Infectious Diseases Issues in Central Australia

IKTO Meeting – October 2013

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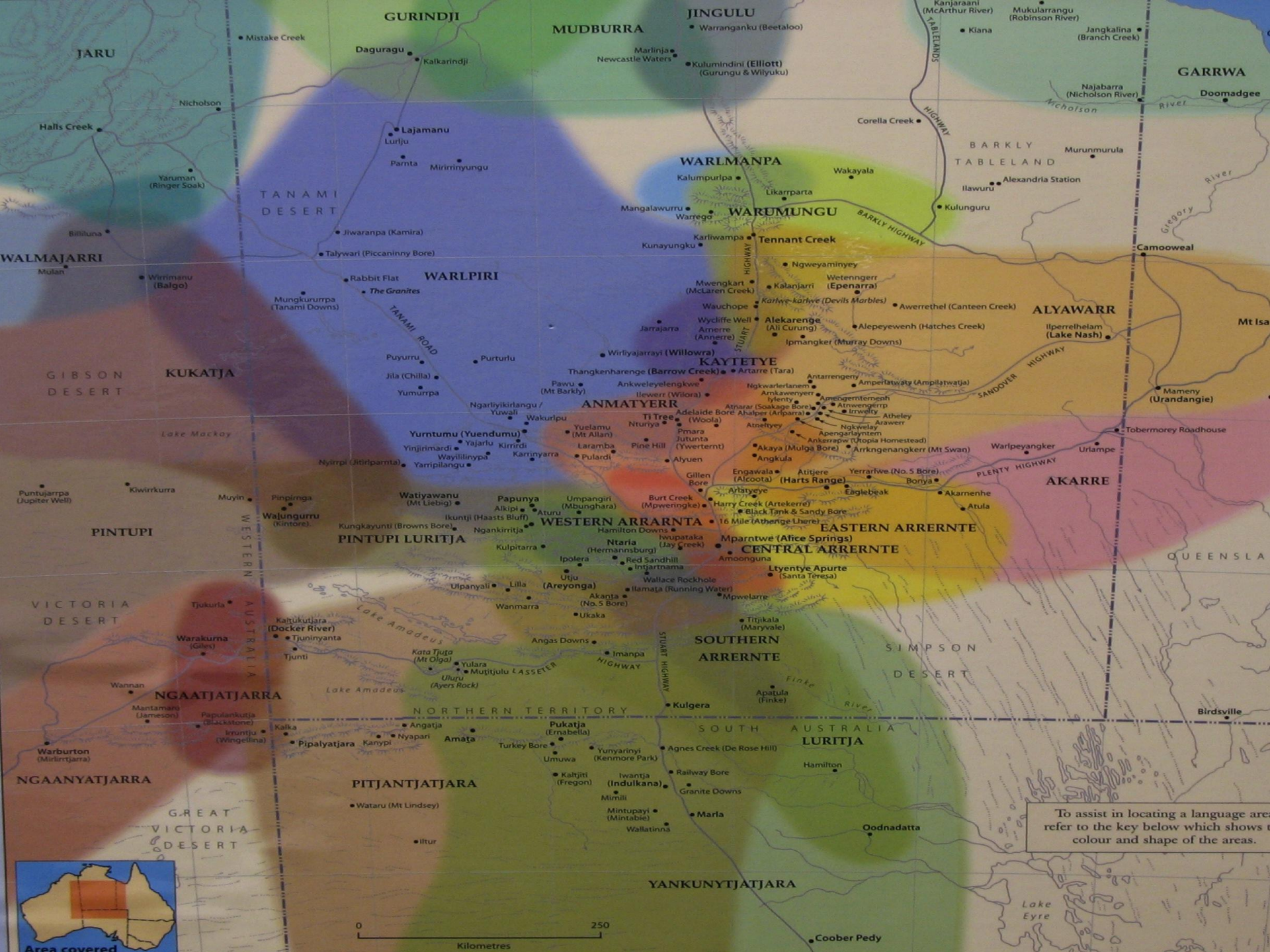

GURINDJI
MUDBURRA
JINGULU
Warranganku (Beetaloo)
Mistake Creek
JARU
Daguragu
Kalkarindji
Marlinja
Newcastle Waters
Kulumindini (Elliott)
(Gurungu & Wilyuku)
Kanjaraani
(McArthur River)
Mukularrangu
(Robinson River)
Kiana
Jangkalina
(Branch Creek)
TABLELANDS
GARRWA
Najabarra
(Nicholson River)
Doomadgee
Nicholson River
Nicholson
Halls Creek
Lajamanu
Lurlju
Parnta
Miriminyungu
Corella Creek
HIGHWAY
BARKLY
TABLELAND
Murunmurula
Yaruman
(Ringer Soak)
WARLMANPA
Kalumpurlpa
Wakayala
Alexandria Station
Ilawuru
Likarrparta
TANAMI
DESERT
Mangalawurru
Warrego
WARUMUNGU
BARKLY HIGHWAY
Kulunguru
Gregory River
Billiluna
Jiwaranpa (Kamira)
Karliwampa
Tennant Creek
Kunayungku
Talywari (Piccaninny Bore)
WALMAJARRI
Mulan
Camooweal
Wirrimanu
(Balgo)
Rabbit Flat
WARLPIRI
The Granites
Ngweyaminyey
Mwengkart
(McLaren Creek)
Kalanjarri
Wetenngerr
(Epenarra)
Mungkururrpa
(Tanami Downs)
TANAMI ROAD
Karlwe-karlwe (Devils Marbles)
Wauchope
Awerrethel (Canteen Creek)
ALYAWARR
Wycliffe Well
Jarrajarra
Arnerre
(Annerre)
Alekarenge
(Ali Curung)
Alepeyewenh (Hatches Creek)
Ilperrelhelam
(Lake Nash)
Mt Isa
STUART HIGHWAY
Ipmangker (Murray Downs)
Puyurru
Purturlu
Wirliyajarrayi (Willowra)
KAYTETYE
GIBSON
DESERT
KUKATJA
Jila (Chilla)
Thangkenharenge (Barrow Creek)
Artarre (Tara)
Antarrengerny
Amperlatwaty (Ampilatwatja)
SANDOVER HIGHWAY
Yumurrpa
Pawu
(Mt Barkly)
Ankweleyelengkwe
Ngkwarlerlanem
Arnkawenyerr
Mameny
(Urandangie)
Ilewerr (Wilora)
ANMATYERR
Iylenty
Amengernternenh
Atnwengerrp
Ngarliyikirlangu /
Yuwali
Wakurlpu
Atnarar (Soakage Bore)
Irrweity
Atheley
Ti Tree
Adelaide Bore
(Woola)
Ahalper (Arlparra)
Arawerr
Nturiya
Atneltyey
Ngkwelay
Lake Mackay
Yurntumu (Yuendumu)
Yajarlu
Yuelamu
(Mt Allan)
Pmara
Jutunta
(Ywerternt)
Apengarlayntem
Tobermorey Roadhouse
Yinjirimardi
Kirrirdi
Laramba
Pine Hill
Ankerrapw (Utopia Homestead)
Akaya (Mulga Bore)
Arrkngenangkerr (Mt Swan)
Warlpeyangker
Urlampe
Wayililinypa
Karrinyarra
Pulardi
Alyuen
Angkula
Nyirrpi (Jitirlparnta)
Yarripilangu
Engawala
(Alcoota)
Atitjere
(Harts Range)
Yerrarlwe (No. 5 Bore)
PLENTY HIGHWAY
Bonya
Gillen
Bore
AKARRE
Puntujarrpa
(Jupiter Well)
Kiwirrkurra
Muyin
Pinpirnga
Watiyawanu
(Mt Liebig)
Papunya
Umpangiri
(Mbunghara)
Arlatyeye
Eaglebeak
Akarnenhe
Burt Creek
(Mpweringke)
Harry Creek (Artekerre)
Atula
Alkipi
Aturu
Black Tank & Sandy Bore
Wajungurru
(Kintore)
Ikuntji (Haasts Bluff)
16 Mile (Athenge Lhere)
Kungkayunti (Browns Bore)
Ngankirritja
WESTERN ARRARNTA
Hamilton Downs
EASTERN ARRERNTE
PINTUPI
PINTUPI LURITJA
Iwupataka
(Jay Creek)
Mparntwe (Alice Springs)
Ntaria
(Hermannsburg)
CENTRAL ARRERNTE
Kulpitarra
Ipolera
Red Sandhill
Amoonguna
QUEENSLA
Intjartnama
Ltyentye Apurte
(Santa Teresa)
Utju
(Areyonga)
Wallace Rockhole
Ulpanyali
Lilla
Ilamata (Running Water)
Akanta
(No. 5 Bore)
Mpwelarre
VICTORIA
DESERT
Tjukurla
Wanmarra
Ukaka
Titjikala
(Maryvale)
Kaltukutjara
(Docker River)
Tjuninyanta
Warakurna
(Giles)
Angas Downs
SOUTHERN
ARRERNTE
SIMPSON
DESERT
Tjunti
Kata Tjuta
(Mt Olga)
Imanpa
Yulara
Mutitjulu
Uluru
(Ayers Rock)
Lake Amadeus
Finke River
Wannan
NGAATJATJARRA
Apatula
(Finke)
Mantamaru
(Jameson)
Papulankutja
(Blackstone)
NORTHERN TERRITORY
Kulgera
Birdsville
Kalka
Angatja
Pukatja
(Ernabella)
SOUTH AUSTRALIA
Iruntju
(Wingellina)
Nyapari
Amata
Turkey Bore
Yunyarinyi
(Kenmore Park)
Agnes Creek (De Rose Hill)
LURITJA
Warburton
(Mirlirrtjarra)
Pipalyatjara
Kanypi
Umuwa
Hamilton
NGAANYATJARRA
Kaltjiti
(Fregon)
Railway Bore
Iwantja
(Indulkana)
Granite Downs
PITJANTJATJARA
Mimili
Wataru (Mt Lindsey)
Mintupayi
(Mintabie)
Marla
Wallatinna
Oodnadatta
GREAT
VICTORIA
DESERT
Iltur
YANKUNYTJATJARA
Lake
Eyre
Coober Pedy
0
250
Kilometres
Area covered
To assist in locating a language are
refer to the key below which shows t
colour and shape of the areas.

Remote Clinics

Lake Nash

Ti Tree


LEGEND
Town Camps
Aboriginal Organisations
Roads
Train Line
Todd River
Tangentyere Council
N
Ilperle Tyathe (Warlpiri Camp)
Basso's
Libily St
Mount Nancy
Dulgety Rd
Basso Rd
Aper Alwerrknge (Palmer's Camp)
Charles Ck
Lhenpe Artnwe (Anmatyerre)
Anthelk Ewlpaye (Charles Creek Camp)
Nyewente (Trucking Yards)
Anhelke (Namatjira Camp)
Priest St
Smith St
Akngwertnarre (Morris Soak)
Lovegrove Drive
Elder St
Wilkinson St
Fogarty St
Larapinta Drive
Milner Rd
Blain St
Yarrenyty Arltere (Larapinta Valley)
Bradshaw Drive
Railway
Todd River
Mpwetyerre (BP/Abbotts)
Heavitree Gap
Macdonnell Ranges
Inarlenge (Little Sisters)
Commonage Rd
Palm Crt
Ragonesi Rd
Ross Hwy
Len Kittle Dv
Ilyiperenye (Old Timers)
Ilparpa Rd
Stuart Highway
Blatherskite Range
Karnte Rd
Anthepe (Drive In)
Karnte
Ilparpa
Schwartz Cres
Sturt Tce
Karrajong Dv
Undoolya Rd
Irrkerlantye (Whitegate)
Stott Tce
Spearwood Rd
Ilpiye Ilpiye (Golder's)
Sadadeen Rd
Power Station
Ewyenper Atwatye (Hidden Valley)
North Side:
1. Ngaanyatjarra Council, 58 Head Street
2. Central Land Council (CLC) 31-33 Nth Stuart Hwy
3. Centre for Appropriate Technology (CAT) 32 Priest Street
4. Aboriginal Areas Protection Authority(AAPA), Belevedere Hse, Parsons St
5. ATSIC Alice Springs, Cwlth Bldg, Hartley St
6. Aboriginal Hostels Ltd, 15 Leichardt Tce
7. Imparja Television, 14 Leichardt Tce
8. Central Australian Aboriginal Legal Aide Service (CAALAS) 55 Bath St
West Side:
9. TANGENTYERE COUNCIL , 4 Elder St
10. Pitjantjatjara Council, 3 Wilkinson St
11. Nganampa Health Service, 3 Wilkinson St
12. Ngurratjuta-Pmara Ntjarra Corp, 29 Wilkinson St
13. Ayiparinya Hostel, Larapinta Dve
14. Yipirinya School, Lovegrove Drive
South Side:
15. Central Australian Aboriginal Media Association (CAAMA) 101 Todd St
16. Institute for Aboriginal Development (IAD) 3 Sth Terrace
17. Arrernte Council, 9 South Terrace
18. Central Australian Aboriginal Congress, (CAAC) 25 Gap Rd
19. Aboriginal Child Care Agency (ACCA) 9 Parke Cres
South through the gap:
20. TANGENTYERE NURSERY, Nth Len Kittle Dv (dirt)
21. Ingkrerreke Outstation Resource Centre, Nth Len Kittle Drive (dirt)
22. Central Australian Aboriginal Alcohol Program Unit(CAAAPU) 90 Ragonesi Rd
23. Tyewere Social Club, Len Kittle Drive
24. Yirrara College, Sth Stuart Hwy
RedDirt Graphics

Socioeconomic determinants of health – NT statistics

- 62.6% of Indigenous people were in community housing
- 34% of Indigenous households in the NT were overcrowded
  - 60.8% in those in community housing
- Australia-wide in “discrete Indigenous communities”
  - 53% used bore water as major water source, 11% used a river or reservoir
  - 53% used community generators for electricity

What's Common in Alice Springs?

- Skin & soft tissue infections
- Bronchiectasis
  - Prevalence 147 cases per 10 000 Indigenous children in Central Australia [1]
- Strongyloides
- Sexually transmitted infections
  - NT has highest rate of Chlamydia, Gonorrhoea & Syphilis in the country [2]
- Bacteraemia
  - Especially *Staph aureus* and *Strep pneumoniae*
- Human T cell lymphotropic virus 1 (HTLV-1)

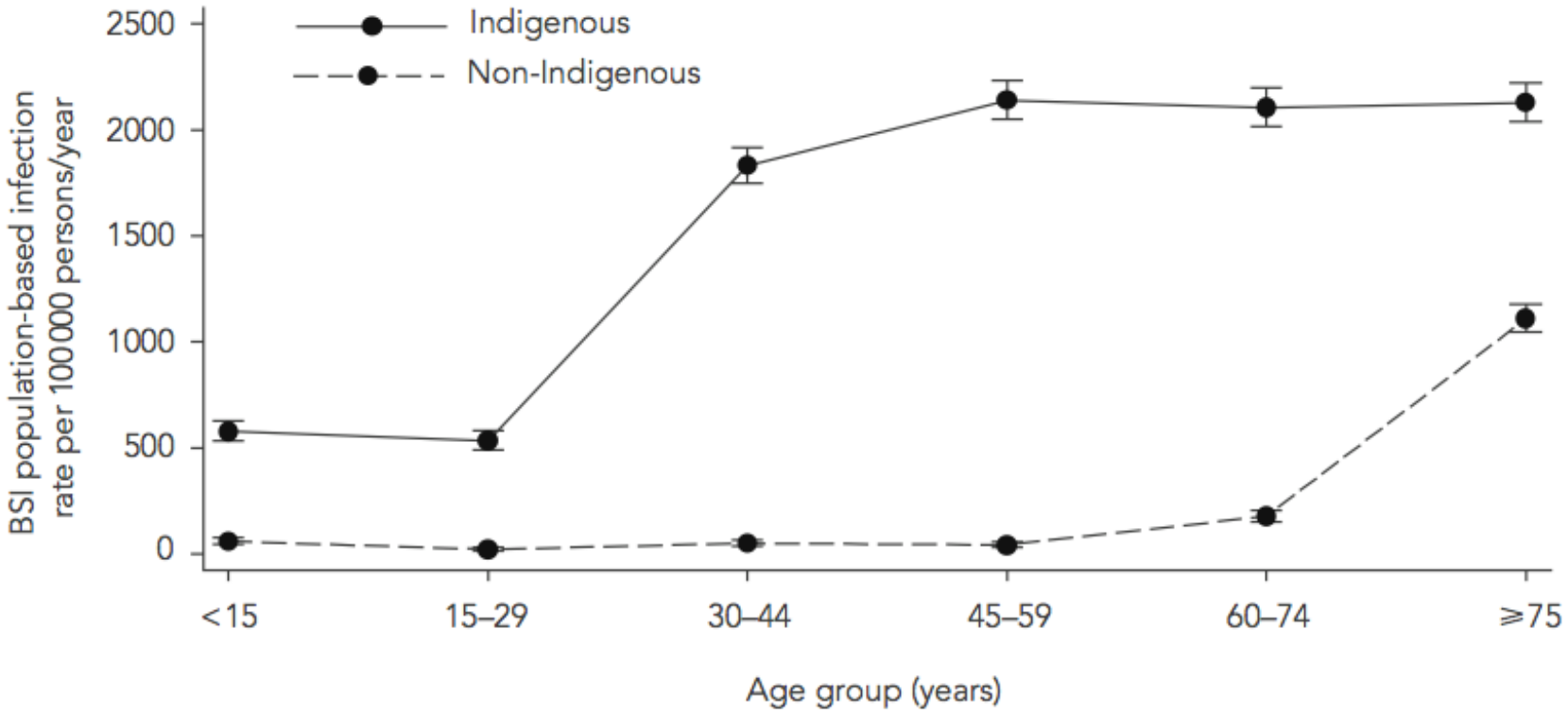
[2] Chang AB, MJA 2008
[1] Kriby Institute, 2012

Two nations: racial disparities in bloodstream infections recorded at Alice Springs Hospital, central Australia, 2001–2005

Lloyd J Einsiedel and Richard J Woodman

MJA 2010; 192: 567–571

3 Population-based BSI incidence rates among Indigenous and non-Indigenous patients admitted to Alice Springs Hospital, by age, 2001–2005



1 Patient characteristics, outcomes and comorbid conditions for Indigenous and non-Indigenous adults admitted to Alice Springs Hospital with BSIs, 2001–2005

	Indigenous patients	Non-indigenous patients	*P*
Characteristics	(*n* = 614)	(*n* = 69)	
Mean age, in years (SD)	44.0 (15.2)	57.3 (20.4)	< 0.001
Age > 65 years, *n* (%)	64 (10.4%)	29 (42.0%)	< 0.001
Male, *n* (%)	271 (44.1%)	43 (62.3%)	< 0.001
Residence outside region, *n* (%)*	110 (17.9%)	24 (34.8%)	< 0.001
Outcomes			
30-day mortality, *n* (%)	76 (12.4%)	6 (8.7%)	0.38†
Overall mortality, *n* (%)	197 (32.1%)	9 (13.0%)	0.003†
Mean age at death, in years (SD)	48.5 (16.2)	75.1 (18.7)	< 0.001
Recurrent BSI, *n* (%)‡	91 (16.5%)	3 (5.0%)	0.019
Comorbid conditions, *n* (%)§	(*n* = 392)	(*n* = 44)	*P*¶
Diabetes mellitus	164 (41.8%)	6 (13.6%)	0.16
Alcohol dependence	152 (38.8%)	6 (13.6%)	0.21
Chronic renal failure	59 (15.1%)	2 (4.5%)	0.68
Haemodialysis	49 (12.5%)	0	< 0.001
Chronic liver disease	14 (3.6%)	0	< 0.001
Congestive cardiac failure	8 (2.0%)	1 (2.3%)	0.99
Malignancy	5 (1.3%)	4 (9.1%)	0.58
HTLV-1**	116/270 (43.0%)	nt	
Strongyloidiasis††	73/206 (35.4%)	nt	

BSI = bloodstream infection. HTLV-1 = human T-cell lymphotropic virus type 1. nt = not tested.

* Residence outside Alice Springs rural area. † Log-rank test. ‡ Among patients who survived > 30 days after initial BSI (Indigenous [*n* = 550]; non-Indigenous [*n* = 60]). § Comorbidities recorded for patients admitted over the period 2003–2005. ¶ Binomial test of proportions. ** Positive Western blot test for HTLV-1. †† Positive serology for *Strongyloides stercoralis*.

Non-communicable diseases, infection and survival in a retrospective cohort of Indigenous and non-Indigenous adults in central Australia

Lloyd Einsiedel, Liselle Fernandes, Sheela Joseph, et al.

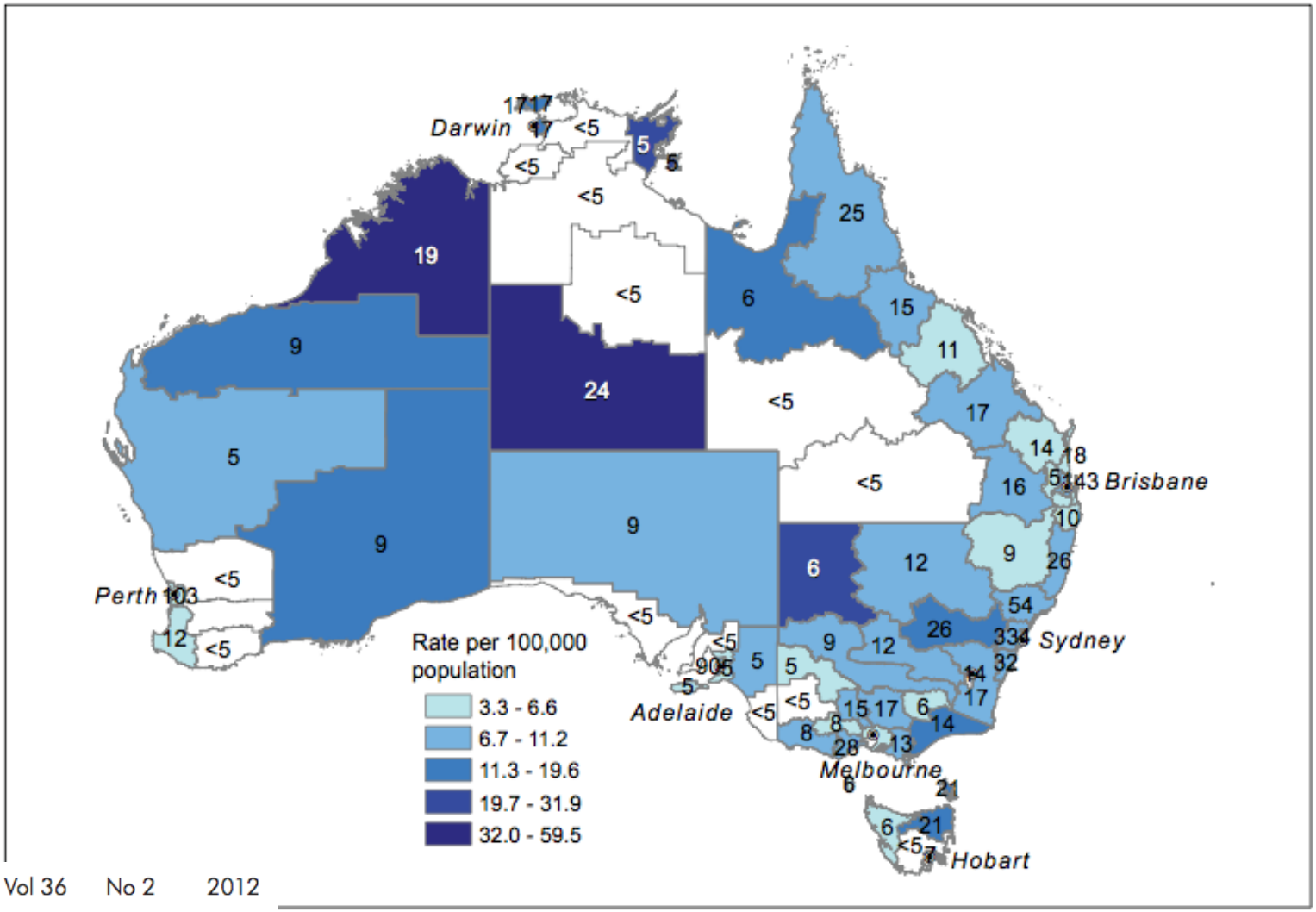
BMJ Open 2013 3:

Table 1 Demographics and comorbidities for indigenous and non-indigenous BSI patients 2003–2007

	Indigenous (n=558)	Non-indigenous (n=55)	p Value for difference
Age (years) (±SD)	44.7±15.2	57.5±21.1	<0.001
Gender (M/F) (%)	234/324 (42/58)	31/23 (57/43)	0.03
Mortality			
28 days	62 (11.1)	7 (12.7)	0.72
All deaths	145 (26.0)	15 (27.3)	0.84
Age of death (years)	47±15	68±21	<0.001
Major BSI pathogens††	1029	110	
Enterobacteriaceae	370 (36.0)	38 (34.5)	0.56
Escherichia coli	246 (66.5)	28 (73.7)	0.37
Klebsiella pneumoniae	57 (15.4)	2 (5.3)	0.09
Staphylococcus aureus	191 (18.6)	20 (18.2)	0.83
MRSA	53 (27.8)	1 (5.0)	<0.001
Streptococcus pneumoniae	136 (13.2)	8 (5.9)	<0.001
Streptococcus pyogenes	68 (6.6)	8 (7.3)	0.42
Haemophilus influenza	22 (2.14)	0	0.14
Enteric pathogens‡‡	29 (2.81)	1 (0.91)	0.27

Invasive Pneumococcal Disease

Map: Notification rates for invasive pneumococcal disease, Australia, 2008, by Statistical Division of residence



Staphylococcus aureus bacteraemia

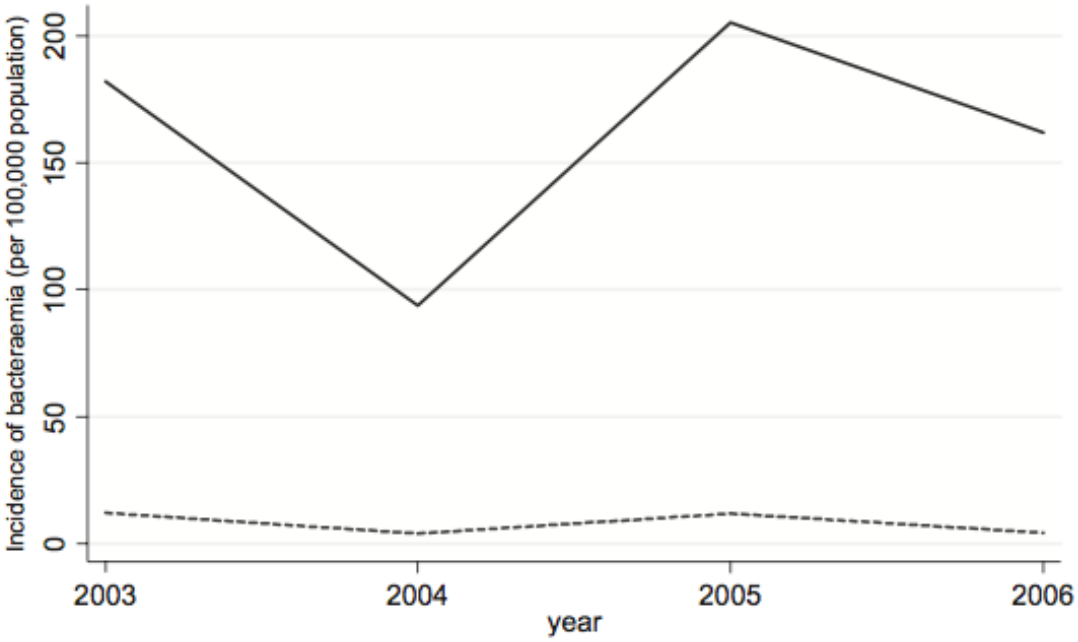


Figure 1 Annual incidence rates of *Staphylococcus aureus* bacteraemia, 2003–2006, among indigenous and non-indigenous residents of Central Australia. Annual incidence rates of *S. aureus* bacteraemia for the indigenous and non-indigenous resident population of the Alice Springs Region using the Australian Bureau of Statistics annual estimated resident population as the denominator. (—) indigenous; (----) non-indigenous.

[1] Hewagama S, IMJ 2012

Human T Cell Lymphotropic Virus 1 (HTLV-1)

- Cell associated retrovirus
  - Vertical transmission
  - Breast feeding
  - Sexual
  - Blood products

- Endemic to certain areas:
  - Japan
  - Sub-Saharan Africa
  - Caribbean
  - South America
  - Central Australia
    - 31% of dialysis patients in Alice Springs in 2011

HTLV-1

	Epidemiological evidence			Biological evidence	
	Case reports or series	Case control studies	Cohort studies	HTLV-1 in lesions	Animal model
Inflammatory syndromes					
HAM/TSP	Yes	Yes	Yes	Yes	Yes
Uveitis	Yes	Yes	..	Yes	Yes
Arthropathy	Yes	Yes	..	Yes	Yes
Sjögren's syndrome	Yes	..	..	Yes	Yes
Polymyositis	Yes	..	..	Yes	Yes
Thyroiditis	Yes	..	..	Yes	..
Pneumopathy	Yes	..	..	..	..
T lymphocyte alveolitis	Yes	..	..	..	..
Malignant diseases					
ATL	Yes	Yes	Yes	Yes	Yes
Cutaneous T-cell lymphoma	Yes	..	..	Yes	..
Infectious complications					
Strongyloides stercoralis	Yes	Yes	Yes	..	..
Crusted scabies	Yes	..	..	..	..
Infective dermatitis	Yes	..	..	..	..
Tuberculosis	Yes	Yes	..	..	..
Leprosy	Yes	Yes	..	..	..

HAM/TSP=HTLV-1-associated myelopathy/tropical spastic paraparesis. ATL=adult T-cell leukaemia/lymphoma. ..=unknown. References 1, 5, 55, 103, 105–126. See webappendix for supplemental list of references, and an indication of which studies relate to each association and basis for association.

Table 2: **Diseases reported in association with HTLV-1 and basis for this association**

Bronchiectasis Is Associated With Human T-Lymphotropic Virus 1 Infection in an Indigenous Australian Population

Lloyd Einsiedel,[1,2] Liselle Fernandes,[2] Tim Spelman,[2] Daniel Steinfort,[1] and Eduardo Gotuzzo[3]

- 52/89 (58.4%) of Indigenous adults with bronchiectasis were HTLV-1 positive

- HTLV-1 associated with:
  - ↑ number of bronchiectatic lobes (OR 1.51; 95% CI 1.03-2.20)
  - ground glass opacities on HRCT (OR 8.54; 95% CI 1.04-70.03)
  - ↑ disease specific mortality (OR 5.78; 95% CI 1.17-26.75)

- Presence of skin lesions was associated with mortality (OR 6.77; 95% CI 1.46-31.34)

- Mortality 34.2% - median age 42.5

Clinical Infectious Diseases 2012;54(1):43–50

INFECTIONS IN RENAL TRANSPLANT PATIENTS

Renal Transplant Outcomes in Central Australia: 2000-2011 Retrospective Review

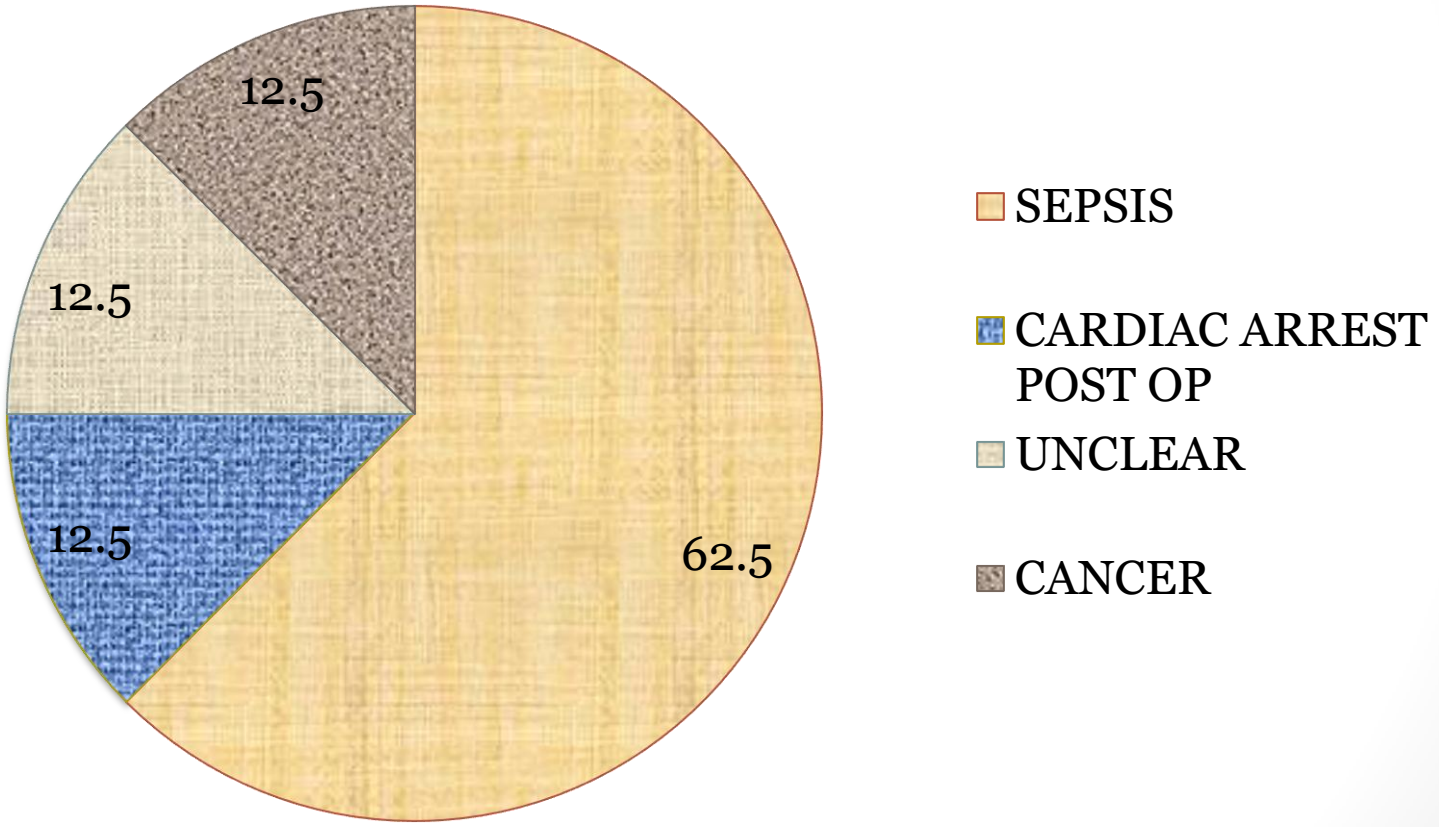
- 42 transplants in 38 recipients
  - i.e. 4 re-transplants
  - 26 Indigenous, 16 non-Indigenous

- All non-Indigenous patients from/in Alice Springs
- 6 of Indigenous patients in Alice Springs, 10 in Tennant Creek

- 21 recipients alive with functioning graft & 12 alive with a failed graft

- 8 deaths in patients with a functioning graft (7 Indigenous)

Cause of Death



The past 10 years

- Functioning graft
  - Enterococcal bacteraemia
  - CMV Colitis
  - BK viraemia
  - Cutaenous CMV
- Failed graft
  - Rhizoctonia bataticola skin infection, Cryptosporidial diarrhoea, disseminated microsporidiosis, Nocardia bacteraemia
  - Cryptosporidial diarrhoea
- Deaths
  - ESBL UTI, CMV viraemia, BK viraemia
  - Apophysomyces elegans skin infection (Zygomycete)
  - E.coli urosepsis
  - Fungal pneumonia

Mr W.E

- 59yo Indigenous male from Tennant Creek
- ESRF presumed secondary to diabetic nephropathy
  - PHx: T2DM, dyslipidaemia, past *M.bovis* lung infection, cleared Hepatitis B, (IHD)

- Cadaveric renal Tx in 2010
  - Acute vascular rejection day 7 – Rx: Atgam

- Cutaneous fungal infection – Rhizoctonia bataticola
  - Rx: liposomal Amphotericin B then voriconazole

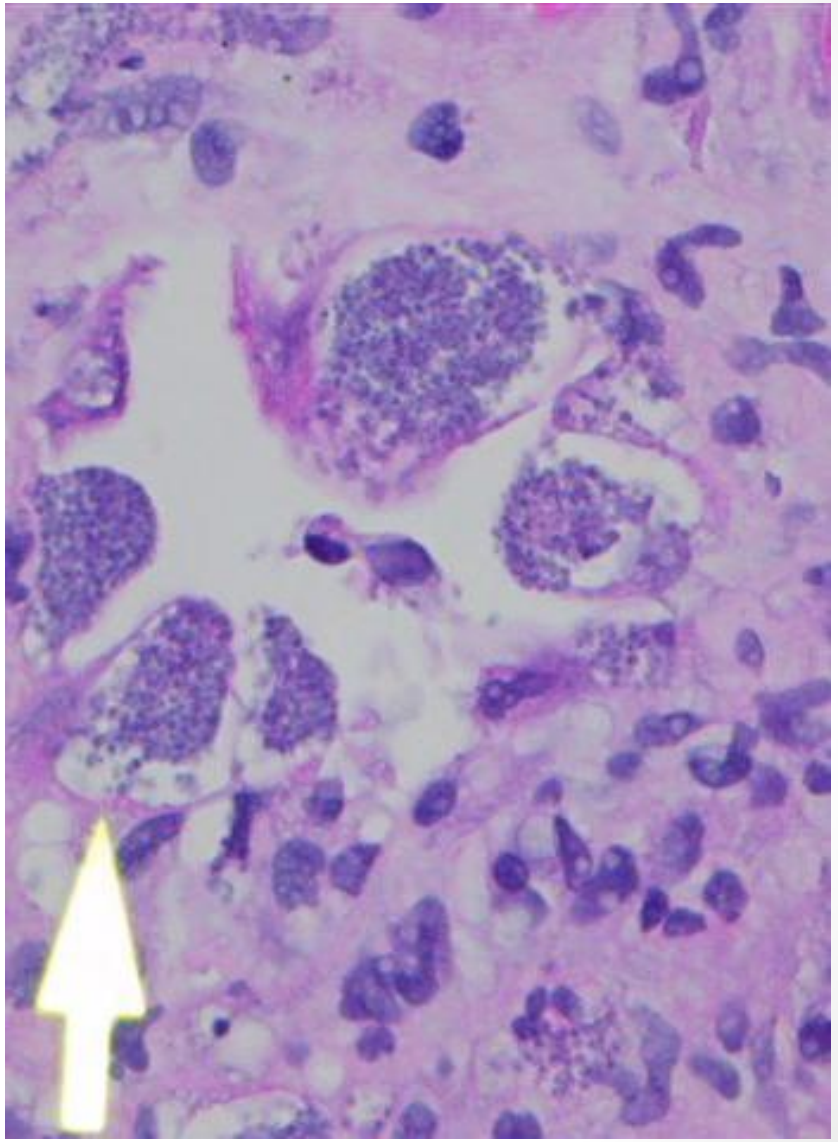
- Cryptosporidial diarrhoea
  - Rx: 2/52 nitazoxanide

- Scabies

2011 – Disseminated Microsporidiosis

- presented with a LRTI
- Deteriorated despite broad spectrum antibiotics
- Intubated in ICU
- Bronchoscopy:
  - microsporidial spores
- Renal biopsy:
  - extensive granulomatous inflammation with spores of microsporidia
- Started on albendazole Rx

- Transferred to RAH
  - Microsporidia seen again on BAL (*E.intestinalis*)
  - CMV colitis on rectal biospy
  - *C.difficile* diarrhoea



Progress

- October 2011 – Nocardia bacteraemia
  - Presented with fevers & new lung infiltrate on CXR
  - Complicated by seizures (CT brain NAD)
  - Rx: meropenem & bactrim – subsequently changed to imipenem and ciprofloxacin, then ciprofloxacin maintenance Rx for 1 year
- Decision to withdraw immunosuppression and return to haemodialysis

Microsporidiosis

- Intestinal disease
  - Usually *Enterocytozoon bieneusi*
- Disseminated disease
  - Usually *Encephalitozoon* species

- Often associated with HIV infected individuals
- A number of case reports of disseminated disease in SOT patients; the majority in renal transplantation
  - Most *E.cunuculi* infection
  - 1 other case report of *E.intestinalis* disseminated infection (also a renal transplant patient)[1]

- *E.intestinalis* infection usually associated with gastrointestinal disease and is associated with poor socioeconomic living conditions[2]

[1] Latib MA, Transpl Int 2001
[2] Enriquez FJ, CID 1998

Cryptosporidiosis

- Intestinal protozoa
- Faecal-oral spread, requires a low infectious inoculum
  - often transmission from swimming pools
- Oocyst survives for long periods in the environment & is relatively resistant to chlorine

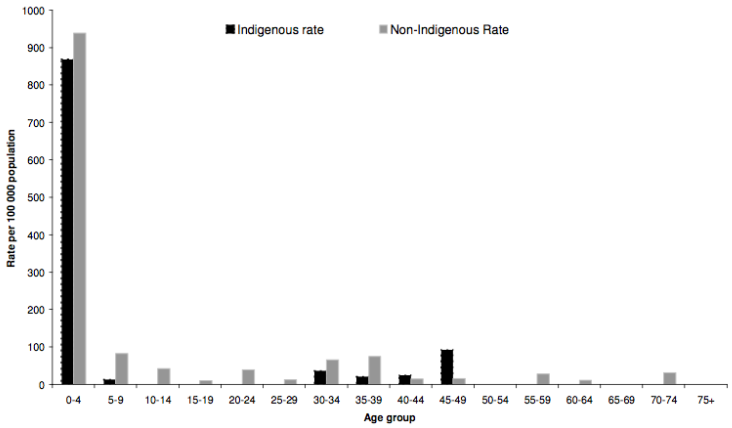
- Often infects children <5 years old or immunocompromised patients

- Immunocompetent pts:
  - Self-limiting diarrhoea but 40% have recurrent symptoms
  - In developing countries can cause more persistent diarrhoea (predictor of malnutrition)
- HIV patients
  - CD4 >150 – usually self-limited diarrhoea but more frequent relapse
  - CD4 <150 – persistent diarrhoea & disseminated disease
    - Respiratory tract & biliary tree

Cryptosporidiosis in the NT

- In 2012
  - 243 notifications
    - 75% higher than the 5 year mean
    - 156% higher than 2011
  - 74% were between 0-4 years old
  - Overall:116 cases per 100,000 Indigenous vs 90 cases per 100,000 non-Indigenous
    - Rate ratio 1.3 (p=0.04)
    - Non-significant in the 0-4 year olds only

Figure 4. Cryptosporidiosis rates, by age and Indigenous status, Northern Territory, 2012



ANY QUESTIONS?