MONASH University
Business and Economics

Centre for Health Economics

Research Paper 2006 (15)

Developing a Strategy for Preventative Health

A Framework

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August, 2006

ISSN 1833 – 1173
ISBN 1 921187 14 X

ACKNOWLEDGEMENTS

Funding from the Victorian Government, Department of Treasury and Finance is gratefully acknowledged.

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ABSTRACT

Much of the ill-health and disease burden facing Australians today and into the foreseeable future is preventable. An effective preventative health strategy thus offers the prospect of improving the health of the community. This is both of direct benefit and indirect benefit via a possible impact on workforce participation/productivity and a reduction in need for health care.

Prevention can be categorised as; i) *Primary prevention*, by preventing the adoption of harmful behaviours (such as smoking), preventing development of clinical risk factors such as high blood pressure, or preventing disease in those already 'at risk'; ii) *Secondary prevention* to prevent/delay complications in persons with disease (newly diagnosed/established), iii)*Tertiary prevention* to prevent/delay complications in those with established disease and morbid consequences, and distinguished from *consequential* activities that reflect a failure of prevention.

Preventative interventions operate on the modifiable factors that influence health. These fall into four inter-related influences:

i. *Social and physical infrastructure* – eg housing, social connectedness, employment, education, neighbourhood setting which contribute directly to mental and physical health and via impact on lifestyle;
ii. *Lifestyle behaviours* – primarily nutrition, physical activity, drug and alcohol use, tobacco smoking, which also contribute directly to mental and physical health, but also to disease incidence and progression directly and via the influence on clinical parameters;
iii. *Clinical parameters*– obesity (especially abdominal fatness), hypertension, dislipidemia, etc., work primarily via their role in disease incidence and progression; and
iv. *Management of chronic disease* – management protocols for chronic disease with demonstrated capacity to delay disease progression and the rate of complications.

Health promotion and illness prevention is highly complex. A wide range of competing and/or complementary strategies are available to address modifiable risk factors. These include:

i. *Population wide initiatives* such as; legislation, enforcement, regulations and standards; pricing incentives, through tax penalties, tax exemptions, subsidies; media-based strategies to inform and to promote desired behaviours; related policy on transport etc.;
ii. *Community level interventions* to modify the social and physical infrastructure (eg redesign neighbourhoods) and empower communities – eg through school-based programs
iii. *Individual level clinical interventions* such as pharmaceuticals/pharmacy review, clinician consultations, vaccination, screening, specialist teams.

Moving towards a prevention Strategy

Given the almost infinite array of possible prevention options, a set of six criteria has been devised to support the development of an evidenced-based Prevention Strategy. The suggested criteria are:

i. *Equity* - prioritise interventions that target those who are most disadvantaged, with the aim of reducing health inequalities.
ii. *Efficiency* - prioritise interventions whose *performance* in terms of benefit per unit cost is favourable. Consider $/QALY as the preferred measure of performance[1].
iii. *Effectiveness* - prioritise interventions where gains at the individual level are 'meaningful' as well as statistically significant.

[1] The QALY or quality adjusted life year, combines mortality and quality of life into a single measure. It is the sum of quality of life (or change in) measured on a scale of 0 (death) to 1 (full health) multiplied by time in health state, and incorporating change in life expectancy. The QALY is one of only two measures that combines quality of life and mortality. The other is the DALY (disability adjusted life year), the product of a disability weight (0=no disability, 1.0= total disablement) and time in health state, with premature mortality. DALY weights are published for a limited number of defined health states which makes them less suitable for economic evaluation than the QALY for which QoL weights are derived as a continuous variable.

iv. *Dynamic efficiency* - prioritise initiatives that reduce distortions and promote resource shifts to cost-effective interventions; (eg supporting empowered consumers[2] and flexible, responsive providers).

v. *A portfolio that will spread costs and returns*- include a mix of strategies that will yield both immediate and delayed returns and where investment can be staged.

vi. *Other objectives* – consider other objectives, such as labour market participation/ productivity.

Steps in Developing a Preventative Health Strategy

Short/medium term

1. Agree on selection Criteria (as listed above or modified as appropriate).
2. Identify a set of 'candidate' interventions for possible inclusion in the Preventative Health Strategy. (See for example preliminary list in Box 1, based on a partial review of the literature.)
3. Collate evidence on the candidate interventions and assess against the Criteria.
4. Review results of 3 and identify a subset of interventions suitable for inclusion in the Strategy.
5. Calculate the budget impact over time of specific interventions, initial cost and expected downstream cost savings. Refine Strategy components in light of financial flow information.

Research Program

1. Estimate current level of expenditure on prevention – by disease/health problem, by modality, by stage in disease progression, by population target.
2. Develop a research agenda on; the determinants of health, the effect of interventions on health, downstream cost impacts and workforce participation and productivity.

Box 1 Indicative list of interventions for inclusion in a preventive health strategy

Primary prevention Population level

- Public campaign to promote fruit and vegetable consumption (to prevent/reduce disease progression in cancers, Cardiovascular disease, diabetes);
- Tobacco control – continue public campaigns;
- Limit advertising of high density snacks and soft drinks heavily implicated in the obesity epidemic, eg remove tax deductibility on such advertising or partial prohibitions;

Primary prevention - targeted

- Support GPs to provide brief alcohol and smoking advice (eg 'life script' program)

Primary prevention - Clinical

- Intensive behavioural programs (diet and physical activity) for person at high risk of type 2 diabetes (persons who are obese with IGT[33] and women with previous GDM[3]), eg through community-based multi-disciplinary teams;

Secondary/Tertiary prevention

- In persons with advanced heart disease, support adoption of Mediterranean style diet;
- Targeted quit smoking interventions in smokers with heart diseases, diabetes, pregnant women;
- Mental health – support best practice care in various anxiety disorders, consider role for drug and alcohol centres (eg as per the successful model of the US Veterans Health Administration).
- Support Pharmacy reviews to reduce complications of multiple medications (poly pharmacy).

System change

- Support new preventative approaches to primary care, through an enrolled population, electronic patient record, quality audit/quality assurance.
- Consider how tax incentives support or undermine healthy behaviours and adjust.

[2] A central role of governments is to ensure citizens can make well-informed (rather than poorly informed) choices about the actions relevant to their health.

[3] IGT impaired glucose tolerance, GDM, gestational diabetes mellitus (diabetes during pregnancy)

Developing a Strategy for Preventative Health. A Framework

1. Purpose of Discussion Paper

This paper was prepared as a discussion document for a Preventative Health Workshop, hosted by the Victorian Government Departments of Treasury and Finance and Human Services. The workshop was part of the response by the Victorian Government to the COAG meeting of10th February 2006, at which Australian governments nominated several health related issues as priorities in the National Reform Agenda. Under *Human Capital* addressing the effect of an ageing population and associated health consequences on workforce participation and productivity were identified as a priority. A range of specific initiatives are being developed in response to this, including the allocation of $500 million over 4 years under the '*Australian Better Health Initiative*' for 'promoting good health, disease prevention and early interventions', through actions such as expanding the health workforce and extending the items funded under the Medicare Benefits Schedule[4]. 'Human capital' initiatives are also proposed to address the prospect of reduced workforce participation due to poor health, with a focus on strategies to improve chronic disease outcomes, particularly in the working age population. This paper is designed to provide some guidance to the development of a strategy to promote good health and disease prevention.

We commence by outlining some key concepts - including the scope of prevention and current resources allocated to 'Prevention'. This is followed in Section 3 with an introduction to the literature on modifiable risk factors in health and wellbeing. It is this evidence-base that underpins the role for prevention in reducing disease burden. A Framework for development of a preventative health strategy is then described in Section 4 including a set of criteria for selecting/assessing interventions for inclusion in a Prevention Strategy. The paper concludes (Section 5) with a suggested way forward. The development of a preventative health strategy is a large task and would ideally draw on the considerable expertise residing within various organisations, research groups and individuals who have been studying issues around prevention for some time. Once agreement is reached on suitable decision criteria, candidate intervention options would be identified and then assessed against the criteria to inform an evidence-based Prevention Strategy. For illustrative purpose, a preliminary and partial list of interventions has been identified as a starting point that largely target national health priority areas and a sample intervention assessed against the suggested criteria.

2 Background

2.1 Concepts and scope

There is some debate about what is encompassed by *prevention*. In this paper it is used in its broadest sense to cover all activities designed to ameliorate negative health and wellbeing outcomes and thus includes any initiative designed to modify health outcomes. Prevention is not solely concerned with primary prevention – preventing ill health in the population at large and those at elevated risk, but also secondary and tertiary prevention, to reduce the harmful consequences of those with a current health condition. Under this definition all interventions that are not strictly consequential would be considered preventative.

[4] COAG 2006, communiqué, www.coag.gov.au/meeting/100206/index.htm. see also Annex.

Prevention can be achieved through public health[5] strategies but also through clinical interventions addressed at individuals and through strategies outside the health sector. Prevention is a broader concept than health promotion or public health. *Public health* equates broadly with the population-level prevention activities; whilst, *Health promotion* is concerned with promotion of 'positive health', not simply the absence of disease. For this paper a broad definition of 'health' is adopted which includes physical and mental health, positive aspects of wellbeing as well as the absence of disease. The breadth of the concept is well illustrated by the VicHealth definition of mental health[6]. Health promotion as enunciated by VicHealth[7] tends to focus on population strategies and system-wide solutions, which include community capacity building.

In understanding and thinking about possible preventative health actions, the taxonomy outlined in Box 2 might be useful for categorising possible prevention strategies.

Box 2 Characterisation of prevention strategies/interventions

i) ***Broad intent and Population target***
- *Primary prevention of Risk Factor* – designed to prevent or delay adoption of risk factor/harmful behaviour in the population at large or in those at elevated risk, such as an advertising campaign to discourage teenagers from taking up smoking
- *Primary prevention 'Disease'*– prevent/delay incidence of a disease or risk factor /social problem in the population at large or those at elevated risk
- *Secondary prevention* – prevent delay consequences/complications of disease in high risk group/persons with established disease/health problem
- *Tertiary prevention* - prevent delay consequences/complications of disease in persons with established disease/health problem and morbid consequences. (Eg person who have had a heart attack, use of illicit drugs as a response to child abuse and neglect).

ii) ***Sector of the economy*** through which the intervention/strategy is delivered
- Whether delivered through the health, transport, environment, physical activity, human services.

iii) ***Mode of intervention***
- Legislation/enforcement/regulation/standards – eg prohibitions (such as advertising bans), standards – food quality, tuckshop meals, seatbelt legislation
- Pricing incentives – including taxation (tax penalty eg cigarettes, tax exemptions eg fresh food), subsidized access, (eg services listed on MBS, PBS),
- Media – TV, radio, print
- Education – general/health specific; via schools, media, clinical
- Clinical service – pharmaceutical, clinician consult, vaccination, screening
- Community-level intervention -

iv) ***Reach*** – National, state, regional, local

v) ***Specific health problem/source of burden targeted*** - eg disease category, harmful behaviour

vi) ***Level of intervention – population, sub-population, individual.*** Examples of the latter are dental care, blood pressure medication or life style advice for person with high blood pressure.

vii) ***Objective of government being addressed***
- Provide desirable services the private sector won't or will under-provide (public goods)
- Address distorted incentives, eg assist citizens make informed choices, counter misinformation
- Support actions that contribute to achievement of societal goals
- Discourage harmful actions (merit goods)
- Promote equity.

[5] The National Public Health Partnership (1998) defines public health as: 'the organised response by society to protect and promote health, and to prevent illness, injury and disability.' he starting point for identifying public health issues, problems and priorities and for designing and implementing interventions is the population as a whole or population subgroups'.

[6] VicHealth defines 'Mental health as not merely the absence of mental illness. It is the embodiment of social, emotional and spiritual wellbeing. It is fundamental to physical health, productivity in the workplace, school, family and to overall quality of life. Mental health provides individuals with the vitality necessary for active living, to achieve goals and to interact with one another in ways that are respectful and just'. http://www.vichealth.vic.gov.au/content.aspx?topicID=17

[7] VicHealth defines its role as 'promoting good health and preventing ill-health … by fostering change in social, economic, cultural and physical environments' VicHealth mission at www.vichealth.vic.gov.au

2.2 Resources allocated to prevention

Ideally this paper would include a description of Australian resources allocated to prevention, contrasted with consequential expenditure (a failure of prevention), with prevention also classified by population target and possibly other attributes listed in Box 1. In this way a picture would be developed of the proportion of expenditure for each disease area/health problem allocated to prevention. It is likely that large differences would be observed across health conditions. For instance, attributable costs of child abuse are estimated to be $4,000 million/year, but this is mostly to deal with the consequences of child abuse, with little on preventive actions (Keatsdale 2003). Whilst for CVD, a large part of the large costs of management is on prevention (eg on anti-hypertensive agents and cholesterol lowering drugs). Such information would not in itself indicate priorities for spending but can highlight areas where the balance between prevention and consequences may be distorted.

The AIHW has estimated Public health expenditure in 2003-04, at $1265 million for Australia or $63/head. Victoria is similar to the national average at $61/headwhilst public health spending in the Northern Territory is far higher at $252/head. These figures include only expenditure by Commonwealth and State Health agencies, in defined 'public health' categories (see Table 1) and thus provide a partial estimate of all public health activities. In Victoria, 34% of public health expenditure was on immunisation and screening and 38.5% on 'selected health promotion' largely related to hazardous drug use and harmful lifestyle behaviours. It is also the case that some important public health preventative initiatives do not have a high direct cost[8], such as those involving legislation/regulation. Such initiatives are not well captured in tables of public health expenditure. Public health spending within the entire health budget is less than 2% (Table 2).

Table 1: Public Health Expenditure, Australia, Victoria 2003-04 $m, %

Category of Public Health	Total million dollars		% public health budget	
	Australia	Victoria	Australia	Victoria
▫ Communicable disease control	204	40.4	16.1	17.9
▫ Selected health promotion[1]	215	64.1	17.0	28.3
▫ Organised immunisation	268	43.7	21.2	19.3
▫ Environmental health	81	4.9	6.4	2.2
▫ Food standards and hygiene	36	3.2	2.8	1.4
▫ Screening Breast & Cervical cancer	198	34.4	15.6	15.2
▫ Prevention of hazardous drug use	172	23.0	13.6	10.2
▫ Public health research	93	12.6	7.4	5.6
Total public health expenditure	1,265	226.3	100%	100%
per head	63	61.4		

Source/Notes:
AIHW National Public Health Expenditure Report 2001-02 to 2003-04, Table 1.5 Public Health Expenditure by Government health agencies

Expenditure on prevention is more difficult to identify and quantify. It includes not just the public health budget but also clinically-based approaches to prevention, and spending on public health activities by agencies outside government and outside the health sector, not captured in the AIHW estimate.

[8] While legislative and similar interventions may be associated with loss of 'consumer surplus', placing a value on such 'loss' is complex, as preferences are not immutable.

Clinical prevention services would include a large share of dental, pharmaceuticals, medical and allied health services. It would also include a small share of the hospital budget. Undoubtedly considerable resources are now allocated to prevention of disease and reduction of the harmful consequences. For instance in 2004-05 $1,063million was spent on cholesterol lowering drugs, $800m on anti-hypertensive medications and $212 million on anti-diabetic agents. If in addition say 40% of medical services and other clinical services were allocated to prevention[9] and 80% of dental services, together with say 10% of the hospital budget, expenditure on 'prevention' through the health sector would be more than $15,000 million per year, (see Table 2). It is almost certain that public health not only forms a very small share of the total health budget but that it also constitutes a small share of the health budget allocated to prevention.

Table 2: Health Sector Budget and 'plausible' allocation to preventive health

Health Sector	Australia (a) $	(%)	Spending on prevention? nominated scenario	$
▫ hospitals	26,183	(33.4)	@ 10%	2,620
▫ medical services	12,961	(16.5)	@ 40%	5,180
▫ pharmaceuticals	10,935	(14.0)	@ 25%	2,730 (b)
▫ high level residential care	4,985	(6.3)	@ 0%	
▫ dental services	4,694	(6.0)	@ 70%	2,630
▫ other clinical	3,378	(4.3)	@ 40%	1,350
▫ public health	1,265	(1.6)	@100%	1,265
Total health expenditure	78,369	(100.0)		15,775

a) AIHW (2005), Health Expenditure Bulletin 2003-04

b) In 2003-04, over $2,000 million was spent just on cholesterol lowering drugs ($1,063m), anti-hypertensive medications ($800m) and diabetic agents ($212m).

3 Role of modifiable risk factors in health & wellbeing

The opportunity for prevention arises because health is responsive to various modifiable influences. Heath is not simply determined by age, gender and genetics. Risk rated formula based simply on age and gender typically explain less than 3% of the variation in health service use and cost (Van de Ven and Ellis 2000).

Epidemiological studies suggest a substantial proportion of disease burden is attributable to potentially modifiable factors. Modifiable risk factors fall into four broad categories:

1. life-style behaviours, of tobacco smoking, drug and alcohol misuse, physical inactivity, poor nutrition,
2. clinical attributes such as obesity, high blood pressure and high cholesterol, (which are causally related to diet and physical activity),
3. social and physical infrastructure and
4. access to and use of health care.

It is well beyond the scope of this paper to summarise the epidemiological evidence from cohort and cross-sectional studies that describe the relationship between health and the determinants. Some of the evidence, in relation to the role of lifestyle behaviours, is drawn together in a recent review by Segal and colleagues (Segal et al 2006).

[9] A large part of chronic diseases management occurs in primary/secondary care and is designed to prevent or delay of the expected complications. GPs also provide advice on modifying harmful behaviours, (smoking, excessive alcohol consumption etc.) as part of disease prevention. GPs are also involved in preventing communicable diseases (for instance providing influenza vaccinations). Such activities clearly constitute a large part of clinical care. The figure of 40% is illustrative. Ideally a program of work will be completed to use the available evidence to estimate the total level of preventive activity.

The evidence from cohort and cross-sectional studies informs the published 'risk equations' that seek to describe health, (eg all-cause or CHD mortality), as a function of modifiable and non-modifiable risk factors. Such equations have been used to attribute burden of disease to risk factors and to disease. See Mathers 1999 or Department of Human Services, Victoria (1999 a, b, 2005), who report estimated disease burden in DALYs[10] attributable to selected disease categories and risk factors. The attribution of disease burden to risk factors is complicated by the inter-relationship between risk factors, such that individual attributions cannot be summed[11]. None-the-less, it is clear that lifestyle behaviours of smoking, physical inactivity, poor nutrition and alcohol misuse directly and via obesity and dislipidemia[12] and high blood pressure account for a considerable share of disease burden. Some of this research is summarised in Tables 3 and 4. An 'adjusted' calculation, reports that 73% of DALYs attributable to stroke and 78% for ischaemic heart disease (IHD) are attributable to smoking, physical inactivity, low fruit and vegetable intake, high cholesterol, obesity and high blood pressure. Dominant sources of disease burden include cancers 21%, cardiovascular disease 18% and mental health disorders 14%, which are all partially preventable. For persons of working age, mental health is the largest source of disease burden (see Table 3).

Table 3: Major Sources of Disease burden, DALYs – Victoria 2001

Disease category (largest sub-categories)	**'000 DALYs**	
	Total	**in 15-65 age group**
Mental disorders (anxiety disorders 33, depression 31.3 alcohol 4.6 , heroin 4.7,)	94	83
Cancers (lung 23, bowel 19, breast 16, cervix 1, prostate 11, melanoma 4)	135	64
CVD (IHD 60.8, stroke 33.8)	115	38
Neurological & sense disorders (dementia 28.3, hearing loss 6.2, Parkinson's 28.3)	75	26
Unintentional injuries (road traffic 11.5, falls 4.9)	27	20
Chronic respiratory (asthma 16.9, COPD 20.3)	48	17
Diabetes	29	17
Intentional injuries (self-inflicted harm 12.5, homicide 2.0)	18	13
Musculoskeletal (osteoarthritis 10.9)	21	12
Infectious (septicaemia 2.1, HIV/aids 1.2, hepatitis 0.4)	8	4
Subtotal (major) chronic diseases	**517**	**240**
Total DALYs	**653**	**329**

Source: Victorian Burden of Disease Study Mortality and morbidity in 2001, Public Health Group, Department of Human Services, Victoria, 2005, Appendix Table 7

The burden of disease includes not just reduced quality of life and premature death, but also associated costs of treatment and lost production (in the paid workforce and the community and family setting). Treatment costs are considerable and underscore the possible cost savings from a reduction in disease incidence and prevalence through prevention. Expected reduction in downstream health service costs represents an important source of benefit if harmful behaviours are modified. Research by Cai & Kalb 2005, also suggests some effect of health status on workforce participation rates, particularly in persons aged between 55 and 65.

[10] The DALY or disability adjusted life year, combines the disability associated with disease YLD (calculated as the product of disability weights scored from 0 no disability, to 1.0 totally disabled and time in the particular health state), with years of life lost, YLL into a single measure.

[11] An unadjusted calculation, summing individual components, reports 178% of the DALYs attributable to stroke are attributable to smoking, inactivity, low fruit & vegetable intake, high cholesterol, obesity and high blood pressure and 145% for ischaemic heart disease (IHD).

[12] Disordered lipid profile, of low HDL cholesterol, high LDL cholesterol and high triglycerides.

Table 4: The Attributable Burden of Lifestyle Risk Factors, Australia 1996

Alcohol	**DALYs**	**Obesity**	**DALYs**
Alcohol dependence/ abuse	45,372	obesity	n.e.
Road traffic accidents	15,363	Ischaemic heart disease	33,458
Stroke and hypertension	11,517	Type 2 diabetes mellitus	30,729
Cirrhosis of the liver	10,940	Osteoarthritis	18,038
Accidental falls, drowning, poisoning, fires	8,701	Colorectal cancer	10,221
Cancer of mouth, pharynx, larynx	7,221	Ischaemic stroke, hypertension	9,787
Breast cancer	5,815	Breast cancer	3,550
Suicide and self-inflicted injury	5,170	Gall bladder disease	1,023
Colorectal cancer	4,901	Back problems	981
Homicide and violence	4,555	Uterus cancer	742
Inflammatory heart disease	1,874	Kidney cancer	511
Liver cancer	1,660		
Miscellaneous.	856	**Total**	**109,040**
Total	**123,885**		
Smoking		**Physical Inactivity**	
Lung cancer	75,929	Direct impact on QoL	n.e.
COPD	59,786	Ischaemic heart disease	67,321
Ischaemic heart disease	38,571	Stroke and hypertension	34,496
Cancer of the mouth, oropharynx & larynx	16,390	Colorectal cancer	20,671
Stroke	14,090	Breast cancer	13,112
Cancer of the kidney, bladder, pancreas	13,140	Depression	12,050
Age-related vision disorders	6,626	Falls	11,330
Peripheral vascular disease	3,153	Type 2 diabetes mellitus	7,030
Asthma	3,111	Chronic back pain	2,171
Low birth weight	2,982	**Total**	**168,181**
SIDS	2,227		
Inflammatory bowel disease	2,076		
Stomach cancer	1,898	**Inadequate Fruit & Vegetable Intake**	
Lower respiratory infections	1,395	Cancers	51,321
Cancer of the cervix & uterus	1,335	Ischaemic heart disease	12,655
Fire injuries	1,083	Stroke	4,101
Total	**242,138**	**Total**	**68,077**

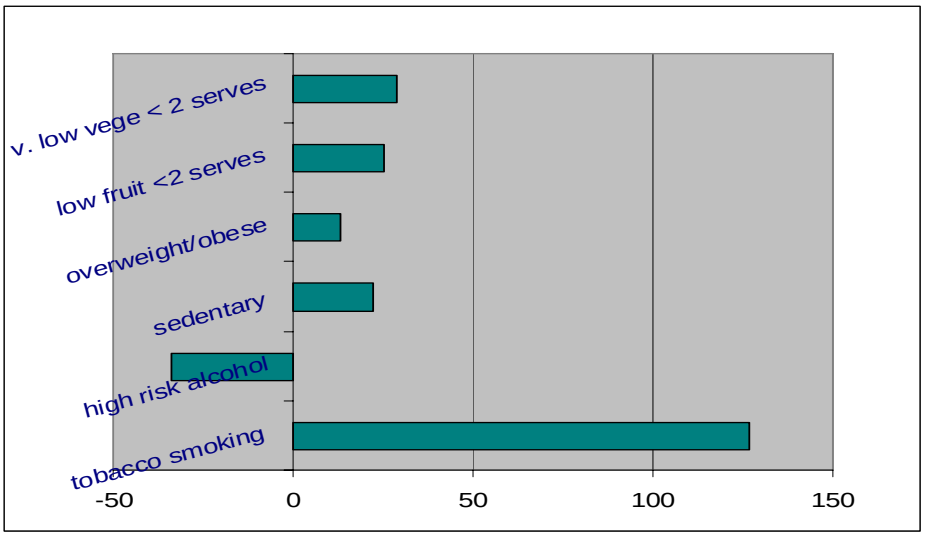
Source: Derived from Mathers et al, 1999, Australian Burden of Disease Study, AIHW

Notes n.e. not estimated

DALYs – disability adjusted life years = YLL + YLD

The adoption of harmful life style behaviours differ across population groupings such as region, ethnicity and combined socio-economic indices. As shown in Figure 1, high risk drinking is more common in persons from upper compared with lower socio-economic groups, whilst all other risk factors are more common in persons from lower SES. The biggest differential relates to smoking, where 30% of persons in the lowest quintile smoke, which is more than double the rate of 13.5% of those in the top quintile. Lifestyle behaviours and other modifiable risk factors are both a source of health differential across region and social class, and a possible means for reducing or alternatively exacerbating these differentials.

Figure 1 Excess risk for harmful lifestyle behaviours. 1st vs 5th quintile socio-economic disadvantage.



Source: ABS National Health Survey; Summary of Results, Table 18

Evidence from intervention studies

The literature on the impact of risk factors on health is vast and quite beyond the scope of this document to summarise. An introduction to the evidence concerning the effect of poor nutrition, physical inactivity and in combination obesity, tobacco smoking and alcohol misuse on health can be found in a Literature Review prepared for the Department of Health and Ageing [Segal, Dalton et al 2006]. This work was completed by the Centre for Health Economics (CHE) jointly with the Department of General Practice, University of Melbourne, the VicHealth Tobacco Control Council and NDARC (National Drug and Alcohol Research Centre). The report includes a summary of the evidence from 166 interventions, drawn from 438 articles and reports of intervention studies.

The literature provides the evidence that modifiable risk factors have a major impact on health and that health promotion and prevention strategies to modify these behaviours can improve the health of the community. The Returns on Investment Report, prepared for the Department of Health & Ageing draws together some of this evidence to demonstrate the substantial returns to the community from previous investments in public health [Abelson et al 2003][13]. The largest returns derive from investments in tobacco control and prevention of Coronary Heart Disease. Other studies confirm the role of changing behaviour, notably reduced smoking and improved diet in reducing CHD deaths; (see for example Unal et. al. 2005, Pietinen 2001, deLorgerill et al 1999).

Four examples are used to illustrate the effectiveness of behavioural interventions at various stages in the disease process: and iii) tertiary prevention.

1. Primary prevention through population-based initiatives - Finland from the1970s implemented a comprehensive population wide campaign aimed at reducing very high rates of CHD. The strategy included media elements, clinical elements, community-based interventions. The intervention achieved major dietary changes, such as a 3-fold increase in vegetable intake, 2-fold increase in fruits and a large fall in dietary fats, to record a 70% reduction in CHD death rates between 1972 and 1995. (Pietinen 2001).
2. Primary prevention in a high risk population - Trial results for a number of interventions to prevent Type 2 diabetes report large reductions in the incidence of type 2 diabetes of between 40 and 95%, when targeted at persons at high risk - those with impaired glucose tolerance, (Knowler et al 2002, Pan et al 1999, Long et al 1994, Tuomilehto et al 2001). Key results are summarised in Figure 2.

[13] An unusual approach has been taken in this work of adopting a cost-benefit approach and assigning a value of $50,000 per life year gained. A return of 5:1 is equivalent to an intervention costing $10,000/LY gain.

3. Secondary prevention - Studies of comprehensive diabetes care demonstrate large improvement in health, measured for instance by all-cause mortality and major non-fatal events (eg heart attack, stroke, renal failure, (eg UK PDS 1998, Hellman 1997).
4. Tertiary Prevention - The Lyon Heart Study, a randomised control trial of Mediterranean diet compared with the American Heart Association (AHA) diet in people following a heart attack, reported a 72% reduction in cardiac deaths and non-fatal AMI (CO1) and a 55% reduction in all major cardiac events + all-cause mortality (CO2). See Figures 3A and B which show the difference in diet and associated change in health outcomes (deLorgerill et al 1999). Persons who quit smoking after a first heart attack, compared with those who continue to smoke report a 55% reduction in mortality in a 15 year follow-up (Daly et al 1983).

Figure 2 The impact of diabetes prevention programs on the incidence of Type 2 diabetes, in persons with IGT, 3 -5 year follow-up (no intervention set at 100%).

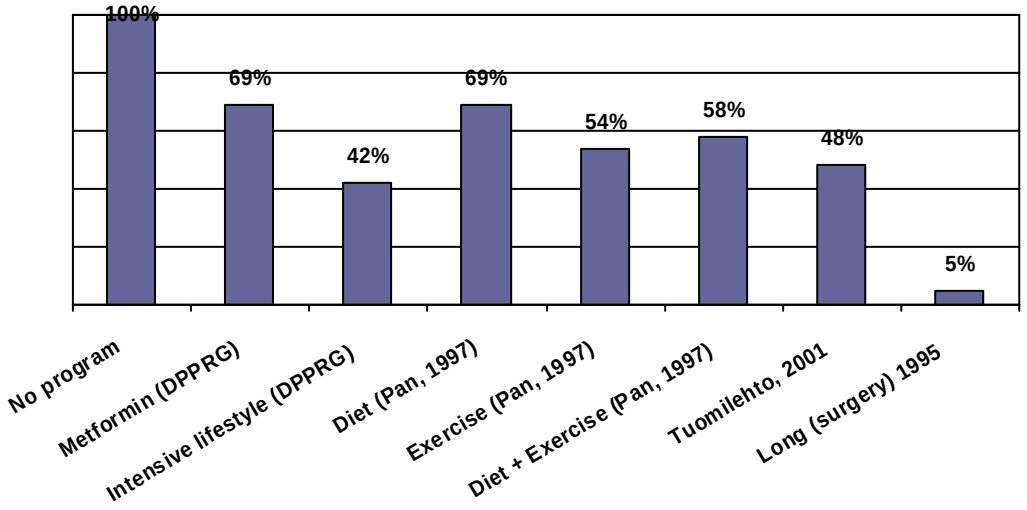


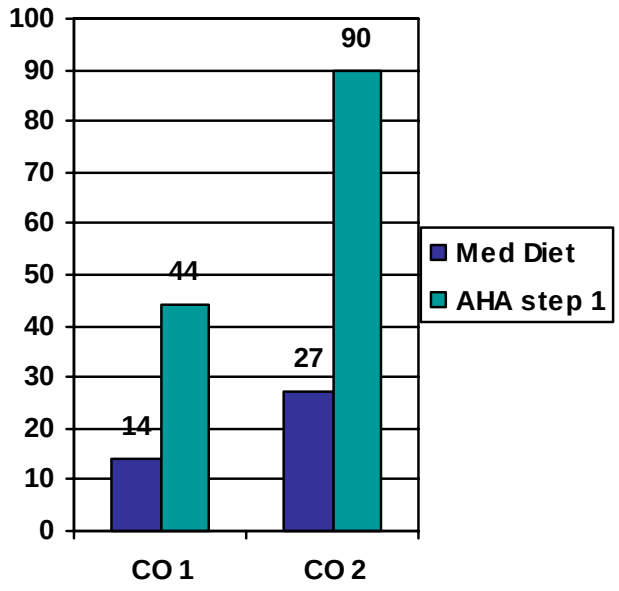
Figure 3 Lyon Diet Heart Study, Key Results

3A Dietary intake: American Heart Association(AHA) and Mediterranean Diet group

	Med Diet	AHA
Bread	167.0	145.0
Cereals	94.0	99.4
Legumes	19.9	9.9
Vegtables	316.0	288.0
Fruits	251.0	203.0
Processed meat	6.4	13.4
Fresh meat	40.8	60.4
Poultry	57.8	52.8
Cheese	32.2	35.0
Butter/cream	2.8	16.6
Margarine	19.0	5.1
Oil	15.7	16.5
Fish	46.5	39.5

Source: deLorgeil.et al 1999

3B Number of major events: 5 year follow up Mediterranean diet group & AHA group



CO1 cardiac deaths and non-fatal AMI
CO2 all major cardiac events + all-cause mortality

Research also consistently shows the value of early intervention in improving outcomes for children from disadvantaged backgrounds, but associated frustration at the lack of response to that evidence (Anderson et al 2003).

Current disease burden would undoubtedly be considerably higher if not for investments in previous decades to reduce disease incidence and the rate of disease progression.

The performance of health promotion and disease prevention programs is mixed. Not all existing or potential interventions are effective or cost-effective. This is highlighted in a current CHE study funded by the Australian Research Council, in which published evidence on over 250 Australian cost-effectiveness analyses has been collated and analysed. Whilst the set of interventions included is not exhaustive and consistency in methods across studies could not be assured, considerable variation in cost-effectiveness ratios measured in terms of incremental $/QALY ($/DALY or $/LY) gain observed reflects a very real divergence in performance. This variation is also found in individual priority setting exercises completed by a single research team, where methods employed are applied consistently across interventions, (eg Carter et al 2000, Segal 2004, George et al 2001).

It is also apparent looking at the 250 health interventions, which cover all modalities and purpose of care, that no simple rules define what is more and what is or less cost-effective. The 33 most cost-effective interventions, those identified as dominant (cost less and better outcomes) up to $1,000/QALYgain, include medical (clinical, surgical, pharmaceutical), allied health and media-based interventions, those addressed at harmful behaviours (such as problem drinking or poor nutrition), overweight/obesity in general or high risk populations and better quality management in those with diagnosed conditions. Similarly, the 26 interventions that are dominated (more expensive and less effective than the control), or highly cost in-effective >$200,000/QALY, include a range of lifestyle and medical interventions and interventions targeting both prevention and management (see Table 6).

The conclusion we draw from this work is that each candidate intervention needs to be assessed independently and that recourse to 'general rules' are unlikely to promote efficiency. To move forward and develop a prevention strategy that will make the best use of limited resources, the careful analyse of the literature to establish the performance of specific intervention options, in terms of expected benefits for resources allocated is required.

Table 5: Median cost-effectiveness ratio 250 interventions

Type of intervention	Median cost/QALY	N interventions
Modality		
Allied health	$ 3,700	68
Community/media/education	$18,000	39
Vaccination	$56,000	17
Pharmaceuticals	$26,000	52
Medical care (GP and specialist)	$18,000	65
In-patient	$10,000	26
Target population		
General	$20,000	45
High risk/specific	$17,000	200
Young <18 years	$41,000	43
Older >65 years	$19,000	20
Purpose of management		
Modify lifestyle	$10,000	68
Screening	$26,000	33
Treatment/management	$14,000	119
Tertiary care	$19,000	48

Source: Segal & Dalziel, ARC funded study, CHE 2006, (Collation of published studies).

Table 6: Preventative interventions that are highly cost-effective and highly cost-ineffective: Examples

	Cost/QALY
Highly cost – effective interventions	
Primary prevention – risk factor	
Tobacco campaign – multiple-components	<$1500/QALY
High tax on tobacco products	Cost saving
Seat belt legislation	Cost saving
Fruit and veg media campaign	<$1,000/QALY
Primary prevention emotional health	
Early intervention for children at risk	Cost saving
Primary prevention in high risk persons	
Intensive diet/physical activity intervention for obese persons with IGT	Cost saving
Brief interventions in primary care for problem drinkers	<$500/QALY
Secondary /tertiary prevention	
Comprehensive care for persons with diabetes	Cost saving
Mediterranean diet for persons with heart disease	Cost saving
Treatment of Schizophrenia a/c recommended guidelines	Cost saving
ACE inhibiters in congestive heart failure	Cost saving
Anxiety disorders – best practice multi-disciplinary care	Cost saving
Highly cost-ineffective	
Chicken pox vaccine (range of target age groups)	~$150,000/QALY
Universal screening of all year 8 students for TB; Screening for TB targeting overseas born	>$200,000/QALY >$1,000,000/QALY
Cervical screening - current regimen compared with 3 yearly screening or commence age 25 (not 18)	> $500,000/QALY
Cox 2 NSAIDS compared with non-specific NSAIDs	dominated

Source: Segal & Dalziel, ARC funded study, CHE 2006 (Collation of published studies).

We also found no relationship between cost-effectiveness ratio and the likelihood of funding. That is, less cost-effective interventions were as likely to be funded as more cost-effective interventions. This situation is illustrative of market failure in the health sector and arises because of attributes intrinsic to health and health care[14] which are exacerbated by distortions in government funding and delivery arrangements. In short the health care market embodies perverse incentives which impede optimal resource shifts[15].

These distortions provide a clear opportunity for substantial gain in health and wellbeing by shifting resource from less to more cost-effective programs. As a matter of logic redistributing $1million from an intervention costing $100,000/QALY gain to another costing just $5,000/QALY, will yield a net gain of nineteen QALYs at no additional cost to the community. An evidenced-based Preventative Health Strategy offers the promise of realising some of these available gains.

[14] such as public goods and externalities, the complexity of the relationship between health and heath care and the importance of equity as an objective of health care access

[15] As explained in any health economics text eg Le Grand et al 1992, ch 2 or for Australia, Segal 1998a.

4 A Framework for developing a Preventative Health Strategy

The capacity to prevent ill health depends on the existence of modifiable factors - factors that can be the subject of interventions and which impact on health and wellbeing. Preventive interventions can potentially be applied at each stage in the sequence below – see Figure 4;

A. *Life style behaviours* – to prevent/delay uptake, or modify behaviours once adopted,

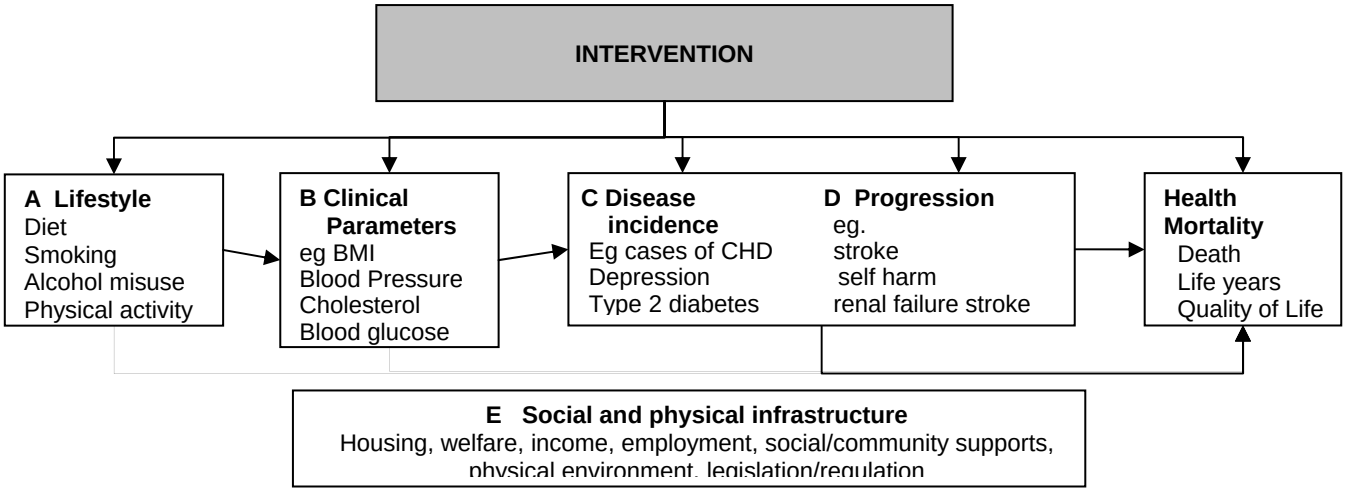
B. *Clinical parameters* – to maintain parameters at a healthy level or treat those once elevated,

C. Disease incidence - to prevent/delay disease on-set,

D. Disease progression – to delay disease progression and prevent delay complications,

E. *Social and physical context* – enhance capacity of social and physical environment to promote healthy behaviours and discourage harmful behaviours, support access to quality health care and directly contribute to positive health and wellbeing.

Figure 4 The risk pathway



Individual risk factors: Life-style behaviours/clinical parameters - Most Australians have one or more harmful lifestyle behaviours which can directly impact on health and wellbeing and contribute to clinical risk factors. Nutrition is the attribute furthest from optimal, (see Table 7).

Table 7: Prevalence of selected risk factors, Australia 2001

Risk factor	% population with risk factor
Harmful Behaviours	
Smoking	22% persons 15+, 8% persons 75+
Inadequate fruit and vegetable intake	47% report eating ≤ 1 serve of fruit per day 70% eat ≤ 3 serves of vegetables per day,
Sedentary	31% are physically inactive + 38% exercise at a low level
Alcohol misuse	11% of people report drinking at 'at-risky' levels
Clinical parameters	
High cholesterol > 5.5 mmol	8% report high cholesterol with 62% are on cholesterol lowering medication
High blood pressure	13% report high blood pressure with 86% reporting use of medications to lower their blood pressure
Overweight + obese	44% 15+, 59% persons 55 to 64

Source: ABS 2003, drawn from the 2001, National Health Survey

The earlier in the chain the intervention occurs, the greater are the possibilities for compounding beneficial effects. For instance, adopting a more healthy diet (eg Mediterranean style) will improve clinical parameters (weight, lipid profile and blood pressure), directly reduce disease incidence (eg Type 2 diabetes, colon cancer, CVD) and reduce the rate of complications as well as contribute directly to health and wellbeing.

Investing in a *supportive social and physical infrastructure* can both directly influence health and wellbeing and provide the context within which physical and emotional health can be produced. Such an investment can potentially yield sustained and on-going improvements in both mental as well as physical health. Despite this, it is not always the case that intervening 'earlier' and by investing in social and physical infrastructure is more effective or more cost-effective than intervening later or through other mechanisms. A focus on social and physical infrastructure may be desirable in any case for equity reasons, to build capacity to generate health in disadvantaged communities. Adopting more effective and cost-effective ways of intervening to generate a supportive social and physical environment still requires evidence.

Disease progression - There are, on the other hand, reasons why intervening later in the disease spectrum may be highly effective. An individual once diagnosed with a serious health condition has a great incentive to modify harmful behaviours (provided there is evidence of beneficial effect). Any benefits will tend to be recouped sooner, generating 'early returns'. An example of a highly effective and cost-effective preventive intervention at the tertiary end of the spectrum (people experiencing morbid consequences of disease), is the adoption of a Mediterranean diet in persons who have had a heart attack. In the Lyon Heart Study, (de Lorgerill 1999), the Mediterranean diet group16, experienced a 66% reduction in major non-fatal CVD events and a 56% lower all-cause death rate over a 5 year follow-up period, compared with a randomised control receiving American Heart Association dietary advice, see Figure 2. This intervention was highly cost-effective at <$1,000/QALY (Dalziel et al 2005).

On the other hand, intervening downstream is not always on option. Where damage cannot be reversed and the consequences of not intervening are extreme, intervening earlier and in a way that is effective is the only effective strategy. Examples might include alcohol misuse, some cancers, child abuse/neglect.

Priority Setting Framework

What is needed is a priority setting framework that incorporates the available evidence and makes explicit the basis for determining the relative performance of identified options. The priority setting approach should also avoid sub-optimising, as can occur if a constrained choice set or inappropriate decision criteria are used[17]. This requires the use of global measures of performance and an opportunity for all options to compete for the one pool of funds to create a 'level playing field'. This suggests the widest possible range of interventions should be considered, regardless of funding source and jurisdictional boundaries.

The Health-sector wide (HsW), disease-based priority setting model (Segal et al 1994, 2004, 2006) was developed to meet these requirements. It was devised to facilitate comparisons across budget silos, across delivery settings, modalities and target populations and to reduce reliance on 'expert' opinion.

Advances have recently been made with PBMA (program budgeting and marginal analysis, under the acronym ACE) to also achieve a greater emphasis on objective evidence and application

[16] Key elements of the Mediterranean diet are more fruit and green vegetables, more fish, less red and processed meats, no butter and cream, oils/spreads restricted to olive or rapeseed oil. The diet is high in omega 3 fatty acids. Moderate alcohol consumption (wine) is usually permitted.

[17] Sub-optimisation is the primary problem with the process for the listing of drugs on the Pharmaceutical Benefits Scheme. As the published Guidelines do not require cost-effectiveness against other modalities and in fact all but preclude this, and other modalities have no equivalent mechanism to seek government support, the listing process in effect provides a mechanism for subsidizing pharmaceuticals in preference to other modalities. This will be the situation unless the nominal cost/QALY cut-point is set at the opportunity cost of gaining a QALY elsewhere in the health system, however given the high cost/QALY at which some drugs are listed; this clearly is not the case.

beyond the agency context (Haby et al 2004). Other researchers have also been active in priority setting, for example working more closely with policy makers to increase likely adoption of recommendations (eg Mitton & Donalson 2004).

The HsW framework defines a population level process for collating the available evidence and comparing the performance of different interventions. It does this in a way that allows this very large research task to be staged, by target populations. It compares interventions designed to prevent illness, with early case finding, secondary and tertiary prevention and also with consequential care; (see Figure 5). It facilitates comparison of performance of interventions for a particular population at a given disease stage (within a cell), but also across populations and disease stages, down a column in Figure 5. By completing the budget estimates at the end of rows and columns useful insights into the allocation of current resources can be gathered.

The Framework has been applied provided an effective structure for determining how to reduce the burden of common chronic diseases, including diabetes and osteoarthritis. A recent application to the burden of harm from physical inactivity, poor nutrition, alcohol misuse and tobacco smoking highlights its potential value outside a disease context. For that study cost-utility estimates were developed for some 28 interventions covering public health/health promotion interventions (school-based, community-based, media etc), clinical (medical, allied health), and pharmacotherapies, (Segal et al 2005).

The major tasks of implementing the Framework are described elsewhere (Segal & Chen 2003, Segal and Mortimer 2006) and outlined in Box 3 below incorporating also Figure 2.

Box 3 Major steps in implementing Health sector-wide priority setting framework

1. *Identify all intervention options at each stage* – proceeding cell by cell, down a column. Comprehensiveness in terms of modality, health delivery setting, target population, philosophy of care, occupation group/professional mix and method of delivery is paramount. Interventions identified by horizon scanning should be included, as well as existing technologies, without regard, in the first instance to the quality of available evidence.
2. *Select interventions to include in the priority setting exercise* – aiming for comprehensiveness, contingent upon constraints related to the availability of evidence. Any intervention that is currently funded or is likely to receive funding should be included. Where lack of evidence precludes formal evaluation, the identified data gaps should feed into research priorities.
3. *Specify objective/measure of benefit* – Select a measure of benefit which supports comparison within and between columns (Figure 2) and reflects community values. The QALY or value-weighted QALY – incorporating mortality, quality of life and other dimensions of benefit (such as equity) – is perhaps the most suitable composite outcome measure. See also Box 3.
4. *Collect evidence on costs and outcomes* - Identify all published studies that provide evidence on outcomes and costs (resource use) for the selected interventions. Locate and use studies of 'best' quality, with respect to study design, sample size, length of follow-up, reporting of pertinent outcomes and precision with which intervention and comparator are specified.
5. *Identify critical data gaps* in the primary clinical trial evidence and to estimate downstream and broader 'external' impacts to inform research priorities.
6. *Calculate the cost-effectiveness of each intervention* - Using standard techniques of cost-effectiveness analysis (eg Drummond et al 2005), but where intermediate outcomes are translated into final health outcomes and outcomes are modelled beyond published trial results.
7. *Compare the performance of interventions within and across disease stages*.
8. *Develop conclusions about desirable resource shifts* – identify desirable resource shifts based on the relative performance of competing and complementary interventions. List interventions excluded from the performance measurement task due to a lack of evidence but still of interest (for instance because they are currently funded), with interventions for which performance measurement was possible. Where performance is estimated using poor quality evidence, results may be too imprecise to develop recommendations concerning desirable resource shifts. This should be made clear.

Figure 5: Resource Prioritisation Framework

Disease stage *Target population*	Positive Health and wellbeing Disease/health problem						Budget to stage
	Musculoskeletal	Mental Health	Drug abuse	Cancers	Endocrine	CVD Etc.	
	OA RA	Depression Anxiety disorders	Alcohol Children at risk	Lung, CRC Breast, skin	GDM, Type1, Type 2	CHD stroke	
Primary prevention risk factor Lifestyle behaviour Clinical risk factor Disease/ health problem							
Secondary prevention *undiagnosed/recently diagnosed/established disease*							
Tertiary prevention *established disease + morbid consequences*							
Consequential – failure of prevention.							
Total budget allocated to disease/ health problem area							

This framework provides the link between evidence and policy by providing a structured approach to drawing together the results of published cost-effectiveness analyses. It also identifies critical extensions to the evidence base. Implementation of the Framework in effect would create a League table, for instance with all interventions ranked by performance expressed in $/QALY. Health will be maximised by shifting resources away from interventions that cost more to generate a QALY to interventions that cost less to gain a QALY. The implication is that subject to other objectives, interventions would be funded up to a notional cut-point where society is no longer prepared to allocate resources to health gain. Whilst society norms, implied by the decisions of the Pharmaceutical Benefits Advisory Committee (PBAC), suggest a cut-point of around $50,000/QALY[18] (given sound evidence), this may not be sustainable if applied beyond pharmaceuticals. However, decisions can be made about reallocation of resources between interventions, without knowing the societal 'willingness to pay for health gain'.

While 'league tables' have many pitfalls (for example as enunciated by Drummond et al 1993), they are still a potentially powerful policy instrument, partly because of their simplicity. The challenge is to construct a league table that meets minimum methodological requirements and places health promotion and all approaches to prevention on a 'level playing field'. The alternative is an implicit league table, in which the reasons for resource allocation decisions are not transparent. Academic groups are already engaged in the task of collating and commenting on published cost-effectiveness studies, with results available on international websites.

[18] Summary of Decisions for the Listing of drugs on the PBS (Pharmaceutical Benefits Schedule) 1991 to 1996.

$/QALY or $/LY #	n	% Listing Recommend At requested price	At lower price	% Rejected
< $40,000	19	89	11	0
$40,000 to $80,000	8	50	0	50
>$80,000	7	0	29	71

Source George et al (2001), Tables 1 and 2 p1106, 1107

Notes: # Incremental cost per QALY or Life Year gain , n = number of submissions that expressed outcomes in QALYs or LYs between 1991 to 1996 with $/QALY or $/LY falling within the nominated range

A number of economic evaluation issues are particularly pertinent to preventative health:

1. How to capture benefits beyond the individual, such as the impact on family members and the wider community?
2. How to deal with joint benefits and synergistic components?
3. How to capture the indirect and consequential impacts of complex interventions?
4. How to capture aspects of benefit other then health? While, health benefit, expressed in terms of cost/QALY may provide an adequate measure of health, other criteria may also be relevant.

The possible dimensions of benefit including Health, together with other criteria that may be pertinent in developing a Preventative Health Strategy are listed in Box 4.

Box 4 Suggested Criteria for selecting components of a Preventative Health Strategy

1. Equity:

- Reduce health inequalities and inequalities in access – give priorities to interventions targeting the most disadvantaged persons – in terms of health and SES.

2. Efficiency considerations

- What ever the objective it should be pursued in an efficient fashion. In relation to health the $/QALY[19] is recommended as the preferred measure of performance. It is one of only two measures[20] that combine impact on quality of life and morality and cover both mental and physical health.
- Any intervention that is cost saving or dominant relative to 'current practice' should unequivocally be supported. Such initiatives clearly represent sound investments for society and will not normally crowd out other initiatives.

3. Effectiveness

- Interventions can be highly cost effective because they result in a large improvement in individual heath and are moderately priced, or result in little perceptible change in health, but cost little. It can be argued that very small changes in health at an individual level are not meaningful, such that a minimum threshold of effectiveness might be considered a prior requirement.

4. Other 'political' objectives

- Consider if there is a specific focus for the Strategy, for example labour market participation and productivity[21]. If so, give priority to interventions that have a greater affect on the 'target' area.

5. Dynamic efficiency

- Support initiatives that reduce distortions and will promote resource shifts to more cost-effective interventions, as these can have on-going and wider benefits.
- A well-functioning market requires informed consumers and responsive providers. A central role of government is to ensure its citizens can make well-informed (rather than poorly informed) choices about the actions relevant to their health. Such initiatives should also be a priority.

6. Portfolio to spread costs and returns

- Consider the timing of the resources input required to implement programs and the timing of returns- both in health gain and reduced cost of services. Incorporate a mix of strategies that will yield immediate and delayed returns and where investment can be staged.

Possible additional criteria

Promote *'fairness'* in terms of chance of access by citizens to (gain benefits from) an intervention, which would suggest a spread of initiatives to address a range of health problems and 'stages'.

Support interventions that would *not otherwise be supported*. Funding and delivery rules discourage certain types of services/interventions/modalities (eg allied health services and multi-disciplinary team care). The Strategy provides an opportunity to redress, in small part, these distortions, and need not include preventative activities that are supported by current funding arrangements (such as the use of anti-hypertensive medications and cholesterol lowering drugs).

[19] The QALY or quality adjusted life year, combines mortality and quality of life into a single measure. It is commonly used to measure the impact on health of an intervention and recommended for this purpose by the PBAC. It is the sum of life years and quality of life measured on a scale of 0 (death) to 1 (full health) X time in health state.

[20] The DALY also combines the disability associated with disease with premature mortality into a single measure. Either is a potentially suitable measure - What is more important than the choice of DALY or QALY is the quality of the effectiveness data and confidence in the assumptions used to generate QALY or DALY estimates.

[21] Poor health can reduce workforce participation and productivity *through* premature mortality in persons of working age, illness that restricts work capacity and high carer burden. For example drug and alcohol use is the highest source of disease burden in the working age population and a condition that can affect both workforce participation and productivity.

Application of the framework to develop a preventive health strategy – Next steps

Given the broad scope of 'prevention' development of an evidenced-based Preventative Health Strategy requires, as outlined above implementation of a coherent work program, including engagement of key agencies.

A set of specific steps in progressing this task have been identified:

Short/medium term

1. Agree on the objectives of the Preventative Health Strategy and Criteria for assessing performance (See Box 4).

Conduct a priority setting exercise following the HSW framework approach (see Box 3).

2. Identify a set of 'candidate' interventions that might be suitable for inclusions in the Strategy,
3. Collate evidence on the candidate interventions; primarily on costs and effectiveness and contribution to agreed objectives – such as reducing health inequalities
4. Assess performance of interventions against the Criteria.
5. Review results of this process and select a subset of interventions suitable for inclusion in the Strategy.

Consider Financial Flows

6. Calculate the budget impact over time, of strategy components, including the investment in the intervention and expected downstream cost savings – as a function of size of program, reflecting intervention target. Draw on financial flow information to refine Strategy.

Longer term Research Program

1. Estimate current level of expenditure on prevention – by disease/health problem, by modality, by stage in disease progression, by population target (eg complete resource columns and rows of Figure 2).
2. Develop a research agenda to meet important gaps in evidence about
    - the determinants of health,
    - the impact of health on workforce participation and productivity,
    - the effect of interventions on health and downstream cost impacts.

This task of identifying possible interventions to include in a Preventative Health Strategy could proceed primarily by drawing, in the first instance on previous reviews, plus the reports of various groups tasked with developing health promotion strategies around specific risk factors. This could be supported by a strategic review of the literature. A full review of the literature, given the vastness of the possible scope would potentially paralyse progress in developing a preventative health strategy. For example it is useful to draw on the work of groups such as the National Public Health Partnership (NPHP) and associated SIGNAL (Strategic Inter-governmental Nutrition Alliance), VicHealth, the Australian Obesity Taskforce, the Australian Chronic Disease prevention Alliance (eg 2004), the work of NDARC (National Drug and Alcohol Research centre) and MUARC (Monash University Accident Research Centre), School of Exercise and Nutrition Science, Deakin University and other academic research groups in the areas of public health, chronic disease, health economics etc.. The areas covered by these groups include, description of a tobacco control strategy, by VicHealth Centre for Tobacco Control 2001, a physical activity strategy by Bauman et al 2002 prepared for the NPHPs and components of a nutrition strategy prepared for SIGNAL by Miller and Stafford 2000.

The process for identifying candidate interventions should also involve input from key researchers as well as research groups from government as well as academic and clinical groups.

The population perspective of many groups identified with health promotion is only part of the broad canvas of prevention. Other researchers/policy groups and policy initiatives have focused on

the secondary and tertiary prevention end. For instance through HARP (the Hospital Admission Risk Program) initiative in Victoria designed to reduce 'Avoidable hospital admissions from Ambulatory Care Sensitive Conditions (ACSC) (Victorian Govt, 2004), a wide range of preventative health initiatives have been trialled. Initiatives typically involve multi-disciplinary team approaches to enhancing the quality of care for persons with common ACSC (diabetes, asthma, COPD), in those at highest risk of hospitalisation. The HARP initiatives have apparently had some success at reducing admissions and presentations to emergency departments, with reported reductions of between 15 and 40% (Turning Point 2004). Although a formal economic evaluation is yet to be completed.

The success of the United States Veterans Health Administration (VHA) comprehensive quality-driven reform has seen large improvements in health outcomes and reduction in hospital admissions and savings in total costs. The central driver has been improving the quality of chronic disease management and prevention. The VHA initiative was supported by a comprehensive quality assurance initiative (across 8 chronic disease groups as well as pharmacy and surgery) and a demanding accountability process, as well as funding reform (regional capitation funding), and a large expansion in access to multi-disciplinary primary care, through new ambulatory care centres and over 100 drug and alcohol centres (Kizer et al 2000).

The potential scope of what may fall within a preventative health strategy is truly enormous. To conclude this paper a preliminary and partial list of possible components of a Preventative Health strategy has been developed. Possible interventions are listed according to major modifiable risk factor, stage at which intervention occurs and disease targets (see Table 8). The aim in developing the list is illustrative. It is beyond the scope of this paper to document the relevant literature to support particular inclusions. This would be part of the formal task in developing a Preventative Health Strategy. The set of interventions listed below covers categories responsible for most avoidable disease burden and selected to cover the range of 'stages of disease' – primary, secondary and tertiary prevention. The list inevitably reflects an idiosyncratic knowledge of the literature. It also reflects in part evidence gathered in recent research by the author on life style interventions (Segal et al 2005, Segal et al 2006). In that project a range of life style interventions were identified as both highly effective and highly cost-effective, especially those targeting alcohol misuse, smoking and poor nutrition.

Nutrition is of particular interest, partly as it has not been the subject of major public preventive initiatives to date, despite high quality evidence of the role of nutrition in most, if not all, chronic illnesses as both a risk factor and an important component of management. The literature from intervention trials consistently shows considerable health benefits from nutrition interventions. In relation to nutrition interventions, the evidence is especially compelling in persons with heart disease (de Lorgeril 2000) and at high risk of Type 2 diabetes[22], persons with type 2 diabetes[23] and more recently in cancer management (English et al 2005).

Despite the evidence, these at risk groups have very limited access to publicly funded nutrition/ multi-disciplinary team services. And people are not using private dietitian services[24].

Many of the interventions listed in Table 8 are cost saving – superior to current practice and cheaper, or more effective and initial investment lower than downstream cost savings.
Cos-saving interventions include a number of nutrition interventions, but also continuation of media-based tobacco control programs and tobacco and alcohol interventions in primary care and cognitive behavioural interventions to encourage adoption of low risk drinking. It is presumed that

[22] Reduction in disease incidence of 40 to 60% is reported in all behavioural trials and up to 95% in surgical interventions for weight loss (Knowler et al 2002, Pan et al 1999, Tuomileto 2001, Long et al 1994), persons with type 2 diabetes (UKPDS, Helman 1997) showing up to 60% reduction in a range of complications including renal failure,

[23] Where studies eg Helman 1997 show up to 60% reduction in a range of complications including renal failure.

[24] For instance, in 2004-5, people were more than 3 times as likely to have seen a naturopath as a dietician. (ABS National Health Survey 2001 data files, analysis by CHE). While in 2004-05 private health insurers across Australia paid out just $4.0 million on dietician services, compared with 21.8 million on psychologists, 23.5 million on acupuncture, 36 million on natural therapies, 56 million on podiatry, $151 million on chiropracty and 340 million on physiotherapy (PHIAC 2006).

assessment of candidate interventions against agreed criteria will form part of an explicit process for making decisions about the Preventative Health Strategy.

Finally whilst this discussion document is for the most part focused on a process to identify specific interventions to include in a preventative health strategy that operate within the existing funding and delivery setting, the possibility of supporting change at the system level should not be ignored. As noted the existing anomalies arise in large part from distortions in funding and delivery arrangements and can perhaps best be addressed by modifying these arrangements to create a level playing especially across modalities, program areas and delivery settings. Introducing reforms that will address the perverse incentives, so that resources can respond to evidence of performance and shift between programs and modalities is important. Several suggestions are made that relate to broader system issues in Table 9.

It is clear that there is much to be gained by reviewing current spending on health care and in particular the balance between prevention and ameliorative interventions and between primary, secondary and tertiary interventions, and across modalities, settings and program areas. As a society we already allocate considerable resources to preventive health, but it is almost certain that this occurs in a way that does not generate most benefits. The Framework described in this Paper offers a way of adopting an evidenced-based approach to developing a preventive health strategy that would over time shift resources form less to more valued interventions to the enhance the health and wellbeing of the population and better meet other societal objectives.

Table 8: Preliminary and Partial list of possible components of a prevention strategy

Modifiable factor	Disease/Health Problem area	Primary prevention (delayed benefits, >10 years)	Secondary (medium term benefits within 4 years)	Tertiary (Immediate benefits – within 12 months)
Obesity [0] 33% overweight, 17% obese **Poor nutrition** (a) (39% popn. eat < 2 serves of fruit, 40% eat ≤ 2 serves 67% eat ≤ 3 serves vegetables.	Chronic diseases, CVD, Type 2 Diabetes, Osteoarthritis Cancers	**1.** Legislate to reduce consumption of soft drinks and high fat snacks[1] Eg ▫ Prohibit advertisements (at all or at certain times) ▫ Remove tax deductibility on advertising of high density snacks? ▫ Punitive taxes on soft drinks/high calorific snacks **2.** Employ dieticians at community health centres and other primary care settings to provide clinical advice to ▫ healthy persons to reduce risk of cancer, CVD, diabetes etc., ▫ persons who are obese or overweight **3.** Community level nutrition interventions ▫ Eg school canteen ▫ employ community dieticians to deliver community level nutrition interventions **4**. Implement media program to encourage greater fruit and vegetable consumption [2]	**5**. Publicly funded nutrition advice, clinical dietician positions in community health and other primary care settings, target: ▫ obese persons with clinical risk factors including IGT, high cholesterol , high blood pressure [3] ▫ persons with diet related chronic diseases eg CVD, diabetes etc	**6.** Clinician based intensive nutrition advice/referral to specialist weight loss and other nutrition services for high risk persons. Commence/ recruit in the in-patent setting. ▫ support adoption of Mediterranean diet for persons with heart diseases post AMI. [4] **7.** Fund stomach banding surgery for people who are seriously obese (now only available in private sector) [5]
Multi-risk factor (Including nutrition, physical inactivity)	Type 2 diabetes CVD General health and wellbeing	**8**. Community level intervention in disadvantaged communities – incorporate community empowerment. Not school-based – evidence equivocal. Not media - evidence equivocal.	**9.** Comprehensive multi-disciplinary prevention program for persons with IGT through exercise and diet, as per protocol from the 'Diabetes Prevention program' [6] **10**. Multi-disciplinary Obesity clinics/ weight loss teams; at outpatients, community health centres, other primary care settings[7]	**11** Comprehensive multi-disciplinary team care for persons with diabetes care, as per clinical practice guidelines. Eg fund diabetes specialist teams in the primary care setting.[8]
Physical activity **Strength training**	CVD, Type 2 Diabetes, Depression, OA	**12** Effective school-based programs – eg standing class room.		**13** Specifically designed exercise and strength training for people with depression and various physical conditions such as OA [9].

Modifiable factor	Disease/Health Problem area	Primary prevention (delayed benefits, >10 years)	Secondary (medium term benefits within 4 years)	Tertiary (Immediate benefits – within 12 months)
Alcohol consumption **Social & Economic determinants** of **health:** **Depression, anxiety disorders etc.**	Mental health Depression Alcohol misuse Anxiety disorders	Social, community, family, support services Example; cross sector approach to reduction of alcohol consumption[10]	**14.** Access to alcohol counselling, eg brief counselling within primary care [11] **16.** Explore establishment of Drug and Alcohol Centres (eg as per USA, VHA **)**	**15.** Fund/support best practice treatment for anxiety disorders, depression, schizophrenia; including ▫ computer-based interventions eg for panic disorders[12] **17**. Intensive interventions for persons with alcohol dependence and associated health related problems [13] **18.** Community-based programs for problem drinkers, eg alcoholics anonymous
Family functioning. Children at risk	Mental health Social alienation depression	**19.** Social, community, family, support services, **20** Mothers and babies – smoking, alcohol, multi-dimensional	**21.** Intensive support for abused and 'at-risk' children and their families	
Smoking	CVD, Diabetes, cancers	**22.** Pricing, Extend smoking bans, Advertising, **23**. Adopt effective intervention strategies at the population level (note mixed results of school-based programs, data on continued effectiveness of media advertising)	**24.** Quit support, remove tax on Nicotine replacement therapy [14] **25**. Encourage GPs to offer quit smoking advice (eg through life-scripts)[15]	**26.** Intensive quit smoking for persons with CVD, diabetes etc. [16] **27** intensive quit smoking advice for in-patients [17] **25.** Quit programs for pregnant women, new mothers[18]
Empowerment – skills, knowledge, capacity	Mental health, general physical health, social & economic exclusion, ↓ workforce participation	**26** Effective community capacity building programs to address alienation due to language, culture, lack of skills etc., such as micro-credit/financial literacy for disadvantaged unemployed migrant women[19]	**27**. Effective community programs targeting high risk groups,	
Inappropriate use of prescription medications	Major cause of avoidable hospital admissions – poor health outcomes		**28** Interrogate PBS/DVA medication data. Request GP instigate medication review where drugs contra-indicated or more than specified number of scripts[20].	**29** Specialist teams to follow-up with person at risk on discharge from hospital [21]

Notes /source to Table 8

1. ABS, National Health Survey Summary of Results 2004-05, ABS Cat no 4364.0
2. Ludwig et al 2001, Finkelstein et al 2005
3. NPHP 2000a, Segal et al 2005 Table 6.19.
4. Steptoe et al 2003
5. de lorgerill et al 1999
6. long et al 1994
7. Knowler 2002, Pan et al 1997, Tuomilehto 2001, Palmer et al 2004, Segal 1998b, Herman et al 2005
8. Bjorvell and Rosner 1992
9. Hellman 1997, UKPDS, 1998
10. Segal et al 2004
11. Wiggers et al 2004
12. Wik et al 1997, Saunders et al 2001, Mortimer & Segal 2006.
13. Huezendroeder L., 2004
14. Heather et al 2000, Sellman et al 2001
15. Zhu et al 2000
16. Silagy et al 2004
17. Hughs et al 2004, Pater 2001,
18. Wolfenden L., et al 2003
19. Lumley et al 2006
20. Women's Health in the North
21. Gilbert et al 2005
22. Stewart et al 2000

Table 9: System Level Initiatives to address distortions in funding and delivery arrangements: Examples

System –wide initiatives
Support limited fund holding: Eg for chronic disease groups (as per coordinated care trials), or within particular geographic regions (as per PHCAP, or ATSI CCTs)
Support a model of evidenced-based, quality driven, planned primary care Invest in the required infrastructure namely: ▫ patient enrolment ▫ creation of a single electronic patient record ▫ collection of relevant information to include on record – including lifestyle behaviours, as well as health history, and clinical information ▫ quality audit process - employ clinical audit manager to interrogate patient records – to assess quality of patient management and outcomes – especially for persons with the common chronic conditions that respond well to appropriate primary care; including diabetes, CHD, CHF, COPD
Offer community-based salaried positions for GPs and allied health professionals ▫ facilitate provision of multi-disciplinary team care for persons with chronic conditions.
Seek 'level playing field' status with pharmaceuticals for other modalities. ▫ Require cost-effectiveness analyses of pharmaceuticals to consider modalities other than drugs as comparators and provide access to an equivalent funding base to the PBS for other modalities.

Annex: The Australian Better Health Initiative

"COAG recognises the importance of good health, disease prevention and early intervention and has announced the *Australian Better Health Initiative that* will start to re-focus the health system and will see the Commonwealth and States and Territories working together, and with the community, to promote good health and tackle chronic disease. This component of the package is linked to the National Reform Agenda in that over time it will assist in raising productivity and workforce participation.

From 1 July 2006, $500 million will be provided over four years, comprising $250 million from the Commonwealth and $250 million from States and Territories, for:

promoting healthy lifestyles through nationally-consistent messages on health, implementing nationally-consistent school canteen guidelines and school-based and local programs to facilitate and support lifestyle changes;

supporting early detection of lifestyles risks and chronic disease through a new *Well Person's Health Check* which will be available nationally people around 45 years old with one or more identifiable risks that lead to chronic disease;

supporting lifestyle and risk modification through referral to services that assist people wanting to make changes to their lifestyle. Assistance could include nutritional advice, advice on weight management, support to give up smoking, and counselling;

encouraging active self-management of chronic disease with services ranging from group-based courses to different forms of counselling; and

improving integration and coordination of care so that people with chronic conditions can receive more flexible and innovative support.

People being treated for cancer will be supported better by new arrangements for case conferencing for cancer specialists through the MBS, and by improved state health coordination services for cancer patients" COAG communiqué (10 February 2006), p.12.

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