

**Western Australia
Burden of Disease Study
Disability-Adjusted Life Years**

Technical overview

November 2004

Epidemiology Branch
Health Information Centre
Department of Health
Western Australia

Acknowledgements

The estimates were derived from data and methods sourced from the Australian Institute of Health and Welfare, the Victorian Department of Human Services and the School of Public Health, Queensland University. The advice provided by Dr Theo Vos, Stephen Begg and John Goss on the application of this information is gratefully acknowledged.

The production of this report would not have been possible without the contributions, advice and support of the following people:

Dr Jim Codde, Alison Daly, Stella Serafino and Helen Love.

Citation

The citation below is recommended for the referencing of this publication:

Somerford P, Katzenellenbogen J, Western Australian Burden of Disease Study: Disability-Adjusted Life Years: Technical overview. Department of Health, Perth, Western Australia, April 2004.

Contents

Acknowledgements	2
Citation	2
Contents	3
Executive summary	4
1.0 Introduction	6
2.0 Method	8
2.1 Australian ratio YLD:YLL	8
2.2 Applying Australian YLD rates	8
2.3 Risk factor attribution	9
2.4 Projected Burden to 2016	9
3.0 Discussion	11
3.1 Disability	11
3.2 Burden of Disease	11
3.3 Risk factors	11
3.4 Projections	12
3.5 Precision of estimates	12
3.5.1 Ratio YLL:YLD	12
3.5.2 Australian rates	12
3.5.3 ICD coding	13
3.5.4 Conditions with smaller burden	13
3.5.5 Projections	13
3.6 Future developments	13
4.0 References	14

Executive summary

Disability Adjusted Life Years (DALYs) developed by the World Health organisation to measure population burden of disease, consists of two additive components – mortality (Years of Life Lost) and disability (Years Lost Due to Disability). The process for determining the burden of disease for the Western Australian population began with the quantification of the mortality component published in the report *Western Australian Burden of Disease Study: Mortality 2000*. This report estimates the disability component and determines the disease burden (DALYs) for the WA population in 2000 derived from the two components.

Years lost due to disability (YLD)

Data from the Australian Burden of Disease Study were used to extrapolate the disability burden of disease data for WA, rather than derived directly from WA disease occurrence data. The disease specific ratio of disability burden to mortality burden was applied to WA disease specific mortality burden to extrapolate the WA disability burden for conditions with high mortality. For conditions with low mortality the disease specific disability burden rates were applied to the WA population figures of 2000 to estimate the WA disability burden.

Disease burden (DALYs)

The disease specific YLDs extrapolated from the Australian 1996 data were added to the disease specific YLL data as reported in '*WA Burden of Disease Study: Mortality 2000*'¹ to provide disease specific DALYs. Disaggregation of disease burden by specific condition, disease groupings, gender or age is possible because the method derives DALYs for 184 conditions separately.

Risk factors

The disaggregation of DALYs into specific diseases, age groups and gender allowed attribution of burden to modifiable risk factors based on aetiological fractions derived from up to date WA risk factor prevalence data and relative risks used in the Australian Burden of Disease Study. The disease burden attributable to tobacco smoking, alcohol consumption, obesity and overweight, physical inactivity, hypertension, high blood cholesterol, inadequate consumption of fruit and vegetables, other drug abuse, unsafe sex and occupation exposures was measured.

Projections

Disease burden was projected to the year 2016 based on mortality trends and population changes for conditions with high mortality and population size and age-structure changes for conditions with low mortality. The lack of trend information for disease incidence and the reliance on mortality trends to remain constant increases the uncertainty of the projections. Also changes in risk factor prevalence (lifestyle, environmental and genetic), advances in medical technology and levels of preventive health services will affect disease burden, all of which are difficult to predict.

Conclusion

For the first time a summary health measure has been developed for WA based on the quantity and quality of life lost, namely the DALY. The key to the development of this measure was the quantification of the disability component, which has not been reported previously for WA. The disability component is a population-based measure and provides a more holistic account of non-fatal outcomes than traditionally used hospitalisation data. Derived from epidemiological data, the disability component is free from the bias such as access, repeated admissions and disease specific admission practices found in hospitalisation data.

The quantification of the burden caused by risk factors helps to identify the potential for health gains achievable through planned interventions. Modelling the likely impact on the health care system of changes in risk factor prevalence by applying different risk factor profile scenarios to burden of disease data will assist in the identification of target populations and the assessment of interventions for the best return on investment. With these qualities, burden of disease data is a valuable tool in supporting policy formulation and setting priorities in purchasing health services.

While the mortality component was estimated from WA data, estimates of disability were extrapolated largely from Australian data. The challenge for future work is to improve the extrapolated estimates and extend the description of disease burden to sub-populations of WA using the extensive range of health data sources available in WA, such as the WA Health Surveillance System and the WA Data Linkage System.

1.0 Introduction

Health budgets are coming under increasing pressure from demands for health services with increasing costs. In Western Australia (WA) the demand is exacerbated by an ageing population with an increasing life expectancy that has an expectation of receiving the best in medical care, knowledge and technology. Under budgetary constraints decisions about the allocation of resources need to consider how to maximise the health gains from health expenditure whilst maintaining equity of health services.

To fully inform the decision making process in strategic planning for the WA health system there is a need to extend the scope of the measurement of health outcomes from the reliance on traditional mortality and hospital utilisation data. Death data include only the extreme of ill-health and hospitalisation data include a bias towards conditions for which surgical or medical interventions are appropriate. Consideration of conditions managed in the community by primary health care providers or by individuals themselves is essential to address the full range of conditions and behaviours which not only impact on the health in the WA population but also on the total cost of health care in WA. An alternative summary health measure must not only be comprehensive but also be able to integrate both quantity and quality of life.

It was with this imperative in mind that the WA Health Department undertook the WA Burden of Disease Project in mid-2002. Central to this project was the estimation of burden of disease using a metric that combines mortality and disability information into a single summary health-outcome measure, namely the Disability-Adjusted Life Year (DALY). One DALY equates to one year of healthy life lost due to disability or death and is the sum of years of life lost to premature mortality (YLL) and years lost due to disability (YLD).

The first objective of the project was to produce updated burden of disease estimates for WA for use by strategic planners as an alternative to traditional hospital and mortality-based data. The second objective was to develop local expertise in this very complex and data-intensive methodology so that WA could generate its own estimates and critically review estimates used by the Commonwealth for monitoring health in the State and as a basis for funding.

The project was completed in two phases. Phase I produced WA estimates for the mortality component of the study¹ while Phase II, reported in WA Burden of Disease Bulletin Series,²⁻⁸ produced estimates for the disability component and the combined burden of disease and injury for WA in the year 2000.

This report thus describes the first attempt to estimate YLDs and consequently DALYs for WA. The disability component of DALYs represents the years of life lost with disability and describes the burden of non-fatal conditions, which informs health service planning and priority setting by appropriately reflecting non-fatal health outcomes.

In this report, descriptions of methodology will be kept to a minimum and the reader is referred to the Australian Burden of Disease and Injury report⁹ and WA mortality report¹ for more detailed information on this methodology. A brief synopsis of the general method is given on the following page.

The report is devoted to describing the methods used to estimate the DALYs along with the assumptions made in their application and any limitations of them. The analysis of the burden of disease is reported in a series of separate bulletins which describe the total disability burden for WA,² the distribution of total burden across broad disease groups,³ age categories,⁴ leading specific causes,⁵ the burden attributable to selected risk factors,^{6,7} and projections of the disease burden to the year 2016.⁸

SYNOPSIS OF GENERAL METHOD TO ESTIMATE BURDEN OF DISEASE AND INJURY

- Total burden of disease (disability-adjusted life years or DALY) is the summation of the burden from mortality (years of life lost or YLL) and the burden from disability (years lost to disability or YLD)

$$\text{Thus : } \quad \mathbf{DALY} = \mathbf{YLL} + \mathbf{YLD}$$

- For both YLL and YLD, ICD disease codes have been divided into some 184 specific disease groupings (eg IHD), which can be aggregated into more general disease groupings (eg CVD).
- YLL are calculated directly from mortality data, by disease group, 5 year age group and gender
- YLD are calculated from a range of diverse data, by disease group, 5 year age group and gender
- Three data items are required for YLD estimation: incidence, duration and disability weight for each disease. The process of obtaining these estimates is extremely resource-intensive requiring disease modelling using disease specific incidence, prevalence, case fatalities, mortality and remission.
- In the absences of the time and resources to estimate the incidence, duration and disability weights for each disease group, estimates can be generated using information from other areas and time periods. For the purposes of this report, such estimates are called synthetic estimates in that data from elsewhere are adjusted to the WA mortality and population in 2000.

2.0 Method

Estimations of YLDs for a comprehensive range of specific diseases and injury causes have been published for Australia.⁹ Parameters needed to estimate YLDs are age and sex-specific incidence, duration and severity weights for each disease stage. Local WA data are not available for both incidence and duration for the comprehensive range of conditions described in the Australian Burden of Disease Study.⁹ It is out of the scope of the Western Australia Burden of Disease Study to determine both parameters for all disease and injury stages. Initial synthetic estimates of WA YLD data were derived from estimates reported by the Australian study rather than from disease modelling estimates using WA epidemiological data. The preliminary estimates of YLDs and DALYs, calculated from these YLDs and the YLLs reported previously¹, form the basis of this report.

Synthetic YLD estimates for the year 2000 were derived using two methods. Firstly, for those conditions with high mortality, YLDs for WA were extrapolated from the Australian Burden of Disease Study⁹ and from YLLs previously derived for WA.¹ Secondly, the rates of Australian YLDs of conditions with low mortality for 1996 were applied to the WA population as the updates for Australian Burden of Disease estimates are not due for completion until mid-2004. These approaches are discussed below.

2.1 Australian ratio YLD:YLL

The first approach adopted to produce synthetic estimates uses the Australian ratio of YLD to YLL estimated by the Australian Burden of Disease Study for 1996. By multiplying the ratio and the YLLs estimated for Western Australia in 2000, the YLDs for WA in 2000 were derived. This method assumes the disability burden of conditions change in proportion to the mortality burden of the same disease for different regions. Only conditions with relatively high mortality were appropriate for this method because of the reliance on YLLs (Table 1).

Table 1: Conditions for which ratio of YLD:YLL for Australia 1996 used to estimate YLD.

Condition
Tuberculosis
HIV/AIDS
Meningitis
Septicaemia
Lower respiratory tract infections
Alzheimer's and other dementias
Malignant neoplasms
Cardiovascular disease (excluding Rheumatic heart disease)
Diseases of the digestive system (excluding peptic ulcer and inflammatory bowel disease)
Genitourinary diseases (excluding incontinence and genital prolapse)
Injury and poisoning

The method of applying the ratio of YLD:YLL from one study to derive the YLDs for another is common in burden of disease analysis. The ratio of YLL:YLD for related Global Burden of Disease region is recommended to determine YLDs for each condition for countries with limited data on disease occurrence.¹⁰ The Australian Burden of Disease study used this method to derive the YLDs for residual conditions not specifically analysed, but which were grouped to complete a broad disease grouping (eg. Other cardiovascular conditions).

2.2 Applying Australian YLD rates

The conditions for which the YLD:YLL ratio was suitable to extrapolate the YLDs accounted for 31% of the total YLD for WA in 2000. The remaining 69% was determined by applying the Australian 1996 age and gender specific YLD rate to the WA 2000 population for the conditions in Table 2.

2.3 Risk factor attribution

The population attributable fraction method was used to calculate the proportion of total burden attributable to risk factors as in the attribution of the mortality burden to risk factors.¹ Aetiological fractions derived from established relative risks and risk factor prevalence from local WA data¹¹ were applied to the disease specific YLDs and added to YLLs to estimate the disease specific DALYs attributable to each risk factor, independent of all others. Consequently the total burden attributed to the same 10 risk factors are reported. The estimated prevalence of each risk factor and the relative risk estimates remain the same as those reported in the mortality burden report¹.

Table 2: Conditions for which YLD for Australia 1996 was applied to estimate YLD.

Condition
Sexually transmitted diseases (excluding HIV/AIDS)
Intestinal infectious diseases
Childhood vaccine preventable diseases
Arbovirus infection
Hepatitis
Malaria
Trachoma
Other infectious and parasitic diseases
Acute respiratory infections (excluding LRTI)
Maternal conditions
Neonatal causes
Nutritional deficiencies
Other neoplasms
Diabetes mellitus
Endocrine and metabolic disorders
Mental disorders
Nervous system, sense organ disorders (excluding Alzheimer's and other dementias)
Rheumatic heart disease
Chronic respiratory disease
Peptic ulcer disease
Inflammatory bowel disease
Incontinence
Genital prolapse
Skin diseases
Musculoskeletal diseases
Congenital anomalies
Oral health
Ill-defined conditions

2.4 Projected Burden to 2016

Projections of disease burden must take into account not only the increasing population size but also ageing. The projected population figures for 2016 in Western Australia were sourced from Department of Planning and Infrastructure and prepared by the Strategic Planning Directorate. Changing trends in disease occurrence, death rates and risk behaviours must also be considered in addition to changes in population characteristics.

Both the mortality and disability components of the burden were projected to 2016. Projection of both components involved an extrapolation of the 2000 data using Western Australia mortality trends. Western Australian death rate trends for diseases or groups of diseases with a relatively high mortality were determined from 1983 to 2001 by the method described in the Victorian Burden of Disease Study.^{12,13} Mortality was projected to 2016 using simple exponential extrapolation of trends, whilst accounting for changes in population characteristics. The total deaths in 2016 were limited to that of the projected all-cause

mortality by apportioning total deaths to each disease based on the proportion of the all-cause rate contributed by each disease specific rate.

Because of the lack of trend information on incidence of diseases in WA, the disability projections were derived using the mortality trends for conditions with high mortality, assuming any change in mortality would be accompanied by an equivalent change in incidence. Similar adjustments to the decline in cardiovascular mortality and increase in drug-related mortality were applied to the WA 2000 disability data as in the Victorian study.^{12,13} The mortality trends for female lung cancer and COPD were determined using male rates with a 20-year lag, assuming female death rates will begin to decline over the next decade following a reduction in female smoking prevalence, as observed among males in the 1980s.

For conditions with low mortality, the rates of YLDs for 2000 were applied to projected 2016 population estimates to derive projections of YLDs for 2016.

The method used to derive avoidable future burden due to risk factors was the same as that used to estimate attributable burden, except for the assumption of future prevalence of risk factors. The adjustments made to risk factor prevalence followed those used in the Victorian study.^{12,13} Based on past trends alcohol consumption levels, hypertension, tobacco and physical inactivity prevalence were decreased. The prevalence of obesity was increased, while the prevalence for blood cholesterol and fruit and vegetable intake remained stable.

3.0 Discussion

Extrapolation of Australian estimates of YLDs to produce preliminary YLDs and DALYs for the WA population in 2000 is the next step in providing a summary health measure in WA, which quantifies fatal and non-fatal health outcomes with the same metric. The capability of disaggregation of the measure by age, gender and condition is an added advantage, allowing DALYs to be attributed to modifiable risk factors to allow the assessment of preventable burden. Because the measurement incorporates the disability component of a comprehensive range of conditions it extends the scope of health outcomes assessed in comparison to traditional death and hospitalisation data. Also, the method for calculating DALYs has the advantage of relying on population-based epidemiological rather than health service utilisation data, which contain admission and access bias.

The development of a broad measure of disease burden for the Western Australian population will be a valuable tool for health promotion advocates, strategic planners and health service managers within the Western Australian health system. Not only does burden of disease information assist in assessing cost-effectiveness of public health interventions but also has implications for decision making in resource allocation, and priority setting. Priorities should be assessed on the basis of burden of disease in conjunction with knowledge of current health services and public health interventions rather than in isolation. For example, a small burden attributable to a condition may reflect the success of health services or public health interventions.

3.1 Disability

As the DALYs are derived from the sum of YLLs and YLDs for each condition the fatal and non-fatal outcomes of each condition can be studied separately. About half of the total burden was accounted for by disability.

The distribution of the proportion of the disability burden contributed by each broad disease category varies greatly from that of the mortality component. The importance of establishing a measure to quantify non-fatal illness is highlighted when the amount of burden contributed by mental health conditions alone is considered. Conditions such as depression would be poorly represented in any analysis that included only death and hospitalisation data. Furthermore, almost the entire disability burden for ages 15 to 24 was accounted for by mental health disorders.

3.2 Burden of Disease

By combining disability and mortality into the single measure of DALYs the contribution to overall burden of the major disease categories was different compared to the distribution when using traditional data sources. Mental disorders become more prominent and were the third leading cause of burden, with neurological and sense organ disorders ranked fourth above injury and poisoning.

3.3 Risk factors

The mortality burden attributed to the 10 leading risk factors analysed was reported previously¹. In this report the quantity of life attributed to the risk factors has been combined with quality of life measures to quantify the total burden attributed to these risk factors.

Quantification of the burden attributed to modifiable risk factors indicates the potential for substantial health gains that can be made by interventions to reduce the prevalence of known risk factors. The size of the burden attributed to risk factors suggests that current interventions need to be maintained while new interventions are investigated. Development of new initiatives need to be based on the best possible evidence of health effects, the costs of feasible interventions and interactions with other interventions.¹⁴

This report has extended the work begun in attributing burden to risk factors independently in WA by adding the disability burden to the mortality burden previously reported.¹ As in the mortality report, the likely interactive effects of two or more of these risk factors were not considered. For this reason, the sum of the burden attributed to each risk factor was unlikely to equal the actual burden attributable to all risk factors. Recent research indicates that an estimated 39% of total disease burden globally resulted from the joint effects of the 20 leading modifiable risk factors.¹⁵

3.4 Projections

The total burden was estimated to decline by 2016 due to a substantial decrease in the mortality component. A smaller decrease in the disability component was projected due to the increase in degenerative diseases driven by an ageing population. The impact of these changes on the population may result in longer life expectancy, but with little reduction in disability.

Public health initiatives aimed at reducing risk factor prevalence will need to be maintained to ensure declining prevalence continues, while new interventions need to be developed to ensure the burden attributed to emerging risk factors is reduced.

3.5 Precision of estimates

The estimates of YLL reported previously and used to calculate total burden were based on sound and reliable death reporting. The mortality component accounted for 51% of the total burden. The estimation of the disability component (YLDs) relied upon Australian estimates from the 1996 study. The Australian Burden of Disease report suggested possible sources of uncertainty in calculation of YLD estimations for Australia in 1996.⁹ Additional sources of uncertainty arose from extrapolating YLD estimates for WA in 2000 from Australian 1996 data.

3.5.1 Ratio YLL:YLD

Estimates of YLDs calculated using the ratio of YLL:YLD for the Australian 1996 study accounted for 15% of total DALYs (or 31% of YLDs). Applying Australian 1996 YLD:YLL ratios to YLLs calculated for WA in 2000 may result in imprecise estimates of YLDs if the survival from various conditions has changed significantly over the five-year period. For example, survival of patients suffering HIV/AIDS,¹⁶ cardiovascular diseases¹⁷ and cancers¹⁸ has increased over time. To improve the estimates of YLD for the conditions in Table 1 local epidemiological information for each condition must be updated. The WA Burden of Disease study has undertaken this task.

3.5.2 Australian rates

The remaining 35% of total DALYs (69% of YLDs) were derived by applying 1996 Australian rates to the 2000 WA population. There are potential sources of error in the YLDs derived by applying Australian 1996 rate to WA 2000 population. Any significant change in disease occurrence over the five-year period as well as any inherent difference between the disease occurrence in the Australian as compared to the WA population may reduce the precision of the WA estimates. For example, evidence suggests that the prevalence of diabetes mellitus is increasing in WA¹¹, while the prevalence for mental disorders was higher in WA than in Australia¹⁹⁻²¹. Not only were these conditions leading causes of burden in WA, but the extrapolation from Australia rates may underestimate the YLDs attributed to them. The concern of the precision of the YLD estimates for these two disease groups exemplifies both the need for caution in the use of estimates extrapolated from Australian rates and the derivation of improved WA YLD estimates from more timely and local data sources.

3.5.3 ICD coding

In addition, definition of certain disease groupings have changed from 1996 to 2000 due to a switch from ICD9 to ICD10 coding system and the refinement of disease categories. Some changes in disease definitions may not be reflected in the extrapolation of Australian YLD rates to WA in 2000. Further work by The WA Burden of Disease study in consultation with the national group will ensure consistent disease group definitions between YLL and YLD estimates.

3.5.4 Conditions with smaller burden

As the data is taken from a single year for WA, the incidence and mortality estimates for condition with a low burden ranking are based on small numbers, which fluctuate over time. This means the absolute ranking of particular conditions with smaller burden have a high level of uncertainty and the results may be meaningless.

3.5.5 Projections

Estimates of projected DALYs should be interpreted with caution due to limitations in the projection methods. Firstly, the projected disability burden was based on YLDs extrapolated from the 1996 Australian and consequently inherits the limitations of that method discussed previously. Secondly, the lack of information on incidence and prevalence trends effects the precision of the YLD estimates. The reliance on mortality trends to project incidence without evidence of the decreased mortality being due to improved survival rather than decreased incidence of some conditions may underestimated the projected disability burden. Also the incidence of non-fatal conditions was assumed to remain stable and the projections for these conditions were determined by changes in population characteristics alone. Furthermore the projections were based on the assumption that the mortality trends from 1983 to 2001 will remain constant until 2016. In reality these trends will be affected by changes in risk factor prevalence (lifestyle, environmental and genetic), advances in medical technology and levels of preventive health services.

Estimates of avoidable future burden due to risk factors are limited by uncertainty of future risk factor prevalence and the reversibility of risks, in addition to the limitations in projecting the burden of disease. Despite these limitations, the potential of avoidable burden information in contributing to policy development substantiates the production of these estimates, provided these concerns are understood.

3.6 Future developments

The process of improving burden estimates extrapolated from Australian disability estimates will be ongoing, utilising local and up to date WA data where possible. Whilst improving the disability estimates for WA remains a priority, the differences in disease burden between different socio-economic groups and local areas will also be assessed. This analysis and future quantification of the burden of disease in WA will be updated to include new developments in the BOD approach. Developments in the methods used to estimate YLDs is ongoing with an updated Australian study due for release in the near future.

To describe the burden of disease in sub-populations of the WA population, local and up to date data will be sourced to estimate the mortality and disability burden. The extensive range of health databases in WA including the WA Data Linkage System, the WA Health Surveillance System and specific disease registers such as the WA Cancer Registry will enable the estimation of regional differences in mortality, disease incidence and risk factor prevalence. Data from future National studies will continue to be applied to WA YLL estimates and population data to obtain YLDs estimates for conditions with limited local disease occurrence information.

4.0 References

1. Katzenellenbogen JM, Somerford P and Serafino S. Western Australian Burden of Disease Study: Mortality 2000. Department of Health, Perth, Western Australia, July 2003.
2. Somerford P, Katzenellenbogen JM and Codde JP Burden of disability in Western Australia. WA Burden of disease study. Bulletin No. 2. Department of Health, Perth, Western Australia, 2004.
3. Somerford P, Katzenellenbogen JM and Codde JP. Burden of disease in Western Australia: An overview. WA Burden of disease study. Bulletin No. 1. Department of Health, Perth, Western Australia, 2004.
4. Somerford P, Katzenellenbogen JM and Codde JP. Major causes of disease burden: An analysis by age. WA Burden of disease study. Bulletin No. 4. Department of Health, Perth, Western Australia, 2004.
5. Somerford P, Katzenellenbogen JM and Codde JP. An overview of the leading causes of disease burden. WA Burden of disease study. Bulletin No. 3. Department of Health, Perth, Western Australia, 2004.
6. Somerford P, Katzenellenbogen JM and Codde JP. Impact of health modifiable risk factors on disability and death: Overview by age. WA Burden of disease study. Bulletin No. 5. Department of Health, Perth, Western Australia, 2004.
7. Somerford P, Katzenellenbogen JM and Codde JP. Disease burden: A detailed analysis by modifiable risk factor. WA Burden of disease study. Bulletin No. 6. Department of Health, Perth, Western Australia, 2004.
8. Somerford P, Katzenellenbogen JM and Codde JP. Projected disease burden for Western Australia, 2016. WA Burden of disease study. Bulletin No. 7. Department of Health, Perth, Western Australia, 2004.
9. Mathers C, Vos T, Stevenson C 1999. The burden of disease and injury in Australia. AIHW cat. no. PHE 17. Canberra: AIHW.
10. Mathers CD, Vos T, Lopez AD, Salomon J, Ezzati M (ed) 2001. National Burden of Diseases Studies: A Practical Guide. Edition 2.0. Global Program on Evidence for Health Policy. Geneva: WHO.
11. WA Health Surveillance System. Department of Health, Perth, Western Australia. 2004.
12. Vos T, Begg S. The Victorian Burden of Disease Study: Mortality. Melbourne: Victorian Department of Human Services, 1999.
13. Vos T, Begg S. The Victorian Burden of Disease Study: Morbidity. Melbourne: Victorian Department of Human Services, 1999.
14. The World Health Report:2002: Reducing risks, promoting healthy life. World Health Organisation. 2002.
15. Ezzati M, Hoorn SV, Rodges A et al. 2003. Estimates of global and regional potential health gains from reducing multiple risk factors. *Lancet* 2003;362(9380): 271-280.
16. Australian Institute of Health and Welfare 2004. Australia's health 2004. Canberra:AIHW.
17. Australian Institute of Health and Welfare 2004. Heart, stroke and vascular diseases – Australian facts 2004. AIHW Cat NO. CVD 22. Canberra: AIHW and National Heart Foundation of Australia (Cardiovascular Disease Series No. 22)
18. WA Cancer Registry. Department of Health, Perth, Western Australia. 2004.
19. ABS 1999. Mental Health and Wellbeing: Profile of Adults, Western Australia. 1997-98. Catalogue No. 4326.5. Canberra: ABS.
20. ABS 1999. Mental Health and Wellbeing: Profile of Adults, Australia. 1997. Catalogue No. 4326.0. Canberra: ABS.
21. Department of Health and Aged Care 1999. People Living with Psychotic Illness; an Australian study 1997-1998.