1 Introduction and overview

1.1 The Disease Costs and Impact Study

The Australian Institute of Health and Welfare (AIHW) started its disease costing analysis in 1992 as part of the Macro Economic Evaluation Model, which aimed to develop a broad macro-level approach to evaluation of health interventions. The Institute has continued this project as the Disease Costs and Impact Study (DCIS), in collaboration with the National Centre for Health Program Evaluation (NCHPE). It aims to measure health services utilisation and expenditure for specific diseases and disease groups in Australia.

This project has already produced reports and data that are of considerable interest to policy makers, evaluators and industry. Institute reports to date include:

- *The Cost of Diet-related Disease in Australia*
- *The Economic Costs of Disease in Australia: Interim Report for NHMRC Working Party on Prevention Programs*
- *The Economics of Cardiovascular Disease*
- *The Economic Cost of Cancer in Australia*
- *The Costs of Injuries in Australia – Preliminary Report*
- *Disease Costs of Tuberculosis and Syphilis in Australia*
- *Disease Costs of Hepatitis B in Australia.*

Sections on the costs of disease in Australia in 1989–90 have been included in *Australia's Health 1994* and *Australia's Health 1996* (AIHW 1994, 1996). Other reports which have used the 1989–90 results include the recent report by the National Health and Medical Research Council (1996a) on preventive health interventions in clinical practice.

This report outlines the methodology used to estimate the direct costs of diseases in Australia for 1993–94. Estimates of health system costs of disease for 1993–94 have been published in *Australia's Health 1998* (AIHW 1998) and a series of AIHW reports (see Preface).

1.2 The DCIS methodology

The basic methodology for estimating the direct costs of hospitals, medical expenditure, allied professionals, pharmaceuticals and nursing homes was developed by Ms Kathryn Antioch under Rob Carter's direction for the Macro Economic Evaluation Model (Antioch 1992; Crowley et al. 1992). The methodology was revised during 1993 to use 1989–90 health expenditure figures compiled by the Institute instead of estimates obtained by inflating the 1988–89 figures (also compiled by the Institute) by their relevant inflators (Conway et al. 1993). Where State breakdowns of expenditures were available, they were used instead of the national average figure.

In 1994, costings were extended to disease groups defined by all chapters of the Ninth Revision of the International Classification of Diseases (ICD-9) (WHO 1977) and it became possible to check that disease costs in each sector added to the totals from the AIHW Health Expenditure Database. This identified a number of areas where revisions to the attribution methods were needed. Additionally, the model did not include some major areas of expenditure such as hospital non-inpatient services. During 1995 and 1996 the methodology was revised by the authors to resolve these problems.

The basic approach for direct costs of health services has been to take known aggregate expenditures on health care and apportion these to disease categories using Australian data (hospital morbidity data, casemix data, the 1990–91 Survey of Morbidity and Treatment in General Practice in Australia undertaken by Professor Bridges-Webb and colleagues (GP survey), and the 1989–90 Australian Bureau of Statistics (ABS) National Health Survey). Recurrent expenditure on health care which has not yet been attributed includes expenditure on ambulance services, community health services, and most health promotion and illness prevention. The attribution of the direct costs of health services to disease is discussed in more detail in Section 1.5.

The disease costing methodology aims to disaggregate the total health expenditure in 1993–94 ($31.4 billion for sectors included in the model) by the following dimensions:

- disease (defined by ICD-9 code groups)
- sector (hospital inpatient, non-inpatient, medical, drugs, etc.)
- program (treatment, prevention)
- sex (male, female)
- age (0–4, 5–14, 15–24...65–74, 75+).

Note that the DCIS has shifted from using the 10-year age groups, 0–9, 10–19...80+, to using 10-year age groups in line with Institute standards.

The revised methodology has increased the proportion of direct health expenditure included in the disease costings from around 70% to 92%. The disease costings are being updated to 1993–94 data and it is planned to publish reports on the costs of all diseases at ICD-9 chapter level, and on the costs of cardiovascular disease and cancer.

It is planned to measure disease impact directly (in terms of lost years of life, etc.) rather than through the calculation of indirect costs of premature death and morbidity. Indirect costs are discussed further in Section 1.4. The DCIS generates, as a by-product, estimates of health service utilisation by age–sex–disease group.

1.3 Cost of illness analysis

Cost of illness analysis is used to estimate the cost impact of disease on the community. By measuring the impact of disease in economic terms, it presents another picture of the way in which diseases affect the community. The main uses of cost of illness data are in providing an economic justification for disease control action and an input into evaluating the potential cost-effectiveness of interventions for the purpose of priority setting.

At a minimum, cost of illness studies are useful for identifying how resources are allocated between different types of costs, diseases and services. Cost of illness studies can also attempt to measure the value that illness subtracts from the productive potential of a large social unit, such as a nation (Gertstein 1991). For the health services sector, direct costs are the costs of forgone alternatives: if there was less illness, then a proportion of the resources spent on diagnosing and treating the sick could be put to other uses. Indirect costs are the value of the output that is lost because people are too ill to work or have died prematurely. Indirect costs are discussed in more detail in Section 1.4.

Cost of illness calculations can also provide the base against which new interventions can be assessed. Planners can compare the relative burden of different diseases in considering priorities for prevention. Cost of illness estimates can be used to model the 'do nothing' or current case option, and to investigate the potential impact of different treatment practices. The latter follows naturally from separately identifying the components of costs (such as hospital, medical, pharmaceutical, nursing home and allied health costs). Cost of illness studies can also be useful to health planners who wish to know the relationship between the

number of cases of a disease and the consequent use of health services. Planners may wish to identify what potential changes in use might be achieved by prevention or to estimate possible cost savings.

Such estimates need to be carefully interpreted. They are usually only indicative. They are not estimates of immediately realisable savings, but rather 'opportunity cost' estimates measuring resources devoted to the treatment of preventable disease that could be available for other purposes. Conversion of 'opportunity cost savings' into financial savings involves a number of other practical[1] and theoretical[2] considerations.

Cost of illness data can also be useful for researchers and planners who wish to know where in the health system expenditures are incurred, for example, by type of illness, and by age and sex. Such information can assist in analysing equity issues in the provision of health services.

1.4 Indirect costs of disease

Cost of illness analysis often attempts to measure the total economic cost to society of illness by including not only the direct costs of illness (the health sector costs of providing health services), but also the indirect costs, which usually focus on lost production due to sickness and premature death, but can include costs that have an impact outside the health care sector (such as police and court costs associated with drug abuse).

The 1989–90 methodology used the human capital approach to value the lost production associated with morbidity and mortality. In this method, an individual is perceived as producing a stream of output over time that is valued at market earnings. These market earnings can also be imputed for the value of unpaid household work (Hodgson & Meiner 1982; Max, Rice & MacKenzie 1990). The 1989–90 methodology estimated the indirect costs associated with morbidity in terms of absenteeism, and with receipt of hospital and medical services (a prevalence-based approach), and the indirect costs associated with mortality using an incidence-based approach in terms of the discounted stream of potential lifetime earnings (including an imputed value for unpaid household work) from age at death (Antioch 1992).

The indirect costs of disease can be defined in several ways, depending on the perspective and objective of analysis. If indirect costs are conceptualised in terms of the opportunity costs of lost production (whether for paid or unpaid labour), then the human capital approach will usually drastically overestimate the costs of lost production. The actual loss of production will be restricted to a so-called friction period needed to adapt to the changed situation (Koopmanschap & van Ineveld 1992; Koopmanschap et al. 1995). The friction period is the period needed to effectively replace the sick or dead worker, whether by recruiting someone else or by training someone to replace the lost worker. The friction cost method explicitly takes into account the short- and long-run processes in the economy which reduce production losses substantially as compared with the potential upper limit given by the human capital method. Such indirect costs will depend on the labour market situation and will also vary in

1. There are a range of practical issues such as professional interests, workforce restructuring, management policies, political acceptability and/or public reaction.
2. The theoretical issues relate to the cost characteristics of the production function, involving issues such as the mix of 'variable costs' and 'fixed costs', and 'lumpiness' in the expansion/contraction of capital equipment and assets. Variable costs are avoidable, in that, by definition, they vary directly with the level of production. Fixed costs, as their name implies, are fixed for a period of time (or may even be 'sunk' or non-redeemable if very specialised assets are involved). A financial objective of asset liquidation, financial savings or expenditure restraint, therefore, can have very different implications from one of making best use of available resources. Assuming a hospital ward or health service continues in operation but treats different patients is very different from downsizing or cessation of activities.

different segments of the labour market. Indirect costs estimated using the friction cost method will be lower in countries with high levels of unemployment than in countries with low unemployment.

On the other hand, indirect costs of disease may be defined in terms of the economic value that society, including the individual concerned, places on human life and on the avoidance of other 'intangibles' such as pain, suffering, anxiety or bereavement. From this perspective, the main criticism of the human capital methodology is that it excludes important intangibles, only counts earnings (whether actual or imputed), and places a low value on some groups such as low income earners, the unemployed and people not in the labour force, such as children (Max, Rice & MacKenzie 1990).

It is commonly argued that the best way to value human life is by the willingness-to-pay approach, which values life and health according to what people would be willing to pay for a change that reduces the probability of illness or death (Schelling 1968; Acton 1975; Max, Rice & MacKenzie 1990). Lifetime earnings, as calculated by the human capital approach, provide a lower bound to the value of human life as measured by willingness to pay (Linnerooth 1979).

One objection to the willingness-to-pay method is that the value of individual lives depends on income distribution, with the rich able to pay more than the poor. This can be resolved by using appropriately agreed population averages. More importantly, it is very difficult for individuals to place a value on small reductions in the probability of death (Rice, Hodgson & Kopstein 1985; Goss 1997). The willingness-to-pay approach is thus very difficult to operationalise, although Goss (1997) has suggested that good contingent valuation approaches may provide better estimates than generally realised. Also, willingness-to-pay estimates can be derived from the revealed preferences of government decision makers (George, Harris & Mitchell 1997).

Most economic evaluations in the health area prefer not to cost the value of life, but rather to compare the ratios of direct costs to 'life years gained' or 'quality-adjusted life years gained' (QALYs) so that the decision index is dollars per QALY. This goes to the heart of the differences between cost–benefit, cost-effectiveness, and cost–utility analyses (Linard 1992; Mathers 1996; Dowie 1997). Inclusion of indirect cost estimates is more widely accepted in cost of illness studies than in economic evaluations. Most cost of illness studies address indirect costs in terms of lost production, rather than through valuing human life and suffering.

The inclusion of indirect costs in cost of illness studies remains an area of debate and controversy (Collins & Lapsley 1991; Koopmanschap et al. 1995). Since the two major objectives in measuring indirect costs lead to different methodologies (and very different magnitudes of estimates), and these methodologies are either contentious and/or at an early stage of development, the Institute has decided to focus on the analysis of direct health system costs in the DCIS and to include in reports, where appropriate, more direct measures of disease impact in health status terms, rather than the impact in dollars.

1.5 Estimation of direct costs

Direct costs are the costs of forgone alternatives; if there were no illness, the money spent on diagnosing, treating and caring for the sick, and the money spent on prevention, could be put to other uses. The direct costs of illness are calculated in the DCIS by apportioning estimates of recurrent health expenditure (published in the AIHW Health Expenditure Bulletins) to

categories of disease using Australian data on disease prevalence and health service utilisation. The areas of health expenditure used in the AIHW Health Expenditure Database are shown in Table 1.1.

Table 1.1: Total recurrent health expenditure 1993–94, by area of expenditure[a]

Area of expenditure	Expenditure $ millions	As per cent of total
Hospitals		
Recognised public hospitals	9,655	28.3
Private hospitals	2,333	6.8
Repatriation hospitals	357	1.0
Public psychiatric hospitals	473	1.4
Nursing homes	2,647	7.8
Medical services	6,884	20.2
Dental services	1,831	5.4
Other professional services	1,244	3.6
Pharmaceuticals	4,042	11.7
Ambulance	484	1.4
Other institutional (nec)	121	0.4
Community/public health	1,558	4.6
Aids and appliances	770	2.3
Administration	1,099	3.2
Research	534	1.6
Other non-institutional	109	0.3
Total recurrent health expenditure	**34,141**	**100.0**

(a) Areas of expenditure as defined in AIHW Health Expenditure Database.

Source: AIHW 1996.

A prevalence-based costing approach is used. The prevalence-based approach provides estimates of the direct costs of health services for preventing, diagnosing and treating illness incurred as a consequence of the prevalence of illness during the specified period, usually one year. Most cost of illness studies employ the prevalence-based approach (Rice, Kelman & Miller 1991).

The DCIS reorganises areas of expenditure used in the AIHW Health Expenditure Database to split hospital costs into inpatient and non-inpatient costs, to include in-hospital private medical costs with inpatient costs, and to split pharmaceuticals expenditure into prescription drugs and over-the-counter medicines (Table 1.2). Note that private hospital expenditure has increased because of the inclusion of in-hospital medical services, whereas public hospital expenditure has been split between inpatient services (including private medical services) and non-inpatient services.

The health sector expenditures (Table 1.2) are attributed to disease, age and sex using available data on the distribution of service utilisation and, where available, relative costs of services. The data sets used and the basic method of attribution are summarised in Section 1.6 and described in detail in chapters 2 to 8. The revised methodology ensures that the direct costs across all diseases are consistent with the total health expenditures published in the AIHW Health Expenditure Bulletins and regrouped as shown in Table 1.2.

Table 1.2: Total recurrent health expenditure 1993–94, by DCIS area of expenditure

DCIS area of expenditure	Expenditure $ millions	As per cent of total
Hospital inpatients		
Recognised public hospitals	7,652	22.4
Private hospitals	3,221	9.4
Repatriation hospitals	295	0.9
Public psychiatric hospitals	473	1.4
Hospital non-inpatients	2,421	7.1
Nursing homes	2,647	7.8
Out-of-hospital medical services	5,640	16.5
Dental services	1,831	5.4
Allied health services	1,244	3.6
Pharmaceuticals		
Prescription drugs	2,972	8.7
Over-the-counter drugs	1,070	3.1
Cancer-related public health programs[a]	69	0.2
Research	534	1.6
Other institutional (nec)	121	0.4
Administration	1,099	3.2
Other non-institutional	109	0.3
Total included in DCIS costings	*31,397*	*92.0*
Not included in DCIS costings		
Ambulance	484	1.4
Community/public health[b]	1,490	4.4
Aids and appliances	770	2.3
Total recurrent health expenditure	**34,141**	**100.0**

(a) Includes costs of breast, cervix, lung and skin cancer public health programs.
(b) Community health services and public health services apart from breast, cervix, lung and skin cancer programs.

1.6 Attribution of costs to age–sex–disease groups

Total recurrent health expenditures for 1993–94 (Table 1.2) are apportioned by sector using hospital morbidity and casemix data for 1993–94, Medicare and Pharmaceutical Benefits Scheme data for 1993–94, and data from the 1990–91 Survey of Morbidity and Treatment in General Practice in Australia (GP survey) and the ABS 1989–90 National Health Survey. Table 1.3 summarises the attribution methods and the data used for each of the health sectors included in the DCIS.

Table 1.3: Summary of DCIS methodology, 1993–94

Health sector	Basis of cost attribution to age–sex–disease groups	Data sources
Hospitals		
Acute hospital inpatients Repatriation hospital inpatients	Separations weighted by DRG cost weight and length of stay	AIHW National Hospital Morbidity Database 1993–94
Public psychiatric hospital inpatients	Bed days	AIHW National Hospital Morbidity Database 1993–94
Hospital non-inpatients	At chapter level: number of visits in last two weeks. Sub-chapter level according to inpatient separations by site.	1989–90 ABS National Health Survey AIHW National Hospital Morbidity Database 1993–94
Medical services		
In-hospital medical services for private, compensable and other patients	Separations weighted by DRG-based estimated medical service cost weights.	Medicare data on fees charged for eligible in-hospital medical services in 1993–94 AIHW National Hospital Morbidity Database 1993–94
Out-of-hospital medical services	GP encounters weighted by Medicare data on fees charged. Specialist referrals by GPs, weighted by Medicare data on fees charged.	Medicare data on fees charged for eligible out-of-hospital medical services in 1993–94 1990–91 Survey of Morbidity and Treatment in General Practice in Australia
Pharmaceuticals		
Prescription drugs	Prescriptions weighted by relative utilisation and average prescription cost for therapeutic drug group.	Pharmaceutical Benefits Scheme Utilisation and Cost Data for 1993–94 1990–91 Survey of Morbidity and Treatment in General Practice in Australia
Over-the-counter medicines	Use of non-prescription medications in the last two weeks.	1989–90 ABS National Health Survey
Allied health services	Reported visits in the last two weeks, together with referrals by GPs.	1989–90 ABS National Health Survey 1990–91 Survey of Morbidity and Treatment in General Practice in Australia
Nursing homes	For ICD-9 chapters: number of residents by main disabling condition. Attribution to sub-chapter level on basis of distribution of transfers from acute hospitals.	1993 Survey of Disability, Ageing and Carers AIHW National Hospital Morbidity Database 1993–94
Other[a]		
Public health	Estimated costs for breast and cervix cancer national screening programs and for lung and skin cancer prevention programs. Costs of other public health programs not included as yet.	Harris & Scott 1995; Richardson et al. 1996; Carter, Marks & Hall 1997 Medicare data on fees charged for Pap smears and PSA tests in 1993–94 Scollo 1998
Research	Estimated expenditure for major disease groups from Nichol, McNeice & Goss. Distributed to detailed age–sex–disease groups in proportion to NHMRC and other relevant grant distributions.	Nichol, McNeice & Goss 1994 NHMRC 1996
Other institutional (nec), Administration and Other non-institutional	Allocated to age–sex–disease groups in proportion to total expenditure in other categories.	n.a.

It must be emphasised that the cost estimates for 1993–94 are based on attribution of total health expenditures to diseases based on available information on the mix of diseases treated and the costs of treatment. For medical and allied health services, and to some extent for drugs, utilisation data relate to 1989–90 or 1990–91, and so costs reported for these sectors will not reflect changes in clinical practice or disease patterns between then and 1993–94. The only exceptions to this are for pathology screening tests for cervix and prostate cancer where

1993–94 Medicare data were used. Also, costs of specialist medical services are estimated using 1990–91 data on referral patterns by general practitioners and costed at the average cost within specialist type. For example, this means that all pathology tests (apart from Pap smear and prostate specific antigen (PSA) tests) are assumed to have the same average cost.

Although the cost estimates reported here provide a broad picture of the health system resources used by age, sex and disease, they should be interpreted with caution for specific diseases. Detailed bottom-up costing of the treatment costs of a specific disease, calculated by adding up actual costs for a cohort of patients, may in some cases give more accurate estimates than the top-down approach of the DCIS, but the latter ensures consistency of estimates and complete coverage of all diseases, and ensures that cost estimates for individual diseases and age–sex groups add to the known total health expenditures.

Recurrent expenditure on health care which has not yet been attributed includes expenditure on ambulance services, community health services, health promotion and illness prevention (apart from public health programs relating to breast, cervix, lung and skin cancer), and aids and appliances. Other types of direct costs not yet attributed to disease categories are capital expenditure ($1.5 billion in 1989–90) and costs not counted within the national accounts context. These include costs incurred by families and friends in caring for patients, travel costs of patients and welfare service costs. The current estimates of direct costs are therefore conservative.

1.6.1 Hospital inpatient services

This sector includes inpatient (admitted patient) costs for recognised public hospitals (including public psychiatric hospitals), repatriation (Department of Veterans' Affairs) hospitals and private hospitals. The proportions of total public acute hospital expenditure which relate to inpatients are given by the inpatient fractions estimated for each State and Territory by the National Health Ministers' Benchmarking Working Group (1996).

Disease costs for inpatient services are estimated by apportioning the total inpatient expenditure for each State or Territory to individual episodes of hospitalisation, with an adjustment for resource intensity of treatment for the specific episode (using diagnosis related groups (DRGs)). Medical costs for private, compensable and other non-public patients in public, repatriation and private hospitals are estimated using DRG-derived medical cost weights and age–sex-specific information from the Health Insurance Commission on in-hospital private medical charges for various categories of service.

Public psychiatric hospital data for New South Wales and Victoria are used to allocate public psychiatric hospital inpatient costs. These costs all fall in the mental health chapter of ICD-9.

Refer to Chapter 2 for full details of the methodology for hospital inpatient costs.

1.6.2 Outpatient and casualty services

The 1989–90 ABS National Health Survey is used to allocate total expenditure on non-inpatient services for 1993–94. Total visits to outpatient clinics (including casualty or accident and emergency departments) for each age–sex–disease group are estimated from the National Health Survey data on numbers of outpatient visits in the two weeks prior to interview. Expenditure is allocated assuming that all visits have the same cost.

Refer to Chapter 3 for full details of the methodology for non-inpatient costs.

1.6.3 Nursing homes

The distribution of the main disabling health condition of nursing home residents in the 1993 Australian Survey of Disability, Ageing and Carers is used to allocate total nursing home expenditure for 1993–94 to age–sex–disease categories at ICD-9 chapter level. This expenditure is apportioned to specific disease groups at the sub-chapter level according to the distribution of diagnoses for patients in that age–sex group who transfer from acute hospitals (around 60% of nursing home admissions).

Refer to Chapter 4 for full details of the methodology for nursing home costs.

1.6.4 Medical services

This sector includes expenditure on all private medical services apart from those for hospital inpatients. It includes consultations with general practitioners and specialists, as well as pathology tests and screening and diagnostic imaging services. The GP survey is used to allocate age–sex-specific out-of-hospital expenditure on medical services to disease diagnoses. This allocation is done separately for general practitioners (based on encounters surveyed in the GP survey) and for 17 categories of specialists (based on the pattern of referrals to each category of specialist in the GP survey).

Age–sex-specific out-of-hospital expenditure on medical services is derived from Medicare and Department of Veterans' Affairs data. This expenditure covers all charges for which a Medicare or Department of Veterans' Affairs claim has been made. It is adjusted to include expenditure for which claims have not been made, using an inflation factor derived from the AIHW Health Expenditure Database on total expenditure on medical services.

This methodology assumes that the pattern of general practitioner services by diagnosis in 1993–94 is the same as that collected in 1990–91, that the pattern of diseases managed by each type of specialist in 1993–94 reflects the pattern of referrals to that specialist type from general practitioners in 1990–91, and that each referral to a specialist of a given type generates services with equal cost. Estimates of the number of services and costs for pathology screening tests for cervix and prostate cancer were adjusted to reflect total Medicare claims and charges for 1993–94 for Pap smears and PSA tests respectively. Utilisation and costs for Pap smears were adjusted upwards by a factor of 1.38 to take account of Pap smears read in public laboratories (Dankiw 1994).

All other screening and diagnostic tests apart from screening mammography (see Section 1.6.7) were costed based on the 1990–91 pattern of referrals by general practitioners, using the overall average charge per pathology test in 1993–94.

Refer to Chapter 5 for full details of the methodology for out-of-hospital medical services.

1.6.5 Allied health services

The GP survey and the National Health Survey are used to allocate total Australian expenditure on allied health practitioners to age–sex–disease groups. Total visits to allied health practitioners in 1993–94 for each age–sex–disease group are estimated from the National Health Survey data on visits to 14 types of allied health practitioners in the two weeks prior to interview. Annual visits to other types of allied health practitioner are estimated from referrals by general practitioners in the GP survey. Expenditure is allocated assuming that all visits have the same cost. The methodology covers all allied health professionals except pharmacists (see Section 1.6.6).

Refer to Chapters 6 and 7 for full details of the methodology for allied health service costs.

1.6.6 Pharmaceuticals

Total pharmaceutical expenditure is decomposed into two components: expenditure on prescription drugs and non-prescription (over-the-counter) pharmaceuticals. Data from the GP survey, together with 1993–94 estimates of total costs and numbers of prescriptions for 40 categories of drugs, are used to allocate total Australian expenditure on prescription pharmaceuticals to age–sex–disease groups. Expenditure on over-the-counter pharmaceuticals is attributed to age–sex–disease groups using information from the National Health Survey. The methodology addresses all pharmaceutical costs apart from the cost of pharmaceuticals dispensed in hospitals, which are included in estimates of hospital costs.

For each of 40 therapeutic drug groups (Pharmaceutical Benefits Pricing Authority 1994), the relative distribution of prescriptions by disease, age and sex for all community prescriptions in 1993–94 is assumed to be the same as that for prescriptions by general practitioners in 1990–91. For diseases where a significant proportion of prescriptions are made by medical specialists, this assumption may have limited validity. Detailed estimates of 1993–94 utilisation and expenditure for the 40 drug categories are used as a starting point for attribution to age–sex–disease groups. This takes into account differences in average drug costs across therapeutic categories, average numbers of repeats, and relative changes in utilisation and costs across drug categories between 1989–90 and 1993–94.

Refer to Chapter 8 for full details of the methodology for pharmaceutical drug costs.

1.6.7 Public health programs

Community and public health programs in general are not yet included in the estimates of disease costs due to the difficulties in obtaining comprehensive casemix data for these health sectors. However, estimates of the costs for breast and cervix cancer national screening programs and for lung and skin cancer prevention programs have been included in the 1993–94 costs to provide a more complete picture of health system costs for cancer in Australia.

Costs of mammographic screening for breast cancer under the National Program for the Early Detection of Breast Cancer are funded outside the Medicare scheme on an equal dollar-for-dollar basis by the Commonwealth and the States and Territories. The total cost of this program is estimated as double the expenditure by the Commonwealth Department of Human Services and Health in 1993–94 (Richardson et al. 1996) and the age distribution of screening obtained from evaluation data (Commonwealth Department of Human Services and Health 1994).

Costs for taking and reading Pap smears under the Organised Approach to Cervical Cancer Screening in Australia are covered by Medicare (Harris & Scott 1995) and are estimated using Medicare data as described in Section 1.6.4. The additional costs of recruitment, coordination, registry and quality control reporting are funded on an equal dollar-for-dollar basis by the Commonwealth and the States and Territories. These additional costs are estimated as double the expenditure by the Commonwealth Department of Human Services and Health in 1993–94 (Richardson et al. 1996) and are included under the 'Public health' sector.

Public health program costs associated with the prevention of lung cancer have been estimated as a proportion of the total costs of anti-smoking programs in Australia in 1993–94. Scollo (1998) has estimated that total State and Territory and non-government expenditure on anti-smoking health education programs comprised $14.9 million in 1993–94. To this estimate has been added an estimated $2 million for tobacco legislation enforcement at State and Territory level, and $1.1 million in Commonwealth expenditure. The latter figure comprises an estimated $0.17 million in tobacco-specific programs under the National Drug Strategy

and 50% of the National Drug Strategy funding of $1.9 million for school and other general drug education programs (total expenditure on the National Drug Strategy amounted to $31.1 million in 1993–94).

Total 1993–94 expenditure on anti-smoking activity was thus estimated at $18.0 million. Lung cancer accounts for around 25% of the total disease burden attributable to tobacco smoking (English et al. 1995), so 25% of $18.0 million, or $4.5 million, was identified as public health expenditure related to lung cancer. The other $13.5 million is not included in the disease cost estimates for other diseases at this stage (the costs attributable to prevention of other smoking-related cancers are quite small). The 'lung cancer' expenditure of $4.5 million is allocated to age–sex groups in proportion to the number of smokers in each age–sex group in 1993.

Public health program costs for the prevention of skin cancer in 1993–94 are based on estimates by Carter, Marks & Hall (1997).

1.6.8 Research

Estimated total Australian expenditure on health and medical research for major disease and population groups in 1991 (Nichol, McNeice & Goss 1994) was used to estimate total research spending for males and females by ICD-9 chapter. Chapter-level expenditure was allocated to age–sex–disease groups at sub-chapter level in proportion to total health expenditure for other health sectors. In the case of cancer and cardiovascular disease, it was considered that this process did not give reasonable estimates of the distribution of research costs by type of cancer or type of cardiovascular condition. For these two groups of conditions, an analysis was carried out of the distribution of National Health and Medical Research Council grants for 1996 (NHMRC 1996b) and of grants by the New South Wales Cancer Council and the Victorian Anti-Cancer Council. These data were used to make preliminary estimates of the distribution of research funding across cancer sites and across disease groups within the cardiovascular chapter.

1.6.9 Other institutional, non-institutional and administration

Other institutional health expenditure (the Red Cross Blood Transfusion Service), other non-institutional health expenditure (Family Planning Services) and administration expenditure (Commonwealth and State and Territory health authority administration expenses and management expenses of Medicare and registered private health insurance funds) are allocated to age–sex–disease groups in proportion to total health expenditure for other health sectors.

It may be possible to refine this attribution process through analysis of the types of expenditure comprising these categories. For example, almost half of 'Administration' expenditure is for administration of health insurance funds, and it may be possible to allocate this according to the distribution across sectors of health insurance funds expenditure. At this stage, a simple overall pro rata allocation process has been used for the three sectors combined.