

## HEALTH INEQUALITIES: SOMETHING OLD, SOMETHING NEW

### GUEST EDITORIAL

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There are substantial inequalities in health in NSW and Australia generally.<sup>1,2</sup> These inequalities translate into large differences in levels of mortality and morbidity for individuals and communities. For instance, the most disadvantaged quintile of the Australian population aged less than 65 suffers 60 per cent more years of life lost due to premature death than the most advantaged quintile of the population.<sup>2</sup> Such inequalities are important whether your perspective is social justice (that is, they are unfair and preventable) or economic (that is, they have high direct and indirect costs on the health system and the wider community).

Health inequalities associated with, for instance, income, socioeconomic status, employment status, gender, ethnicity, and place of residence, have been extensively and repeatedly described in developed countries since the middle of the nineteenth century. Put simply, as far as financial resources are concerned: wealthy people are healthy people; poor people have poor health. Over the last decade, however, there has been a dramatic increase in the interest shown in health inequalities in Australia and overseas by health service policy makers, planners, providers, researchers and commentators.

The recent surge of interest can largely be traced back to the publication of the now iconic Black Report in the United Kingdom in 1980.<sup>3</sup> The Black Report's extensive review of continuing inequalities and its postulated explanations and policy recommendations provided the stimulus for a sharp increase in the number of articles and books about inequalities in the health and medical literature of North America, Europe, and

*continued on page 118*

## CONTENTS

- 117 Guest editorial—Health inequalities: something old, something new
- 119 Call for articles
- 120 Measuring health inequalities in New South Wales
- 126 Socioeconomic differentials in life expectancy and years of life lost in Victoria, 1992–1996
- 130 Global health inequalities: The challenge to epidemiology
- 134 Income inequality trends in the 1980s and 1990s
- 
- 136 Promotion, prevention and early intervention in mental health: Two new national documents
- 137 Getting in early: A framework for early intervention and prevention in mental health for young people in New South Wales
- 
- 138 Electronic report of the NSW Health Surveys 1997 and 1998
- 
- 138 'Evidence from systematic reviews of research relevant to implementing the wider public health agenda'
- 
- 139 EpiReview: Hepatitis C in NSW, 1991–1999
- 
- 142 FactSheet: Cryptosporidiosis
- 
- 143 Communicable Diseases: May 2001
- 143 Trends
- 143 Enterovirus 71
- 143 Arbovirus activity

Australasia. Initially, these mostly provided further descriptions of health inequalities and sought clarification of the causes, sometimes with longitudinal studies. These publications were, however, significant in two major ways. First, they confirmed the ubiquity of health inequalities in developed countries. Second, they demonstrated that—despite the increasing wealth of developed countries and the development of sophisticated social welfare systems—health inequalities were not decreasing. There is not the space here to review the extensive literature on health inequalities, but references 1–9 will provide readers with useful overviews. A summary of what can be asserted with some certainty about the relationship between socioeconomic status and health is provided in the box below.

#### **WHAT DO WE KNOW ABOUT HEALTH INEQUALITIES ASSOCIATED WITH SOCIOECONOMIC STATUS IN DEVELOPED COUNTRIES?**

- However socioeconomic status and health are measured, affluent, privileged people have better health and lower mortality than poor, disadvantaged people.
- If society is divided into 2–5 groups ranging from least to most affluent, the illness and mortality rates are approximately 1.5–5 times greater in the least affluent group.
- Health increases along a gradient as affluence increases—that is, throughout the whole spectrum of society a little more affluence is associated with slightly better health.
- Health inequalities have been described:
  - in all developed countries
  - at national, regional and local levels within countries
  - for almost all diseases and causes of death
  - for men and women
  - across the whole age range.
- Differences in lifestyle (for example: smoking, diet, exercise) explain approximately 1/3–1/2 of the difference.
- The health gap between rich and poor is not decreasing.

Over the last decade dissatisfaction with simply describing yet more health inequalities has grown among health workers and there has been increasing interest in finding policies and programs that might begin to redress the problem.<sup>6–8,10–14</sup> One manifestation of this in Australia has been the steady stream of overseas luminaries to our shores in the last five years:

for example, Leonard Syme, George Kaplan, John Lynch and Ichiro Kawachi from the USA; and Donald Acheson, Jerry Morris, Richard Wilkinson, Peter Townsend, Ken Judge, Martin McKee, David Hunter and Michael Marmot from the UK. Governments and other organisations have also begun to take some leadership for the issue within Australia. This has led, for example, to the establishment of the Commonwealth funded Health Inequalities Research Collaboration, the funding of equity specific projects and programs, and the development of a Health and Equity Statement for NSW Health.

We are, therefore, delighted to be guest editors of a series of issues of the *NSW Public Health Bulletin* that we hope will contribute to an informed debate on health inequalities. The first two issues will describe some major health inequalities, examine some of the global and national factors that influence them, and highlight a selection of current Australian policy and research initiatives. Subsequent issues will focus on ways of reducing health inequalities. Locally relevant studies are being sought for inclusion (see Call for Articles on page 120). Overall our aims are to provide readers with a background to the current knowledge about and interest in health inequalities, to showcase current work in NSW, and to stimulate consideration of what is being and could be done to reduce health inequalities.

In this first issue we publish three articles about health inequalities and one about income inequalities. As well as presenting examples of inequalities, the articles provide information about relevant databases and identify shortcomings with the available data. Starting in NSW, Moore and Jorm present some striking examples of health inequalities by sex, country of birth, indigenous status, geographic remoteness, socioeconomic disadvantage of place of residence, labour force participation and level of education. Moore and Jorm's findings indicate the considerable value of routine national and state data collections such as the Australian Bureau of Statistics' census and mortality data, and the NSW Health Survey and Midwives Data Collection.

Looking south, Vos et al. utilise data from the Victorian Burden of Disease Study, part of a larger Australian study based on the methods developed for the Global Burden of Disease Study,<sup>2,15</sup> to identify geographical and gender-based inequalities in life expectancy and years of life lost in Victoria. The authors also highlight the great complexity in attributing causation.

Using life expectancy to illustrate his arguments, McKee exposes the vast inequalities in health globally. While it is proper that we should be concerned about inequalities within our own country, where life expectancy at birth for 1991–96 was 57 years (male) and 62 years (female) for indigenous Australians and 75 years (male) and 81 years (female) for all Australians,<sup>16</sup> it is well to remember that Australia is

among the healthiest of nations. As well as discussing problems with the global data and the complexity of developing explanations for health inequalities, McKee emphasises the need to consider conditions within each country when making comparisons.

Of all the social variables, family and personal income have some of the strongest associations with health. Reviewing trends in income inequality in Australia over the last two decades, Harding demonstrates that the popular perception that 'the rich have got richer and the poor have got poorer' is rather more complicated when appropriate methods of analysing the data are used. In summary, after taking account of taxation, welfare payments and family size, the gap in disposable income between Australia's richest and poorest did not increase between 1982 and 1997. Disappointingly though, the people in the middle income brackets did not fare quite so well and there are indications of increasing regional inequalities. If we take account of recent debates about social capital and its effects on health,<sup>17,18</sup> we should also question what has been happening to investment in public infrastructure and public services over the same period. There is probably a popular perception that this also has been decreasing, but is this so? We will return to this in a later issue.

In the next inequalities issue we will focus on Australian initiatives to tackle health inequalities. This will include articles on the national Health Inequalities Research Collaboration, the NSW Department of Health's *Healthy People 2005* direction statement for public health, with its emphasis on reducing health inequalities, and the NSW Department of Health's Health and Equity Statement.

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## CALL FOR ARTICLES

In future issues of the *NSW Public Health Bulletin's* health inequalities series we would like to include articles from public health policy makers, practitioners and researchers in NSW.

Articles can address any aspect of health inequalities (that is research, policy development, policy analysis, program implementation and evaluation) but must relate to work done in NSW. If you would like to discuss a proposed article before starting work on it, please contact Peter Sainsbury on (02) 9515 3275) or Liz Harris on (02) 9828 6230.

Copies of the Bulletin's guidelines for authors should be obtained from Michael Giffin on (02) 9391 9241 or by emailing [mgiff@doh.health.nsw.gov.au](mailto:mgiff@doh.health.nsw.gov.au). ☞

# MEASURING HEALTH INEQUALITIES IN NEW SOUTH WALES

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This paper presents information on some key indicators of inequality in health in NSW related to demographic, socioeconomic and geographic factors. Its purposes are to highlight some of the more striking health inequalities, and to describe some of the challenges in improving their measurement.

The information presented here is drawn from the reports *The health of the people of New South Wales—Report of the Chief Health Officer 2000*,<sup>1</sup> and the electronic report *NSW Health Surveys 1997 and 1998*.<sup>2</sup> More detailed information about a wide range of health inequalities is available in these reports.

## HEALTH INEQUALITIES BY SEX

Measurement of health inequalities between males and females is relatively simple because sex is available in all the major health data sources in NSW. These demonstrate substantial differences in health, and use of health services, between males and females. For example:

- Women have a longer life expectancy than men, although this difference is decreasing. Between 1965 and 1998, life expectancy at birth steadily increased from 67.1 to 76.5 years for males, and from 73.7 to 81.9 years for females.

- In the 1997 and 1998 NSW Health Surveys, women were more likely to report being admitted to hospital overnight and to report visiting a general practitioner in the last two weeks and the last 12 months, whereas men were more likely to report visiting an emergency department in the last 12 months.
- In the same surveys, men were more likely than women to report being current smokers and being overweight or obese. Men were less likely to report eating the recommended daily quantities of vegetables and fruit. However, fewer women than men reported adequate levels of physical activity.

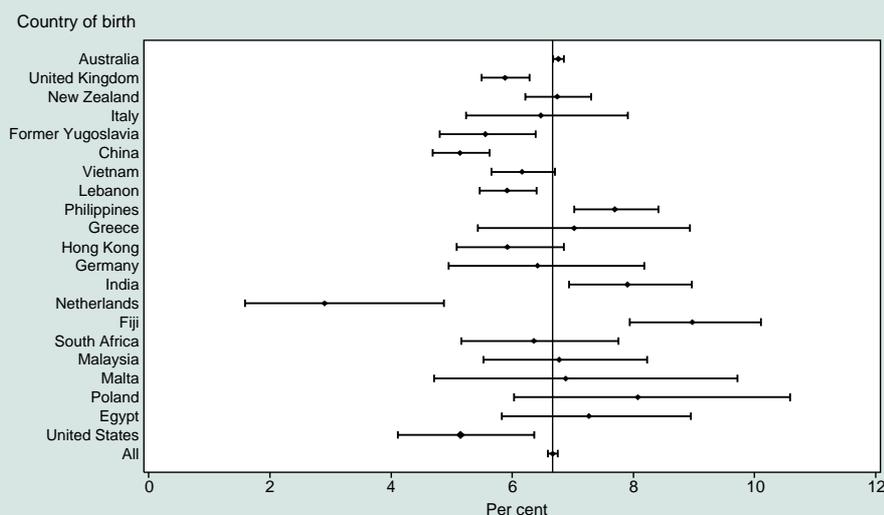
## HEALTH INEQUALITIES BY COUNTRY OF BIRTH AND LANGUAGE SPOKEN AT HOME

Measuring health inequalities among country-of-birth and language groups is not straightforward in NSW. Data on language spoken at home is not available in some data sets (for example, Australian Bureau of Statistics mortality data), and the accuracy of ethnicity data in others (such as the NSW Inpatients Statistics Collection) is unknown. Other limitations include the restricted availability of population denominator data (available only every five years from the Census) for calculation of rates, and the small size of many ethnic communities.

Available data demonstrate that in general, overseas-born residents have better health than Australian-born

**FIGURE 1**

### PREMATURE BIRTHS BY COUNTRY OF BIRTH OF MOTHER



Note: Births where gestational age was less than 37 weeks were classified as premature births. Infants of at least 400 grams birth weight or at least 20 weeks gestation were included. Upper and lower limits of the 95 per cent confidence interval for the point estimate least 20 weeks gestation were included. Upper and lower limits of the 95 per cent confidence interval for the point estimate

Source: NSW Midwives Data Collection (HOIST). Epidemiology and Surveillance Branch, NSW Department of Health.

residents, possibly reflecting a 'healthy migrant effect'.<sup>3</sup> Rates of premature death, chronic diseases and recent illnesses tend to be lower for migrants. However, certain diseases and risk factors are more prevalent among some country-of-birth groups. Some key examples are:

- In the period 1994 to 1998, premature births varied by maternal country of birth, from 3.3 per cent for mothers born in the Netherlands to 8.8 per cent for mothers born in Fiji. Mothers born in the United Kingdom and Ireland, countries of the former Yugoslavia and China were less likely to give birth prematurely, while mothers born in Lebanon and Malta were more likely to have premature births (Figure 1).
- In 1997 and 1998, men and women born in New Zealand and men born in Vietnam and Lebanon, reported higher rates of current smoking than their Australian-born counterparts. Men and women born in Italy and women born in China, Vietnam and the Philippines, were less likely to report current smoking.
- While cervical cancer rates were higher in women born in China and Vietnam in 1993–1997 compared with Australian-born women, self-reported Pap Test screening rates were lower, particularly for women born in China.
- There were considerable differences in reported rates of toothache (sometimes, often or very often)

in the past 12 months among language groups. Men and women speaking Chinese and Lebanese, and men speaking Vietnamese, reported higher than average rates of toothache (Figure 2).

## HEALTH INEQUALITIES BY INDIGENOUS STATUS

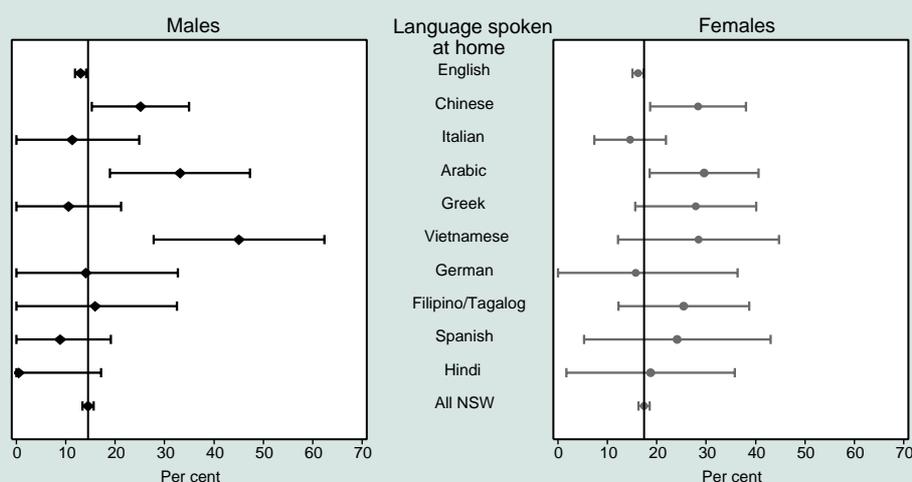
Indigenous status is generally poorly recorded in most health data collections; however, improvements have been made in recent times, particularly for death data. Additionally, examination of trends in indigenous health is complicated by increasing levels of self-identification as an indigenous person. This affects both health datasets and population denominator data.<sup>4</sup> Despite these limitations, poorer birth and health outcomes and higher prevalence of health risk factors among indigenous people have long been recorded and remain apparent in NSW. Some of the more striking differences include:

- There is currently little information about the mental health and wellbeing of indigenous Australians, nor is there an agreed method for assessing it.<sup>4</sup> However, in the 1997 and 1998 NSW Health Surveys,<sup>2</sup> the reported level of psychological distress, based on the Kessler 10 measure,<sup>5</sup> was higher among indigenous than non-indigenous respondents of both sexes (Figure 3).
- Among people who reported having an overnight hospital admission in the last 12 months, indigenous people (19.7 per cent) were more than twice as likely

**FIGURE 2**

### TOOTHACHE EXPERIENCE BY LANGUAGE SPOKEN AT HOME

Toothache experienced very often, often and sometimes in previous 12 months by language spoken at home and sex, persons aged 16 years and over with at least one natural tooth, NSW 1998



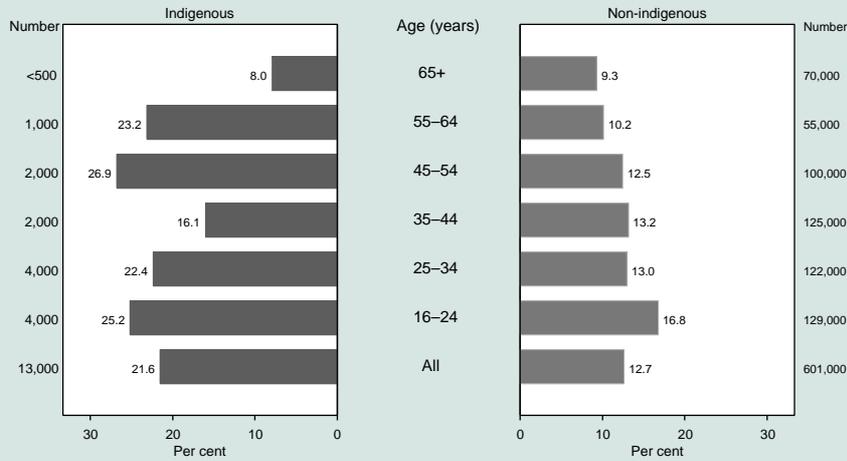
Note: Estimates based on 15,557 respondents with at least one natural tooth (0 in 1997; 15,557 in 1998). 36 (0.2%) not stated for toothache in the previous 12 months. 13,870 respondents spoke English at home; 1,669 respondents spoke a language other than English at home.

Source: NSW Health Survey 1998 (HOIST). Epidemiology and Surveillance Branch, NSW Department of Health.

**FIGURE 3**

**PSYCHOLOGICAL DISTRESS BY AGE AND INDIGENOUS STATUS**

Psychological distress score of 60 or more by age and indigenous status, persons aged 16 years and over, NSW, 1997 and 1998



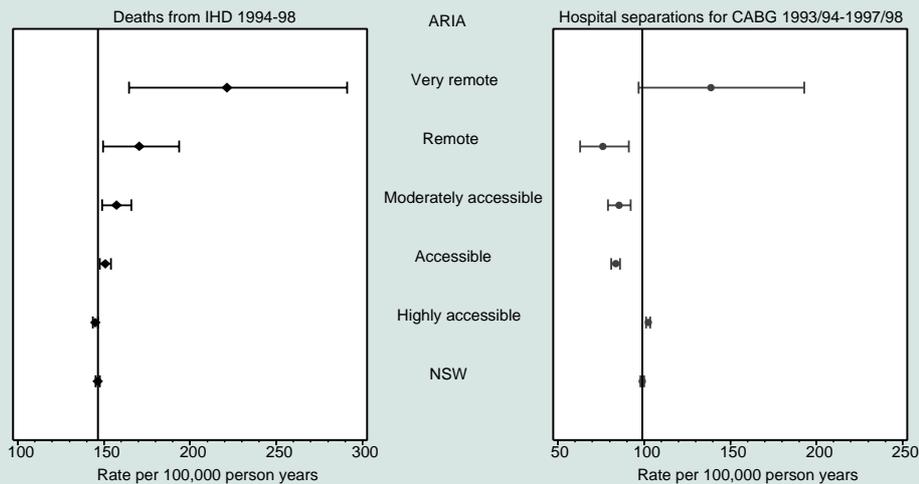
Note: Estimates based on 35,025 respondents (17,531 in 1997; 17,494 in 1998). There were 646 indigenous and 34,360 non-indigenous respondents.

Source: NSW Health Surveys 1997 and 1998 (HOIST). Epidemiology and Surveillance Branch, NSW Department of Health.

**FIGURE 4**

**DEATHS FROM ISCHAEMIC HEART DISEASE AND HOSPITALISATIONS FOR CORONARY ARTERY BYPASS GRAFTS, BY ACCESSIBILITY-REMOTENESS INDEX FOR AUSTRALIA (ARIA)**

Deaths from ischaemic heart disease and hospital separations for coronary artery bypass graft by ARIA, NSW



Note: Ischaemic heart disease was classified according to the ICD-9-CM diagnosis codes 410-414. Coronary artery graft was classified according to the ICD-9-CM procedure code 36.1. Statistical local areas were assigned to the Accessibility/Remoteness Index of Australia (ARIA). Rates were age-adjusted using the Australian population as at 30 June 1991. LL/UL95%CI of the standardised rate are shown.

Source: ABS mortality data and population estimates (HOIST). Epidemiology and Surveillance Branch, NSW Department of Health.

as non-indigenous people to rate the care they received in hospital as 'fair' or 'poor' (9.3 per cent).

- In 1997–1998, indigenous people living in rural areas in NSW (162 per 100,000 population) were just over three times more likely to receive haemodialysis than indigenous people living in urban areas (53 per 100,000 population), and five times more likely to receive haemodialysis than non-indigenous people living in rural areas (32 per 100,000 population).

### HEALTH INEQUALITIES BY PLACE OF RESIDENCE

Measurement of health inequalities associated with geographic remoteness has been facilitated by the development of the Accessibility–Remoteness Index for Australia (ARIA).<sup>6</sup> This is based on road distance travelled from major service centres and provides a measure of service access on a population basis. ARIA scores can be assigned on the basis of postcode of residence. Examples of inequalities demonstrated by analysis by ARIA category include:

- In 1994–1998, death rates from ischaemic heart disease increased progressively with increasing remoteness. By contrast, hospital separation rates for coronary artery bypass graft (CABG) showed a less consistent pattern, with little difference in rates for those living in remote and highly accessible areas, and slightly lower rates for those living in

areas with intermediate levels of service access (Figure 4).

- In the 1997 and 1998 NSW Health Surveys, a higher percentage of people living in remote (60.0 per cent) and very remote (69.6 per cent) areas of NSW reported one or more alcohol drinking behaviours that are associated with an increased risk to health compared with those living in highly accessible areas (49.0 per cent).
- In the same surveys, a higher percentage of people living in remote (20.8 per cent) and very remote (41.3 per cent) areas of NSW reported having difficulties getting the health care they needed compared with those living in highly accessible areas (8.2 per cent).

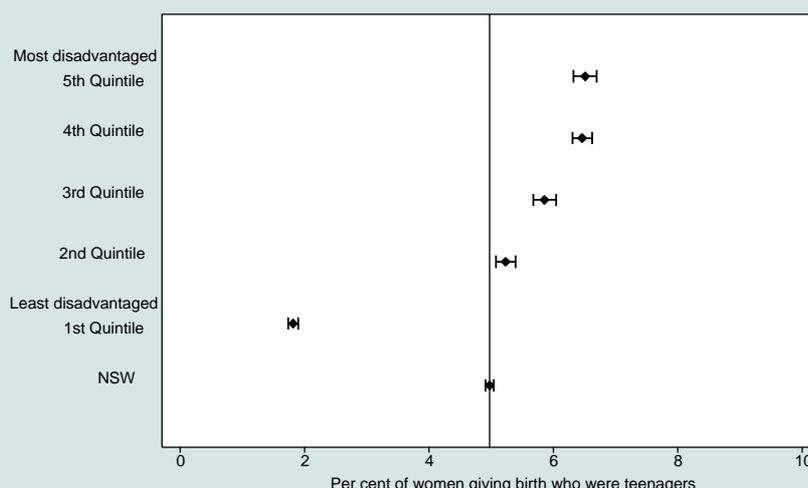
### HEALTH INEQUALITIES BY SOCIOECONOMIC DISADVANTAGE, LABOUR FORCE CATEGORY AND EDUCATION

Socioeconomic differentials in health can be measured using data on individuals (for example: level of education, employment status, or income) and relating it to a measure of that individual's health. An alternative approach is to use aggregate socioeconomic characteristics of the populations of defined geographic areas (such as postcodes or local government areas) as a proxy for the socioeconomic status of individuals.<sup>3</sup> The Socioeconomic Indices for Areas (SEIFA) were developed for this purpose by the

**FIGURE 5**

#### TEENAGE MOTHERS BY INDEX OF RELATIVE SOCIOECONOMIC DISADVANTAGE

Teenage mothers by socioeconomic disadvantage score for LGAs, NSW 1994 to 1998



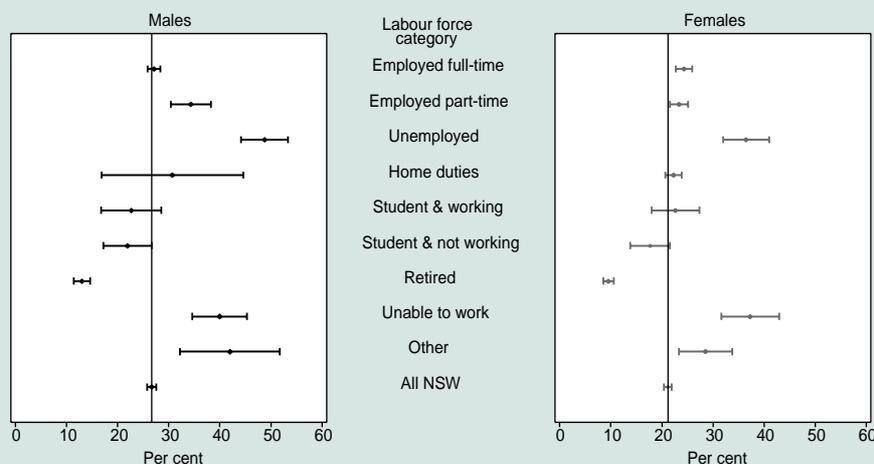
Note: Local Government Areas (LGAs) were classified into quintiles by scores based on the ABS Index of Relative Socioeconomic Disadvantage (IRSD). Lower and upper limits of the 95 per cent confidence interval for the point estimate are shown.

Source: NSW Midwives Data Collection and Census data, and SEIFA index (HOIST). Epidemiology and Surveillance Branch, NSW Department of Health.

**FIGURE 6**

**CURRENT SMOKING BY LABOUR FORCE CATEGORY**

Currently smoke daily or occasionally by labour force category and sex, persons aged 16 years and over, NSW 1997 and 1998



Note: Estimates based on 35,025 respondents (17,531 in 1997; 17,494 in 1998). 6 not stated for current smoking status.

Source: NSW Health Surveys 1997 and 1998 (HOIST). Epidemiology and Surveillance Branch, NSW Department of Health.

Australian Bureau of Statistics using census data.<sup>7</sup> The SEIFA index of relative socioeconomic disadvantage (IRSD) is compiled from 21 different census indicators summarising underlying social and economic variables of disadvantage, such as low income, low level of education, unemployment, recent migration, lack of fluency in English and indigenous status. Socioeconomic differentials demonstrated by analysis of NSW data using both of these approaches include:

- In 1994 to 1998, the likelihood of giving birth as a teenager was strongly associated with socioeconomic disadvantage. Teenage mothers represented 1.8 per cent of all women giving birth in the least disadvantaged quintile compared with 6.5 per cent of all women giving birth in the most disadvantaged quintile (Figure 5).
- In the 1997 and 1998 NSW Health Surveys, reported rates of current smoking increased with increasing levels of socioeconomic disadvantage. Both male and female respondents who were unable to work, unemployed or employed part-time had much higher reported rates of current smoking than the state average (Figure 6).
- In the same surveys, psychological distress,<sup>5</sup> was associated with socioeconomic disadvantage. Reported rates of psychological distress were lowest among men and women with university or other tertiary qualifications and highest among respondents who had not completed their high school certificate (Figure 7). It should be noted that the highest level of educational attainment was also strongly associated with age (there is generally a

lower level of educational attainment with increasing age).

**DISCUSSION**

The reports *Health of the people of New South Wales—Report of the Chief Health Officer 2000*,<sup>1</sup> and *NSW Health Surveys 1997 and 1998*,<sup>2</sup> demonstrate many inequalities in the health of the NSW population, based on sex, ethnicity, indigenous status, area of residence and socioeconomic factors. Whether these differences represent inequities in health relies on an assessment of their fairness and preventability.<sup>3,8</sup>

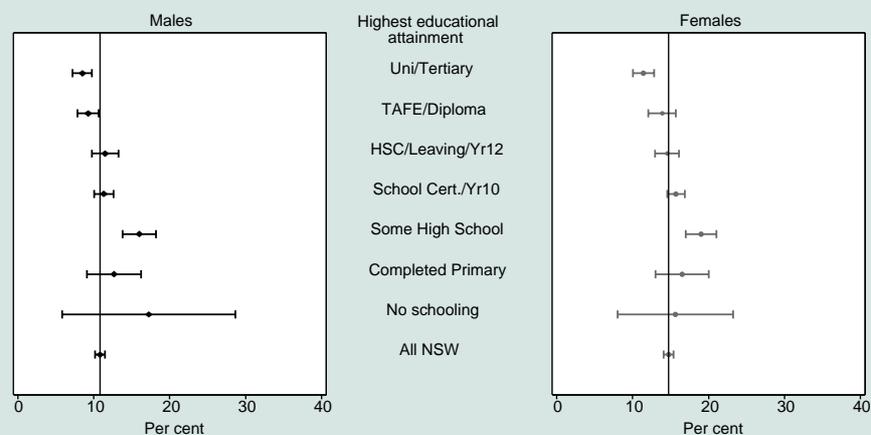
Much work is required to improve the measurement of inequalities in health. Issues include the appropriateness of focusing on individual level determinants of health when macrolevel determinants (such as unemployment and income) may have a far greater impact on health and require different policy interventions.<sup>9</sup> This is particularly important considering evidence that socioeconomic determinants that lead to poor health tend to be concentrated in the same groups in society.<sup>10</sup>

Also, for many conditions, notably non-communicable diseases such as cardiovascular diseases, the relationships between social and economic factors and health are more difficult to understand, and therefore to measure. Here, identifying the role of influences that operate throughout life—the ‘lifecourse approach’—may help to tease out differences both between and within socioeconomic groups, which may be different for different conditions.<sup>8</sup>

In future editions of the *Report of the Chief Health Officer* it is planned to present data on trends in health

**FIGURE 7****PSYCHOLOGICAL DISTRESS BY LEVEL OF EDUCATION**

Psychological distress score of 60 or more by highest educational attainment and sex, persons aged 16 years and over, NSW 1997 and 1998



Note: Estimates based on 35,025 respondents (17,531 in 1997; 17,494 in 1998). 290 (0.8%) not stated for any question in the K10 instrument. Respondents who partially completed primary school are in the no schooling category which had 236 respondents.

Source: NSW Health Surveys 1997 and 1998 (HOIST). Epidemiology and Surveillance Branch, NSW Department of Health.

inequalities. Challenges include choosing indicators for monitoring the size and direction inequalities. A range of such indicators has been described by Mackenbach and Kunst,<sup>11</sup> and by Gakidou et al.<sup>12</sup> Selecting which ones to present involves making choices between measures of relative and absolute differences; individual–mean differences and inter-individual differences; and simple measures and more sophisticated ones. Ideally, such choices should be informed by eliciting information on community preferences, through mechanisms such as the NSW Health Survey.

### ACKNOWLEDGEMENTS

Past and present staff of the Epidemiology and Surveillance Branch involved in the production of the *Health of the people of New South Wales—Report of the Chief Health Officer 2000* and *NSW Health Surveys 1997 and 1998* included Deborah Baker, Tim Churches, Devon Indig, Jill Kaldor, Kim Lim, Ru Nguyen, Hanna Noworytko, Tim Owen, Michelle Puech, Lee Taylor and Margaret Williamson. Members of the Health Equity Forum assisted with text about health inequalities for the *Report of the Chief Health Officer 2000*.

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# SOCIOECONOMIC DIFFERENTIALS IN LIFE EXPECTANCY AND YEARS OF LIFE LOST IN VICTORIA, 1992–1996

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While the public has growing expectations of health services, and the repertoire of health services to respond to these demands is expanding, governments are under pressure to justify their allocation of health resources. Expressed intentions to base decision-making on health outcomes will remain rhetoric, however, unless adequate tools to measure health outcomes are used. In response to this need for comparable information on health outcomes, the Public Health Division of the Department of Human Services in Victoria has undertaken a body of work to assist decision-making on health resource allocation in Victoria.

The Victorian Burden of Disease Study is one of the endeavours in this process.<sup>1,2</sup> The study uses the methodology developed by researchers at Harvard University and the World Health Organization for the Global Burden of Disease Study.<sup>3</sup> The Victorian study had a similar goal: to provide a comprehensive assessment of premature mortality and disability attributable to diseases, injuries and various risk factors in 1996 and projections 20 years ahead. The Victorian study was undertaken in close collaboration with a national study at the Australian Institute of Health and Welfare (AIHW).<sup>4</sup> This article presents analyses of the effect of socioeconomic differentials in life expectancy and mortality in Victoria between 1992 and 1996.

## METHODS

The Australian Bureau of Statistics (ABS) supplied data on deaths of Victorians that occurred anywhere in Australia and were registered between 1992 and 1996. All-cause mortality by age and sex was used to create abridged life tables according to the Chiang method.<sup>5</sup> The accuracy of life tables depends on the size of the population for which mortality observations are available. For the US Burden of Disease Study, Murray and colleagues found by simulation methods that the 95 per cent confidence interval around a life expectancy estimate is more than two years and rapidly widens for population sizes smaller than 100,000.<sup>6</sup> Most of the Local Government Areas (LGAs) in Victoria have a smaller population size. To improve the accuracy of the calculations of life expectancy by small areas, we therefore examined five years of death data and aggregated contiguous LGAs with populations of fewer than 30,000 (or 150,000 person years of observation for five years). Thus, the 78 LGAs in Victoria were reduced to 56 small areas and all LGAs within a small area were given the same life expectancy.

The 95 per cent confidence intervals of the life expectancy at birth estimates were derived by simulation methods, using the @RISK software program.<sup>7</sup> The software allows the entry of probability distributions in a spreadsheet and then recalculates the spreadsheet many times over and produces summary statistics of designated output variables. We entered age and sex specific mortality rates as normal distributions defined by the observed rate and the standard error:<sup>8</sup>

$$\text{Standard Error} = \sqrt{\frac{\text{Mortality rate}}{\text{population}}}$$

Years of Life Lost (YLL) are the mortality component of Disability Adjusted Life Years (DALY). They are determined by the average remaining life expectancy while discounting future years by three per cent. We used a cohort life expectancy table created by Colin Mathers for the Australian National Burden of Disease study. For comparisons between populations and over time, YLL rates per 1,000 population were calculated and age-standardised to the 1996 Victoria population. Confidence intervals around the YLL rates were extrapolated from the 95 per cent confidence intervals of the age-standardised mortality rates applying the size of the interval as a proportion of the mortality rate to the YLL rate.

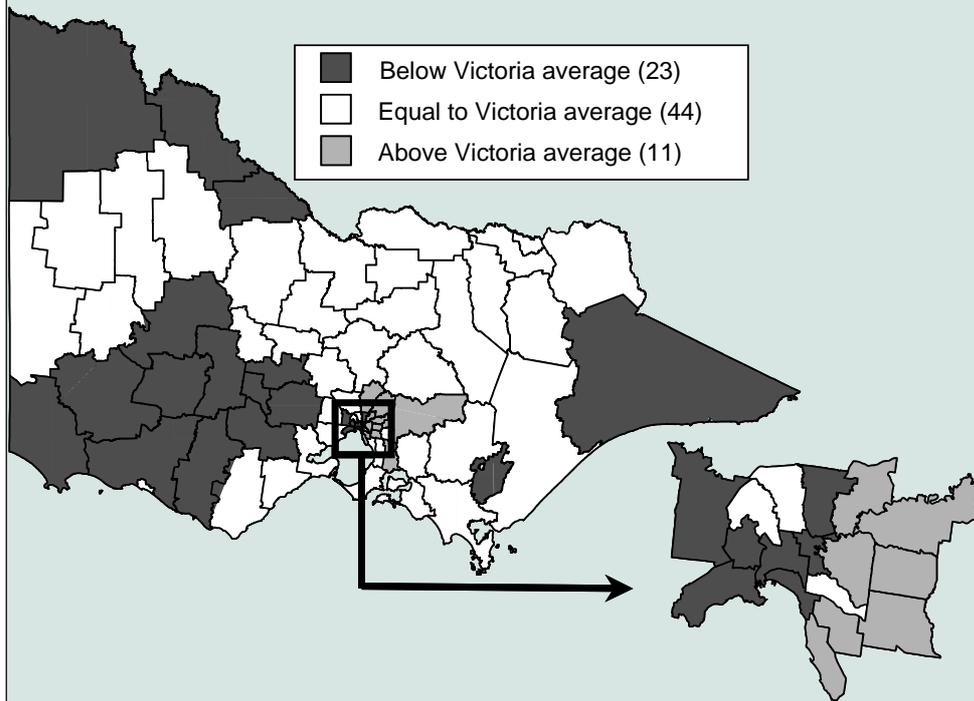
For comparisons of mortality differentials between metropolitan areas, rural centres (towns with 10,000–100,000 population) and other rural and remote areas, the Rural, Remote and Metropolitan Areas (RRMA) classification of the approximately 200 Statistical Local Areas (SLA) was used.<sup>9</sup> This classification is based on pre-1995 SLA boundaries. Where new SLA boundaries overlapped with old SLAs with different rurality status we assigned the rurality status taking population size and density into consideration.

Based on information collected at the census, the ABS produces socioeconomic indices for statistical local areas.<sup>10</sup> In analyses of the relationship between socioeconomic status and mortality, we used the 1996 Socioeconomic Indexes for Areas (SEIFA) index of relative socioeconomic disadvantage, a composite measure that combines factors such as income, education, employment, family structure, dwellings, house ownership, marital status and ethnicity. After ordering SLAs by SEIFA index we grouped SLAs into SEIFA quintiles ensuring roughly equal population totals for each quintile.

Correlations between SEIFA index and rurality status by SLAs and life expectancy were done with simple linear regression methods. Log-linear Poisson regression models were used to examine the association between age-standardised all-cause and

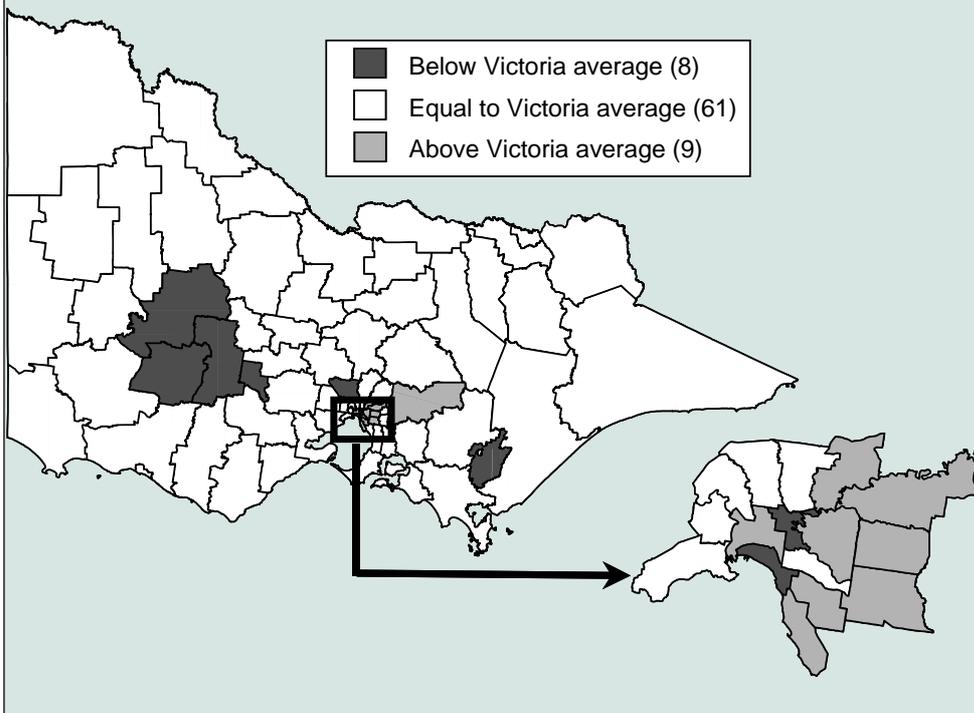
**FIGURE 1**

**MALE LIFE EXPECTANCY AT BIRTH BY LOCAL GOVERNMENT AREA, VICTORIA 1992–1996**



**FIGURE 2**

**FEMALE LIFE EXPECTANCY AT BIRTH BY LOCAL GOVERNMENT AREA, VICTORIA 1992–1996**



cause-specific mortality rates, SEIFA index, rurality status and population density.

## RESULTS

The average male life expectancy at birth in Victoria over the period 1992–1996 was 75.6 years, ranging from 71.7 years in Yarra to 78.6 in Manningham. LGAs with significantly lower life expectancy than the state average include 16 rural LGAs and seven metropolitan LGAs. Eleven metropolitan LGAs had higher than average life expectancy (Figure 1)

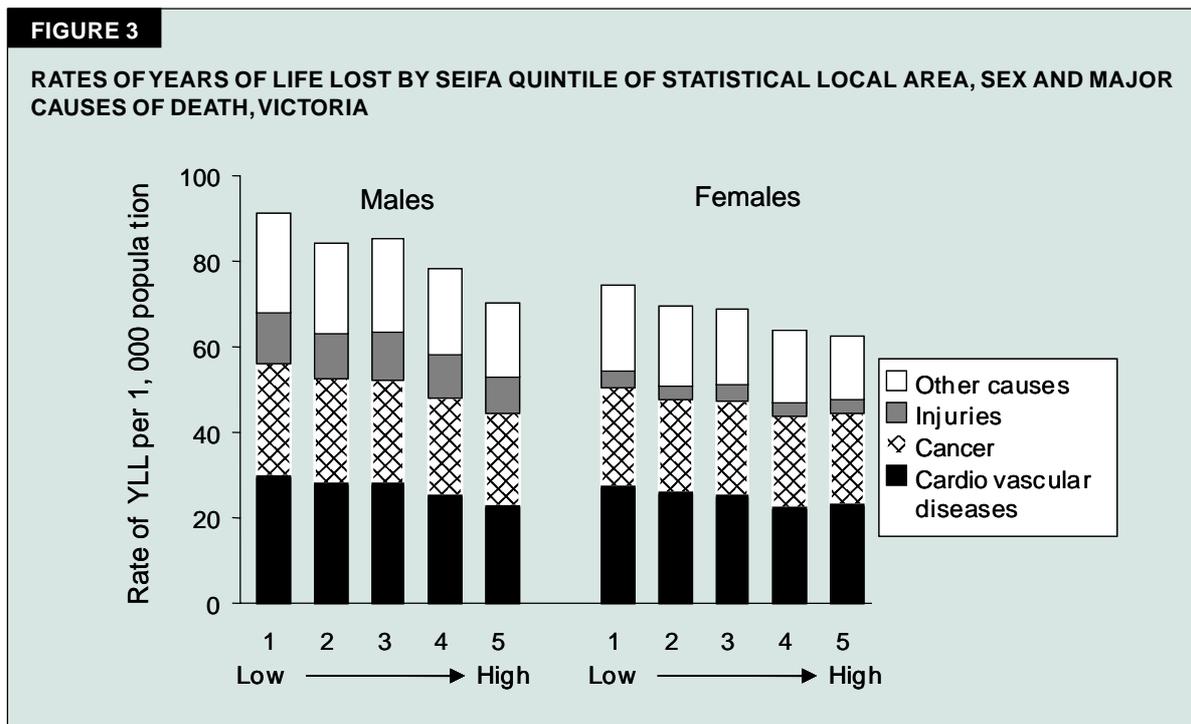
Female life expectancy at birth in Victoria over the period 1992–1996 was 81.3 years, ranging from 79.4 in La Trobe to 83.3 in Monash. LGAs with significantly lower life expectancy than the state average include five rural areas and three metropolitan areas. Nine metropolitan LGAs had higher than average life expectancy in women (Figure 2).

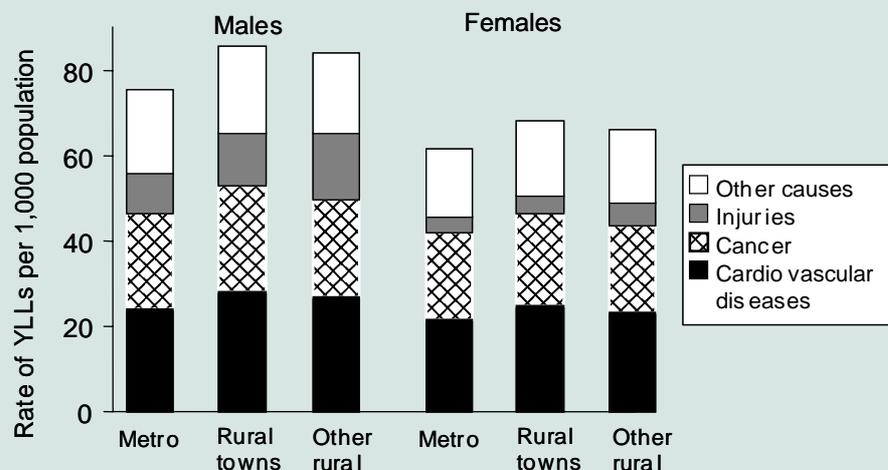
Regression analyses revealed an association between low socioeconomic status and lower life expectancy at birth. The SEIFA index of relative socioeconomic disadvantage explains 36 per cent and 30 per cent of the variation in life expectancy at birth between LGAs in males and females respectively. As this is an ecological analysis, taking the average socioeconomic status of the population living in a small area and correlating it with the average mortality experience in the area, it is likely that this has diluted the true association between socioeconomic status and life expectancy. Unfortunately, the ABS mortality figures, unlike the SEIFA index, do not allow comparison of areas smaller than SLAs. If analysis at the level of census collection districts or even at the level of the

individual were possible, socioeconomic status would be a stronger predictor of mortality. The Port Phillip LGA is a good example of how an average can mask large differences within one area. The area combines the very wealthy suburbs of Albert Park and Middle Park, and a mix of upcoming and disadvantaged areas in Port Melbourne and St Kilda. The male and female life expectancy of Port Phillip as a whole is already among the lowest in Victoria and would certainly have been lower if we could have separated out the more advantaged areas.

All-cause YLL rates show a marked gradient across the five quintiles of the SEIFA index of relative socioeconomic disadvantage. The differentials are more marked in men. The male YLL burden in the lowest quintile is 30 per cent higher than in the highest quintile, while in women this difference is 19 per cent. While the overall YLL burden in women is considerably smaller than in men, women in the lowest quintile areas experience higher YLL than men of the most well-to-do areas (Figure 3).

Ischaemic heart disease, chronic obstructive pulmonary disease (COPD), diabetes, asthma, sudden infant death syndrome (SIDS), road traffic accidents and homicide are the most important causes of death in both men and women that show large socioeconomic differences. In addition, socioeconomic differences are associated with a greater mortality burden in men for pneumonia, stomach cancer, lung cancer, stroke, cirrhosis, drug overdoses, dementia, inflammatory heart disease, other transport accidents, drowning and suicide. Neonatal conditions in female infants, and not in male infants, are associated with lower SEIFA quintiles. AIDS in men and breast cancer



**FIGURE 4****RATES OF YEARS OF LIFE LOST BY RURALITY STATUS, SEX AND MAJOR CAUSES OF DEATH, VICTORIA**

in women are the only causes of death that show the opposite effect being more common in wealthier areas.

The mortality burden is greater in rural Victoria than in the metropolitan areas of Melbourne and Geelong. The smaller differences in rates of years of life lost between the larger rural towns and the more remote rural areas are not significant (Figure 4). Ischaemic heart disease, COPD, road traffic accidents and drowning are the main causes of death more commonly found in rural Victoria. Additional causes of the higher mortality burden in the more remote rural areas are asthma in men and women, and suicide, other transport accidents and machinery accidents in men. AIDS, drug overdose and hepatitis are the only causes more prevalent in the metropolitan areas. The differences in the years of life lost due to injuries are most striking. The road traffic toll is 60 per cent greater in people living in rural towns and two-and-a-half times higher in the more remote rural areas compared to metropolitan Melbourne and Geelong.

## DISCUSSION

The overlap in the conditions that are responsible for the greatest differences in mortality burden by rurality status and relative socioeconomic disadvantage begs two questions:

- which of the two factors is of greater importance?
- do they differ by cause?

The first thing to note is the uneven distribution of the SEIFA index of relative socioeconomic disadvantage across Victoria, indicating a strong link between socioeconomic status (SES) and rurality. Thus, there is a confounding effect between SES and rurality as

explanatory factors for differentials in the mortality burden. When both factors are taken into account, a clearer picture of the importance of each appears. The higher mortality burden from cardiovascular diseases in rural Victoria is largely due to the lower socioeconomic status of rural residents. This would indicate that differences are mostly likely attributable to life style factors such as smoking and diet. However, after controlling for socioeconomic status, rural residence remains significantly associated with mortality from ischaemic heart disease. This raises the hypothesis that people in rural areas may not have the same level of access to life-saving treatment. This could be due to delays in resuscitation, thrombolytic treatment or surgical interventions. Also, it cannot be ruled out that SES influences access to treatment.

The higher injury mortality in rural Victoria and particularly for the more remote rural areas is largely due to rurality status rather than SES. Road traffic accidents, machinery accidents, other traffic accidents, the other categories of unintentional injuries, and suicide in young males, are all significantly raised causes of mortality that are independent of socioeconomic status. The differences with the more densely populated parts of Victoria are great enough to warrant targeted interventions. More detailed analysis of the circumstances and the nature of injury deaths is needed to identify appropriate interventions for injury prevention.

These large differentials in life expectancy and YLL gave the impetus to a detailed analysis of the burden of disease for each of the 78 LGAs in Victoria. LGA burden of disease data is available for scrutiny on the Internet at [www.dhs.vic.gov.au/phd/lgabod/index.htm](http://www.dhs.vic.gov.au/phd/lgabod/index.htm).

Planners at state, regional and LGA level are using the results to identify local health problems and implement strategies that can reduce the large differentials in health status between LGAs.

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# GLOBAL HEALTH INEQUALITIES: THE CHALLENGE TO EPIDEMIOLOGY

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## THE SCALE OF INEQUALITY

In 1998, of every 100 15-year-old boys in Iceland, 91 could expect, on the basis of current levels of mortality, to survive until the age of 60. Among a similar group of Zambian boys, only 22 could have a similar expectation. Male life expectancy at birth is similar in Russia and Ghana, but the underlying causes are very different.

The scale and diversity of the variation in mortality between countries has fascinated researchers for years. If we can begin to understand these differences, maybe we can gain some insights into the causes of inequalities in health within countries. This article examines the inequalities in life expectancy between countries, discusses the quality of global data sources, and describes how many analyses fail to recognise the complexity of attributing causality.

A first question must be: how good the data are on which such comparisons are based? There are two major issues. The first is whether they cover an adequate spectrum of ill health. A major achievement of the program on the Global Burden of Disease has been to highlight the importance of conditions that

have a greater effect on disability than on death, such as mental health.<sup>1</sup> Unfortunately, most comparisons are limited to data on mortality. While the World Health Organization does publish data on disability adjusted life expectancy,<sup>2</sup> this involves the application of standard weightings for particular conditions to diverse populations and they are not based on directly collected data on disability in each country. Further, the correlation between unadjusted and disability adjusted life expectancy is very high ( $r = 0.96$ ). Many countries do collect some information on health status, typically from household surveys, but comparability is limited.<sup>3</sup>

The second issue is the quality of mortality data. It is necessary for information to be accurate with respect to population denominators, numbers of deaths, and their causes. A substantial proportion of the world's population never officially exist, in that neither their death nor their birth will ever be recorded by any government agency. This is especially likely in areas of conflict, where there are often large-scale movements of population and where registration systems are a low priority. Even in countries that appear to have well-functioning registration systems there may be considerable discrepancies between official data and that gathered by household surveys. Data on infant mortality are especially problematic, even among some groups in advanced industrialised countries.<sup>4</sup>

Consequently, data from many countries must be treated with a degree of caution. Nonetheless, it is apparent that, even allowing for considerable errors in some countries, the expectation of a healthy life varies enormously.

### EXPLAINING INEQUALITIES

Early work identified the importance of economic factors, a relationship that is still apparent, at least for poorer countries. Thus, among countries with a gross domestic product per capita of up to about US\$5,000, greater wealth is clearly associated with longer life expectancy (Figure 1).

There are, however, some exceptions. Life expectancy at birth is about a year longer in Sri Lanka than in Malaysia, even though the latter is more than twice as wealthy as the former. Similarly, life expectancy in Costa Rica is 25 years longer than in Gabon, although both are at a similar economic level.

In a study of global determinants of life expectancy, Hertz et al. argued that the underlying determinants of life expectancy included a clean water supply, nutrition, and literacy rates. They went on to examine the circumstances of three outlying countries: Costa Rica and Sri Lanka, which performed better than

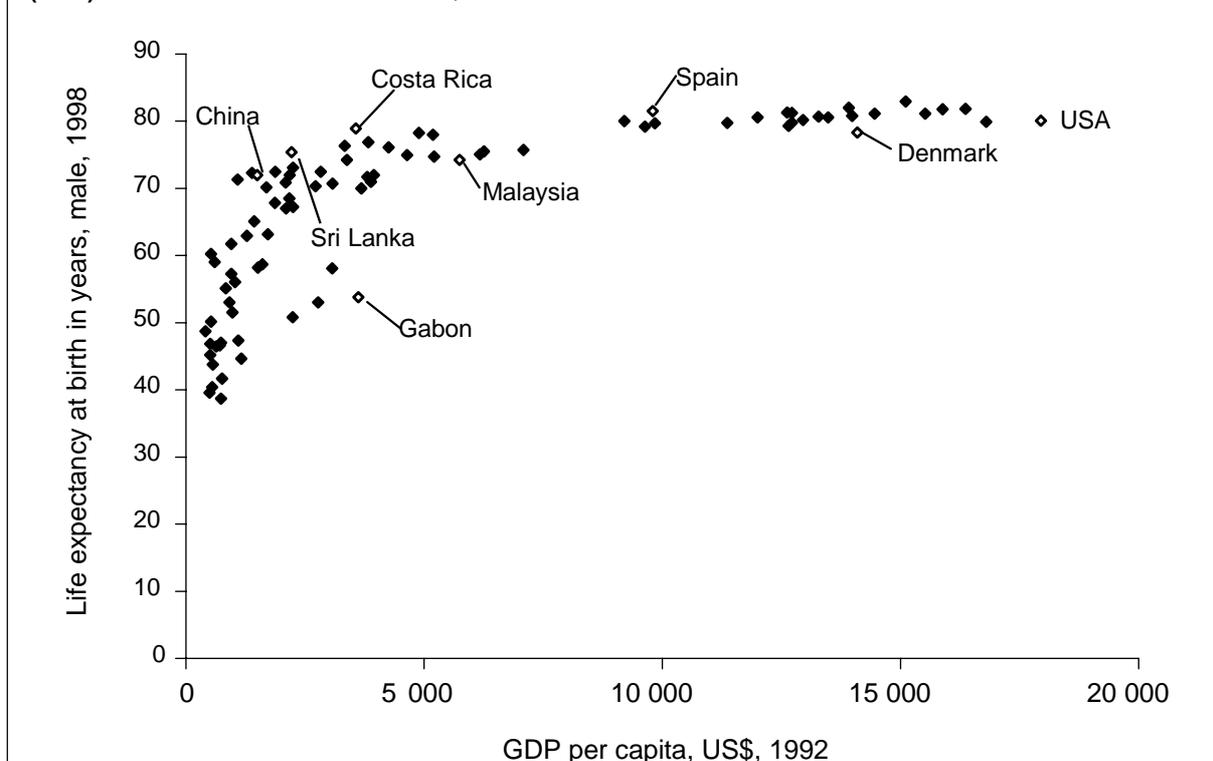
expected; and Egypt, which performed worse.<sup>5</sup> They drew attention to the high level of investment in education and basic infrastructure, accompanied by land redistribution in Costa Rica and Sri Lanka. In contrast, in Egypt, social investment was very limited, primarily because of the large amount of government revenues spent on defence, a very different situation from that of Costa Rica that had abolished its army some years previously.

In wealthier countries different factors apply. Above a national income of about US\$5,000 per capita the relationship between wealth and life expectancy almost disappears. Thus, while the United States of America is five times as wealthy as Costa Rica, this brings only one year of additional life expectancy.

Although the magnitude of the differences is much less than among poorer countries, considerable diversity in life expectancy remains among wealthy countries. One of the most widely cited explanations for this variation is that proposed by Wilkinson, who argues that countries with less equal income distributions have lower life expectancies.<sup>6</sup> This view has been challenged by Judge, who has shown that the relationship disappears when household incomes are adjusted for family size, as well as pointing out some other problems with the data used.<sup>7</sup>

**FIGURE 1**

**THE ASSOCIATION BETWEEN MALE LIFE EXPECTANCY AT BIRTH AND GROSS DOMESTIC PRODUCT (GDP) PER CAPITA EXPRESSED IN US\$**



Wilkinson's approach continues a long tradition of comparative studies that have sought explanations for current patterns of mortality in a limited number of present-day factors. Earlier work has examined, for example, health care inputs (interestingly, finding a negative association).<sup>8</sup>

It is now apparent that such analyses are over-simplistic, for several reasons. First, they tend to be driven by the easily measurable. This immediately eliminates many potentially important factors to which exposure is difficult to measure. Examples include diet, climate, and those components of the environment that increase risk of injury. Even where data are available they may be measuring the wrong thing. For many potential explanatory variables, such as diet, alcohol or cigarettes, data are often only available on sales and take no account of informal (or illicit) production or smuggling. Data on consumption may measure the wrong thing. Thus, many surveys of alcohol consumption have assessed average weekly consumption although it is now apparent that the pattern of drinking is equally important.<sup>9</sup> The high level of cardiovascular disease and injuries in Russia can only be understood by taking account of the extent of binge drinking.<sup>10</sup>

Second, they take no account of context. A word used in one country may not mean the same in another. Comparisons of health care inputs often include numbers of hospital beds even though a bed, on its own, contributes nothing to health care. It is the number and quality of the staff that come with it, and the tools at their disposal that really count. These are much less easy to measure.

Third, very few factors operate in isolation. Risk factors often interact in ways that remain unclear. Thus, a diet rich in fruit and vegetables reduces the risk of many cancers where an exogenous carcinogen is involved, such as those of the lung, colon or stomach.<sup>11</sup> This may go some way to explaining the disproportionately high death rate from lung cancer in Hungary and the somewhat lower rate in Spain, despite comparable patterns of smoking.

Diet and smoking cannot be considered in isolation from the societal and economic factors that often constrain the choices available to people. Culture, although imperfectly understood, is also important. The much lower level of life expectancy in Denmark than in its neighbour, Sweden, while attributable to some immediate causes such as higher rates of lung cancer and cirrhosis, also reflects a fundamental cultural difference in the perception of the importance of individual choice in the two countries.<sup>12</sup> Culture is also shaped by geography, which influences patterns of agriculture and thus diet. The potential effect on health can be seen in southern Europe, which owes some of its long life expectancy to the benefits of a Mediterranean diet.<sup>13</sup>

Culture and economic factors combine, as in the rapidly increasing death rate in sub-Saharan Africa. HIV–AIDS is obviously a key factor, but a comprehensive analysis must also take account of the pervasive poverty, the low status of women, the high prevalence of other sexually transmissible infections, and the lack of availability of affordable treatment.<sup>14</sup>

Genetic factors may also play a role, where a population has been subject to one type of evolutionary pressure for centuries but where a new risk factor emerges. This is exemplified by the increase in type II diabetes among Pacific Islanders. Selection of those best able to survive episodic famine created populations that are especially susceptible to an abundance of food, the thrifty genotype theory.<sup>15</sup>

However the main limitation of such analyses is their failure to take account of the time over which different factors act. In some cases the link with identifiable risk factors is apparent. For example, smoking rates in a population are largely fixed by the time people leave their teens but many of the health consequences will only become apparent many years later. The death rate from lung cancer among Russian men has been falling since the early 1990s but this is because of the reduced supply of cigarettes between the end of the Second World War and the death of Stalin.<sup>16</sup> Changes in alcohol consumption lead to changes in alcohol-related malignancies approximately 20 years later.<sup>17</sup> Current levels of heart disease in France are more closely associated with risk factors 20 years ago than now.<sup>18</sup>

What has been less apparent until recently is the effect of conditions in early life on adult disease. There is now a large body of work linking growth in the womb and early childhood with a wide range of conditions including stroke, ischaemic heart disease and type II diabetes.<sup>19</sup> The consequences are apparent at a population level. Thus, Portugal stands out from the rest of western Europe in terms of its death rates from stroke and stomach cancer, both of which are at levels comparable to those in eastern Europe.<sup>20</sup> These two conditions have only one thing in common, that they are driven largely by conditions in the womb and early childhood. The significance becomes clear when it is recalled that conditions in Portugal in the 1950s and 1960s were much closer to those in Poland than in its neighbour, Spain.

## CONCLUSION

In this brief review it has only been possible to touch on one aspect of the inequalities in health among countries. Other important issues include the impact on these differences of future developments arising from the process of globalisation,<sup>21</sup> as well as the complex relationship

between migration and health.<sup>22</sup> Neither has it been possible to explore the contribution of health care to patterns of health, even though it is clear that many people in developing countries are dying because of shortages of essential drugs.<sup>23</sup> In industrialised countries differences in the quality of health care are now having a visible effect on disease outcomes at a population level.<sup>24</sup>

The wide inequalities in health among nations pose substantial challenges to epidemiologists. New approaches are needed that take account of the difficulties of disentangling the causal chains involved. This will involve a combined effort by demographers, epidemiologists, political scientists, basic medical scientists and others. There is a need to recognise that research based on individuals may not answer questions about the health of populations,<sup>25</sup> and also that, contrary to the prevailing view among many funding bodies, understanding the human genome will not solve all our problems.

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# INCOME INEQUALITY TRENDS IN THE 1980s AND 1990s

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This article describes trends in income inequality in Australia during the past two decades, primarily using the income distribution survey unit record tapes released by the Australian Bureau of Statistics for 1982 and 1996–97. There has been little change in national overall inequality during this period. But this lack of overall change at the national level disguises two major trends:

- better outcomes for the poor and the rich than for middle Australia;
- an apparent increase in spatial income inequality (that is, inequality of income by geographical regions).

As always, there is considerable debate about trends in income inequality in Australia. The popular perception is that ‘the rich have got richer and the poor have got poorer’. But once the most appropriate methods are used for analysing income inequality, the evidence does not bear this out.

Two issues are particularly important when analysing trends in income inequality. The first is that total (gross) income is not the best measure of income to use, because it does not take account of the equalising effect of income tax. Our income tax system is progressive, which means that it takes a higher proportion of the income of the rich than of the poor, so it is important to include it within the distributional picture. Thus, most income inequality

experts prefer to use *disposable* income as their measure of economic wellbeing. This equals private income, plus government cash transfers (such as age pension), minus income tax.

The second issue is that it is important to look at *equivalent* income and rank families by their equivalent income. Equivalent income is calculated as a means to more accurately compare the relative economic wellbeing of families with different needs. Such scales recognise, for example, that a single person with an income of \$20,000 is in a better position than a couple with three children with an income of \$20,000. There is not, however, any agreement within Australia or internationally about the exact needs of different types of families and thus about the ‘best’ equivalence scale to use. The analysis below uses the detailed Henderson equivalence scales, developed by the Henderson poverty inquiry in the mid-1970s.

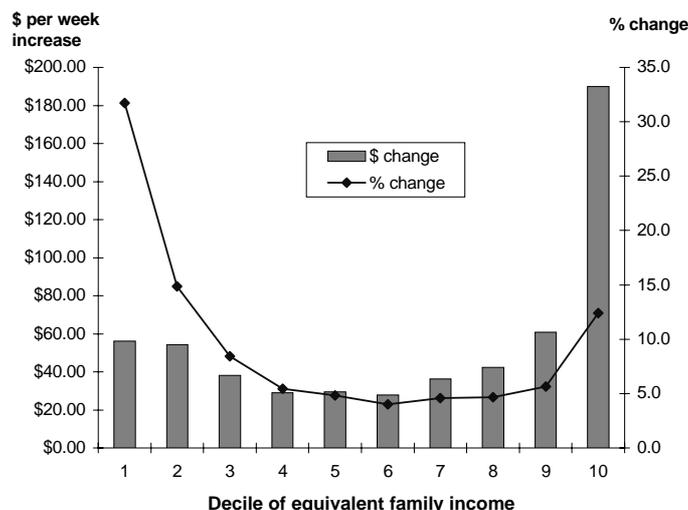
## THE OVERALL PICTURE

Aggregate inequality measures attempt to describe in a single summary statistic the state of income inequality in a country. Gini coefficients are one measure of the change in aggregate income inequality. The Gini varies between 0 (absolute equality) and 1 (one family has everything).

The Gini coefficients in Table 1 suggest sharp increases in the inequality of investment, wage and earned income between 1982 and 1996–97. Government cash benefits became more progressive over this period, so the rise in government transfers (that is, the age and disability pensions, unemployment benefits, etc.) helped to offset

**FIGURE 1**

**AVERAGE REAL DOLLAR AND PERCENTAGE CHANGES IN EQUIVALENT FAMILY INCOME, AUSTRALIA 1982 TO 1996–97**



**TABLE 1**

**GINI COEFFICIENTS FOR A RANGE OF INCOME MEASURES, AUSTRALIA, 1982 AND 1996-97**

	1982	1996-97	Change 1982 to 1996-97	Verdict
Investment Income	0.896	0.922	0.026	Sharp inequality increase
Wage Income	0.547	0.573	0.026	Sharp inequality increase
Earned Income (incl own business)	0.477	0.538	0.061	Sharp inequality increase
Private Income	0.457	0.511	0.054	Sharp inequality increase
Total Income	0.386	0.398	0.012	Inequality increase
Tax (concentration coefficient) *	0.582	0.615	0.033	More progressive
Disposable Income	0.337	0.346	0.009	Little change
Henderson Equivalent Income	0.290	0.287	-0.003	No change

\* The inequality measure for tax is called the 'concentration coefficient', and an increase in this measure means that taxes are becoming more progressive (that is, higher tax rates for higher income earners).

the growing inequality of private income produced by the market. The rise in the Gini for total income was thus much less substantial than that for private income.

Income taxes also became more progressive during this period, so that income taxes helped to further offset the growing market-based inequality. Thus, the Gini for disposable income (that is, after receipt of government transfers and payment of income tax) remained roughly the same.

After taking account of the needs of families using an equivalence scale, the results suggest that overall income inequality remained much the same in 1982 and 1996-97.

**THE SUFFERING MIDDLE**

Figure 1 shows the final trends in income from 1982 to 1996-97, after taking account of trends in private income, government cash benefits, income tax, and changing family size.<sup>1</sup> Overall, the results suggest that on average all deciles had higher equivalent incomes in 1996-97 than in 1982. However, those at the bottom and those at the top had higher real dollar increases than those in the middle.

A slightly different impression is given if these real gains are looked at as a percentage. Then the lowest two deciles have higher percentage gains than the middle and top deciles. In other words, even though the top decile makes substantial dollar gains, these amount to less than a 15 per cent increase in their equivalent disposable incomes between 1982 and 1996-97 (Figure 1).

Why is the bottom decile apparently doing so well? The composition of the bottom decile changed between 1982 and 1996-97, with many sole parents and couples with children moving out and up as a result of generous family assistance reforms. They were replaced by couples without children, the aged and single people. Lower unemployment rates for the bottom decile played an

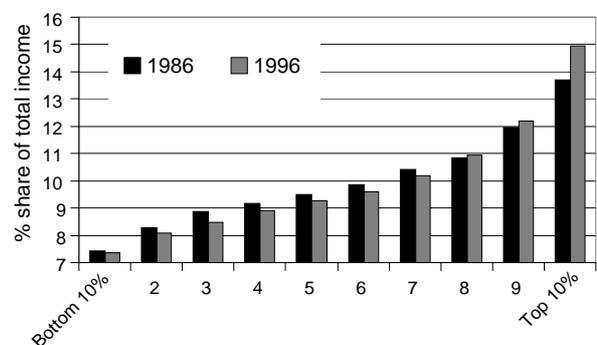
important part, with 29.3 per cent of all individuals in the bottom decile living in families where someone was unemployed in 1982, versus only 26.4 per cent in 1996-97. In 1982 single employed people made up 5.2 per cent of the bottom decile; by 1996-97 this was up to 9.6 per cent. The average number of earners per family in the bottom decile increased from 0.59 in 1982 to 0.62 in 1996-97. This 0.03 increase in the number of earners was in sharp contrast to the average fall of 0.01 earners per family for the population as a whole. Thus, to some extent, social security dependent families with children moved out of the bottom decile and were replaced by the working poor.

**REGIONAL INCOMETRENDS**

There is growing evidence that the picture of no overall national change in income inequality is also disguising growing spatial divisions. Using census data, for example,

**FIGURE 2**

**SHARE OF TOTAL EQUIVALENT GROSS HOUSEHOLD INCOME RECEIVED BY EACH DECILE OF AUSTRALIANS (RANKED BY THE EQUIVALENT GROSS HOUSEHOLD INCOME OF THE LGA IN WHICH THEY LIVED)**



Lloyd et al. recently found that income growth over the 1991 to 1996 period was roughly twice as rapid in the capital cities as in most other areas of Australia.<sup>2</sup> The proportion of low income households has been increasing somewhat more rapidly outside the cities.

In Figure 2, all Australians have been ranked by the equivalent gross household income of the local government area in which they live (using the OECD equivalence scale). The bottom decile thus consists of the 10 per cent of Australians who lived in the poorest local government areas. The results suggest that the 10 per cent of Australians living in the most affluent local government areas gained over the 10 years to 1996, with their share of the total income pie increasing by 1.26 percentage points to 14.96 per cent. Overall, the 30 per cent of Australians living in the top three deciles of local government areas increased their share of the total pie. In contrast, the 70 per cent of Australians living in middle and lower income local government areas lost ground, seeing their share of the total income pie shrinking from 63.5 per cent to 61.91 per cent. There is thus some evidence

that already rich neighbourhoods are becoming even richer, while poorer neighbourhoods are becoming even poorer.

### CONCLUSION

There has been little change in national overall inequality during this period. But this lack of overall change at the national level disguises two major trends: better outcomes for the poor and the rich than for middle Australia; and an apparent increase in spatial income inequality (that is, inequality of income by geographical regions).

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## PROMOTION, PREVENTION AND EARLY INTERVENTION IN MENTAL HEALTH: TWO NEW NATIONAL DOCUMENTS

*Kym Scanlon, Beverley Raphael and Kathy Paterson*  
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Mental health has been identified as a key priority area by NSW Health and also nationally. Recent documents have highlighted the increasing burden imposed by mental health problems and disorders in our society. Depression alone has been predicted as one of the greatest problems internationally by the year 2020.<sup>1</sup> Promotion, prevention and early intervention for mental health has been identified as important to progress, in order to diminish this burden. There is growing evidence that effective promotion, prevention and early intervention initiatives can reduce the prevalence of mental health problems, and lessen the severity and duration of mental illness.<sup>2,3,4</sup>

The *National Action Plan for Promotion, Prevention and Early Intervention for Mental Health 2000*,<sup>5</sup> and an accompanying *Promotion, Prevention and Early Intervention for Mental Health 2000: A Monograph*,<sup>6</sup> were released in late 2000. These two documents have

been developed by the National Promotion and Prevention Working Party, which has representation from the National Mental Health Working Group and the National Public Health Partnership.

Together these documents provide a strategic framework and a plan for action to address promotion, prevention and early intervention priorities and mental health outcomes across Australia. The monograph provides the theoretical and conceptual framework and background information for the action plan.

To support the implementation of the National Action Plan, a New South Wales Promotion, Prevention and Early Intervention Steering Committee has been appointed. Consultation forums to guide implementation are occurring in the area health services across NSW, with 600 people participating in these to date.

Copies of *Action Plan 2000* (ISBN 0642 447241) and the *Monograph* (ISBN 0642 44725X) are available from the Better Health Centre, telephone: (02) 9816 0452; fax: (02) 9816 0492. Feedback on the documents can be provided through a form enclosed at the back of these documents.

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## GETTING IN EARLY: A FRAMEWORK FOR EARLY INTERVENTION AND PREVENTION IN MENTAL HEALTH FOR YOUNG PEOPLE IN NEW SOUTH WALES

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Centre for Mental Health  
NSW Department of Health

Improving the mental health of young people is a priority of the NSW Government. A substantial number of adolescents and young adults have significant mental health problems. Up to 24 per cent of adolescents experience depression by the time they are 18 years old, and young people aged 15–24 years are the group most frequently affected by a first episode of psychosis.<sup>1</sup> These mental health disorders have serious consequences for young people and their families including:

- an increased risk of suicide
- an increased risk of hazardous substance use
- disruption to psychological, educational and social development
- strain on relationships.

Mental health problems in young people have been poorly recognised, identified and managed, and there has often been a considerable delay in young people receiving appropriate care. Increasing evidence shows that preventing and intervening early for young people with mental health problems can dramatically improve their immediate and long term health outcomes.<sup>1,2</sup>

Programs and initiatives for depression and first onset psychosis have been established in area health services across NSW. *Getting in Early—A Framework for Early Intervention and Prevention in Mental Health for Young People in NSW* is a framework for improving and supporting these initiatives.

Five broad strategies are outlined for mental health promotion, prevention and early intervention in young people:

- developing and coordinating comprehensive programs and services;
- engaging young people and their families and providing comprehensive assessment and management;
- developing and implementing prevention programs;
- educating the community, particularly on depression and related disorders and first onset psychosis in young people;
- monitoring quality and effectiveness.

*Getting in Early* provides an innovative framework for mental health service delivery for young people. *Getting in Early* also presents an opportunity to emphasise and maximise mental health services working collaboratively with other agencies towards better mental health for young people in NSW.

Copies of *Getting in Early* (Publication No. CMH00014) are available from the Better Health Centre, telephone: (02) 9816 0452; fax: (02) 9816 0492.

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# ELECTRONIC REPORT OF THE NSW HEALTH SURVEYS 1997 AND 1998

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The electronic report presents the combined results of health surveys conducted in NSW in 1997 and 1998. It is the most comprehensive such report ever produced in Australia, and consists of more than 6000 web pages.

The surveys were conducted by telephone, using computer-assisted telephone interviewing (CATI). More than 35,000 randomly selected NSW residents aged 16 years and over participated. These people each gave around 25 minutes of their time to help build a detailed picture of the health of the adult population.

New topic areas in this report include:

- oral health
- health-related quality of life measured using the EQ-5D instrument

- self-reported Pap test screening rates
- motorbikes on rural properties
- fences on rural properties.

The report also contains breakdowns for most topic areas by:

- indigenous status
- country of birth
- language spoken at home
- language of interview
- socioeconomic disadvantage
- self-rated health
- geographic remoteness.

Printable versions of each page of the report, and data in spreadsheet form, can be downloaded from [internal.health.nsw.gov.au/public-health/nswhs](http://internal.health.nsw.gov.au/public-health/nswhs) or [www.health.nsw.gov.au/public-health/nswhs](http://www.health.nsw.gov.au/public-health/nswhs). ☒

## 'EVIDENCE FROM SYSTEMATIC REVIEWS OF RESEARCH RELEVANT TO IMPLEMENTING THE WIDER PUBLIC HEALTH AGENDA'

**Peter Sainsbury**

*Division of Population Health  
Central Sydney Area Health Service*

If you are involved in preparing a policy or a plan that concerns public health, in its broadest possible meaning, and you do not consult this report you will now be negligent. Prepared by contributors to the Cochrane and Campbell Collaborations and published by the NHS Centre for Reviews and Dissemination, University of York, UK, in August 2000, this mighty book is an absolutely essential resource for all public health workers and health service planners.

The first four sections of the report present the evidence from systematic reviews of specific interventions concerning cancer, coronary heart disease and stroke, accidents, and mental health. Each section has four subsections covering social and economic, environmental, personal behaviour, and services interventions. So, for instance, concerning providing 'incentives to employees to cycle or walk to work, or leave their cars at home' to reduce heart disease or stroke, the only review found concluded that 'public health exercise promotion strategies aimed at modifying the environment, to encourage walking and cycling, are likely to reach a greater proportion of the inactive population than efforts that

aim to increase the use of exercise facilities'. Readers are also informed where there is no evidence from reviews to support an intervention, where no reviews have been performed and where a review is in progress.

The final three sections of the report, organised differently, present the review evidence for interventions involving education, social care and social welfare, and crime, drugs and alcohol.

The authors emphasise that the report does not tell you what to do, but they hope that it will help readers to answer the following questions:

- Which policies might be prioritised because research evidence suggests that they are likely to succeed in achieving specific public health goals?
- Having prioritised policy areas for public health investment, how might your goals best be achieved?
- What additional research might help to identify further strategies for improving the public health?

References are provided for all the reviews used and it is intended that the report will be regularly updated. The report contains about 350 densely typed, landscape pages. Copies can be obtained from the NHS Centre for Reviews and Dissemination. It can be accessed on the Web at [www.york.ac.uk/inst/crd/wph.htm](http://www.york.ac.uk/inst/crd/wph.htm). ☒

## HEPATITIS C IN NSW, 1991–1999

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*NSW Department of Health*

Hepatitis C is a bloodborne virus that may present as an acute illness with jaundice, but more commonly passes unnoticed. Most people infected are symptomless initially, but 65–85 per cent will progress to chronic HCV infection (persistent viraemia) and 15–20 per cent will develop long-term liver damage.<sup>1</sup> Liver cancer has been reported in approximately 1–4 per cent of cases, and cirrhosis after an average of 25–30 years of infection.<sup>2</sup> Over the past decade hepatitis C virus (HCV) infections have been identified as one of the common important infections, with an estimated 170 million persons infected worldwide.<sup>3</sup>

Hepatitis C was first identified in 1989, and a serological (antibody) assay to detect evidence of infection became available in 1990. There have been several generations of antibody tests available since testing began in 1990, and it is likely that in the earlier years of testing there were higher rates of false positives.

Under the NSW Public Health Act, laboratories have been required to notify diagnoses of HCV since 1991. In addition, doctors and hospital managers are required to notify diagnoses of acute viral hepatitis. Here we

present an analysis of HCV reports among NSW residents for the nine year period 1990–1999.

### METHODS

At each Public Health Unit, staff enter details of HCV notified cases including their age, sex, postcode, diagnosis, and date of specimen collection, onto the confidential statewide Notifiable Diseases Database (NDD). We analysed these data to determine the characteristics of persons reported with an acute and other hepatitis C infection. Incidence rates were calculated using the estimated 1997 mid-year population from the Australian Bureau of Statistics.

### RESULTS

Over the period 1991–1999, over 55,000 people were reported with markers of HCV infection. There was a substantial increase in the number of people notified with the infection from 852 in 1991 to 7701 in 1999 (Table 1). Notifications peaked in 1994 (8027) and since have plateaued with 7000 and 8000 cases per year.

The 25–34 year age group had the highest average annual notification rate (243.1/100 000) for the period followed by the 35–44 year age group (204.5/100 000) (Table 2). There has been little variation in the number of notifications from year to year among these age groups, particularly since 1995. In contrast,

**TABLE 1**

**NOTIFICATIONS OF ACUTE HEPATITIS C INFECTIONS AND TOTAL NOTIFICATIONS AND RATES OF HEPATITIS C BY YEAR OF DIAGNOSIS, NSW, 1991–1999**

	<i>Hepatitis C</i> Acute N (%) <sup>*</sup>	<i>Hepatitis C</i> Total notifications N (%)	<i>Rate</i> <sup>#</sup>
1991	22 (2.6)	852 (1.5)	13.6
1992	28 (0.7)	3997 (7.2)	63.7
1993	23 (0.4)	6036 (10.9)	96.2
1994	22 (0.3)	8027 (14.5)	128.0
1995	33 (0.5)	7026 (12.7)	112.0
1996	19 (0.3)	7134 (12.9)	113.7
1997	19 (0.3)	7077 (12.8)	112.8
1998	101 (1.4)	7380 (13.4)	117.7
1999	81 (1.1)	7701 (13.9)	122.8
<b>TOTAL</b>	<b>348 (0.6)</b>	<b>55230 (100.0)</b>	<b>97.8</b>

\* Percentage of total HCV notifications per year

# Average annual notification rate per 100,000 based on 1997 population estimates

**TABLE 2****CHARACTERISTICS OF PERSONS NOTIFIED WITH ACUTE HEPATITIS C INFECTIONS AND TOTAL NOTIFICATIONS AND RATES OF HEPATITIS C, NSW, 1991–1999**

	<i>Hepatitis C Acute N (%)*</i>	<i>Hepatitis C Total notifications N (%)</i>	<i>Rate#</i>
<b>Sex</b>			
Male	223 (0.7)	34444 (62.4)	122.9
Female	122 (0.6)	20137 (37.6)	70.9
<b>Age (years)</b>			
0–9	4 (0.5)	825 (1.5)	10.4
10–14	2 (1.8)	113 (0.2)	2.9
15–19	33 (1.7)	1898 (3.4)	49.2
20–24	65 (1.1)	5956 (10.7)	146.3
25–34	140 (0.7)	21181 (38.4)	243.1
35–44	73 (0.4)	17760 (32.2)	204.5
45–54	19 (0.5)	3874 (7.0)	53.6
55–64	6 (0.4)	1558 (2.8)	31.8
65+	6 (0.3)	2036 (3.6)	28.3
<b>TOTAL</b>	<b>348 (0.6)</b>	<b>55230 (100.0)</b>	<b>97.8</b>
Table excludes missing or other			
* Percentage of total HCV notifications per row			
# Average annual notification rate per 100,000 based on 1997 population estimates			
+ see Table 1 for complete heading			

notification in the 15–19 year age group has steadily increased since 1995: 1995 (170), 1996 (229), 1997 (320), 1998 (372), and 1999 (433).

Northern Rivers Area Health Service had the highest average annual rate (170.4/100 000) followed by Central Sydney (153.5/100 000) and South Eastern Sydney (136.2/100 000) (Table 3). Males were more likely to be reported with hepatitis C than females (ratio 1.7 to 1.0) with an average annual rate of 122.9/100 000 in males compared to 70.9/100 000 in females. Aboriginality was poorly reported and was missing in 88 per cent of notifications.

Laboratory notifications accounted for over 99 per cent of notifications. The majority of HCV notifications were unspecified and these notifications provide insufficient information to determine whether the infection was recently acquired. Very few cases were notified as acute HCV (<1 per cent).

## DISCUSSION

Hepatitis C is the most commonly reported notifiable infection in New South Wales and the rest of Australia.<sup>4</sup> Over 140,000 persons have been notified in Australia since antibody testing became available in 1990, over a third of whom were NSW residents.<sup>2</sup> It has been estimated that the total number of HCV notifications represented only 60–70 per cent of the people infected and a large number remain undiagnosed.<sup>4</sup>

The number of HCV infections notified annually in NSW has plateaued in recent years. The high rate of notifications in 1994 may represent changes in reporting rather than a true rise in infections, as the test kits became available and health care workers and patients became more aware of the condition. Also, because antibody tests used in the early 1990s had a relatively high false positive rate, data from earlier years may include people who did not have HCV.

HCV is predominantly transmitted by the parenteral route, and mainly from injecting drug use.<sup>5</sup> The increase in HCV notifications in the 15–19 year age group is consistent with an increasing trend in hepatitis C prevalence observed among injecting drug users. Prevalence surveys indicate that infection rates among injecting drug users remain high and are highest among those who have injected for more than three years. However, there is also a gradual increase in transmission rates in those who have injected for less than three years.<sup>4</sup> Of additional concern is that the percentage of injecting drug users seen at needle and syringe exchange programs who report sharing of injecting drug equipment increased from 14 per cent in 1997 to 23 per cent in 1999.<sup>4</sup>

Newly-acquired HCV infections have been poorly reported to date in NSW. In 2000, however, NSW Health introduced enhanced surveillance through local public health units to determine newly-acquired infections in

**TABLE 3****TOTAL NOTIFICATIONS AND CRUDE RATES OF HEPATITIS C BY AREA HEALTH SERVICE, NSW, 1991–1999**

Area Health Service	Total Hepatitis C	Rate <sup>#</sup>
Central Sydney	6637	153.5
Northern Sydney	3818	55.8
Western Sydney	6610	112.2
Wentworth	1973	71.9
South Western Sydney	6761	100.9
Central Coast	2057	82.8
Hunter	3708	78.2
Illawarra	2435	80.0
South Eastern Sydney	9221	136.2
Northern Rivers	3859	170.4
Mid North Coast	1946	86.0
New England	930	58.3
Macquarie	393	42.4
Mid Western	1573	105.3
Far West	168	37.8
Greater Murray	1211	52.5
Southern	1415	87.4

# Average annual crude rate per 100,000 based on 1997 population estimates

the previous 24 months. In addition, enhanced surveillance is collecting information describing potential risk factors and people who have recently been infected. Given the clinical profile of the illness and the associated stigma of specific risk factors such as injecting drug use, HCV poses a particular challenge in disease surveillance. The need to improve the surveillance of HCV has been highlighted at both state and national levels.<sup>6,7</sup>

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# CRYPTOSPORIDIOSIS

## WHAT IS CRYPTOSPORIDIOSIS?

- Cryptosporidiosis is a diarrhoeal disease caused by the parasite *Cryptosporidium*, which infects the intestine.
- Cryptosporidium infections have been reported in humans; and in a variety of farm, pet and native animals.
- Although there are several species of *Cryptosporidium*, only one species, *Cryptosporidium parvum*, is thought to cause infection in humans.
- Cryptosporidiosis has been notifiable to the NSW Department of Health since 1996. The number of cases in NSW tends to increase in the warmer months.

## HOW IS IT SPREAD?

- The *Cryptosporidium* organism is present in the faecal matter of infected humans and animals and is spread by the faecal–oral route.
- The disease is passed on when the parasite is ingested.
- Transmission most often occurs through:
  - person-to-person contact, particularly in families and among small children (for example, in child care centres)
  - drinking contaminated water
  - swimming in contaminated pools
  - food (in rare cases)
  - handling infected animals
  - sexual activity that involves contact with faeces.
- A person is most infectious when they have diarrhoea, but the parasite may be excreted for several weeks after symptoms disappear.

## WHAT ARE THE SYMPTOMS?

- The most common symptoms of cryptosporidiosis are watery diarrhoea, stomach cramps, fever, nausea and vomiting. These symptoms may lead to weight loss and dehydration.
- The first signs of the illness appear between 1–12 days (average seven days) after a person becomes infected.
- In some cases there may be no symptoms at all. However, these people may still pass the disease on to others.

- Most healthy people recover in less than two weeks.
- People with a weak immune system may have more severe symptoms that can last for many weeks.

## WHAT IS THE DIAGNOSIS AND TREATMENT?

- If you have diarrhoea, the only way to tell if it is due to cryptosporidiosis is by going to a doctor and having a stool specimen taken.
- It is important for people with diarrhoea to drink plenty of fluids to avoid dehydration.
- There is no specific treatment for cryptosporidiosis.

## HOW IS IT PREVENTED?

To avoid catching cryptosporidiosis:

- always wash hands thoroughly with soap and running water after using the toilet, handling animals, changing nappies, or working in the garden, and before preparing food and drinks;
- do not drink untreated water (for example, from rivers, streams, lakes and dams). Boiling water from these sources for one minute will kill germs including cryptosporidiosis.

To avoid spreading cryptosporidiosis:

- keep small children who have diarrhoea home from school, preschool, childcare or playgroups until the diarrhoea has completely stopped;
- food handlers, childcare workers and health care workers with cryptosporidiosis should not work until diarrhoea has stopped;
- for at least one week after the diarrhoea has stopped, do *not*:
  - use swimming pools or other water recreational areas.
  - share linen and towels with others.

For further information please contact your local Public Health Unit, Community Health Centre, or doctor.

May 2001. ☒

# COMMUNICABLE DISEASES, NSW: MAY 2001

## TRENDS

The onset of autumn brought with it further declines in **pertussis** and **salmonellosis** notifications (Figure 1, Table 2). **Hepatitis A**, **rubella** and **measles** have all remained uncommon in recent months. Autumn tends to be the peak season for **legionnaires disease**, but so far in 2001, no particular peak has emerged in notifications. However, it is timely to remind building owners of the importance of ensuring that cooling towers are regularly inspected and cleaned, to minimise the risk of contamination with legionella bacteria.

## ENTEROVIRUS 71

**Valerie Delpech, Lorraine Young, Bill Rawlinson and Dominic Dwyer**

Hand, foot and mouth disease (HFMD) is a childhood disease that causes blisters, often in the mouth and on the hands and feet. It is usually not a serious illness. It can be caused by a number of different types of viruses, and is spread through contact with the fluid of the blisters, saliva and/or respiratory droplets of an infected person. Viruses are also shed in the faeces of affected people, who can remain infectious for several weeks. There is no vaccine against HFMD. Frequent handwashing and attention to personal hygiene may help in the prevention of the disease. HFMD is endemic both in Australia and throughout the world.

While infections with the group of viruses that are associated with HFMD usually cause only mild illness or no symptoms at all, they are rarely associated with neurological complications including meningo-encephalitis. There have been recent well-publicised outbreaks of HFMD caused by the virus Enterovirus 71 (EV71). In 1997, there was an outbreak in Sarawak, Indonesia, in which about 34 children were reported to have died. In 1998, there was an outbreak in Taiwan, in which over 100,000 children were reported to be infected with EV71, and 80 were reported to have died. In 1999, a small outbreak of EV71 was reported in Western Australia.<sup>1</sup>

Between November 2000 and February 2001, four infants were admitted to the Intensive Care Unit (ICU) of the Sydney Childrens Hospital (SCH) and two to the ICU at Nepean Hospital. All were diagnosed with enteroviral meningo-encephalitis. Two of the children had a history of HFMD. The two children admitted to the Nepean Hospital recovered and were discharged in February 2000.

Three of the four children at SCH remain in a critical condition. EV71 was identified in three cases and typing indicates that the organisms are identical. One case remains untyped. However, this EV71 strain is

distinguishable from strains isolated during the recent outbreak in Western Australia.

The SCH Emergency Department reported larger than usual number of presentations of HFMD during November and December 2000. Rates have subsequently dropped.

Public health units were placed on alert since late December. Emergency Departments were updated at this time and requested to collect additional specimens from children presenting with suspected viral meningo-encephalitis.

Other enteroviruses can also be associated with HFMD and/or meningoencephalitis, and there have been significant numbers of Coxsackie B4 and other enteroviruses isolated and typed at the ICPMR, Westmead Hospital. Current NHMRC recommendations—to exclude cases from childcare facilities until all blisters have dried—should be followed.<sup>2</sup>

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## ARBOVIRUS ACTIVITY

**Richard Russell, Stephen Doggett, Linda Hueston, Dominic Dwyer**  
*on behalf of the NSW Arbovirus Surveillance and Mosquito Monitoring Program*  
ICPMR, Westmead Hospital, Westmead

This month we present a new feature, results of the NSW Arbovirus Surveillance and Mosquito Monitoring Program. The program provides data on mosquito trapping activities from both coastal and inland NSW, as well as data on weekly blood tests from sentinel chickens located in flocks in western NSW. Mosquito trapping is primarily an indicator of local mosquito activity, and thus of possible arbovirus infection (Murray Valley encephalitis virus and Kunjin virus, Ross River virus and Barmah Forest) in humans. The testing of chickens began in 1979 to provide an early warning of flavivirus activity (that is, Murray Valley encephalitis virus and Kunjin virus), and thus the risk to humans posed by these diseases. The variability of local conditions means that interpreting summary statewide data is problematic. In February 2001, for the first time since the commencement of the program, MVE activity was confirmed—in sentinel chickens tested in late January—in the Far Western and Macquarie areas of

**TABLE 1****RESULTS OF MOSQUITO TRAPPING AND SENTINEL CHICKEN TESTING, NSW, NOVEMBER 2000–MARCH 2001**

Month	Mosquito traps	Mosquitoes Trapped	Viruses detected in mosquitoes	Chicken flocks Tested (no. birds)	Chicken flocks with flavivirus seroconversions
<b>November</b>	48	15845	0	9 (393)	0
<b>December</b>	125	73021	6 Sindbis	9 (489)	0
<b>January</b>	162	28963	13 Sindbis 1 Ross River	10 (189)	2 KUN (2 flocks) 4 MVE (3 flocks) 3 Both (2 flocks)
<b>February</b>	173	58916	5 Sindbis 4 Ross river 2 Kunjin	10 (405)	7 KUN (4 flocks) 1 MVE (1 flock) 1 Both (1 flock)
<b>March</b>	160	24860	1 Kokobera	10 (672)	25 KUN (8 flocks) 2 MVE (1 flock) 1 Both (1 flock)

NSW. Evidence of Kunjin virus was also detected in February Greater Murray Area mosquitoes and chickens.

Kunjin and Murray Valley encephalitis viruses remained active in western NSW in March (Table 1). No human clinical cases of Kunjin or Murray Valley encephalitis cases were reported. Reports of human infections with Ross River virus were most common in the northern coastal areas and south west of the state. Mosquito

numbers generally declined across the state through March, although unusually large collections were made at Ballina, following heavy localised rainfall, and from the Port Stephens area. Note that Sindbis and Kokobera viruses are rarely reported as causing human illness.

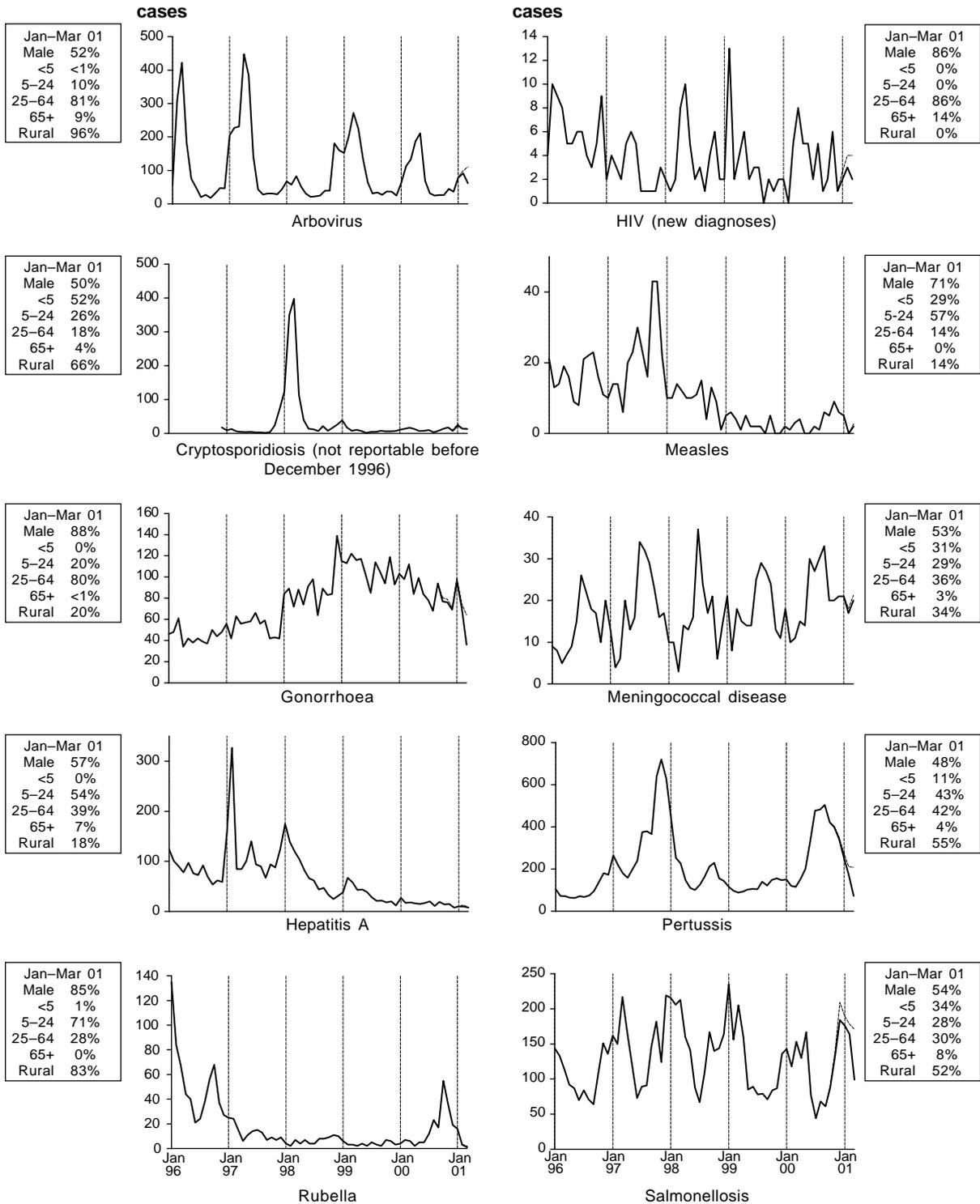
For complete surveillance results, consult the NSW Arbovirus Surveillance web site at: [www.arbovirus.health.nsw.gov.au](http://www.arbovirus.health.nsw.gov.au). ☒

**FIGURE 1**

**REPORTS OF SELECTED COMMUNICABLE DISEASES, NSW, JANUARY 1996 TO MARCH 2001, BY MONTH OF ONSET**

These are preliminary data: case counts for recent months may increase because of reporting delays. Laboratory-confirmed cases, except for measles, meningococcal disease and pertussis — actual — predicted after adjusting for likely reporting delays

NSW population	
Male	50%
<5	7%
5-24	28%
25-64	52%
65+	13%
Rural*	42%



\* For definition, see *NSW Public Health Bulletin*, April 2000

**TABLE 1** REPORTS OF NOTIFIABLE CONDITIONS RECEIVED IN MARCH 2001 BY AREA HEALTH SERVICES

Condition	Area Health Service (2001)																Total			
	CSA	NSA	WSA	WEN	SWS	CCA	HUN	ILL	SES	NRA	MNC	NEA	MAC	MWA	FWA	GMA	SA	CHS	for March†	To date†
<b>Blood-borne and sexually transmitted</b>																				
AIDS	1	-	1	-	-	-	-	-	8	-	-	-	-	-	-	-	1	-	11	44
HIV infection*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33
Hepatitis B - acute viral*	-	1	1	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	5	25
Hepatitis B - other*	28	27	32	1	72	3	1	3	37	1	1	3	1	-	8	7	2	1	130	862
Hepatitis C - acute viral*	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	21
Hepatitis C - other*	29	31	47	23	52	22	19	34	105	36	27	12	4	5	3	5	14	32	504	1,962
Hepatitis D - unspecified*	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3
Hepatitis, acute viral (not otherwise specified)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chancroid*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlamydia (genital)*	-	25	21	7	8	11	25	10	72	25	13	12	18	-	5	7	7	1	272	839
Gonorrhoea*	-	10	6	2	3	1	-	-	35	5	1	2	2	-	2	1	-	-	70	250
Syphilis	19	-	1	2	5	-	-	-	18	1	-	1	-	-	-	1	-	1	49	138
<b>Vector-borne</b>																				
Arboviral infection (BFV)*	-	-	-	-	-	1	1	2	-	8	7	-	-	-	-	-	6	-	25	60
Arboviral infection (RRV)*	-	-	-	-	1	-	6	3	1	19	15	8	7	2	2	28	2	-	94	210
Arboviral infection (Other)*	-	3	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	5	6
Malaria*	-	5	2	-	-	-	1	1	-	3	-	-	-	-	-	-	-	-	12	40
<b>Zoonoses</b>																				
Anthrax	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brucellosis*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leptospirosis*	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	2	18
Lyssavirus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Psittacosis	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	2	8
Q fever*	-	-	-	-	-	-	1	-	-	1	1	-	3	1	-	-	-	-	7	35
<b>Respiratory and other</b>																				
Blood lead level*	-	1	-	1	9	2	5	2	1	1	-	1	1	-	-	-	-	-	24	108
Influenza	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	3	5
Invasive Pneumococcal Infection	-	2	1	-	-	2	2	-	1	3	-	-	-	-	-	-	-	-	11	22
Legionnaires' Longbeachae*	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	5
Legionnaires' Pneumophila*	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	5
Legionnaires' (Other)*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leprosy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Meningococcal infection (invasive)	-	4	3	-	4	-	3	2	4	1	-	-	-	1	-	-	-	-	22	64
Mycobacterial tuberculosis	2	3	2	-	1	1	4	2	4	-	1	-	-	-	-	-	1	-	21	95
Mycobacteria other than TB	-	1	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	5	17
<b>Vaccine-preventable</b>																				
Adverse event after immunisation	-	1	1	-	-	-	-	2	-	-	-	-	-	-	-	3	-	-	7	12
H.influenzae b infection (invasive)*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Measles	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2	8
Mumps*	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	3	7
Pertussis	11	12	17	7	22	4	29	17	16	17	7	10	6	-	-	10	4	-	189	773
Rubella*	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	2	29
Tetanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Faecal-oral</b>																				
Botulism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cholera*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cryptosporidiosis*	-	1	1	-	1	-	-	1	3	6	1	-	-	-	-	-	1	-	15	54
Giardiasis*	-	8	3	1	1	1	18	4	14	16	1	9	2	-	3	-	-	-	81	209
Food borne illness (not otherwise specified)	12	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	15	15
Gastroenteritis (in an institution)	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	185
Haemolytic uraemic syndrome	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Hepatitis A*	4	2	-	-	2	1	-	-	3	1	-	-	-	-	-	-	-	-	13	33
Hepatitis E*	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4
Listeriosis*	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	2	7
Salmonellosis (not otherwise specified)*	-	15	22	12	34	8	18	5	21	23	3	7	2	9	2	5	8	-	194	546
Shigellosis	-	1	-	-	-	-	1	-	11	-	1	-	-	2	-	1	-	-	17	27
Typhoid and paratyphoid*	2	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	4	13
Verotoxin producing Ecoli*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

\* lab-confirmed cases only

† includes cases with unknown postcode

CSA = Central Sydney Area  
NSA = Northern Sydney Area  
WSA = Western Sydney AreaWEN = Wentworth Area  
SWS = South Western Sydney Area  
CCA = Central Coast AreaHUN = Hunter Area  
ILL = Illawarra Area  
SES = South Eastern Sydney AreaNRA = Northern Rivers Area  
MNC = North Coast Area  
NEA = New England AreaMAC = Macquarie Area  
MWA = Mid Western Area  
FWA = Far West AreaGMA = Greater Murray Area  
SA = Southern Area  
CHS = Corrections Health Service

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