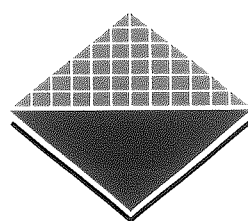


Aboriginal & Torres Strait Islander Health Information Bulletin



AUSTRALIAN INSTITUTE OF
HEALTH & WELFARE

NUMBER 20
April 1995

Aboriginal and Torres Strait Islander Health Information Bulletin

Number 20, April 1995

Aboriginal and Torres Strait Islander Health Information Bulletin

Editor: Kuldeep Bhatia

Assistant editor: Sue Woodward

Aims and scope

The purpose of the *Aboriginal and Torres Strait Islander Health Information Bulletin* is to improve access to health-related information about the indigenous populations of Australia. In addition, it provides background information and timely reviews on current issues. The Bulletin is aimed at both Aboriginal and non-Aboriginal health administrators, doctors, health workers, nursing staff, dentists, social workers, educators, researchers and other professionals in the field.

Published twice yearly by the Australian Institute of Health and Welfare, the Bulletin is provided at no cost and may be obtained by writing to the Publications Officer, Australian Institute of Health and Welfare, GPO Box 570, Canberra, ACT 2601.

© Named contributors retain copyright of their articles. In all other cases copyright is retained by the Australian Institute of Health and Welfare. Apart from any fair dealing for the purposes of private study, research, criticism or review, as permitted under the *Copyright Act 1968*, no part of this publication may be reproduced by any process whatsoever without the written permission of the publisher.

The views expressed by the contributors do not necessarily reflect the position of the Australian Institute of Health and Welfare.

ISSN 0817-4814

Contents

Editorial	1
 Aboriginal and Torres Strait Islander health-related statistics	
Highlights from Australian Institute of Health and Welfare publications	3
Around the States and Territories: summaries of Aboriginal and Torres Strait Islander health statistics	7
The 1994 National Health Information Forum: Aboriginal and Torres Strait Islander health-related issues <i>K Bhatia</i>	17
 Review article	
Dogs and human health in Aboriginal communities—how important are zoonoses? <i>B Currie</i>	19
 Original articles	
Aboriginal health outcomes <i>P Swan, N Mayers and B Raphael</i>	30
Estimating the Aboriginal and Torres Strait Islander population 1986–1991 States/Territories and Australia <i>A Howe</i>	34
Indicators for monitoring Aboriginal health <i>K Bhatia and P Anderson</i>	42
 Brief communication	
Utilisation of hospital and rehabilitation services by Aboriginal and Torres Strait Islander peoples of the Shoalhaven District, New South Wales <i>J Turner</i>	55
 Aboriginal and Torres Strait Islander health bibliography	58
 Guidelines for contributors	70

Editorial

New initiatives to improve the state of our knowledge and information about Aboriginal and Torres Strait Islander health resulted from the National Aboriginal Health Strategy (NAHS) Working Party report in 1989 and the Royal Commission into Aboriginal Deaths in Custody report in 1991. A major initiative of the NAHS was the 1992 National Housing and Community Infrastructure Needs Survey, commissioned by the Aboriginal and Torres Strait Islander Commission (ATSIC). Monies were also allocated under the NAHS to the Australian Institute of Health and Welfare (AIHW) to improve the quality of Aboriginal health-related data collections at a national level.

Following the recommendations of the Royal Commission, the Australian Bureau of Statistics (ABS) conducted a nationwide survey in 1994, the National Aboriginal and Torres Strait Islander Survey (NATSIS), to collect social, demographic, health and economic information relating to indigenous peoples. Also in 1994, the Department of Human Services and Health undertook a survey of drug use among Aboriginal and Torres Strait Islander peoples as a part of the Commonwealth's response to the Royal Commission's recommendations.

A number of other initiatives have also occurred. The ABS plans to enhance the sample size of Aboriginal and Torres Strait Islander peoples in its 1995 National Health Survey (NHS) to 1,500 in order to generate a more reliable and comparative picture of the state of Aboriginal health. The National Health Information Plan, at present being developed by the AIHW on behalf of various stakeholders, also identifies improvements in health-related information for Aboriginal and Torres Strait Islander peoples as a priority.

The ABS has recently released the initial results of its 1994 survey of Aboriginal and Torres Strait Islander peoples (NATSIS). Final results from the 1994 survey of drug use among Aboriginal and Torres Strait Islander peoples, conducted by AGB McNair on behalf of the Department of Human Services and Health, are also likely to become available in June 1995. These surveys provide a stronger information base for developing Aboriginal health goals and targets and for measuring outcomes against the objectives, aspirations and needs of Aboriginal and Torres Strait Islander peoples.

It is important that a national process be initiated for Aboriginal health goals and targets in the context of the NAHS Working Party's holistic definition of health. Appropriate Aboriginal- and Torres Strait Islander-specific process and outcome indicators need to be developed urgently. Realistic and achievable goals and targets should be set in consultation with Aboriginal and Torres Strait Islander communities and their representatives, particularly the ATSIC and the National Aboriginal Community Controlled Health Organisation (NACCHO), as outlined in the recent Commonwealth Department of Human Services and Health's report on national goals, targets and strategies for better health outcomes into the next century. However, empowerment of Aboriginal and Torres Strait Islander peoples is a must for such a process to succeed.

This issue of the Bulletin includes an article by Pat Swan, Naomi Mayers and Beverley Raphael on health outcomes for indigenous peoples of Australia. Also included in this issue is my report on the Aboriginal and Torres Strait Islander health information issues

raised at the 1994 National Health Information Forum, and a paper on health indicators for Aboriginal and Torres Strait Islander peoples submitted by the AIHW to the NAHS Evaluation Committee last year.

Articles in this issue of the Bulletin include a review by Bart Currie on dog zoonoses and the role these organisms play in Aboriginal health. Andrew Howe deals with the important issue of censal and intercensal estimates of Aboriginal and Torres Strait Islander populations. A brief communication by Jean Turner on Aboriginal hospitalisation in the Illawarra area provides some insight into the extent of ill-health among indigenous peoples.

State and Territory governments have increased their efforts to provide information on the state of Aboriginal and Torres Strait Islander health. We have collated this information and summarised it in this issue of the Bulletin. Aboriginal and Torres Strait Islander health-related information has also been excerpted from various AIHW publications.

After four years of association with the bulletin as its assistant editor, Bruce English has taken up new responsibilities in the Institute. This issue is also the last for Sue Woodward who helped me in preparing and editing the new-look bulletin. My sincere thanks to both Bruce and Sue for their assistance and support during the transitional period.

Kuldeep Bhatia

Aboriginal and Torres Strait Islander health-related statistics

Highlights from Australian Institute of Health and Welfare publications

The Australian Institute of Health and Welfare and its external units regularly provide statistical updates on the health status of Australians. These reports also provide appropriate information on Aboriginal and Torres Strait Islander populations. To make this information more widely available to workers in the field, I have excerpted highlights from the recent publications of the Institute. Wherever possible, original summaries with slight modifications have been retained. All publications described below are available from Australian Government Publishing Service bookshops in all capital cities, except those marked with an asterisk, which are available at no cost from the Publications Officer, Australian Institute of Health and Welfare, GPO Box 570, ACT 2601.

Kuldeep Bhatia

An overview of Aboriginal and Torres Strait Islander health: present status and future trends

This report presents analysis of Aboriginal and Torres Strait Islander health-related data collections of the Australian Institute of Health and Welfare to 1992. Information derived from other data sources has also been used to generate a comprehensive picture of the health status of Aboriginal and Torres Strait Islander peoples.

According to the report, age-standardised death rates for Aboriginal males (combined data from New South Wales, Western Australia, South Australia and the Northern Territory) improved during 1985-1992 (from 1,592 deaths per 100,000 males in 1985-86 to 1,440 deaths per 100,000 males in 1991-92); however, no reduction in death rate among Aboriginal females was noted. Overall, the gap between Aboriginal and all Australian death rates was found to have widened in recent years, ostensibly due to faster reductions in the latter rate, although improvements in levels of identification of Aboriginal Australians may have contributed to this observation.

Continuing divergence of death rates has led to substantial differences in life expectancy, which for an Aboriginal boy born in the Northern Territory in 1992 was 18 years shorter than that for his non-Aboriginal counterpart. The gap was even wider for Aboriginal girls born in the Territory. Slightly lower, but nonetheless high, differentials in life expectancy were also noted for Aboriginal boys and girls born in Western Australia and South Australia when compared with life expectancies obtained for Australians as a whole.

The report dwells upon the growing impact of non-communicable diseases, particularly diabetes, on Aboriginal mortality and morbidity. With adult prevalence rates exceeding 30% in some communities and age-standardised mortality more than seven times that of

the non-Aboriginal rate, diabetes is being increasingly identified as a primary cause of death among Aboriginal males. (Its contribution rose from 1 out of 55 Aboriginal deaths in 1985–86 to 1 out of 35 deaths in 1991–92.) The proportion of diabetes as a primary cause of death increased among Aboriginal females as well although the proportional increase was much lower. Aboriginal cancer death rates also increased somewhat during 1985–92, particularly among females.

Aboriginal mortality from cardiovascular disease declined during 1985–92, offsetting increases in death rates contributed by diabetes. This contrast in diabetes and cardiovascular disease mortality trends is similar to that noted in the wider community. It is possible that changes in medical practice in relation to identification of diabetes as an underlying cause of death may have contributed to some of these countertrends.

Reduction in Aboriginal mortality from infectious and parasitic diseases was also noted, which for Aboriginal males declined by almost 58% between 1985–86 and 1991–92. However, a clear diminution in deaths from communicable diseases is not yet in sight. No decline in the death rate for these largely preventable diseases has been noted among Aboriginal females. Diseases such as pneumonia also keep accounting for a large number of deaths with no clear trend over time.

For Aboriginal males, the 1991–92 hospital admission rate in New South Wales and South Australia was found to be 60% higher than that expected from the indirectly age-standardised rate for non-Aboriginal males. The hospitalisation rate for Aboriginal and Torres Strait Islander females, which also included admissions for childbirth, was 50% higher than the corresponding rate for non-Aboriginal females.

The report also reviews available information on disability and handicap in Aboriginal people. A recent AIHW survey of Aboriginals in the Taree area of New South Wales found that one in four persons had one or more disabilities. Although the results from a localised survey cannot be generalised to the whole indigenous population, it suggests that levels of disability and handicap are likely to be substantially higher in Aboriginal and Torres Strait Islander communities than in the rest of the population.

Incomplete identification of indigenous peoples in health-related collections is one of the major concerns raised in the report. There is still substantial under-identification of births, deaths and hospitalisation of Aboriginal and Torres Strait Islander peoples, particularly in the eastern States, which compromises the quality of estimates generated for various health-related variables.

Public housing in Australia

The role of public housing and the provision of housing assistance generally have been of central importance to the welfare of Aboriginal and Torres Strait Islander peoples. This report details data available and presents analyses to inform community discussion and contribute to the development of policies aimed at assisting both Aboriginal and non-Aboriginal Australians who experience some form of housing disadvantage.

Since public housing is defined to include only self-contained dwellings that have been funded under the Commonwealth–State Housing Agreement (CSHA), it excludes dwellings that are provided to indigenous Australians through housing assistance programs administered by the Aboriginal and Torres Strait Islander Commission. However, an analysis of public housing provided under the Aboriginal Rental Housing Program—currently a tied program under the CSHA to acquire dwellings that are let to

Aboriginal and Torres Strait Islander peoples—is included in the report. Indigenous peoples can also rent dwellings acquired through untied funds so that CSHA assistance to this group is not limited to assistance provided through the Aboriginal Rental Housing Program.

In 1991–92, \$91 million, or 6.3% of all public housing funds, was allocated to the Aboriginal Rental Housing Program. Over the decade from 1982–83 funds allocated to the Aboriginal Rental Housing Program have increased by an annual average of 4.5%. As well, housing assistance for Aboriginal and Torres Strait Islander peoples is provided through a range of programs administered by the ATSIC. The Commission's community housing programs fund the acquisition of rental dwellings for Aboriginal and Torres Strait Islander peoples and its Home Ownership Program provides home loans to low-income earners.

Data about the characteristics of people housed through tied programs are very limited since reporting arrangements require only some data to be provided regarding the Aboriginal Rental Housing Program. It is possible to derive some information in relation to Aboriginal and Torres Strait Islander peoples living in public housing through the 1991 census. However, such an analysis would include all Aboriginal and Torres Strait Islander peoples rather than only those living in Aboriginal Rental Housing Program dwellings.

From services to outcomes: the Supported Accommodation Assistance Program in Victoria 1990–93

This report presents an analysis of data from the Supported Accommodation Assistance Program (SAAP) client database in Victoria for the period March 1990 to June 1993. An overview of SAAP-funded Victorian outlets participating in the various data collections is also provided along with a description of services offered and a profile of service users in the State. Specific findings relating to the Aboriginal and Torres Strait Islander service users are included.

The SAAP was established in 1985 to consolidate a number of Commonwealth, State and Territory government programs assisting homeless people and women and children escaping domestic violence. Funding is provided by the Commonwealth and State and Territory governments and the program is administered by State and Territory community services departments. Although the current agreement does not identify homeless Aboriginal and Torres Strait Islander peoples as specific target groups, they are recognised as populations with special needs. A number of culturally appropriate service outlets are now available to meet these needs.

The proportion of Aboriginal and Torres Strait Islander peoples accommodated through SAAP in Victoria has remained constant. In 1992–93, they constituted about 4% of all service users, approximately eight times their representation in the Victorian population. Females were two-thirds of Aboriginal and Torres Strait Islander service users in contrast to only one-half of non-Aboriginal service users. Aboriginal and Torres Strait Islander service users were also generally younger than non-Aboriginal clients; in comparison to 10% of non-Aboriginal service users aged over 44 years, only 4% of Aboriginal service users were over 44 years of age.

Indigenous service users were considerably more likely than non-Aboriginal service users to be accompanied by their children when seeking accommodation. Over one-third sought assistance on behalf of themselves and their child(ren). It is of note that there was also a

greater proportion of Aboriginal and Torres Strait Islander service users approaching SAAP directly from public housing or from some form of non-independent housing.

Aboriginal and Torres Strait Islander service users were less likely than other service users to be accommodated in transitional outlets but more than twice as likely to be accommodated in outlets targeting women escaping domestic violence. This was reflected in the reasons given for seeking assistance—Aboriginal and Torres Strait Islander service users were more likely (25%) than other service users (17%) to request SAAP accommodation due to conflict with an abusive partner. The type of assistance provided to Aboriginal and Torres Strait Islander service users did not, however, differ in any substantial way from that provided to non-Aboriginal clients.

Finally, the probability of Aboriginals and Torres Strait Islanders being turned away from generalist outlets was significantly higher in regions containing Aboriginal and Torres Strait Islander-specific assistance outlets (91%) than in regions without such outlets (66%).

Services for the homeless 1990–92: a statistical profile*

This report was prepared to inform the evaluation of the national Supported Accommodation Assistance Program (SAAP), a joint Commonwealth–State program that provides funding to community organisations and local governments to provide accommodation and related support services for homeless people and those in crisis—as well as for women escaping domestic violence. The report based on national data presents findings relating to the provision of services to homeless people between 1990 and 1992.

SAAP service users are overwhelmingly from an English-speaking background (almost 80%). Aboriginal and Torres Strait Islander clients represent some 8% of all clients—over four times their representation in the total population.

The Special Client One Night Census data indicate that Aboriginal and Torres Strait Islander clients received, on average, fewer services (4.5 services per person) than clients from non-English-speaking backgrounds (5.6 services per person) and clients from non-Aboriginal English-speaking backgrounds (5.0 services per person). However, Aboriginal and Torres Strait Islander peoples represented a greater proportion of people accommodated by SAAP outlets than the general community and were three times more likely to use services directed to women escaping domestic violence. They were also more likely than other SAAP service users to have accompanying children.

Publications referred to in this article

Bhatia K, Anderson P. *An Overview of Aboriginal and Torres Strait Islander Health: Present Status and Future Trends*. Canberra: Aboriginal and Torres Strait Islander Health Unit, Australian Institute of Health and Welfare, 1995

Foard G, Karmel R, Collett S, Bosworth E, Hulmes D. *Public Housing in Australia*. Canberra: Australian Institute of Health and Welfare, 1994

Merlo R, Foard G, Tregenza J, Collett S. *From Services to Outcomes: the Supported Accommodation Assistance Program in Victoria 1990–93*. Canberra: Australian Institute of Health and Welfare, 1994

Merlo R, Anderton N, Foard G, Cresswick G. *Services for the Homeless 1990–1992: A Statistical Profile*. Canberra: Australian Institute of Health and Welfare, 1994

Around the States and Territories: summaries of Aboriginal and Torres Strait Islander health statistics

A wide range of information on Aboriginal and Torres Strait Islander health is now available from the health authorities of the various States and Territories. To make this information available to Aboriginal health workers and researchers in the field, we have excerpted information from some recent publications. These summaries provide a composite picture of the state of Aboriginal and Torres Strait Islander health; no attempt has been made to synthesise this information to generate a national picture.

Sue Woodward and Kuldeep Bhatia

New South Wales

Westley-Wise V, Taylor L. *Health of Aboriginal Mothers and Babies in NSW*. New South Wales Public Health Bulletin, No. 5, 1994

This study presents analyses of data obtained from several sources including the NSW Midwives Data Collection, the NSW Inpatient Statistics Collection, the Registry of Births, Deaths and Marriages, notifications of maternal deaths to the NSW Health Department and the Australian Bureau of Statistics. Covering the period 1986 to 1991, the report profiles the health of Aboriginal mothers and babies in the State. According to the report:

Mothers

- Aboriginal women tend to be of higher parity than non-Aboriginal women: 5% of Aboriginal women giving birth had at least five previous pregnancies, compared with less than 1% of non-Aboriginal women.
- Aboriginal women are much more likely to be single mothers than non-Aboriginal women (56% compared with 11%), and tend to have fewer antenatal visits than non-Aboriginal women.
- Aboriginal women experienced higher rates of gestational diabetes (15.4 per 1,000 confinements, 1.4 times higher than for non-Aboriginal mothers), premature rupture of membranes (22.9 per 1,000 confinements, 1.5 times higher than non-Aboriginal mothers), and threatened premature labour (21.4 per 1,000 confinements, 1.5 times higher than non-Aboriginal mothers).
- The rate of major puerperal infection for Aboriginal women in 1989-91 was 11.8 per 1,000 confinements, which was nearly four times higher than the rate for non-Aboriginal women.
- The maternal mortality rate for Aboriginal women (1982-1990) was 47.3 per 100,000 births, some 5.8 times higher than the rate for non-Aboriginal women.

Babies

- Compared with other infants, Aboriginal infants were more likely to have spontaneous cephalic deliveries, and less likely to be delivered by forceps and elective caesarean sections.

- The perinatal mortality rate among Aboriginal infants during the period 1987–90 was 23.5 per 1,000 births, 1.9 times higher than that for non-Aboriginal births. No significant regional differences were noted in Aboriginal perinatal mortality rates.
- Extreme prematurity was the single most common cause of perinatal death for Aboriginal infants, accounting for 19% of perinatal deaths. For non-Aboriginal infants, extreme prematurity accounted for only 12% of perinatal deaths.
- Low birthweight was much more common among Aboriginal babies (1.8 times the rate among non-Aboriginal babies), with one in seven Aboriginal babies in this weight category dying during the perinatal period. Low gestational age was also found to be more common among Aboriginal than non-Aboriginal babies. The higher perinatal mortality rate among Aboriginal babies is in part the result of relatively high rates of low birthweight and low gestational age.

Fertility

- In 1991, the NSW Aboriginal crude birth rate was 20.2 live births per 1,000 population, 1.3 times higher than that of the non-Aboriginal population. The general fertility rate for Aboriginal women in 1986 was 84.2 live births per 1,000 women (aged 15–44 years), which was also 1.3 times higher than for non-Aboriginal women.

Pym M, Nguyen R, Taylor L, Delpech V. *New South Wales Midwives Data Collection 1993*. New South Wales Public Health Bulletin, No. 5 (Supplement 6), 1994

- In New South Wales, a total of 87,901 births to 86,746 mothers were reported in 1993; 1.7% of all confinements were to Aboriginal mothers. Aboriginal mothers tended to be younger than New South Wales mothers as a whole, and about one in five Aboriginal or Torres Strait Islander mothers was less than 20 years of age.
- Aboriginal mothers comprised more than 10% of all confinements in four districts: Orana (39.1%), Barwon (16.8%), Far West (12.7%) and Macquarie (11.1%).
- The proportion of low birthweight infants born to Aboriginal mothers was 10.5%, about two-thirds higher than the proportion among non-Aboriginal infants born in New South Wales.
- The rate of prematurity among Aboriginal babies was also high at 10.5%, compared with a rate for all New South Wales infants of 6.4%.
- The perinatal mortality rate of Aboriginal infants was 25.3 per 1,000 total births—about three times that of non-Aboriginal infants (8.6 per 1,000 total births).

Taylor L, Delpech V, Kemp T. *New South Wales Birth Defects Register: 1992 Report*. New South Wales Public Health Bulletin, No. 5 (Supplement 7), 1994

- In 1992, the New South Wales Birth Defects Register recorded 2,142 infants with birth defects, of whom 33 were born to Aboriginal mothers. This represents a rate of 23 birth defects per 1,000 Aboriginal infants, which was not statistically different from the rate of 24 per 1,000 total births in New South Wales as a whole.
- The proportion of Aboriginal infants reported with birth defects increased from 19 to 23 per 1,000 births in the two-year period 1990–91, in parallel with the overall trend in New South Wales. This increase is largely attributable to an improvement in the reporting of birth defects in the state in 1992.

Victoria

Perinatal Data Collection Unit. *Births in Victoria 1983-1992*. Fitzroy: The Consultative Council on Obstetric and Paediatric Mortality and Morbidity, 1994

This report, compiled by the staff of the Perinatal Data Collection Unit, presents aggregated statistics on key factors associated with Aboriginal mothers and infants for 1983-92:

- A total of 3,360 Aboriginal women gave birth during the ten-year period. The number of confinements of Aboriginal women rose from 296 per year (0.49% of all confinements) during the triennium 1983-85 to an average of 420 confinements per year (0.64% of all confinements) during 1990-92.
- Compared with non-Aboriginal mothers, a higher proportion of Aboriginal mothers were younger than 20 years of age (19.8% compared with 4.3%). The increasing proportion of non-Aboriginal women delaying the birth of their first child has widened the gap in the age-distributions of Aboriginal and non-Aboriginal women.
- A significant increase in the number of spontaneous deliveries was noted among Aboriginal mothers, with a corresponding decline in the rate of forceps delivery and elective caesarean, as well as emergency caesarean sections. In fact, the rate of assisted delivery was significantly higher among non-Aboriginal mothers.
- The proportion of low birthweight Aboriginal babies was found to be high in comparison to non-Aboriginal babies, and was statistically significant for those in the weight range 1,500-2,499 g. However, the proportion of very low birthweight babies was similar in both populations.
- In parallel with the pattern in other States and Territories, the report found a higher perinatal mortality rate among Aboriginal than non-Aboriginal births; however, this difference was not statistically significant. A relatively high stillbirths rate contributed to excess Aboriginal perinatal mortality; neonatal mortality was lower among Aboriginal than non-Aboriginal babies.

Queensland

Queensland Health, Epidemiology and Health Information Branch. *Causes of Excess Deaths in the Torres Strait*. Information Circular, No. 27, 1994

- The health status of Torres Strait Islanders, like Aboriginal Australians, is poor in comparison with other Australians. Their risk of premature death is about 2.5 times higher than the Queensland population as a whole. The risk is particularly high for Torres Strait Islander women, nearly three times that for other Queensland women.
- Although the death rate among Torres Strait Islanders is similar to that of Aboriginal Queenslanders, the patterns of illness contributing to their excess mortality differ somewhat. Diabetes is the largest single contributor to their increased mortality, followed by heart disease and stroke. Respiratory illnesses such as pneumonia and chronic diseases also contribute to excess mortality among Torres Strait Islanders.
- The neonatal mortality rate among Torres Strait Islander babies is twice as high as that among Aboriginal infants in Queensland, and four times higher than the rate for all Queenslanders. Pneumonia has been identified as one of the leading causes of neonatal deaths in the Torres Strait.

- No significant reduction in the rate of mortality has been noted for adult Torres Strait Islanders in the last 15 years. Their infant mortality rates also remain high.
- Any strategy aimed at reducing excess mortality among Torres Strait Islanders must focus on diabetes, respiratory and cardiovascular diseases. In addition, strategies to improve infrastructure and establish equitable funding, surveillance of the organisms involved in infections, assessment of the role of various vaccines, development of standard treatment approaches and anti-smoking programs are important to reduce excess mortality in the Torres Strait region.

Runciman C, Ring I. *The Health of Indigenous People in Queensland: Some Background Information*. Brisbane: Epidemiology and Health Information Branch, Queensland Health, 1994

This publication presents background information on the health of indigenous peoples of Queensland. Historical issues are discussed, and comparisons made between health policy and the health status of indigenous peoples in Queensland and those of New Zealand and the United States.

- The authors acknowledge that the intractable health problems of indigenous peoples in Queensland are the result of a history of race relations policies which promoted their geographical and social dislocation. The legacies of such policies continue to impact on the lives and health of indigenous peoples today.
- The authors identify two major differences between Queensland on the one hand, and New Zealand and the United States on the other, in relation to indigenous peoples. The first is the relative lack of access to health care services experienced by indigenous Queenslanders. The second is the existence of treaties in New Zealand and the United States, and the implications this has for self-determination and health. The authors suggest that these two differences are at least partly responsible for the poorer health outcomes experienced by indigenous peoples in Queensland, relative to New Zealand and the United States.
- The largely preventable excess deaths of indigenous peoples in Queensland result from circulatory and respiratory diseases, diabetes and injuries. The environmental conditions in indigenous communities in Queensland also contribute to the poor state of Aboriginal health.
- The authors recommend increased community control over decision-making processes, particularly those relating to the provision of health services to indigenous peoples. The model of community-controlled health services available in other parts of Australia is favoured.

Leonard D, Beilin R, Moran M. *Kai Kai Blo Umi: Our Food. A Report on the Food Supply to the People of the Torres Strait and Northern Peninsular Area*. Cairns: Tropical Public Health Unit, Queensland Health, 1994

This report identifies problems faced by the people of the Torres Strait Region in accessing a healthy food supply as a major cause of ill health.

- Several barriers to a healthy food supply, including the loss of traditional staples, and the high cost of fresh fruit and vegetables due to transport and handling costs, are identified. Australian quarantine regulations which restrict the movement of traditional foods, obstructing traditional exchange networks, are also considered to be a major problem.

- Recommendations for action are made, including measures to improve the availability and lower the cost of fresh fruit and vegetables, and to increase local production of food, including some traditional staples.

Western Australia

Swensen G, Unwin E. *A Study of Hospitalisation and Mortality due to Alcohol Use in the Kimberley Health Region of Western Australia 1988-1992*. Perth: Epidemiology and Health Statistics Section, Health Department of Western Australia, 1994

- Rates of hospitalisation for injuries attributable to alcohol are high in the Kimberley Health Region of Western Australia, particularly among its Aboriginal people. The aetiological fraction of alcohol was deemed to be responsible for the equivalent of 1,138 episodes with Aboriginal people constituting a large proportion (75.4%), in significant excess of their demographic representation in the region, with their age-standardised hospitalisation rate exceeding the non-Aboriginal rate more than three times.
- No significant difference in these alcohol-attributable injury-related hospitalisation was found between Aboriginal males and females; in comparison, the rate for non-Aboriginal males was almost three times higher than that for non-Aboriginal females.
- A significant increase in Aboriginal hospitalisation due to alcohol-attributed injuries occurred during 1988-92, most of it among Aboriginal females. No such trend was noted in the non-Aboriginal population.
- Hospitalisation for conditions fully attributable to alcohol had a slightly different sex distribution in the Kimberley Health region compared to other regions in Western Australia. Aboriginal males, like their non-Aboriginal counterparts were over-represented when compared with females in their respective population groups. Aboriginal sex-specific rates were considerably higher when compared with non-Aboriginal rates.
- Rates of hospitalisation for reasons fully attributable to alcohol increased for both male and female Aboriginals between 1989 and 1992. No such increase was noted among non-Aboriginal people.
- Four-fifths of fatal injuries attributable to alcohol were estimated to be among Aboriginal people. Road injuries, suicides and assaults were considered to be responsible for a majority of these deaths. No sex ratio differences were found between Aboriginal and non-Aboriginal peoples.
- Twenty-four out of 29 deaths fully attributable to alcohol were of Aboriginal persons. Aboriginal females comprised a third of all such deaths. All five non-Aboriginal deaths due to alcohol were of males.

Gee V. *Perinatal Statistics in Western Australia: Eleventh Annual Report of the Western Australian Midwives' Notification System 1993*. Perth: Health Department of Western Australia, 1994

- Aboriginal women comprised 5.7% of all confinements (n=24,916) in Western Australia in 1993. Of these Aboriginal mothers, 27.7% were teenagers, compared with 4.8% of Caucasian mothers.

- Aboriginal mothers on average had a much higher parity. The proportion of nulliparous Caucasian women (39.3%) was higher than that for Aboriginal women (28.8%). Aboriginal women having their fifth or more child were much higher in proportion than their non-Aboriginal counterparts (8.5% compared with 1.1%).
- Babies of Aboriginal mothers fared considerably worse than babies of non-Aboriginal women. There were considerable racial differences in stillbirth and infant mortality rates.
- The proportion of low birthweight Aboriginal babies (12.4%) was more than double that among non-Aboriginal babies (5.8%). Very low birthweight babies similarly comprised a much higher proportion of Aboriginal babies.
- The Aboriginal perinatal mortality in 1993 was 13.2 per 1,000 births, compared with 7.0 per 1,000 non-Aboriginal births. Their neonatal mortality rate in 1993 (4.9 per 1,000 live births) was similarly more than two times the non-Aboriginal rate of 2.3 per 1,000 live births.
- The total fertility rate of Aboriginal women (125.7 per 1,000) was more than double that of non-Aboriginal women (62.1 per 1,000). The rate was particularly high in the 15 to 19 year age group (164.0 per 1,000), some eight times the rate for non-Aboriginal women (18.5 per 1,000). For those in the 20–34 year age group, the rate for Aboriginal women (151.3 per 1000) was far greater than that for non-Aboriginal women (102.2 per 1000).
- Fertility rates for Aboriginal women declined from 139.2 per 1,000 in 1984 to 125.7 per 1,000 in 1993. In comparison, fertility rates for non-Aboriginal women declined from 67.4 per 1,000 to 62.1 per 1,000 during the same period.

FitzGerald P, Thomson N, Thompson J. *Cancer in Western Australia, 1991. Health Statistics, Western Australia, No. 5, 1994*

- Analysis of cancer statistics from Western Australia for the period 1987–91 revealed a lower incidence (age-standardised) among Aboriginal people when compared with non-Aboriginal people. The incidence is particularly low among Aboriginal males with the age-standardised incidence rates higher among Aboriginal females than males (250 per 100,000 persons compared with 216 per 100,000 persons). This contrasts with the non-Aboriginal situation, where the age-standardised incidence rate is much higher among males than females (290 compared with 236 per 100,000 persons).
- Age-standardised death rates (ASDRs) from cancer were similar among Aboriginal (153 deaths per 100,000 persons) and non-Aboriginal males (154 deaths per 100,000 persons), but higher among Aboriginal (132 deaths per 100,000 persons) than non-Aboriginal females (100 deaths per 100,000 persons). The excess mortality among Aboriginal females was due largely to deaths from cancer of the cervix.
- Among Aboriginal people, the most common causes of death were lung cancer for males (57 deaths per 100,000 persons; ASDR for non-Aboriginal males: 43 deaths per 100,000 persons) and cancer of the cervix for females (24 deaths per 100,000 persons; ASDR for non-Aboriginal females: 3.4 per 100,000 persons).
- Differences in rates between Aboriginal and non-Aboriginal peoples should be treated with caution, as the small number of Aboriginal cases usually means that differences are not statistically significant.

Unwin E, Thomson N, FitzGerald P. *Aboriginal Health—Current Status, Trends and Projections*. Health Statistics, Western Australia, No. 4, 1994

This report summarises the current health status of Aboriginal people in Western Australia using indicators such as mortality, fertility, birthweight and hospitalisation, and makes projections to the year 2000 on the basis of trends noted for these indicators.

Mortality

- There has been no significant change in age-standardised death rates (ADRs) for Aboriginal people in Western Australia in the last decade. While rates for Aboriginal males declined slightly, the Aboriginal female ADR actually increased during the period 1983–85 to 1989–91. ADRs for Aboriginal males and females were 1,596 and 1,198 per 100,000 persons respectively in 1989–91. Aboriginal ADRs are projected to decline slightly by the year 2000, but will remain much higher than non-Aboriginal rates.
- No clear trend was apparent in Aboriginal infant mortality although the 1990 infant mortality rate was one-third less than the 1983 figure (16.3 infant deaths per 1,000 live births in 1990 compared with 24.7 infant deaths per 1,000 live births in 1983). However, even at the 1990 levels, the Aboriginal infant mortality rate was much higher than the non-Aboriginal rate which in 1990 was 6.1 infant deaths per 1,000 live births.

Fertility

- The fertility rate of Aboriginal women has declined steadily over the past decade, but is still significantly higher than that for non-Aboriginal women. The rate is projected to be more than twice that of non-Aboriginal women in the year 2000.

Birthweight

- The proportion of low birthweight babies born to Aboriginal women remained above 10% in Western Australia throughout the decade 1982–1992, almost twice the proportion seen among non-Aboriginal newborns. In the absence of any systematic improvement, the proportion of low birthweight Aboriginal babies is likely to remain at least 70% higher than the proportion among non-Aboriginal babies by the year 2000.

Hospitalisation

- The Aboriginal all-cause crude hospitalisation rate was more than two and a half times the non-Aboriginal rate during 1983–1991. The rate was much higher among Aboriginal females than Aboriginal males, partly due to hospitalisation for confinements, and has shown some decline between 1983–1985 and 1989–1991. No significant change in crude hospitalisation rates was noted for non-Aboriginal people in Western Australia during this period.

South Australia

Maternal, Perinatal and Infant Mortality Committee. *Maternal, Perinatal and Infant Mortality in South Australia 1993*. Adelaide: South Australian Health Commission, 1994

- In 1993, one of the three maternal deaths in South Australia directly attributable to complications associated with pregnancy was that of an Aboriginal woman.

- Both the Aboriginal perinatal mortality (32.5 per 1,000 births) and Aboriginal post-neonatal mortality (7.6 per 1,000 live births) rates were more than three and four times higher than the respective death rates among non-Aboriginal births and live births.
- The neonatal mortality rate among Aboriginal babies (17.7 per 1,000 live births) contributed significantly to the much higher Aboriginal infant mortality rate of 25.4 per 1,000 live births, with a mortality ratio of 4.7 when compared with non-Aboriginal babies. One of the four cases of sudden infant death syndrome (SIDS) in the State in 1993 was also found to be Aboriginal.

Chan A, Scott J, McCaul K, Keane R. *Pregnancy Outcome in South Australia 1993*. Adelaide: Pregnancy Outcome Unit, South Australian Health Commission, 1994

- Aboriginal women comprised 2.0% of the 19,681 confinements in South Australia during 1993, compared with their representation of less than 1.3% of the State's female population in the age range 15–44 years. Although the proportion of women giving birth who were Aboriginal rose from 1.4% in 1983 to the present figure, the proportion has been relatively stable over the last six years.
- Twenty-six per cent of Aboriginal women who gave birth in 1993 (compared with 5.6% of all new mothers in the State) were teenagers. Less than one in four Aboriginal women were primigravida in comparison to almost 31.9% of Caucasian women and 35.5% Asian women. High parity (4 or more previous births) was significantly more common among Aboriginal (13.1%) than among Caucasian women (2.8%).
- More than 30% of Aboriginal women who gave birth in 1993 had limited antenatal care (less than 7 visits), compared with 7% of Caucasian and 9% of Asian women in the State. Most of the Aboriginal mothers (54%) gave birth in a country hospital.
- A perinatal mortality rate of 32.5 per 1,000 Aboriginal births was noted, more than three times higher than that for non-Aboriginal infants (9.2 per 1,000 Caucasian births). The proportion of neonatal deaths was particularly high among Aboriginal perinatal deaths.

Priest K, Roder D, Esterman A. *South Australian Health Statistics Chartbook: 1993 Edition*. Adelaide: South Australian Health Commission, 1993

This chartbook provides assessments of recent health trends in the population of South Australia. The charts presented also provide a picture of the state of Aboriginal and Torres Strait Islander health when compared with the non-Aboriginal population of the State.

Life expectancy

- During the period 1988–91, Aboriginal residents of Adelaide had a life expectancy at birth 10 to 14 years lower than that of all South Australians. Life expectancy at birth for Aboriginal residents of country areas was 10 years lower again (that is, 20 to 24 years shorter than that of all South Australians).

Causes of death

- Compared with cancer, cardiovascular disease, external injuries, complications of pregnancy and respiratory diseases as the major causes of death—in descending order—among non-Aboriginal South Australians during 1987–90, Aboriginal deaths occurred more often from cardiovascular disease, external injuries, respiratory diseases, cancer and endocrine disorders, arranged in order of their proportional contribution to overall mortality.

Hospital admissions

- Compared with the causes of hospital admission for non-Aboriginal people, hospital admissions for Aboriginal residents during July 1988 to December 1990 were relatively high for injuries and poisoning, respiratory diseases, mental disorders, circulatory diseases, skin and subcutaneous diseases, infectious diseases and endocrinal and nutritional disorders

Cancers

- Compared with the distribution of cancers by type among non-Aboriginal South Australians, Aboriginal residents were diagnosed during 1977–1990 with a proportional excess of lung, liver, cervical, gall bladder, stomach, pancreatic and pharyngeal cancers. On the other hand, Aboriginal residents were diagnosed with relatively few cancers of the colon or rectum, skin and prostate, as well as cancer of the female breast.

Perinatal mortality

- Perinatal risk factors and indicators more common among babies of Aboriginal mothers in South Australia included low birthweight, prematurity, low five-minute Apgar score, and prolonged time to establish regular breathing.
- Babies of Aboriginal mothers had a much higher perinatal death rate in 1987–91, particularly when the mothers were residents of country regions.
- Fertility rates were much higher among Aboriginal than non-Aboriginal women. Aboriginal mothers were more likely to be multipara (at least three previous pregnancies) than their non-Aboriginal counterparts; they were also less likely to access full antenatal care than non-Aboriginal mothers.

Northern Territory

McComb J, Condon J, Woods M. *Northern Territory Perinatal Collection Statistical Report 1992*. Darwin: Epidemiology and Statistics Branch, Northern Territory Department of Health and Community Services, 1994

Mothers

- Aboriginal women accounted for 34.9% of 3,586 mothers who gave birth in the Northern Territory in 1992, but comprised only 24.0% of women aged 15–44 years. Aboriginal mothers were comparatively young, with almost two-thirds of Aboriginal mothers less than 25 years of age, compared with one-third of non-Aboriginal mothers (65.3% compared with 30.0%).
- No difference was found in the proportion of normal and assisted deliveries in Aboriginal and non-Aboriginal mothers despite the differences in age-distributions. However, a much higher proportion of Aboriginal mothers delivered by emergency Caesarean section.

Babies

- Aboriginal babies comprised 34.4% of all live births in the Territory (1,239 of 3,599 total live births). They also comprised over half the total number of stillbirths (52.2%).

- Regional variation in Aboriginal crude birth rates and stillbirths was noted. The Alice Spring/Barkly region had the lowest stillbirth rate, but the highest Aboriginal crude birth rate.
- The average birthweight of Aboriginal babies was significantly lower than that of non-Aboriginal babies (3,035 g compared with 3,287 g). The proportion of low birthweight Aboriginal babies (less than 2,500 g) was almost twice that among non-Aboriginal babies (15.8% compared with 7.5%); this ratio was three times in babies weighing less than 2,000 g.
- Significant inter-regional variation was noted in the proportion of low birthweight Aboriginal babies. With almost 20% of babies in the East Arnhem region low birthweight, the proportion was twice the rate among Aboriginal babies born in the Alice Spring/Barkly region.
- The proportions of Aboriginal babies among neonatal and post-neonatal deaths in the Territory, 53.1% and 88.0% respectively, were disproportionately high. There has been little change in the Aboriginal infant mortality rate in the Northern Territory since 1987, which appears to have stabilised at about four times the non-Aboriginal rate (29.2 compared with 7.7 per 1,000 live births).
- Regional differences were noted in Aboriginal stillbirths and infant mortality rates. The East Arnhem region had the highest stillbirth and neonatal death rates. In comparison, the rate of post-neonatal deaths among Aboriginal babies of the Darwin region was more than four times that of the Katherine region.
- Congenital anomalies accounted for a similar proportion of perinatal deaths among Aboriginal and non-Aboriginal babies (24%). However, most of the deaths due to congenital malformations among Aboriginal babies resulted from central nervous system abnormalities (7 out of 9) in comparison to none (out of a total of 8 deaths) in non-Aboriginal babies.

The 1994 National Health Information Forum: Aboriginal and Torres Strait Islander health-related issues

Kuldeep Bhatia*

Australian Institute of Health and Welfare, Canberra

The 1994 National Health Information Forum was held at Old Parliament House in Canberra on 23 and 24 November, to assist the Australian Institute of Health and Welfare to develop a National Health Information Development Plan. It is expected that the forum's recommendations will help set priorities for improving national health-related information and data collection, as well as their use in Australia, over the next 5 to 10 years.

Prior to the forum, written submissions were invited from the general public and key stakeholders on health information requirements, the suitability and adequacy of information available, and the need for new collections. Comments on the establishment of appropriate mechanisms and procedures for the dissemination of health-related information were also sought. Consultation workshops were held in July 1994 in State capitals and Canberra with officials of health departments and representatives of non-government organisations. Input received at these workshops was combined with materials from written submissions into a package of options for consideration at the forum.

The forum was attended by some 160 invited participants from a wide range of backgrounds, including representatives from all Australian health authorities, non-government organisations, health consumer organisations, and the private sector. Academics and other experts in the field of health policy and information also participated in its deliberations. Issues discussed at the forum were organised into nine groups to achieve coherent, focused discussions on issues raised in pre-forum consultations.

The focus of the group on priority populations, chaired by Dr Ian Ring of Queensland Health, included determining the health information requirements of Aboriginal and Torres Strait Islander peoples. The group accepted that Torres Strait Islanders should be distinguished from Aboriginals in all health-related data collections and proposed to the general assembly of the forum the following strategic directions:

- to improve the Aboriginal and Torres Strait Islander health information base and its use in consultation with indigenous peoples;
- to improve the identification of Aboriginal and Torres Strait Islander peoples, in State, Territory and national health data collections, by developing and implementing practicable as well as reliable methods of identification;
- to improve the accuracy and completeness of identification of Aboriginal and Torres Strait Islander peoples in primary health care information systems;
- to improve methods for accurately estimating health parameters for Aboriginal and Torres Strait Islander peoples in population surveys;

* Address for correspondence: Kuldeep Bhatia, Aboriginal and Torres Strait Islander Health Unit, Australian Institute of Health and Welfare, GPO Box 570, Canberra, ACT 2601.

- to involve Aboriginal and Torres Strait Islander peoples in all decision-making processes about the development and use of health information;
- to establish disease-specific registers, particularly for diseases affecting Aboriginal and Torres Strait Islander peoples disproportionately; and
- to include information about Aboriginal and Torres Strait Islander populations in any national system for electronic dissemination and access to health information.

In addition to strategic directions recommended by the Working Group on Priority Populations, a number of other groups discussed Aboriginal- and Torres Strait Islander-specific issues. In particular, the group dealing with inequalities in the health system recommended that information be developed on the aspirations of Aboriginal and Torres Strait Islander peoples in relation to their health. The forum as a whole endorsed the improvement of Aboriginal and Torres Strait Islander health-related information as a major priority over the next 5–10 years.

A report on the proceedings of the forum, published by the Australian Institute of Health and Welfare, is available by writing to:

The Publications Officer,
Australian Institute of Health and Welfare,
GPO Box 570,
Canberra ACT 2601.

Review article

Dogs and human health in Aboriginal communities—how important are zoonoses?

Bart Currie*

Menzies School of Health Research and Royal Darwin Hospital, Darwin

Introduction

Since the mid 1980s various Aboriginal communities in central and northern Australia have had dog health programs involving combinations of sterilisation and contraception, and treatment of dogs with the anti-parasitic agents avermectin/ivermectin, either orally or injected. The protocols for the programs have been diverse and often ad hoc, with funding coming sometimes externally and sometimes from within the community. Motivation for the programs has also sometimes been external and sometimes community-based. Results have been variable, with only some communities sustaining ongoing programs. In others the programs have petered out fairly quickly. While in some situations there has actually been an increase in dog populations with an attempted dog program, there is now emerging evidence that the health of dogs in communities where there is a well run program is significantly improved. Ivermectin is active against both blood-sucking arthropods (exoparasites) and intestinal nematodes (VanReken and Pearson 1990), and the most evident improvement is in dog scabies or mange. Prospective studies in the Kimberley showed a decrease in intestinal parasites of the dogs, although such parasites are usually not eradicated.

There have been anecdotal reports of improvements in human health in communities where dog programs are underway. However, to date there is no scientifically valid published data that documents an improvement in human health as a result of dog programs in Aboriginal communities. This is obviously a critical question as a major justification for funding for dog health programs, in addition to the important area of animal welfare, is the purported benefit for human health.

Perceived benefits to human health from dog programs could be due to:

- (a) a decrease of zoonotic disease due to a decrease in dog infections and carriage of organisms;
- (b) parallel environmental interventions in communities decreasing the community burden of infectious organisms independent of any zoonotic role of dog infections. Environmental interventions are fundamental to breaking the well-known cycle of human-to-human transmission of infection;

* Address for correspondence: Bart Currie, Menzies School of Health Research, PO Box 41096, Casuarina, NT 0811.

- (c) communities motivated to initiate a dog health program being at the same time similarly motivated to improve specific child health programs, such as treatment protocols for diarrhoeal disease, skin disease and respiratory infections, and to improve environmental parameters such as sanitation and water supply; or
- (d) seasonal factors and other longitudinal factors for change.

Any analysis of the impact of dog health programs on human health needs to take into consideration all of these factors. The critical question is how much of the burden of infections and malnutrition in Aboriginal children is attributable to dog-human interactions in comparison with human-human interactions. Is it 5% or is it 90%? The purpose of this paper is to look at established zoonoses from dogs, discuss the potential burden of speculative zoonoses, and to contrast these with the known burden of human-to-human transmitted infectious diseases in Aboriginal communities.

Epidemiology of transmission

Pathogens for human-to-human and dog-to-human transmission include bacteria, viruses, mycoses and parasites including protozoa, helminths and ectoparasites (Cook 1989; Baxter and Leck 1984). Transmission for gastrointestinal infection is often faecal-oral (dog or human) via contamination of food, water, hands, utensils or through eating soil (pica) (Feachem 1984). Flies may well also have an important role in faecal-oral transmission for certain bacteria (Benenson 1990). Some gastrointestinal parasites such as hookworms and strongyloides are transmitted from stool (eggs or larvae) to soil to skin (via infective larvae). Cutaneous bacteria are transmitted from skin to skin and also possibly by flies (Allen and Taplin 1974). Some viruses and filarial parasites are transmitted via mosquitoes. For both skin disease and diarrhoeal disease it is well recognised from studies earlier this century and from more recent work in disadvantaged communities overseas that the most important factors for transmission are household overcrowding, sanitation and water supply (Feachem 1984). With as many as 20 or more people per household in Aboriginal communities and with often poorly maintained sanitation, the international experience tells us that human-to-human transmission of infectious diseases will be enormous. The undefined parameter in Aboriginal communities is the added burden because of the presence of many dogs per household.

Human gastrointestinal infections

Table 1 lists the most important human gastrointestinal parasites in tropical Australia and their recognised association with disease. Of these parasites, *Strongyloides stercoralis*, *Giardia duodenalis* and *Cryptosporidium* spp. have possible zoonotic implications and are discussed below. Over the last decade there has been a wealth of publications focusing on the importance of human gastrointestinal parasites as a cause of malnutrition and poor growth (Bundy et al. 1990; Stephenson et al. 1989; Warren 1993). While the association of anaemia with human hookworms has been recognised for most of this century, the importance also of *Trichuris trichiura* as a cause of anaemia, poor growth and cognitive deficit has recently been elucidated (Cooper and Bundy 1988; Cooper et al. 1990). *Trichuris trichiura* is now the commonest parasite found in stools in the 'Top End' of the Northern Territory and it is also widespread in North Queensland (Fisher et al. 1993).

Table 1: Human intestinal parasites in tropical Australia

Organism			
Biological name	Common name	Distribution	Disease
Worms (helminths)			
<i>Ancylostoma duodenale</i>	hookworms	north>south	anaemia growth ↓
<i>Necator americanus</i>			
<i>Trichuris trichiura</i>	whipworm	north>south Qld, NT>WA	diarrhoea rectal prolapse growth ↓
<i>Strongyloides stercoralis</i>	strongyloides	variable	autoinfection: • larva currens • dissemination intestinal obstruction
<i>Enterobius vermicularis</i>	threadworm	universal	anal itch
<i>Ascaris lumbricoides</i>	roundworm	Qld, not NT, WA	intestinal obstruction growth ↓
<i>Hymenolepis nana</i>	dwarf tapeworm	universal	diarrhoea with heavy infection
Protozoa			
<i>Giardia duodenalis</i>		? universal	diarrhoea growth ↓
<i>Cryptosporidium</i> spp.		variable	diarrhoea growth ↓

Important international studies have shown that routine deworming with single dose albendazole, a broad spectrum antihelmintic, improves growth, nutrition and physical fitness of children in disadvantaged communities with a burden of intestinal parasites (Bundy et al. 1990; Stephenson et al. 1989; Warren 1993). Such targeted chemotherapy for humans is now recommended by the World Health Organisation and other agencies (Warren 1993) as an essential component of primary health care in appropriate areas, which most definitely would include northern Australia.

Table 2 lists important bacteria and viruses associated with diarrhoeal disease in humans in tropical Australia. Of these *Campylobacter jejuni* and salmonellosis are recognised as possible zoonoses from dogs, although other animal sources, contaminated food and water and direct human-to-human spread are thought to predominate (Cook 1989; Baxter and Leck 1984). It was estimated in one study in the United Kingdom that campylobacter infection was due to zoonotic disease from dogs in 5% of cases, and salmonellosis may be zoonotic from dogs in 1% of cases (Baxter and Leck 1984). Given the number of dogs in Aboriginal communities it is possible that these percentages might be higher. Of note is the recognition in Aboriginal children of bacteraemic infection with *Campylobacter upsaliensis*, a species associated with zoonotic infection from dogs (Hanna et al. 1994). One study from the Kimberley showed carriage of *Campylobacter jejuni* in humans without evident diarrhoeal disease (Gunzburg et al. 1992). Isolation of salmonella species from dog stools

has been attributed in part to the dogs eating human stools infected with salmonella (Baxter and Leck 1984). The role of dogs in transmission back to humans remains generally speculative (Fisher et al. 1993) and given the standards of hygiene and levels of crowding that exist in communities the well known transmission of salmonella directly and indirectly between humans is to be expected.

Table 2: Bacterial and viral human gastrointestinal pathogens in tropical Australia

<i>Escherichia coli</i>
<i>Campylobacter</i> spp.
<i>Salmonella</i> spp.
<i>Shigella</i> spp.
Rotaviruses

Escherichia coli transmission occurs through contamination of food and water and human-to-human contact (Benenson 1990). Studies from the Kimberley show the presence of a range of *E. coli*, including enterotoxigenic (ETEC), enteropathogenic (EPEC), enterohaemorrhagic (EHEC) and enteroaggregative (EAaggEC) strains (Gunzburg et al. 1992, 1993). The epidemiology of *E. coli* in tropical Australia requires much more work, but at this stage there is, as in the rest of Australia, no evidence of *E. coli* being an important zoonotic disease from dogs. It is recognised that ETEC strains are largely species-specific (Benenson 1990).

Shigellosis and rotavirus infections are well recognised to be transmitted directly and indirectly from human to human and there is no established link to zoonotic disease from dogs (Cook 1989; Benenson 1990; Stevenson and Hughes 1988). One outbreak of calicivirus-associated gastroenteritis in the UK was considered to be from an infected dog, but generally viral gastrointestinal infections have not been linked to dogs (Humphrey et al. 1984).

Intestinal parasites of dogs

Table 3 lists various intestinal parasites of dogs in tropical Australia which have zoonotic potential. A number of other parasites also occur which will not be discussed and these include *Sarcocystis* spp., *Spirometra erinacei*, *Isospora* spp. and *Gnathostoma spinergum* (Stevenson and Hughes 1988; Meloni et al. 1993). In addition *Hymenolepis* spp. have been found in a few dog stools in the Kimberley and *Hymenolepis nana* is common throughout tropical Australia in human stools, although it is generally considered to be mostly associated with asymptomatic carriage, except with heavy infections (Stevenson and Hughes 1988; Meloni et al. 1993; Stuart 1990). *Entamoeba coli* is seen in human stools and occasionally in dog stools but is generally not considered an important pathogen (Meloni et al. 1993).

Table 3: *Intestinal parasites of dogs with zoonotic potential in tropical Australia*

<i>Giardia duodenalis</i>
<i>Strongyloides stercoralis</i>
<i>Cryptosporidium</i> spp.
<i>Toxocara canis</i>
<i>Ancylostoma caninum</i>
<i>Ancylostoma braziliense</i>
<i>Trichuris vulpis</i>

Giardia duodenalis is the commonest parasite isolated from human stools in Australia (Meloni et al. 1993). In a recent publication from the Kimberley it was present in 32% of stools from children and 12.5% of stools from adults (Meloni et al. 1993). The species is also well recognised in dogs, being present in 21% of dogs in Perth and 17% of dogs in the Kimberley (Stevenson and Hughes 1988; Meloni et al. 1993). In many of the studies in Aboriginal communities, giardia has been mainly associated with asymptomatic carriage (Gunzburg et al. 1992), but its role in causing acute diarrhoea is also recognised. Experimental work has shown that cysts and trophozoites from humans can be transmitted to dogs experimentally, and there is growing epidemiological data to support the potential significance of wild and domestic animals as reservoirs for giardia (Schantz 1991). It remains to be ascertained whether there are host specificities with regards to sub-species of *Giardia duodenalis* (Cook 1989; Stevenson and Hughes 1988; Shantz 1991) and major molecular epidemiological studies underway at Murdoch University, Western Australia will hopefully answer this question. As with other organisms, the important point to be answered is what percentage of infections in humans from giardia is acquired from other humans and what percentage of giardia is from dogs.

Strongyloides stercoralis is only occasionally found in dogs in tropical Australia (Meloni et al. 1993), but there is a report from 1974 of transmission of *S. stercoralis* from dogs in a colony to their human handler (Georgi and Spinkle 1974). However, apart from this episode there is little evidence that dogs are important in the cycle of strongyloides, particularly where human infection is relatively common such as in tropical areas (Fisher et al. 1993; Meloni et al. 1993). Once again molecular epidemiology may help answer the question of subspecies and host specificity.

Cryptosporidium spp. are occasionally found in dog stools, especially puppies (Stevenson and Hughes 1988). It is a well recognised zoonosis from cattle, in particular via contaminated food and milk. Human-to-human transmission is also important and contaminated water supplies have been described (Schantz 1991). Reports of daycare centre outbreaks and multiple family infections, together with household epidemiology studies suggest that the main source of transmission is person-to-person (Current 1994). Cryptosporidiosis is increasingly recognised as an important cause of diarrhoea in young children, including sporadically in tropical Australia (Gunzburg et al. 1992).

Toxocara canis, the dog roundworm, causes visceral larva migrans, probably the most well recognised zoonosis from dogs after hydatid disease (Cook 1989; Schantz 1991). *T. canis* was present in 70–80% of dogs in North Queensland in the 1970's (Welch and Freeman

1978) but is apparently now less common. It has also been less common in the Northern Territory and Western Australia (Meloni et al. 1993; Welch and Freeman 1978), but it is recognised that puppies are more likely to be infected than adults (Stevenson and Hughes 1988). In the last five years there has been only one documented human case of this well-described zoonotic disease in the Top End of the Northern Territory.

Ancylostoma caninum and *Ancylostoma braziliense*, the dog and dog/cat hookworms, are well known causes of the zoonotic disease cutaneous larva migrans (Stevenson and Hughes 1988). *A. braziliense* is commoner in cats than dogs in the tropics, but is still found in dogs in tropical regions and in particular in North Queensland (Stevenson and Hughes 1988). *A. caninum* is present in 50–100% of dogs in tropical areas and has been found as far south as Victoria in smaller percentages (Stevenson and Hughes 1988; Meloni et al. 1993). In the Top End of the Northern Territory several cases of cutaneous larva migrans are seen each year in non-Aboriginal people. Consultation with colleagues suggests such cases are not generally evident in Aboriginal communities in the Northern Territory. However, it should be noted that cutaneous lesions from *A. caninum* larvae are generally less dramatic than those of the less common *A. braziliense*. In addition, cutaneous larval migration involving *Strongyloides stercoralis* larvae (larva currens) is likely to occur in Aboriginal communities.

A. caninum has recently been associated with eosinophilic enteritis in Caucasians living in Townsville and other parts of North Queensland (Prociv and Croese 1990). We have also identified similar presentations in non-Aboriginals in the Top End of the Northern Territory (Currie and Anstey 1991), but despite surveillance we have not been able to attribute any similar clinical disease to *A. caninum* in Aboriginals. More work is needed to characterise the pathology caused by migrating parasite larvae in Aboriginal communities, including any role in facilitating bacterial skin and blood sepsis.

Trichuris vulpis, the dog whipworm, has occasionally caused disease in humans overseas but no case has ever been recognised in Australia (Stevenson and Hughes 1988). It is of no significance when compared to the enormous rates of exposure to and infection with the human equivalent, *Trichuris trichiura* (Fisher et al. 1993).

Summary of gastrointestinal pathogens

With all the important human gastrointestinal pathogens mentioned the role of human to human spread and of infection from contaminated food and water is well established. On the other hand, the role of zoonotic infection from dogs is only adequately documented for campylobacter and probably for salmonella to a lesser extent. Cryptosporidiosis and giardiasis are important areas for continuing work and it may well be that giardiasis is a major zoonosis. Shigellosis and infections with *E. coli* and rotavirus, which are so important in Aboriginal communities, do not appear to relate to dogs and reflect as elsewhere the interactions between humans.

Action of ivermectin

Ivermectin/avermectin is antiparasitic and not specifically antibacterial (VanReken and Pearson 1990). Of the dog intestinal parasites mentioned it is active against *Strongyloides stercoralis*, *Trichuris vulpis* and to a lesser extent the dog hookworms. In human studies ivermectin has not eradicated hookworms (Whitworth et al. 1991), and of interest is that in the Kimberley studies dog hookworm numbers are decreased with therapy but certainly not eradicated. Protozoan parasites such as giardia are also not specifically affected by

ivermectin. Therefore there appears to be little specific implication for human intestinal pathogens in treating dogs with ivermectin. However, it must be stated that the general improvement in dog health which is documented with ivermectin may lead to some non-specific benefits. Dogs are often asymptomatic carriers and shedders of bacteria, viruses and parasites, and with stress there is not only clinical illness but also an increase in shedding (Stevenson and Hughes 1988). In addition in puppies there is generally more illness and shedding (Stevenson and Hughes 1988). It is therefore possible that with the improved health of dogs from ivermectin, and with a decreased number of puppies because of the sterilisation program, there would be less shedding of bacteria and viruses which have zoonotic potential. As noted above, this is probably going to be most important for campylobacter, maybe salmonella, and possibly cryptosporidium and giardia. This is obviously an important area for study in any prospective trials.

Skin disease

Host specificity is not absolute for the scabies mite, *Sarcoptes scabiei* (Arlian et al. 1984). The dog scabies, *Sarcoptes scabiei* var *canis* can reside on humans and lead to local irritation, and therefore secondary infection subsequent to scratching (Smith and Claypoole 1967). Replication of the dog variant in human skin is thought to be unusual (Cook 1989). It is important to recognise that the streptococcal bacterium causing infections in damaged skin in humans is the human-specific bacterium *Streptococcus pyogenes* (group A streptococcus) (Allen and Taplin 1974). Group A streptococcus is unusual in dogs, but both group C and group G streptococci are common in dogs (Biberstein et al. 1980). Group C and group G streptococci are occasionally responsible for human post-streptococcal glomerulonephritis subsequent to skin infections, but by far the predominant organism remains group A streptococcus (Benenson 1990). Therefore when scabies becomes secondarily infected in humans, irrespective of the source of the scabies, the infection is due to human-associated bacteria. The important question is how much of this infection is initiated by the human scabies variant (*Sarcoptes scabiei* var *hominis*) in comparison with the dog variant. In situations of high endemicity for scabies, such as in many Aboriginal communities in northern Australia, the human scabies variant predominates as it does everywhere else in the world. This is evident by the transmission dynamics and also by the frequent presence of burrows. However, it is important to document the proportion of illness caused by dog scabies variants residing on human skin. Treating dogs with ivermectin will improve or cure the scabies in dogs, but will not prevent the mini-epidemics of human scabies that are occurring all the time throughout tropical Australia.

Skin irritation in humans can also occur from free-living mites resident on dogs, *Cheyletiella* spp., and from bites of dog fleas *Ctenocephalides canis* (Cook 1989).

Other potential zoonoses

The dog lung worm, *Dirofilaria immitis*, is present in up to 100% of dogs in tropical Australia, and has extended as far south as Melbourne (Stevenson and Hughes 1988). It is a well recognised cause of pulmonary nodules in humans, but cases are very rare and we have not had a diagnosed case in an Aboriginal person in the Northern Territory in the last 5 years. Despite this, serology in humans suggests exposure to this mosquito-born filarial parasite, with seroprevalences as high as 50% in past studies from Aboriginal communities (Welch and Freeman 1978). Ivermectin is the drug of choice for control of this parasite in dogs.

Some species of leptospirosis are recognised to be occasionally transmitted by dogs (Cook 1989; Baxter and Leck 1984). This is particularly important for *L. canicola*, which however has apparently not been found to date in Australian dogs (Stevenson and Hughes 1988). Leptospirosis is usually acquired from contact with contaminated urine from rodents or hosts such as cattle or swine.

Ehrlichia canis has not yet been demonstrated in Australia, but the possibility of *Ehrlichia* spp., new rickettsiae and new spirochaetes as causes of fevers of unknown origin in tropical Australia needs further investigation. *Borrelia* spp. have been found in dogs in the United States, but the link between dogs, humans and Lyme disease has not to date been established (Cook 1989). *Brucella canis* is an uncommon cause of disease in humans in the USA and has not been recognised in Australia (Stevenson and Hughes 1988).

The extent of zoonotic dermatomycosis from *Microsporum canis* in Aboriginal communities needs elucidation, although it appears to be a less common cause of tinea capitis and tinea corporis than in non-tropical Caucasian communities (Stevenson and Hughes 1988). The anthropophilic *Trichophyton rubrum* predominates in Aboriginal communities in the north (Stevenson and Hughes 1988).

Treatment priorities for child health in Aboriginal communities

In contrast to the uncertainties regarding zoonotic disease from dogs in Aboriginal communities, the international literature clearly documents a number of important priorities for child health. One such priority is age-targeted community based deworming with a drug such as albendazole (Bundy et al. 1990; Stephenson et al. 1989; Warren 1993). Given the presence of known important parasitic human pathogens in Aboriginal communities the results expected based on the overseas studies would be improved growth, nutrition, cognitive function and fitness in children in addition to a substantial decrease of their intestinal parasites. Recent work from Murdoch University showing that albendazole also has activity against giardia is very exciting and strengthens the importance of focussing on child health (Reynoldson et al. 1992). For various commercial reasons albendazole has not as yet been marketed for general use within Australia, although it was approved for general use in 1994. This very much reflects the disadvantages for Aboriginal communities in gaining access to appropriate resources. The drug regulation system in Australia is geared for an affluent society and requires a willing pharmaceutical company to sponsor a drug, usually based on that drug being a commercially viable proposition. The market in tropical Australia has been seen to be too small, despite the fact that albendazole has been successful for some years in much of the tropical world.

A second specific intervention which has been very successful overseas has been the use of 5% permethrin cream in community-based scabies programs (Taplin et al. 1991). It has been well documented that intermittent therapy for scabies does not eradicate established infection within a community and is certainly not cost effective in the longer term (Taplin et al. 1991). Five per cent permethrin cream is less irritant than the current standard therapy of benzylbenzoate and is less toxic than the older therapy with the organochlorine lindane (gamma benzene hexachloride). The Food and Drug Administration approved 5% permethrin for use in the United States in September 1989, and the slow process in Australia has once again been to the great disadvantage of people in Aboriginal communities. With the licensing and marketing of 5% permethrin in Australia in 1994,

community-based interventions are currently being implemented in the Northern Territory (Currie et al. 1994).

A third priority for child health is the availability and application of penicillin protocols for the treatment of skin sores (Antibiotic Guidelines Sub-Committee 1992-93). The skin sores are often associated with scabies (Taplin et al. 1991) and the response to penicillin, usually given intramuscularly, is almost invariably excellent.

A fourth priority is the broader focus on sanitation, water supply and housing which is so evidently fundamental to control of all the diseases being discussed (Feachem 1984).

Studying dog health programs

Given the lack of data regarding the human health impact of dog programs and given the funding implications of implementing such programs it is critical that objective assessments be made. Ideally a longitudinal study would need:

- (i) control communities without interventions;
- (ii) a cross-over design if possible;
- (iii) to recognise seasonal factors in implementation and assessment;
- (iv) to factor for confounding interventions, such as environmental manipulation and child health interventions; and
- (v) objective measures on both dogs and humans including stool and blood tests.

Conclusions

- There is a lack of objective data on the magnitude of the contribution of dogs to human infections and malnutrition in Aboriginal communities.
- Conversely, there can be no doubt about the role of human-to-human transmission of pathogens and about the potential benefits of child health programs based on the wealth of documented international and local experience.
- A review of the literature and local experience in tropical Australia shows there is little clinical evidence in Aboriginal communities of the classical dog zoonoses hydatid disease, visceral larva migrans, cutaneous larva migrans and disease from *Dirofilaria immitis*.
- Transmission from dogs to humans of *Campylobacter* spp., *Salmonella* spp., *Cryptosporidium* spp. and *Sarcoptes scabiei* var *canis* probably occurs to some degree, and *Giardia duodenalis* may yet prove to be an important zoonosis.
- Given the above, child health programs should take priority. This includes community-based routine deworming and scabies programs, and also resources for sanitation, water supply, housing and education.
- Financial constraints in public health and competition for resources justify concerns that dog health programs are not implemented at the expense of child health programs and not used as an excuse to neglect consideration of health hardware infrastructure such as housing, sanitation and water supply.
- With the above considerations in mind, dog programs in parallel to child health and environmental programs may then provide additional benefits to humans as well as the obvious benefits to dogs.

References

- Allen AM, Taplin D. Skin infections in eastern Panama. Survey of two representative communities. *Am J Trop Med Hyg* 23: 950-956, 1974
- Antibiotic Guidelines Sub-Committee. Central and Northern Australia and other remote areas. In: *Antibiotic Guidelines*. Victorian Medical Postgraduate Foundation, 1992-93, pp. 156-183.
- Arlian LG, Runyan RA, Estes SA. Cross infectivity of *Sarcoptes scabiei*. *J Am Acad Dermatol* 10: 979-986, 1984
- Baxter DN, Leck I. The deleterious effects of dogs on human health. 2. Canine zoonoses. *Community Med* 6: 185-197, 1984
- Benenson AS. *Control of Communicable Diseases in Man*. Washington, DC: American Public Health Association, 1990
- Biberstein EL, Brown C, Smith T. Serogroups and biogroups among beta-hemolytic streptococci of canine origin. *J Clin Microbiol* 11: 558-561, 1980
- Bundy DAP, Wong MS, Lewis LL, Horton J. Control of geohelminths by delivery of targeted chemotherapy through schools. *Trans R Soc Trop Med Hyg* 84: 115-120, 1990
- Cook GC. Canine-associated zoonoses: an unacceptable hazard to human health. *Q J Med* 70: 5-26, 1989
- Cooper ES, Bundy DAP. *Trichuris* is not trivial. *Parasitology Today* 4: 301-306, 1988
- Cooper ES, Bundy DAP, MacDonald TT, Golden MHN. Growth suppression in the *Trichuris* dysentery syndrome. *Eur J Clin Nutr* 44: 138-147, 1990
- Current WL. *Cryptosporidium parvum*: household transmission. *Ann Intern Med* 120: 518-519, 1994
- Currie B, Anstey N. Eosinophilic enteritis in the Northern Territory. *Med J Aust* 154: 71, 1991
- Currie BJ, Connors CM, Krause VL. Scabies programs in Aboriginal communities. *Med J Aust* 161: 636-637, 1994
- Feachem RG. Interventions for the control of diarrhoeal diseases among young children: promotion of personal and domestic hygiene. *Bull WHO* 62: 467-476, 1984
- Fisher D, McCarry F, Currie B. Strongyloidiasis in the Northern Territory. Under-recognised and under-treated? *Med J Aust* 159: 88-90, 1993.
- Georgi JR, Spinkle CL. A case of human strongyloidosis apparently contracted from asymptomatic colony dogs. *Am J Trop Med Hyg* 23: 899-901, 1974
- Gunzburg S, Gracey M, Burke V, Chang B. Epidemiology and microbiology of diarrhoea in young Aboriginal children in the Kimberley region of Western Australia. *Epidemiol Infect* 108: 67-76, 1992
- Gunzburg ST, Chang BJ, Elliott SJ, Burke V, Gracey M. Diffuse and enteroaggregative patterns of adherence of enteric *Escherichia coli* isolated from Aboriginal children from the Kimberley region of Western Australia. *J Infect Dis* 167: 755-758, 1993
- Hanna JN, Enbom RM, Murphy DM. *Campylobacter upsaliensis* bacteraemia in an Aboriginal child. *Med J Aust* 160: 655-656, 1994

- Humphrey TJ, Cruickshank JG, Cubitt WD. An outbreak of calicivirus associated gastroenteritis in an elderly persons' home: a possible zoonosis? *J Hyg* 92: 293-299, 1984
- Meloni BP, Thompson RCA, Hopkins RM, Reynoldson JA, Gracey M. The prevalence of *Giardia* and other intestinal parasites in children, dogs and cats from Aboriginal communities in the Kimberley. *Med J Aust* 158: 157-159, 1993
- Prociv P, Croese J. Human eosinophilic enteritis caused by dog hookworm *Ancylostoma caninum*. *Lancet* 335: 1299-1302, 1990
- Reynoldson JA, Thompson RCA, Horton RJ. Albendazole as a future anti-giardial agent. *Parasitology Today* 8: 412-414, 1992
- Schantz PM. Parasitic zoonoses in perspective. *Int J Parasitol* 21: 161-170, 1991
- Smith EB, Claypoole TF. Canine scabies in dogs and in humans. *JAMA* 199: 95-100, 1967
- Stephenson LS, Latham MC, Kurz KM, Kinoti SN, Brigham H. Treatment with a single dose of albendazole improves growth of Kenyan schoolchildren with hookworm, *Trichuris trichiura* and *Ascaris lumbricoides* infections. *Am J Trop Med Hyg* 41: 78-87, 1989
- Stevenson WJ, Hughes KL. *Synopsis of Zoonoses in Australia*. Canberra: AGPS, 1988
- Stuart J. A review of helminth infestations in Aboriginal children. *Aboriginal Health Information Bulletin* 13: 33-38, 1990
- Taplin D, Porcelain SA, Meinking TL, Athey RL, Chen JA, Castillero PM, Sanchez R. Community control of scabies: a model based on use of permethrin cream. *Lancet* 337: 1016-1018, 1991
- VanReken DE, Pearson RD. Antiparasitic agents. In: *Principles and Practice of Infectious Diseases*, edited by GL Mandell, RG Douglas and JE Bennett. New York: Churchill Livingstone, 1990, p. 400
- Warren KS. For the new millenium: control of helminth diseases throughout the world. *Med J Aust* 159: 461-463, 1993
- Welch JS, Freeman C. Parasitology. *Queensland Institute of Medical Research Annual Report* 33: 22-27, 1978
- Whitworth JAG, Morgan D, Maude GH, McNicholas AM, Taylor DW. A field study of the effect of ivermectin on intestinal helminths in man. *Trans R Soc Trop Med Hyg* 85: 232-234, 1991

Original articles

Aboriginal health outcomes[†]

Patricia Swan,* Naomi Mayers and Beverley Raphael

Aboriginal Medical Service Co-operative, Redfern, and Department of Psychiatry,
University of Queensland

Any delineation of Aboriginal health outcomes must take into account the great inadequacy of our current knowledge and the fact that where data do exist, they give clear evidence of the impact of continuing disadvantage on health status.

A recent report on Australia's health (Australian Institute of Health and Welfare 1994) has provided some of the current data on general health and noted some levels of improvement in infant mortality, life expectancy and lower burden of infective and parasitic diseases. But rates of hospitalisation and all health outcomes remain of major concern as they exceed the corresponding rates for Australians generally to a significant degree. The standardised mortality ratio for Aboriginal males is 2.8, and for Aboriginal females 3.3. The death rates among Aboriginals show patterns of age and sex specific mortality which differ from the general population: for instance, between 55 to 74 years the mortality rate for Aboriginal women is equal to that for Aboriginal men, whereas in the general population female mortality at this age is close to half that of males. Expectation of life at birth remains much lower for Aboriginal people, with that for a newborn Aboriginal boy 18.2 years shorter than for non-Aboriginal, and 19.8 years shorter for an Aboriginal girl. This lower life expectancy continues throughout life with expectation in adult life being much lower than for non-Aboriginal people.

Perinatal mortality remains significantly higher than for the general population with rates in the Northern Territory and South Australia being more than three times the general population rate in 1991. Similarly while Aboriginal infant mortality has improved significantly, rates are still much higher than the general population, being more than three times the rates in the Northern Territory and South Australia.

Another area where rates remain high is in the area of maternal mortality. Despite major achievement in this area for the population generally, a significant percentage of the deaths that do occur are among Aboriginal women.

Morbidity

Morbidity patterns among Aboriginal people also reflect the impact of both disadvantage and colonisation. Deaths are accounted for by ischaemic heart disease, cerebrovascular

[†] Reproduced from the *Health Outcomes Bulletin* with the authors' permission.

* Address for correspondence: Patricia Swan, Aboriginal Medical Service Co-operative Ltd., 36 Turner Street, Redfern, NSW 2016.

disease, injury and poisoning. Respiratory illness, diabetes, infections and parasitic diseases are more frequent and contribute significantly to morbidity and mortality among Aboriginal people. Higher hospitalisation rates for males (71% higher) and females (57% higher) show further impact of poorer health outcomes.

Disability studies are few and the 1988 Survey of Disabled and Aged Persons (Australian Bureau of Statistics 1990) did not provide separate data for Aboriginal people. The available data from a survey in one NSW community shows one in four Aboriginal people had a disability, and Aboriginal people were 70% more likely to be handicapped (Thomson and Snow 1994). Loss of sight and hearing, asthma, delays of learning and development, heart disease, and diseases of the musculoskeletal system were frequent. Chronic otitis media among children and adults is one very significant area of disability leading to other health and social problems.

Risk factors

Again data are limited because Aboriginals are under-represented in large population studies. Where data exist they point to higher rates of smoking, high blood cholesterol, high diastolic blood pressure, obesity and harmful drinking levels.

In considering health outcomes for Aboriginal people it is critical that there are data which allow comparisons with other population groups and mechanisms to elucidate the source of adverse health outcomes such as those described above. Clearly current data are inadequate. This may relate in some instances to issues such as the failure to identify Aboriginal people in national surveys, or to sampling in ways which do not access the contribution of Aboriginal people. Issues of self-determination are crucial, and the development of Aboriginal Community Controlled Health Organisations and Medical Services is increasingly providing an excellent source of care for health problems identified by Aboriginal people, in ways which not only fulfil health needs but also meet cultural norms. Data exist with respect to health and health outcomes through these services but its aggregation and analysis in terms of health outcomes is a matter for these organisations to determine. Resources would need to be made available for such data to be accessed. Sensitivity also exists with respect to both the publication of data and its potential for use in negative ways, and as well to racism and its implications.

Recent considerations of health outcome instruments (UK Clearing House for Health Outcomes 1994) have discussed classes of measure to be considered for multi-dimensional health profiles. These include mortality, complications and service morbidity, disease specific measures (e.g. syndromes and symptoms), measures of service use, health-related behaviours, impact of illness measures such as functional capacity and health-related quality of life. All of these measures are definitely relevant, but as indicated above data are neither representative nor adequate. Further issues also arise in accessing many Aboriginal populations in rural and remote communities, and identifying the health problems they face.

Critical to any consideration of health outcomes is the recognition of cultural views of health and its meaning. If there are differing views, Aboriginal people generally come together to form some sort of consensus about health issues. For instance, Aboriginal people place a very strong emphasis on an holistic view of health, where spiritual, physical and mental issues are interrelated, and where the centrality of issues such as land and spirituality to well-being is acknowledged. Delineation of any outcome indicator for health would have to encompass this holistic approach. Neither a symptom count, nor a

delineation of the degree of disability, would be adequate to address impairments and handicaps faced by Aboriginal people if there were no measure or recognition of the impact of social disintegration and hopelessness on some assessment of spiritual well-being. This type of measure is not readily available in contemporary Western health outcome records.

Significant delineation of health outcomes in the field of mental health has also been problematic. Indeed, there are no valid and adequate measures of health, especially mental health and well-being, for Western health outcome studies, let alone those sensitive to the cultural issues. For instance, there have been high hospitalisation rates for psychiatric disorders. Yet it has only been in the most recent period that mental health has been identified as an issue of priority by Aboriginal people themselves as stigma, incarceration and failure of cultural understanding made them naturally hesitant to acknowledge problems in this area. Nor have mental health systems been attuned to the special needs of Aboriginal people until recent times.

No understanding of mental health outcomes could take place without a recognition of the impact of trauma and loss for Aboriginal people (Swan 1988). This loss has undoubtedly impacted on physical as well as mental health, yet there are no surveys identifying this risk factor in the community as a whole. Studies in one health service (McKendrick et al. 1992) showed that this risk factor was a key variable contributing to the high levels of psychiatric disorders found in its clients, with a very high frequency of depression.

In suggesting appropriate health outcomes for mental health, Jenkins (1990) delineates mortality and morbidity indicators, but highlights the need for questions to be focused to matters that may lead to effective intervention. She asks questions concerning specific psychiatric disorders, such as: can the incidence of the disorder be reduced? can relapse and readmission rates be reduced? can total disability be reduced? is there avoidable mortality? In terms of each of these issues she delineates input, process and outcome indicators. This work contains matters of importance for all mental health outcome assessment including matters of relevance for Aboriginal people. But there is also a need to encompass broader and culturally relevant issues such as the patterns of morbidity and disability that affect Aboriginal people in terms of their mental health, and the risk factors associated with them.

Overriding all consideration of health outcomes for Aboriginal people must be a recognition of the effects of colonisation, racism and disadvantage in terms of poor housing, financial problems, unemployment, and lack of access to resources. And health outcomes must be conceptualised in terms of cultural issues as well as an understanding of the impact of history.

Thus in addition to traditional measures of mortality and morbidity, which can only be interpreted with a recognition of the limitations of the data for Aboriginal people, it is necessary that risk indicators, well-being indicators and quality-of-life measures be evolved. Such measures could be developed by Aboriginal people in formats that reflect their cultural needs and understanding, with the consultative approach that is central to their way of life. These indicators should encompass as a minimum:

- mortality as outcome and its causes;
- health care utilisation: any such delineation should involve the views of the National Aboriginal Community Controlled Health Organisation (NACCHO) membership and the data frameworks they have evolved;

- disability measures which include aspects of disability relevant to groups in different settings as well as global measures, for instance impacting on capacity to participate in prescribed cultural practices;
- quality-of-life measures which reflect the views of Aboriginal people as to this dimension, and the contributing components of it—with particular reference to matters such as social group, land, spirituality and family; and
- risk factors: measures need to be sensitive and specific to the impact of disadvantage generally. However, specific risk factors for ill health need to include not only matters such as smoking and heavy alcohol intake, but also levels of exposure to loss and trauma, land and people, effects of stigma and racism, and other relevant variables.

Finally the holistic understandings of health, while difficult to define, are central. Any measure of outcome for Aboriginal people must ultimately reflect the integration of body, land and spirit.

References

- Australian Bureau of Statistics. *Disability and Handicap, Australia 1988*. Canberra: Australian Bureau of Statistics, 1990
- Australian Institute of Health and Welfare. *Australia's Health 1994*. Canberra: Australian Government Publishing Service, 1994
- Jenkins R. Towards a system of outcome indicators for mental health care. *Br J Psychiatry* 157: 500–514, 1990
- McKendrick J, Cutter T, MacKenzie A, Chiu E. The pattern of psychiatric morbidity in a Victorian urban Aboriginal general practice population. *Aust N Z J Psychiatry* 26: 40–47, 1992
- Thomson N, Snow C. *Disability and Handicap Among Aborigines of the Taree Area of New South Wales*. Australian Institute of Health and Welfare: Aboriginal and Torres Strait Islander Health Series, No. 9. Canberra: Australian Government Publishing Service, 1994
- Swan P. *200 Years of Unfinished Business*. Paper presented to the National Conference, Status of the Nation, Sydney, 1988
- UK Clearing House for Health Outcomes. The potential contribution of multidimensional health profiles. *Health Outcomes* 2: 2–7, 1994

Estimating the Aboriginal and Torres Strait Islander population 1986-1991: States/Territories and Australia

Andrew Howe*

Demography Section, Australian Bureau of Statistics, Canberra

Summary

This paper provides an overview of the procedures used for obtaining intercensal and census year estimates of the Aboriginal and Torres Strait Islander population for the period 1986-91. The methods used include adjustments for no response to Aboriginality identifier during the 1986 and 1991 censuses, age misstatement, young adult male undercounts and census undercounts. Incompleteness of and inaccuracies inherent in Aboriginal births and deaths registration as well as migration were taken into account. Experimental estimates of Aboriginal and Torres Strait Islander peoples by State or Territory and total Australia, and the adjustments made to arrive upon these figures, are provided.

Introduction

Aboriginal and Torres Strait Islander population counts have been available from the 1991 Census of Population and Housing for more than three years now, but no attempt had been made to compile reliable estimates of the indigenous population. The Australian Bureau of Statistics (ABS) has recently developed a method to estimate numbers of small, identifiable populations (Benham and Howe 1994). This paper presents an overview of the application of this method to estimate the Aboriginal and Torres Strait population figures released recently by the ABS (1994).

Method for estimating the census date indigenous populations

The generation of population estimates requires a reliable base population. An evaluation of the quality of both the 1986 and 1991 census counts for the indigenous population (Benham 1993) revealed substantial deficiencies, affecting both the level of completeness of enumeration and age profiles. Adjustments to the census counts were therefore considered necessary to produce more reliable estimates of the indigenous population.

Adjustment for 'Aboriginality not stated'

The first stage of the adjustment process dealt with those persons for whom there was no response to the Aboriginal or Torres Strait Islander origin question. Considering that some of these persons were actually of Aboriginal or Torres Strait Islander origin, a proportion of non-responses were allocated to being of indigenous origin. This was done on the basis of the ratio of the indigenous to the total stated response population.

* Address for correspondence: Andrew Howe, Demography Section, Australian Bureau of Statistics, PO Box 10, Belconnen, ACT 2616.

Adjustment for age misstatement

Adjustment was also made to correct for errors in age reporting. Some age misstatement occurred in both the 1986 and 1991 censuses. To remove the distorting effects of age misstatement, a three-term moving average was applied to the single year numbers to bring age structures in line with expected distributions. This adjustment resulted in smoother age distributions.

Adjustment for young adult male undercount

Another set of adjustments involved correcting for undercount of young indigenous men. It is widely recognised that young adult males, both Aboriginal and non-Aboriginal, are significantly underenumerated in major statistical collections including the census. Some evidence of this phenomenon was found when the 1986 and 1991 census Aboriginal sex ratios were compared. It is assumed that low sex ratios were due to male undercount rather than female overcount, because overcounting in the census is unlikely. Population counts for age groups where the sex ratio was substantially lower than that expected were adjusted to accord with expected sex ratios derived from model indigenous populations (Gray and Tesfaghiorghis 1993).

Adjustment for census undercount

The final adjustment was to adjust both male and female numbers by the female age-specific net census undercount rates for each State or Territory. These rates were derived from the 1991 Census Post Enumeration Survey (PES) for the total female population. Table 1 compares the 1991 census counts with the experimental estimates after these adjustments, while Table 2 shows each adjustment's effect on the experimental estimates.

Table 1: Distribution of the Aboriginal and Torres Strait Islander population, census and experimental estimates by State/Territory^(a), 6 August 1991

State/Territory	Census		Experimental estimates	
	Count	Per cent of total indigenous	Estimate	Per cent of total indigenous
New South Wales	69,993	26.4	75,204	26.5
Victoria	16,701	6.3	17,929	6.3
Queensland	70,002	26.4	74,391	26.2
South Australia	16,227	6.1	17,282	6.1
Western Australia	41,844	15.8	44,191	15.6
Tasmania	8,912	3.4	9,484	3.3
Northern Territory	39,857	15.0	43,347	15.3
Australian Capital Territory	1,583	0.6	1,616	0.6
Australia ^(b)	265,459 ^(c)	100.0	283,631	100.0

(a) State/Territory of usual residence; (b) includes Jervis Bay Territory; (c) includes those who stated their usual residence at the time of the census as overseas.

A larger-than-expected increase in the census counts occurred between 1986 and 1991, which could not be wholly accounted for by natural increase (births minus deaths). It appears that the propensity for people to identify themselves as being of indigenous origin increased between the two censuses. The 1991 Census counts reflect more accurately the current level of identification. Indigenous population estimates for 30 June 1986 are therefore based on the 1991 Census arrived back from the 1991 adjusted Census counts [Table 1].

Table 2: Adjustments made to Census counts to obtain experimental estimates, by sex and State/Territory, Aboriginal and Torres Strait Islander population, 6 August 1991

Adjustment stage	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
Males									
Census count	34,627	8,225	34,742	7,919	20,888	4,496	19,606	784	131,390
Adjustment for:									
not stated & age misreporting	1,126	266	1,125	193	545	127	862	17	4,266
young male undercount	1,281	268	974	433	459	137	735	0	4,288
census undercount	682	145	587	100	392	63	673	3	2,656
Total adjustment	3,089	679	2,686	726	1,396	327	2,270	20	11,210
Experimental estimate	37,716	8,904	37,428	8,645	22,284	4,823	21,876	804	142,600
Per cent increase	9.5	9.3	7.6	9.2	7.0	7.9	11.1	2.6	8.7
Females									
Census count	35,366	8,476	35,330	8,308	20,956	4,416	20,251	799	133,981
Adjustment for:									
not stated & age misreporting	1,094	274	1,067	196	497	119	710	10	3,977
young male undercount	na	na	na	na	na	na	na	na	na
census undercount	663	140	585	96	380	57	665	3	2,596
Total adjustment	1,757	414	1,652	292	877	176	1,375	13	6,573
Experimental estimate	37,123	8,890	36,982	8,600	21,833	4,592	21,626	812	140,554
Per cent increase	5.4	5.4	4.7	3.7	4.2	4.9	6.5	1.6	6.8
Persons									
Census count	69,993	16,701	70,072	16,227	41,844	8,912	39,857	1,583	265,371
Adjustment for:									
not stated & age misreporting	2,219	540	2,192	389	1,042	246	1,571	27	8,243
young male undercount	1,282	268	974	433	459	137	735	0	4,281
census undercount	1,345	285	1,172	196	772	120	1,339	6	5,251
Total adjustment	4,846	1,093	4,338	1,018	2,273	503	3,645	33	17,783
Experimental estimate	74,839	17,794	74,410	17,245	44,117	9,415	43,502	1,616	283,154
Per cent increase	7.4	7.4	6.2	6.5	5.6	6.4	8.8	2.1	6.8

Intercensal estimates

Births component

The principal source of births information for ABS population estimates are the birth registration systems in the various States. Although the quality of birth registrations for the total population is quite reliable, birth registration data for indigenous persons remains patchy, both in terms of coverage and internal consistency. Aboriginal and Torres Strait Islander births are currently identified on official birth notification forms in all States except Queensland. Only Victoria, South Australia and the Northern Territory have continuous information on births of indigenous persons from 1986 to 1991. And of these, only South Australia and the Northern Territory have good-quality (over 90% complete) birth registration data for this period. Western Australia has good-quality births data for this period from the Western Australia Midwives' Notification System. Registered indigenous births data has been available in New South Wales and Western Australia since 1992, in Tasmania since 1991, and in the ACT since 1990.

Estimates of fertility of the indigenous population are also available from the 1991 census, based on the own-child method of fertility estimation (Dugbaza 1994). However, the accuracy of the own-child estimates is likely to be affected by deficiencies in the census counts.

A more general problem with estimating fertility is that in considering only indigenous women and their children, a significant proportion of births of indigenous persons occur in cases where the father is an indigenous person and the mother non-indigenous. This reinforces the need for good quality birth registration data.

Given these deficiencies in indigenous fertility data, estimates of indigenous births for the inter-censal period were derived using life table survival techniques. The indigenous population estimates of persons aged 5, 4, 3, 2 and 1 years as at 30 June 1991 were survived back to produce estimates of the number of persons aged less than 1 year old in each inter-censal year 1986 to 1990.

Deaths component

There is considerable variation from State to State in the quality of data on Aboriginal and Torres Strait Islander deaths as collected by the State and Territory Registrars. While the available data show broad correspondence in the patterns of registered deaths, there are substantial differences in age-specific death rates between the States.

The quality of Aboriginal and Torres Strait Islander death registration was evaluated by the ABS (Benham 1993) using a procedure developed by Preston and Hill (1980). The results of this analysis of 1986 to 1991 registration data which measures the relative completeness of the number of intercensal deaths are shown in Table 3.

Table 3: Relative completeness of 1986 to 1991 death registration data, Aboriginal and Torres Strait Islander population

State/Territory (a)	Males	Females
New South Wales	0.61	0.55
Victoria	0.51	0.35
South Australia	0.64	0.76
Western Australia	0.93	0.91
Northern Territory	0.91	0.90

(a) No death registration data are available for Queensland, Tasmania and the Australian Capital Territory.

For the current series of estimates, life tables generated for the period 1981 to 1986 (Gray 1990) and 1986 to 1991 (Gray and Tesfaghiorghis 1993) were used as a basis for determining intercensal deaths for 1986 to 1991. These life tables were derived using methods of functional analysis, which are described in Preston and Hill (1980) and Luther and Retherford (1988).

In order to estimate intercensal deaths, the mid points of the two periods (1983–84 and 1988–89) were established, and the average annual rates of change calculated between these two points. These rates of change were then applied to the 1988–89 death rates to obtain death rates for the two previous financial years (1987–88 and 1986–87) and the two subsequent financial years (1989–90 and 1990–91).

Interstate and overseas migration components

The only consistent source of information on Aboriginal and Torres Strait Islander interstate migration is from the five-yearly census. There have been few studies undertaken on interstate migration of indigenous Australians. Analyses have been made by the Commonwealth Bureau of Census and Statistics (1973), Smith (1980) and Gray (1989). The latter two studies found that the volume and the rate of interstate migration of the indigenous populations has been increasing, although from a very low base and quite slowly.

Table 4 shows the level of interstate migration of the indigenous populations from 1986 to 1991 as recorded by the 1991 census. Net interstate migration flows over this five year period were generally very small, and were much smaller on a one-yearly basis. Overseas migration was even less significant. According to the 1991 census the in-migration rate of the indigenous population for the period 1986 to 1991 was 0.1 per 1,000. Therefore, for the purpose of calculating inter-censal estimates, it was concluded that migration was not a significant factor in influencing the size of the indigenous populations, with all net migration flows for the indigenous populations for the period 1986 to 1991 assumed to be zero.

Outstanding quality issues

While the ABS believes that such corrections have resulted in a consistent and reliable series of estimates, potential anomalies exist which we were not able to account for in the compilation procedures. The first of these concerns the unexpected high number of

persons who stated they were of Torres Strait Islander descent on the census form in States such as Tasmania. It appears that some degree of misidentification, as reported in ABS (1989), may be continuing.

Table 4: Interstate movement of the indigenous populations^(a) 1986 to 1991

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Total departures ^(b)
NSW	—	445	1,065	145	151	68	133	182	2,196
Vic	538	—	336	120	99	140	108	35	1,376
Qld	1,535	344	—	176	228	111	530	85	3,009
SA	222	146	213	—	210	25	343	18	1,177
WA	230	121	227	170	—	37	399	14	1,198
Tas	89	140	85	22	36	—	12	3	387
NT	132	80	572	291	384	15	—	11	1,485
ACT	357	31	119	8	23	9	48	—	569
Total arrivals^(b)	3,103	1,307	2,617	932	1,131	405	1,573	348	11,423

(a) Excludes persons aged 0–4 in 1991, persons who did not state their State of usual residence in 1986 and persons overseas at the time of the 1991 census; (b) Includes Jervis Bay Territory.

Another potential anomaly likely to affect census counts relates to possible changes in the propensity of an individual to identify as an indigenous Australian. Evidence for this is provided by comparing responses given at the census with those given at the PES, conducted three weeks after the census. Table 5 shows considerable discrepancy in responses to the Aboriginal/Torres Strait Islander question between the 1991 census and the PES. The count of Aboriginal and Torres Strait Islander persons was 1.6% lower in the 1991 PES than the 1991 census. This contrasts with results from the 1986 PES, where the number of persons identified as being of Aboriginal or Torres Strait Islander origin was 10.6% higher in the PES than the census. This could indicate that, in 1986, people of indigenous origin were less likely to identify themselves as such in the census (ABS 1993).

Table 5: Responses to the Aboriginal/Torres Strait Islander origin question in the census and PES, 1991

PES response	Census response			Total
	Non-indigenous	Aboriginal	Torres Strait Islander	
Non-indigenous	63,888	134	58	64,080
Aboriginal	157	809	15	981
Torres Strait Islander	17	4	76	97
Total	64,062	947	149	65,158

Analysts such as Gray and Tesfaghiorghis (1991) have asserted that the level of changing identification is unlikely to be substantial, although no hard evidence is provided in support of this assertion. What is certain is that given the large number of other factors which could influence the indigenous population counts it is not possible to determine the extent of changing identification in the indigenous populations.

A further issue which may influence the quality of these estimates is that the ABS census definition of Aboriginality is not identical to the Australian Government's official definition. The official definition comprises three elements: Aboriginal or Torres Strait Islander descent, self-identification as Aboriginal or Torres Strait Islander and acceptance as Aboriginal or Torres Strait Islander by the community with which the person is associated. The first two of these requirements are present in the census definition, but the third is not. To the extent that some of these individuals who identified as an indigenous person in the census may not be accepted as such by the community with which they associate, the census may overestimate the Aboriginal and Torres Strait Islander populations.

References

- Australian Bureau of Statistics. *Aboriginals and Torres Strait Islanders: Australia, States and Territories*. Catalogue No. 2499.0. Canberra: Australian Bureau of Statistics, 1987
- Australian Bureau of Statistics. *Census 86: Data Quality—Aboriginal and Torres Strait Islander Counts*. Catalogue No. 2602.0. Canberra: Australian Bureau of Statistics, 1989
- Australian Bureau of Statistics. *1991 Census Data Quality: Aboriginal and Torres Strait Islander Counts*. Census Working Paper 93/6. Canberra: Australian Bureau of Statistics, 1993
- Australian Bureau of Statistics. *Experimental Estimates of the Aboriginal and Torres Strait Islander Population, June 1986 to June 1991*. Catalogue No. 3230.0. Canberra: Australian Bureau of Statistics, 1994
- Benham D. *Estimates of the Aboriginal Population: Review of Data Sources*. Demography Working Paper No. 93/2. Canberra: Australian Bureau of Statistics, 1993
- Benham D, Howe A. *Experimental Estimates of the Aboriginal and Torres Strait Islander Population 1986–1991: States/Territories and Australia*. Demography Working Paper No. 94/2. Canberra: Australian Bureau of Statistics, 1994
- Commonwealth Bureau of Census and Statistics. *Commonwealth Bureau of Census and Statistics Bulletin 9: The Aboriginal Population*. Canberra: Commonwealth Bureau of Census and Statistics, 1973
- Dugbaza T. *Recent Trends and Differentials in Aboriginal Fertility 1981–1991*. Demography Working Paper No. 94/1. Canberra: Australian Bureau of Statistics, 1994
- Gray A. Aboriginal migration to the cities. *J Aust Pop Assoc* 6: 122–144, 1989
- Gray A. National estimates of Aboriginal mortality. In: *A Matter of Life and Death: Contemporary Aboriginal Mortality*, edited by A. Gray. Canberra: Aboriginal Studies Press, 1990, pp. 147–158
- Gray A, Tesfaghiorghis H. *Social Indicators of the Aboriginal Population*. Canberra: Centre for Aboriginal Economic Policy Research, Australian National University, Discussion Paper No. 18, 1991

Gray A, Tesfaghiorghis H. Aboriginal population prospects. *J Aust Pop Assoc* 10: 81-99, 1993

Luther NY, Retherford RD. Consistent correction of census and vital registration data. *Math Pop Studies* 1: 1-20, 1988

Preston S, Hill K. Estimating the completeness of death registration. *Pop Studies* 34: 349-366, 1980

Smith LR. New black or black new town: the urbanization of Aborigines. In: *Mobility and Community Change in Australia*, edited by IH Burnley, RJ Pryor and DT Rowland. St Lucia: University of Queensland Press, 1980, pp. 193-208

Indicators for monitoring Aboriginal health

Kuldeep Bhatia* and Phil Anderson

Aboriginal and Torres Strait Islander Health Unit, Australian Institute of Health and Welfare, Canberra

Background

To improve the health of Aboriginal and Torres Strait Islander peoples and to reduce inequalities in their access to and use of health services, the National Aboriginal Health Strategy (NAHS) Working Party (1989) recommended the development of an operational set of health outcome goals and targets in the context of its holistic definition of health. The Working Party also recommended that health goals and targets be continually revised, with the expressed intention of maximising positive health outcomes.

Taking their inspiration from the NAHS Report, Wronski and Smallwood (1992) developed an interim Aboriginal Health Goals and Targets document. They recommended 46 different goals with a series of targets, most of them to be achieved over the next 5 to 10 years. The goals encompassed health outcomes, access, health support areas, infrastructure, decision making, and employment, education and training. Recently, the NSW Department of Health (1993) and Gracey (1994) have outlined some of the goals and targets for Aboriginal health in New South Wales and Western Australia respectively.

An extensive list of recommended goals and targets for the Australian population as a whole, and also for specific groups was prepared by Professor Nutbeam and his colleagues in their report to the Commonwealth Department of Health, Housing and Community Services (Nutbeam et al. 1993). Following their recommendations, the Australian Health Ministers took a focused approach to the finalisation of goals and targets for four major health concerns, namely cardiovascular disease, cancer, mental health and injury (Department of Human Services and Health 1994). The approach seeks to achieve a balance of prevention, health care and delivery to maximise health outcomes. Embedded in the initiative are goals and targets aimed at reducing inequalities suffered by Aboriginal and Torres Strait Islander peoples.

The goals and targets approach is meaningful only if the prevalence of population-specific diseases and other relevant health indicators, along with their baselines, are well defined. Although the setting of a goal should be free from data constraints, measurability is a must if progress is to be compared against targets (US Public Health Service 1990). However, in the absence of reliable baselines, a composite set of achievable goals and targets should be developed for evaluation against process rather than outcome health indicators given the state of Aboriginal health statistics.

Health indicators

Most comparisons of health status have traditionally relied on outcome indicators relating to mortality and illness. However, the insight provided by these indicators into the health of a population is limited. The death statistics and data gathered from the provision of

* Address for correspondence: Kuldeep Bhatia, Aboriginal and Torres Strait Islander Health Unit, Australian Institute of Health and Welfare, GPO Box 570, Canberra, ACT 2601.

health services are routinely produced for other administrative purposes and are easily aggregated. This easy access to an information pool may not have encouraged the development of more appropriate and cost-effective indicators of health. Besides, limited information has become available from Aboriginal Medical Services (which provides a large proportion of primary health care to indigenous peoples) about their clientele and the services offered. This limits the suitability of indicators to be used for monitoring Aboriginal and Torres Strait Islander health.

A good indicator should be able to measure change over time in response to an intervention or action. It must also be able to extract information concerning a goal to the maximum possible level. Emphasis on determining the accrual of health benefits to individuals and communities while keeping the need of providers in perspective is another mark of a good indicator. An indicator must:

- be valid and have a direct relationship to the goal;
- be measurable in a standard manner;
- not require collection of a whole new set of baseline data;
- evaluate effectiveness of the procedures or interventions;
- be amenable to age, sex and population stratification;
- be appropriate for statistical evaluation;
- measure cost effectiveness of a program;
- help chart pathways for an integrated system; and
- not be counterfactual.

The cultural appropriateness of indicators also needs to be given full consideration. In addition, a customised approach to data collection, monitoring and evaluation should be developed to suit individual populations.

The development of population surveys has increased the number of potential indicators available for determining health outcomes, since the sampling may allow inclusion of those individuals who do not need to enter hospital or use health services. As well, the surveys allow social and economic factors to be linked with health indicators and risk factors. For example, information on disabilities and handicaps, an area for which data have been particularly difficult to obtain, is now becoming available through such surveys (Australian Bureau of Statistics 1993). Similarly, the National Health Survey data allow insight into the extent of chronic illness and the general well-being of a population, useful information which does not usually become available from routine data collections. Recently, the National Aboriginal and Torres Strait Islander Survey has provided useful information on indicators such as long-term illness, disability status, health actions and availability of mainstream hospital services (Australian Bureau of Statistics, 1995).

Currently available Aboriginal health indicators

A limited set of health indicators is currently used for describing the health status of Aboriginal populations and comparing it with other groups in Australia (Devanesan et al. 1986). Prominent among these indicators and measures are:

Mortality

One of the best known, and certainly the most widely used, key indicators of Aboriginal health. Measures in use include:

- *Age-specific death rates*, death rates calculated for various age groups and usually for each sex separately. Such a rate represents the number of deaths (in a specified period) per 1,000 (or 100,000) persons in a particular age group.
- *Age-standardised death rate*, a summary measure of mortality adjusted to the age distribution of a reference population. (Technically, it is the weighted average of age-specific death rates according to a standard distribution of age. This procedure eliminates the effect of varying age distributions and facilitates valid comparisons over time or between populations.)
- *Standardised mortality ratio*, is the ratio of observed death rate in a population to that expected if the age-specific death rates of a standard population apply. (Technically, the expected rate is indirectly standardised using the weighted age-specific death rates of a reference population applied to the age distribution of the population in question.)

Whereas a decrease in the *age-standardised death rate* indicates an absolute improvement in population-specific mortality, a decrease in the *standardised mortality ratio* indicates an improvement relative to the mortality of a reference population. The Australian Institute of Health and Welfare uses the 1991 Australian population for such standardisations and comparisons at present.

Two indicators of perinatal and infant mortality are:

- *perinatal mortality rate*, the number of perinatal deaths (stillborn or death within 28 days) per 1,000 total births; and
- *infant mortality rate*, the number of infant (less than one year old) deaths per 1,000 live births.

Small numbers do not permit reliable disaggregation for all diseases in Aboriginal populations; Aboriginal cause-specific mortality information is therefore often compiled following the chapter headings of International Classification of Diseases, Revision 9 (ICD-9).

Another set of commonly used health indicators based on mortality data is *life expectancy at various ages*, the number of years a person of a given age (e.g. a newborn) would be expected to live given the prevailing mortality rates.

Aboriginals can now be separately identified in all mortality data collections except that from Queensland. This identification is known to be highly incomplete except in Western Australia, South Australia and the Northern Territory. The usefulness of mortality-based indicators for monitoring Aboriginal health at a national level is therefore limited at present.

Morbidity

The second major set of indicators in use is derived from systems for treating illness, that is, health services information. *Hospital separation rates* or *admission rates* reflect the number of in-patient episodes experienced by a group. Since episodes rather than persons are counted, some individuals may be included in the rate estimation more than once. As with mortality rates, hospitalisation rates should be *age-standardised* or *age-specific* for valid comparisons.

There are many shortcomings in using data from hospital admissions: for example, sick people who do not have access to hospitals are not counted, and people with multiple episodes are counted each time. Patient attitude in seeking care for non-acute conditions and non-availability of culturally-appropriate facilities also affect the uptake of hospital services. These factors along with the cause(s) of ill health, which are often age-associated, vary among population groups and must be taken into account while interpreting morbidity indicators.

Aboriginals are now separately identified in all hospital morbidity collections except those from Tasmania. However, the accuracy of identification of Aboriginals in these collections is not known with any certainty. Lack of adequate information on the nature and types of illnesses presented to the Aboriginal Medical Services accentuates the situation further.

Cancer incidence and mortality

Cancer is a notifiable disease in all States and Territories. It is the only major disease category for which an almost complete coverage of incidence data has become available, through cancer registries operating in each State and Territory. These data are compiled by the National Cancer Statistics Clearing House and are made available to the general public and policy-makers (Australian Institute of Health and Welfare 1994).

Aboriginals are identified in all cancer registry data except those from Tasmania. The accuracy of this identification is not known at present.

Communicable disease notifications

Certain communicable diseases are notifiable to State and Territory health authorities under the public health legislation in each jurisdiction. The National Notifiable Diseases Surveillance System (NNDSS), established under the auspices of the Communicable Diseases Network, compiles and reports this information regularly through the Communicable Diseases Intelligence Bulletin (Hall 1993). The data compiled by NNDSS allow a national picture of communicable disease epidemiology.

Notification of communicable diseases is known to be incomplete. It is believed that more serious, exotic or rare diseases are more likely to be notified than those without serious clinical or public health consequences. Of particular concern is the failure to distinguish between new or old cases, which may affect the estimation of incidence and prevalence rates for these diseases.

Aboriginals are identified in communicable disease notifications from all States and Territories except Victoria and Tasmania. The accuracy of this identification is not known.

Birthweight

Birthweight is one of the most useful biological indicators of the maternal environment and of a child's health status. *Low birthweight* babies of less than 2,500 grams are known to be more susceptible to infections. In view of the recent reports of increased rates of disabilities and other problems later in life among low birthweight babies (Hack et al. 1994, Barker 1992), this particular indicator has significant potential.

Birthweight and other data related to pregnancy and the perinatal period are collected in each State and Territory and compiled by the Australian Institute of Health and Welfare's National Perinatal Statistics Unit. Aboriginals are identified in all such collections, but the accuracy of identification is unknown.

Self-assessment of health

The recognition of self-assessment of health, well-being and experience of diseases as useful health indicators has been an important development in the last decade. This information, which often includes an individual's point of view and his or her self-perception of health, is not available from medical records and other collections and must be obtained through special surveys.

The National Health Survey, conducted by the Australian Bureau of Statistics, is one such survey which provides national benchmarks covering a range of key health indicators. First conducted in 1989-90, the Survey obtained information on illnesses, injuries, chronic conditions, and other health indicators. A second such survey is planned for 1995.

The 1989-90 National Health Survey provided for the identification of Aboriginals included in the sample; however, no special sampling procedures were employed to ensure that the Aboriginal sample was large enough to provide detailed information on their health. To overcome this problem, the Australian Bureau of Statistics will increase the Aboriginal sample in its 1995 National Health Survey to 1,500. The increased sample, funded by the Australian Institute of Health and Welfare, the Aboriginal and Torres Strait Islander Commission and Commonwealth and State health agencies, will yield national estimates of key Aboriginal health indicators for urban and rural areas, and permit comparisons with those obtained for non-Aboriginals.

As part of its response to the Royal Commission into Aboriginal Deaths in Custody, the Commonwealth Government funded the Australian Bureau of Statistics to conduct the National Aboriginal and Torres Strait Islander Survey (NATSIS), which along with other population characteristics has generated information on self-reported illness, risk factors, health-related actions taken by individuals, and disability and handicap, through a representative sample of over 15,700 individuals (Australian Bureau of Statistics 1995). Although the information generated by this survey did not cover all the items usually included in the National Health Surveys, NATSIS has provided useful baselines for a number of Aboriginal health indicators.

It is important to be aware of the weaknesses of population-based survey data. Such surveys are limited by the amount of information a respondent can recall or is prepared to report. Precise medical diagnoses and duration of chronic diseases may not be known (National Centre for Health Statistics 1993). Besides, inadequate sample sizes may not allow the finer disaggregation of data possible with information obtained from other sources.

Disability and handicap

The extent of disability and handicap in a population is measured for a number of different reasons, the most prominent of which is to develop strategies aimed at avoiding or reducing debilitating conditions. *Disability* is defined as having one or more of the conditions which include the loss of sight, slowness at learning, and restriction in physical activity, among others. A disabled person who is further limited in his or her ability to perform tasks in relation to self-care, mobility, verbal communication, schooling, and/or employment is defined as *handicapped*.

Comprehensive national-level information on disability and handicap is generated by the Australian Bureau of Statistics through population-based surveys. Three such surveys have been undertaken since 1981. Small community-based surveys yield additional useful data. However, no information on the extent of disability and handicap among Aboriginal

people has been generated by the Bureau so far. Its 1981 and 1988 surveys did not include appropriate identifiers. The 1993 Survey of Disability, Ageing and Carers identified Aboriginals, but no analysis of this particular subsample has yet been made.

The data for the routinely used indicators of Aboriginal health mentioned above, although often incomplete, are currently available or can be generated with some effort. In addition, there are a number of other indicators and variables for which information can also be easily collected. Tables 1 and 2 list some of the selected indicators which can be successfully used for monitoring Aboriginal health.

Aboriginal health data sources and collections

State and Territory collections

The health indicators described above are mostly those derived from vital statistics registrations and other regular administrative collections. Registration of vital events in Australia is the responsibility of State and Territory Registrars of Births, Deaths and Marriages. The information provided by the registrars is compiled and aggregated by the Australian Bureau of Statistics and supplied to other agencies after rigorous data quality checks. A number of other health-related collections are also made by the States and Territories.

Collections of vital events include registration of births and notification of deaths. Those relating to hospitalisation and illnesses include hospital separations, maternal and perinatal collections, cancer registration and communicable disease notifications. Provision now exists for the identification of Aboriginals in all vital statistics collections except in Queensland. Identification also occurs for all hospital separations and cancer registration collections except in Tasmania, and for all communicable disease notifications except in Victoria and Tasmania.

Table 1: Selected list of health indicators and measures for monitoring Aboriginal and Torres Strait Islander health and relevant data sources or collections

Key indicator	Sub-indicator	Data sources or collections	
		Currently available#	Other possible sources
Mortality	Total mortality	AIHW Mortality Database	
	Life expectancy	AIHW Mortality Database	
	Age-specific mortality	AIHW Mortality Database	
	Perinatal mortality	AIHW NPSU Collections	Midwives' Notification Systems
	Infant mortality	AIHW Mortality Database	
	Maternal mortality	AIHW Mortality Database	NHMRC collections
	Cause-specific mortality	AIHW Mortality Database	
	Chronic illnesses	ABS NHS	NATSIS, specially commissioned surveys

(continued)

Table 1 (continued): Selected list of health indicators and measures for monitoring Aboriginal and Torres Strait Islander health and relevant data sources or collections

Key indicator	Sub-indicator	Data sources or collections	
		Currently available#	Other possible sources
Fertility/pregnancy	Hospital separation	AIHW Hospital Morbidity Database	Specially commissioned surveys
	Length of stay in hospital	AIHW Hospital Morbidity Database	Specially commissioned surveys
	Cost of hospitalisation	AIHW Hospital Morbidity Database	Specially commissioned surveys
	Age-specific and total fertility	ABS Censuses	NATSIS
	Age at first birth	AIHW NPSU Collections	Midwives' Notification Systems
	Obstetric complications	AIHW NPSU Collections	Midwives' Notification Systems
	Number of antenatal visits	AIHW NPSU Collections	Midwives' Notification Systems
Child health	Completed family size	ABS Censuses	NATSIS
	Congenital malformations	AIHW NPSU Collections	State Birth Defects Registries
	Stillbirths	AIHW NPSU Collections	Midwives' Notification Systems
	Low birthweight	AIHW NPSU Collections	Midwives' Notification Systems
	Low birthweight-associated mortality	No information available	Data linkages between Midwives' Notification Systems and AIHW Mortality Database
Risk factors	Smoking, alcohol consumption	ABS NHS, NATSIS	Aboriginal Drug Use Survey
Aged care	Excess weight	ABS NHS	
	Nursing home beds/ population ratio	No information available	ABS SDAC
Oral health	Scores (DMFT)	AIHW DSRU Collections (NT only)	Specially commissioned surveys
Health services	Access indicators (to be developed)	No information available	NATSIS, AMS data
	Utilisation indicators (to be developed)	No information available	NATSIS, AMS data

(continued)

Table 1 (continued): Selected list of health indicators and measures for monitoring Aboriginal and Torres Strait Islander health and relevant data sources or collections

Key indicator	Sub-indicator	Data sources or collections	
		Currently available#	Other possible sources
Health insurance	Private health insurance	No information available	Specially commissioned surveys
Health expenditure	Recurrent/capital expenditure	No information available	NHS, ATSIC, AIHW Health Expenditure Database
Disability and handicap	Age-and cause-specific prevalence	ABS SDAC	NATSIS
	Severity of handicap	ABS SDAC	NATSIS
	Support indicators (to be developed)	ABS SDAC	NATSIS
Employment status	Unemployment rate	ABS Censuses	NATSIS
Education	Literacy	ABS Censuses	NATSIS

Reliable data available for some States and Territories only.

Abbreviations: ABS, Australian Bureau of Statistics; AIHW, Australian Institute of Health and Welfare; AMS, Aboriginal Medical Services; DSRU, Dental Statistics Research Unit; NATSIS, National Aboriginal and Torres Strait Islander Survey; NHMRC, National Health and Medical Research Council; NHS, National Health Survey; NPSU, National Perinatal Statistics Unit; SDAC, Survey of Disability, Ageing and Carers.

Table 2. Selected list of disease-specific measures for monitoring Aboriginal health and relevant data sources or collections

Major disease	Sub-indicator	Data sources or collections	
		Currently available#	Other possible sources
Cancer	Incidence	AIHW NCSCH	
	Mortality	AIHW Mortality Database	
Diabetes mellitus	Prevalence*		Specially commissioned surveys
	Mortality	AIHW Mortality Database	
	Complications	No information available	
HIV infection	Incidence and mortality	No information available	
STD	Prevalence	NNDSS	

(continued)

Table 2 (continued): Selected list of disease-specific measures for monitoring Aboriginal health and relevant data sources or collections

Major disease	Sub-indicator	Data sources or collections	
		Currently available#	Other possible sources
CVD	Injuries	Intentional injury hospitalisation	AIHW Hospital Morbidity Database
	Unintentional injury hospitalisation	AIHW Hospital Morbidity Database	
	Transport-related injury hospitalisation	AIHW Hospital Morbidity Database	
	Suicides	AIHW Mortality Database	
	Prevalence*		Specially commissioned surveys
Renal disease	Hospitalisation	AIHW Hospital Morbidity Database	Specially commissioned surveys
	Mortality	AIHW Mortality Database	
	Prevalence*		
	Renal replacement	No information available	Specially commissioned surveys
Trachoma	Dialysis and other related hospitalisation	AIHW Hospital Morbidity Database	ANZ Transplantation Registry
	Incidence*	No information available	Specially commissioned surveys
	Associated blindness*	No information available	Specially commissioned surveys
Mental health	Schizophrenia prevalence*	No information available	Specially commissioned surveys
Infectious diseases	Immunisation status*	State Epidemiology Collections	Specially commissioned surveys
	Notifications	NNDSS	
	Mortality	AIHW Mortality Database	

* No national-level data available at present; baselines need to be generated through specially commissioned surveys or other data collection mechanisms.

Abbreviations: AIHW, Australian Institute of Health and Welfare; NATSIS, National Aboriginal and Torres Strait Islander Survey; NCSCH, National Cancer Statistics Clearing House; NNDSS, National Notifiable Diseases Surveillance System.

The main sources of data on Aboriginal health to date have been the births and deaths collections, which have included Aboriginality for a longer period than have other collections in some States and Territories. Consequently, deaths rates have been the principle indicators of Aboriginal health. Although important indicators, death rates fail to provide a complete picture of a population's health.

Due to poor Aboriginal identification in various collections, comparisons are usually made between the Aboriginal population and the total Australian population rather than the non-Aboriginal population. In practice this makes little difference because Aboriginals comprise less than 2% of the Australian population.

However, provision for the identification of Aboriginality in major health statistical collections does not guarantee that they will always be so-identified in practice. The proportion of Aboriginals correctly identified varies from State to State, and is particularly low in the large urban centres. The completeness of identification may also vary from year to year. This is especially true in the first few years of policy implementation, when under-reporting may be extensive. This inconsistent identification poses a problem, particularly when examining time series and will influence the estimates of regression coefficients.

The problem of incompleteness of Aboriginal identification can be partly overcome by studies designed to validate the quality of different data sources. It is possible to investigate the proportion of Aboriginal patients that are correctly identified in a particular hospital over a certain period of time. Differences in Aboriginal enumeration between any two consecutive censuses can be similarly validated against the registered numbers of births and deaths during the corresponding period. Such studies could provide estimates of the degree of correction required for indicators derived from national databases.

Disease registers

Disease registers, such as the State and Territory Cancer Registries, are a valuable source of information about major health conditions. Since 1972, these registries have collected information about new cases of cancer, as well as collating information about deaths from cancer. As a result, comprehensive national cancer data are available from 1982. Aboriginal identification is now made by all the cancer registries, although the degree of its completeness has not been validated.

Establishment of national registers or centralised data systems for other diseases such as diabetes and renal disease should also be considered. Such databases would prove invaluable for undertaking epidemiological studies using appropriate health indicators.

Sample surveys

Another source of data is national sample surveys or studies of a sample or section of the population, which may include items on self-assessment of health and self-reported illness, access to and use of health services, and personal and social behaviours affecting health. With appropriate sampling techniques, such surveys can provide an excellent view of the health status of a population. Detailed studies in local communities yield information concerning the prevalence and seriousness of particular diseases, and patterns of risk behaviours. Such surveys and local studies need to be repeated in a controlled manner at regular intervals, in order for them to be useful for the analysis of trends.

Specifically targeted surveys are often the only way to gather information on risk factors (for example, smoking, alcohol consumption, diet, obesity and blood pressure), health behaviours and awareness, and access to and use of health services. Most of the national

surveys conducted in the past failed to include identification of Aboriginals, although the 1989-90 National Health Survey did identify Aboriginal individuals. The 1993 Survey of Disability, Ageing and Carers Australia also identified individuals belonging to the Aboriginal population. However, the number of Aboriginals sampled in both these surveys was too small to allow meaningful estimates.

Three different surveys which should generate useful health-related information on Aboriginals have been recently undertaken, or are currently underway. We have already described the nature and contents of two of these surveys, the 1994 NATSIS and the 1995 NHS, in a previous section. A survey to determine the pattern of drug use by over 3,000 Aboriginals, planned by the Department of Human Services and Health, was undertaken in 1994. The numbers of individuals sampled in these surveys are sufficiently large to allow useful comparisons with the wider community.

Studies to determine the prevalence of particular diseases and conditions at a regional or State level have also been carried out on Aboriginal populations. Undertaken at regular intervals in different centres, such studies would complement information on indicators derived from the national databases.

Aboriginal Medical Services minimum dataset

To date, there has been limited standardised information available on the nature and types of illnesses presented at Aboriginal Medical Services. Recently, the Department of Human Services and Health has begun a pilot project, in consultation with National Aboriginal Community Controlled Health Organisation (NACCHO) and the Australian Institute of Health and Welfare (AIHW), to develop a minimum dataset for these services. This would be a first step towards developing Aboriginal health indicators for problems seen at the primary care level, and setting achievable and realistic health goals and targets, based on such a minimum dataset, should follow.

Limitations of available health indicators

Mortality and morbidity indicators, used traditionally as key health outcome indicators for comparing the health status of populations at different socio-economic levels, have largely lost their relevance in a developed world setting. With the bulk of mortality in industrialised countries now occurring later in life, simple mortality and morbidity-based measures fail to fully inform us about the degree of physical, emotional and cultural well-being of an individual or a population. Indices such as *expectancy of life at birth* summarise a population's survival distribution but are not particularly useful outcome indicators as they are insensitive to all but gross changes in a population's health.

However, these indicators continue to have relevance in today's Australia—given the high proportion of avoidable deaths among Aboriginal and Torres Strait Islander peoples. These high levels of preventable mortality continually remind us that further examination of local health services, their appropriateness, shortcomings and availability to Aboriginal peoples, is indicated. Differences in cause-specific mortality and hospitalisation rates among Aboriginal peoples are additional reminders of this unmet need. Unfortunately, the utility of these indicators to help interpret even the basic causes of death among Aboriginal people remains limited because mortality and hospitalisation data on indigenous people are often incomplete and inaccurate. Unless those obtaining this information can be encouraged to improve their collection, these indicators will remain largely irrelevant to Aboriginal health also.

At present, there is little information available on process indicators such as immunisation rates, renal replacement therapy, chronic disease management among Aboriginal people which could have been successfully used as proxies for favourable outcomes. Lack of information on incidence and prevalence of non-fatal illnesses is another area in which development of Aboriginal-specific health indicators is not possible at present.

Health-promoting behaviour and health actions taken to improve the quality-of-life are other indicators for which the basic information is scanty. No quantification of physical, emotional and cultural well-being of the population is possible at present. Data obtained through NATSIS and NHS may fill some of this information gap but are unlikely to prove suitable for developing appropriate process as well as outcome indicators for monitoring Aboriginal health, particularly in the absence of suitable information on risk factors.

Effectiveness of primary health care among Aboriginal people is another area where patient-based measures of health outcomes are required. We need to develop effective indicators to measure the extent to which the aims and objectives of specific services are met. The present databases on self-reported illnesses, hospital separations, GP visits and Aboriginal Medical Services health care are neither integrated nor complementary enough to allow development of appropriate measures which may reflect local health service intervention as well as the multi-agency input.

Given the state of Aboriginal health-related information, a number of indicators may be extremely difficult to develop. A good example of this is the impact of diabetes on mortality and morbidity in a population. Since diabetes is a net contributor to susceptibility, development and poor prognosis of a variety of different diseases, its role in these conditions (the *aetiological fraction*) can not always be reliably estimated. Development of new indicators which take the aetiological fraction of various risk factors into account would address this issue. A population-specific multiple risk factors approach may therefore be suitable for Aboriginal and Torres Strait Islander peoples.

References

- Australian Bureau of Statistics. *Disability, Ageing and Carers Australia 1993: Summary of Findings*. Catalogue No. 4430.0. Canberra: Australian Bureau of Statistics, 1993
- Australian Bureau of Statistics. *National Aboriginal and Torres Strait Islander Survey 1994: Detailed Findings*. Catalogue No. 4190.0. Canberra: Australian Bureau of Statistics, 1995
- Australian Institute of Health and Welfare. *Australia's Health 1994*. Canberra: Australian Government Publishing Service, 1994
- Barker DJP, ed. *Fetal and Infant Origins of Adult Disease*. London: British Medical Journal, 1992
- Department of Human Services and Health. *Better Health Outcomes for Australians: National Goals, Targets and Strategies for Better Health Outcomes into the Next Century*. Canberra: Australian Government Publishing Service, 1994
- Devanesan D, Furber M, Hampton D, Honari M, Kinmonth N, Peach HG. *Health Indicators in the Northern Territory*. Darwin: Northern Territory Department of Health, 1986.
- Hall R. Annual report of the National Notifiable Diseases Surveillance System, 1992, Part 1. *CDI* 17: 466-511, 1993

- Gracey M. Possible targets to reduce Aboriginal mortality and morbidity rates from specific conditions by the year 2000. In *Task Force on Aboriginal Social Justice: Report of the Task Force, Volume II, Appendix E*. Perth: Government of Western Australia, 1994
- Hack M, Taylor G, Klein N, Eiben R, Schatschneider C, Mercuri-Minich B. School-age outcomes in children with birth weights under 750 g. *N Engl J Med* 331: 753-759, 1994
- National Aboriginal Health Strategy Working Party. *A National Aboriginal Health Strategy*. Canberra: 1989
- National Aboriginal Health Strategy Evaluation Committee. *The National Aboriginal Health Strategy: An Evaluation*. Canberra: 1994
- National Centre for Health Statistics. *Health United States 1993*. Hyattsville, Maryland: Public Health Service, 1993
- NSW Department of Health. *Aboriginal Health Goals for New South Wales*. Sydney: Office of Aboriginal Health, 1993
- Nutbeam D, Wise M, Bauman A, Harris E, Leeder S. *Goals and Targets for Australia's Health in the Year 2000 and Beyond*. Canberra: Australian Government Publishing Service, 1993
- US Public Health Service. *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*. Washington: Department of Health and Human Services, 1990
- Wronski I, Smallwood G. *Aboriginal and Torres Strait Islander Health Goals and Targets (Interim)*. Canberra: 1992

Brief communication

Utilisation of hospital and rehabilitation services by Aboriginal and Torres Strait Islander peoples of the Shoalhaven District, New South Wales

Jean Turner*

Aboriginal Liaison Officer, Shoalhaven District Memorial Hospital, Nowra

Introduction

The Shoalhaven District, located along the south coast of New South Wales, is home to 68,236 persons, of which 1,524 persons are of Aboriginal or Torres Strait Islander descent, representing approximately 2.3% of the population. This study was undertaken primarily to determine the extent to which the Koori Community of the District accesses hospital and rehabilitation services offered by the Shoalhaven District Memorial Hospital and to find out if the services available were sufficient to meet the community needs. The question of accurate Aboriginal identification was also explored.

Results

Of the 26,795 presentations at the Emergency Department of the Shoalhaven District Memorial Hospital between July 1993 and August 1994, there were 1,175 Aboriginal and Torres Strait Islander registrations representing almost 4% of the total presentations (see Table 1). The number of Aboriginal presentations was high in comparison to their proportion in the population of the Shoalhaven District (2.3%). However, in view of the comparatively younger age distribution of the Aboriginal population, this figure may not be significantly high.

Hospital inpatient figures

There were a total of 11,852 discharges from the Shoalhaven District Memorial Hospital for the period July 1993 – August 1994, of which 516 (4.3%) were identified as being of Aboriginal persons. The Aboriginal inpatients were hospitalised for a total of 2,046 days, ranging from 1 to 50 days, with an average stay of 3.96 days. Since each hospital separation is counted as an individual episode, the 516 hospital discharges include individuals with multiple admissions.

* Address for correspondence: Jean Turner, Aboriginal Liaison Officer, Shoalhaven District Memorial Hospital, PO Box 246, Nowra NSW 2541.

Table 1: Mode of separation at the Emergency Department of the Shoalhaven District Memorial Hospital, July 1993 – August 1994

Mode of separation	Total	%	Aboriginal	%
Discharged	20,881	77.9	885	75.3
Admitted	3,644	13.6	187	15.9
Transferred to another hospital	1,208	4.5	33	2.8
Did not wait	898	3.4	56	4.8
Discharged themselves	54	0.2	8	0.7
Dead upon arrival	81	0.3	4	0.3
Died in the Emergency Department	29	0.1	2	0.2
Total	26,795	100.0	1,175	100.0

Psychology services

From July 1993 to June 1994, a total of 120 outpatients were offered psychology services, of which only two persons were of Aboriginal descent. Coincidentally, both the Aboriginal patients discontinued their therapy.

According to the clinical psychologist of the hospital, the possible reasons for the under-utilisation of services by Aboriginal persons was due to lack of referral, non-Aboriginal staff, part-time service, and limited knowledge regarding the nature and type of services provided by a psychologist. In addition, the appointments structure imposes time limits which seem to be a hurdle in effective communication with Aboriginal patients.

Coronial investigations

A total of 57 deaths were the subject of coronial investigation during July 1993 – August 1994, seven of which were Aboriginal persons (12.3%). Eighteen of the 57 deaths were suicide cases, 13 non-Aboriginal, five Aboriginal.

Mental health services

There were a total of 445 registrations during July 1993 – August 1994, 47 of which were of Aboriginal people, representing 10.6% of the Mental Health Services' client load.

Operating theatre waiting list

A total of 37 individuals on the waiting list identified themselves to be Aboriginals. Overall, in the Illawarra region, there are between 890 and 950 individuals on the operating theatre waiting list, some 450 of them waiting for three months or longer.

Speech pathology

During July 1993 – August 1994, a total of 655 children were seen by speech pathologists, 22 (3.4%) of which were Aboriginals. Coincidentally, more than one-third of these cases presented themselves in the last two months (July – August 1994). It was noted that most of the Aboriginal children presenting at the clinic have severe problems; it may be that those with mild to moderate problems are being missed. Long waiting lists at the clinic

may be one of the factors leading to loss of motivation and failure to attend follow-up appointments.

Sexual assault services

A total of 186 new clients were registered with Sexual Assault Services, 11 (5.9%) of which were Aboriginal.

Discussion

Accurate and complete registration of Aboriginal and Torres Strait Islander individuals when utilising hospital and rehabilitation services is of significant interest to both health planners and service providers. However, the extent to which indigenous persons identify themselves or are requested to identify has not been reliably determined. Significantly often, the people presenting to the admission clerks are not being asked the identification question. In some cases, the identity of the individual is being determined on the basis of his or her visual appearance or family names, both of which may lead to substantial misclassification.

As an Aboriginal Liaison Officer based in the hospital and in view of my strong community knowledge, I was able to identify most of the Aboriginal individuals seeking hospital services. The figures presented above therefore constitute a close to true picture of Aboriginal hospitalisation in the Shoalhaven District.

Going through the information collected and the diagnosis of certain medical problems that exist in the Aboriginal community, it would appear that more education and information needs to be provided to the community regarding the range of services available. The most glaring issue that needs to be researched is the suicide rate in the Aboriginal community. It is very high and across the board. Along with me, many other people in the community want to answer the question: *Why is it happening?*

Aboriginal and Torres Strait Islander health bibliography

Bibliographic citations list generated from Medline

Alessandri LM, Read AW, Stanley FJ, Burton PR, Dawes VP

Sudden infant death syndrome and infant mortality in Aboriginal and non-Aboriginal infants

J Paediatr Child Health 30: 242-247, 1994

The aim of this study was to investigate sudden infant death syndrome (SIDS) in the context of total infant mortality for Aboriginal and non-Aboriginal infants. Deaths for infants born in Western Australia from 1980 to 1988 inclusive were ascertained from a total population data base. Infant mortality rates and rates by period and cause of death were calculated for both populations. Aboriginal infants had a mortality rate three times that for non-Aboriginal infants (23.6 cf. 7.9 per 1000 live births) and both populations showed a similar rate of decline in mortality over the study period. There were differences in the proportion of deaths occurring neonatally and postneonatally in the two populations. In terms of SIDS, 21% of the deaths in Aboriginal infants occurred neonatally compared with 7% for non-Aboriginal infants. The overall cause of infant death distribution differed significantly between the two populations ($P < 0.001$). During the study period, Aboriginal infants showed a significant increase in deaths due to SIDS and a significant decrease in those due to birth defects and low birthweight. These results suggest it would be useful to review the pathology and diagnosis of sudden unexplained death in infancy.

Alessandri LM, Read AW, Stanley FJ, Burton PR, Dawes VP

Sudden infant death syndrome in Aboriginal and non-Aboriginal infants

J Paediatr Child Health 30: 234-241, 1994

This study, based on routinely recorded data, was designed to compare the epidemiology of sudden infant death syndrome (SIDS) in Aboriginal and non-Aboriginal infants in Western Australia (WA). All cases of SIDS occurring in infants born in WA from 1980 to 1988 were included in the study. There were 66 Aboriginal (6.1 per 1000 live births) and 337 non-Aboriginal (1.7 per 1000 live births) infants who died from SIDS. It was found that there was a significant linear increase in the Aboriginal SIDS rate over the study period while the non-Aboriginal rate remained relatively constant. For non-Aboriginal infants, there was an elevated risk of SIDS for young maternal age, single marital status and male gender but this was not found for Aboriginal infants. There was a significant difference in the age at death distribution for the two populations. Low birthweight and preterm birth were risk factors for both Aboriginal and non-Aboriginal infants. There may be differences in the aetiology and/or classification of SIDS between the two populations.

Barker RN, Thomas DP

A practical intervention to address ear and lung disease in Aboriginal primary school children of central Australia

J Paediatr Child Health 30: 155-159, 1994

Australian Aboriginal populations have an extremely high prevalence of lung disease and ear disease. In addition to an improvement in socio-economic conditions, implementation of strategies to address the problem, within the limitations of present conditions, is needed. A 5 month trial was conducted to investigate the effectiveness of a school-based intervention programme involving nose blowing, deep breathing and coughing combined with exercise performed daily. This was a community-based trial, designed to give priority to cultural and ethical considerations, to be non-intrusive and to utilize local skills and resources. Results of the trial showed that signs of upper and lower respiratory tract disease and pulmonary function measurements were statistically significantly improved. Hearing levels showed no statistically significant change. The programme met with a good response from children and teachers. This study does suggest that this strategy may help address the existing problems of lung and ear disease in Aboriginal primary school children, providing some immediate benefits within the limitations of the present socio-economic conditions.

Bowden FJ, Currie BJ, Miller NC, Locarnini SA, Krause VL

Should Aboriginals in the 'Top End' of the Northern Territory be vaccinated against hepatitis A?

Med J Aust 61: 372-373, 1994

OBJECTIVE: To determine the level of immunity to hepatitis A virus infection in rural Australian Aboriginal populations in the 'Top End' of the Northern Territory. **METHODS:** A total of 344 sera, for which details of donors' age, sex and domicile were available, were collected and tested for hepatitis A total antibody in a delinked seroprevalence study. **RESULTS:** Overall, 337/344 samples (97.97%) tested positive for hepatitis A total antibodies--18/20 samples (90%) in the 1-5 year age group; 85/88 (96.6%) in the 6-10 year age group; 98/98 (100%) in the 11-15 year age group; 32/33 (97.0%) in the 16-20 year age group and 104/105 (99%) in the older than 20 year age group. **CONCLUSION:** Hepatitis A is hyperendemic in the rural Aboriginal communities studied and the virus is acquired predominantly in the first five years of life. Symptomatic hepatitis A infection is uncommon in this population. We suggest that hepatitis A vaccination for rural Aboriginal children is not indicated as it would not reduce clinical disease rates and may produce a cohort whose immunity could decrease over the following 10 years. Although vaccination is appropriate for non-immune individuals working in remote communities, emphasis must be placed on the inequities in health infrastructure and education underlying the high transmission rates in Aboriginal children.

Burns C, Currie B, Currie J, Maruff P

Petrol sniffing down the track [letter]

Med J Aust 160: 729-730, 1994

Burns CB, Powers JR, Currie BJ

Elevated serum creatine kinase (CK-MM) in petrol sniffers using leaded or unleaded fuel

J Toxicol Clin Toxicol 32: 527-539, 1994

This study examined blood lead and creatine kinase levels in a group of 24 Australian Aboriginal males admitted to the hospital for treatment of severe petrol sniffing related illness after using only leaded petrol and 27 sniffers, 16 ex-sniffers and 13 non-sniffers from an isolated Aboriginal community using only unleaded petrol. Creatine kinase levels (which were nearly all creatine kinase-skeletal muscle isoenzyme indicating skeletal muscle damage) were correlated with blood lead levels and were elevated in active sniffers of leaded petrol on admission to hospital but were also increased in those sniffing unleaded petrol in the remote community. After fourteen days in hospital, median creatine kinase levels of leaded petrol sniffers dropped rapidly to levels similar to those of ex-sniffers and non-sniffers while median blood lead levels decreased but still remained higher than the other three groups. The data suggest that elevated creatine kinase associated with petrol sniffing may be due to compounds in petrol other than the lead additives, possibly volatile hydrocarbon components. Elevated creatine kinase may be useful in detecting current petrol sniffing activity, particularly in locations using unleaded petrol.

Cercarelli LR

Road crashes involving Aboriginal people in Western Australia

Accid Anal Prev 26: 361-369, 1994

Previous researchers who have looked at the problem of Australian Aboriginals involved in road crashes have examined data about Aboriginals killed in crashes as this has been the only kind available. The aim of the present study was to describe the characteristics of Aboriginals and non-Aboriginals hospitalised in Western Australia after a crash. The results suggested that Aboriginals were over-represented in casualty road crashes on a per-capita basis but that they did not differ in the patterns of injuries received or in injury severity when compared to non-Aboriginal casualties. Additional data are needed to further examine these issues.

Cheah WK, King PA, Tan HL

A review of pediatric cases of urinary tract calculi

J Pediatr Surg 29: 701-705, 1994

A retrospective review was performed of the records of 93 children with urinary tract calculi treated during a 10-year period (1983 to 1992). Two distinct groups of patients were identified. One group comprised 63 Aboriginal children, mainly from the northern region of Western Australia, who presented at a young age (average, 2.8 years) with urinary tract infections and failure to thrive. The other group comprised of 30 non-Aboriginal children, mainly from the metropolitan region, who presented at an older age (average, 6.7 years) with abdominal and flank pain. Calculi were located in the upper urinary tract in 85 children (91.4%) and in the bladder in eight (8.6%). Most patients underwent open surgical procedures for removal of their calculi, and the overall success rate was 86%. In recent years, percutaneous nephrolithotomy has been used successfully in selected patients with renal pelvic calculi. This method seems to be the trend for the future.

Currie B, Burrow J, Fisher D, Howard D, McElver M, Burns C

Petrol sniffer's encephalopathy [letter]

Med J Aust 160: 800-801, 1994

Dunne P, Patterson C, Kilmartin M, Sladden M

Health service provision in rural and remote areas: a needs analysis

Med J Aust 161: 160-162, 1994

OBJECTIVES: To assess the health service needs of rural and remote populations and to examine the relationship between these needs as obtained from available data and as perceived by community general practitioners (GPs) and other health providers. **DESIGN:** Existing census and research data were used to study the Huon and Channel health district of South-East Tasmania. Primary data collection consisted of structured interviews with medical practitioners and community representatives. **RESULTS:** Serious health problems are widespread in rural and remote areas as a result of socioeconomic conditions arising from economic recession and unemployment and pre-existing lifestyle and cultural attitudes towards health, low educational levels, isolation and lack of transport. General practice and primary health care provision follow urbanisation and decrease with increasing distance from a major rural centre, as do the incidence of poverty and worsening health problems. **CONCLUSIONS:** Most primary health care in rural and remote areas is provided by GPs, with curative services predominating. The health service patterns conform to lower socioeconomic patterns in that preventive health is given in low priority. Preventive health programs should tie in with curative health service provision, making use of the resources already available within the communities. The primary role taken by rural GPs in health service provision demands that they take a pivotal role in preventive health service delivery.

Gratten M, Morey F, Hanna J, Hagget J, Pearson M, Torzillo P, Erlich J

Type, frequency and distribution of *Haemophilus influenzae* in central Australian Aboriginal children with invasive disease [letter]

Med J Aust 160: 728-729, 1994

Guest CS, O'Dea K

Food habits in Aborigines and persons of European descent of southeastern Australia

Aust J Public Health 17: 321-324, 1993

As part of a study of risk factors for glucose intolerance and heart disease in Australian Aborigines and persons of European descent, we elicited the prevalence of food habits that may be associated with high fat and high salt intakes. Interview data were gathered from population-based samples in country towns and visitors to an Aboriginal health service in a state capital city, all in southeastern Australia. Among persons aged 13 years and over, the frequency of eating takeaway food as a meal was categorised as monthly or less, weekly, more than once per week, and daily or more often. The prevalence of eating such meals was higher among city Aborigines than those living in the country town; the prevalence was lowest among the country-town Europeans ($\chi^2 = 184$, 6 df, $P < 0.001$). The prevalence of adding salt during cooking and food consumption was higher among Aborigines compared with Europeans. Among country-town Aboriginal males aged 35 or under, 25 of 40 (63 per cent) added salt to cooked food 'most of the time', compared with 66 of 185 (36 per cent) Europeans

(chi 2 = 9.8, $P = 0.002$). Among Aboriginal females, 47 of 64 (64 per cent) were in the highest category of salt use, compared with 35 of 190 (18 per cent) of Europeans (chi 2 = 66.3, $P < 0.001$). About one-third of country-town Aboriginal males used dripping to fry food, but in the other ethnicity, gender and location groups, vegetable oil was the most frequent choice. The main differences in food habits were associated with ethnicity, rather than location. (ABSTRACT TRUNCATED AT 250 WORDS)

Guest CS, O'Dea K, Larkins RG

Blood pressure, lipids and other risk factors for cardiovascular disease in Aborigines and persons of European descent of southeastern Australia

Aust J Public Health 18: 79-86, 1994

Based on a survey in two country towns of southeastern Australia, cardiovascular risk-factor prevalence data from Aborigines and persons of European descent are presented. The mean diastolic blood pressure in 123 Aboriginal males was 83.2 mmHg, compared with 79.2 mmHg in 272 European males ($P = 0.005$). In 178 Aboriginal females, mean diastolic pressure was 79.2 mmHg, compared with 76.3 mmHg in 281 European females ($P = 0.006$). Mean plasma total cholesterol was higher in Europeans (both males and females: 5.7 mmol/L) than in Aborigines (in males 5.2 and females 5.0 mmol/L) (male comparison, $P = 0.02$, female comparison, $P < 0.001$). The prevalence in participants aged 25 to 64 years of at least one major risk factor (diastolic blood pressure 95 mmHg or higher, plasma cholesterol 6.5 mmol/L or higher, or smoking more than one cigarette daily) was higher in both these samples of Aborigines (94 per cent in males, 89 per cent in females) and Europeans (70 per cent in males, 59 per cent in females) than in the 1989 urban sample of the National Heart Foundation (47 per cent in males, 36 per cent in females). Multivariate analyses showed statistically significant independent contributions of body mass index and the variable 'ethnicity' (unidentified genetic and environmental differences between the groups) to blood pressure and other risk factors. The higher cardiovascular mortality of Aborigines may be explained partly by the higher prevalence of risk factors in this group compared with other Australians. Further, the risk-factor profile may be worse among rural compared with urban Europeans.

Hanna J

Hib meningitis immediately after vaccination [letter]

Med J Aust 160: 452, 1994

Hart RF, Ring I, Runciman C

Public hospital activity, expenditure and staffing levels for indigenous and nonindigenous settlements in remote Queensland

Aust J Public Health 17: 325-330, 1993

Aborigines and Torres Strait Islanders who live in discrete communities have poor health. Their life expectancy is relatively low and the underlying rates of morbidity, mortality and hospitalisation are much higher than the Australian average. For Aborigines and Torres Strait Islanders in the remote communities, the mortality rate is some three times higher than that of the total population. By comparing remote Aboriginal and Torres Strait Islander communities with similarly remote nonindigenous settlements, the paper shows that there was greater hospital activity per person in remote Aboriginal and Torres Strait Islander communities. Paradoxically, whereas there was greater hospital activity in discrete indigenous communities, there was lower expenditure per person on

hospital services. The paper finds also that there were fewer medical and nursing staff per person in remote Aboriginal and Torres Strait communities.

Hayes L, Quine S, Bush J

Attitude change amongst nursing students towards Australian Aborigines

Int J Nurs Stud 31: 67-76, 1994

A pre-test and post-test impact evaluation design was used to determine if attendance at a workshop conducted by Australian Aboriginal health personnel improved the attitudes of nursing students towards Aborigines. A three-hour workshop attended by first year nursing students comprised an introduction, video and discussion. A self-administered questionnaire, consisting of socio-demographic background questions and attitude rating scale, was used to measure students' attitudes before and after the workshop. The Wilcoxon signed rank test and paired t-test were used to test for significant improvement in students' total attitude scores. Multiple regression analysis was conducted to determine if socio-demographic variables contributed to the changes in the students' attitude scores. Complete data were collected from 246 students. Results indicate improvement in attitude scores. Socio-demographic variables did not contribute to these scores.

Jones CO, White NG

Adiposity in Aboriginal people from Arnhem Land, Australia: variation in degree and distribution associated with age, sex and lifestyle

Ann Hum Biol 21: 207-227, 1994

A number of researchers have found substantial sex, population and group differences in adiposity and fat-distribution patterns, but there is relatively little information on body fat distribution in Aboriginal groups, especially for the indigenous people of Australia. This study, the largest of its kind for Australian Aboriginal people, presents information on adiposity and fat distribution in 425 Yolngu, a group of Aboriginal people living in a number of communities representing a wide range of lifestyles, in northeast Arnhem Land, Australia. Using BMI standards developed for people of European descent, the majority of the individuals in this study were lean, and the incidence of obesity was considerably less than in other Australian groups, Aboriginal and non-Aboriginal. For the Yolngu in this study the relationship between ageing and adiposity is similar to that reported for tradition-orientated Aboriginal people, as well as for a number of other indigenous groups, viz., while the men maintain their weight into old age, the women, once they are past early adulthood, lose body fat with age. The results from the present study suggest that the age at which the Yolngu women start to gain, and subsequently lose, body fat is associated with differences in degree of acculturation. As has been found in other populations, age- and sex-related differences in body fat distribution occur, but no correlation was found between adiposity and fat distribution. The Aboriginal women and men, however, had a significantly more central distribution of subcutaneous fat than their non-Aboriginal counterparts. Our findings have implications for the health and demography of Aboriginal people in general, and the Yolngu in particular, as they continue the transition from hunting and foraging towards a more 'westernized' lifestyle.

Kijas JM, Fowler JC, Van Daal A

PCR amplification of alleles at locus D17S5: detection of new and rare long-length alleles by oligoprobinding in a survey of Australian populations

Hum Biol 66: 329-337, 1994

Alleles of the hypervariable human locus D17S5 were amplified by polymerase chain reaction (PCR) and categorized by length. Unlike other surveys of this locus, the products of amplification were authenticated by Southern analysis using an oligomeric probe directed to part of the 70-base-pair (bp) variable number of tandem repeat (VNTR) region. A small number of unusually long alleles were located. In a survey of 201 unrelated Caucasian individuals, 16 alleles (size range, 170-1430 bp) and 59 genotypes were observed (heterozygosity, 86.4%; discriminating power, 0.963). In a similar survey of 166 traditional Australian Aboriginals, 18 alleles (size range, 170-1430 bp) and 46 genotypes were found (heterozygosity, 80.8%; discriminating power, 0.942). The allele frequencies differed significantly between these two ethnically distinct populations. Comparisons are made with other anthropologically diverse populations.

Kricun ME

Edward B.D. Neuhauser Lecture. Paleoradiology of the prehistoric Australian Aborigines

Am J Roentgenol 163: 241-247, 1994

Prehistoric populations suffered the rigors of everyday survival as hunter-gatherers, and some of the individuals had osseous manifestations as a result both of these stresses and of aging. Paleomedical scientists usually seek out osseous abnormalities found in skeletal remains, thus stressing the morbidity of a population. In so doing, they portray those populations as less healthy than their own. This may not necessarily be the case. Specimens without signs of injury should be considered as evidence of the population's vitality; bones with evidence of injury that has healed during life should be considered as evidence of debility; and bones with evidence of conditions that are occupational in origin should be considered as evidence of social, economic, and ecological environmental conditions. This is more useful than singling out specimens with abnormalities as signs of the population's morbidity. This is confirmed by the majority of bones appearing osteologically healthy, except for the characteristic findings of biomechanical wear and tear arising from acquiring food and from combat (osteoarthritis, fractures). Although a number of children may have been infected by the treponematoses, which were manifested by cutaneous lesions, only a small percentage of children actually experienced osseous infection. Also, bone metastases were extremely rare.

Nienhuys TG, Boswell JB, McConnel FB

Middle ear measures as predictors of hearing loss in Australian Aboriginal school children

Int J Pediatr Otorhinolaryngol 30: 15-27, 1994

This study sought to establish the value of tympanometry and otoscopy for predicting significant conductive hearing loss in remote-area Aboriginal children, and also to measure the range of hearing loss which can be expected with middle ear disease, with or without a tympanic membrane (TM) perforation. A field study is reported of 255 Aboriginal children aged up to 16 years who were examined with pneumotoscopy and tympanometry and whose hearing was tested under controlled acoustic conditions. Results showed that pneumatic otoscopy for detection of middle ear effusion and identification of perforations resulted in the best rate of prediction of significant conductive

hearing loss. Furthermore, the hearing of children with perforated TMs (mean pure-tone average 30.0 dB; S.D. 11.1) was significantly worse than those in which tympanometry suggested middle ear effusion (mean pure-tone average 20.3 dB; S.D. 9.6), and both differed significantly from ears showing normal tympanograms (mean pure-tone average 11.2 dB; S.D. 5.9). Implications for community-based hearing screening and classroom management of affected children are discussed.

Norgan NG

Interpretation of low body mass indices: Australian Aborigines

Am J Phys Anthropol 94: 229-237, 1994

Low body mass index (BMI, kg/m²) has been proposed as a practical measure of energy undernutrition although it has some well-known limitations. Some reports have suggested that those Australian Aborigines living a largely traditional way of life have low BMI without compromised health status and may have paradoxically high levels of subcutaneous adipose tissue. The evidence for low BMI in Australian Aborigines is reviewed from the mean data of 1,174 individuals in 26 groups of adults and from the individual data of 349 of these individuals, collected before 1970. Three of the nine groups of women had mean BMI less than 18.5 kg/m² and 4% of the individual men and 14% of the individual women had values less than 16 kg/m², a value regarded as indicating severe chronic energy deficiency. Skinfold thicknesses were greater than expected from the BMI, suggesting paradoxically high subcutaneous fatness. The contribution of long-leggedness to low BMI was estimated from the regression of BMI on the sitting height to stature ratio (SH/S). For the 26 groups, this was estimated to be 2 kg/m², $r^2 = 31\%$. The relationship was weaker with the individual data, $r^2 = 15\%$. Body shape as evinced by low SH/S does contribute to low BMI in these Australian Aborigines. Single cut-offs of BMI are not applicable to all population groups and allowance may have to be made for body form when using BMI to assess nutritional status.

O'Neill G

Cemetery reveals complex Aboriginal society [news]

Science 264: 1403, 1994

Pascoe L, Seow WK

Enamel hypoplasia and dental caries in Australian Aboriginal children: prevalence and correlation between the two diseases

Pediatr Dent 16: 193-199, 1994

This study investigated the prevalence of enamel hypoplasia and dental caries and the relationship between the two diseases in all 4- to 6-year-old Australian Aboriginal children of the Tiwi tribe on Bathurst Island. Seventy-nine of 80 children (99%) had enamel hypoplasia, with a mean of 12.0 \pm 4.1 hypoplastic teeth per child. Dental caries was noted in 66 (83%) of children and the mean number of decayed teeth per child was 3.9 \pm 3.3. A strong association between enamel hypoplasia and dental caries ($P < 0.01$) suggests that enamel hypoplasia may be a significant caries risk factor in this group. Furthermore, while high levels of medical morbidity were found, the relative importance of each medical condition in the pathogenesis of enamel hypoplasia could not be determined because nearly all patients with enamel hypoplasia had the full range of medical problems. It is likely that all the medical conditions commonly encountered contribute to enamel hypoplasia and may act synergistically.

Pearn J

Acacias and Aesculapius. Walter Edmund Roth, 1861-1933

Med J Aust 161: 216, 1994

Rowse T

The relevance of ethnographic understanding to Aboriginal anti-grog initiatives

Drug Alcohol Rev 12: 393-399, 1993

Aboriginal initiatives to 'beat the grog' may or may not draw on ethnographies of Aboriginal drinking behaviour. The deeper reason for this uncertainty has to do with fundamental ideas of citizenship and (self) governance. What is the relevance of 'culture' to individual responsibility? This paper reviews this question at three levels; the political debate about 'rights' and responsibility'', ethnographic depictions of Aborigines as both group-dominated and individualistic, and through one Aboriginal organization's embracing of the perspectives of Alcoholic's Anonymous.

Rowse T, Scrimgeour D, Knight S, Thomas D

Food-purchasing behaviour in an Aboriginal community. 1. Results of a survey

Aust J Public Health 18: 63-67, 1994

Attempts to improve the nutritional status of Aboriginal people through nutritional education programs should be informed by an understanding of contemporary patterns of food procurement, preparation and distribution. This paper describes the results of a survey of food-purchasing behaviour in a central-Australian Aboriginal community. Every transaction occurring in each food outlet in the community over a two-week period was recorded and the data analysed. The results show that women play a much greater role than men in food purchasing, that there is a significant recourse to takeaway foods, that there is a cycle of expenditure determined by distribution of pension and Community Development Employment Project cheques, and that children have sufficient disposable income to be able to provision themselves from the food outlets, so that much of their food consumption is not determined by adult members of their family.

Scrimgeour D, Rowse T, Knight S

Food-purchasing behaviour in an Aboriginal community. 2. Evaluation of an intervention aimed at children

Aust J Public Health 18: 67-70, 1994

The previously described survey of food-purchasing behaviour in a central-Australian Aboriginal community demonstrated that children have sufficient disposable income to provision themselves directly from food outlets. Subsequently, a community-based intervention project developed strategies to provide healthier choices for these children. Two years after the initial survey, a follow-up survey was conducted in which all food purchases by children under the age of 15 in the community were recorded over a two-week period. The results demonstrate an improvement in the quality of foods and beverages purchased by children at the time of the second survey.

Stocks NP, Newland H, Hiller J

The epidemiology of blindness and trachoma in the Anangu Pitjantjatjara of South Australia

Med J Aust 160: 751-756, 1994

OBJECTIVE: To determine the prevalence of trachoma and blindness in the Aboriginal population in the Anangu Pitjantjatjara and Yalata lands of South Australia. **DESIGN AND SETTING:** A population-based prevalence survey undertaken in conjunction with routine South Australian Aboriginal Trachoma and Eye Health Program trips during 1989 and 1990. **RESULTS:** A group of 1514 individuals aged 0-90 years, or approximately 58% of the estimated Aboriginal population in the Anangu Pitjantjatjara and Yalata lands, was examined. Active inflammatory trachoma was found in 17.6% of the group (266 individuals), cicatricial trachoma in 25.2% (382) and binocular blindness (Australian definition) in 1.5% (22). The major causes of monocular and binocular blindness were trachoma, cataracts and trauma. Two per cent of women (17 of 849) were blind, compared with 0.8% (5 of 665) of men (odds ratio, 3.22; 95% confidence interval, 1.03-10.43). **CONCLUSIONS:** Although trachoma is still endemic in the 'traditional' Aboriginal population of SA, its prevalence and severity appear to be less than previously recorded. However, the prevalence of blindness is comparable with that found in developing countries and the causes are still largely preventable. Further effort is required to reduce trachoma and preventable or treatable blindness in these communities.

Stuart J

Guidelines on the management of paediatric middle ear disease [letter]

Med J Aust 160: 451, 1994

Suter K

British atomic tests in Australia

Med War 10: 195-206, 1994

The United Kingdom and Australia have reached agreement on the British payment for cleaning up the Maralinga (South Australia) site at which the UK tested some of its atomic weapons in the 1960s. The tests were conducted amid great secrecy and only in recent years has the truth about the health hazards fully emerged. The peace movement opposed the tests and its stand has been vindicated. Also vindicated have been the claims by Aborigines that more damage was done by the tests than was earlier admitted.

Verge CF, Silink M, Howard NJ

The incidence of childhood IDDM in New South Wales, Australia

Diabetes Care 17: 693-696, 1994

OBJECTIVE: To determine the incidence of insulin-dependent diabetes mellitus (IDDM) in children 0-14 years of age in the state of New South Wales, Australia, which has a total population of 5.73 million. **RESEARCH DESIGN AND METHODS--**We established a prospective register, identifying 361 incident cases over a 2-year period (1990-1991) with two independent sources of case ascertainment. The primary source was the reporting of newly diagnosed patients by physicians and diabetes educators. The secondary source was a subsidized syringe scheme. **RESULTS--**Using the capture-recapture method, ascertainment was estimated to be 99.4% complete. The age-standardized incidence rate was 14.5 per 100,000 person-years (95% confidence interval: 13.0-16.0). No significant

differences were found when comparing the first and second years of the register, boys and girls, geographical areas, or Aboriginal and non-Aboriginal children. There was seasonal variation in the onset (with more cases in winter), which was evident in the 10- to 14-year age-group ($P = 0.01$), but not in younger age-groups. A first-degree relative was already affected in 6.9% of the cases. No significant difference was noted in the age at onset when comparing cases with and without an affected first-degree relative. **CONCLUSIONS**--The incidence of childhood IDDM in New South Wales is similar to rates found in other predominantly Anglo-Saxon populations. IDDM occurs in Aboriginal children with a frequency comparable to that in the rest of the population.

Veroni M, Gracey M, Rouse I

Patterns of mortality in Western Australian Aboriginals, 1983-1989

Int J Epidemiol 23: 73-81, 1994

The ratios of age-standardized mortality rates of Aboriginals to non-Aboriginals in Western Australia during the period 1983-1989 were 2.6 for males and 3.0 for females. Mortality rates experienced by Aboriginals were much higher in all age categories except 75+ years and for most major diseases except neoplasms. The peaks of all-cause age-specific mortality rate ratios (RR) for Aboriginal males and females were 10.2 (at 40-44 years) and 10.0 (at 35-39 years), respectively. These excess mortalities were mainly due to circulatory diseases, injury and poisoning, respiratory diseases and, in females, to digestive diseases and genitourinary diseases. The highest age-standardized, cause-specific RR for Aboriginal males were for mental disorders (10.3), injury and poisoning (8.9) and genitourinary diseases (8.6); for females the highest RR were for genitourinary diseases (16.9), endocrine, nutritional and metabolic (mainly diabetes mellitus) (12.3), and for infectious and parasitic diseases (7.5).

Wan X, Currie B, Miller N, Mathews JD

Acute hepatitis B infection in Aboriginal Australians

Aust J Public Health 17: 331-333, 1993

The apparent incidence of acute hepatitis B infection in the Top End of the Northern Territory was estimated from notification data and hospital data to be 12 per 100,000 per year, with a marked difference between Aborigines (42 per 100,000) and non-Aborigines (4 per 100,000), and an odds ratio of 9.7 (95 per cent confidence intervals 3 to 33). Sixty percent of Aboriginal cases of acute hepatitis B occurred in children under 10 years of age, whereas non-Aboriginal cases occurred in adults aged 20 to 29, most with behavioural risk factors. These findings confirm the importance of immunising Aboriginal children to reduce the future incidence of hepatitis B infection and hepatoma.

Ward BR, McPherson B, Thomason JE

Hearing screening in Australian Aboriginal university students

Public Health 108: 43-48, 1994

Many indigenous peoples have been found to show an increased prevalence of both middle ear disorder and associated conductive hearing loss. Hearing loss may cause educational disadvantage during school years. For many indigenous populations in developed countries there are now increasing opportunities to participate in established formal education. This has led to greater numbers of indigenous students in post-secondary education. This study examined the results of a

three-year hearing health programme for Australian Aboriginal students entering university studies. Prevalence rates were compared with those of urban Aboriginal adult non-students and non-indigenous populations. It was found that 15.5% of indigenous university students had a unilateral or bilateral hearing loss. Recommended screening procedures and methods to enhance classroom listening for indigenous hearing impaired students were suggested.

Weeramanthri T, D'Abbs P, Mathews JD

Towards a direct definition of an alcohol-related death: an analysis in Aboriginal adults

Aust J Public Health 18: 71-78, 1994

This paper addresses the conceptual and methodological difficulties in obtaining reliable information on alcohol-related mortality in Aboriginal communities. A working definition is proposed; this requires an alcohol-positive history together with a consistent mode of death, and is applied retrospectively to a series of 29 adult deaths in a large Aboriginal community. An informant history of alcohol abuse was found to be the most sensitive indicator of an alcohol-positive history and correlated well with autopsy findings and medical records. Alcohol-positive histories were found for 17 of 29 deaths by informant history, for 9 of 29 by autopsy findings, and for 12 of 29 by medical record review. These indicators were combined with a mode of death categorisation to arrive at an estimate of 5 of 29 definite, 5 of 29 probable, and 1 of 29 possible alcohol-related deaths. We conclude by examining the process by which such a definition might be further developed and the context in which resulting information might then be used.

Guidelines for contributors

Reports of investigations or contributions including critical analysis and review of available information which could be published as 'Original articles', 'Brief communications', 'Health-related statistics', and 'Subject reviews' are considered. Non-standard, free format articles are also accepted for publication.

Articles submitted or published elsewhere but of significant relevance to Aboriginal health workers are included on the understanding that they have been made available for wider dissemination, and that the permission to reproduce the material has been obtained from the copyright holders.

No strict peer review is intended; however, the manuscripts are submitted to external referees to ensure consistency and relevance of the contents to the Bulletin's aims and scope.

The Editors would be grateful for any assistance in the compilation of the Bulletin, particularly with regards to current topics, recently published and unpublished reports, articles and theses.

Authors are urged to submit their manuscript in electronic format as far as possible. The preferred format is Apple Macintosh, Microsoft Word, but manuscripts in other formats will be accepted. References should be kept to a minimum and must be in the style shown below:

Knapp L, Schimdt R, Stein L. Alcoholism and hospitalisation in central Australia. *Aboriginal and Torres Strait Islander Health Information Bulletin* 16: 23-34, 1992

Hunter L, Merlo N. Trends in Aboriginal mortality. *Hum Biol* 23: 190-196, 1995

Schmidt L. Fetal alcohol syndrome. In *Consequences of Alcohol Misuse*, edited by J Ram, P Paul and L Schmidt. Sydney: Lotka Press, 1991, pp. 35-41

Australian Bureau of Statistics. *Australia's Aboriginal and Torres Strait Islander Population*. Catalogue No. 2740.0. Canberra: Australian Bureau of Statistics, 1993

Australian Institute of Health and Welfare. *Australia's Health 1994*. Canberra: Australian Government Publishing Service, 1994

Hogg R, Thomson N. *Fertility and Mortality of Aborigines Living in the Queensland Aboriginal Communities 1972-1990*. Australian Institute of Health and Welfare: Aboriginal and Torres Strait Islander Health Series, No. 8. Canberra: Australian Government Publishing Service, 1992