1998

Eye health of Aboriginal and Torres Strait Islander people: Aboriginal and Torres Strait Islander Health Reviews: Number 1

Neil Thomson

Beverley Paterson

Edith Cowan University

Copyright Warning

Aboriginal and Torres Strait Islander
Health Reviews

Number 1 June 1998

EYE HEALTH OF ABORIGINAL AND TORRES STRAIT ISLANDER PEOPLE

Neil Thomson and
Beverley Paterson

nal Aboriginal and Torres Strait Islander
Health Clearinghouse

Aboriginal and Torres Strait Islander Health Reviews

Number 1, June 1998

Eye health of Aboriginal and Torres Strait Islander people

Neil Thomson

Beverley Paterson

National Aboriginal and Torres Strait Islander Health Clearinghouse

Edith Cowan University

Perth, Western Australia

Aboriginal and Torres Strait Islander Health Reviews

This is the first in a planned series of reviews of various aspects of Aboriginal and Torres Strait Islander health.

The reviews will be undertaken or commissioned by the National Aboriginal and Torres Strait Islander Health Clearinghouse as part of its role in developing and disseminating information about Aboriginal and Torres Strait Islander health.

The Clearinghouse can be contacted at:
Edith Cowan University, 100 Joondalup Drive, Joondalup WA 6027.
Telephone: (08) 9400 5104. Facsimile: (08) 9400 5449.
Email: natsihc@cowan.edu.au

A copy of this review is available also on the National Aboriginal and Torres Strait Islander Health Clearinghouse's Internet site:
Web address - http://www.cowan.edu.au/clearinghouse

National Library of Australia Cataloguing-in-Publication data

ISSN 1441-0346

Acknowledgements

The authors are particularly grateful to Professor Hugh Taylor for his very valuable guidance in the conduct of this review of the eye health status of Aboriginal and Torres Strait Islander people and for comments on the draft manuscript.

The review would not been possible without the contributions of the many organisations and individuals who contributed information about Aboriginal and Torres Strait Islander eye health. The authors thank these organisations and individuals, whose details are recorded in Appendix 3 of this report.

Thanks are extended also to the Commonwealth Department of Health's Office for Aboriginal and Torres Strait Islander Health Services, which provided funds both for the conduct of the review and the publication of this report.

Suggested citation

Thomson, N. & Paterson, B. (1998). Eye health of Aboriginal and Torres Strait Islander people. *Aboriginal and Torres Strait Islander Health Reviews*, Number 1. National Aboriginal and Torres Strait Islander Health Clearinghouse, Perth.

Contents

List of tables

1. Introduction

1.1 Eye health status prior to European settlement

As with many other aspects of health status, it is most probable that prior to the European settlement of Australia in 1788 the eye health of Australian Aborigines and Torres Strait Islanders was excellent. In fact, their eye health was almost certainly better than that of Europeans of the time.

There are no definite data from early post-settlement times, but this conclusion appears reasonable from the results of a number of thorough surveys conducted as late as the 1940s and 1950s (1-4). Despite finding some severe preventable problems, particularly trachoma (a form of infective conjunctivitis - see Appendix 1 for more details), these surveys documented the relative rarity among Aborigines of common ocular abnormalities, including degenerative causes of blindness. These findings were largely confirmed in the most extensive survey of indigenous health ever undertaken, the National Trachoma and Eye Health Program (5).

The findings of early surveys of exceptionally good vision among Aborigines were confirmed in a detailed study undertaken by Professor Hugh Taylor in conjunction with the National Trachoma and Eye Health Program (6). This study found that Aborigines overall had much better visual acuity than non-Aborigines. In some Aborigines, acuity 'was better than that believed possible on theoretical grounds, and certainly much better than that documented for any other racial group' (6:110). These words echo Professor Ida Mann's comment that some of the Aborigines she examined had visual acuity that was 'phenomenal by European standards' (7:468).

In the group assessed by Taylor, the superiority of acuity was partly due to the presence of less refractive error among Aborigines, who were found to have less myopia (particularly high myopia) and less astigmatism than non-Aborigines (6). Based on his finding that the superior vision of Aborigines persisted when essentially emmetropic groups were compared, Taylor concluded that the superiority may also be partly a result of 'finer retinal organisation or better cerebral integration of visual stimuli'(8).

Colour vision has also been documented as superior among Aborigines. Of the 257 Aboriginal males tested in the Kimberley region of Western Australia, only 6 (2.3 per cent) were found to be colour blind by the Ishi-hara colour vision test (3). This level was significantly lower than that found for the 25 (12.1 per cent) of the 207 non-Aboriginal men tested, and also well below the stated level of 8 per cent for Caucasian males (3). In the Eastern Goldfields area of Western Australia, the prevalence among Aborigines was even lower, 1.0 per cent for Aborigines without evidence of miscegenation, and 2.7 per cent for 'part-Aborigines' (4). Consistent with its virtual non-existence among women, no cases of colour blindness were

found among Aboriginal women. In the Kimberley region, Mann noted that not only was there a low prevalence of colour blindness among Aboriginal males, but also many men could detect the confusion number, being able to see one figure superimposed on the other.

Strabismus (non-alignment of both eyes on the object of visual attention) has also been found to be less common among Aboriginal children than among non-Aboriginal children (3, 5). In childhood, strabismus is usually convergent. If it develops early in life, and is constant and uncorrected, then amblyopia ('blunt sight') in the defective eye may develop and persist through life (5). Divergent strabismus most generally occurs if sight in an eye is lost or greatly reduced at ages beyond early childhood. For all ages, the prevalence of convergent strabismus for Aborigines was 0.2 per cent, compared with 0.5 per cent for non-Aborigines (5). A prevalence of divergent strabismus of 0.5 per cent was found for both Aborigines and non-Aborigines.

Inherited primary glaucoma, involving an abnormal increase of pressure within the eye, and predisposing to blindness, is rare among Aborigines (3, 5). Although the National Trachoma and Eye Health Program noted that 34 per cent of the listed Aboriginal glaucoma was primary, compared with 70 per cent of non-Aboriginal glaucoma, the Program's Director, Professor Fred Hollows, did not find one certain case of primary open angle or primary closed angle glaucoma among Aborigines.

The situation with regard to infective and traumatic ocular conditions and those related to ultra-violet radiation is less clear.

Many people have interpreted the records of William Dampier, who explored some of the western coast of the continent in the late 17th century, as evidence of the presence of trachoma at that time. From the work of Professor Ida Mann, one of the undoubted experts on the subject, this appears unlikely, however. Based on a detailed examination of the epidemiology of the disease in Australia and New Guinea, Mann concluded that the disease was introduced by European and Chinese settlers (9).

On the other hand, the lifestyle of Aboriginal people before 1788 suggests that ultra-violet exposure-related and traumatic eye conditions may not have been uncommon.

1.2 The National Trachoma and Eye Health Program

The work of Mann, Flynn and others, which had highlighted the extent of preventable eye pathology among Aborigines, prompted the Royal Australian College of Ophthalmologists to seek, and obtain, Commonwealth funds to undertake the National Trachoma and Eye Health Program.

Between 1976 and 1979, the National Trachoma and Eye Program examined and treated more than 62,000 Aborigines and almost 39,000 non-Aborigines throughout much of rural Australia (5). In so doing, the Program confirmed very much higher levels of preventable eye conditions, including blindness, among Aborigines than non-Aborigines. In particular, the Program found that:

- blindness was nine times more common among Aborigines than non-Aborigines: almost 15 out of every 1,000 Aboriginal people were blind compared with less than 2 out of every 1,000 non-Aboriginal people (see Table 5.2). For people aged 60 years or older, four times as many Aborigines than non-Aborigines were blind: 1 out of 5 Aborigines was blind, compared with 1 out of 20 non-Aboriginal people;
- follicular trachoma was 16 times more common among Aborigines than non-Aborigines: an eighth of Aboriginal people were affected by the condition, compared with less than 0.8 per cent of non-Aborigines (see Appendix 2, Table A2.2). Among children aged 9 years or less, 21 times more Aborigines than non-Aborigines were affected: 25 per cent of Aborigines had follicular trachoma, compared with slightly more than 1 per cent of non-Aborigines
- cicatricial trachoma, the scarring consequence of follicular trachoma, was 30 times more common among Aborigines than non-Aborigines: almost a third of Aboriginal people had evidence of the condition, compared with only one per cent of non-Aborigines (see Appendix 2, Table A2.3). Among Aborigines, four per cent had the most severe form of cicatricial trachoma, with a substantial proportion of older people having the condition severe enough to threaten vision.

Trachoma was found to be more prevalent and more severe in central and north-western Australia, particularly in four zones - the Western Desert (Zone 3), the Red Centre (Zone 1), Cattle Country (Zone 2) and Goldfields (Zone 4) - of the thirteen zones into which the NTEHP grouped its data.[1] Levels of blindness were highest in these four zones, and in the coastal areas of the north of Western Australia.

1.3 The 1985 review

In an attempt to review progress since the time of the NTEHP in the late 1970s, in 1985 the then Commonwealth Minister for Aboriginal Affairs, Mr Clyde Holding, initiated a review of 'the current ocular health status' of Aborigines (10:1.1), with the report to be comparable to the data provided by the 1980 report (5).

---

[1] The Program's 13 zones in rural Australia were defined according to relative similarities in geographic, climatic, industrial and demographic conditions (details of zones are shown in Appendix 2, Table A2.1).

With limited time and resources, the review restricted its screening to 20 communities, largely within the areas found to have a high prevalence and severity of trachoma in 1976-1977 (10). The review team examined a total of 2,228 people, comprising 2,008 Aborigines and 220 non-Aborigines.

Despite the fact that much of the data reported by the 1985 review was not directly comparable with that documented in the 1980 report, it was evident that the overall prevalence and severity of both follicular and cicatricial trachoma had declined since 1976-1977. However, the reduction in follicular trachoma, in particular, was not uniform, with the prevalence actually increasing in a number of communities.

The report also provided estimates of standardised prevalence ratios (SPR), which make allowances for the different age structure of the population examined in 1985. Compared with the SPR of 100 for the 1976-1977 screenings, the SPR for all forms of follicular trachoma in 1985 was 74[2] (or 83 when adjusted for relative community weightings) (10:6.7). Proportionately, the reduction in severe follicular trachoma was slightly greater: the SPR for 1985 was 55 (or 60 when weighted).

These overall declines conceal the actual changes that occurred between 1976-1977 and 1985 in individual communities. Of the 17 communities seen at both times, the SPR decreased between 1976-1977 and 1985 in 12 communities, but increased in five. For severe follicular trachoma, the SPR decreased in 11, increased in four and was unchanged in two.

While no SPR was reported for cicatricial trachoma, the prevalence of scarring was found to be substantially lower in 1985 than in 1976-1977. However, in recognition of the increased SPRs in some communities, the Review warned that 'future scarring prevalences may also be higher' (10, p6.1)

The findings of the 1985 Review were consistent with a number of other reports from around the same time (10-14).

A detailed assessment of trachoma in three Western Australian towns, Onslow, Meekatharra and Wiluna, (13) found that there was a marked decrease in follicular trachoma in each community. However, as a proportion of total follicular disease, there was a slight increase in the severe forms in Onslow. Overall, there was also a reduction in the prevalence of cicatricial trachoma, though, probably because of the small numbers in some age groups, the reduction was not uniform.

---

[2] An SPR of 100 would indicate no change in prevalence after allowance had been made for differences in the age structures of the populations surveyed. An SPR of less than 100 would indicate a decreased prevalence and an SPR of greater than 100 an increased prevalence.

1.4 This report

The new information contained in this report was prepared as part of a national review of Aboriginal and Torres Strait Islander eye health commissioned in November 1996 by the Commonwealth Minister for Health and Family Services, Dr Michael Wooldridge. The Minister requested Professor Hugh Taylor, Chair and Head of the Department of Ophthalmology at the University of Melbourne and Director of the Centre for Eye Research to:

A Describe the changing epidemiology of eye disease in Aboriginal and Torres Strait Islander peoples

B Describe and assess the appropriateness and efficiency of:

- current Commonwealth-funded trachoma and eye health programs in South Australia, Northern Territory and Queensland including the Northern Territory mobile track team;
- programs organised on an ad hoc basis using individual ophthalmologists and some mainstream arrangements with regional hospitals;
- an approach to delivering specialist ophthalmology and optometrist services to remote communities in the Cape York region, because of unique funding arrangements; and
- any other approaches to the treatment of trachoma and other eye health issues in Aboriginal and Torres Strait Islander communities identified by the Centre.

C Make recommendations to the Minister on how best to ensure that Aboriginal and Torres Strait Islander communities have good quality, appropriate primary and specialist eye health care, with particular reference to:

- the appropriate role and funding model for various parts of the health care sector;
- how to ensure appropriate linkages between primary and secondary care; and
- the future role of Commonwealth-funded trachoma and eye health programs.

In addressing the first of these terms of reference, current data were collected, collated, analysed and synthesised. Data were collected from a variety of sources, but it is important to note that no systematic surveys were undertaken.

Aspects of the changing epidemiology of Aboriginal and Torres Strait Islander eye health were included in the full findings of Professor Taylor's review (15), but separate publication was also deemed necessary.

2 Methodology

2.1 Sources of information

This assessment of the current status of Aboriginal eye health has used data from a variety of sources. These have included published reports and articles; research studies; information from State and Territory health authorities; information from Aboriginal community-controlled health services; service level information from ophthalmologists, doctors, and optometrists; theses; opportunistic local surveys; prevalence surveys conducted during treatment programs; and anecdotal evidence from practitioners in the field (see Appendix 3 for organisations and individuals contacted for the review).

Broadly, two types of information have been utilised - information already available in the public domain and information provided in response to requests for collected data. The requests for material produced a mixed response - from some areas a wealth of collected data was provided and from others little or no information was received.

Most State and Territory health authorities expressed support for the review, but reported that they did not maintain special collections in the area. Few of the Aboriginal-controlled health services which responded to the request were able to provide useful information. The three State-based trachoma programs provided a variety of information, but much of it was service-related. Of the State-based public health units contacted, useful information about trachoma among children was provided by three of the Western Australian units. The Lions Eye Institute (Perth) provided some information, as did 19 ophthalmologists and other doctors.

2.2 Quality, comparability and availability of data

The quality and comparability of data obtained are variable. Wherever possible, the data selected for inclusion are of a reasonable epidemiological standard, with emphasis being given to published reports, articles and research studies. Where this information has not been available (or current), other data sources and/or anecdotal evidence have been used. Much of the information provided had been collected at a service level, and often reflects access to services rather than actual population served. There are thus doubts about the denominator (population to which the cases relate) as well as the numerator (numbers of cases involved). This makes accurate estimation of the prevalence[3] of particular eye disorders difficult, if not impossible.

---

[3] Prevalence is defined as the number of existing cases of a disease in a population divided by the number of people in the population. It is the main epidemiological measure used in the analysis of survey and similar data collections.

With regard to trachoma, children have been the main focus of many trachoma programs in recent years and, as a result, much less information has been collected about scarring and trichiasis.

Much of the data provided had been summarised in non-standard ways making it difficult to incorporate into a broader picture. There has been no standard method or form used in the collection of data at either a state or national level. A recording form was provided with the request for information (see Appendix 4), but data were difficult to interpret when the original material had not been collected with sufficient specificity. The resulting synthesis of the data, and subsequent gaps in current information, reflect these aspects about the collection and collation of material.

2.3 General methodological issues

General methodological issues for data used in this review include: a lack of standardisation of diagnostic criteria; intra- and inter-observer variation; lack of consistency in age groups surveyed; method of selection of survey participants; seasonal factors; time relationship between surveys and treatment activities; a lack of full details about populations (the denominator); identification of Aboriginality; transient populations; and differences in the combining of towns and/or communities in the presentation of the data.

2.4 Disease-specific issues

Trachoma[4]

Material for the trachoma section (Section 3) incorporates both historical and current data. Comparisons have been made with earlier data collected by the NTEHP in 1976-1979 (5) and the 1985 review (10), providing some indication of the changing epidemiology of the disease among Aborigines and Torres Strait Islanders. An analysis of trends at a regional level has been made where comparability of data has allowed.

There are a number of methodological issues specific to the section on trachoma:

- lack of standardisation of diagnostic criteria - the grading of trachoma has changed over the years for which detailed data are available. The basic classifications of relevance to recent information collected for this report are: TF - follicular trachoma; TI - intense (severe) follicular trachoma; TS - scarring trachoma; TT - trachoma trichiasis, and CO - corneal opacity. Most recent surveys of trachoma have followed the revised five-sign system, but generally this is not stated explicitly. Unfortunately, nearly all the recent data on trachoma simply report follicular trachoma (TF) or 'inflammatory' trachoma. The absence of a breakdown into the various categories in the source data has precluded

[4] See Appendix 1 for a brief summary of the condition.

such a breakdown in this report. The comparability of data from different surveys - between and within regions - is not clear.

- observer variation - little information is known about the training of the people who conducted the surveys, so there is great potential for intra- and inter-observer variations in the assessment of trachoma. The NTEHP devoted considerable attention to instruction in the diagnosis of trachoma, but still found some intra- and inter-observer variation (10, p.20-23)
- lack of consistency in age groups surveyed - some surveys specify the age groups of children (such as 0-9 years) surveyed, but others do not (often just specifying 'schoolchildren'). As well, the actual age distribution of children within the groups is not stated. For proper comparisons to be made, it is necessary to know the prevalence of trachoma for each year of age. This would enable appropriate adjustments to be made, taking account of the different age structures of the surveyed populations and the likely age pattern of trachoma prevalence (see Appendix 2, Table A2.2 for the pattern found by the NTEHP).
- numbers and selection of survey participants - few details are known about the proportions of communities' populations included in many of the recent surveys. Also, little is known about how participants were chosen for inclusion. For those that examined children when they were at school, it is possible that the school attenders were not truly representative of all children in that locality. For example, those absent from school may have been so because of their poor health status, including eye health status. In this case, the survey figures may under-estimate the true prevalence of trachoma. On the other hand, if a survey focused on children known to be of greater risk of having trachoma, the survey results may over-estimate the true prevalence. The extent and direction these selection biases is simply not known.
- assessing trends in prevalence at the regional level will be influenced also by the proportion of communities in the region that have been surveyed. When surveys are undertaken for the planning and monitoring of services, it is clearly not sensible to continue undertaking detailed surveys in communities for which the prevalence of trachoma has been reduced to very low levels. This has happened in a number or regions. As a result, those recent service-oriented surveys which do not include all communities in the region will overestimate the regional prevalence of the disease.[5]
- seasonal factors - a number of surveys, particularly in the tropical north of the country, have noted differences in the prevalence of trachoma between the 'wet' and 'dry' seasons. However, many of the surveys from which data have been provided do not state the time of the year that data collection took place.

---

[5] If information was available about the proportions of the communities' populations seen in those surveyed, and the populations of those not surveyed, some adjustment could be made in the estimation of regional prevalence.

- time relationship between surveys and treatment activities - it is possible that some of the surveys may have been undertaken as a follow-up to a treatment program, after which a lower prevalence could be expected. Again, such information has not been included with the data provided.

Diabetic retinopathy[6]

Little historical information is available on the prevalence of diabetic retinopathy in the Aboriginal and Torres Strait Islander populations. A small number of studies and supporting anecdotal evidence provide an indication of the magnitude of this eye disorder, and a review of the literature on Aboriginal diabetes gives some indication of the future impact that this may have on the Aboriginal population. Only data from the Katherine region in the Northern Territory allow some analysis of trends over time.

It has been possible to present a broad picture of the known status of diabetic retinopathy among Aborigines, but there are some difficulties with direct comparability of the data. Some figures indicate the number of eyes with diabetic retinopathy and others provide information on the numbers of patients. Some of the studies report vision-threatening retinopathy and others the numbers requiring laser treatment.

The assessment of diabetic retinopathy involves the use of a number of different screening modalities, and the sensitivities and specificities of these modalities for detecting the various lesions of the condition vary widely (16).[7] The sensitivities and specificities vary also according to the experience and skill of the person performing the screening. For example, compared with the level of detection and grading of lesions identified by stereoscopic photographs of seven standard 30^0 fields, the sensitivities of ophthalmologists or retinal specialists performing ophthalmoscopy through dilated pupils were: any retinopathy - 56-61%; microaneurysms alone - 50-72%; non-proliferative diabetic retinopathy - 17-77%; proliferative retinopathy - 30-79%; and macular oedema - 40% (16. pp 39-40). For less trained people, including general medical practitioners, nurses and Aboriginal health workers, the sensitivities are even less.

In view of these sensitivities for the detection of diabetic retinopathy, there is clearly some uncertainty about the accuracy of the numbers of cases of the condition detected by various observers using different techniques in sometimes less than ideal conditions.

---

6 See Appendix 1 for a brief summary of the condition.

7 Sensitivity is the proportion of truly ill people in the screened population who are identified as ill by the screening test. Specificity is the proportion of truly healthy people who are so identified by the screening test.

Other conditions

A comprehensive and systematic survey of blindness among Aborigines was carried out by the NTEHP(5). Since then, the best estimate of blindness comes from a 1989-1990 survey in the Anangu Pitjantjatjara communities of northern South Australia(17). Minimal service data are available on blindness.

There has been no systematic assessment of cataracts since the NTEHP survey (5) and a small study undertaken in conjunction with the Program (18). Current data come from service usage, and provide information only on the number of patients who had cataracts or cataract surgery, giving little indication of the prevalence of cataracts in the Aboriginal community.

3 Trachoma

3.1 Recent evidence of trachoma prevalence

Periodic surveys, undertaken almost exclusively in areas of high trachoma prevalence, provide some evidence of the current levels of trachoma. As noted in the introduction, some caution must be exercised, however, in the interpretation of this evidence. This is largely because most of the surveys have been undertaken as a guide for the provision of services rather than as precise epidemiological investigations. There are a number of methodological issues which should be borne in mind when interpreting the data presented in this report. These issues, which are considered in detail in Section 2.4, include:

- lack of standardisation of diagnostic criteria
- observer variation
- lack of consistency in age groups surveyed
- selection of survey participants
- seasonal factors
- time relationship between surveys and treatment activities

Inflammatory trachoma

As noted in Section 2.4, nearly all the recent data on trachoma simply reports either follicular or inflammatory trachoma, the latter appearing to be used synonymously with follicular trachoma. The more severe form of inflammatory trachoma - trachoma intense - is very rarely reported. As a result, the information reported in this section is restricted to follicular trachoma.

For those areas where recent data are available, substantial numbers of children are affected by follicular trachoma and the prevalence in many areas appears to be still at hyperendemic levels[8] (see Table 3.1).

Table 3.1 Prevalence of follicular trachoma for children by prevalence category[1], region and year, 1988-1996

Prevalence category / region	Year	Age-group	Trachoma[2]	Numbers[3]	Prevalence[4] (%)
Hyperendemic areas					
Pilbara	1996	Children	Follicular trachoma	261/473	55 (51-60)
Alice Springs	1989/90	1-9 years	Follicular trachoma	315/724	44 (40-47)
Central Desert	1994	S/children	Follicular trachoma	67/189	36 (29-42)
Anangu Pitjantjatjara[5]	1990	0-9 years	Inflammatory trachoma	67/246	27 (22-33)
Eastern Goldfields	1990	0-9 years	Follicular trachoma	86/396	22 (18-26)
Mild to moderate endemic areas					
Katherine	1996	S/children	Follicular trachoma	55/289	19[6] (15-24)
Murchison	1996	0-9 years	Follicular trachoma	34/189	18 (13-23)
Kimberley	1996	S/children	Follicular trachoma	366/2522	15 (13-16)
East Arnhem	1988/89	1-9 years	Follicular trachoma	63/411	15 (12-19)

Sources: Kimberley Public Health Unit (1996)(19), Wallace (1996)(20), Stocks et al. (1996)(21), Pilbara Public Health Unit (1997)(22), Midwest Public Health Unit (1997)(23), Lions Eye Institute (1997)(24), Northern Territory Aboriginal Eye Health Committee Inc. (1992)(25), Trachoma and Eye Health Western Australia (1989) (26)

Notes:
1 Prevalence categories are: hyperendemic areas - prevalence greater than 20%; mild to moderate endemic areas - prevalence 5-20%; non-endemic areas - prevalence less than 5%. Communities have been categorised according to the most recent estimate of prevalence.
2 Trachoma classification is according to information provided.
3 Shown are numbers with trachoma and numbers surveyed.
4 Numbers in parentheses are 95% confidence intervals.
5 The Anangu Pitjantjatjara data relate to four communities - Yalata, Iwantja (Indulkana), Amata and Aparawatatja (Fregon).
6 The survey for the Katherine region was undertaken as a follow-up to a treatment program.

Bearing in mind the differences in the age groups surveyed and the year(s) of the surveys, the prevalence of follicular trachoma ranged from 15 per cent, for schoolchildren in the Kimberley region and children aged 1-9 years in East Arnhem Land, to 55 per cent for

[8] Trachoma prevalence can be categorised as: hyperendemic - areas with a prevalence greater than 20%; mild to moderate endemic - areas with a prevalence of 5 to 20%; non-endemic - areas with a prevalence less than 5%.

children in the Pilbara region. There are no hard data about the current severity of trachoma, but the impressions of ophthalmologists is that in many areas the trachoma is less severe than it was 10 to 20 years ago.

Scarring trachoma and trichiasis

As noted in Section 2.4, nearly all the recent data on trachoma simply reports follicular or inflammatory trachoma, and rarely scarring trachoma (TS) and trichiasis (TT).

An epidemiological study undertaken in 1990 among 1,514 Aboriginal people living in the Anangu Pitjantjatjara lands found that the prevalence of cicatricial trachoma (including TS and TT) was 25 per cent (17). Less than 6 per cent of people aged 19 years of less had any scarring (most of which was mild), but the prevalence increased with age to a peak of almost 90 per cent in those aged 60 years or older. Only 39 (2.6 per cent) of the 1,514 people surveyed had evidence of trichiasis. Of these 39, 26 were aged 60 years or older, with 19.1 per cent in that age group being affected.

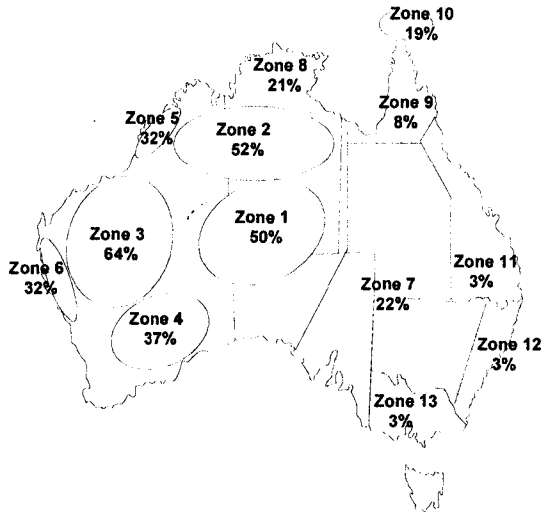
The only other recent data on scarring trachoma and trichiasis come from a survey undertaken by trainee Aboriginal health workers under the supervision of an ophthalmologist (27). The survey, of 308 people living in six communities in the Fitzroy Crossing Kimberley region of Western Australia, found evidence of scarring in 154 (50 per cent) of people, and trichiasis in four (one per cent). Despite the high prevalence of scarring, the report commented that 'it was notable how few people in these communities required surgical corrections of defects resulting from trachoma scarring' (27).

3.3 Trends in prevalence of trachoma

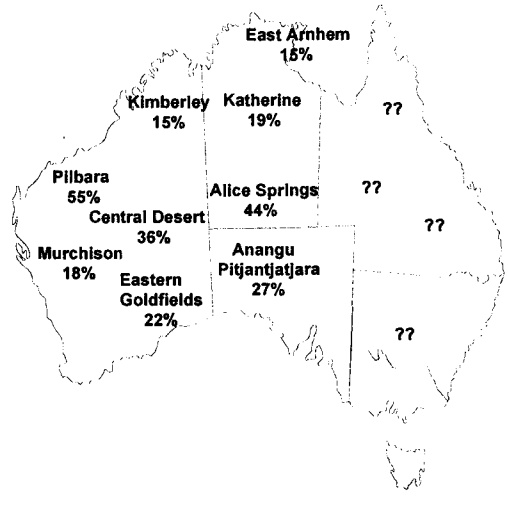
There are a number of sources of data which permit some analysis of trends in the prevalence of follicular trachoma over recent years, but really none for an analysis in trends of scarring trachoma and trichiasis. As a result, information in this section is confined to follicular trachoma. Overall, the prevalence of follicular trachoma has declined over the past 20 years, but, as noted above, substantial numbers of children continue to affected by follicular trachoma and the prevalence in many areas appears to be still at hyperendemic levels (see Figure).

Figure **Prevalence (%) of follicular trachoma among Aboriginal children, by geographic area and time period**

By NTEHP Zone, 1976-1979



By geographic region, 1989-1996



Notes
1. See Table A2.1 (Appendix 2) for details of NTEHP zones
2. Precise boundaries are not known for the geographic regions applying to data for 1989-1996
3. The age groups (when stated) for the various sources are: NTEHP Zones - 0-9 years; Alice Springs - 1-9 years; Anangu Pitjantjatjara - 0-9 years; East Arnhem - 1-9 years; Eastern Goldfields - 0-9 years; Murchison - 0-9 years. For the other sources, the survey populations were: Central Desert - schoolchildren; Katherine - schoolchildren; Kimberley - schoolchildren; Pilbara - children.
4. The time periods for the various regions for which recent data are available are: Alice Springs - 1989-1990; Anangu Pitjantjatjara - 1990; Central Desert - 1994; East Arnhem - 1988-1989; Eastern Goldfields - 1990; Katherine - 1996; Kimberley - 1996; Murchison - 1996; Pilbara - 1996. See Table 3.1 for further details.

Probably the most reliable data on trends of follicular trachoma are for four communities in the Anangu Pitjantjatjara lands, but the most general information relates to a number of the communities screened in 1985 as a follow-up to the 1976-1979 NTEHP.

Communities included in 1985 review

Recent data are available for a number of the communities surveyed in 1976-1979 and re-surveyed in 1985. For many of these communities, the prevalence of follicular trachoma has declined but still appears to be at hyperendemic levels (see Table 3.2).

Table 3.2 Prevalence[1] of follicular trachoma for children for selected communities[2] by prevalence category[3] and year, 1976-1996

Prevalence category / community	Year							
	1976/ 1979	1985	1990/ 1991	1992	1993	1994	1995	1996
Hyperendemic areas								
Jigalong	83	73	80	n/a	n/a	n/a	n/a	66
Yiyili (Louisa Downs)	58	71	82	66	69	16	32	42
Halls Creek	45	42	76	73	88	32	38	40
Billiluna	100	78	84	36	27	8	10	29
Anangu Pitjantjatjara communities[4]	55	57	27	n/a	n/a	n/a	n/a	n/a
Mild to moderate endemic areas								
Katherine	20	22	n/a	n/a	26	n/a	49	19[5]
Kununurra	49	27	n/a	14	n/a	n/a	n/a	n/a

Sources: Royal Australian College of Ophthalmologists (1980)(5), Trachoma and Eye Health Review Committee (1985)(10), Kimberley Public Health Unit (1996)(19), Wallace (1996)(20), Stocks et al. (1996)(21), Pilbara Public Health Unit (1997)(22), Midwest Public Health Unit (1997)(23), Paterson (1997)(28)

Notes:
1 Prevalences are shown as percentages.
2 The communities are those included in the 1985 review, for which more recent data are available.
3 Prevalence categories are: hyperendemic areas - prevalence greater than 20%; mild to moderate endemic areas - prevalence 5-20%; non-endemic areas - prevalence less than 5%. Communities have been categorised according to the most recent estimate of prevalence.
4 The 1976 and 1985 data for four Anangu Pitjantjatjara communities - Yalata, Iwantja (Indulkana), Amata and Aparawatatja (Fregon) - have been combined to permit comparison with the 1990 data. See Table 3.3 for more details for these data.
5 The 1996 data for Katherine were collected as a follow-up to a treatment program.

More than half the schoolchildren surveyed at Jigalong (in the Pilbara region of Western Australia) in recent years showed signs of follicular trachoma, as did between a third and

two-fifths of those surveyed at Yiyili (formerly Louisa Downs) and Halls Creek, both in the Kimberley region of Western Australia. The prevalence at Billiluna (in the Kimberley region of Western Australia) has declined substantially since 1976 and 1985, but was still 29 per cent in 1996 (interestingly, lower prevalences were reported for 1994 and 1995). Substantial declines have occurred also for Kununurra (in the Kimberley region of Western Australia) and for four Anangu Pitjantjatjara communities in northern South Australia.

Anangu Pitjantjatjara communities

As noted above, probably the best evidence for a general decline in the prevalence of follicular trachoma since 1976 comes from a detailed epidemiological study undertaken among Aboriginal people living in the Anangu Pitjantjatjara lands in 1989 and 1990 (17, 21). The study found that the overall prevalence of trachoma had decreased since 1976, but that 14 per cent were still affected in 1990. Among children aged 9 years or less, the prevalence had declined from around 55 per cent in 1976 to 27 per cent in 1990 (see Table 3.3). The results from the 1985 review (10) are not as sound as those from the 1990 study, but report a prevalence of 57 per cent.

Table 3.3 Prevalence of follicular trachoma for children living in four Anangu Pitjantjatjara communities[1] by year, 1976-1990

Age group	1976		1985		1990	
	Numbers[2]	Prevalence[3] (%)	Numbers[2]	Prevalence[3] (%)	Numbers[2]	Prevalence[3] (%)
0-4	50/94	53 (43-64)	23/28	82 (63-94)	33/110	30 (22-40)
5-9	84/151	56 (47-64)	27/59	46 (33-59)	34/136	25 (18-33)
0-9	134/245	55 (48-61)	50/87	57 (47-68)	67/246	27 (22-33)

Sources: Stocks et al. (1996)(21)

Notes:
1 The four Anangu Pitjantjatjara communities are Yalata, Iwantja (Indulkana), Amata and Aparawatatja (Fregon).
2 Shown are numbers with trachoma and numbers surveyed.
3 Numbers in parentheses are 95% confidence intervals.

Interestingly, the 1990 study found an increase in inflammatory trachoma among people aged 20 years and older. This could have been due to diagnostic variations, but the authors also raise the possibility of it being due to a cohort effect, which 'would occur if a group of individuals severely affected by trachoma in the 1970s continued to suffer from poor eye health in the 1990s, while a younger generation had grown up with better living conditions and less severe trachomatous disease' (21:380).

With regard to trachomatous scarring, the reported prevalence of 25 per cent for cicatricial trachoma in 1989-1990 (17) is much lower than the level of 65 per cent documented by the NTEHP for the Red Centre zone (which included the Anangu Pitjantjatjara communities)

(5). There must be some doubt, however, about the comparability of these data, as the age-specific prevalences suggest declines within individual age cohorts.

The 1989-1990 survey reported that the overall prevalence of trichiasis (2.6 per cent - see Section 3.1), about which there is less diagnostic variation, had declined since 1976 (17).

Communities in Western Australia

Several sources of data provide estimates of the trends in trachoma prevalence in Western Australia. Again bearing in mind the methodological issues in comparing data collected by different people at different times, data aggregated to the NTEHP zones suggest the overall prevalence of follicular trachoma has declined since 1976, but the condition is still at hyperendemic levels in the Western Desert zone (see Table 3.4).

Table 3.4 Prevalence[1] of follicular trachoma for Western Australian children[2] living in selected NTEHP zones[3] by prevalence category[4] and year, 1977-1996

Prevalence category / area	1977	1986	1987	1988	1996
Hyperendemic areas					
Zone 3, Western Desert	64	22	20	22	45
Mild to moderate endemic areas					
Zone 2, Cattle country	52	16	15	16	15
Zone 4, Goldfields	37	10	12	10	n/a

Sources: Kimberley Public Health Unit (1996)(19), Pilbara Public Health Unit (1997)(22), Midwest Public Health Unit (1997)(23), Trachoma and Eye Health Western Australia (1989)(26)

Notes:
1 Prevalences are shown as percentages. Data did not permit calculation of 95% confidence intervals.
2 The data for 1977, 1986, 1987 and 1988 relate to children aged 0-9 years, and those for 1996 to 'schoolchildren'.
3 See Appendix 2, Table A2.1 for details of the NTEHP zones. These data relate only to the Western Australian sections of these zones.
4 Prevalence categories are: hyperendemic areas - prevalence greater than 20%; mild to moderate endemic areas - prevalence 5-20%; non-endemic areas - prevalence less than 5%. Communities have been categorised according to the most recent estimate of prevalence.

The most recent survey data for the Pilbara region of Western Australia (which is included in the Western Desert zone) reveal that trachoma is at hyperendemic levels in eight communities and at mild to moderate levels in four others (see Table 3.5). However, the data are not consistent in terms of ages surveyed and year of survey (see footnote to Table 3.5).

Table 3.5 Prevalence[1] of follicular trachoma for children[2] living in selected communities in the Pilbara region of Western Australia by year, 1987-1996

Prevalence category[3] / Community	1987	1991	1996
Hyperendemic areas			
Punmu	35	92	n/a
Yandeyarra	20	65	79
Roebourne	6	44	76
Parngurr	n/a	70	n/a
Jigalong	28	80	66
Nullagine	17	74	62
Pumajina	n/a	67	26
Port Hedland, 12 mile camp	n/a	21	n/a
Mild to moderate endemic areas			
Onslow	5	18	n/a
Marble Bar	5	44	13
Port Hedland	12	13	n/a

Sources: Pilbara Community Health Unit (1991)(30), Pilbara Public Health Unit (1997)(22), Trachoma and Eye Health Western Australia (1989)(26)

Notes:
1 Prevalences are shown as percentages.
2 The data for 1987 relate to children aged 0-9 years, those for 1991 to children aged 0-18 years, and those for 1996 to 'children'.
3 Prevalence categories are: hyperendemic areas - prevalence greater than 20%; mild to moderate endemic areas - prevalence 5-20%; non-endemic areas - prevalence less than 5%. Communities have been categorised according to the most recent estimate of prevalence.

There have been periodic screenings over the past 10 years of trachoma among Aboriginal children living in towns and communities in the Murchison region of Western Australia (see Table 3.6). With the exception of 1991-1992, when much higher prevalences were attributed to high summer rainfall (29), the levels of follicular trachoma among 0-9 year old children have remained fairly steady for each of the communities surveyed.

As part of the Kimberley Trachoma Control Program, initiated in 1991, annual prevalence surveys of schoolchildren have been undertaken by Aboriginal Health Workers, community nurses and doctors. The prevalence of follicular trachoma has declined slightly, from 20 per cent in 1992 to 15 per cent in 1996 (see Table 3.7) (19). The prevalence for some areas/communities has declined consistently over the period. However, for others, such as Halls Creek and Balgo, the prevalences have fluctuated and were much the same in 1996 as they had been in 1992.

Table 3.6 Prevalence[1] of follicular trachoma for children aged 0-9 years living in selected communities in the Murchison region of Western Australia by prevalence category[2] and year, 1987-1996

Prevalence category / community	1987	1989/ 1990	1990/ 1991	1991/ 1992	1992/ 1993	1993/ 1994	1996
Hyperendemic areas							
Wiluna	15	24	43	74	44	n/a	n/a
Karalundi	n/a	43	n/a	n/a	100	n/a	32
Mild to moderate endemic areas							
Yalgoo	8	4	0	n/a	n/a	n/a	20
Burringah	n/a	n/a	n/a	20	n/a	n/a	n/a
Meekatharra	7	29	25	90	17	32	19
Mt Magnet	5	6	3	100	13	4	10
Cue	6	26	6	78	50	0	0

Sources: Trachoma and Eye Health Western Australia (1989) (26), Midwest Public Health Unit (1997)(23)

Notes: 1 Prevalences are shown as percentages.
2 Prevalence categories are: hyperendemic areas - prevalence greater than 20%; mild to moderate endemic areas - prevalence 5-20%; non-endemic areas - prevalence less than 5%. Communities have been categorised according to the most recent estimate of prevalence.

Table 3.7 Prevalence[1] of follicular trachoma among schoolchildren[2] living in the Kimberley region of Western Australia, by prevalence category[3], area and year, 1992-1996

Prevalence category / area	1992	1993	1994	1995	1996
Hyperendemic areas					
Balgo	46	34	18	19	37
Halls Creek	45	33	12	28	33
Mild to moderate endemic areas					
Fitzroy Crossing	77	52	37	33	19
Kununurra	7	n/a	n/a	N/a	14
Derby	18	11	14	7	13
Broome	3	8	3	10	9
Wyndham	18	10	30	14	5
All areas/ communities	20	22	19	16	15

Sources: Kimberley Public Health Unit (1996)(19), Kimberley Public Health Unit (1997)(31)

Notes: 1 Prevalences are shown as percentages.
2 The ages of the 'schoolchildren' were not stated.
3 Prevalence categories are: hyperendemic areas - prevalence greater than 20%; mild to moderate endemic areas - prevalence 5-20%; non-endemic areas - prevalence less than 5%. Communities have been categorised according to the most recent estimate of prevalence.

4 Diabetic retinopathy[9]

4.1 Prevalence of diabetic retinopathy

Limited information is available on the prevalence of diabetic retinopathy among Aboriginal and Torres Strait Islander people, but anecdotal and service information suggests that diabetic retinopathy has increased in recent years and is now the major vision-threatening condition. Little research that assesses the extent of diabetic retinopathy has been undertaken, but with diabetes mellitus being approximately four times more common among Aborigines than non-Aborigines (32) the problem is likely to increase.

A review of six studies of diabetic retinopathy in the general Australian population found that the prevalence was 35 to 49 per cent in diabetic clinics, 22 to 36 per cent in diabetics in the community, and there was an overall prevalence of 1.1 to 2.2 per cent among older Australians (16). The prevalence of vision threatening retinopathy was between 6 and 13 per cent among diabetics in the community.

The crude prevalence of diabetic retinopathy among diabetic Aborigines appears to be similar to that documented for the general Australian diabetic population (see Table 4.1).

The most recent data for Aborigines come from a study evaluating the use of a non-mydriatic fundus camera in identifying retinopathy in the Pilbara region of Western Australia. Among the 164 diabetic patients (328 eyes) examined, 74 eyes (23 per cent) were diagnosed with retinopathy, with 35 (11 per cent) eyes assessed as requiring laser treatment (33, p.2).

Data from the Pilbara study and a number of other studies suggest that the prevalence of diabetic retinopathy among Aboriginal diabetics is between 8 and 35 per cent, with the prevalence of vision threatening retinopathy being between 4 and 18 per cent.

Among diabetics in rural Western Australia in the early 1980s, 31 per cent of Aborigines had diabetic retinopathy compared with 20 per cent of non-Aborigines (40). 'Obstructive retinopathy' was also found to be more common among Aborigines (12 per cent) than among non-Aborigines (8 per cent).

The prevalence of vision threatening retinopathy among Aboriginal diabetics attending renal clinics (renal disease is another potential complication of diabetes) was also higher. Seven of 24 Aboriginal diabetics with renal disease in central Australia had proliferative retinopathy (29 per cent) (39, p.235). Among 118 patients seen in early 1996 in a Darwin renal unit laser treatment was required for 64 eyes (27 per cent) (34, p.1).

---

[9] See Appendix 1 for some information about the nature of diabetic retinopathy.

However, these crude prevalences are likely to under-estimate the relative magnitudes of background and proliferative retinopathy among Aboriginal and non-Aboriginal people, as they do not take account of the ages of affected people. An important aspect about diabetes is that the Aboriginal population affected is younger than the non-Aboriginal population affected (32).

Table 4.1 Prevalence of diabetic retinopathy in selected regions/communities, 1985-1997

Region	Year	Sample	Number of diabetics in sample	Retinopathy (%)	Vision threatening retinopathy[1]	Source
Pilbara, WA	1997		164	23	11%	(33)
Katherine, NT	1996		274	35	18%	(34)
Katherine, NT	1993		269	20	10%	(34)
Darwin, NT	1996	Patients in renal unit	118	n/s	64 eyes	(35)
Torres Strait & Cape York	1996	Ophthalmological clinic	1059	n/s	91 eyes	(36)
Victoria	1995/96	Voluntary participation	21	14	n/s	(37)
East Arnhem, NT	1996	Chronic disease register	72	8	n/s	
Bourke, NSW[2]	1995	Eye outpatient clinic	54	19	n/s	(38)
Central Australia, NT	1993	Patients in renal unit	24		29%	(39)
Rural WA	1985	Voluntary participation	121	31	n/s	(40)

Sources: Brian (1997)(36), Diamond (1997)(33), Markey et al. (1996)(35), Ballentine & Woods (1996)(37), Jaross (1996)(34), McKenzie (1995)(38), Phillips (1993)(39), Stanton (1985)(40)

Notes:
1 Vision threatening retinopathy includes the requirement for laser therapy. Some sources reported patients in this category, and some reported eyes.
2 The prevalence for Bourke, NSW was for non-proliferative and proliferative retinopathy combined.

Diabetic retinopathy appears also to affect Aborigines at younger ages than non-Aborigines. In a study examining visual impairment in Bourke, New South Wales, it was noted that most of the 54 Aboriginal diabetics attending an outpatient eye clinic were aged 25 to 44 years whereas most of the 70 non-Aboriginal diabetics were aged between 45 and 64 years (38, p.43). Ten of the Aboriginal diabetics (19 per cent) were assessed as having background and proliferative retinopathy, as were 11 of the non-Aboriginal diabetics (16 per cent).

The higher prevalence of diabetic retinopathy at a younger age among Aborigines may relate to poorer diabetic control (38, 40). Anecdotal information suggests that early onset and late presentation of diabetes has an impact on the higher prevalence of diabetic retinopathy among younger Aborigines (41).

Another aspect of relevance to the likely impact of diabetic retinopathy among Aboriginal (and non-Aboriginal people) is the numbers of undiagnosed diabetics. It is believed that the average latent period between onset and diagnosis of diabetes is around six years, during which time unmanaged diabetes can be causing vascular damage, the pathology underlying diabetic retinopathy.

Preliminary information from a study of diabetic retinopathy among Aborigines living in the Katherine region of the Northern Territory provides additional insights (34, p.8). Among a known diabetic population of 328 Aboriginal people, 265 (81 per cent) had eye examinations. Of these 265, 32 people (12 per cent) required diabetic laser treatment. Over the four-year period 1993-1996, 169 of the 607 screenings (28 per cent) of diabetics found evidence of diabetic retinopathy with 82 (13.5 per cent) patients having vision threatening diabetic retinopathy (34).

Table 4.2 Prevalence of diabetic retinopathy and vision-threatening retinopathy[1] among Aboriginal diabetics in the Katherine region, Northern Territory, 1993-1996

Year	Number of diabetics	Diabetic retinopathy		Vision threatening diabetic retinopathy	
		Number	Prevalence[2] (%)	Number	Prevalence[2] (%)
1993	269	55	20 (16-25)	28	10 (7-14)
1994	53	14	26 (15-38)	6	11 (3-20)
1995	11	4	36 (8-65)	0	0
1996	274	96	35 (29-41)	48	18 (13-22)

Sources: Jaross (1996)(34)

Notes: 1 Vision threatening retinopathy includes the requirement for laser therapy
2 Numbers in parentheses are 95% confidence intervals.

5 Other eye conditions

5.1 Blindness

As noted in section 1.2, the NTEHP found that around 1.5 per cent of Aboriginal people rural Australia in the late 1970s were blind (defined as a visual acuity of no better than 6/60 in the better eye[10]), compared with only about 0.2 per cent of non-Aboriginal people (5).

The causes of blindness were substantially different for Aborigines and non-Aborigines (5). Corneal disease was responsible for 50 per cent of the blindness seen among Aborigines, but for only 7 per cent of the blindness among the non-Aboriginal people examined. Much of the corneal disease among the Aboriginal people was secondary to trachoma, making this condition responsible for around 41 per cent of the blindness seen among Aborigines. Lens abnormalities (mainly cataracts) were responsible for 39 per cent of the blindness among Aboriginal people, and for 23 per cent of that among the non-Aboriginal people. Abnormalities of the retina were responsible for 52 per cent of blindness among the non-Aboriginal people, but only 6 per cent among Aboriginal people.

Anangu Pitjantjatjara communities

The best recent estimate of the level of blindness among Aboriginal people comes from a 1989-1990 survey in the Anangu Pitjantjatjara communities of northern South Australia (17). Using the Australian definition for blindness (visual acuity less than 6/60 in the better eye), this survey found that almost 1.5 per cent of Aboriginal people living in the Anangu Pitjantjatjara communities in 1989-1990 were blind (Table 5.1). This prevalence is virtually the same as that documented by the NTEHP for all of rural Australia, but the prevalences are not really comparable. The NTEHP (using the slightly more inclusive definition of visual acuity of no better than 6/60 in the better eye) found that the prevalence of blindness among Aborigines varied substantially between zones - from 0.5 per cent for the Southern Mainland to 3.5 per cent for the Cattle Country zone. The prevalence for the Red Centre zone (which included the Anangu Pitjantjatjara communities) was 2.3 per cent (5:p62). If this overall prevalence for the Red Centre zone was representative of the situation in the Anangu Pitjantjatjara communities, the 1989-1990 survey results suggest that prevalence of blindness for these communities may have declined slightly between 1976-1979 and 1989-1990.

The leading causes of blindness among the Aboriginal people living in the Anangu Pitjantjatjara communities in 1989-1990 were similar to those documented by the NTEHP

[10] The NTEHP defintion (visual acuity of no better than 6/60 in the better eye) differs from the Australian definition (visual acuity of less than 6/60 in the better eye) and from the generally accepted World Health Organization definition (visual acuity in the better eye of less than 3/60).

for Aborigines in rural Australia in 1976-1979, with trachoma and cataracts each responsible for around 41 per cent of the cases found.

Table 5.1 Prevalence[1,2] of blindness[3] by age, rural Australia, 1976-1979 and Anangu Pitjantjatjara communities, 1989-1990

Age group	Rural Australia, 1976-1979		Anangu Pitjantjatjara communities, 1989-1990		
	Aborigines	Non-Aborigines	Aborigines		
			Males	Females	Persons
0-49	0.18	0.03	0	0.28	0.16
	(0.15-0.22)	(0.01-0.05)		(0-0.67)	(0-0.38)
50-59	2.76	0.69	0	1.67	0.89
	(2.15-3.38)	(0.14-1.24)		(0-4.91)	(0-2.64)
60+	18.88	4.65	8.06	18.92	13.97
	(17.67-20.10)	(3.27-6.02)	(1.29-14.84)	(10.00-27.84)	(8.14-19.80)
All ages	1.49	0.16	0.75	2.00	1.45
	(1.39-1.58)	(0.12-0.19)	(0.10-1.41)	(1.06-2.94)	(0.85-2.06)

Sources: Royal Australian College of Ophthalmologists (1980) (5), Stocks et al. (1996) (17)

Notes:
1 Prevalence is expressed as a percentage.
2 Numbers in parentheses are 95% confidence intervals.
3 Blindness was defined according to the Australian definition of a visual acuity of no better than 6/60 in the better eye. This is different to the World Health Organization definition of a visual acuity of no better than 6/30 in the better eye.

Bourke, New South Wales

Of the 168 Aboriginal patients seen at the eye clinic in Bourke, New South Wales between 1985 and 1995, 20 (12%) were assessed as being visually impaired in one or both eyes (visual impairment was defined as a best corrected vision of 6/18 or less) (38). The overall prevalence of visual impairment was assessed at 9.5 per cent for the Aboriginal community and 8.5 per cent for the non-Aboriginal community, but the difference was not statistically significant.

Data for binocular blindness were not provided separately for Aborigines and non-Aborigines. However, only three (0.4 per cent) of the 800 study participants (including 168 Aborigines) were assessed as being blind binocularly (using the Australian definition). Of the 34 people assessed as having monocular blindness (using the WHO definition), eight (24 per cent) were Aboriginal.

5.2 Cataracts

There has been no systematic assessment of the prevalence of cataracts among Aboriginal people since the time of the NTEHP. The NTEHP reported an overall prevalence of lens abnormalities[11] of 3.6 per cent among Aborigines and 0.8 per cent among non-Aborigines (5). After adjustment for differences in the age structures of the Aboriginal and non-Aboriginal populations, lens abnormalities were reported to be twice as common for Aborigines than non-Aborigines.

In a small, intensive study undertaken in conjunction with the Program, Taylor (18) examined 350 Aborigines over the age of 30 years. Of these, 116 people (33 per cent) were found to have lens opacities other than traumatic cataract.

The only recent information relating to cataracts can be derived from service data, which are particularly vulnerable to selection bias. Out of 405 patients seen in the Katherine region of the Northern Territory in 1993, 31 (8 per cent) required surgery for cataracts (34). In 1994 an Eye Surgical Operation was carried out in Katherine, NT to clear the backlog of Aboriginal patients requiring eye surgery - 39 cataract extractions being performed (42)

In 1994, in response to an excess of demand over capacity for cataract operations among Aborigines in Central Australia, the Australian Defence Forces performed cataract surgery from a mobile tent theatre in Alice Springs 'some 100 patients suitable for cataract operations had been identified in the south of the Northern Territory by the Northern Territory Aboriginal Eye Health Committee, and this greatly exceeded the capacity of the Alice Springs Hospital' (42, p.13). Ninety procedures were successfully performed on 75 patients. In 1996 a similar operation was set up on Bathurst Island and 7 cataract operations were performed.

Similar levels were seen among new consultations in North Queensland in 1995, in Cape York, Torres Strait and Wuchopperen, (65 cases required surgery out of 1,059 new consultations - 6 per cent) and in 1996 (152 out of 1,477 - 10 per cent) (36). Among 1,247 Aborigines, from 26 North Queensland communities, seen by the Queensland Trachoma and Eye Health Programme in 1996, 55 cataract operations were performed. During 1995 1104 people were seen from 16 communities and 52 cataract operations were performed (43, 44).

Alice Springs Hospital Eye Clinic performed 13 cataract operations on Aborigines in the period 25/6/96 -31/1/97. From the 10/2/97-3/3/97 5 cataract operations were performed. Interestingly, unlike the European population where cataracts are generally found amongst the aged, these cataract operations were performed on relatively young Aborigines (2 were from the age group 20-39 and 3 from the age group 40-59). During an ophthalmologist's

[11] Lens abnormalities included cataracts (congenital, senile and traumatic), aphakia or subluxation of the lens, and psuedoexfoliation of the lens.

visit to Hermansburg and Kintore (20/2/97-4/3/97) 6 cataracts were noted amongst the patients seen, again cataracts affected a younger age group (1 was aged 20-39, 3 were in the age group 40-59 and 2 were in the age group 60+) (45).

5.3 Pterygium

The NTEHP found that pterygia were common among Aborigines (2,194 cases - prevalence 3.4 per cent) than among non-Aborigines (442 cases - 1.1 per cent) (46). This prevalence is slightly below the overall level of 4.1 per cent documented in 1953 (7) for Kimberley residents, where the disorder was equally common among Aborigines and non-Aborigines.

As was the case for cataracts, service data provide the only recent information about pterygia. However, unlike the service data for cataracts, those for pterygia do not permit any useful prevalences to be derived.

6 Hospitalisation for eye conditions

6.1 Introduction

Hospital admissions[12], which generally are for more serious types of eye disease, do not necessarily accurately reflect the extent or pattern of treatable eye conditions in the community. They do, however, provide some further insights into the extent of eye disease among Aboriginal and Torres Strait Islander people.

Some information is available about hospitalisation in Queensland, Western Australia, South Australia and the Northern Territory[13] for conditions classified to the International Classification of Diseases (ICD) group 'Disorders of the eye and adnexa' (ICD codes 360-379)[14].

6.2 Hospitalisation by State

Queensland

The overall hospital admission rate for disorders of the eye (ICD codes 360-379) among Queensland Aboriginal and Torres Strait Islander people of 530 admissions per 100,000 population was slightly higher than the rate of 400 per 100,000 for the total Queensland

---

[12] Episodes of hospitalisation are often referred to, most accurately, as separations, because they are counted at the time of separation (by discharge, transfer or death) from the hospital. In this paper, however, they will be referred to as admission, the more readily understood term.

[13] Some caution should be exercised in comparing hospitalisation rates, as they can be influenced by many factors, including State/Territory variations in admission policies, differential geographic accessibility of hospitals and whether or not data relate to private hospitals as well as public hospitals.

[14] It is hoped to expand this section with information about specific eye conditions and procedures, such as traumatic eye conditions, operations on the lens and retinal laser photocoagulation.

population (see Table 6.1). The rate for Aboriginal and Torres Strait Islander people living in the Northern Region (including Cape York and the Torres Strait Islands) was 700 per 100,000, but for those living in the Mackay Region the rate was much lower at 30 per 100,000.

Table 6.1 Hospital[1] admission rates for conditions of the eye and adnexa by Aboriginality and region of residence, Queensland, July 1992 - June 1993

Population / Region	Admission rate[2]
Aboriginal and Torres Strait Islanders	
Northern Region	700
Mackay Region	30
Queensland	530
Total Queensland population	400

Sources: Wronski et al. (1995) (47)
Notes: 1 Data relate to public hospitals only.
2 Admission rates are age-standardised rates per 100,000 population.

Western Australia

In 1993, Western Australian Aboriginal people were admitted to hospital for conditions of the eye and adnexa at a rate of 805 per 100,000, 1.6 times the rate of 509 per 100,000 for Western Australian non-Aboriginal people.

South Australia

In South Australia, admission rates were lower for Aboriginal (319 per 100,000) than non-Aboriginal people (417 per 100,000) living in Adelaide (see Table 5.2). In other parts of South Australia, the rate for Aboriginal people was much higher (697 per 100,000), but the rate for non-Aboriginal people (408 per 100,000) was similar to that of non-Aboriginal people living in Adelaide.

Table 6.2 Hospital[1] admission rates for conditions of the eye and adnexa by Aboriginality and area of residence, South Australia, 1991-1994

Population / Region	Admission rate[2]
Aborigines	
Adelaide	319
Country	697
Other South Australians	
Adelaide	417
Country	408

Sources: Nguyen et al. (1996) (48)
Notes: 1 Data relate to public and private hospitals.
2 Admission rates are age-standardised rates per 100,000 population.

Northern Territory

In the Northern Territory, admission rates for conditions of the eye and adnexa have been much higher generally for Aboriginal than non-Aboriginal people over the period 1979-1988 (see Table 6.3). Rates for Aboriginal people have tended to increase over that period, whereas rates for non-Aboriginal people have fluctuated but have not increased. Among Aboriginal people, admission rates have been higher consistently for males than females

Table 6.3 Hospital[1] admission rates[2] for conditions of the eye and adnexa by Aboriginality and sex, Northern Territory, 1979-1988

	Males		Females	
Year	Aboriginal	Non-Aboriginal	Aboriginal	Non-Aboriginal
1979	462	352	199	300
1980	424	318	240	184
1982	363	214	285	209
1983	406	200	367	171
1984	642	287	445	250
1985	494	278	449	313
1986	482	208	430	179
1987	724	312	548	366
1988	618	271	569	204

Sources: Plant et al. (1995) (49)
Notes: 1 Data relate to public and private hospitals.
2 Admission rates are age-standardised rates per 100,000 population.

6.3 Age pattern of admissions

The information from Western Australia and South Australia show that the difference between Aboriginal and non-Aboriginal admission rates is greatest among young and middle-aged adults (see Table 6.4). The age-specific rate ratios[15] are highest in the 30-39 years and 40-49 years age groups. It is not possible to discern from the available data the reasons for the much higher admission rates for Aboriginal than non-Aboriginal people in these age groups, but admissions in these age groups could be due to admissions for traumatic eye conditions and/or retinal laser photocoagulation.

[15] The age-specific rate ratio is the Aboriginal admission rate divided by the non-Aboriginal rate for the specific age group (for example, the 30-39 years age group).

Table 6.4 Hospital[1] admission age-specific rate ratios[2] for conditions of the eye and adnexa, Western Australia and South Australia, 1991-1994[3]

Age group (years)	Western Australia	South Australia	
		Adelaide	Country
0-4	0.4	0.6	1.3
5-9	0.5	1.4	1.6
10-14	0.4	0	3.2
15-19	2.7	0	2.0
20-29	1.1	2.2	1.3
30-39	3.0	1.4	5.2
40-49	3.3	1.6	3.6
50-59	2.6	1.1	3.3
60-69	2.0	0.6	1.7
70-79	0.9	0.3	1.2
80+	n/a	0.5	0.4
All ages	1.6	0.8	1.7

Sources: Nguyen et al. (1996) (48), Somerford et al. (1995) (50)

Notes:
1 Data relate to public and private hospitals.
2 Admission rates are age-standardised rates per 100,000 population.
3 Western Australian data are for 1993 and South Australian data for 1991-1994.

Appendix 1

This appendix summarises some background information about a number of the eye conditions considered in this review. The summaries, which have been derived largely from Professor Taylor's full report of the review (15), are intended for readers unfamiliar with the conditions, and do not attempt to be comprehensive. Readers wishing to study the conditions in more detail should consult standard ophthalmological texts and journals.

Trachoma

Trachoma is a form of conjunctivitis caused by the obligatory intracellular bacterium, *Chlamydia trachomatis*. The initial form of the disease, follicular trachoma, is largely a disease of childhood and early adolescence with a peak prevalence in children aged 2 to 3 years. Long-standing and moderately severe follicular trachoma can lead to cicatricial trachoma, involving scarring and other damage to the eyelids and eyes. Severe scarring of the eyelids and in-turning of the eyelashes (trichiasis) can lead to opacification of the cornea and blindness.

Worldwide, trachoma is the most common serious infectious eye disease affecting about 160 million people, including around 20 million who have been blinded from it (51). In its work in the late 1970s, the NTEHP found that trachoma was the major cause of blindness among Australian Aboriginal people (5).

Diabetic retinopathy

One of the complications of diabetes is damage to small blood vessels, including those in the retina. The presence of retinal microvascular lesions in known as diabetic retinopathy. 'The earliest lesions visible with an ophthalmoscope are termed non-proliferative retinopathy, including microaneurysms, haemorrhages, hard exudates, cotton wool spots, intraretinal microvascular abnormalities and venous beading. The proliferative stage is characterised by growth of new vessels and fibrous tissue and pre-retinal and vitreous haemorrhage. .. Leak from macular capillaries results in macular oedema, and when present close to the central macula, is termed clinically significant macular oedema' (16. p5).

Non-proliferative diabetic retinopathy is not vision-threatening, but may proceed to proliferative diabetic retinopathy, which is.

Cataract

A cataract is an opacity of the crystalline lens of the eye, which can prevent light from reaching the retina at the back of the eye. Cataract is increasingly frequent as people grow older and its occurrence doubles with each decade after the age of 40 years. Cataract develops progressively. At an early stage, cataract may only reduce vision a little, but with time a mature cataract can cause marked blindness. Because a cataract forms in the lens of the eye, the eye will not focus properly after cataract surgery without a replacement lens. An intraocular lens is now implanted at the time of surgery for this purpose. The quality of vision after modern cataract/intraocular lens surgery is usually excellent, although normal bifocal glasses are usually needed.

Pterygium

A pterygium is a triangular thickening of the bulbar conjunctiva extending from the inner canthus to the border of the cornea, with the apex towards the pupil.

Appendix 2

This appendix contains details and data relating to the National Trachoma and Eye Health Program, which examined and, if indicated, treated more than 61,000 Aborigines and almost 38,000 non-Aborigines in rural Australia between 1976 and 1979.

Table A2.1 National Trachoma and Eye Health Program zones

Zone 1, Red centre: central Australia, including areas in the Northern Territory, South Australia and Western Australia
Zone 2, Cattle country: inland areas of the Kimberley region of Western Australia and adjacent areas of the Northern Territory
Zone 3, Western Desert: the Pilbara and Murchison areas of Western Australia
Zone 4, Goldfields: the Eastern Goldfields region of Western Australia
Zone 5, Coastal missions, WA: from missions in the northern areas of the south-west to the Kimberley region
Zone 6, Coastal towns, WA: Geraldton, Carnarvon, Pipingarra, Port Hedland, Broome, Derby and Wyndham
Zone 7, Arid eastern: extending from Ceduna, SA through inland areas of north-east South Australia to western areas of New South Wales and Queensland
Zone 8, Top End, NT: includes the islands, Darwin and Arnhem Land
Zone 9, Gulf and Cape country, Queensland
Zone 10, Torres Strait Islands
Zone 11, Coastal Queensland: including adjacent inland areas of central and southern Queensland
Zone 12, Coastal NSW
Zone 13, Southern mainland: including the Gippsland area of Victoria, the Riverina areas of NSW and Victoria, and south- east South Australia

---

Sources: Royal College of Ophthalmologists 1980 (5)

Table A2.2 Follicular trachoma: Aborigines and non-Aborigines, by age group, rural Australia, 1976-1979

Age group	Aborigines			Non-Aborigines		
	Numbers		Prevalence	Numbers		Prevalence
	Seen	Affected	(%)	Seen	Affected	(%)
0-1	2240	388	17	302	3	1
2-3	3182	1096	34	503	10	2
4-5	4877	1503	31	2831	39	1
6-7	6453	1540	24	6281	82	1
8-9	5785	1109	19	5988	55	1
10-13	9980	1350	14	10658	71	1
14-19	7525	466	6	4513	20	0
20-29	6573	156	2	2387	7	0
30-39	4568	59	1	1962	5	0
40-49	3898	53	1	1240	0	0
50-59	2698	18	1	855	2	0
60+	3916	24	1	895	3	0
All ages	61695	7762	13	38415	297	1

Source: Royal College of Ophthalmologists 1980

Table A2.3 Cicatricial trachoma: Aborigines and non-Aborigines, by age group, rural Australia, 1976-1979

Age group	Aborigines			Non-Aborigines		
	Numbers		Prevalence	Numbers		Prevalence
	Seen	Affected	(%)	Seen	Affected	(%)
0-2	3605	76	2.1	527	0	0
3-5	6690	624	9.3	3136	8	0.3
6-9	12241	2539	20.7	12271	64	0.5
10-14	11897	3187	26.8	12591	70	0.6
15-19	5608	1855	33.1	2580	32	1.2
20-29	6573	2521	38.4	2386	36	1.5
30-39	4568	2100	46.0	1962	32	1.6
40-49	3897	1873	48.1	1240	33	2.7
50-59	2698	1347	49.9	855	28	3.3
60+	3923	2700	68.8	896	83	9.3
All ages	61700	18822	30.5	38444	386	1.0

Source: Royal College of Ophthalmologists 1980

Appendix 3

This appendix contains details of organisations and individuals who were contacted and/or provided information for this report.

State health authorities
Department of Health and Community Care, ACT
The New South Wales Health Department
The Department of Human Services, Victoria
Queensland Health
The South Australian Health Commission
Health Department of Western Australia
Department of Community and Health Services Tasmania
Northern Territory Department of Health and Community Services

State and Territory based eye health and trachoma programs
Queensland Trachoma and Eye Health Program
South Australia Trachoma and Eye Health Program
NT Aboriginal Eye Health Committee

Other organisations
Alice Springs Eye Clinic, Alice Springs Hospital
Lions Eye Institute, WA
Kimberley Public Health Unit, WA
Midwest Public Health Unit, WA
Pilbara Public Health Unit, WA
Kalgoorlie Public Health Unit, WA
Albany Public Health Unit, WA

Ophthalmologists and individual researchers[16]

Dr Jamie La Nauze
Dr David Moran
Dr Garry Brian
Dr Ian McAllister
Dr Peter Graham
Professor Doug Coster
Dr Henry Newland
Dr Nandor Jaross
Dr Massoud Mahmood
Dr Wilfred Win Law
Dr Dick Galbraith
Dr John Kearney
Dr Michael Minogue
Dr Peter Hall
Dr Richard Rawson
Dr Luke Hazell
Dr Paul Beaumont
Dr Anthony Maloof
Dr Mark Loane
Dr Nick Karunaratne
Dr David Heine
Dr Peter Cooper
Dr Gary Dowse
Dr Tania Wallace
Dr Paul Torzillo
Dr Bill Glasson
Dr Lee Lenton
Dr Gary Lillicrap
Dr Richard Rawson
Dr Andrew Laming
Dr Jill Keefe
Dr Tim Isaacs
Dr Paul Van Buynder
Dr Ian Cameron

[16] Does not include names of individuals from listed organisations who were contacted for the review

Dr Paul Torzillo
Dr Charles Guest
Dr Tim Welborn
Dr Kim Stanton
Dr Ian Anderson

Professor Coroneo
Dr Michael English

Aboriginal Controlled Health Services
Aherrenge Association Inc Alice Springs NT
Alpurrurulam Community Alice Springs NT
Angurugu Community GovernmentCouncil Inc Aluangula NT
ATSI Health Worker Education Program Aboriginal Corporation Cairns QLD
Aboriginal & Islander Community Health Service (AICHS) Ipswich QLD
Aboriginal & Islander Community Health Service (AICHS) Brisbane
Woolloongabba QLD Aboriginal Medical Service Co-Operative Limited Redfern NSW
Aboriginal Medical Service of WA Inc East Perth WA
Anyinginyi Congress Aboriginal Health Service Tennant Creek NT
Apunipima Health Council Cairns QLD
Armidale & Districts Services Inc Armidale NSW
Awabakal Newcastle Aboriginal Co-operative Ltd Islington NSW
Bay of Isles Aboriginal Community Inc Esperance WA
Benelongs Haven Ltd Kinchela Creek NSW
Laynhapuy Homelands Association Nhulumbuy NT
Bundjalung Tribal Society Limited Lismore NSW
Bundybunna Aboriginal Corporation Mullewa WA
Bega Garnbirringu Health Service Kalgoorlie WA
Biripi Aboriginal Corporation Medical Centre Taree NSW
Bourke Aboriginal Health Service Bourke NSW
Brewarrina Aboriginal Health Service Brewarinna NSW
Broome Regional Aboriginal Medical Service (BRAMS) Broome WA
Bulgarr Ngaru Health Service Co-Operative Ltd Grafton NSW
Central Australian Aboriginal Congress Inc. (CAAC) Alice Springs NT
Coomealla Health Aboriginal Corporation Dareton NSW
Corporation of the City of Port Augusta Port Augusta SA
Carnarvon Aboriginal Medical Services (CAMS) Carnarvon WA
Ceduna Koonibba Aboriginal Health Service Ceduna SA
Central Gippsland Aboriginal Health & Housing Co-Op. Ltd Morwell VIC
Charleville & West Areas Aboriginal & Torres Strait Islander Co-operative for Health Charleville QLD
Coranderrk Koori Co-op Healesville VIC
Doonooch Self-healing Aboriginal Corporation Nowra NSW
Dunjiba Community Council Incorporated Oodnadatta SA
Daguragu Community Government Council Katherine NT
Dandenong & District Aboriginal Co-operative Society Ltd. Dandenong VIC
Daruk Aboriginal Medical Service Co-Operative Ltd Mt Druitt NSW
Durri Aboriginal Corporation Medical Service Kempsey NSW
Eastern Zone House Aboriginal Corporation Matraville NSW
East Kimberley Aboriginal Medical Service (EKAMS) Kununurra WA
Enmaraleek Association Inc Broadmeadows VIC
Flinders Island Aboriginal Assoc Inc Flinders Island TAS
Gallang Place Aboriginal &Torres Strait Islander Corporation Wooloongabba QLD
Gehgre Aboriginal & Torres Strait Islanders Corporation Gladstone QLD

Gippsland & East Gipplsand Aboriginal Co-op Bairnsdale VIC
Goolburri Health Advancement Aboriginal Corporation Mobile Dental Service Toowoomba QLD
Goolum Goolum Aboriginal Co-operative LtdHorsham VIC
Goondir Aboriginal and Torres Strait Islander Corporation for Health Services Dalby QLD
Gumatji Association Nhulumbuy NT
Gumbi Gumbi Aboriginal & Torres Strait Islanders Corporation Rockhampton QLD
Gurungu Council Aboriginal Corporation Elliott NT
Gapuwiyak Community Inc Gapuwiyak NT
Geraldton Regional Aboriginal Medical Service (GRAMS) Geraldton WA
Gunditjmara Aboriginal Co-operative Warrnambool VIC
Ieramugadu Group Incorporated Roeburne WA
Ilpurla Council Aboriginal Corporation Alice Springs NT
Intjartnama Aboriginal Corporation Intjartnama Outstation Alice Springs NT
Illawarra Medical Service Aboriginal Corporation Berkeley NSW
Imanpa Community Inc Alice Springs NT
Ivanhoe Aboriginal Corporation Ivanhoe NSW
Julalikari Council Aboriginal Association Inc Tennant Creek NT
Junjuwa Community Inc. Fitzroy Crossing WA
Kalano Community Association Incorporated Katherine NT
Kalparrin Inc. Murray Bridge SA
Kaltukatjara Community Inc. Fregon NT
Kaltukatjara Community Council Aboriginal Corporation Fregon NT
Kalwun Development Corporation Medical Centre Mermaid Beach QLD
Aboriginal Corporation Barkly Highway Mount Isa QLD
Katungul Aboriginal Corporation Narooma NSW
Kirrae Whurrong Community Inc Purnim VIC
Krurungal Aboriginal and Islander Corporation Palm Beach QLD
Kimberley Aboriginal Medical Service Council (KAMSC) Broome WA
Koolyangarra Family Group Home Aboriginal Corporation Nowra NSW
Lake Tyers Aboriginal Trust Lakes Entrance VIC
Maningrida Council Inc Maningrida NT
Marr Mooditj Foundation Inc. Waterford WA
Meeanjin Treatment Association Inc Kangaroo Point QLD
Milbi Incorporated Rockhampton QLD
Milliya Rumurr Inc Broome WA
Mudth Niyleta Aboriginal & Torres Strait Islander Corporation Sarina QLD
Mackay Aboriginal & Islander Health Service Mackay QLD
Mamu Medical Service Innisfail QLD
Mawarnkarra Health Service Roeburne WA
Mildura Aboriginal Corporation Mildura VIC
Miwatj Health Aboriginal Corporation Nhulumbuy NT
Moogji Aboriginal Council Orbost VIC
Mookai & Rosie Bi-Bayan Aboriginal & Islander Corporation Earlville QLD
Mulungu Aboriginal Corporation Mareeba QLD
Murray Valley Aboriginal Co-op. Ltd Robinvale VIC
Mutitjulu Community Service Mutitjulu Health Service Ayers Rock NT
Ngkarte Mikwekenhe Community Inc. Alice Springs NT
Ngoonjuwah Council Aboriginal Corporation Halls Creek WA
Ngwala Wilumbong Co-op Ltd St Kilda VIC
Ninga Mia Village Aboriginal Corporation Kalgoorlie WA

Njernda Aboriginal Corporation Echuca VIC
Ngaanyatjarra Health Alice Springs NT
Nganampa Health Council Alice Springs NT
Ngangganawili Medical Service Wiluna WA
Nganmarriyanga Community Inc Darwin NT
Nunkuwarrin Yunti Inc. Adelaide SA
Oolong Foundation IncBomaderry NSW
Orana Haven Aboriginal Corporation Brewarrina NSW
Puntukurnuparna(Western Desert) Aboriginal Medical Service South Hedland WA
Paupiyala Tjarutja Aboriginal Corporation Kalgoorlie WA
Pika Wiya Health Service Port Augusta SA
Pintubi Homelands Health Service Kintore NT
Pius X Aboriginal Corporation Moree NSW
Port Lincoln Aboriginal Health Service Port Lincoln SA
Ramahyuck District AboriginalCorporation Sale VIC
Rrumburriya Malandari Council Aboriginal Corporation Borroloola NT
Rumbalara Aboriginal Co-op Ltd Mooroopna VIC
South Coast Medical Service Aboriginal Corporation Nowra NSW
Swan Hill and District Aboriginal Co-Operative Swan Hill VIC
Tangentyere Council Inc Alice Springs NT
Tasmanian Aboriginal Centre Inc Hobart TAS
Tharawal Corporation Aboriginal Medical Service Campbelltown NSW
Thubbo Aboriginal Medical Centre Co-Operative Ltd Dubbo NSW
Townsville Aboriginal & Islander Health Service Ltd Townsville QLD
Townsville Aboriginal & Torres Strait Islander Corporation for Mental Health Townsville QLD
Umoona Community Council Incorporated Coober Pedy SA
Urapuntja Aboriginal Health Service Utopia NT
Victorian Aboriginal Health Service Co-op Ltd Fitzroy VIC
Warburton Community Inc Alice Springs NT
Warringarri Aboriginal Corporation Kununurra WA
Wathaurong Aboriginal Corporation Norlane VIC
Winda Mara Aboriginal Corporation Heywood VIC
Witjintitja Aboriginal Corporations Granite Downs Station NT
Wulungurru Community Aboriginal Corporation Kintore NT
Wurli Wurlinjang Health Service Katherine NT
Walgett Aboriginal Medical Service Co-Operative Ltd Walgett NSW
Walhallow Aboriginal Corporation Caroona NSW
Waminda South Coast Womens Health & Welfare Aboriginal Corporation Nowra NSW
Warralong Aboriginal Health Service Broome WA
Weimija Aboriginal Corporation South Broken Hill NSW
Wellington Aboriginal HealthService Wellington NSW
West Gippsland Aboriginal Community Co-Operative Ltd Drouin VIC
Wheatbelt Aboriginal Corporation Northam WA
Winnunga Nimmityjah Canberra ACT
Wu Chopperen Medical Service Cairns QLD
Yalata/Maralinga Health Service Ceduna SA
Yulu Burri Ba North Stradbroke Island QLD
Yuri Yungi Aboriginal Health Service Halls Creek WA
Bloodwood Tree Aboriginal Inc. South Hedland WA
Richmond Health Service Lismore NSW

Puntukurnu Aboriginal Medical Service Jigalong WA
Aboriginal Health Council of SA Adelaide SA
Ampilatwatja Health Centre Alice Springs NT
Ballarat Aboriginal Health Service Ballarat VIC
Yaamba Aboriginal and Torres Strait Corporation for Men Bundaberg QLD
Imanpa Community Council Inc.Imanpa NT

Appendix 4

Community Eye Health Reports	
Community name	
State	
Dates visited	
Approximate total population	
Number of patients seen	

Age group	0-4	5-9	10-14	15-19	20-39	40-59	60+
Trachoma							
TF							
TS							
TI							
TT							
CO							
Total seen							
Blind							
Total seen							
Cataracts							
Total seen							
Diabetic retinopathy							
Non-proliferative retinopathy							
Proliferative retinopathy							
Maculopathy							
Total seen							
Glasses Number of patients requiring glasses							
Total seen							
Surgery							
Cataract							
Trichiasis							
Total seen							

References

1. Flynn F. Trachoma among natives of the Northern Territory of Australia. Medical Journal of Australia 1957;2(8):135-137.
2. Mann I. Opthalmic survey of the South-west portion of Western Australia. Perth: Government Printer, 1956.
3. Mann I. Opthalmic survey of the Kimberley division of Western Australia. Perth: Government Printer, 1954.
4. Mann I. Opthalmic survey of the Eastern Goldfields of Western Australia. Perth: Government Printer, 1954.
5. Royal Australian College of Ophthalmologists. National trachoma and eye health program. Sydney: Royal Australian College of Ophthalmologists, 1980:
6. Taylor H. Vision of Australian Aborigines: the distribution of visual acuity and refractive error in Aborigines and the prevalence and causes of blindness [Doctor of Medicine thesis]. Melbourne: University of Melbourne, 1978.
7. Mann I. Culture, race, climate and eye disease. Springfield: Charles C Thomas, 1966.
8. Taylor H. Racial variations in vision. American Journal of Epidemiology 1981;113(1):62-80.
9. Mann I. Probable origins of trachoma in Australasia. Bulletin of the World Health Organization 1957;16:1165-1187.
10. Trachoma and Eye Health Review Committee. Trachoma and eye health report. Canberra: Australian Government Publishing Service, 1985.
11. Banks J, Braun P. Trachoma treatment in Aborigines. Medical Journal of Australia 1985;142:576.
12. Cooper R, Coid D, Constable I. Trachoma 1985 update in W.A. Australian and New Zealand Journal of Ophthalmology 1986;14(4):319-323.
13. Denner G. Endemic trachoma - epidemiology and chemotherapy in three Western Australian communities [Master of Public Health thesis]. Sydney: University of Sydney, 1983.
14. Health Department of Western Australia. Annual report, 1986-87. Perth: Government Printer, 1987.
15. Taylor HR. Eye health in Aboriginal and Torres Strait Islander communities: The report of a review commissioned by the Commonwealth Minister for Health and Family Services, the Hon. Micheal Wooldridge, MP. Canberra: Commonwealth Department of Health and Family Services, 1997:
16. Mitchell P, Wang J. Clinical practice guidelines for the management of diabetic retinopathy. Sydney: Conducted for the Clinical Outcomes and Guidelines Section, National Health and Medical Research Council. Department of Ophthalmology, University of Sydney, Westmead Hospital, 1996:
17. Stocks N, Newland H, Hiller J. The epidemiology of blindness and trachoma in the Anangu Pitjantjatjara of South Australia. Medical Journal of Australia 1994;160:751-756.
18. Taylor H. The prevalence of corneal disease and cataracts in Australian Aborigines in northwestern Australia. Australian Journal of Ophthalmology 1980;8:289-301.
19. Kimberley Public Health Unit. Trachoma control program report Kimberley 1996. Derby: Kimberley Public Health Unit, WA, 1996:
20. Wallace T. Trachoma treatment program in the Katherine region. The Northern Territory Communicable Diseases Bulletin 1996;3(4):13-15.
21. Stocks N, Hiller J, Newland H, McGilchrist C. Trends in the prevalence of trachoma, South Australia, 1976 to 1990. Australian and New Zealand Journal of Public Health 1996;20(4):375-381.

22. Pilbara Public Health Unit. Unpublished data. 1997:
23. Midwest Public Health Unit. Unpublished data. 1997:
24. Lions Save Sight Foundation WA Inc. Unpublished data. 1997:
25. Northern Territory Trachoma Control and Eye Health Committee Inc. Biennial Report July 1990-June 1992. Darwin: Northern Territory Trachoma Control and Eye Health Committee Inc, 1992:
26. Trachoma and Eye Health Western Australia. Unpublished data. 1989:
27. Winch J. 1993 trachoma survey at Fitzroy Crossing and surrounding communities. Perth: Marr Mooditj Foundation, Inc., 1993:
28. Paterson B. Unpublished data. 1997:
29. Public Health Unit. Trachoma screening 1991/92 and 1992/93: Murchison towns. Geraldton: Public Health Unit, 1994:
30. Pilbara Community Health Unit. Unpublished data. 1991:
31. Kimberley Public Health Unit. Personal communication. 1997:
32. Guest C, O'Dea K, Hopper J, Nankervis A, Larkins R. The prevalence of glucose intolerance in Aborigines and Europids of south-eastern Australia. Diabetes Research and Clinical Practice 1992;15:227-235.
33. Diamond J, McKinnon M, Barry C, et al. Non-mydriatic fundus photography: a viable alternative to fundoscopy for identification of diabetic retinopathy in an aboriginal population in rural Western Australia [submitted for publication]. 1997.
34. Jaross N. Unpublished data. 1996:
35. Markey P, Weeramanthri T, Guthridge S. Diabetes in the Northern Territory. Darwin: Diabetes Australia, NT, 1996.
36. Brian G. Medical specialist service delivery to rural and remote Australian communities: a demonstration project (unpublished). Fred Hollows Foundation, 1997:
37. Ballentine C, Woods H. Eye Screening Project July 1995 - July 1996. Melbourne: Royal Victorian Institute for the Blind, 1996:
38. McKenzie K. Visual impairment in a rural New South Wales community: an analysis of Bourke District Hospital outpatient eye clinic data 1985-1995 [Master of Public Health thesis]. Sydney: University of New South Wales, 1995.
39. Phillips C, Patel M, Cabaron Y. Utilisation of health services by Aboriginal Australians with diabetes. Diabetes Research and Clinical Practice 1993;20:231-239.
40. Stanton K. Diabetes in part-aborigines of Western Australia. Diabetologia 1985;28:16-21.
41. Van Buynder P. Personal communication. 1997:
42. Northern Territory Trachoma Control and Eye Health Committee Inc. Triannual Report July 1992-June 1995. Darwin: Northern Territory Trachoma Control and Eye Health Committee Inc, 1996:
43. Queensland Trachoma and Eye Health Programme Inc. Unpublished data. 1997:
44. Queensland Trachoma and Eye Health Programme Inc. Queensland Trachoma and Eye Health Programme Inc 1996 Report. Queensland Trachoma and Eye Health Programme Inc, 1997:
45. Eye Clinic Alice Springs Hospital. Unpublished data. 1997:
46. Moran D, Hollows F. Pterygium and ultraviolet radiation: a positive correlation. British Journal of Ophthalmology 1984;68:343-346.
47. Wronski I, Stanley J, Stronach P, Solomon N. Expanding indigenous community participation in health: a health needs assessment for the North Queensland ATSIC zone. Townsville: Department of Public Health and Tropical Medicine, James Cook University, 1995:

48. Nguyen A, McCaul K, Carman J, Roder D, Priest K, Luke C. South Australian Regional Health Statistics Chartbook 1996: a working document. Adelaide: South Australian Health Commision, 1996:
49. Plant A, Condon J, Durling G. Northern Territory Health Outcomes, Morbidity and Mortality 1979-1991. Darwin: Northern Territory Department of Health & Community Services, 1995:
50. Somerford P, FitzGerald P, Gattorna L, et al. Our State of Health, 1995: an overview of the health of the Western Australian population. Perth: Health Department of Western Australia, 1995:
51. World Health Organisation. Primary health care level management of trachoma. World Health Organisation Programme for the Prevention of Blindness, 1995.