

# Primary Prevention of Cardiovascular Disease In Scotland

We Must Go Further



Matthew Lowther and Alan Mordue

On behalf of The Heart Health Network Executive Group

JANUARY 2006

The views expressed in this paper are the collective views of The Heart Health Executive Group and do not necessarily reflect the views of individuals, their employing organisations or Health Scotland.

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## SUMMARY

This paper examines primary prevention of cardiovascular disease (CVD) in Scotland. Although recognising both are important and complementary, it focuses on a “population approach” (i.e. reducing risk in whole populations) as opposed to a high-risk approach (i.e. reducing risk in individuals at high risk of CVD). It charts the progress to date in Scotland in preventing CVD and improving its risk factors, documenting a range of positive policies and actions throughout the country. It goes on to examine possible explanations why secondary prevention is often seen as a higher priority compared to primary prevention and outlines what could happen if this is allowed to continue. It discusses reasons for the relative imbalance, mainly related to a perceived lack of good quality evidence for primary prevention (compared to secondary prevention). The paper then explores why this may be the case, discussing issues such as hierarchy of evidence and difficulties in conducting and evaluating large community-based interventions. The paper then looks to the future, exploring where Scotland could be in a number of years given several potential scenarios. Finally it looks at what more currently needs to be done in Scotland to prevent CVD and move us towards the more optimistic scenarios. A summary of its recommendations are given below:

1. NHS Boards and Councils should improve the coordination and balance of downstream health improvement work focused on lifestyles with more upstream work, particularly through the community planning process.
2. Health improvement interventions should be customised for the specific intended target population, taking account of the knowledge, attitudes and beliefs of that section of the population.
3. Multiple barriers to change (structural, social and financial) should be addressed simultaneously to improve effectiveness of interventions and is likely to be particularly required in disadvantaged communities to reduce existing inequalities in health.
4. A substantial increase in health improvement activity is required to complement existing service developments and ensure that the prevalence of chronic diseases do not increase and to limit future demands on NHS and Local Authorities services. The Scottish Executive should encourage and support NHS Boards and Councils to develop their health improvement activity, in part through the assessment and discussion of local Joint Health Improvement Plans (JHIPs).
5. The Scottish Executive should agree with the NHS in Scotland a definition of health improvement for financial monitoring purposes within the NHS so that investment over time and between areas can be compared, and progress towards the levels suggested by the Wanless review assessed. Consideration should also be given to a definition for Council health improvement investment so that JHIPs can identify total investments from both statutory agencies (NHS Boards and Local Authorities). At the very least local trends should be monitored using consistent definitions and indicators.
6. Year on year investment in human and financial resources are required to deliver the above recommendations and should be monitored via the annual Health Improvement PAF process, locally and nationally, and commented upon in each Director of Public Health Annual Report.

7. The incidence, prevalence (potentially through the new GMS Contract Quality and Outcomes Framework) and mortality from CHD and stroke should be monitored annually. National targets for incidence and prevalence should be considered.
8. Consideration should be given to increasing sample sizes taken in the Scottish Health Survey so that all Board areas in Scotland have reliable data to monitor trends in major risk factors and assess the progress of health improvement interventions.

It is important to note that this paper is a strategic view of primary prevention. For specific guidance on recommended action to prevent cardiovascular disease at a local level the reader is referred to *Cardiovascular Disease: A Guide to Primary Prevention in Scotland* (NHS Scotland, 2005) in the first instance

## CARDIOVASCULAR DISEASE IN SCOTLAND AND ITS PREVENTION

Coronary heart disease (CHD) and cerebrovascular disease (CBD) are the two main forms of cardiovascular disease (CVD), which is the nation's leading killer. In 2003 there was a total of 58,420 deaths in Scotland with cardiovascular disease accounting for 38% – CHD was responsible for 20% and CBD 11%. Cancer, the other major killer in Scotland, was responsible for 26% of all deaths (all data from GROS, 2004). CVD is also responsible for substantial morbidity in the form of pain, disability and poorer quality of life for thousands of people in Scotland.

Like many other diseases and conditions, there is a clear gradient of increasing mortality from CVD with increasing deprivation. Using the Carstairs deprivation scores (derived from 2001 Census), it has been shown that mortality rates are progressively higher for increasing levels of deprivation and the relationship appears to be strongest for CHD and for those aged under 65 (ISD, 2005). In addition, there is evidence that South Asians (Indians, Bangladeshis, Pakistanis and Sri Lankans), have a higher premature death rate from CHD than average. The rate is 46% higher for men and 51% higher for women (British Heart Foundation, 2004). The difference in the death rates between South Asians and the rest of the population is increasing. This is because the death rate from CHD is not falling as fast in South Asians as it is in the rest of the population. From 1971 to 1991 the mortality rate for 20-69 year olds for the whole population fell by 29% for men and 17% for women whereas in South Asians it fell by 20% for men and 7% for women (British Heart Foundation, 2004).

### Primary and Secondary Prevention

The principal aim of primary prevention is to decrease the risk of developing symptomatic disease in individuals and populations and its effectiveness can be monitored through incidence rates (i.e. number of new cases each year). The principal aim of secondary prevention is to prevent further illness and death in those individuals who are already symptomatic (prevalence) and its effectiveness can be monitored through case fatality rates. The top figure in Appendix 1 shows how incidence (new cases falling into bath), prevalence (pool of individuals with CHD), case fatality rate (represented by the size of the plug-hole) and mortality are related.

The incidence of CVD is determined by a complex interaction of risk factors acting over the life-course. A large number of major UK and international epidemiological studies have greatly increased our understanding of key risk factors and it has been suggested that nine easily measured and potentially modifiable risk factors explain up to 94% of the CHD risk within populations (Yusef *et al.*, 2004). However, although these factors account for much of the CHD risk it is also important to note that they don't account for all the risk and there are still as yet unidentified factors. For example, a recent study by Mitchell *et al.* (2005) showed that Scotland's higher CHD rate, when compared to England, could not be completely explained by traditional risk factors; there was an unexplained "Scottish effect".

Behaviour, and therefore exposure to the key risk factors, does not occur within a vacuum however, but is influenced by our psychological health, the social environment within which we live and work, the wider determinants of health such as income, employment, housing, education, and the physical environment. This situation is represented in the diagram in Appendix 2. This wider perspective on what influences risk factor exposure emphasises the importance of broader health improvement work to change many of these determinants, something which is particularly critical for disadvantaged populations who face multiple structural social and lifestyle barriers to achieving good health.

### **Primary Prevention: Population and High Risk Approaches**

Risk factors such as serum cholesterol and blood pressure tend to follow a statistically normal distribution (although skewed a little to the right). A population approach seeks to prevent or delay the onset of CVD by shifting the whole curve to the left. A high-risk approach to primary prevention focuses only on that small number of individuals above a certain threshold (e.g. by defining "hypercholesterolaemia" or "hypertension") or estimated from risk prediction charts to be at higher absolute risk (e.g. greater than 30% at 10 years, SIGN 40, 1999).

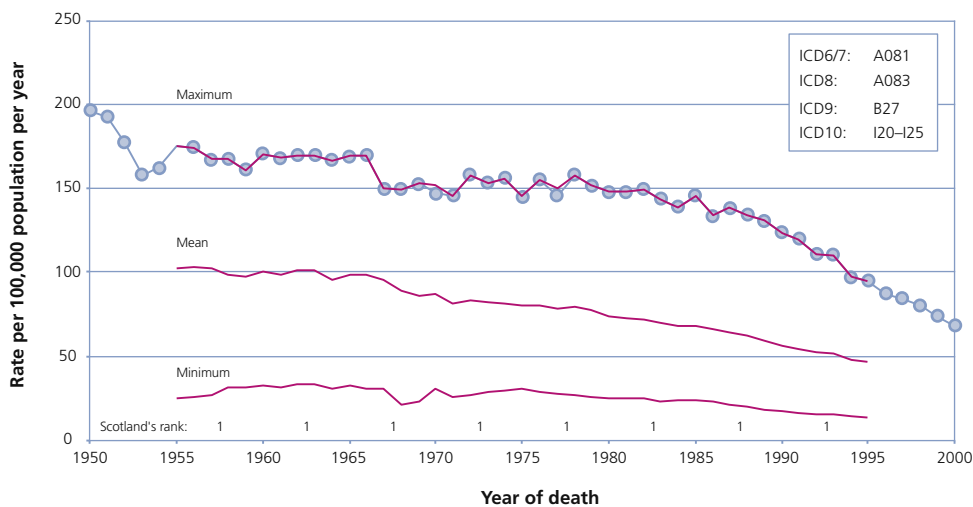
For years the merits of taking either one approach or the other has been fiercely debated but it is now widely accepted that they are complementary (Rose, 1992, Mordue *et al.*, 2003). This is endorsed in the *CHD and Stroke Strategy for Scotland* (Scottish Executive, 2002; updated 2004) that recommends local primary prevention strategies should incorporate both approaches. Clearly, it is a clinical imperative that those who are at greatest risk receive treatment to lower that risk (Mordue *et al.*, 2003). However, as only a small percentage of the population are deemed to be at high risk and the vast majority of CHD cases emanate from those at lower risk (Rose, 1981) a high-risk strategy alone will not have a significant impact on the population. Put another way, "a large number of people exposed to a low risk is likely to produce more cases than a small number of people exposed to a high risk" (Rose, 1981). Consequently, as Beaglehole (2001) states "the only strategy with the potential to greatly increase the proportion of the population at low-risk status is the population-wide approach to primary prevention. All other strategies will, at best, only restrain the epidemics; they will not prevent them". This is endorsed by the European Heart Network in their publication *Food, Nutrition and Cardiovascular Disease Prevention in the European Region: Challenges for the New Millennium* (2002).



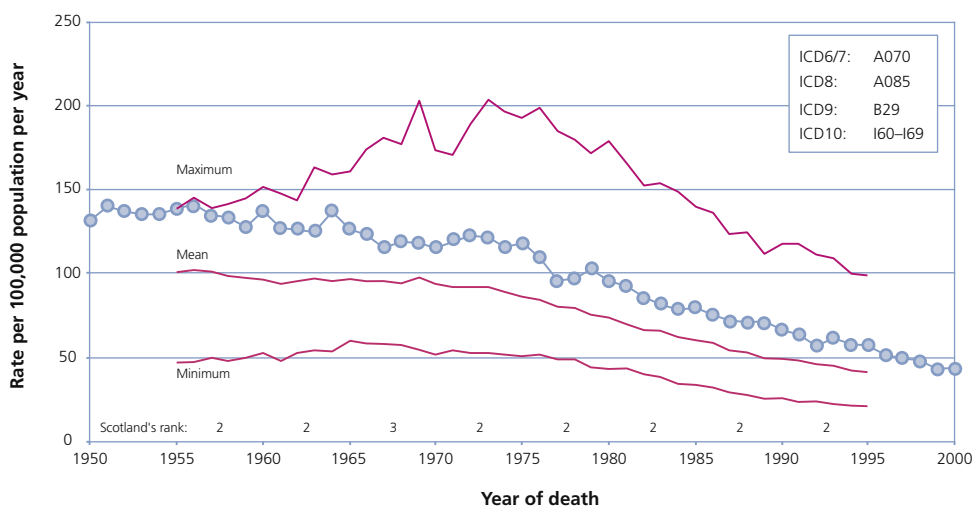
## PROGRESS TO DATE

### Trends in Cardiovascular Disease and its Risk Factors in Scotland

Figures 1 and 2 give the female CHD mortality and the male CBD mortality age standardized rates (15-74 years) for Scotland set in the context of maximum, minimum, and mean rates for 17 Western European countries respectively.



**Figure 1.** CHD mortality age standardized rates among females aged 15-74 years. Scotland in context of maximum, minimum, and mean rates for 17 European Countries (Source, Leon *et al.*, 2003).

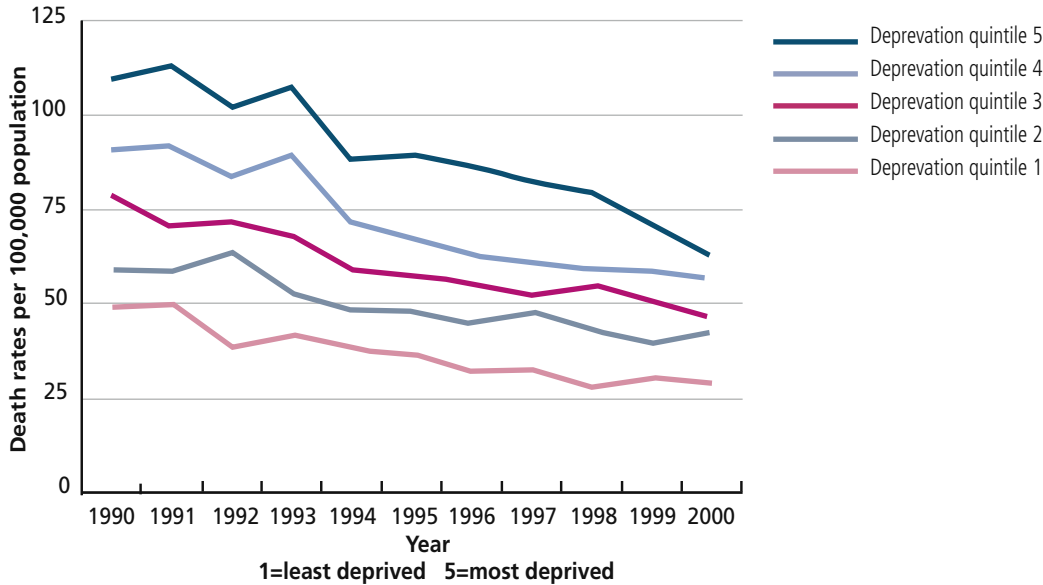


**Figure 2.** CBD mortality age standardized rates among men aged 15-74 years. Scotland in context of maximum, minimum, and mean rates for 17 European Countries (Source, Leon *et al.*, 2003).

As figures 1 and 2 indicate, the good news is that deaths in Scotland from CHD and CBD have been falling steadily in recent years (similar trends exist for male CHD and female CBD) and if

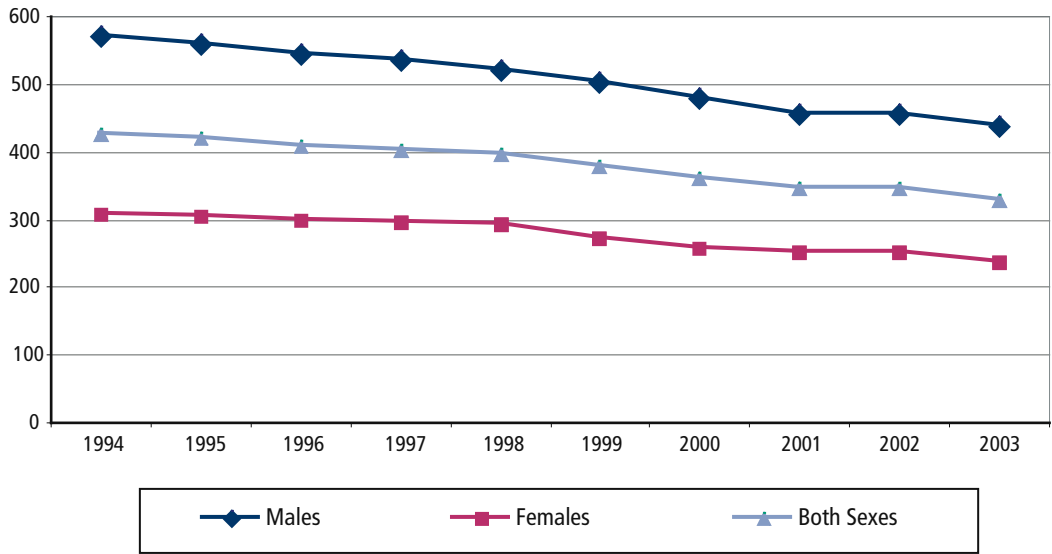
current trends continue, national mortality targets are likely to be met. However, the bad news is that Scotland is still near the top of the mortality 'league table' (indicated by "Scotland's rank" at the bottom of figures 1 and 2). This is because deaths are falling just as quick and in some instances quicker in other Western industrialised countries than they are in Scotland. Scotland will continue to be near the top of the table unless we can speed up the current decline.

Figure 3 demonstrates that although mortality rates are falling across the deprivation spectrum, the greatest relative fall has occurred in the less deprived areas (fall of approximately 44% compared to 41% in most deprived areas) meaning the ratio of deaths between the most and least deprived has actually increased.



**Figure 3.** CHD mortality trends (1990-2000) by social class (Source "Health in Scotland 2001", Annual Report of the Chief Medical Officer for Scotland, Scottish Executive, 2001).

As figure 4 indicates, incidence based on hospital admission has also been falling in recent years. Between 1994 and 2003 CHD age standardised incidence fell by 23% and CBD age standardised incidence by 19% (ISD, 2005).



**Figure 4.** CHD age standardised (European standard population) incidence rate in Scotland per 100,000 population (Source: ISD 2005).

However, figure 4 does not reflect true incidence, it only reports new hospital cases plus deaths with admission. Clearly this doesn't account for undiagnosed cases or cases that are managed out-with the hospital setting. A recent BMJ paper by Lampe *et al.* (2005) based on general practice data drawn from 24 UK towns showed that overall there was little change in the incidence of first diagnosed coronary artery disease. It is likely therefore that incidence is not falling as fast as mortality (if falling at all). As discussed earlier if declines in incidence don't "catch-up" with those of mortality, prevalence will inevitably rise. There are no reliable, representative data available on prevalence of CHD or CBD to examine this issue directly.

Appendix 3 contains data on some of the population risk factor trends from the 1995 and 1998 Scottish Health Surveys. The Scottish Household Survey from 1999 to 2002 (with thanks to colleagues in ISD Scotland) shows corresponding risk factor data for smoking. The trends are favourable for smoking, fresh fruit intake and exercise, but not for cooked green vegetable intake and alcohol intake in women. There is significant geographical variation and, although not shown here, also by social class and level of deprivation. Across the two Scottish Health Surveys there are also favourable trends for serum cholesterol levels, relatively little change for blood pressure, and adverse trends in levels of being overweight and obese.

A review of *The Health Education Population Surveys* from 1996-2004 (NHS Health Scotland, 2005) showed similar favourable trends in self-reported behaviour with improvements in physical activity, consumption (and knowledge of consumption) of fresh fruit and vegetables, smoking prevalence and the belief that people can positively influence their health.

A number of studies have examined the causes of the substantial reductions in mortality observed over the last few decades and they have consistently shown that improvements in risk factors explain more of the observed declines in mortality compared to treatments (Kelly and Capewell, 2004). For example, in Scotland it has been estimated that changes in the three main risk factors (smoking, cholesterol and blood pressure) accounted for about 50% of the mortality reductions observed between 1975 and 1994, 10% was attributed to other risk factors, and 40% to clinical treatments (Capewell, Morrison and McMurray, 1999). This is consistent with similar international studies (Kelly and Capewell, 2004). Similarly, Critchley, Capewell and Unal (2003) have estimated that modest reductions in population risk factors in Scotland between 1975 and 1994 gained almost three times as many life-years compared to clinical treatments (35,991 compared to 12,025) and a later study based on data from England and Wales for the period 1981-2000 estimated as much as four times as many life years were gained through modest reductions in major risk factors (731,270 life years gained) compared to clinical treatments (194,145 life years gained) (Unal *et al.*, 2005).

These studies analysed data up to 1995-2000, since when there have been substantial improvements in the implementation of secondary prevention approaches and substantial investment in clinical treatments. However, by focusing resources primarily on secondary prevention at the expense of primary prevention we could be inadvertently increasing the prevalence of CHD and other chronic diseases. The prevalence of chronic disease is determined by a number of factors including both incidence and treatment (MacIntyre, Pell and Morrison, 2002). For example a decrease in the incidence resulting from primary prevention would reduce prevalence, while improved survival as a result of better treatment would increase prevalence. If similar numbers of people become symptomatic but live longer as a result of improved treatments, which seems likely given recent developments, then prevalence will inevitably rise. This effect is shown diagrammatically in the middle figure 2 in Appendix 1. If this happens with a number of our major diseases, it could threaten the ability of services to cope when combined with the increases in prevalence because of demographic changes and the effect of the increase in obesity levels. Put simply "if we don't get upstream and start making real in-roads in terms of prevention then a publicly funded health service will not be sustainable" (Donaldson 2004). At the very least this effect will increase costs within the NHS and local authority services substantially (Wanless 2002). What is also clear, is that from a patient point of view prevention is far more attractive than treatment. ***Given all of the above, effective primary prevention has to be given a higher degree of priority.***

### **Scotland's Response to the Prevention of Cardiovascular Disease**

Scotland now has its own strategy for CVD (Scottish Executive, 2002; updated 2004) and has funded innovative programmes such as "Have a Heart Paisley" ([www.haveaheart.org.uk](http://www.haveaheart.org.uk)) and its associated "Heart Health National Learning Network" ([www.healthscotland.com/hearthealth](http://www.healthscotland.com/hearthealth)) to test what works in preventing and treating CVD in a Scottish context. The Heart Health Network is a network of individuals and organisations interested in the prevention of CVD from the NHS, local authorities, academia, the voluntary sector and the Scottish Executive, and has produced a CVD Prevention Guide (NHS Health Scotland, 2005a). This reviews and presents the

most up-to-date evidence (mainly recent systematic reviews), outlines current policy and makes recommendations designed to help the development of local primary prevention and health improvement strategies and action.

The Scottish Executive has also allocated record levels of resources for national health improvement programmes – £173m in the 2002 Spending Review and £243m in 2004 (covering the years 2005/6, to 2007/8). Encouragingly, this absolute increase means that national health improvement spending relative to overall health spending, will remain consistent year on year (at about 0.82%). (See table 7.01 in *Building a Better Scotland: Spending Proposals 2005-2008: Enterprise, Opportunity, Fairness*, Scottish Executive, 2004a.)

Encouragingly, the Executive is also keen to shift towards a health service where the focus is on preventive medicine, more continuous care in the community and a reduction in health inequalities. These are the key messages in *Delivering for Health* (Scottish Executive, 2005). Executive recognition of the role of Community Health Partnerships, particularly in relation to reducing health inequalities and health improvement is also welcomed and related guidance that has been produced is helpful (e.g. *Community Health Partnerships and Health Improvement*, Community Health Partnerships Development Group Sub-Group on Health Improvement, 2005). The pilot work being undertaken in this area through the “Prevention 2010” project will be invaluable in driving this agenda forward.

Whilst the authors fully endorse the approaches described and recognise the Executive’s commitment to these areas it is important to note that they are aimed more at a high-risk approach to prevention. The authors believe that the recommendations made in the current paper would help deliver on these priorities whilst at the same time ensuring that the wider population approach has maximum impact.

It is also interesting to note a potential conflict. *Delivering for Health* assumes that the prevalence of many chronic diseases will inevitably increase (e.g. page 17). However, the main aims outlined in *Delivering for Health* are to prevent illness and if successful should help ensure chronic disease prevalence is reduced or at least maintained at current levels.

The Executive also has a number of strategies related to several key modifiable “lifestyle” risk factors such as diet, tobacco and physical inactivity. In particular, the actions on risk factor reduction within the Scottish population are set out in the white paper *Improving Health in Scotland: The Challenge* (Scottish Executive, 2003) through three special focus programmes: smoking, physical activity and healthy eating. Table 1 (p.15) outlines key national targets that have been set together with existing mechanisms to monitor progress at national level.

These national policies are the backbone of a wider healthyliving campaign. This integrates core messages of the benefits of making healthier eating choices and of increasing levels of physical activity. The campaign is both the front end of a broad food and health programme which supports the implementation of the Scottish Diet Action Plan (Scottish Executive, 2004b) in partnership with the main influencers of dietary behaviour (primary producers, manufacturers, supermarkets, caterers and the media) and the public face of the national strategy for physical activity. This is aimed at encouraging people to enjoy the benefits of leading an active life, creating an environment that both enables and encourages activity and sets out a framework of key actions to achieve this. The campaign markets healthy eating and physical activity as achievable and desirable for the majority of people in Scotland, raising awareness. The brand acts as a sign post, at point of sale, for healthier food choices and at point of decision making for opportunities to be more active, together with marketing sources of support, advice and education thus maximising every opportunity available to individuals to improve their diet and be more physically active.

Legislation has also recently been passed to ban smoking in public places. This ground-breaking legislation represents the biggest public health intervention for decades and should have a substantial impact on CVD in Scotland, as well as on a wider range of health problems, particularly cancers and respiratory diseases.

**Table 1.** Current Scottish targets for CVD mortality, incidence and risk factors

Condition/ Risk Factor	Scottish Target	Source/National Strategy	Routinely Collected Scottish Monitoring Data
CHD mortality	Reduce by 60% the number of deaths in people aged under 75 years between 1995 and 2010	<i>Towards a Healthier Scotland</i> (Scottish Office, 1999) and <i>Coronary Heart Disease and Stroke Strategy for Scotland</i> (Scottish Executive, 2002; updated 2004)	GROS annual return, ICD10 120-125
CBD mortality	Reduce by 60% the number of deaths in people aged under 75 years between 1995 and 2010	<i>Towards a Healthier Scotland</i> (Scottish Office, 1999) and <i>Coronary Heart Disease and Stroke Strategy for Scotland</i> (Scottish Executive, 2002; updated 2004)	GROS annual return, ICD10 160-169
CHD & CBD incidence	No	/	Limited: ISD produce incidence data based on new hospital cases plus deaths with no hospital admission.
CHD & CBD prevalence	No	/	None until April 2005, from then collected as part of GMS QOF data.
Diet/nutrient intake	Various e.g. % of total energy derived from total and saturated fat by 2005 less than 35% and less than 11% respectively	<i>Eating for Health: Meeting the Challenge</i> (Scottish Executive, 2004b)	Expenditure & Food Survey (UK level only)
Diet – consumption frequency of various foods	Various e.g. 400g of fresh fruit and vegetables per adult per day (equates to approximately 5 portions)	<i>Eating for Health: Meeting the Challenge</i> (Scottish Executive, 2004b)	Limited. The Scottish Health Survey does ask about frequency but doesn't provide enough information to assess if targets are met
Smoking	Various e.g. reduce smoking rates amongst adults (aged 16-64) to 29% by 2010	<i>A Breath of Fresh Air for Scotland. Improving Scotland's health: The Challenge</i> (Scottish Executive, 2003a)	Scottish Health Survey

Physical activity	Various e.g. 50% of all adults will meet the recommended level of physical activity by 2022	<i>Let's Make Scotland More Active: A Strategy for Physical Activity</i> (Scottish Executive, 2003b)	Scottish Health Survey
Obesity	No	National strategies on diet and physical activity and a clinical guideline: SIGN 69	Scottish Health Survey
Serum Cholesterol	No	National strategy on diet and a clinical guideline:SIGN 40	Scottish Health Survey
Hypertension	No	National strategies on diet and physical activity and a clinical guideline:SIGN 49	Scottish Health Survey

The Scottish Executive also recognises the need to target “upstream” life circumstances such as housing, poverty and social/physical environments and has a raft of policies and strategies in place to do this. *Building a Better Scotland* (Scottish Executive, 2004c) outlines the Executive’s spending strategy to improve the lives of people across Scotland. *Closing the Opportunity Gap* (Scottish Executive, 2002a) is the Executive’s anti-poverty strategy, which focuses on six key objectives, including one to tackle health inequalities. Community Planning Partnerships are key to delivery of this agenda, with the production and implementation of Joint Health Improvement Plans and Regeneration Outcome Agreements in the context of local Community Plans.

It is important to note that whilst this discussion paper has outlined some key related policies, it is nonetheless not intended to provide a comprehensive overview of all Scottish Executive policy that may directly or indirectly affect the prevention of CVD and health improvement in Scotland.

Despite the undoubted commitment of the Executive to health improvement, resources allocated for treatment and care far outweigh those available for prevention. As outlined earlier, the expenditure allocated for national health improvement is about 0.82% of that allocated for overall health expenditure (Scottish Executive, 2004a). This is also reflected locally. A recent estimate in one Board area suggested that approximately 1% of local NHS resources were spent on health improvement, across all diseases, risk factors and age groups and that this percentage had progressively reduced at a time when NHS resources had increased substantially (Scottish Borders Joint Health Improvement Plan 2005-2010). Therefore it may be that the consistency seen in national health improvement spending, relative to total health expenditure, is not reflected locally. This position is exacerbated when central allocations to local Health Improvement Funds have not received any uplift year on year and as a result of the decision to exclude primary prevention from the £40million allocated for implementation of the *National CHD and Stroke Strategy* (Scottish Executive, 2002; updated 2004). This issue was also highlighted at the Heart Health national conference in 2004. The conference focussed on preventing CVD in Scotland and collated perceived barriers to action and potential solutions. Funding to further develop prevention activities was one of the significant barriers identified.



It appears therefore, that although there are many supportive policies and strategies at national level, investment at the local level is not sufficient to help deliver the step change in the level of health improvement activity that in turn could help to deliver the step change in health expected in Scotland (Improving Health in Scotland: The Challenge, 2003b).

Perhaps a reason for the relatively low priority given to population primary prevention is that despite being clear about **what** needs to be done to improve the population's risk (i.e. reduce smoking, improve diet, increase physical activity) less certainty exists about **how** to achieve this. Blamey (2004) has recently reviewed the literature on the effectiveness of community-based CHD interventions and reports that the evidence for secondary prevention interventions is clearer, stronger and easier to interpret and implement compared to community-based, primary prevention interventions. There are several possible reasons for this.

First of all there is the issue of research funding. Clinical trials are supported financially by the pharmaceutical industry. Although publicly funded organizations such as the Medical Research Council conduct health improvement research, overall, work in this area is comparatively under-funded. In addition, as the risk in the population is far lower than in high-risk groups, large, long and expensive studies are often required stretching limited resources even further. Added to this is the fact that research in this area has generally focussed on trying to identify and quantify risk (i.e. the relationship between a particular behaviour or groups of behaviour and health) as opposed to ways of reducing risk (i.e. changing behaviour).

Related to this is the issue of hierarchy of evidence. In the current world of evidence based policy and practice the randomised control trial (RCT) is seen as the "gold standard". For a variety of reasons clinical research lends itself far better to this type of study. It is extremely difficult to conduct these kinds of trials in the public health/health improvement arena. In 1995 the WHO Regional Office for Europe established a WHO European Working Group on Health Promotion Evaluation (WHO 1995). The group reached a number of important conclusions and made a series of recommendations for policy-makers on how they might more effectively fulfil their role in this area. One of the conclusions reached was "the use of randomised control trials to evaluate health promotion initiatives is, in most cases, inappropriate, misleading and unnecessarily expensive" (p2). The group went on to recommend that policy-makers should use a wide range of evaluation methods, incorporating quantitative and qualitative methods to evaluate health promotion initiatives.

This is also recognised by Sorensen *et al.* (1998) who reviewed evaluation methodologies used in a variety of population based intervention trials. They found that despite recommendations that large scale trials aimed at population change should focus on a range of research phases (from hypothesis development [phase 1] and methods development [phase 2] to controlled intervention trials [phase 3] to studies in defined populations [phase 4] and demonstration research [phase 5]), the majority of studies have focussed on phases 3 and 4. They go on to recommend that "an expanded range of research methodologies is required to address the diverse needs for scientific rigor, appropriateness to research questions, and feasibility in terms of cost and setting. By inclusion of the full range of phases – from hypothesis testing generation to demonstration

research – it may be possible to develop a more balanced and diversified approach“(Sorensen *et al.* 1998, p.401). As stated earlier, this need for a range of evaluation approaches (that may include an RCT) is often far more expensive and complex compared to a relatively compact RCT.

This issue is highlighted by Blamey (2004) who outlined the difficulties in implementing and evaluating large, multi-sector, multi-faceted community-based interventions. Having reviewed all of the relevant literature she reported modest effects on CHD risk factors and little or no effect on mortality as a result of community-based programmes. Given these findings, some authors suggest that the current focus of health promotion on educational and behavioural interventions to reduce population risk is ineffective and suggest scarce resources be targeted on high risk individuals or on fiscal, policy, legislative and environmental actions (Ebrahim and Davey Smith, 2002). However, Blamey outlined a number of reasons for the equivocal findings in relation to community based interventions and these can be grouped into implementation limitations (e.g. unrealistic timescales, activities that have limited intensity and fail to saturate their target communities, low adherence rates, limited control over delivery and contextual issues) and evaluation limitations (e.g. limited tools and techniques, inability to detect small changes at population level, secular trends [i.e. inability to disentangle change occurring as a result of the intervention with that already occurring within the wider population], contamination [i.e. experimental interventions contaminating control populations], inappropriate outcome measures and lack of process information linked to outcomes).

Finally, knowing what to do but not necessarily how to do it was the position in clinical medicine and arguably still is (Effective Healthcare Bulletin 1999). There is ample evidence on what has to be done from RCTs but less certainty about how to change behaviour of all clinicians or implement the evidence in practice. The response has been to apply current evidence and best practice and evaluate approaches through clinical audit and research. The response to uncertainty in health improvement should be the same. When the threats to health are great, action may be required even if there is not absolute certainty about the effectiveness of the intervention. This can be informed by knowledge on the most likely best options. This precautionary principle is often applied in public health practice, particularly health protection, and other areas of society for example to combat perceived terrorist threats. Wanless put it like this:

“However, the need for action is too pressing for the lack of a comprehensive evidence base to be used as an excuse for inertia. Instead current public health policy and practice, which include a multitude of promising initiatives, should be evaluated .... so that over time an evidence base can be built up...”

Wanless, 2004

## LOOKING TO THE FUTURE

### What is possible?

Using data drawn from recent UK epidemiological studies, the Health Development Agency (now National Institute for Health and Clinical Excellence) (Kelly and Capewell, 2004) estimate the following:

- if prescribing were increased so that 80% of eligible patients received appropriate medications, this would result in approximately 20,000 fewer deaths each year in the UK
- modestly reducing average cholesterol levels in the UK from 5.8 to 5.2mmol/l (as already achieved in several other countries) would prevent approximately 25,000 deaths each year
- reducing smoking to American levels would prevent 17,000 UK deaths
- adding the reduction of cholesterol and smoking to small reductions in population blood pressure, Kelly and Capewell (2004) estimate 50,000 fewer deaths annually in England (equating to a halving of current CHD mortality).

According to Kelly and Capewell (2004) it is far more cost effective to control risk factors and mortality through national public health policy initiatives (i.e. last bullet) as opposed to pharmacological control (i.e. first bullet). They go on to argue that given reductions in cholesterol, blood pressure and smoking will result in substantial mortality reductions often within 12-24 months the much used argument that “we must fund more treatments because we do not have time to wait for the benefits of risk factor reduction” is flawed.

The National Heart Forum (McPherson *et al.*, 2002) has used epidemiological evidence to estimate the effect on future CHD for differing changes in risk factors. Some key estimates are:

- a 10% reduction in CHD if everyone were able to maintain a serum cholesterol level of less than 6.5mmol/l
- a 9% reduction if those people with light or sedentary lifestyles changed to a moderate level of activity
- a 6% reduction if hypertension was halved
- if all smokers quit there would be a reduction of 20% and if all those who smoke more than 10 cigarettes per day cut down to less than 10 cigarettes per day there would be reduction of 5%
- in total, they estimate that a change of CHD incidence of around 30% in 10 years could be achieved with the above “plausible” improvements in risk factors.

It is important to note that these are the estimated effects on CHD only. As the same risk factors are related to a range of other conditions, the effect on population health would be even greater, however benefits might take longer to emerge.

In 2002 Derek Wanless was commissioned by the Chancellor to undertake a review of the long-term trends affecting the health service in the UK to “quantify the financial and other resources required to ensure that the NHS can provide a publicly funded, comprehensive, high quality service available on the basis of clinical need and not the ability to pay” (Wanless 2002). According to Wanless (2002) “the resources required to deliver a high quality service will depend on the health needs and demands of the population, technological developments, workforce issues and productivity. As there is uncertainty around how these additional cost drivers will change, the Review built up three scenarios:

- **slow uptake** – there is no change in the level of public engagement: life expectancy rises by the lowest amount of all three scenarios and the health status of the population is constant or deteriorates. The health service is relatively unresponsive with low rates of technology uptake and low productivity;
- **solid progress** – people become more engaged in relation to their health: life expectancy rises considerably, health status improves and people have confidence in the primary care system and use it more appropriately. The health service is responsive with high rates of technology uptake and a more efficient use of resources; and
- **fully engaged** – levels of public engagement in relation to their health are high: life expectancy increases go beyond current forecasts, health status improves dramatically and people are confident in the health system and demand high quality care. The health service is responsive with high rates of technology uptake, particularly in relation to disease prevention. Use of resources is more efficient.”

#### **In relation to health improvement:**

- **slow uptake** – with unchanged levels of health inequalities and risk factors, the *slow uptake* scenario is the most pessimistic of the three.
- **solid progress** – this *solid progress* scenario is one of steady improvement, with current public health targets met and maintained.
- **fully engaged** - this scenario is the most optimistic of the three: a picture of rapid improvement in the health of the nation, underpinned by a *fully engaged* public and a high quality service. Public health improves dramatically with a sharp decline in key risk factors such as smoking and obesity, as people actively take ownership of their own health. The improvements seen in the *solid progress* scenario are achieved quickly and exceeded. People have better diets and exercise much more. Targets for obesity are met quickly and maintained. Fewer people smoke: only one in six compared to around one in four today, matching levels in California where there has been intensive smoking reduction in recent years. These reductions in risk factors are assumed to be largest where they are currently highest, among people in the most deprived areas. This contributes to further reductions in socio-economic inequalities in health.”

Clearly, the fully engaged scenario should be a target simply on health improvement grounds as it is likely to bring about the largest gains in health. If it is also considered that Wanless (2002) calculated that in the long-term the fully engaged scenario would actually cost the country far less in terms of total health spend the scenario has to be a national priority (an estimated £30 billion per annum less than the slow uptake scenario). Achievement of the scenario would mean we have lower prevalence of CHD and other chronic diseases and from the individuals point of view this would equate to a delay in chronic disease, e.g. heart attack and CHD. A simple delay in disease onset may not sound an attractive goal, but from the individual's perspective it certainly can be, for example if the onset of CHD is delayed until their 70's people will enjoy a healthy retirement and live to see their grandchildren grow up, as opposed to onset in their 50's/60's followed by years of pain, disability and poorer quality of life with more and more intensive treatments.

### **What more needs to be done?**

We now have a very clear understanding of the aetiology of CVD and it is apparent that a combined high-risk and population-wide strategy to primary prevention represents the way ahead. However, within this it is clear that the population approach is the most cost-effective and will have the greatest potential impact on CVD incidence, prevalence and ultimately mortality (third figure in Appendix 1). In addition, as many of the behavioural risk factors (e.g. smoking, physical inactivity, poor diet) addressed through a population approach are also related to other highly prevalent conditions (e.g. cancer, obesity, diabetes) the overall health benefit will be increased. The population approach therefore has to be a higher priority. Whilst we may have made progress in this regard in terms of policy, this has not been matched by progress in funding, practice or research.

Taking account of her findings on community based CHD interventions, Blamey (2004) made a number of recommendations for the implementation and evaluation of future prevention programmes. An outline of the former follows:

- **Focus to a much greater extent on more upstream solutions and the physical and social environment.** At present the main focus of health improvement is on micro-intervention (such as individual projects and local programmes of work). However, population health improvement requires macro-intervention. This would involve greater policy, structural and environmental intervention. The proposed national ban on smoking in public places is an example. In addition, there is now a body of evidence linking deprivation/poor life circumstances to unhealthy behaviours and more directly to ill-health. If population health is to be improved and health inequalities reduced, improving the underlying life circumstances is fundamental.
- **Target multiple levels of influence.** For programmes of work to be effective and have a population impact we need a range of groups and organisations to work together. This includes national and local government, the NHS and local community and voluntary groups. This also means targeting families, settings and structures rather than simply individuals within them.

- **Focus individual approaches on high-risk groups.** Evidence shows that individual pharmacological, behavioural and educational interventions are most likely to be effective among high-risk groups.
- **Target interventions on pockets of high prevalence in communities.**  
Given scarce resources, to achieve saturation and change social norms effective interventions need to be targeted at areas of particular need where prevalence of risk factors is high. Often these are disadvantaged communities. These communities are usually those with the greatest number of barriers and therefore interventions need to be multi-faceted, tailored to the specific target groups and the particular barriers to change they face, intensive and prolonged.
- **Involve communities in design, planning and implementation.** For community interventions to be effective communities have to be involved in their design, planning and delivery. This is entirely consistent with the philosophy behind Community Health Partnerships (CHPs) and the guidance given on health improvement work within CHPs (Community Health Partnership and Health Improvement, 2005).
- **Concentrate on interventions that can maximise changes in social norms within key target groups** This is related to the first bullet point. If interventions are to be effective in changing population behaviour and health profiles they must be appropriate and acceptable to the groups, saturate that population and be intensive and long-term enough to produce change that can be measured at the individual, group and population level. We must get better at identifying key target groups and saturating them with a range of effective interventions. In other words intensity and saturation are key if we want to change social norms.

In addition to the above we need far better monitoring and feedback in Scotland. For example we do not currently know whether the prevalence of CHD is increasing or not and many NHS Boards do not have accurate data on local risk factor prevalence.

Finally, sustainability is a huge issue. Short-term funding provided by “external agencies” often supports many local health improvement initiatives. For example, many local health improvement activities are supported by a range of time limited non-local authority based funding (e.g. New Opportunity Funded Healthy Living Centres) and we know that any positive effects are not maintained over time without continued support. Core investment is needed from statutory authorities, perhaps supported by very specific time-limited funds.

## CONCLUSIONS

This paper has reviewed the primary prevention of CVD in Scotland. It has shown that we know much about the relationships between a range of risk factors and CVD but we know less about how to bring about positive change in behaviour. The paper argues however that we still have enough evidence to act. It has outlined many positive policies and actions throughout the country; however, it also discusses the current imbalance of investment and effort between population primary prevention and clinical approaches. There is a danger that this leads to increases in the prevalence of CVD and the pain, disability and poorer quality of life experienced by sufferers, and increases the demand on health and social services. This paper has been sent to the National Advisory Committee for CHD, the Scottish Executive, the Directors of Public Health group and has been placed on the Heart Health Network website to promote discussion and debate on this important topic.

Finally, a summary of key areas for change are suggested below:

1. NHS Boards and Councils should improve the coordination and balance of downstream health improvement work focused on lifestyles with more upstream work, particularly through the community planning process.
2. Health improvement interventions should be customised for the specific intended target population, taking account of the knowledge, attitudes and beliefs of that section of the population.
3. Multiple barriers to change (structural, social and financial) should be addressed simultaneously to improve effectiveness of interventions and is likely to be particularly required in disadvantaged communities to reduce existing inequalities in health.
4. A substantial increase in health improvement activity is required to complement existing service developments and ensure that the prevalence of chronic diseases do not increase and to limit future demands on NHS and LA services. The Scottish Executive should encourage and support NHS Boards and Councils to develop their health improvement activity, in part through the assessment and discussion of local Joint Health Improvement Plans.
5. The Scottish Executive should agree with the NHS in Scotland a definition of health improvement for financial monitoring purposes within the NHS so that investment over time and between areas can be compared, and progress towards the levels suggested by the Wanless review assessed. Consideration should also be given to a definition for Council health improvement investment so that JHIPs can identify total investments from both statutory agencies (NHS Boards and Local Authorities). At the very least local trends should be monitored using consistent definitions and indicators.
6. Year on year investment in human and financial resources are required to deliver the above recommendations and should be monitored via the annual Health Improvement PAF process, locally and nationally, and commented upon in each Director of Public Health Annual Report.

7. The incidence, prevalence (potentially through the new GMS Contract Quality & Outcomes Framework) and mortality from CHD and stroke should be monitored annually. National targets for incidence and prevalence should be considered.
8. Consideration should be given to increasing sample sizes taken in the Scottish Health Survey so that all Board areas in Scotland have reliable data to monitor trends in major risk factors and assess the progress of health improvement interventions.



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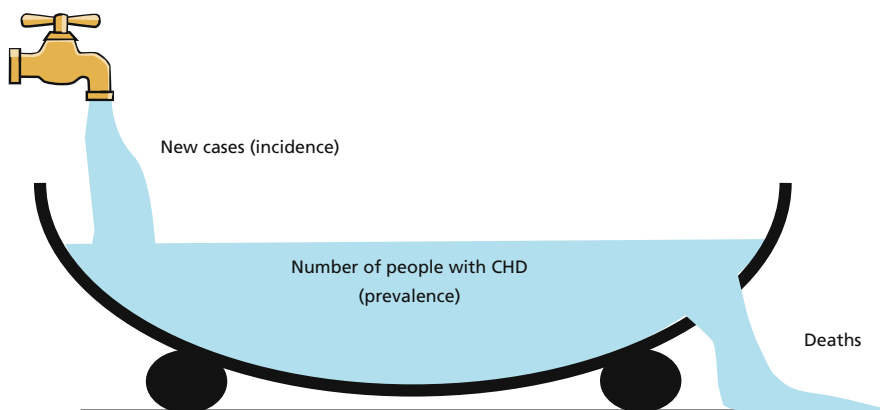
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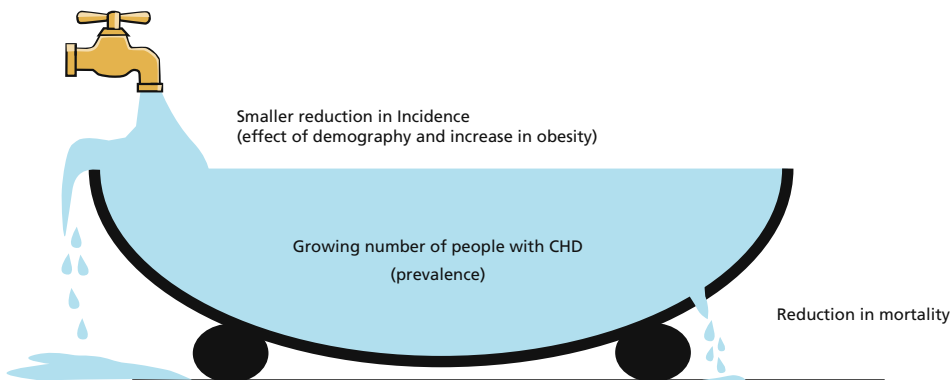
# APPENDIX 1

The relationship between incidence (new cases falling into bath), prevalence (pool of individuals with CHD), case fatality rate (represented by the size of the plug-hole) and mortality

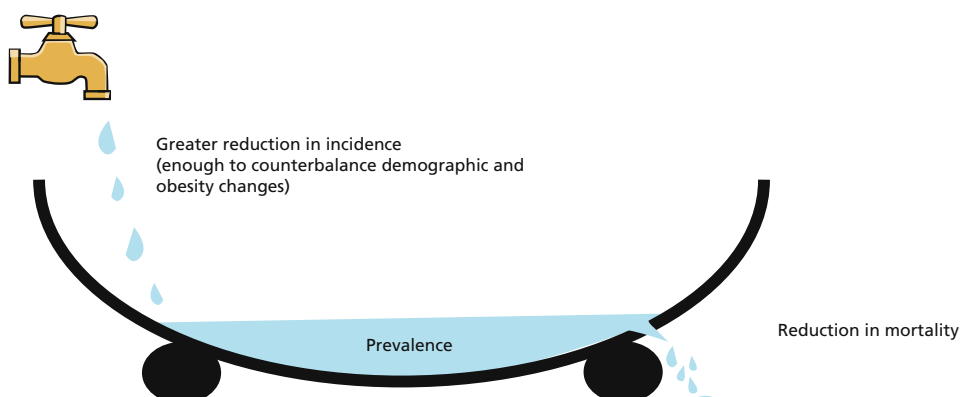
## Incidence, Prevalence and Mortality from CHD in Scotland



### Faster reduction in case fatality rate than incidence

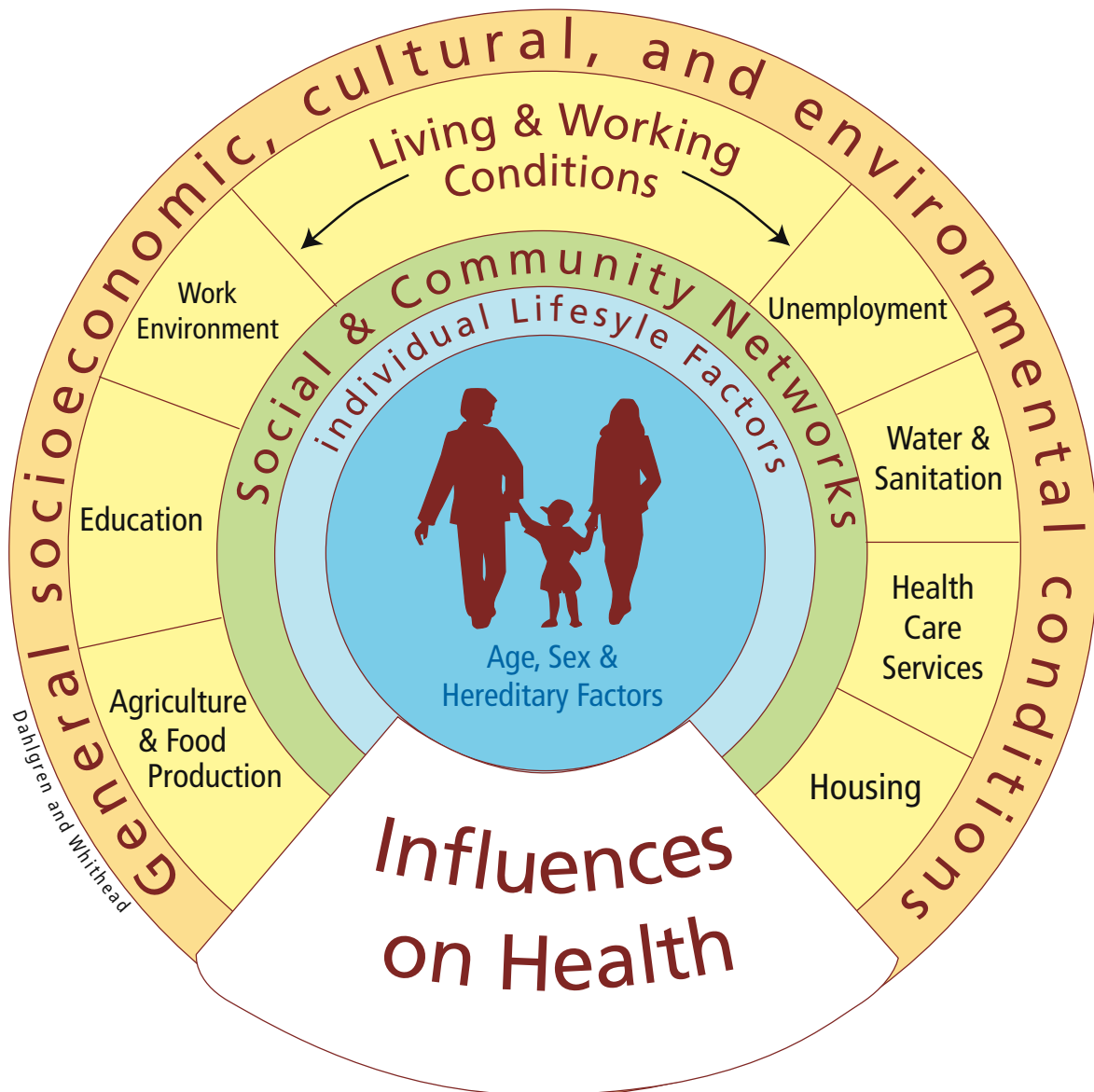


### Faster reduction in incidence than case fatality rate



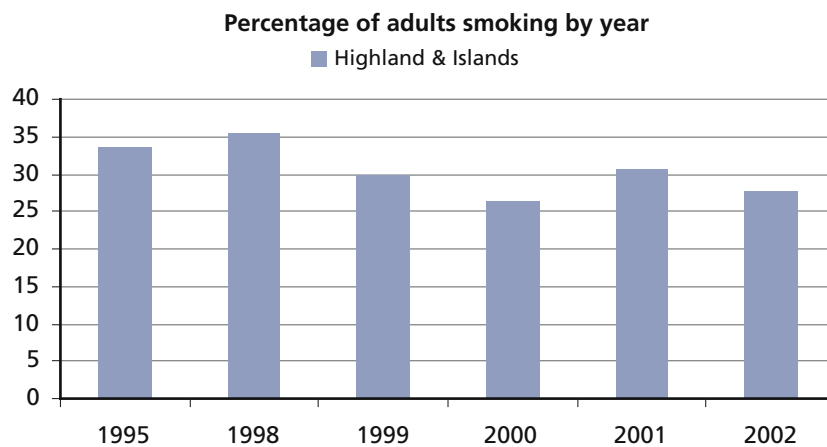
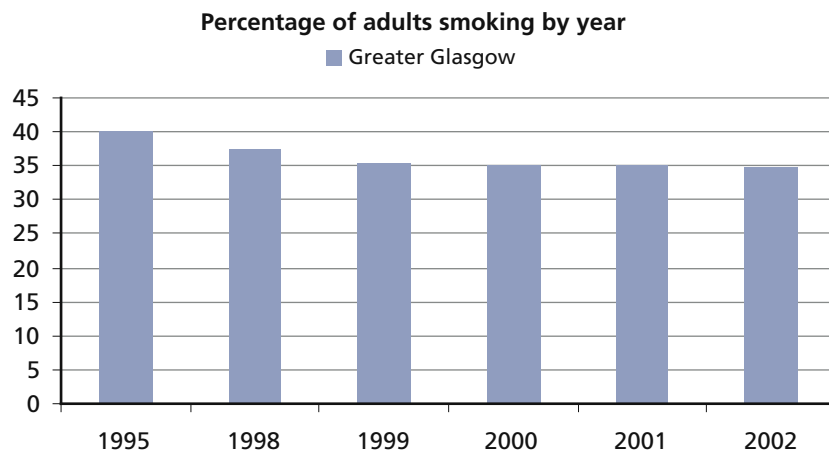
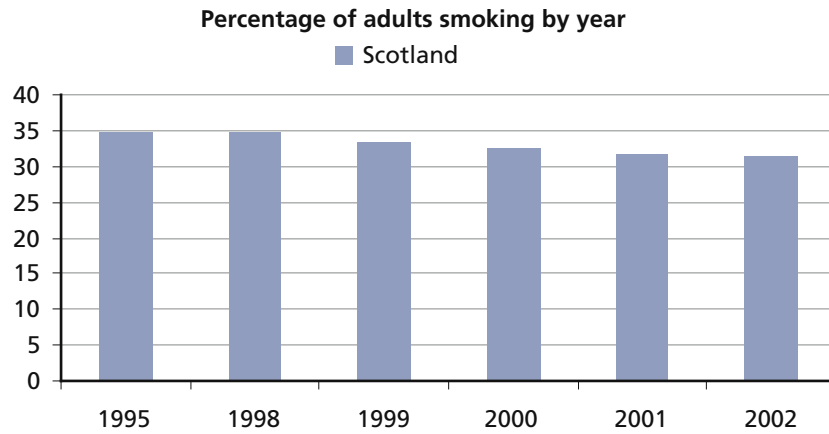
## APPENDIX 2

Dahlgren and Whitehead "Wheel of Health" model (Dahlgren, G. & Whitehead, M. 1991. *Policies and strategies to promote social equity in health*. Stockholm: Institute of Futures Studies).

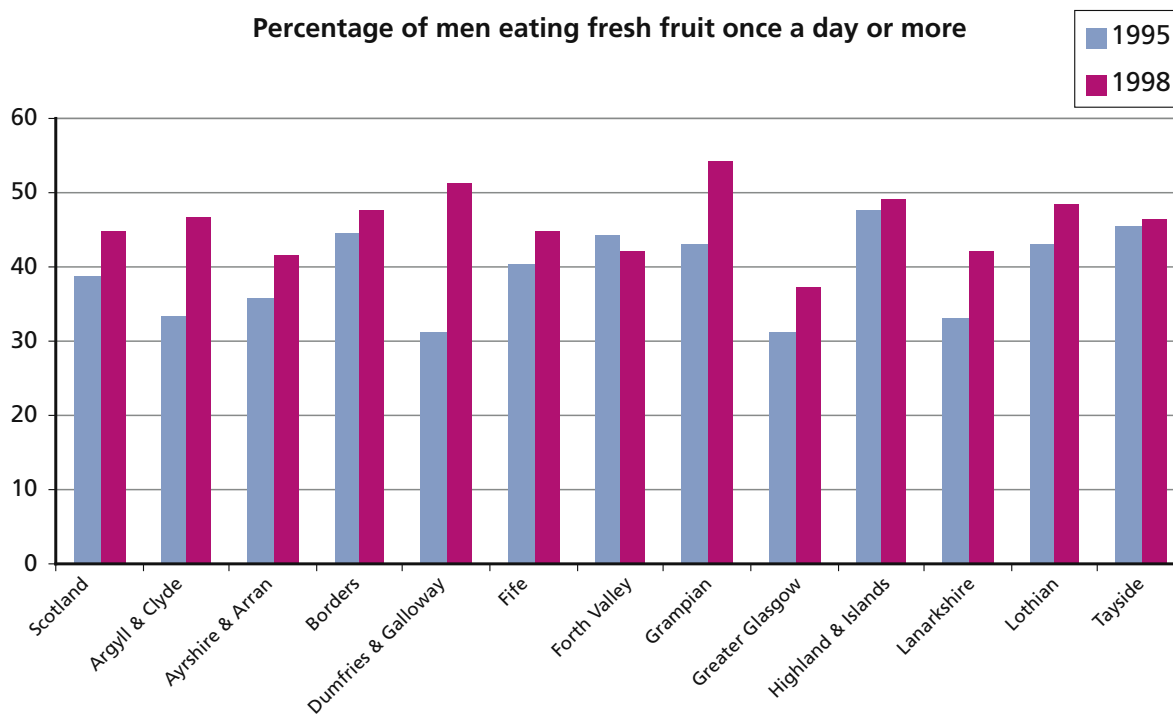


# APPENDIX 3

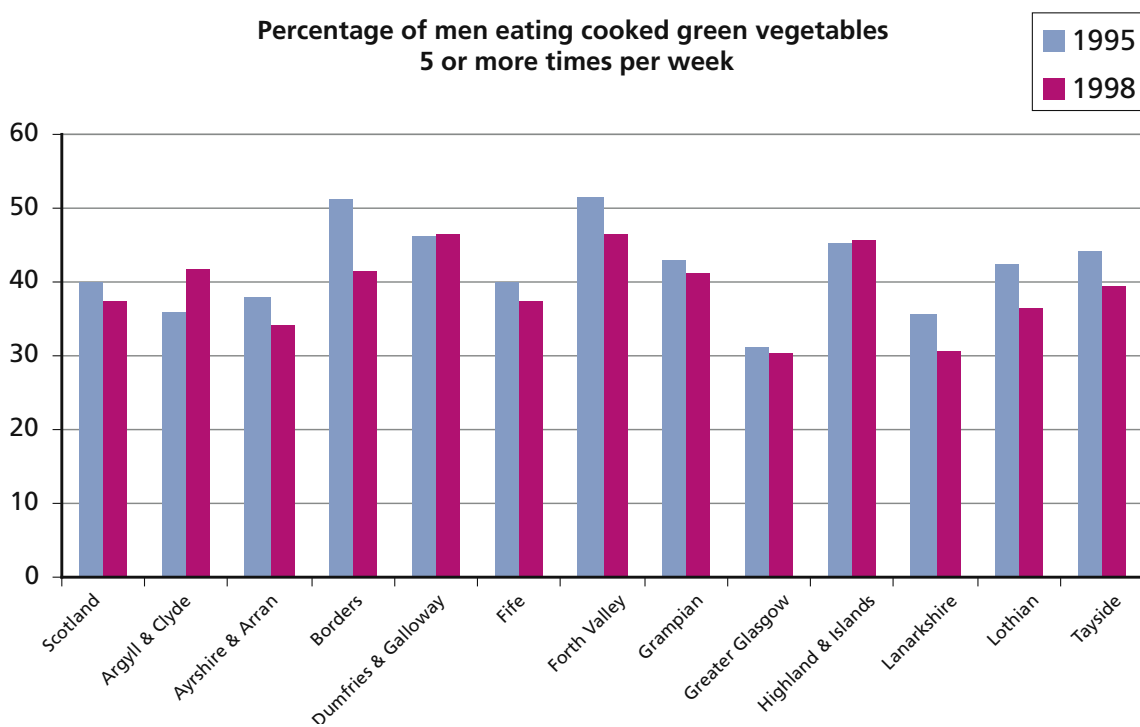
## Population Risk Factor Levels



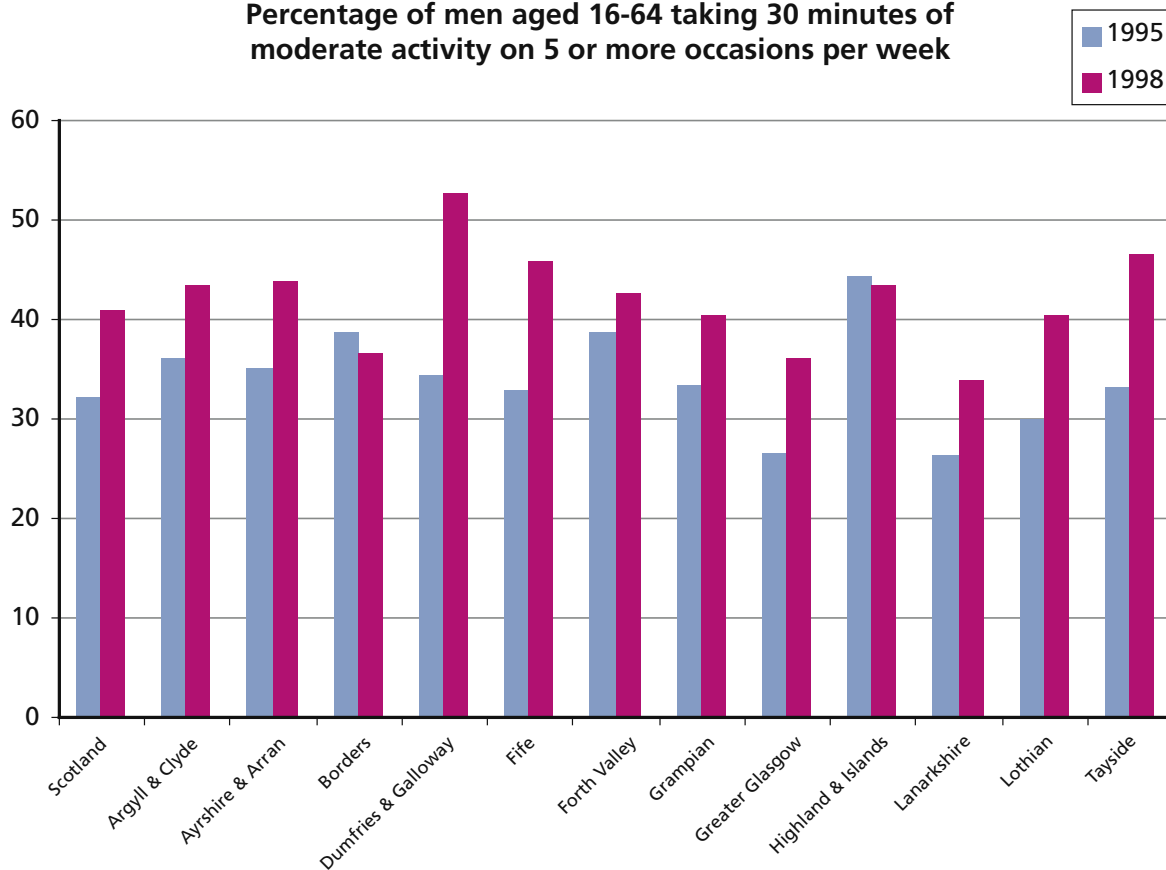
Percentage of men eating fresh fruit once a day or more



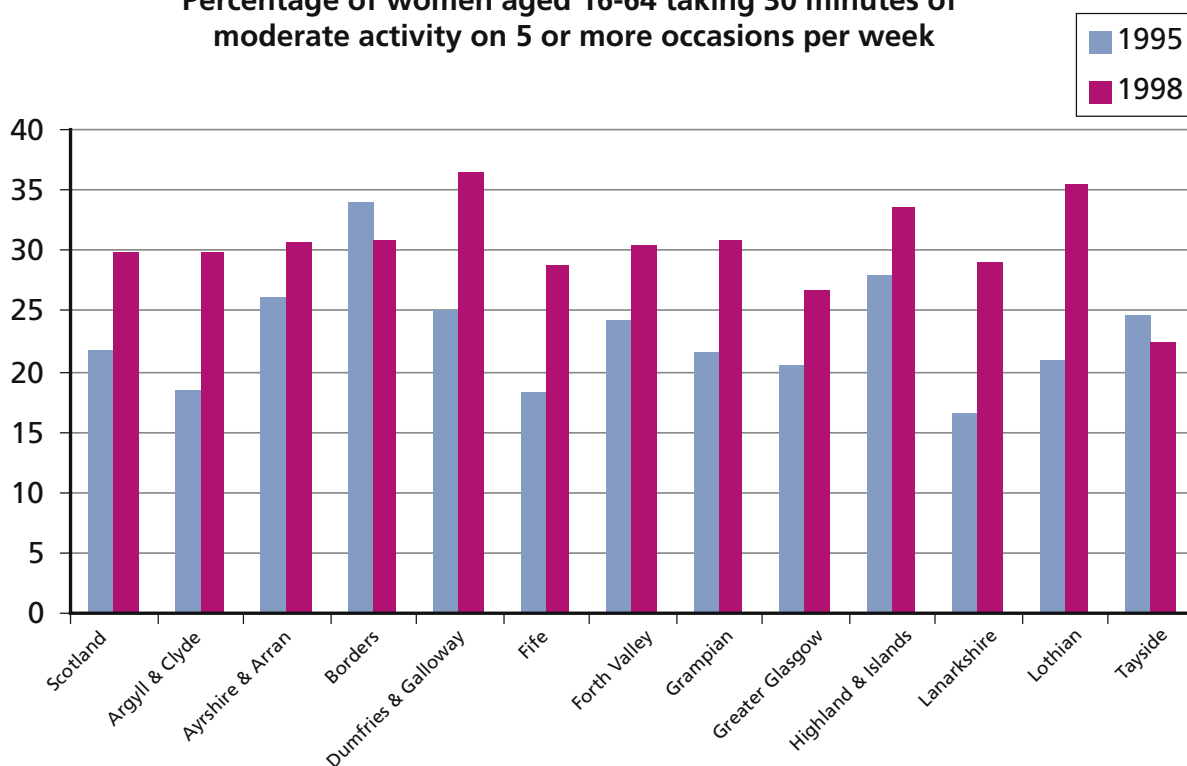
Percentage of men eating cooked green vegetables 5 or more times per week



Percentage of men aged 16-64 taking 30 minutes of moderate activity on 5 or more occasions per week

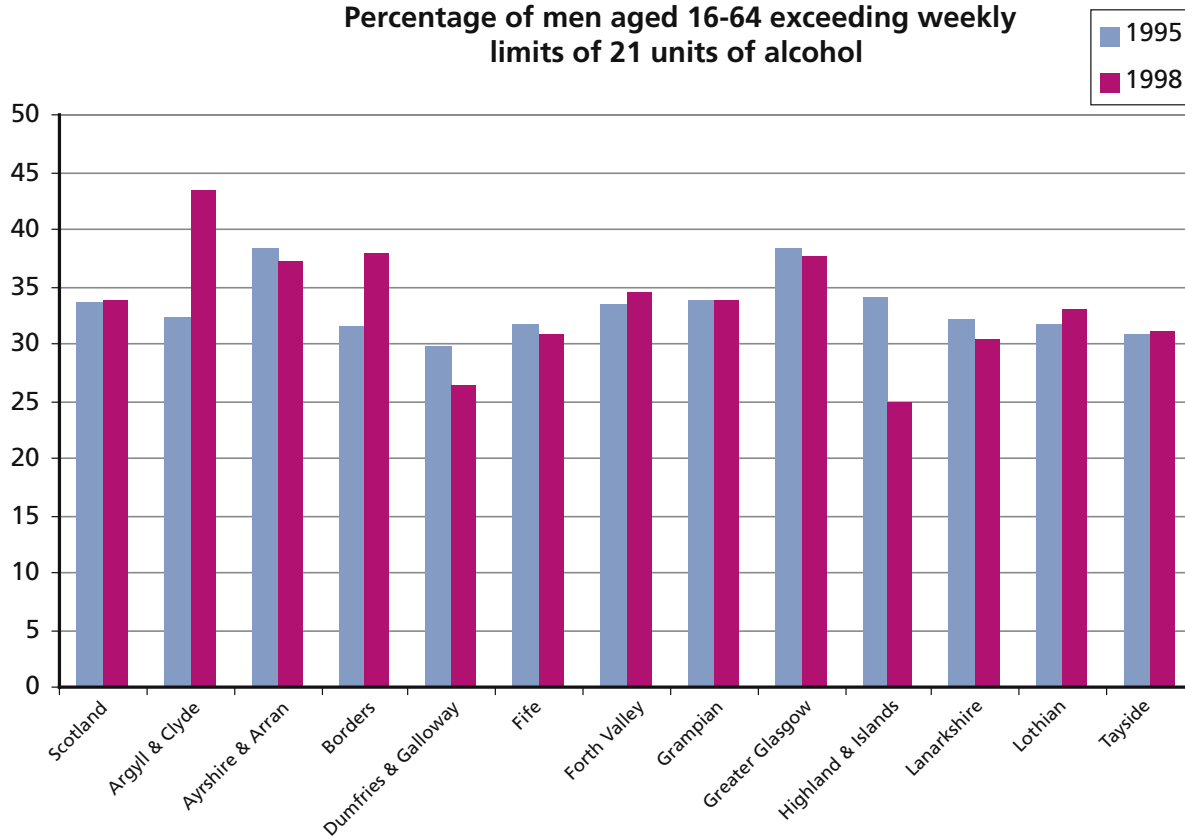


Percentage of women aged 16-64 taking 30 minutes of moderate activity on 5 or more occasions per week

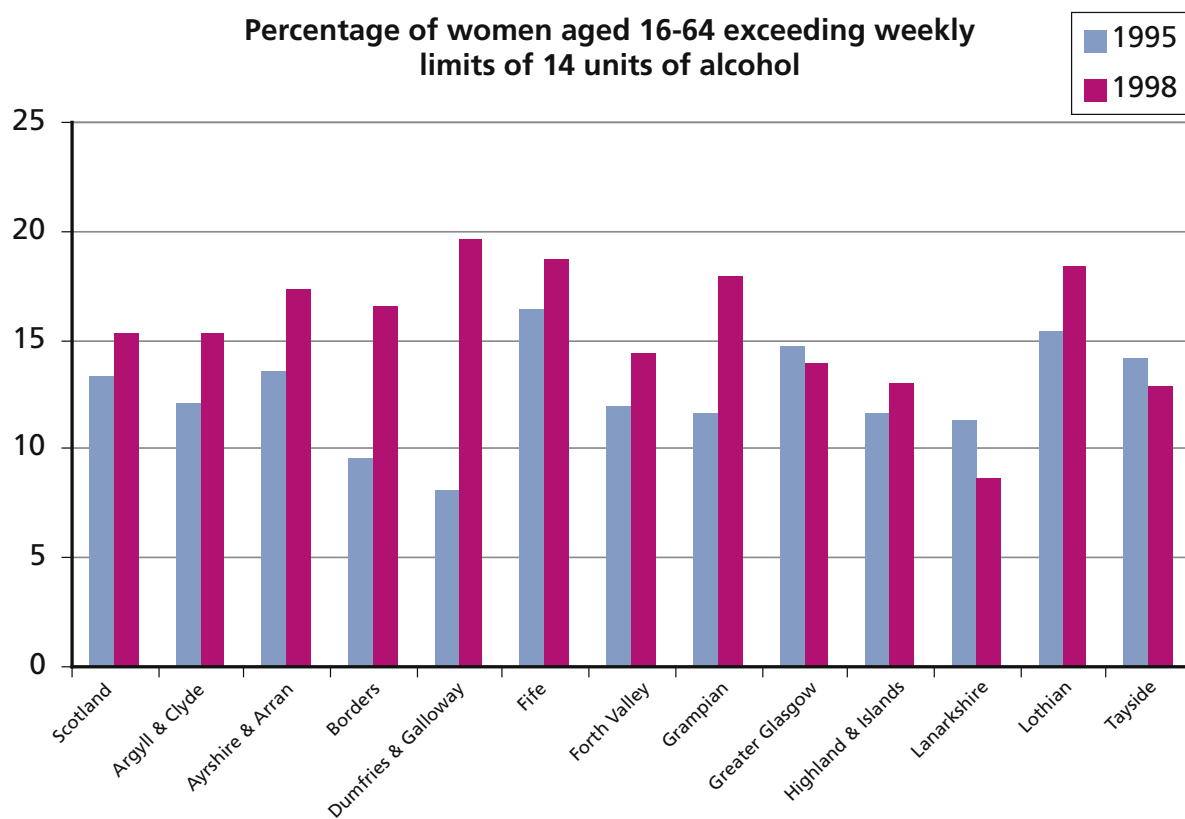




Percentage of men aged 16-64 exceeding weekly limits of 21 units of alcohol



Percentage of women aged 16-64 exceeding weekly limits of 14 units of alcohol



*Primary Prevention of Cardiovascular Disease in Scotland: We must go further* has been produced to support local Managed Clinical Networks (MCNs) develop their primary prevention strategies. Although the guide specifically relates to preventing CVD it is important to note that it may also be of use to those involved in wider health improvement and local health improvement planning. As several chapters demonstrate, physical inactivity, poor diet and nutrition and smoking are important risk factors for a range of other conditions.

The first chapter introduces the guide, charts Scotland's current position in relation to CVD and maps out what is currently happening at a national level to combat it. Chapter 2 maps out a framework for local primary prevention, identifying key modifiable risk factors. It goes on to explore how local primary prevention strategies could link with local health planning. Chapters 3, 4 and 5 present recommendations for local action in the key topic areas of physical activity, smoking and diet and nutrition respectively. For each recommendation, a summary of the evidence is presented together with any relevant local or national policy. Examples of current practice in Scotland are presented and a series of barriers to local implementation of the recommendation, together with levers for overcoming these barriers (as identified by local policy makers and practitioners) are also given.