
AUSTRALIAN TRACHOMA SURVEILLANCE ANNUAL REPORT, 2011

Carleigh S Cowling, Bette C Liu, James S Ward, Tom L Snelling, John M Kaldor, David P Wilson

Abstract

Australia remains the only developed country to have endemic trachoma in some regions. Endemic levels of trachoma in Australia are found predominantly in remote and very remote Aboriginal communities. Data are collected from Aboriginal communities designated at-risk for endemic trachoma (defined as a prevalence of 5% or greater among children) in the Northern Territory, South Australia and Western Australia. This report presents data collected in 2011. The World Health Organization (WHO) grading criteria were used to diagnose cases of trachoma in Aboriginal children with jurisdictions focusing screening activities on the 5-9 year age group. The prevalence of trachoma within a community was used to guide appropriate treatment strategies as a public health response. Aboriginal adults aged 40 years or older were screened for trichiasis. Population screening coverage for trichiasis in 2011 was 9% with a prevalence of 2% in those adults screened. Trachoma screening coverage of the estimated population of children aged 5-9 years in at-risk communities was 65%. Trachoma prevalence among children aged 5-9 years who were screened was 7%. Of the communities screened, 47% were found to have no cases of active trachoma and 40% were found to have endemic levels. Treatment was required in 80 at-risk communities screened. Treatment coverage of active cases and their contacts varied between jurisdictions, ranging from 53% to 98%. This report provides evidence of increasing coverage of trachoma screening and control activities. In the Northern Territory and Western Australia, there is also evidence of a decline in the prevalence of infection that may be attributable to an improvement in control activities. Despite these apparent advances, trachoma prevalence remains at endemic levels in many communities in remote Australia. Continued efforts are required to ensure that Australia remains on track to reach the goal of elimination by 2020 or sooner.

Keywords: active trachoma, antibiotic resistance, control activities, endemic, facial cleanliness, Northern Territory, SAFE control strategy, South Australia, surveillance, Western Australia

Introduction

This is the sixth national trachoma surveillance annual report. Trachoma screening and management data for 2011 were provided to the National Trachoma

Surveillance and Reporting Unit (NTSRU) by the Northern Territory, South Australia and Western Australia.

Trachoma is an eye infection caused by *Chlamydia trachomatis*. The infection can be transmitted through close facial contact, hand-to-eye contact, via fomites (towels, clothing and bedding) or by flies. Repeated infections with *C. trachomatis*, especially during childhood, may lead to scarring, and distortion of the eyelid which may cause the eyelashes to rub against the cornea; this is known as trichiasis and can lead to blindness.^{1,2,3}

Australia is the only high-income country in the world where trachoma is endemic. It occurs primarily in remote and very remote Aboriginal communities in the Northern Territory, South Australia and Western Australia. In 2008 cases were also found in New South Wales and Queensland, where trachoma was believed to have been eliminated.^{4,5,6} Australia is a signatory to the Global Elimination of Blinding Trachoma (GET) 2020 initiative, supported by the World Health Organization (WHO) Alliance. This aims to eliminate blinding trachoma by 2020 through the Surgery, Antibiotics, Facial cleanliness and Environmental improvements (SAFE) strategy. In accordance with the GET 2020 initiative the Australian Government committed \$16 million over a 4-year period from 2009 towards eliminating trachoma in Australia. The funding is for the improvement and expansion of screening and control activities, as well as establishment of a strong framework for monitoring and evaluation, including the NTSRU.

Methods

Each participating jurisdiction undertook screening and treatment activities for trachoma according to its respective protocols, and in the context of the national 2006 Communicable Disease Network Australia (CDNA) *Guidelines for the public health management of trachoma in Australia*.² The guidelines recommend specific treatment strategies depending on the prevalence of trachoma detected through screening.

In 2006 when the National Trachoma Management Program was initiated, each participating jurisdiction identified at-risk communities from historical prevalence data and other knowledge such as data about movement of people between communi-

ties. Over time, additional communities have been reclassified as being at risk. Screening for trachoma focuses on the at-risk communities, but a small number of other communities designated as not being at risk were also screened if there was anecdotal information suggesting the presence of active trachoma. In 2011, jurisdictional authorities designated 207 remote Aboriginal communities as being at risk of endemic trachoma. All jurisdictions have adopted a school-based screening approach, with the focus on the 5-9 year age groups which have the highest levels of school attendance.

The WHO trachoma grading criteria were used to diagnose and classify individual cases of trachoma. Data collection forms for use at the community level were developed by the National Trachoma Surveillance Reference Group (TSRG), based on the CDNA Guidelines. Completed forms were forwarded from the jurisdictional coordinators to the NTSRU for checking and analysis. Information provided to the NTSRU at the community-level for each calendar year included the number of Aboriginal children aged 1-14 years screened for clean faces and the proportion with clean faces:

- by age group; the number of Aboriginal children aged 1-14 years screened for trachoma and the proportion with trachoma
- by age group; the number of episodes of treatment for active trachoma including household contacts and other community members, by age group.

Information provided also included:

- the number of Aboriginal adults screened for trichiasis, number with trichiasis
- the number who had surgery for trichiasis, as well as community level implementation of WHO SAFE strategies.

Northern Territory

Trachoma screening and management in the Northern Territory was undertaken through collaboration between the Northern Territory Department of Health (Centre for Disease Control and Health Development) and Aboriginal community controlled health services (ACCHS). Trachoma screening was incorporated into the Healthy School Age Kids (HSAK)⁷ annual check and conducted by either local primary health care services or ACCHS with support from the Centre for Disease Control (CDC) Trachoma Team. Following screening, treatment was generally undertaken by primary health care services with support from the CDC Trachoma Team. Community screening for trichiasis was initi-

ated in a small number of communities by the CDC Trachoma Team. Some adult screening took place during community visits by the CDC Trachoma Team staff, ACCHS, optometrists or ophthalmologists from the Regional Eye Health Service based in Alice Springs.

South Australia

In 2011, Country Health South Australia (CHSA) was responsible for managing the South Australian trachoma screening and treatment program. CHSA contracted with local health service providers, Aboriginal community controlled health services, the Aboriginal Health Council of South Australia (AHCSA) and Nganampa Health Service to ensure coverage of screening services in all at-risk rural and remote areas. Additional screening activities were undertaken by the Eye Health and Chronic Disease Specialist Support Program (EH&CDSSP), coordinated by the Aboriginal Health Council of South Australia and supported by the Medical Specialist Outreach Assistance Program (MSOAP) and the Office for Aboriginal and Torres Strait Islander Health, Department of Health. This program provides regular visits to South Australian remote Aboriginal communities by optometrists and ophthalmologists. Trichiasis screening was undertaken opportunistically for adults by both the EH&CDSSP team and the trachoma screening service providers, and is also undertaken routinely as part of the Adult Annual Health Checks.

Western Australia

Trachoma screening and management in Western Australia is the responsibility of Population Health Units (PHUs) in the Kimberley, Goldfields, Pilbara and Midwest Health Regions. In collaboration with the local primary health care providers, the PHUs screened at-risk communities in each region through schools within a two-week period, mostly at the end of August or early September. Treatment is undertaken at the time of screening. Trichiasis screening was undertaken in conjunction with adult influenza vaccinations. Screening the target population also occurred with the Visiting Optometrist Scheme (VOS) in the Kimberley. In 2011 Western Australia changed the definition of community, specifically amalgamating several previously distinct communities into one single community. This alters the trends presented in this report compared to previous reports

Data analysis

For the purpose of this report, a community is defined as a specific location where people reside and there is at least one school. Community coverage is defined as the proportion of at-risk communities screened

for trachoma. Individual screening coverage is the proportion of children in the target age group in a community who were actually screened.

Population data were based on the 2006 Australian census as in previous reports.⁸ The population for communities in subsequent years were projected forward using Australian Bureau of Statistics standard estimates of population increase (1.6%, 1.8% and 2.1% in the Northern Territory, Western Australia and South Australia respectively). Population estimates based on the 2006 census do not account for policy changes such as the Northern Territory Intervention, which may have resulted in unexpected population movements. Prevalence of active trachoma was calculated using the number of children screened as the denominator.

Trachoma data were analysed in the age groups 1-4, 5-9 and 10-14 years. Comparisons over time were limited to the 5-9 year age group, for which screening coverage has been consistent over time. Data from 2006 were excluded from the assessment of time trends as collection methods in this first year differed

from those subsequently adopted. Statistical significance in prevalence trend rates for communities that screened consistently from 2007 was tested with the chi-square test for trend. Adherence to the CDNA treatment guidelines was assessed by calculating the estimated proportion of active cases and contacts requiring treatment that were in fact treated.

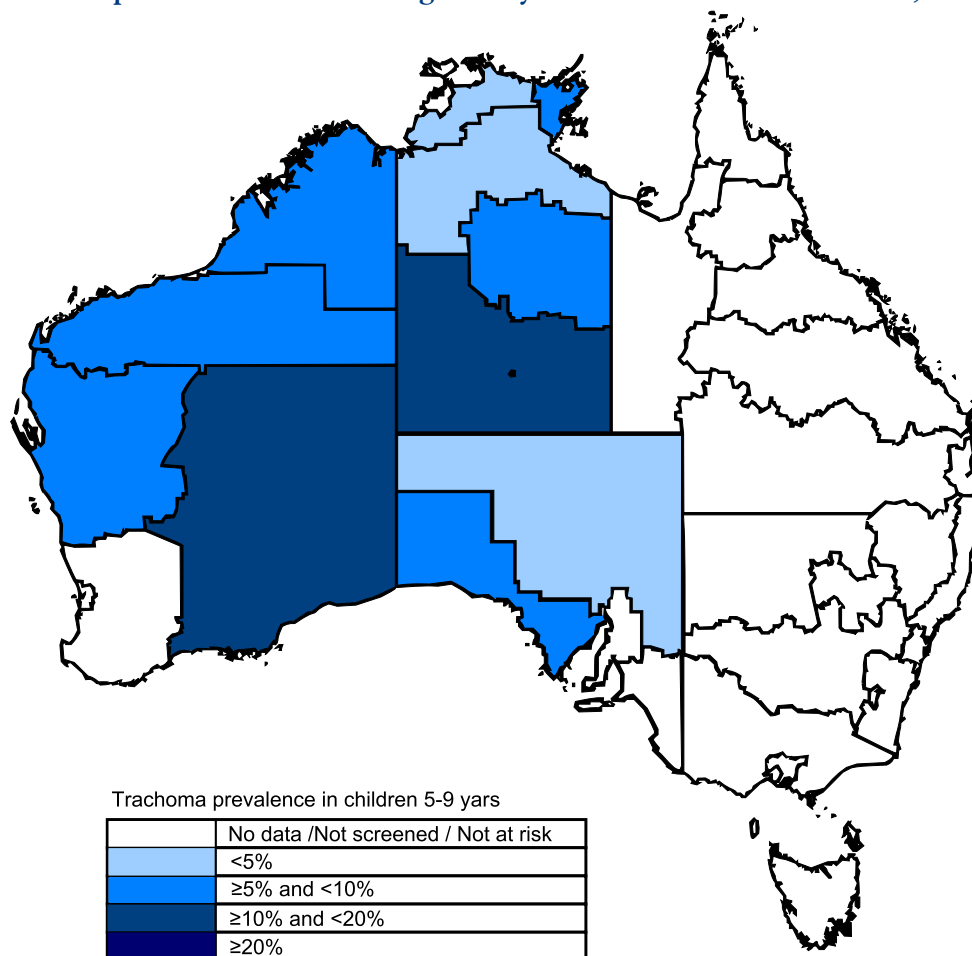
Health promotion resources and programs to promote trachoma and trichiasis awareness, facial cleanliness, and personal and environmental hygiene, and environmental conditions were not reported for the majority of communities and therefore data are not presented here.

Results

Trachoma

In 2011, a total of 152 (73%) of 207 designated at-risk communities were screened for trachoma across 11 endemic regions in the Northern Territory, South Australia and Western Australia (Figure 1). In communities screened for trachoma, 4,746 (65%) of an

Figure 1: Trachoma prevalence in children aged 5-9 years in screened communities, 2011, by region



The numerator and denominator associated with each region refer to the number of communities screened and the number of at-risk communities within each region, respectively.

Table 1: Trachoma screening coverage and prevalence among at-risk communities, 2011, by state or territory

	Northern Territory				South Australia				Western Australia				Total			
	1-4	5-9	10-14	Total	1-4	5-9	10-14	Total	1-4	5-9	10-14	Total				
Number of communities at risk	86				46				75				207			
Number of communities screened	65				19				68				152			
Age group (years)	1-4	5-9	10-14	Total	1-4	5-9	10-14	Total	1-4	5-9	10-14	Total	Total			
Estimated Aboriginal population at risk	3,637	3,909	3,653	11,199	938	931	935	2,804	2,265	2,498	2,095	6,858	6,883	20,861		
Children examined for trachoma	439	2,530	1,785	4,754	151	718	468	1,337	203	1,498	946	2,647	793	4,746	8,738	
Screening coverage	12%	65%	49%	42%	16%	77%	50%	48%	9%	60%	45%	39%	12%	65%	48%	15%
Children with active trachoma	19	175	91	285	2	29	5	36	3	123	38	164	24	327	134	485
Active trachoma prevalence	4%	7%	5%	6%	1%	4%	1%	3%	1%	8%	4%	6%	3%	7%	4%	6%
Trachoma prevalence 1-9 years (weighted by population)*	6%				3%				5%				5%			
Range of trachoma prevalence in 5-9 year olds in regions within jurisdictions	4% - 14%				3% - 7%				5% - 12%				3% - 14%			

* Calculated as the proportions of children with active trachoma in age groups 1-4 and 5-9 years, weighted by the estimated population sizes of each age group. This was done in order to account for uneven coverage with respect to age groups.

Table 2: Number of trachoma cases requiring treatment, and treatment coverage among at-risk communities, 2011, by state or territory

	Northern Territory				South Australia				Western Australia				Total								
	0-4	5-9	10-14	15+	All	0-4	5-9	10-14	15+	All	0-4	5-9	10-14	15+	All						
Number of communities at risk	86				46	75				207											
Number of communities requiring treatment	43				8	29				80											
Age group (years)	0-4	5-9	10-14	15+	All	0-4	5-9	10-14	15+	All	0-4	5-9	10-14	15+	All						
Active cases requiring treatment	19	175	91	N/A	285	2	29	5	N/A	36	3	123	38	N/A	164	24	327	134	N/A	485	
Active cases who received treatment	19	150	66	N/A	235	2	27	5	N/A	34	3	121	35	N/A	159	24	298	106	N/A	428	
% Active cases received treatment					82%					94%					97%						88%
Estimated contacts requiring treatment (according to jurisdictional interpretation of guidelines)					8,772					466					1,304					9,509	
Number of contacts who received treatment	626	841	512	2,636	4,615	36	51	52	316	455	118	254	177	556	1,105	780	1,146	741	3,508	6,175	
Estimated overall treatment coverage *					53%					98%					85%					65%	

* Estimated using average number of household contacts per child in communities who reported number of contacts requiring treatment and population statistics (see Methodology for data)

Table 3: Trichiasis screening coverage, prevalence and treatment among Aboriginal adults aged over 40 years, 2011, by state or territory

	Northern Territory	South Australia	Western Australia	Total
Adult population size of at-risk communities	7,007	1,921	4,538	13,466
Number of communities at-risk	86	46	75	207
Number of communities screened for trichiasis (% of at risk communities)	8 (9%)	7 (15%)	5 (7%)	20 (10%)
Number of adults examined (% of adults population)	212 (3%)	712 (37%)	255 (6%)	1,179 (9%)
Number of adults with trichiasis (% of adults examined)	9 (4%)	8 (1%)	2 (1%)	19 (2%)
Number of adults offered ophthalmic consultation	1	2	3	6
Number of adults receiving trichiasis surgery in past 12 months	0	0	0	0

estimated 7,338 resident children aged 5-9 years were screened. In 2011, screening coverage for children aged 5-9 years in the Northern Territory, 77% in South Australia and 60% in Western Australia (Table 1) (Figures 2 and 3).

In screened at-risk communities in all jurisdictions, the prevalence of trachoma among children aged 5-9 years, was 7%; comprising 7% in the Northern Territory, 4% in South Australia, and 8% in Western Australia. There was a decreasing trend in trachoma prevalence in the Northern Territory and Western Australia compared to data from the previous three years (Figure 4). Prevalence ranges of children aged 5-9 years within regions were between 4% and 14% Northern Territory, 3% and 7% within regions in South Australia and between 5% and 12% in Western Australia. The overall prevalence of trachoma among 1-9 year old children in screened communities was 5% (weighted by population).

In approximately half (47%; 72/152) of at risk communities screened no active trachoma was detected. The proportion of screened communities with no trachoma detected in 2011 increased in the Northern Territory and Western Australia, compared to 2010 and the proportion with endemic trachoma (>5% prevalence) decreased in these jurisdictions (Figures 5 and 6). In 14% (21/152) of at risk communities screened, hyper-endemic levels (>20% prevalence) of trachoma were found and in all participating jurisdictions (Figure 7). The highest prevalence in a single community was 60%, found in Western Australia, where fewer than 10 children were screened. A decreasing trend has been observed in communities that have been consistently screened and treated accordingly from 2007 to

2011. Low screening coverage in previous years in South Australia prevented the examination of time trends in trachoma in this state.

Treatment coverage

Active trachoma cases requiring treatment were detected in 80 of 152 communities screened, with 88% of active cases found to be receiving appropriate treatment for trachoma. Treatment coverage of contacts of the active cases detected with trachoma was 65% overall (Table 2). Since 2009, the Northern Territory has also undertaken 6-monthly treatment in hyper-endemic communities (>20% prevalence of trachoma). This strategy was undertaken in more communities in 2010, particularly in the Alice Springs remote region and may have contributed to the notable decrease in trachoma in that region, from 33% in 2010 to 14% in 2011.

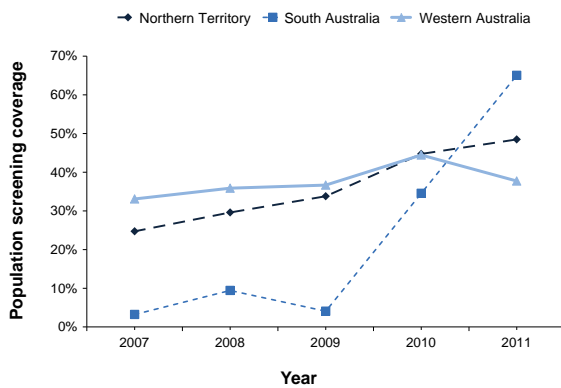
Trichiasis

Trichiasis screening coverage was low in all jurisdictions, with 1,179 adults (less than 10%) of an estimated at-risk population of 13,466 reported to have been screened across the Northern Territory, South Australia and Western Australia (Table 3). Overall trichiasis prevalence among those screened was 2% (n=19). No trichiasis surgery was reported by the jurisdictions. Screening coverage and prevalence of trichiasis has remained stable from 2010 – 2011.

Facial cleanliness

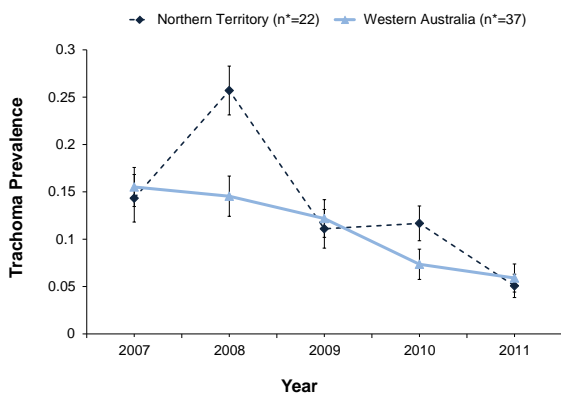
For individuals, the overall prevalence of clean faces in children aged 5-9 years was 76%, with 74% in the Northern Territory, 88% in South Australia and 75% in Western Australia, generally stable since 2010. The proportion of screened at-risk communities

Figure 2: Population screening coverage of children aged 5-9 years, 2007 to 2011, by year and state or territory



The numerator and denominator associated with each region refer to the number of communities screened and the number of at-risk communities within each region, respectively.

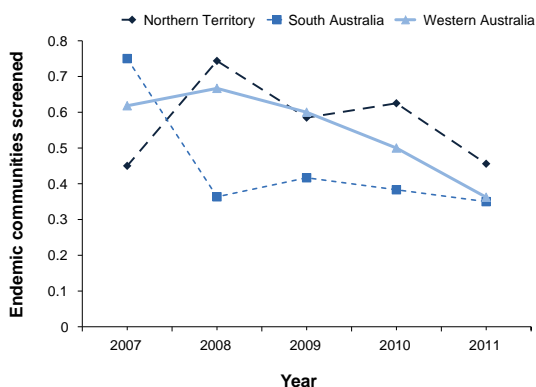
Figure 4: Trachoma prevalence* among children aged 5-9 years, in communities consistently screened* 2007 to 2011, by year and state or territory



* with 95% confidence intervals

† With at least 10 children screen each year between 2007 and 2011

Figure 6: Proportion of screened communities with endemic trachoma* among children aged 5-9 years, 2007 to 2011, by year and state or territory



* Prevalence greater than 5%

Figure 3: Trachoma prevalence among screened children aged 5-9 years, 2007 to 2011, by year and state or territory

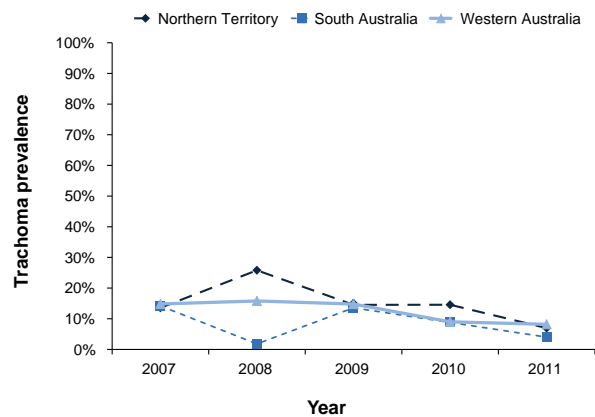


Figure 5: Proportion of screened communities in which no trachoma was reported among children aged 5-9 years, 2007 to 2011, by year and state or territory

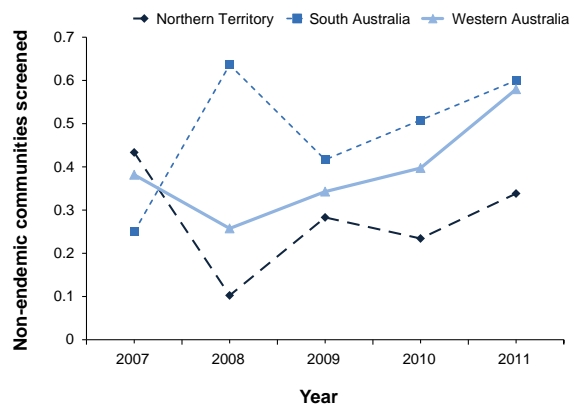
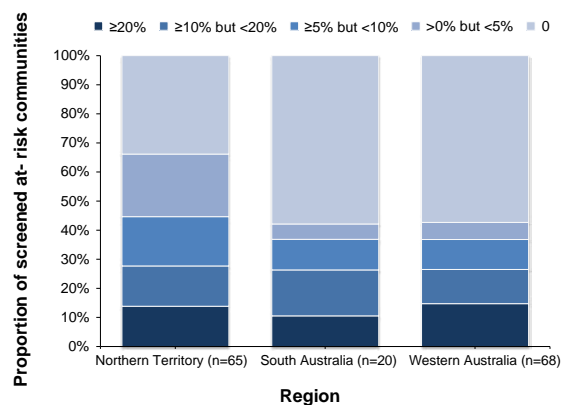
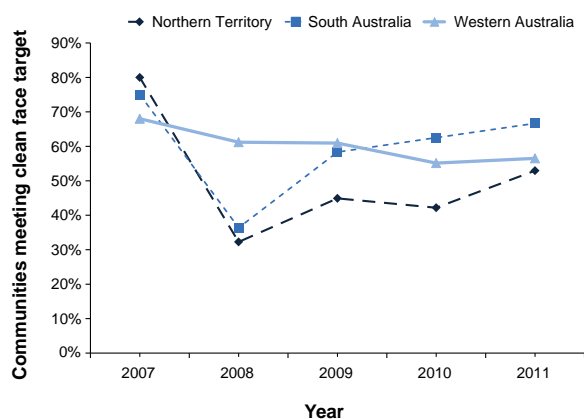


Figure 7: Proportion of screened at-risk communities according to level of trachoma prevalence among children aged 5-9 years, 2011, by trachoma prevalence and state or territory



n denotes number of communities screened

Figure 8: Percentage of screened communities meeting clean face target in children aged 5-9 years, 2007 to 2011, by year and state or territory



meeting the target of facial cleanliness of 80% among screened children aged 5-9 years in 2011 was 53% in the Northern Territory, 67% in South Australia and 57% in Western Australia (Figure 8).

Discussion

Screening coverage

Screening coverage was measured as both the proportion of at-risk communities screened and the proportion of 5-9 year old children screened in at-risk communities. Screening was predominantly conducted through primary school-based initiatives. Screening of older (10-14 year old) and younger (1-4 year old) children also took place, but less consistently. By both screening measures, the screening coverage substantially improved in South Australia in 2011. Coverage of 5-9 year old children has improved steadily in the Northern Territory and Western Australia over the past four years.

Trachoma prevalence in screened communities

Endemic trachoma is defined as a prevalence of active trachoma of 5% or more in screened communities among children aged 1-9 years. Although the focus of screening was among 5-9 year old children, the prevalence in the larger age band was estimated from available data. Across all three jurisdictions in 2011, the prevalence of trachoma among 1-9 year old children in screened communities was 5% (unweighted by population, ranging from 0% to 60%), representing a decrease from the 2010 combined prevalence of 13% (unweighted by population, ranging from 0% to 75%). At a regional level, the prevalence of trachoma among children aged 5-9 (focus of screening activities in 2011 across all jurisdictions was in the 5-9 year age group) years ranged from 3% to 14%.

There is strong evidence of a decrease in overall trachoma prevalence in screened communities in the Northern Territory and Western Australia. This conclusion was also reached when analyses were restricted to the communities that had been screened, and treated every year since 2007. The number of communities found to have a prevalence of above 5% (endemic trachoma) in screened children aged 5-9 years in the Northern Territory and Western Australia decreased, and there was an increasing trend in the number of communities that reported no trachoma in screened children aged 5-9 years.

The target set by both WHO and CDNA for the elimination of blinding trachoma is a community prevalence in children aged 1-9 years of less than 5%, over a period of five years. Several communities designated as being at-risk have reported prevalence levels of less than 5% over the past three years, and are therefore on track to be designated as not at risk if this status is maintained for two more years. However, overall there is more progress to be made with many communities still exceeding endemic trachoma levels.

Trachoma treatment

The CDNA guidelines recommend the treatment of active cases and their household contacts. When prevalence is greater than 10% and cases are not clustered within a few households, "community wide" treatment is advised. The approach to community-wide treatment differs between jurisdictions. In the Northern Territory, interpretation of the recommendation has been applied to treating the entire community, whereas in South Australia and Western Australia all children aged between 6 months and 14 years and household contacts are treated.

Across all three jurisdictions, 65% of those found through screening to have trachoma, or to be the household contact of an active case, were recorded as having been treated appropriately. Of active cases across all jurisdictions, 88% received treatment. At the jurisdictional level, 53%, 98% and 85% of the population requiring treatment were treated in the Northern Territory, South Australia and Western Australia, respectively. This variance in coverage may reflect the differing treatment strategies undertaken by the jurisdictions. In 2010, 57% of active cases were treated according to CDNA guidelines, and 70% of contacts across all jurisdictions received treatment. At the jurisdictional level in 2010, 64% of contacts in the Northern Territory and 91% in Western Australia were treated. Data regarding treatment for trachoma in South Australia was not made available in 2010. WHO and current CDNA targets are for 100% treatment of active cases and contacts.^{2,8}

Trichiasis

Screening rates for trichiasis among Aboriginal adults aged over 40 years across all jurisdictions remained low, and therefore, the reporting systems may not provide an accurate estimate of trichiasis prevalence in Aboriginal communities. Furthermore, prevalence figures only include data collected in communities currently designated as communities at risk of trachoma and do not take into account the possibility that endemic areas have changed over time. The limited number of adults screened for trichiasis in all jurisdictions, the prevalence of trichiasis in each community screened was 1% or greater, which indicates endemic trachoma in those communities. Ophthalmic referral processes were reported to be functioning within the majority of communities, but the effectiveness of the system has not been verified. In 2011, no episodes of trichiasis surgery were reported. However, this may not reflect the true level of ophthalmic consultation and surgical activities.

Facial cleanliness

Facial cleanliness is a major component of the SAFE strategy. The WHO sets a target of 80% facial cleanliness for children screened within communities. This high target illustrates that the presence of nasal and ocular discharge is a significant risk factor for both acquiring and transmitting trachoma. All jurisdictions had levels of facial cleanliness either just under or over this target of 80%. Ongoing health promotion endorsing facial cleanliness and general positive personal and environmental hygiene practices will improve facial cleanliness prevalence and decrease the risk of trachoma transmission.

Environment

Data on environmental conditions were not well reported in 2011, with the majority of communities not providing relevant data. Early in 2012 the Trachoma Surveillance and Control Reference Group (TSCRG) decided that the previously used methods of data collection did not accurately capture the environmental conditions that are recognised to influence trachoma prevalence and transmission. These conditions include adequate housing to decrease overcrowding; functional housing hardware including taps, showers and washing machines; effective maintenance systems for housing hardware; and adequate community waste disposal systems to prevent flies. The TSCRG and NTSRU are currently collaborating with environmental health agencies to develop more effective reporting processes for this component of the SAFE strategy.

Data quality and surveillance systems

Despite considerable improvement in several aspects of program delivery and monitoring in 2011, there are several issues that remain to be adequately addressed.

The analyses in this report have used population denominator estimates based on projections from census figures. These estimates are recognised as having the potential for substantial error in communities that are small or for which there is considerable mobility of community members, however we have no means for determining the extent or direction of any bias that may be present.

There are differences apparent across jurisdictions in the interpretation of the 2006 CDNA *Guidelines for the Public Health Management of Trachoma in Australia*. There is also a need to ensure that the guidelines are up to date. In 2011, the CDNA agreed to undertake a review of the Guidelines to incorporate the latest information on the screening, treatment and management of trachoma. The document is central to supporting trachoma control programs in the Northern Territory, South Australia and Western Australia, and new programs being established in New South Wales and Queensland. The Trachoma Framework Review Working Group, acting as a CDNA subcommittee, will guide the review process, and the NTSRU will manage the review process.

During 2011, the NTSRU developed a web-based interface program to increase the likelihood of consistent reporting across jurisdictions and regions through the use of a standard and simple to use data entry system. The system also allows for more efficient data validation and reporting to stakeholders, including communities. It is anticipated that all components of the web-interface data entry and reporting system will be fully operational in the course of 2012, and this should improve the quality of the data.

Progress towards Australia's elimination target

As a signatory to the WHO Alliance of Global Elimination of Trachoma by the year 2020, Australia is committed to ensuring that trachoma levels continue to decrease to below endemic levels in at-risk communities through increasing and improving effectiveness of all components of the SAFE strategy. This report provides evidence of increasing coverage of trachoma screening and control activities. In the Northern Territory and Western Australia, there is also evidence of a decline in the prevalence of infection that may be attributable to improvement in control activities. Despite these apparent advances, trachoma prevalence remains at endemic levels in many communities of remote Australia. Continued efforts are required to ensure that Australia remains on track to reach the goal of elimination by 2020 or sooner.

Acknowledgements

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Jurisdictional contributors to trachoma data collection

Northern Territory

- Aboriginal Community Controlled Health Services
- Aboriginal Medical Services Alliance of the Northern Territory
- Centre for Disease Control, Northern Territory Department of Health, Northern Territory
- Healthy School Age Kids Program: Top End and Central Australia

South Australia

- Aboriginal Community Controlled Health Services
- Aboriginal Health Council of South Australia
- Country Health South Australia

Western Australia

- Aboriginal Community Controlled Health Services
- Communicable Diseases Control Directorate, Health Department of Western Australia
- Goldfields Population Health Unit
- Kimberley Population Health Unit
- Midwest Population Health Unit
- Pilbara Population Health Unit

The National Trachoma Surveillance and Control Reference Group

The NTSRU is guided by the National Trachoma Surveillance and Control Reference Group, members of which include representatives from the following organisations:

- Office for Aboriginal and Torres Strait Islander Health; Department of Health
- National Aboriginal Community Controlled Health Organisations
- Communicable Disease Network Australia
- Northern Territory Department of Health
- Western Australia Country Health Service
- Country Health South Australia
- Melbourne School of Population Health, University of Melbourne

- Population & Preventive Health, University of Notre Dame
- The National Trachoma Surveillance and Reporting Unit; The Kirby Institute, University of New South Wales

Author details

Carleigh S. Cowling, Senior Surveillance Officer¹
Bette C. Liu, Senior Lecturer¹
James S. Ward, Deputy Director, Head Preventative Health²
Tom L. Snelling, Infectious Disease Physician^{3,4}
John M. Kaldor, Professor of Epidemiology¹
David Wilson, Associate Professor and Head, Surveillance and Evaluation Program for Public Health¹

1. National Trachoma Surveillance Reporting Unit, The Kirby Institute, University of New South Wales, Darlinghurst, New South Wales
2. Baker IDI Central Australia
3. Sydney Children's Hospital, Randwick, New South Wales
4. National Centre for Immunisation Research and Surveillance, Westmead, New South Wales

Corresponding author: Ms Carleigh Cowling, Senior Surveillance Officer, National Trachoma Surveillance Reporting Unit, The Kirby Institute, University of New South Wales, DARLINGHURST NSW 2010. Telephone: +61 2 9385 0865. Email: ccowling@kirby.unsw.edu.au

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