needed each day is given for each shelf. Choosing the recommended number of servings from each shelf, in the suggested portion size, helps provide a healthy, varied diet (DOHC, 2005b).

Figure 10: Food Pyramid Diagram

Following the Food Pyramid recommended servings will provide a range of key nutrients - energy, fat, protein, carbohydrates, vitamins, minerals and water. These nutrients and their contribution to cardiovascular disease are discussed below.

2.1 ENERGY

2.1.1 Energy Intake

Energy in foods is provided by carbohydrate, protein, fats and alcohol. Most foods contain varying proportions of carbohydrate, protein and fat. When energy intake (as food) exceeds energy output (as physical activity) this leads to an increase in body weight. A sustained increase in overweight leads to obesity.

Obesity and being overweight increases the risk of cardiovascular disease, Type 2 diabetes, certain cancers, arthritis and breathing problems. Obesity is both an independent and an aggravating risk factor for cardiovascular disease (DOHC 2005a). It increases the

impact of high blood pressure and raised blood cholesterol levels in the overall risk profile. It also leads to a vastly increased risk of diabetes. The link with Type 2 diabetes is perhaps the most serious effect of being overweight in terms of raising cardiovascular disease risk. The development of Type 2 diabetes is characterised by progressive resistance to insulin-mediated uptake of glucose from the blood. Even mildly impaired glucose tolerance is associated with an increased risk of cardiovascular disease. At least 80% of new cases of Type 2 diabetes can be attributed to excess weight gain (DOHC, 2005a).

Additional information on central obesity and recommended waist measurements are included in Section 5.2. Information on metabolic syndrome is included in Section 5.3.

Levels of overweight and obesity are high across the European region and levels of obesity are increasing rapidly in all age groups (WHO, 2006a). For example, from a self-reporting survey in Ireland, the National Health and Lifestyles Survey (SLÁN), obesity levels in adults have increased by 30% in the past 4 years - one in eight Irish adults is obese and almost every second person is overweight (Kelleher *et al*, 2003). Excess weight in later childhood tends to persist into adult life.

There is particular concern about the increase in prevalence of obesity and overweight in childhood and adolescence. Data from recent surveys indicates that one in ten Irish boys and girls (aged 5-12 years) is overweight and one in ten is obese (IUNA, 2005).

There are methodological challenges in comparing BMI in adolescents due to variation in the age of puberty and its associated increase in height. Data from comparable surveys in 13 European countries, Israel and the United States was combined and found that the prevalence of overweight from this survey showed similar trends, with the US adolescents reporting a higher prevalence of overweight than any of the European countries or regions or Israel. Other countries with significantly increased prevalence of overweight were Greece and Portugal (WHO, 2000).

Adult Population Goal:
BMI of 18.5 - 24.9 kg/m^2
A waist measurement of less than 94cm (37 inches) for adult men and less than 80cm (32 inches) for adult women.

Food-Based Dietary Guideline:
Individuals should eat the right amount of food, using the Food Pyramid as a guide, to achieve and maintain a healthy weight.

2.1.2 Energy Output (Physical Activity)

Energy output is the energy the body uses up through the Basal Metabolic Rate (BMR) that is the body's energy requirements while resting, plus daily activity and physical

activity. When energy intake (as food) exceeds energy output (as physical activity) this leads to an increase in body weight.

Apart from contributing to contributing to weight management, regular physical activity most significantly reduces morbidity and mortality from cardiovascular and other chronic diseases (USDHHS, 1996). Physical activity is a major independent protective factor against coronary heart disease and significantly reduces stroke and provides effective treatment of peripheral vascular disease (Chief Medical Officer, 2004). The Irish Heart Foundation's Position Statement on Physical Activity, published in 2000, summarised the evidence in relation to physical activity and cardiovascular risk factors and other diseases. Increased physical activity favourably affects blood lipids, obesity, hypertension, glucose tolerance and stress, which in turn positively impacts on the risk of cardiovascular disease. Regular physical activity favourably influences diabetes mellitus, osteoporosis, arthritis, obesity, respiratory disease and the physically challenged. It also has psychological, social and economic benefits (O'Brien *et al*, 2000).

In scientific articles, the usual way to recommend activity is as Physical Activity Level (PAL). PAL is the ratio of total daily energy expenditure to basal metabolic rate. A PAL of 1.4 would involve no physical activity and energy requirements would simply be those to satisfy the body's energy requirements while resting or BMR. A PAL of 1.75 is equivalent to 60 minutes per day of moderate activity or 30 minutes per day of vigorous activity (Third Joint Taskforce, 2003).

The Centre for Disease Control and the American College of Sports Medicine recommended a population goal of 'accumulating at least thirty minutes of moderate-intensity physical activity on at least 5 days a week', which has been adopted by many countries. (Pate et al, 1996). Shorter bouts of physical activity, of 10 minutes or more, accumulated through the day are as effective as longer sessions of activity, as long as total energy expenditure is the same (Chief Medical Officer, 2004).

While there is substantial evidence to support the health-related benefits of achieving and maintaining this recommendation, it has emerged that this level of physical activity may not be adequate to prevent excess weight gain (DOHC, 2005a).

Two international meetings proposed by consensus a recommendation of 45-60 minutes of moderate intensity activity to prevent the transition to overweight or obesity and between 60-90 minutes per day for weight loss and the prevention of weight gain after significant weight loss (Saris *et al*, 2002; IARC, 2002). These recommendations are proposed by the WHO / FAO Expert Consultation Report and in the Report of the National Taskforce on Obesity (WHO, 2003a; DOHC 2005a).

It is generally accepted that children and young people should be involved in at least 60 minutes of moderate physical activity each day (Pate, Corbin & Pergrazi, 1998). It is difficult to obtain objective longitudinal data on this population and with the recent rapid increase in childhood obesity, these recommendations may need be revised.

Large proportions of the population do not engage in regular exercise. Data from the National Health and Lifestyles Surveys (SLÁN) showed that in 2002, 51% (52% in 1998) of the Irish adult population reported engaging in some form of physical activity, 22% performing mild exercise four or more times per week, 32% doing moderate exercise three or more times per week, and 11% engaging in strenuous exercise three or more times per week (Kelleher *et al*, 2003; Kelleher *et al*, 1999). There were strong trends according to educational status, age and physical activity, with those having more education reporting more physical activity.

A survey carried out by the Economic Social Research Institute (ESRI) found that 22% of Irish adults were completely inactive, while 78% of adults took part in physical activity of some form (ESRI, 2004). Only 40% met the physical activity recommendations for health set by the WHO (2004a).

The North South Ireland Food Consumption Survey (IUNA, 2001) reported men to be significantly more active than women, and in different ways. Men were approximately twice as active in work and recreational activity as women, but women were three times more active in household tasks. The levels of physical activity declined with increasing age particularly leisure activity in men. Participation in recreational, particularly vigorous, activities was low. Walking was by far the most important leisure activity for both men (41%) and women (60%).

Population Goal:
Adults should accumulate 30 minutes or more of moderate-intensity physical activity most days (for general and cardiovascular health); To prevent the transition to overweight or obesity 45-60 minutes moderate-intensity most days is recommended and 60-90 minutes per day for weight loss and the maintenance of significant weight loss.

Children should be involved in at least 60 minutes of moderate-intensity physical activity each day.

2.2 TOTAL FAT

Fats play a key role in membrane structure in the body and are stored in adipose tissue as a fuel reserve. Fats in food provide a concentrated source of energy. Dietary fats also carry essential nutrients: fat-soluble vitamins and essential fatty acids. The main types of fat are saturated and unsaturated. Unsaturated fat includes monounsaturated and polyunsaturated fat.

Fat is the most energy-dense of nutrients, supplying 38kJ/9kcals per gram compared with 17kJ/4kcals per gram for carbohydrate or protein. There is robust evidence that an energy-dense, high-fat diet is an independent risk factor for weight gain and obesity (WHO, 2003a). The obesity-promoting effect of a high fat diet is enhanced in sedentary individuals, because physical activity levels alter the way dietary fat is utilised and stored

in the body. People with a familial or genetic predisposition to obesity are especially vulnerable.

The population goal of less than 30% energy from fat is based on the need to reduce the fat content of energy-dense diets for the prevention of obesity (EHN, 2002). Some scientists argue that because populations are sedentary, the goal should be as low as 20-25% of energy (Eurodiet, 2001). However, such diets tend to lower protective HDL cholesterol levels. Higher fat intakes, for example, 35% of energy, can be compatible with health, but only when high levels of physical activity are sustained throughout life (WHO, 2003a).

Previous evidence of an epidemiological association between total fat intakes and cardiovascular disease mortality has largely been attributed to accompanying high intakes of saturated fat. Where total fat intakes are high, but intakes of saturated fats are low, for example the traditional diet in Greece, cardiovascular disease rates are generally low. Studies comparing the effects of reducing total fat with replacing saturated fats with unsaturated fats at constant fat intake indicate that the most benefit is gained from a shift away from saturated fats to unsaturated fats (EHN, 2002).

Population Goal:
Short to medium term goal of less than 35% total food energy and medium to long term goal of 30 % of total food energy.

Food-Based Dietary Guideline:
Individuals should use less fat when cooking and eat less fried food. They should choose low-fat spreads, low-fat dairy products and lean meats. They should limit consumption of processed foods that contain a lot of fat, for example cakes, pastries, biscuits and savoury snacks.

2.2.1 Saturated Fats

Saturated fats and trans fats are the main dietary determinants of blood cholesterol levels. In turn, blood cholesterol levels strongly influence risk of coronary heart disease. The greater the proportion of dietary energy provided in the diet from saturated fat and trans fats, the higher the level of LDL cholesterol and the greater the risk of developing coronary heart disease. Without an underlying background of elevated blood cholesterol levels, other risk factors such as high blood pressure, cigarette smoking and physical inactivity have less impact on absolute population risk of coronary heart disease. This helps explain why countries such as Japan, where smoking rates are high, have low rates of coronary heart disease. Strategies to reduce blood cholesterol levels therefore deserve major attention.

Saturated fats are mainly derived from animal sources, such as meat and dairy products. Many hardened margarines and shortenings used in bakery products and processed foods also contain considerable amounts of saturated fats (as do certain vegetable oils such as coconut oil and palm oil). Dietary recommendations for coronary heart disease

prevention have consistently advised reducing intakes of saturated fat, usually to less than 10% of energy (Third Joint Taskforce, 2003). This figure is based on epidemiological evidence that there is a progressive fall in coronary heart disease mortality rates as intakes of saturated fat decline, to a threshold of below 10%. Reports on diet and cancer prevention also strongly recommend reducing animal fat consumption (WHO, 2003a).

Saturated fats raise total and LDL cholesterol, but individual fatty acids within this group have different effects (Grundy and Vega, 1988). Myristic and palmitic acids have the greatest cholesterol raising effect and are abundant in diets rich in dairy products and meat. Stearic acid has not been shown to elevate blood cholesterol and is rapidly converted to oleic acid in vivo (WHO, 2003a). The most effective replacement for saturated fatty acids in terms of coronary heart disease outcome is monounsaturated fat. This is supported by the results of several large randomised clinical trials, in which replacement of saturated and trans fatty acids by monounsaturated vegetable oils lowered coronary heart disease risk (Hu *et al*, 1997). Polyunsaturated fats, when eaten in large quantities, tend to lower HDL and enhance lipid per oxidation, especially in people with diabetes (Third Joint Taskforce, 2003).

Population Goal:
Intakes of saturated fats should be reduced to less than 10% energy.

Food-Based Dietary Guideline:
Individuals should limit consumption of foods rich in saturated fats such as butter, dripping, lard, suet, palm oil and foods made with these ingredients, fast food and high-fat meat and dairy products.

2.2.2 Unsaturated Fats

There are two main types of unsaturated fats - polyunsaturated and monounsaturated fats.

2.2.2.1 Polyunsaturated and Monounsaturated Fats

The two main families of polyunsaturated fats: omega-6 group found mainly in seed oils and polyunsaturated margarines, and the omega-3 group found mainly in fish oils and some seed oils. The most important polyunsaturated fatty acid is linoleic acid, which is abundant especially in soyabean and sunflower oils. The most important omega-3 polyunsaturated fats are eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) found in oil-rich fish, and alpha-linolenic acid found in plant foods.

The only nutritionally important monounsaturated fat is oleic acid, which is abundant in olive and canola/rapeseed oils and also in nuts (WHO, 2003a).

Certain polyunsaturates are essential fatty acids (fatty acids which cannot be made by the body and must be obtained from the diet) and there is a physiological requirement for them in the same way as for vitamins and minerals. Diets with at least 3% energy from polyunsaturates are considered sufficient to meet these needs.

Replacing saturated fat with unsaturated fats (whether mono- or poly-unsaturated) leads to a reduction in LDL cholesterol levels (Kris-Etherton, 1999; Mori and Beilin, 2001).

There is increasing evidence that omega-3 polyunsaturated fats are beneficial for heart health. Omega-3 polyunsaturated fats have anti-thrombogenic and anti-inflammatory effects, lower triglycerides levels and can reduce the risk of sudden death, arrhythmia and recurrent heart attacks (Kang and Leaf, 1996). Eating omega 3 fatty acids, from seafood and vegetable oils, seems to be particularly appropriate as it provides great protection against fatal cardiovascular accidents. It is the most important dietary advice for those with cardiovascular disease, as fish or fish oil supplements is dramatically protective, and rapidly so (Third Joint Taskforce, 2003)

Current low intakes of omega-3 polyunsaturated fats should be increased. This may mean that previous advice emphasising the value of types of oil rich in omega-6 polyunsaturated fat will need to be modified to encourage the use of foods high in omega-6 and omega-3 polyunsaturated fats (regular oily fish consumption 1-2 servings/week) in place of saturated fat sources. The Joint WHO/FAO Expert Consultation report suggests that the evidence for decreased risk of cardiovascular disease is convincing for linoleic acid, fish and fish oils (WHO, 2003a).

Population Goal:
Unsaturated fats (poly- and mono-unsaturated) should be less than 20% of total food energy, of which

- omega-6 polyunsaturated fat: 4 to 8% energy
- omega-3 polyunsaturated fat: 2g/day of linolenic and 200mg/day of very long chain fatty acids.

Food-Based Dietary Guideline:
Individuals should choose polyunsaturated oils, margarines and spreads such as those made from sunflowers, soya or corn (maize); and /or oils and spreads rich in monounsaturated fats such as those made from olives, rapeseed/ canola or peanuts.

Oily fish, including salmon, mackerel, fresh tuna, sea trout and sardines should be eaten once or twice a week.

2.2.2.2 Trans Fats

Trans fats are naturally present in relatively small amounts in fats (meat and milk) from ruminant animals, but the main dietary sources are margarines and shortenings used in baking products. Trans fats are formed during industrial processing when vegetable or fish oils are hydrogenated, or partially hydrogenated, to make hard or semi-solid fats. Trans fats are also formed in frying oils which are used repeatedly, and there are high levels in most frying oils used in restaurants and fast food chains (Mehta and Swinburn, 2001). Biologically, trans fats seem to behave in much the same way as saturated fats. Studies show that trans fats raise LDL cholesterol levels and also reduce levels of

beneficial HDL cholesterol. It is possible that trans fats are more harmful than saturated fats (Katan, 2000).

Several large cohort studies have found that intakes of trans fats increase the risk of coronary heart disease (Oomen *et al*, 2001; Willett *et al*, 1993). Most trans fatty acids are hydrogenated oils. Even though trans fatty acids have been reduced or eliminated from retail fats and spreads in many parts of the world, deep-fried fast foods and baked goods are a major and increasing source (Katan, 2000).

There is no specific data on the intake of trans fats in Ireland. However, in line with European recommendations in Table 2, these Guidelines are setting a population goal of less than 2% of energy intake from trans fatty acids (Third Joint Taskforce, 2003). The World Health Organisation has recommended reducing trans fats to 1% of energy intake (WHO, 2003a).

Population Goal:
Population average intakes of trans fatty acids should be reduced to less than 2% of energy.

Food-Based Dietary Guideline:
Individuals should avoid hard margarines and shortenings and limit consumption of fast food, cakes, biscuits and pastries made with these fats.

2.3 DIETARY CHOLESTEROL

Cholesterol in the diet increases LDL cholesterol levels in the blood, but to a much lesser extent than saturated fat, and the response varies widely among individuals (Hopkins, 1992). Foods high in cholesterol are usually also high in saturated fat, so that reducing intakes of saturated fat, as described previously, should lead to an accompanying fall in cholesterol intakes. Although there is some evidence of a relationship between cholesterol consumption and cardiovascular disease (Hopkins, 1992) no new population goal is included because dietary cholesterol intakes in Europe tend to be within the usual population goal of less than 300mg per day specified by expert groups and consensus documents (EHN, 2002).

Population Goal:
Average intakes of dietary cholesterol should be less than 300mg/day.

Food -Based Dietary Guideline:
Individuals should avoid excess consumption of foods high in dietary cholesterol such as eggs, shellfish and offal. It is recommended that the general population should consume no more than 7 eggs per week.

2.4 PROTEIN

Protein is the major structural and functional component of all body cells. Protein consists of amino acids joined by peptide bonds. Enzymes, membrane carriers, blood transport molecules, hair, fingernails, many hormones and a large part of membranes consist of protein. Protein provides 17kJ/4kcals per gram, although it is not usually required for energy on a daily basis. A variety of protein containing foods is required to provide sufficient protein and the necessary amino acid balance.

The main sources of dietary protein include meat, poultry, fish, eggs, milk, cheese, cereals and cereal products (e.g. bread), nuts and pulses (peas, beans and lentils). The quality of the protein is also important and that depends on the amino acids present. If a protein contains the essential amino acids (amino acids which cannot be made by the body and must be obtained from the diet) in the approximate proportion required by humans, it is said to be of high biological value. If it is comparatively low in one or more of the essential amino acids it is said to be of low biological value.

Nuts are a good source of protein and are rich in unsaturated fats. Several large epidemiological studies have demonstrated that frequent consumption of nuts was associated with decreased risk of coronary heart disease (Kris-Etherton *et al*, 2001) because of their contribution to lowering cholesterol, by altering the fatty acid profile of the diet as a whole. However, because of the high energy content of nuts, advice to include them in the diet must be considered in accordance with the desired energy balance.

Population Goal:
Aim for 10 to 5% of energy from protein. A balance of protein, fat and carbohydrate is important. About 50 to 55% of food energy should come from carbohydrate (preferably high fibre sources), 30% from fat and the remaining 10 to 15% from protein.

Avoid high protein diets as they may have negative effects on renal/kidney function.

Food-Based Dietary Guideline:
Individuals should choose a variety of protein-containing foods such as lean meats, poultry, fish (including oily fish) eggs, low fat milk and cheese, yoghurt, cereals and cereal products (such as bread), nuts and pulses (peas, beans and lentils).

2.5 CARBOHYDRATES

Carbohydrates can be classified into the following major groups: free sugars; short-chain carbohydrates; starch and non-starch polysaccharides (NSP) or fibre. In these guidelines they are broadly dealt with as complex carbohydrates, dietary fibre and sugary foods. They provide a substantial proportion of the energy in most human diets. NSP or fibre is necessary for a healthy digestion. Carbohydrate provides 16kJ/4kcal per gram.

2.5.1 Starch and Complex Carbohydrates

Starch and complex carbohydrates come from plant-based starchy foods such as bread, cereals, potatoes, pasta and rice. There is no evidence that high intakes of complex carbohydrates per se have any influence on cardiovascular disease risk. Rather, they generally occur in low-fat foods, which are suitable for making up the bulk of a lower-fat diet. They also tend to have a low glycaemic index, which leads to improved glucose control. Poor glucose control promotes atherosclerosis (EHN, 2002).

Population Goal:
More than 55% of energy.

Food-Based Dietary Guideline:
Individuals should consume a diet rich in fruit, vegetables, pulses, potatoes, wholemeal breads and wholegrain foods.

2.5.2 Dietary Fibre

Dietary fibre is the largely undigested component of plant-based foods that improves intestinal and bowel function. High-fibre diets are linked to the prevention and management of weight gain, obesity and diabetes. This effect is thought to be due to decreasing intestinal transit time, increased satiety and decreased hunger. Insoluble fibre, which is mainly derived from grain products, is responsible for stool bulking. Soluble fibres found in fruits, vegetables, certain cereals (oats) and particularly pulses (beans, lentils) affect intestinal function and metabolism. There is evidence that soluble fibre such as beta-glucans in oat bran lowers serum cholesterol (Anderson and Hanna, 1999). This effect may be partly attributed to the displacement of high-fat foods.

Population Goal:
More than 25g per day or 3g/MJ or 3g/240kcal

Food-Based Dietary Guideline:
Individuals should choose plenty of foods naturally rich in fibre such as wholegrain foods, pulses, fruit and vegetables.

2.5.3 Sugars

Several reports on diet and health recommend reducing sugar intakes. There is no evidence that sucrose is causally related to the development of cardiovascular disease. However, sugary foods tend to be energy dense and are often nutrient deplete, and it is sensible to limit sugar intakes to address the major problem of rising obesity rates in Europe. There is debate as to whether obesity is enhanced by consumption of high fat, energy-dense foods or just by an overload of calories, independent of the source (fat or sugar). The population goal established in the Eurodiet Core Report (Eurodiet, 2001) accords well with the goal of less than 10% of energy used in other reports including the WHO/FAO Expert Consultation report (WHO, 2003a).

Population Goal:
Less than 10% of energy of sugary foods

Food-Based Dietary Guideline:
Individuals should limit the frequency and amount of confectionery, sugar-sweetened drinks (including canned drinks), biscuits, cakes and desserts consumed.

2.6 VITAMINS

There is a range of vitamins - A, B group, C, D, E and K. Vitamins A, D, E and K are fat-soluble and vitamin C and the B group vitamins are water-soluble. The key vitamins associated with having a protective effect on cardiovascular disease are folate, a B group vitamin and the antioxidant vitamins A, C and E.

2.6.1 Folate

Intakes of folate across Europe are generally low and there are concerns that intakes are unlikely to meet nutritional requirements. Folate deficiency can induce neural tube defects in babies born to deficient mothers. Dietary folates are only 50% bioavailable, so supplements are usually recommended for women who may become pregnant or who are in the early stages of pregnancy.

Folates may also help protect against cardiovascular disease, by lowering levels of an artery-damaging compound, homocysteine, in the blood. Reduced plasma folate has been strongly associated with elevated plasma homocysteine levels and folate supplementation has been demonstrated to decrease those levels.

An elevated plasma homocysteine may also substantially increase the risk associated with smoking, hypertension and hyperlipidaemia (Ford *et al*, 1998). B vitamins are necessary for homocysteine metabolism, and low intakes are associated with raised homocysteine levels. Homocysteine levels are also genetically determined, and the commonest genetic determinant is associated with a somewhat increased risk of cardiovascular disease in folate-depleted individuals (Homocysteine Lowering Trialists' Collaboration, 1998). Folic acid reduces plasma homocysteine but it is not yet known whether this reduces risk of cardiovascular disease. Homocysteine increases the cardiovascular risk related to tobacco abuse, hypertension and dyslipidaemias (Graham *et al*, 1997). For the moment, it is recommended that conventional risk factors should receive careful attention in those with a raised plasma level of homocysteine.

A diet low in saturated fat but high in cereals, fruit and vegetables will tend to be high in folate. Meta-analysis (Law and Morris, 1998) has shown an inverse relationship between fruit and vegetable consumption and cardiovascular morality. This meta-analysis postulated, although speculatively, that the apparent benefit was more likely to relate to folate and potassium intake then to antioxidant vitamins and vitamin E. Smokers tend to have low folate levels.

Data from the Nurses' Health Study showed that folate and vitamin B6, from diet and supplements, conferred protection against coronary heart disease (Rimm *et al*, 1998). A recently published meta-analysis concluded that a higher intake of folate (0.8 mg folic acid) would reduce the risk of heart disease by 16% and stroke by 24% (Law and Morris, 1998).

As yet there is insufficient evidence to justify recommending folate supplements or fortification of foods with folate for cardiovascular disease prevention in the whole population. Increasing consumption of fruit, vegetables, pulses and whole grain cereals in accordance with the other population goals should improve population intake (Third Joint Task Force, 2003).

Population Goal:
More than 400g fruit and vegetables per day.

Food-Based Dietary Guideline:
Individuals should eat five portions of fruit and vegetables every day, choosing citrus fruit and juices and green leafy vegetables regularly and increase intakes of wholegrain cereals and seeds (DOHC, 2005b).

2.6.2 Antioxidant Vitamins

There is a widespread consensus that diets rich in a variety of fruit and vegetables are protective against the wide range of chronic diseases. Mortality and morbidity rates for coronary heart disease, stroke and several common cancers are lower amongst populations eating plenty of fruit and vegetables. Fruit and vegetables can also help reduce the risk of hypertension, help control diabetes, and promote healthy bowel function. The protection appears to be dose related; the more fruit and vegetables consumed, the better the protection. Quite small increases in fruit and vegetable consumption, for example one serving, have recently been found to be associated with significant benefits in cardiovascular disease and all cause mortality (Khaw *et al*, 2001).

The precise reasons why diets rich in fruit and vegetables are beneficial are uncertain. Most fruits and vegetables are virtually fat-free, rich in dietary fibre and contain more than 100 beneficial compounds that may be responsible for their protective effects. These include antioxidants such as vitamins C and E, carotenoids, flavonoids, folate, potassium, magnesium, and other non-nutritive bioactive constituents, such as phytoestrogens and other phytochemicals. It appears that the protective effects of fruit and vegetables are due to the collective action of the range of compounds they contain rather than any single compound on its own. Continuing research is required to provide clearer explanations for the observed beneficial effect of fruit and vegetables (Joshipura *et al*, 2001).

Population Goal:
More than 400g fruit and vegetables per day.

Food-Based Dietary Guideline:
Individuals should eat five portions of fruit and vegetables every day, choosing citrus fruit and their juices and green leafy vegetables regularly.

2.6.3 Vitamin Supplements

Vitamins, in the form of food, are more bio-available than in supplement form. There is currently no clear evidence to support the use of dietary supplements or food fortification to raise intakes of vitamins or minerals for cardiovascular disease prevention. Although antioxidant vitamins may be partly responsible for some of the protective effects of fruit and vegetables, there is insufficient evidence that the use of antioxidant vitamins alone is beneficial (Heart Protection Study Collaborative Group, 2002).

The Heart Outcomes Prevention Evaluation trial (HOPE), a definitive clinical trial relating vitamin E supplementation to cardiovascular disease outcomes, revealed no effect of vitamin E supplementation on myocardial infarction, stroke or death from cardiovascular causes in men or women (Yusuf *et al,* 2000). Also, the results of the Heart Protection Study indicated that no significant benefits of daily supplementation of vitamin E, vitamin C and ß-carotene were observed among the high-risk individuals that were the subject of the study. In several studies where dietary vitamin C reduced the risk of coronary heart disease, supplemental vitamin C had little effect. Clinical trial evidence on use of vitamin supplements is inconclusive at present (Heart Protection Study Collaborative Group, 2002).

Population Goal:
Higher intakes of antioxidants naturally occurring in foods. There is currently insufficient evidence to recommend that individuals should take dietary supplements of antioxidant vitamins, minerals or other compounds for cardiovascular disease prevention.

Food-Based Dietary Guideline:
Individuals should eat a healthy, varied diet, choosing foods from the Food Pyramid in the recommended amounts to obtain the necessary vitamins. Vitamins, in the form of food, are more bioavailable than in supplement form.

2.7 MINERALS

2.7.1 Sodium

Sodium intakes, principally from sodium chloride (salt), influence blood pressure and hence risk of hypertension, stroke and coronary heart disease. The association between salt intake and blood pressure is stronger in those with hypertension and in older and black individuals, who are particularly susceptible to hypertension. In Western societies,

blood pressure rises with age and is an important factor in the age-related susceptibility to cardiovascular disease.

All data show convincingly that sodium intake is directly associated with blood pressure. For primary prevention, lowering the average blood pressure of people with normal blood pressure as well as hypertensive individuals would be the best strategy for lowering cardiovascular disease rates. Proposals for population-wide reductions in salt intake have been controversial because of the lack of strong evidence that such an approach would significantly lower blood pressure in people without hypertension. However, the DASH II study indicated that sustained salt-lowering interventions are strongly supportive of a population-wide salt reduction (Sacks *et al*, 2001). Diets rich in fruit and vegetables, low in fat and low in salt offer the greatest potential for the prevention and treatment of elevated blood pressure.

Population Goal:
Less than 6g salt per day (2.3g sodium per day).

Food-Based Dietary Guideline:
Individuals should restrict use of salt in the home and limit consumption of manufactured foods high in salt such as prepared sauces, soups and meals, smoked and cured meats and salt-preserved foods and salty snacks from the top shelf of the Food Pyramid.

2.7.2 Potassium

There is some evidence that dietary potassium, which is principally derived from fruits and vegetables, may reduce blood pressure. A meta-analysis of randomised controlled trials showed that potassium supplements reduced mean blood pressure levels in normotensive subjects and in hypertensive subjects (Whelton *et al*, 1997). Several large short-term cohort studies have found an inverse association between potassium intake and risk of stroke (Asherio *et al*, 1998). While potassium supplements have been shown to have protective effects on blood pressure and cardiovascular disease, there is no evidence to suggest that long-term potassium supplements should be administered to reduce the risk for cardiovascular disease. The recommended levels of fruit and vegetable consumption will ensure an adequate intake of potassium. The Joint WHO/FAO Expert Consultation report suggests that the evidence for decreased risk of cardiovascular disease is convincing for increased potassium intake (WHO, 2003a).

Population Goal:
Increase potassium intake from fresh foods.

Food-Based Dietary Guideline:
Individuals should eat 5 portions of fruit and vegetables daily.

2.7.3 Calcium

Some studies also suggest that calcium may have a beneficial effect on blood pressure (Vollmer *et al*, 2001). The suggestion that higher calcium intakes may be responsible for the lower coronary heart disease rates in hard water areas, because calcium may reduce the absorption of saturated fat, is not proven.

Population Goal:
Increase up to 800-1000mg/day

Food-Based Dietary Guideline:
Choose 3 servings each day from milk, cheese and yogurt shelf of the Food Pyramid. Choose low fat dairy products frequently and follow the serving size guide.

2.8 FLUIDS

2.8.1 Water

Most people can meet their water needs by drinking when they are thirsty. The average adult needs about 2 litres per day (WHO, 2003b). Beverages including water, milk, tea, coffee, fruit juices and squashes, carbonated drinks and alcohol all contribute to water needs. Food usually provides a fifth of daily water needs. Healthier drinks such as low fat milk and fruit juices should be taken daily as well as at least 8 glasses of water.

2.8.2 Sugary Drinks

Carbonated sugary drinks should be limited, as they have been linked to dental decay and to overweight and obesity in children. WHO have summarised the evidence on factors that might promote weight gain and obesity and have concluded that there is 'probable' evidence that a high intake of sugar-sweetened soft drinks and juices are associated with an increased risk of weight gain (WHO, 2003a). There is also probable evidence that the heavy marketing of energy-dense foods (i.e. processed foods high in sugar and/or fat) promote weight gain and obesity. It is thought that sugar sweetened beverages have a low satiating effect and that individuals are poor at adjusting food intake to account for the energy taken in through beverages (Torduff and Alleva, 1990; Harnack *et al,* 1999; Ludwig *et al,* 2001). It has been estimated that for each additional can or glass of sugar-sweetened drink consumed by a child increases the odds ratio of becoming obese 1.6 times (Ludwig *et al*, 2001). Most of the evidence relates to sugar-sweetened carbonated drinks but many fruit drinks and cordials are equally energy-dense and may promote weight gain if consumed in large quantities (WHO, 2003a). A recent systematic review of sugar-sweetened beverages and weight gain found that a greater consumption of sugar-sweetened beverages is associated with weight gain and obesity and sufficient evidence exists for public health strategies to discourage consumption of sugary drinks (Malik *et al, 2006).*

2.8.3 Coffee

The Joint WHO/FAO Expert Consultation report states that coffee is a 'probable' risk factor for cardiovascular disease (WHO, 2003a). Boiled, unfiltered coffee raises total and LDL cholesterol because coffee beans contain a lipid called cafestol. The amount of cafestol in the cup depends on the brewing method: it is zero for paper-filtered drip coffee and high in the unfiltered coffee traditionally drunk in Scandanavian countries. Intake of large amounts of unfiltered coffee markedly raises serum cholesterol and has been associated with coronary heart disease in Norway (WHO, 2003a). A shift from unfiltered, boiled coffee to filtered coffee has contributed significantly to the decline in serum cholesterol in Finland. In Ireland, the consumption of unfiltered boiled coffee is estimated to be low (James, 1997; 2004). See Section 6.3.

2.8.4 Alcohol

Alcohol contains little or no nutritional value apart from its energy value. It provides 29kJ/7kcal per gram. There is convincing evidence that low to moderate alcohol consumption lowers the risk of coronary heart disease (EHN, 2002). There is some evidence that moderate alcohol consumption may lower risk of coronary heart disease in middle-aged and older men and in post-menopausal women (Rimm, 1999; European Heart Network, 2002). However, consumption of more than two drinks of alcohol per day for men and one for women increases risk of high blood pressure, strokes and certain cancers (EHN, 2002). There is no reliable proof showing any higher cardiovascular benefit of any drink, compared with another (Third Joint Task Force, 2003).

The Joint WHO/FAO Expert Consultation report suggests that the evidence for decreased risk of cardiovascular disease is convincing/strong for low to moderate alcohol intake. The evidence for increased risk of stroke is convincing/ strong for high alcohol intake (WHO, 2003a).

The Third Joint European Societies' Task Force on Cardiovascular Disease Prevention in Clinical Practice concluded that, where there are no contraindications to alcohol use, individuals at high cardiovascular risk do not have to be discouraged if they consume between 10-30g ethanol a day or 1-3 standard drinks (men) and 10–20g ethanol a day or 1-2 standard drinks (women). However, consumption of more than two drinks of alcohol per day for men and one drink for women increases risk of high blood pressure, stroke and certain cancers. Alcohol consumption is also known to contribute to hypertriglyceridaemia (Third Joint Task Force, 2003).

Population Goal:
Moderate alcohol consumption if alcohol is consumed.

Food-Based Dietary Guideline:
Individuals should have no more than the recommended upper limits: 21 standard drinks of alcohol a week for men and 14 standard drinks for women, spread out over the week. One half pint of beer, stout or lager; one small glass of wine; one glass of spirits (whiskey, vodka or gin) is equal to 1.0 standard drinks.

Table 4: FOOD GROUP RECOMMENDATIONS

Fruit & Vegetables	**Population Goal:** Intakes of fruit and vegetables should be more than 400g per day.
	Food-Based Dietary Guideline: Eat 5 portions of fruit and vegetables each day.
Bread, Cereals, Potatoes, Rice & Pasta	**Population Goal:** Intakes of cereal products and potatoes should be increased from current levels if low, maintained at current levels if high.
	Food-Based Dietary Guideline: 6 or more servings of starch and complex carbohydrates should be achieved by consuming more wholemeal bread, other cereals and potatoes. Individuals should eat wholegrain cereal products or potatoes with every meal.
Fish	**Population Goal:** Intakes of fish should be increased from current levels if low, maintained at current levels if high.
	Food-Based Dietary Guideline: Eat fish at least twice a week – one white (such as cod, haddock, plaice or whiting) and one oily fish (such as salmon, mackerel, herring, sardines and trout).
Meat & Dairy Produce	**Population Goal:** Intakes of fatty meat products and full-fat dairy products should be reduced from current levels if high.
	Food-Based Dietary Guideline: Choose lean meats and low-fat dairy produce.

2.10 PRODUCT DESIGN AND FOOD LABELLING

Food product design, its role in the food supply and its potential for influencing food shopping and eating behaviours cannot be over-emphasised. There is a need for traditional foods and convenience foods to be manipulated so that they meet the healthy

eating guidelines. Given the changes in social patterns where families in many countries have both partners working, healthy convenience foods in recommended portion sizes are needed urgently. The EU Platform for Action on Diet, Physical Activity and Health is working with the food and drinks industry to achieve this (EU Commission, 2005).

Food labelling is an essential component of consumer choice. Research has shown that labels are often confusing, particularly food labelling which prevents the consumer from making an informed purchasing decision (EHN, 2003). The WHO Global Strategy on Diet, Physical Activity and Health recommends that consumers should have accurate, standardised and comprehensive information on the content of food items in order to make healthy choices (WHO, 2004a).

There is an important role here for the appropriate food agencies in conjunction with the food industry and consumer groups, to ensure that labelling is accurate, consistent, user-friendly and contains information on portion sizes and nutrient content.

The EU labelling regulations are under review and an important component of successful new labelling will be a consumer education campaign to provide the consumer with adequate skills to use the label to make healthy food choices at the point of sale. The proposed nutrition and health claims regulation is at an advanced stage, however nutrient profiling, favoured by many countries, is a controversial, and not yet finalised. The EU has asked European Food Safety Authority (EFSA) to draw up nutrient-based dietary guidelines for EU member states. When these pan-European nutrient-based guidelines are available, member states can then draw up national Food Based Dietary Guidelines as applicable to each of their specific food consumption intake patterns and incidence of diet related diseases.

Catering institutions and eating establishments, for example restaurants, workplaces and schools, need to make healthy eating possible by ensuring that all catering facilities provide healthy options (EU Commission, 2005).

3.0 MORE HEART HEALTH RELATED ISSUES

3.1 Functional Foods

Functional foods are foods that claim to improve well-being or health. Many functional foods contain added vitamins, minerals and other essential nutrients. Common examples of functional elements in foods are:

1. Stanol esters and plant sterols reduce cholesterol in those on an average diet (see Table 2) but may lack efficacy in those already on a low fat diet and long-term effects on heart disease remain to be shown.
2. Omega -3 fats are also being added to foods such as eggs and milk.
3. Effects of probiotics on cardiovascular disease are insufficiently substantiated.

Foods and food components could prevent or ameliorate many diseases, but more research is required to identify effective ingredients and substantiate their efficacy and safety (American Dietetic Association, 2004).

Functional foods containing physiologically active components, either from animal or plant sources, may enhance health (Irish Heart Foundation, 2006). However, functional foods are not a magic bullet or universal panacea for poor health behaviours. Emphasis must be placed on the overall dietary pattern, and the Irish Heart Foundation recommends following the Department of Health and Children's Healthy Eating Guidelines, using the Food Pyramid servings to ensure a healthy, varied eating plan.

Some functional food products on the Irish market, claim to help lower cholesterol and blood pressure. These products may help in small ways, however they are not a replacement for continuing to take prescribed medication or a substitute for following healthy eating advice to choose five servings of fruit and vegetables and eat less salt.

3.2 Flavanoids

Flavanoids are polyphenolic compounds that occur in a variety of foods of vegetable origin, such as tea, onions, and apples. Data from several prospective studies indicate beneficial effects for dietary flavanoids on coronary heart disease (see Table 3). However, observational studies give conflicting results (Keli *et al*, 1996).

3.3 Garlic

Garlic has organic sulphur compounds, which may lower cholesterol. Several high quality systematic reviews suggest that there is a modest lipid lowering effect of garlic supplementation, however, all state that this is not conclusive as randomised control trials are of low quality and may be biased (Hooper *et al*, 2004).

3.4 Soya

Soya is rich in isoflavones, compounds that are structurally and functionally related to oestrogens. Several trials indicate that soya has a beneficial effect on plasma lipids and may provide protection against coronary heart disease, however data on efficacy and safety is awaited (Messina and Erdman, 2000). (See Table 3).

3.5 Fad Diets

Weight loss occurs when fewer calories are taken in than are needed for daily activities. The best way to lose weight is by following a long-term healthy eating plan, restricting fat, sugars and alcohol, combined with daily physical activity (Irish Heart Foundation, 1996).

Fad diets 'work' in the short-term if they focus on people consuming fewer calories than they expend, however not without possible health and psychological consequences. The American Heart Association's [n.d.] opinion on fad diets is that they:

- Can undermine people's health,
- Are so monotonous they cannot be followed for long,
- Cause physical discomfort, and
- Lead to disappointment when people regain the weight afterwards.

There are various types of fad diets including:

- Low carbohydrate, high protein diets, such as the Atkins diet and the Zone Diet.
- Food combining
- Blood type diets

Given the popularity of the low carbohydrate, high protein diet, it is important to recognise the health consequences of high protein diets. A high-protein diet tends to be high in saturated fat, which may affect blood cholesterol levels and increase risk of heart disease. Following a high protein diet may cause liver and kidney damage, some cancers, and osteoporosis. In the short-term it can result in bad breath and constipation. There are no long-term studies to show that this diet works or is safe. Until more is known about the true risks and benefits of high-protein/low-carbohydrate diets, they should be viewed with caution. Diets that incorporate all food groups are associated with better health and longer life (INDI, 2005).

Diet supplements such as Conjugated Linoleic Acid (CLA); Chromium and Chitosan have shown little benefit with not enough evidence to suggest they could be useful in managing overweight or obesity.

Losing small amounts of weight slowly and focusing on behaviour change, including regular physical activity provides the most effective way to lose weight and stay a healthy weight (O'Meara *et al*, 1997). Many people find weekly weight-reducing group meetings and daily walking groups a good support mechanism.

4.0 SPECIAL GROUPS

4.1 Maternal Nutrition

A varied and balanced diet with adequate amounts of energy and nutrients is essential both before conception and during pregnancy. The Food Pyramid can be used as a guide. During pregnancy, extra servings are needed from the meat, fish and alternatives shelf and from the milk, cheese and yogurt group. For breastfeeding mothers, extra servings from the milk, cheese and yogurt group are required (DOHC, 2005b).

Evidence indicates that the maternal diet influences the health of the baby in the short-term as well as in the long-term. This is a current area of research and is particularly concerned with how the maternal diet influences the later adult risk of cardiovascular disease (Barker, 1990).

It is important for women to be a healthy body weight prior to conception. Overweight and obesity increases the risk of complications during pregnancy such as hypertension and diabetes**.**

An adequate intake of folic acid is essential in advance of conception and during the first 12 weeks of pregnancy. Ensuring a diet rich in folic acid can help to prevent neural tube defects such as spina bifida. To achieve the recommended intake of 400µg per day it is necessary to take a daily folic acid supplement, as it is difficult to meet the requirement through diet alone (Food Safety Authority of Ireland/Department of Health and Children, 2006). Good food sources of folic acid include dark green vegetables and oranges as well as some fortified foods such as breakfast cereals and milk.

A pregnant woman has increased energy and nutrient requirements to fuel the baby's growth. Although women should not restrict their food intake or go on slimming diets when pregnant, there is no need to increase food intakes significantly until late pregnancy.

4.2 Childhood Nutrition

The nutrition and dietary habits of children (2-18 years) are complex and these are discussed in detail in the World Health Organisation Global Strategy for Infant and Young Child Feeding (WHO, 2003c) The Irish Heart Foundation and National Heart Alliance (NHA) developed a Statement on Childhood Nutrition (IHF/NHA, 2002). The main conclusions of this statement appear in Appendix 3. The statement concludes that recommendations for the prevention of cardiovascular disease among adults are not suitable for children. The higher energy needs of children suggest a less restrictive threshold for fat intake (no more than 35%). Furthermore, as the child grows, energy requirements change, therefore three broad age-bands have been chosen namely, under two years, two to five years and over five years and recommendations for fat intake for each of these age bands are given below:

Under two years: milk is the first food and one half of the total energy requirement is met by the fat or lipid fraction of milk. Wherever possible, breastfeeding is to be recommended. As the infant is weaned and spoon feeds are introduced, the amount of energy derived from milk fat decreases. However, breast milk or formula milk should remain the primary nutrient source for the first year and whole cows' milk for the second year**.**

Children between two and five years: a gradual reduction in fat intake to approximately 35% of energy requirements is to be recommended. This reduction in fat can best be achieved by choosing mainly foods rich in unsaturated fats, using the Food Pyramid as a guide.

Children older than five years: require a moderate intake of fat (no more than 35% of energy from fat) with an emphasis on those high in monounsaturated and polyunsaturated fats. In the United States, the upper limit of fat intake has been set at 30% as in the case of adults. However, because of fears that children may not receive sufficient energy from non-fat sources, the upper limit has been set at 35% in Ireland and UK.

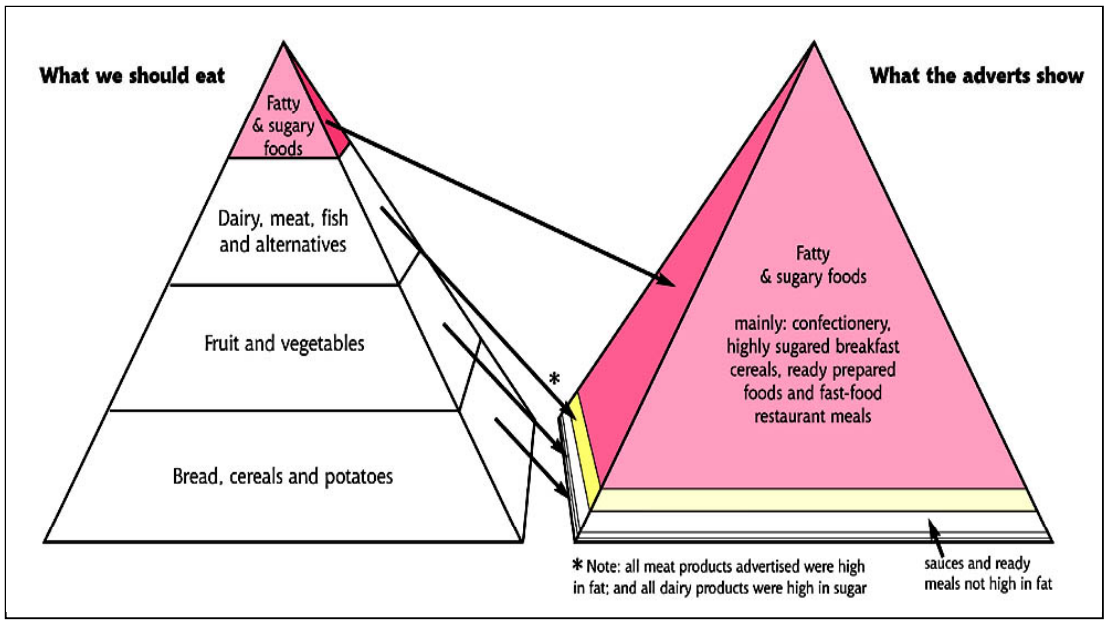
The Childhood Nutrition Statement also highlights the fact that cardiovascular disease is multi-factorial and for cardiovascular disease prevention to succeed, advice on childhood nutrition should be considered as part of an integrated programme including other lifestyle issues, such as physical activity and tobacco smoking.

Food marketing to Children

The media is one of the most popular vehicles through which consumers receive information and is powerful in influencing food selection and health behaviours (Hastings *et al*, 2003). Foods that are high in fat, sugar and salt attract most of the spend on advertising and this is reflected in their high sales (Sustain, 2001). The International Association of Consumer Food Organisations (2003) has highlighted the types of food that are advertised the most compared to the recommended dietary guidelines.

Figure 11: Proportion of the types of foods advertised in relation to the Food Pyramid

(Source: International Association of Consumer Food Organisations, 2003)



There is growing concern about the level and content of food marketing to children (EHN, 2005). Food marketing has been shown to have an effect on children, and particularly on their food preferences and their purchasing behaviour (Hastings *et al*, 2003; McGinnes *et al*, 2006). The promotion of food products takes cognisance of the fact that children are attracted by foods in bright packaging and those accompanied by free gifts or promoted by cartoon characters. Foods marketed at children, for example chocolates, crisps, sugar-sweetened drinks, sugar-coated breakfast cereals and fast food meals, are high in fat, sugar or salt and are among the most heavily promoted, especially by television. These foods differ strongly from those recommended for healthy diets. An expert report from WHO/FAO concluded that the aggressive marketing of these types of food and drinks to young children could increase their risk of becoming obese (WHO, 2004b).

An EU Nutrition Policy Development Group on the Food Promotion and Marketing to Children (2005) was established under the UK Presidency and made the following key recommendations:

- Children should not be targeted by advertising, which exploits their credulity and lack of media literacy. There is a need for tighter control on advertising and promotion of foods that are considered less healthy (foods high in fat, sugar and salt).

- Monitoring activity should be carried out by an independent body, possibly at national level.

- A harmonized approach across the European Union. The European Commission, Member States, industry and consumer organisations should work together on the issue of food marketing to children, through for example the TV without Frontiers Directive for broadcast advertising and other mechanisms for non-broadcast advertising (EU Nutrition Policy Development Group DH, UK, 2005).

The Broadcasting Commission of Ireland (BCI) has developed a mandatory Children's Advertising Code, which includes restrictions on food promotion and marketing to children and research into children's TV viewing patterns (BCI, 2003).

4.3 Older People

Older people, who are healthy and fit, have similar nutritional needs to the general population, but special attention needs to be given to fibre, calcium, salt and cholesterol (FSAI, 2000).

As people age, the need for calories decreases by about 25%. As a result some people tend to put on weight. This can be due to the change in metabolism or because they are less active.

Constipation can be a common complaint amongst older people, especially those with decreased mobility. A high fibre intake is very important to prevent constipation. The fibre found in fruit and vegetables, peas, beans, lentils and oats may also help to reduce cholesterol levels and control blood sugar levels. Foods such as fruit and vegetables, wholemeal breads, cereals should be included in the daily diet. It is very important to increase fibre intake gradually and to also increase fluid consumption. Fibre- rich foods also have a high satiety value and therefore help control weight.

Calcium is needed for building and maintaining strong bones. It also helps the muscles, heart and nervous function properly. Loss of calcium from the bones is part of ageing and can lead to a condition called osteoporosis where the bones become weak and break easily. Once the calcium is lost from the bones it is difficult to replace it, but a daily supply of calcium and Vitamin D will protect against the development and progression of osteoporosis.

The risk of developing high blood pressure increases with age. Excess salt (sodium) can increase blood pressure, which in turn can cause heart disease, stroke and kidney disease. It can also affect the balance of calcium in the body.

Cholesterol levels increase with age. Cholesterol is needed for a healthy nervous system, good digestion and to produce important hormones in the body. Cholesterol can build up inside the blood vessel walls and contribute to hardening of arteries. Saturated fat is converted into cholesterol in the body. Foods rich in saturated fat should not be eaten regularly. On the other hand foods rich in polyunsaturated fats and monounsaturated fats can lower cholesterol levels when used in the diet instead of saturated fat. The total amount of fat eaten is important too, as it can cause weight gain (FSAI, 2000).

5.0 SPECIAL CONDITIONS

5.1 Hypertension

Hypertension is an increasingly prevalent condition in Ireland affecting in excess of 50% of those over 50 years of age (Perry *et al*, 2002). Nutrition has important influences on blood pressure levels (WHO/International Society of Hypertension, ISH, 1999; Sacks *et al*, 2001). Interventions to control hypertension are therefore necessary at both the individual and population level.

Salt

Salt (sodium chloride) consumption needs to be in the region of 3g/ day, and less in children, to satisfy metabolic needs. Salt concentrations in excess of this have the potential to produce fluid retention and hypertension. Individual salt consumption on average is in the region of 10–12g per day, which is much higher than the recommended intake of 6g per day (FSAI, 2006). Most salt intake is in the form of processed foods, fast food, canteen and restaurant food which account for approximately 65 – 70% of dietary salt intake. About 15 – 20% is added at home in cooking or at mealtime and 15% occur naturally in food (FSAI, 2006). Choosing more fresh foods and less processed food, using alternative flavourings in cooking and avoiding ready made sauces will correct dietary salt intake. Salt reduction translates into better blood pressure levels and avoids fluid retention particularly in those with heart failure.

Alcohol

Alcohol induces hypertension by enhancing the sympathetic system thereby increasing heart rate, force of contraction and vasoconstriction (Rimm, 1999). It also reduces the sensitivity of baroreceptors, which normally act to reduce blood pressure levels. Those who have high blood pressure should minimise their alcohol intake to less than 10 units per week (see Section 2.8.4).

Calories

Excess intake of dietary calories results in obesity, particularly central obesity, which increases insulin resistance and hypertension (WHO/ISH, 1999). Weight reduction in overweight hypertensive persons can induce modest weight loss (in the range of 3-9% of

body weight) and is associated with modest blood pressure decrease of approximately 3mmHg systolic and diastolic blood pressure (Brand *et al*, 2000). Weight reduction may decrease dosage requirements of persons taking anti-hypertensive medications (Brand *et al*, 2000).

Potassium, calcium and magnesium

A high potassium intake reduces hypertension and improves blood pressure control in patients with hypertension. The effect of sodium (salt) on blood pressure may be modulated by dietary potassium so that the ratio of sodium to potassium in the diet can be more important than the absolute amount of either (FSAI, 2006). Potassium is found in meat, milk, vegetables, potatoes, fruit and fruit juices, bread, fish, nuts and seeds. Ensuring adequate amounts of calcium and magnesium in the diet is important to protect against high blood pressure (WHO/ISH, 1999**).** Sources of calcium include milk and dairy products, soft bones in canned fish, bread, pulses, green vegetables, dried fruit, nuts and seeds. Foods containing magnesium include cereals and cereal products, meat, green vegetables, milk, potatoes, nuts and seeds.

Physical activity

Hypertension can be both prevented and treated by physical activity. Moderate- intensity aerobic exercise is associated with reductions in both systolic (3.8mmHg) and diastolic (2.6mmHg) blood pressure (Whelton *et al,* 2002). See section 2.1.2 for physical activity recommendations.

5.2 Obesity

Overweight and obesity are associated with an increased risk of cardiovascular disease (Calle *et al*, 1999). Obesity is the most common nutritional disorder in the world and is increasing at an alarming rate (WHO, 2006a). 18% of the Irish population are obese (20% of men and 16% of women) and 39% are overweight (46% of men and 33% of women). Since 1990, the prevalence of obesity has increased 1.25 fold in women and 2.5 fold in men (IUNA 2001).

Body weight is defined according to BMI [weight in kilos / height in metres, squared]. The National Taskforce on Obesity proposes the World Health Organization BMI range of 18.5 to 24.9 as an appropriate population goal for Ireland (DOHC, 2005a). The Eurodiet Core Report notes that new studies are now suggesting an optimum individual BMI of about 20, recommending a mean population goal of BMI of 21 to 22 as the optimum level to limit the likelihood of underweight and overweight (Eurodiet, 2001). The European Heart Network suggests a more achievable European population goal of 23 based on this optimal population goal and an analysis of current levels of overweight across the European region (EHN, 2002).

The pattern of fat deposition is largely governed by genetic factors. Overweight/obese men with a waist measurement over 94cm, and overweight/obese women over 80cm are at increased risk of cardiovascular disease (WHO 2000; DOHC, 2005a).

The distribution of body fat is recognised as a risk factor for cardiovascular disease independent of BMI (Lapidus, 1984). Central obesity where excessive fat is distributed around the abdomen ('apple shaped') confers greater risk than peripheral obesity where fat is distributed about the hips and thighs ('pear shaped') (Ashwell, 1996). Overweight and abdominal obesity are associated with a number of important metabolic abnormalities, including low HDL cholesterol, raised triglycerides and LDL cholesterol in the blood, raised blood pressure, glucose intolerance, insulin resistance with progressive resistance to insulin-mediated uptake of glucose from the blood (see Section 2.1). These metabolic abnormalities tend to cluster in obese subjects. Even mildly impaired glucose tolerance is associated with an increased risk of cardiovascular disease. Obesity greatly increases risk of diabetes, which in turn greatly increases risk of cardiovascular disease.

Health Implications

Being overweight and obese increases the risk of:

- Coronary heart disease (related to increased lipids and hypertension)
- Hyperlipidaemia and a low HDL cholesterol level
- Stroke (related to blood pressure rise)
- Blood pressure elevation (progressive with weight gain, especially with abdominal obesity.
- Type 2 diabetes (DOHC, 2005a)

Overall obese people are two to three times more likely to die prematurely than their lean counterparts (Calle *et al*, 1999). Weight reduction is strongly recommended for obese people.

Dietetic Treatments

The aim of dietary treatment for obesity is to prevent further weight gain, encourage healthier eating patterns, to promote weight loss and decrease other risk factors such as hypertension and hyperlipidaemia, if present (DOHC, 2005c). Dietary therapy consists, in large part, of advising patients on how to modify their diets to achieve a decrease in caloric intake (DOHC, 2005c). An energy deficit of between 500-1000kcals per day from the energy required to maintain weight will lead to a decrease of 0.5-1.0kg (1-2lbs) per week. Dietary educational efforts should pay particular attention to the following topics:

- Energy values of different foods
- Food composition – fats, carbohydrates (including dietary fibre) and protein
- Reading nutritional labels to determine caloric content and food composition
- New habits of purchasing – preference to low calorie and low fat foods
- Food preparation – avoiding adding high-calorie ingredients during cooking
- Maintaining adequate water intake
- Reducing portion sizes
- Limiting alcohol consumption

(Third Joint Taskforce, 2003)

The weight reducing diet must also be sufficiently flexible to take into account a person's taste, financial status and other aspects of their lifestyle. Essential components for weight management programmes are dietary modification and alterations in physical activity, with cognitive behavioural therapy techniques incorporated to achieve the best outcome. Aims need to be realistic and agreed between client and therapist. Weight loss of approximately 5-10% of body weight reduces risk factors for cardiovascular disease (Anderson and Konz, 2001). Further weight loss may be considered after the initial goal is achieved and maintained for 6 months.

Pharmacotherapy
The anti-obesity agents approved for use in Ireland are orlistat (Xenical) and sibutramine (Reductil) (DOHC, 2005c).

Surgical Treatment
The two major types of present operations for severe obesity are vertically banded gastroplasty and Roux-en-Y gastric bypass (DOHC, 2005c).

5.3 The Metabolic Syndrome

People with the metabolic syndrome are at increased risk of coronary heart disease and other diseases related to plaque build-up in artery walls such as stroke, peripheral vascular disease and type 2 diabetes (Grundy, 2000; Third Joint Taskforce, 2003). The underlying causes of this syndrome are overweight or obesity, physical inactivity and genetic factors.

The metabolic syndrome is characterised by a group of metabolic risk factors in one person (National Cholesterol Education Programme (NCEP), 2001; WHO, 1999). They include:

- Central obesity - excessive fat tissue in and around the abdomen;
- Atherogenic dyslipidemia blood fat disorders (mainly high triglycerides and low HDL cholesterol) that foster plaque build-up in artery walls;
- Insulin resistance or glucose intolerance - the body can't properly use insulin or blood sugar;
- Prothrombotic state, such as high fibrinogen or plasminogen activator inhibitor in the blood;
- Raised blood pressure
- Pro-inflammatory state, such as elevated high-sensitivity C-reactive protein in the blood.

<u>Childhood and Adolescence</u>
The clustering of risk factor variables occurs as early as childhood and adolescence, and is associated with atherosclerosis in young adulthood and thus risk of later cardiovascular disease (Bao *et al*, 1994; Berenson *et al*, 1998). This clustering has been described as the

metabolic syndrome or syndrome X (Reaven, 1988; DeFronzo and Ferrannini, 1991). Raised serum cholesterol both in middle age and in early life are known to be associated with an increased risk of disease later on. The Johns Hopkins Precursor Study showed that serum cholesterol levels in adolescents and young white males were strongly related to subsequent risk of cardiovascular disease mortality and morbidity (Klag *et al*, 1993).

5.4 Diabetes

Type 2 diabetes, formerly known as non-insulin-dependent diabetes, accounts for most cases of diabetes worldwide. Type 2 diabetes develops when the production of insulin is insufficient to overcome the underlying abnormality of increased resistance to its action (WHO, 1999).

Lifestyle modification is the cornerstone of treatment and prevention of type 2 diabetes (DOHC, 2007). The changes required to reduce the risk of developing type 2 diabetes at population level are, however, unlikely to be achieved without major environmental changes to facilitate appropriate choices by individuals (WHO, 2003a).

Type 1 diabetes, previously known as insulin-dependent diabetes, occurs less frequently and is associated with an absolute deficiency of insulin, usually resulting from autoimmune destruction of the b cells of the pancreas.

Previously a disease of the middle-aged and elderly, type 2 diabetes has recently escalated in all age groups and is now being identified in younger and younger age groups, including adolescents and children, especially in high-risk populations.

Age-adjusted mortality rates among people with diabetes are 1.5-2.5 times higher than in the general population (WHO, 2003a). In Caucasian populations, much of the excess mortality is attributable to cardiovascular disease, especially coronary heart disease. It is conceivable that the decline in mortality due to coronary heart disease, which has occurred in many affluent societies, maybe halted or even reversed if rates of type 2 diabetes continue to increase. This may occur if the coronary risk factors associated with diabetes increase to the extent that the risk they mediate outweighs the benefit accrued from improvements in conventional cardiovascular risk factors and the improved care of patients with established cardiovascular disease (Grundy and Vega, 1988).

The Glycaemic Index

The glycaemic index is a measure of how much glucose circulates in the blood over several hours after a standard amount of a single food is eaten. This is then expressed as a percentage compared with 50 grams of a standard reference food, generally in the form of glucose or white bread (Wolever *et al,* 1991).

The glycaemic index (GI) is a ranking system for foods in terms of their effect on blood sugar levels. Foods (carbohydrate-containing foods) are described as having a low, intermediate or high GI (Frost and Dornhurst, 2000). Carbohydrate-containing foods with a low GI tend to cause a lower rise in blood sugar, while those with a higher GI cause a higher rise in blood sugar (Brand-Miller *et al*, 2002).

6.0 OTHER HEART HEALTH ISSUES

6.1 Diet in secondary prevention of cardiovascular disease

The Heart Health and Thoracic Dietitians Group of the British Dietetic Association carried out a systematic review of the evidence on dietary advice to prevent further events in people with existing cardiovascular disease (Hooper *et al*, 2004; Mead *et al*, 2006). The review showed that providing evidence-based dietary information (including increasing omega-3 fat intake for example 2 – 3 large portions of oily fish per week or the equivalent 0.5 – 1.0g of omega 3 fats from fish oil) to all people who have had a myocardial infarction would save more lives than concentrating dietary advice in just those in need of weight loss or lipid lowering. The Group stated that the practice of prioritising dietetic time in secondary prevention to those with raised lipids is out of date since the advent of statin therapy. However, effective dietary advice for those with angina, stroke, peripheral vascular disease or heart failure is less clear. It was concluded that there is good systematic review evidence that dietary advice to those with coronary heart disease can reduce mortality and morbidity as well as modify some risk factors. Dietary advice that does this most effectively should be prioritised.

Mediterranean Diet

The most effective ways to reduce secondary heart disease is to increase omega 3 fat intake (oily fish or rapeseed oil) increase fruit and vegetable intake, replace saturated fat with monounsaturated fat (rapeseed or olive oil) and include more fresh foods. The Mediterranean diet is also modest in animal protein, includes legumes and is relatively free of processed foods. A multi-component cardio-protective diet is important. However, work still remains to be done to translate these recommendations into practical dietary advice.

Reduced or Modified Fat

There is consistent evidence that a reduced or modified fat intake results in small but potentially important benefit, although the Mediterranean-type diet may have more importance for long term heart health.

Antioxidant Supplementation

Studies have not shown benefit from antioxidant supplementation in the secondary prevention of cardiovascular disease.

Garlic Supplementation

There is no evidence of a beneficial effect of garlic supplements on disease in people with peripheral occlusive disease.

The Group concluded that it is very important that a healthy diet should be thought of as a whole rather than a recitation of good and bad components (Hooper *et al*, 2004).

The Irish Nutrition & Dietetic Institute (INDI) Cardiac Interest Group discussed the implication of advice for all post MI patients in the light of current staffing levels. They concluded that, while desirable, it may not be currently achievable except in certain situations, such as cardiac rehabilitation programmes, lifestyle group sessions (INDI, 2003).

6.2 Nutrition and Heart Failure

Although controlled trials offer only limited information on diet and nutritional measures, such measures are as important in heart failure, as in any other chronic illness, to ensure adequate and appropriate nutritional balance. Poor nutrition may contribute to cardiac cachexia, although malnutrition is not limited to patients with obvious weight loss and muscle wasting. Clinical or sub-clinical malnutrition is present in about 50% of patients with severe chronic heart failure (Gibbs *et al*, 2000; Thomas, 2001; Remme and Swedberg, 2001).

Patients with chronic heart failure are at an increased risk from malnutrition owing to:

1. A decreased food intake resulting from a poor appetite, which may be related to drug treatment, metabolic disturbance or hepatic congestion.
2. Malabsorption, particularly in patients with severe heart failure.
3. Increased nutritional requirements, with patients who have congestive heart failure having increased energy requirements.

These factors may contribute to a net catabolic state where lean muscle mass is reduced, leading to an increase in symptoms and reduced exercise capacity. Cardiac cachexia is an independent risk factor for mortality in patients with chronic heart failure.

Energy intake needs to be sufficient to meet nutritional requirements and prevent deterioration in nutritional status. Particular attention should be paid to micronutrient intake since the use of diuretics and other drugs may result in significant urinary losses of potassium and water-soluble vitamins. Small, frequent meals are indicated when reduced food intake results from nausea, dyspnoea or a bloated feeling. A formal nutritional assessment with dietetic support is especially important in patients who appear to have a poor nutritional state or are at risk of becoming nutritionally compromised.

Stable heart failure patients should be advised to follow general healthy eating guidelines with attention to weight management and limiting salt use. Obese patients should be encouraged to lose weight as excess body mass increases cardiac workload.

Salt restriction may be useful as an adjunct to treatment with high dose diuretics, at a level of 2 g of sodium a day. This can usually be confined to the avoidance of high salt foods and not adding salt to food. Further restrictions should not be imposed lightly because of the likely reduction in dietary palatability and possibly compromised intake of energy and essential nutrients. To date no randomised studies have addressed the role of salt restriction in congestive cardiac failure.

Fluid intake may need to be considered, if it is in excess of 1.5–2 litres. Evidence is lacking to restrict fluid intake to 1 litre in acute exacerbations of heart failure, but it may be considered when the patient is being closely monitored. Patients who require fluid restriction are often severely anorexic, and this increases the risk of nutritional needs not being met. These patients require intensive dietetic support.

Alcohol intake is not contraindicated except in suspected cases of alcoholic cardiomyopathy. Light alcohol intake has been reported to improve prognosis in patients with left ventricular dysfunction.

Table 5: Important factors in the dietary management of chronic heart failure patients

Adequate energy intake Nutrient dense diet Frequent small meals and snacks Control sodium intake when necessary – in some patients with severe heart failure Avoid excess alcohol intake	Avoid excess fluids in severe heart failure Relax sodium and fluid restrictions if affecting energy and nutrient intake Weight management in overweight/obese patients.

(Gibbs *et al*, 2000; Thomas, 2001; Remme and Swedberg, 2001).

6.3 Nutrition and Arrhythmia Risk

Cardiac rhythm disturbances (arrhythmias) are very common and many of these are influenced by dietary factors. Arrhythmias occur frequently in health and disease states. They may generate a lot of concern. However, many arrhythmias are completely benign but cause symptoms that frighten individuals. Nutrition has a strong influence on the occurrence, severity and type of rhythm disturbances and should not be ignored when treating patients with this condition. Arrhythmias are due to a problem with the heart or to factors outside the heart. Certain nutritional factors need to be addressed.

Caffeine: Caffeine is contained in many beverages and soft drinks and has both direct and indirect stimulatory effects on heart muscle that produces these arrhythmias. Subjects should minimize their caffeine intake or switch to decaffeinated varieties to reduce the risk of arrhythmias (James, 1997; 2004).

Stimulants: Some varieties of drinks, called stimulant drinks, contain substances that are also directly stimulatory to the heart. Their consumption can aggravate rhythm disturbance and should be considered when subjects have an arrhythmia (Safefood, 2005).

Alcohol: Alcohol is a known cardiac stimulant and may also lead to heart muscle problems in susceptible individuals when consumed in excess quantities. For those with arrhythmias, minimizing alcohol intake may be necessary to reduce the frequency and severity of attacks (Poikolainen, 1995).

Dietary Fat Composition: The composition of cell membranes is influenced somewhat by which dietary fatty acids are available. Subjects consuming a higher intake of poly-unsaturated fatty acids incorporate these into their cell membranes. There is increasing evidence that diets high in fish oils (docosohexanoic acid eicosopentanoic acid) are associated with a lower serious arrhythmia risk. Since membranes are the point in cells where most arrhythmias are generated it is not surprising that membrane compositional change from diet could offer some form of protection (Lemaitre *et al*, 2006).

Electrolytes: The levels of electrolytes in our bodies are closely regulated but this system can be challenged when dietary electrolyte composition is very high or very low. Excess levels of dietary potassium can raise blood potassium levels particularly in subjects with kidney disease or in those on drugs called ACE inhibitors or angiotensin receptor blockers. Fruits may have particularly high potassium levels, which might need to be tailored for individual patient requirements (Sowinski and Mueller, 2001; Berk *et al*, 2004).

6.4 Drug Nutrient Interactions

Diet can affect drug action and metabolism in a number of ways and conversely, drugs themselves may affect nutrient intake and metabolism (Stockley, 2002). It is important for health professionals to be aware that individuals on certain medications may be affected by a number of different foods. Research into drug nutrient interactions is ongoing.

Warfarin

Consistency in the intake of certain foods is important as sudden increases or decreases may modify the effect of the warfarin and cause problems with anticoagulant control (Suvarna *et al*, 2003)

Vitamin K

Foods rich in vitamin K include green leafy vegetables (e.g. kale, brussels sprouts, spinach, green cabbage, broccoli), beetroot, pulses, and green tea. Eating moderate quantities of these foods on a consistent basis will not affect the action of warfarin (Booth and Centurelli, 1999).

Alcohol

Small to moderate amounts of alcohol are unlikely to change the effect of warfarin. However, heavy or binge drinkers and those with liver disease will find that prothrombin times are affected.

Other Foods

A number of other foods have been identified as having an effect on the action of warfarin. In many there is no clinical evidence to support the interaction, the number of reported cases are few and may be anecdotal (National Institutes of Health, 2000).

Herbal Medicines

There are a number of cases where herbal medicines have had an effect on the action of warfarin. Their effect is not fully known and more study is needed. Precaution should be taken with all herbal medicines when warfarin is being taken. The following remedies may affect the anticoagulant effect of warfarin; ginseng, St. John's Wort, danshen, boldo, fenugreek, coenzyme Q10, devil's claw and dong quai. Wheat grass is a herbal product that is very high in Vitamin K and should be avoided by anyone taking warfarin. Herbal teas made with tonka beans, sweet clover or sweet woodruff should also be avoided as they can also affect the action of warfarin.

Anti-arrhythmic Drugs, Beta Blockers, Calcium Channel Blockers

Reports have appeared in the media in Ireland and the UK referring to the previously recognised interaction observed between grapefruit juice and certain medicines. There is limited evidence to suggest that the metabolism and bioavailability of these drugs may be affected by grapefruit juice, however research into drug reactions is ongoing. In the case of beta-blockers, excessive consumption of tea, coffee and cola drinks can oppose the effects of the drug and excess should be avoided (Thomas, 2001).

7.0 POLICY RECOMMENDATIONS TO ACHIEVE IRISH HEART FOUNDATION NUTRITION GOALS

The aim of this document is to help reduce the cardiovascular disease risk of the Irish population. It focuses primarily on improving diet and nutrition and acknowledges the need to promote increased levels of physical activity in parallel, thereby addressing many of the public health issues relating to the reduction of blood pressure, obesity, raised lipid profiles and diabetes.

The population and dietary based guidelines will help health promotion and public health practitioners, dietitians and doctors advise and support individuals generally in terms of nutrition and heart health, and in clinical practice help patients in terms of their risk estimation and prevention**.** However, given that the bulk of cardiovascular morbidity and mortality exists in the general population, a public health approach that aims to protect the whole population is needed. Focusing on the food and nutrient goals set out in this document, this approach needs to be translated into action at local, national and European level in order to improve public health nutrition. Therefore it is hoped that the policy recommendations below will inform those involved in planning, budgeting and policy development at all levels.

As already outlined in section 1 several international reports and documents have set out appropriate national policies, structures and approaches that would support achievement of the goals mapped out in this policy (EHN, 2002; WHO, 2003a; WHO, 2004a; Eurodiet, 2001).

At national level, Ireland has several relevant reports, which address key policies in relation to food and nutrition:

1. *Recommendations for a Food and Nutrition Policy* (DOHC, 1995);
2. *Building Healthier Hearts: The Report of the Cardiovascular Health Strategy Group* (DOHC, 1999) and
3. *The Report of the National Task Force on Obesity* (DOHC, 2005)
4. The Department of Health and Children's first National Nutrition Policy will be published in autumn 2007 and will echo the nutrition goals presented here and will identify key priority actions.

However, many of these reports have only been partially implemented so action is needed immediately, if we are to begin to achieve the population goals for food and nutrition as set out in this document.

National policies and plans can also learn from successful policy initiatives in other countries, e.g. Finland, where the country was at the bottom of Europe's league table for coronary heart disease in the 1970's, intervened with a comprehensive and dynamic

response to improve heart health. Norway also has a comprehensive national food policy.

To facilitate national policy in addressing the Irish Heart Foundation's key nutrition goals, the Foundation has identified a number of priority actions, which it has been actively pursuing.

It is important to note that these priority actions are not intended to be a comprehensive national policy. To meet the goals and guidelines set out in this document, the priority actions provide some guidance for policy makers and advocates, based on discussion, consensus and evidence drawn from the many players that engage with the Foundation.

7.1 A FRAMEWORK AND ACTIONS FOR IMPLEMENTING THE FOOD AND NUTRIENT POPULATION GOALS

A number of overarching actions are necessary to achieve the population goals recommended in this document many of which are already acknowledged in the international and national strategies mentioned throughout this document.

7.1.1 Overarching Actions of the Framework

- ***A significant shift in thinking*** **-** It is now well recognised that while it is important that individuals are educated and informed about healthy food choices, many different policies at the local and national level - in effect the broader environment - have an impact on what we eat and have the potential to help promote or prevent cardiovascular disease – see Figure 12 below which sets out the policy related influences on food and nutrition (WHO, 2004c)

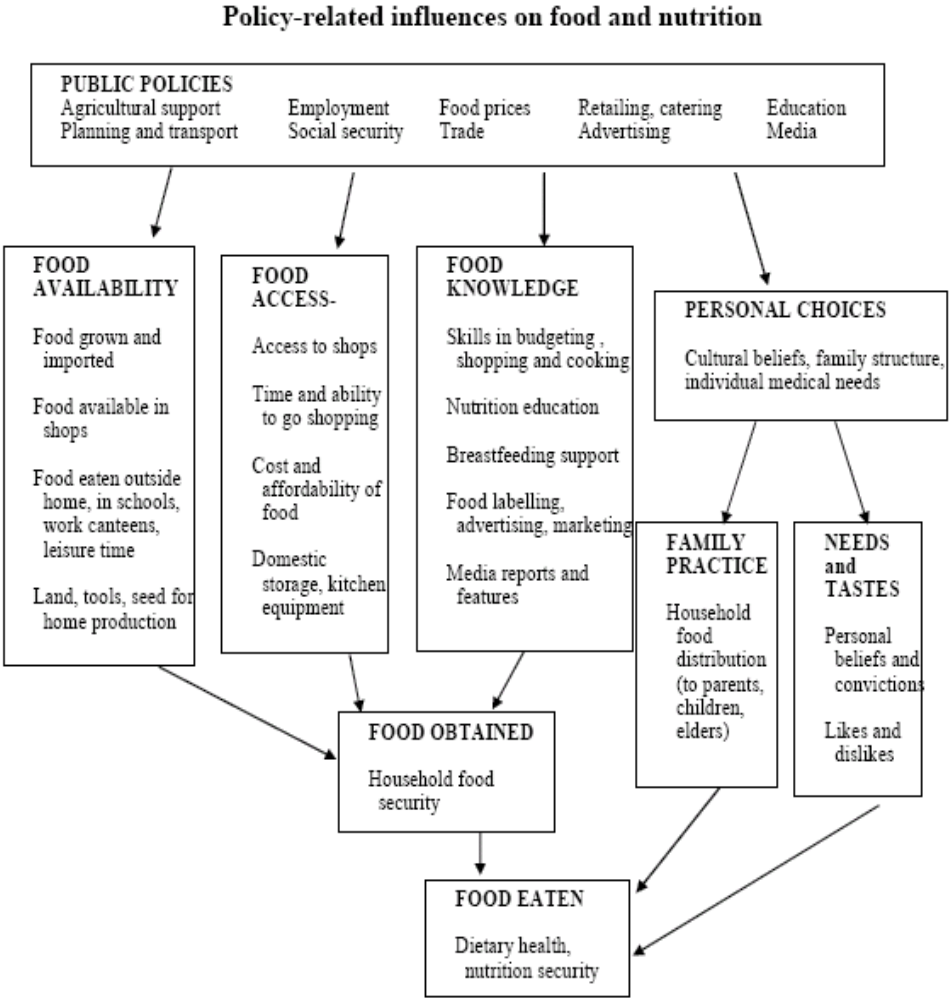


Figure 12 (above) Policy-related influences on food and nutrition.

- ***Establish new structures*** **-** Structures which involve senior policy makers are required to implement the new National Nutrition Policy (in press). Implementation of an integrated plan, which threads through many areas of policy, will require close collaboration and improved coordination. National strategies need to be comprehensive, multicultural, multidisciplinary and participatory (WHO, 2004a; DOHC, 2005)**.**

- ***Strengthen and maintain political commitment*** **–** The Irish Heart Foundation will strive to ensure that political commitment to improving nutrition is sustained. This includes recognition of the barriers to progress that can undermine efforts to improve nutrition and promote health. Some examples are conflicts of interest and prolonged research rather than decisive action due to a very high burden of proof to justify public health measures.

- ***Monitoring and review*** – A formal structure to review implementation of the National Nutrition Policy needs to be established. The Irish Heart Foundation's Council on Nutrition will continually review implementation of these policies and population and food-based guidelines to keep it up-to-date with current national, European and global scientific and best practice models. A full review of this document is planned for 2012.

7.1.2 Existing national policies that can impact on nutrition.

- ***Address policies in relation to food and nutrition to prevent cardiovascular disease as outlined in Building Healthier Hearts*** (DOHC, 1999) - Significant progress has been achieved in relation to the implementation of the cardiovascular health strategy, which has a substantial emphasis on food and nutrition. Funding from Government for full and ongoing implementation of this policy by the Health Service Executive and other bodies needs to continue.

- ***Immediate recognition of the burden of obesity and implementation of The Report of the National Taskforce on Obesity*** (DOHC, 2005). This report deals comprehensively with many policies that would support the aims of these Guidelines. The problem of obesity has been identified by WHO as a major public health issue (WHO, 2006a). The Irish Heart Foundation calls for immediate and full implementation of all recommendations in the Department of Health and Children's report

- ***Adequate funding and manpower for full implementation of The Department of Health and Children's National Nutrition Policy*** (in press 2007). Due to be published later this year, this comprehensive policy will incorporate and update the Department's previous document (1995). This National Nutrition Policy will add further weight and imperative to the two national plans above and its priority focus will be on the dietary needs of children and the socially disadvantaged.

- ***Health promotion*** - The Irish Heart Foundation will continue to take a lead role in health promotion building on our track record of providing general public and patient information, programmes such as *Happy Heart at Work i*n workplaces; *Action for Life* in primary and secondary schools; *Slí na Sláinte* walking routes in communities, and *Heartwatch* a secondary prevention programme in primary care.

  Any national policy would include support for a range of educational and health promotion initiatives for all segments of the population. It is expected that the new national health promotion strategy being developed shortly by the Department of Health and Children and Health Service Executive will help to ensure information, education and empowerment of Irish children, young people and adults in relation to healthy food choices.

7.1.3 Policies and policy tools that impact on nutrition goals

As illustrated in Figure 12 above, all policies that have an impact on the type of food produced (by farmers, by food manufacturers or by caterers) have the potential to affect diet-related disease. Examples of such policies include production incentives and subsidies, food compositional standards, and school and workplace nutrition standards.

Policies that influence the types and quantities of food consumed can have a health impact. Policies in this category include food labelling legislation, regulations on advertising and promotion of food products, pricing policies, retailing strategies which affect the availability of foods and education relating to food and nutrition.

- ***Health impact assessment*** – all local and national state agencies, as part of a health impact assessment, need to develop, prioritise and evaluate schemes and policies, including public procurement, that encourage healthy eating, especially those aimed at children and vulnerable groups as already called for in several government policy documents including The Report of the National Task Force on Obesity (DOHC, 2005)

- ***Front of pack labelling*** - A front of pack labelling scheme should be developed as part of the EC's amended nutrition labelling proposals. This should be in addition to nutrition labelling on the back of pack.

  Both front of pack and back of pack information should: be mandatory; apply to the vast majority of packaged foods, including packaged foods in catering outlets; provide information in a format which has been demonstrated to be helpful to consumers; be consistent with each other.

  The front of pack information in particular should be presented in a format which is simple and quick to use for a wide range of consumers with different literacy and numeracy skills and be embedded in broader educational initiatives.

- ***Back of Pack labelling*** **-** There should be mandatory back of pack labelling for energy, protein, carbohydrate, fat, saturated fat, trans fat, added sugars, fibre, sodium and its salt equivalent.

7.1.4 Policy recommendations and actions that impact on the four key goals:

The four key goals address the following:

- ***Saturated fat and trans fats***
- ***Fruit and vegetables***
- ***Salt***
- ***Body Mass Index***

The four key goals addressed in the Guidelines are consistent with previous international recommendations, the challenge is what policies can make a difference and move the population towards achieving these goals.

1. ***Saturated fat and trans fats*** *– population goal of less than 10% of energy from saturated fat and less than 2% of energy from trans fats.*

   Policy needs to be directed towards changing the composition of fats in the food chain from saturated fat and trans fats to monounsaturated and polyunsaturated fats.

   - The European Commission, Council of Ministers and the Irish Departments of Agriculture and Food and Health and Children need to work with the food industry to introduce the necessary measures to ensure a movement towards the elimination of industrially-produced trans fatty acids from food products.

   - ***Common Agricultural Programme (CAP)*** - EU policies need to ensure that all public health issues are taken into account, e.g. CAP does not take explicit account of the need to produce foods that promote healthy diets.
     - In Europe there should be a gradual change from an animal food based diet to plant-based products (EHN, 2006).

1. ***Fruit and vegetables*** *– population goal of more than 400g/day*.

   Policy needs to be directed towards increasing fruit and vegetable intake by improving the supply of, and access to fruit and vegetables and to reducing their price.

   - ***Common Agricultural Programme (CAP)*** - in the area of fruit and vegetables EU policies need to take account of public health issues (EHN, 2005).
     - Fruit and vegetables should promote the reduction and eventual phasing out of withdrawal compensation. This could lead to falling prices which could stimulate purchase and consumption of fruit and vegetables
     - The single farm payment should be extended to include fruit and vegetables.
     - Any withdrawn products, such as fruit and vegetables, should be used for human consumption, particularly targeting those who eat less fruit and vegetables.

3. ***Salt*** *– population goal of less than 6g/day.*

   Policy needs to be directed towards a gradual reduction in salt in manufactured foods and action is necessary at a national or regional level to obtain the cooperation of manufacturers.

- The Food Safety Authority of Ireland is already working with sectors of the manufactured food industry on a voluntary basis to reduce salt in major food groups including bread, breakfast cereals, soups and sauces. Continuing this approach can make a meaningful impact on reducing deaths and incidence of cardiovascular disease, as most salt intake comes from manufactured foods (See also Irish Heart Foundation Position on Salt (2004)).

4. ***Body Mass Index***
    - Halt the increase in levels of overweight and obesity in the medium term with a longer term population goal of a body mass index of less than 25 and
    - Increase levels of physical activity in the medium term with a longer term population goal of a Physical Activity Level (PAL) of 1.75.

    Policy needs to be directed towards providing opportunities for incorporating physical activity into everyday life in order to achieve a lowering of raised BMI.

- ***Guidelines on physical activity*** - Given the level of inactivity in the Irish population, the Irish Heart Foundation calls for immediate consultation and consensus on physical activity recommendations and guidelines for all population groups and ages.

- ***National body to support and promote physical activity -*** a national research and coordinating body should be established to maximise our potential to increase levels of activity in the population.

- ***Advertising to children*** – The Broadcasting Commission of Ireland's Children's Advertising Code needs to be amended: Television advertising of foods high in fat, sugar and salt should not be permitted up to the watershed time of 9pm. All forms of advertising to children should be restricted and carefully monitored by a national independent body. Additional recommendations for Government, retailers, media, schools and hospitals are set out in the National Heart Alliance position paper on the Marketing of Unhealthy Foods to Children (NHA, 2005)

- ***Television without Frontiers -*** the Irish Heart Foundation, particularly through the European Heart Network, will continue to advocate MEPs to vote for amendments to the Television without Frontiers EU Directive to prohibit advertising of unhealthy foods to children. The Foundation supports recommendation in the Report of the National Taskforce on Obesity that the Ireland should play a role within the European Union to reform policies in relation to marketing and advertising of food to children.

7.1.5 Non-food related policies that impact on nutrition

Other policies also affect cardiovascular disease, for example, physical activity patterns, poverty and social inequalities can have an impact on public health nutrition**.**

- **Fiscal policies** such as subsidising or taxing goods can have an impact on health, as shown by increasing the price of tobacco. A good example of this was the increased taxation on cigarettes in 1999, which has been shown to deter young people from starting to smoke, and provided some funding for the implementation of the Cardiovascular Health Strategy -Building Healthier Hearts (DOHC, 1999). Fiscal policies can be used to improve access to healthy foods, especially for socially disadvantaged population groups. The Irish Heart Foundation urges the Department of Finance to examine as a matter of urgency, the influence of fiscal policies on consumer purchasing for example subsidies for fruit and vegetables (DOHC, 2005).

7.2 THE ENVIRONMENTAL SETTING THAT IMPACTS ON NUTRITION

The environment, both micro and macro, also has an impact on nutrition and the achievement of these population nutrition goals.

The relevant micro-environmental settings include homes, workplaces, schools, colleges and universities, community groups, churches, hospitals, supermarkets, restaurants, cafés and other catering outlets, sports and recreation facilities, transport and healthcare settings.

The macro-environmental settings affect a larger number of people and often operate at the regional, national or international levels. These settings, which include food manufacturers, food retail chains and catering services, urban or rural development organisations, the health system and the media are more difficult to influence.

A method of systematic analysis such as that outlined by the ANGELO framework (**AN**alysis **G**rid for **E**nvironment **L**inked to **O**besity) (Swinburn *et al*, 1999) should to be agreed and applied to each of the four key nutrition goals in relation to cardiovascular disease.

For each goal, the framework could be used to assess the factors, which contribute to the current situation and the opportunities for change. This would mean identifying the relevant macro and micro settings, as outlined above, that might have an impact on each of these priorities. The relevant elements of the physical, economic, political and socio-cultural environments then need to be identified.

- ***The Report of the National Taskforce on Obesity*** outlines many policies across different sectors – government; education; social and community; workplaces, as well as food production and supply, which would all contribute to the achievement of the Irish Heart Foundation's nutrition goals (DOHC, 2005)

- ***Healthy School Policy*** **-** The Department of Health and Children has developed guidelines on nutrition for pre-school and primary level education. At present guidelines are being developed for post primary schools. These guidelines should support schools to introduce healthy eating policies, which do not permit the sale of unhealthy food and drink in the school and ban advertising and sponsorship by branded foods and drinks from the top shelf of the Food Pyramid. It is essential that adequate support is provided to schools and parents by the Department of Education and Science and the Health Services Executive to implement healthy eating guidelines as part of a health promoting school policy.

The Irish Heart Foundation through its relevant Councils and in particular the Nutrition Council will actively seek support for the achievement of the goals mapped out in this document.

APPENDIX 1: HEART HEALTHY EATING GUIDELINES FOR CHILDREN

1 Eat a Wide Variety of Foods

The Food Pyramid should be used as a guide to ensure an adequate energy and protein intake to meet growth requirements. This will also ensure adequate intake of vitamins and minerals. The Food Pyramid suggests serving sizes from 5 years onwards. For younger children, start with smaller and fewer servings and increase up to the recommended guideline, according to the child's growth and appetite.

2 Have a Moderate Intake of Fat

Reduce intake of foods high in saturated fat (top shelf of children's food pyramid) and replace them where necessary with foods rich in polyunsaturated and monounsaturated fat. Foods rich in polyunsaturated fat are found in pure vegetable oils such as sunflower oil, corn oil, and soya bean oil and spreads made from these. Oily fish and nuts such as walnuts, hazel nuts and brazil nuts are also rich in polyunsaturated fats. Foods rich in monounsaturated fast include oils such as olive and rapeseed and spreads made from these. Seeds and nuts such as cashew, almond and peanut are also rich sources. Young children should not consume whole nuts.

3 Have Enough Milk, Cheese and Yoghurt

Reducing fat does not mean cutting out on milk, cheese or yogurt, which are valuable sources of calcium. If family are having lower fat choices these are suitable for children over 2 years. Skimmed milk is not suitable for children under 5 years.

4 Have Enough Meat, Chicken, Fish and Alternatives

These foods are important for growth and development. Red meat is important for iron intake. Choose lean meat and low fat cooking methods.

5 Choose Low-Fat Cooking Methods

Choosing low fat cooking methods will help reduce fat intake e.g. grilling, oven-baking.

6 Eat More Bread, Cereals, Potatoes, Pasta and Rice

Starting at two years, offer small portions and variety and gradually increase.

7 Eat More Fruit and Vegetables

Increase the size and number of the daily portions.

8 Eat Less Salt and Salty Foods

Children should avoid salt and highly salted foods. Most dietary salt comes from processed foods, in particular, snack or convenience foods.

9 Reduce Foods from the Top Shelf of the Food Pyramid that are High in Fat, especially Saturated Fat and Sugar

Children should consume a moderate intake of fat. This should be achieved by limiting intakes of the foods found on the top shelf of the food pyramid e.g. crisps, and savoury snacks, chocolate bars and sweets, biscuits, cakes, chips and other fried foods.

SUMMARY OF RECOMMENDATIONS

1. Where possible, encourage breastfeeding.
2. Recognise the need for a relatively high fat diet in children under 2 years of age. Because milk is the primary nutrient source for children under two years, it should not be considered as a high fat food to be excluded.
3. From 2-5 years, introduce a gradual reduction in total fat intake towards the goal of no more than 35% of energy from fat.
4. In meeting fat and energy requirements in children from 2 years onwards, concentrate on foods that contain monounsaturated and polyunsaturated fats and that are low in saturated fats.
5. In meeting calcium requirements, consider milk as a primary calcium source but consider using low-fat milk from between ages 2-5 years.
6. Do not add salt to food.
7. Choose from a wide variety of foodstuffs. To this end, use the food pyramid to communicate this message to the public.
8. Snack foods tend to be high in saturated and trans fats, sodium and sugar. They should be used as an occasional treat and not as part of the staple diet.
9. Encourage regular, family-centred meals.
10. Encourage the development of a public health campaign to improve childhood nutrition to prevent cardiovascular disease, especially among at-risk groups such as disadvantaged sectors of society and families with a history of premature cardiovascular disease.
11. Limit television viewing and thereby exposure to food advertising.
12. Encourage play and physical activity.
13. Further research is needed including:
    i. On-going surveillance on nutrient intake among Irish children
    ii. Research into the specific nutrient requirements of selected groups of children such as diabetic children.
    iii. Studies of the long-term effects of the recommended changes made during childhood.

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