

DISEASE CONTROL BULLETIN

Vol. 27, No. 1, March 2020

ISSN 1440-883X

COVID-19: The First 3 Months

Karen Dempsey¹ and Anthony Draper²

¹ Epidemiologist, Centre for Disease Control, Public Health Unit, Top End Health Service

² Epidemiologist, Centre for Disease Control, Public Health Unit, Top End Health Service

Since January 2020, Northern Territory (NT) Centre for Disease Control (CDC) has been actively involved in COVID-19 (coronavirus disease 2019)-related activities. This has included:

1. interviewing COVID-19 cases;
2. identifying and quarantining close contacts (contact tracing);
3. analysing NT COVID-19 testing data to ensure that testing rates are targeting appropriate populations, including those most vulnerable; and
4. managing a dedicated COVID-19 telephone hotline.

The NT first (clinician) Alert was issued on 10 January 2020 (page 5). Surveillance situation reports have been prepared daily to provide timely epidemiological information on cases, contact tracing activity and reports that show the testing counts, trends and representativeness.

Cases

The first case of COVID-19 in the NT community was notified on 4 March 2020. As at 31 March 2020, there were 19 cases of COVID-19 diagnosed in the NT, which

included 17 NT residents and 2 interstate residents. In addition, another NT resident was diagnosed interstate.

These numbers do not include 8 passengers who were diagnosed with COVID-19 after disembarking the cruise ship, *Diamond Princess*, who quarantined at a dedicated supervised quarantine facility managed by Australian Medical Assistance Teams (AusMAT). Of the 19 COVID-19 cases (Figure 1), diagnosed in the NT community, 10 (53%) were male with a median age of 50 years at diagnosis (range 21 – 75 years).

Contents

COVID-19: The First 3 Months	1
COVID-19 initial Clinician Alerts.....	5
COVID-19 Situation Report 31 Mar 2020.....	9
A snapshot of immunisation coverage in the NT	10
Meningococcal ACWY disease	14
Northern Territory malaria notifications.....	15
Enteric disease in the Northern Territory in 2019—a brief summary	16
Abstracts from peer reviewed published articles related to the Northern Territory.....	26
Shigella fact sheet	30
Northern Territory notifications of disease by onset date and district.....	32
Graphs of selected diseases and STIs.....	33
Comments on notifications.....	34

Editor: Vicki Krause
 Assistant Editors: Peter Markey, Karen Dempsey
 Production Design: Jade Tavane; Di Bell
 Email: vicki.krause@nt.gov.au
 Media contact: media.health@nt.gov.au

Top End Health Service Public Health Unit
 PO Box 40596
 Casuarina
 Northern Territory 0811



Throughout this document the term Aboriginal should be respectfully taken to include Torres Strait Islander people.

<https://hdl.handle.net/10137/506>

All 19 cases were non-Aboriginal and acquired their infection overseas (Figure 2). There was no community transmission. All cases were isolated in hospital in accordance with NT guidelines. One case required intensive care unit admission. All 19 cases recovered.

Contact tracing

Contact tracing of cases was conducted in accordance with Australian guidelines; the strategy being to conduct rapid and thorough contact tracing of close contacts to ensure rapid entry into quarantine for 14 days and active daily monitoring for symptoms. Close contacts were defined as anyone:

1. with face-to-face contact with a confirmed COVID-19 case for more than 15 minutes cumulatively or continuously (e.g. household setting or healthcare setting without appropriate use of personal protective equipment) or;
2. who was in the same room with an infectious case for more than 2 hours (e.g. school room, workplace) while a case was symptomatic or in the 48 hours prior to symptom onset.

Aircraft close contacts included passengers who were seated in the same row, or in the 2 rows in front of or behind an infectious case.

If the case was a crew member, passengers in the area that the crew member worked were classified as close contacts. Passengers disembarking from cruise ships with high incidence of COVID-19 were also classified as close contacts for surveillance purposes.

Close contacts were required to quarantine at home or in a hotel and respond daily to a short message service (SMS) to declare if they were well or had developed fever or respiratory symptoms which would require testing or if they were needing assistance. Compliance officers conducted random visits to ensure compliance with quarantine requirements.

Close contacts who quarantined in the NT and became unwell during the quarantine period were tested for SARS-CoV-2 and other respiratory viruses. Of these, 5 were diagnosed with COVID-19 and transferred to Royal Darwin Hospital. No close contacts tested positive up to 31 March 2020.

As at 31 March 2020, a total of 283 close contacts had been monitored for signs of illness while undergoing quarantine. The majority of close contacts (176, 62%) were located in the Darwin region. The most common exposure settings for close contacts being monitored were aircraft (169/283, 62%), cruise ships (61/283, 22%) and within the household (26/283, 9%).

Figure 1. Proportion of COVID-19 cases diagnosed in the NT by age group and sex as of 31 March 2020

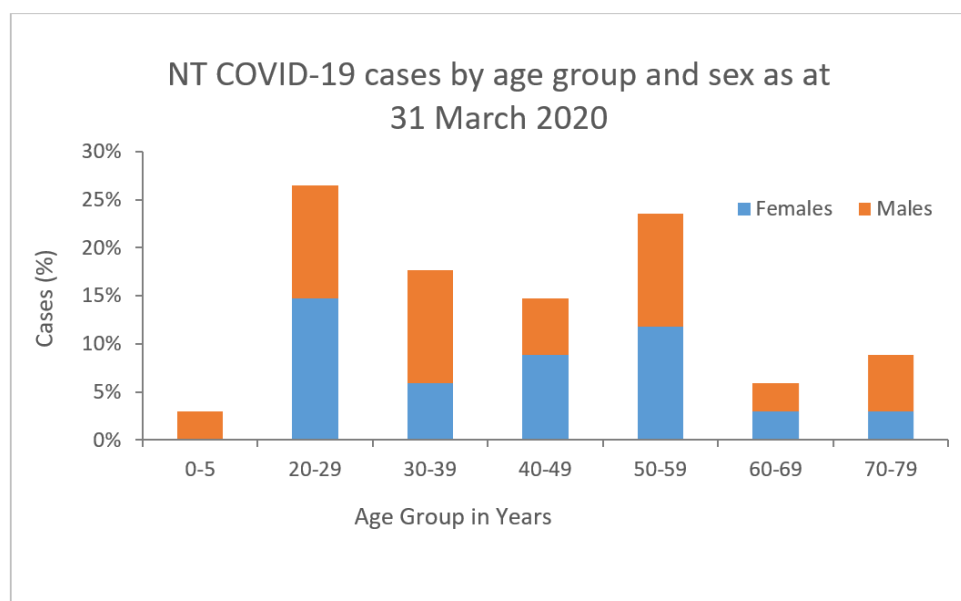
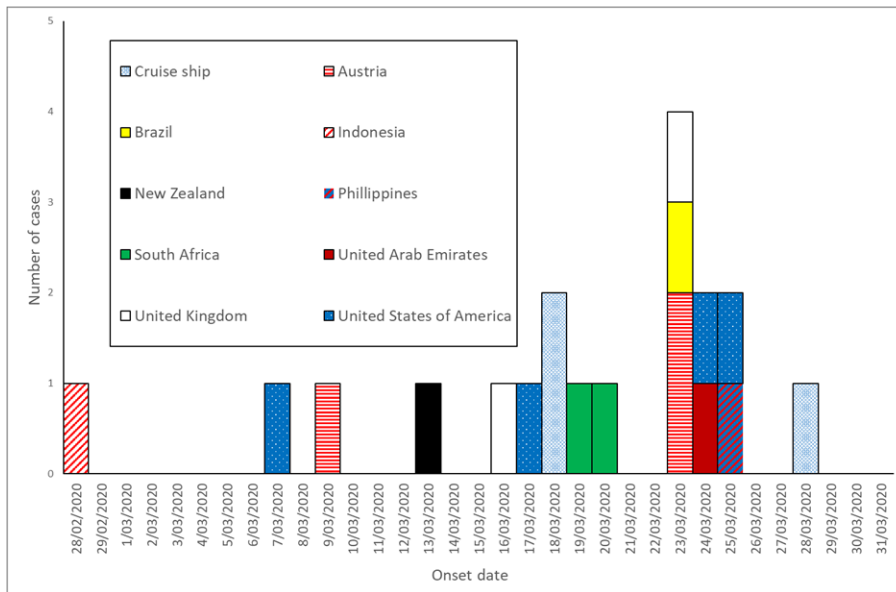


Figure 2. Epidemic curve of COVID-19 cases diagnosed in the NT by onset date and place of acquisition, 28 February to 31 March 2020



Testing

Between 1 February and 31 March 2020 there were 2,493 tests performed on swabs and specimens obtained from people residing in or visiting the NT (Figure 3). The majority of these tests were performed at the Royal Darwin Hospital laboratory but a small percentage were sent interstate for testing at private laboratories.

was established in February 2020. Initially the hotline was managed by staff within CDC; however, by March 2020 it was clear that additional resources were required to respond to the public’s expanding range of COVID-19 concerns.

Hotline

A dedicated COVID-19 telephone hotline

Extra staff were seconded from various areas of NT Health and the Australian Defence Force (ADF) were employed to manage up to 800 calls per day (Figure 4).

Figure 3. Daily number of COVID-19 tests performed in the NT- 1 Feb to 31 March 2020

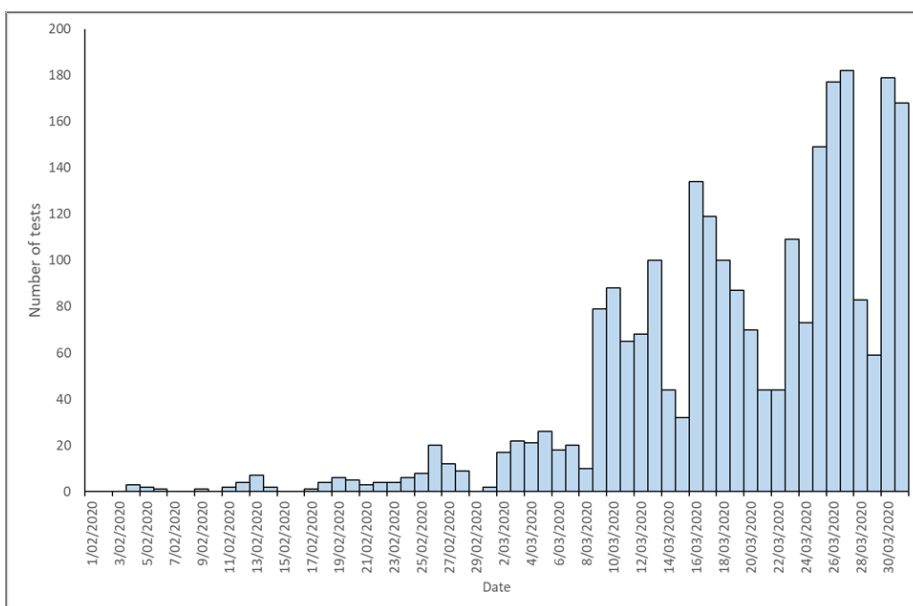


Figure 4. ADF supporting contact tracing in CDC's outbreak room



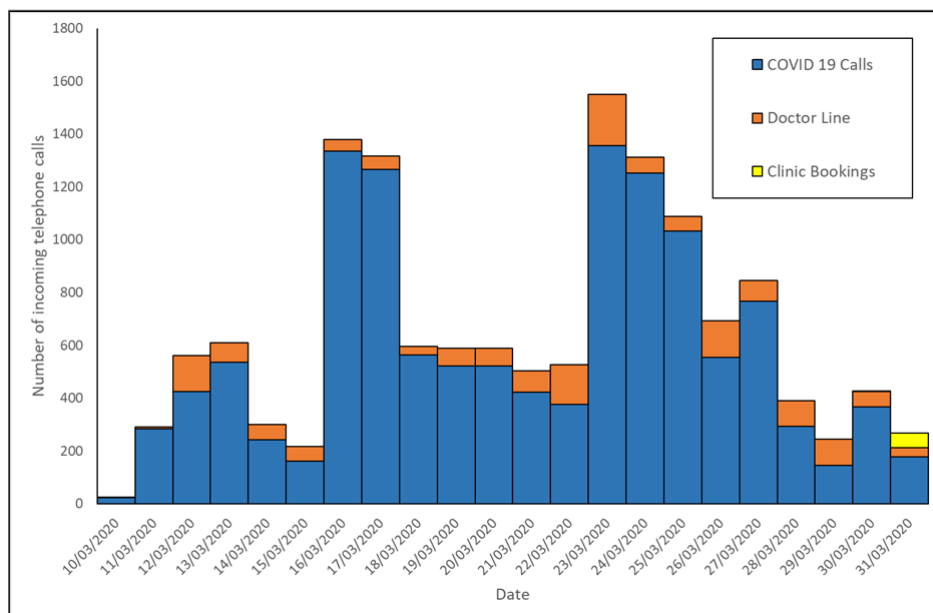
Calls typically surged immediately following announcements of border closures and restrictions. A new telephone system which enabled extraction of summary data was established on 10 March 2020.

Figure 5 shows the hotline calls per day observed using this new system. The peak number of calls received up to 31 March 2020 was 1,549 total calls received on 23

March 2020.

The first alert issued to clinicians on 10 January 2020 when the disease emerged is on pages 5 and 6. Alert #18 issued 29 March 2020 after the disease had been named to COVID-19 is on pages 7 and 8. Page 9 features a COVID-19 Surveillance Situation Report prepared by the NT Centre for Disease Control.

Figure 5. COVID-19 hotline calls per day - 10 March to 31 March 2020 (inclusive of doctor line, general public and clinic lines)





TOP END
HEALTH SERVICE

**Centre for Disease Control
Public Health Unit (PHU)**
Ground Floor, Building 4
Royal Darwin Hospital
Rocklands Drive
TIWI NT 0810

Postal Address
PO Box 40596
CASUARINA NT 0811

T 08 8922 8044
F 08 8922 8310

File Ref: EDOC2020/10718

BE ALERT to information on pneumonia cluster in Wuhan, China 10 January 2020

Dear Clinicians

You may be aware of recent reporting of a cluster of viral pneumonia cases stated to be caused by a novel coronavirus.

The following information has been produced by the Victorian State Government Health and Human Services with acknowledgement from other national public health professionals and has been adapted for use here in the Northern Territory.

Key messages

- There is a cluster of cases of viral pneumonia in Wuhan, China. The cause is being reported in various media outlets as a novel coronavirus.
- The cluster is centered at the Wuhan South China Seafood City Market (also called the South China Seafood Wholesale Market and the Hua Nan Seafood Market).
- Travelers to Wuhan, China, should avoid living or dead animals, animal markets, and contact with sick people.
- Patients presenting with respiratory illness should always be asked about their travel history. Be alert for patients who have travelled to Wuhan, China, within two weeks of onset of illness and who present with fever and respiratory symptoms. Please place a surgical mask on and isolate these patients as soon as they are identified in a negative pressure room or single room and notify the Centre For Disease Control (CDC) on 08 8922 8044 or on call via Royal Darwin Hospital (RDH) switchboard 08 8922 8888.

What is the issue?

There is a cluster of cases of viral pneumonia in Wuhan, China. As of January 5, 2020, local, provincial, and national health commissions in China have reported a total of 59 cases with no deaths. The cluster is centered at the Wuhan South China Seafood City (also called the South China Seafood Wholesale Market and the Hua Nan Seafood Market). In addition to seafood, the market sells chickens, bats, marmots, and other wild animals. The market has been closed since January 1, 2020, for cleaning and disinfection.

Health authorities in China are monitoring more than 150 close contacts for illness. To date, there have been no reports of spread from person-to-person or to healthcare workers.

Reports are that the cause is a new or novel coronavirus. Local authorities have reported negative laboratory results for seasonal influenza, avian influenza, adenovirus, and two specific coronaviruses known to cause respiratory illness (severe acute respiratory syndrome [SARS] and Middle East respiratory syndrome [MERS]).

Who is at risk?

Only people who have travelled to Wuhan, China are considered to be at risk currently. Travelers to other areas of China, or contacts of travelers to Wuhan are not considered to be at risk. This information may change as more becomes known about the characteristics of the virus.

Symptoms and transmission

Reported symptoms include fever, shortness of breath and bilateral lung infiltrates on chest x-ray. The current definition for a suspected case in Victoria and also the Northern Territory is as follows:

Travel to Wuhan within 14 days of symptom onset AND fever or history of fever AND respiratory symptoms

This case definition information may change as further information emerges.

There have been no reports of spread from person-to-person or to healthcare workers.

Recommendations

Clinicians are asked to be alert for patients of any age presenting with symptoms of pneumonia who meet the suspected case definition (*Travel to Wuhan within 14 days of symptom onset AND fever or history of fever AND respiratory symptoms*) particularly if they have had contact with the Wuhan South China Seafood City Market.

Please ensure that patients presenting with pneumonia to triage are being asked about travel specific to Wuhan, China.

If you have a patient who meets the suspected case definition above:

- Place a surgical mask on the patient;
- Undertake an assessment in a private room with the door closed if negative pressure ventilation is not available;
- Apply airborne, contact and standard precautions - in particular, wear a P2 respirator / N95 respirator during any assessment;
- Notify the CDC on 08 8922 8044 or through RDH switchboard on 08 8922 8888, who will assist with conducting a public health risk assessment. Undertake testing in your hospital for alternative causes as soon as possible, in particular for respiratory viruses using an extended virus PCR panel ;

After discussion with CDC, you may be advised to take;

- upper respiratory samples (combined nose and throat swabs, or nasopharyngeal swabs)
- lower respiratory samples lower respiratory tract sample if the lower tract is involved (sputum, tracheal aspirate, bronchoalveolar lavage, pleural fluid,)
- whole blood

These samples are to be forwarded for testing to RDH laboratory.

If you traveled to Wuhan and feel sick, you should:

- Avoid contact with others, except for seeking medical care
- Don't travel while sick.
- Seek medical care right away. Before you go to a doctor's office or emergency department, call ahead and tell the doctor about your recent travel and your symptoms.
- Cover your mouth and nose with a tissue or your sleeve (not your hands) when coughing or sneezing.

Travelers to Wuhan, China, should avoid living or dead animals, animal markets and contact with sick people, and should wash hands often with soap and water.

Yours sincerely,



Dr Vicki Krause

Director, Centre for Disease Control–Environmental Health, Public Health Unit, PHC, TEHS Darwin.

Centre for Disease Control	Darwin	Nhulunbuy	Katherine	Alice Springs	Tennant Creek
Phone	08 89228044	08 89870357	08 89739049	08 89517540	08 89624603
Fax	08 89228310	08 89870500	08 89739048	08 89517900	08 89624420
CDC Darwin on call (working hours only) 0428890958					



ALERT #18
Coronavirus disease 2019 (COVID-19)
Change to NT case definition and further
new advice for clinicians
29 March 2020

TOP END
HEALTH SERVICE

**Centre for Disease Control
Public Health Unit (PHU)**
Ground Floor, Building 4
Royal Darwin Hospital
Rocklands Drive
TIWI NT 0810
T 08 8922 8044
F 08 8922 8310
File Ref: EDOC2020/111095

Dear Clinicians,

There have now been **15 patients diagnosed** with COVID-19 in the NT. **All cases have acquired their disease overseas.** Contact tracing is continuing with close contacts being quarantined and undergoing daily monitoring.

The information below is for identifying COVID-19 in the NT with **newer additions shown in red**. This differs in minor ways from the [National Guidelines](#) because there is **currently no evidence of community transmission in the NT and we do not yet need to use a 'Probable case' definition as is now included in the National Guidelines. All NT suspect cases are still tested to confirm infection. Additionally, the testing criteria in the NT have been **expanded to include symptomatic frontline workers**. As there is currently no community transmission demonstrated in the NT this expansion is a method to identify possible covert transmission.**

See **Advice for clinicians** below on **appropriate use of PPE and collecting sputum samples for diagnosis**.

Key Messages:

- The case definition for a suspect in Category (C) now includes **frontline workers (police, emergency workers, correctional officers, educators and child care workers)** as well as healthcare workers **according to the announcement on 27/03/2020**.
- Test according to case definition and remind people to stay in self-isolation until test results are back (results may take up to 72hrs depending on time and location of test) or if in quarantine, they must complete the 14 days in quarantine.
- **Do NOT test ASYMPTOMATIC people for COVID-19.**
- Call Darwin CDC on 8922 8044, Alice Springs on 8951 7540 or email to cdc.covid@nt.gov.au to report all patients tested providing:
 - a. Name
 - b. Date of birth
 - c. Phone number
 - d. Reason for test (travel or contact and symptoms)
- ALL people returning from overseas after midnight 15 March 2020 **and people returning from interstate after 4pm on 24 March, 2020 must remain in quarantine for the full 14 days after returning, regardless if they have tested negative to COVID-19 within this time period.**
- The CDC alerts are now online at www.health.nt.gov.au.
- Support all in the NT to do the right thing by social distancing and where indicated, quarantine and self-monitor for disease.

Case Definition in the NT

Confirmed case

A person who tests positive to validated specific SARS-CoV-2 NAT or has virus identified by electron microscopy or viral culture.

Suspect case:

A. If the patient satisfies and epidemiological and clinical criteria, they are classified as a suspect case.

Epidemiological criteria

- Any international or interstate travel in the 14 days before the onset of illness.
OR
- Close contact in 14 days before illness onset with a confirmed case of COVID-19.

AND

Clinical criteria

- Fever ($\geq 38^{\circ}\text{C}$) or history of fever (e.g. night sweats, chills)
OR
 - Acute respiratory infection (e.g. shortness of breath, cough or sore throat) with or without fever.
- B. If the patient has severe bilateral community-acquired pneumonia (critically ill*) and no other cause is identified, with or without recent international travel, they are classified as a suspect case.
- C. If any healthcare worker with direct patient contact or **frontline worker (police, emergency workers, correctional officers, educators and childcare workers)** has a fever ($\geq 38^{\circ}\text{C}$) or history of fever (eg. night sweats, chills) **OR** an acute respiratory infection (e.g. shortness of breath, cough, sore throat) they are classified as a suspect case.

*requiring care in ICU/HDU, or for patients in which ICU care is not appropriate, respiratory or multiorgan failure. Clinical judgement should be exercised considering the likelihood of COVID-19.

Advice for clinicians

- 1) A single use surgical mask is now recommended rather than a P2 mask for taking a nose and throat swab, along with the other contact and droplet precaution PPE of a gown, gloves, goggles or face shield. A national expert review has determined this is the appropriate advice for taking a nose and throat swab in a patient with an acute respiratory infection. P2 masks should be reserved for aerosol generating procedures in hospitals (page 9 of the [National Guidelines](#)). See attached poster for donning and doffing of PPE.
- 2) Sputum samples are very appropriate specimens for diagnosing COVID-19 in patients who are coughing and able to produce sputum. A sputum sample can be obtained in place of a nose and throat swab. Ask the patient to step outside the clinic and away from other people or they can go to their car with the windows down and collect their sputum. The patient should expectorate a deep cough sputum directly into a sterile, leak-proof, screw-top dry sterile container.

For more information:

- Visit the Australian Government Department of Health webpage at <https://www.health.gov.au>
- The general public who want more information or are concerned about their health can call the COVID-19 health direct line on 1800 020 080 or visit <https://www.healthdirect.gov.au/coronavirus>.

Yours sincerely

Dr Vicki Krause

Director, Centre for Disease Control-Environmental Health, Public Health Unit, TEHS, Darwin

Centre for Disease Control	Darwin	Nhulunbuy	Katherine	Alice Springs	Tennant Creek
Phone	08 89228044	08 89870357	08 89739049	08 89517540	08 89624259
Fax	08 89228310	08 89870500	08 89739048	08 89517900	08 89624420

NT COVID-19 Surveillance Situation Report (Sit Rep) 31 March 2020

NT COVID-19 Surveillance Sit Rep 31 March 2020

Covid-19 Cases

	NT residents	Interstate/overseas residents	Total	Diamond Princess
Diagnosed in NT	17	2	19	
Diagnosed interstate	1	-	1	
Total	18	2	20	8
Cleared	0	1	1	8

Note: In national reporting the NT figures reflect NT residents only, including those diagnosed elsewhere

Contacts undergoing active monitoring by health district

District	Darwin Urban	Darwin Rural	East Arnhem	Katherine	Barkly	Alice Springs Urban	Alice Springs Rural	All
Current	121	5	3	7	1	37	1	175
Total	152	7	3	9	3	37	3	265

Note: Total includes Not Stated n=34 and Interstate n=27

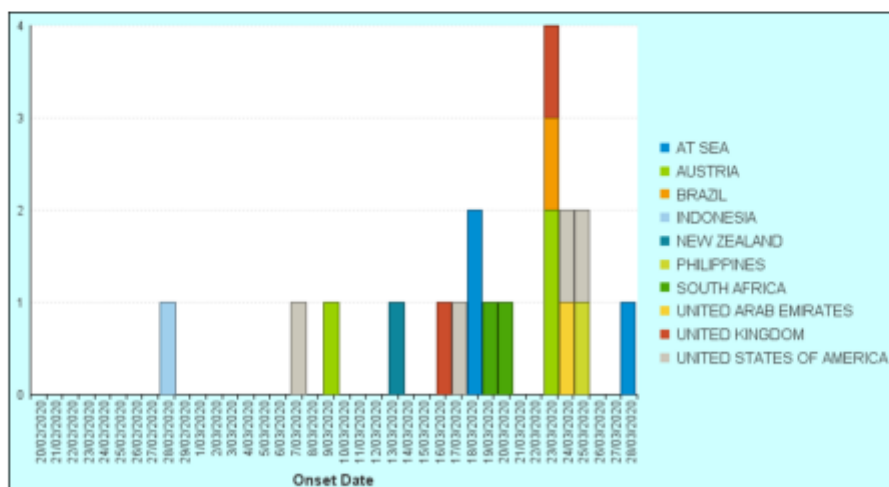
Contacts undergoing active monitoring by exposure setting

Location	Household	Cruises	Flights	Health care	Other	All
Current	17	18	99	1	15	175
Total	18	43	158	4	24	265

Testing

Negative tests	Alice Springs	Darwin	East Arnhem	Katherine	Barkly	All
RDH 30/3	19	57	10	16	0	111
Other labs 30/3						9
Total	19	57	10	16	0	120

Prepared by CDC Surveillance Unit with assistance from RDH laboratory.



NT diagnosed COVID cases by onset date and place of infection

**A snapshot of immunisation coverage in the Northern Territory:
December 2019 and trends in immunisation coverage
4th quarter 2017 to 1st quarter 2020**

Karen Dempsey

Epidemiologist, Centre for Disease Control, Public Health Unit, Top End Health Service

Background information to interpret coverage.

Immunisation coverage is reported by Indigenous status and the Northern Territory (NT) coverage is compared to the coverage in Australia overall. Immunisation coverage is also reported by Australian Bureau of Statistics (ABS) Statistical Area Level 3 (SA3). These SA3s are ABS standardised geographical areas that children have been assigned to, based on their Medicare address as recorded on the Australian Immunisation Register (AIR). The region 'Not Mapped' captures the children whose residency could not be mapped to a specific location within the NT, this includes Post Office (PO) box addresses.

Maps of these geographic area boundaries can be found at: [https://www.abs.gov.au/websitedbs/D3310114.nsf/home/Australian+Statistical+Geography+Standard+\(ASGS\)](https://www.abs.gov.au/websitedbs/D3310114.nsf/home/Australian+Statistical+Geography+Standard+(ASGS))

A child's immunisation details are recorded on the Australian Immunisation Register (AIR) when information is submitted by a recognised immunisation provider. The accuracy of reports greatly depends on provider participation and the transitional flow of data between providers and the Immunisation Register.

Further information about the AIR coverage may be found at: <http://ncirs.org.au/health-professionals/coverage-data-and-reports>.

The following definitions are used to determine whether a child is classified as fully immunised in the 3 age groups; 12–15 months, 24–27 months and 60–63 months of

age as shown in Tables 1 and 2 and Figures 1–3.

- Children in the 12–15 months of age cohort, as assessed on 31 December 2019, were born between 1 July 2018 and 30 September 2018 inclusive. To be considered fully vaccinated, these children must have received vaccines listed on the National Immunisation Program (NIP) Schedule for those up to 6 months of age. Vaccines used in this calculation included coverage of diphtheria, tetanus, pertussis, poliomyelitis, haemophilus influenza type b, hepatitis B and pneumococcal vaccine.
- Children in the 24–27 months of age cohort, assessed on 31 December 2019, were born between 1 July 2017 and 30 September 2017 inclusive. To be considered fully vaccinated, these children must have received vaccines listed on the NIP for those up to 18 months of age. Vaccines used in this calculation included coverage of diphtheria, tetanus, pertussis, poliomyelitis, haemophilus influenza type b, hepatitis B, measles, mumps, rubella, pneumococcal, meningococcal C and varicella.
- Children in the 60–63 months of age cohort, assessed on the 31 December 2019, were born between 1 July 2014 and 30 September 2014 inclusive. To be considered fully vaccinated, these children must have received vaccines listed on the NIP for those up to 4 years of age. Vaccines used in this calculation included coverage of diphtheria, tetanus, pertussis and polio.

Interpretation and comment

Immunisation coverage rates for NT and Australian children by Indigenous status as estimated by the AIR is provided in Table 1. Overall, the NT coverage was marginally lower than the Australia-wide coverage.

Within the NT, immunisation coverage rates are provided according to SA3 area and Indigenous status in Table 2. Coverage was lowest in children aged 24–27 months, irrespective of Indigenous status and area; however, by 60–63 months of age immunisation coverage reached 100% in a number of NT areas.

Table 1. Immunisation coverage in the Northern Territory and Australia by Indigenous status and age group, as at 30 December 2019

Indigenous status	Age cohort	Northern Territory (% coverage)	Australia (% coverage)
Aboriginal	12–15 months	94.0%	92.7%
Non-Aboriginal	12–15 months	93.6%	94.5%
Total	12–15 months	93.7%	94.4%
Aboriginal	24–27 months	88.0%	89.9%
Non-Aboriginal	24–27 months	90.4%	91.8%
Total	24–27 months	89.7%	91.7%
Aboriginal	60–63 months	95.4%	96.1%
Non-Aboriginal	60–63 months	90.8%	94.4%
Total	60–63 months	92.4%	94.5%

Table 2. Areas (SA3) with the lowest and highest immunisation coverage by Indigenous status and age group in the Northern Territory, as at 30 December 2019

Indigenous status	Age Cohort	Area with lowest coverage (% coverage)	Area with highest coverage (% coverage)
Aboriginal	12–15 months	East Arnhem (90.0%)	Alice Springs (95.8%)
Non-Aboriginal	12–15 months	Katherine (90.9%)	Alice Springs (96.0%)
Aboriginal	24–27 months	Palmerston (85.3%)	Katherine (89.7%)
Non-Aboriginal	24–27 months	Darwin City (84.8%)	Darwin Suburbs (94.2%)
Aboriginal	60–63 months	Katherine (90.2%)	East Arnhem, Darwin Suburbs and Palmerston (100.0%)
Non-Aboriginal	60–63 months	Darwin City (85.5%)	Katherine (100.0%)

* SA3 areas with population less than 20 were excluded from the table

Trends in immunisation coverage from 31 December 2017 to 31 December 2019 in the Northern Territory and Australia for the 3 age cohorts are shown in Figures 1–3. In children aged 12–15 months, the immunisation coverage rate for Australian children remained consistently at around 94%, whereas the immunisation coverage rate for NT children in this age cohort fluctuated markedly.

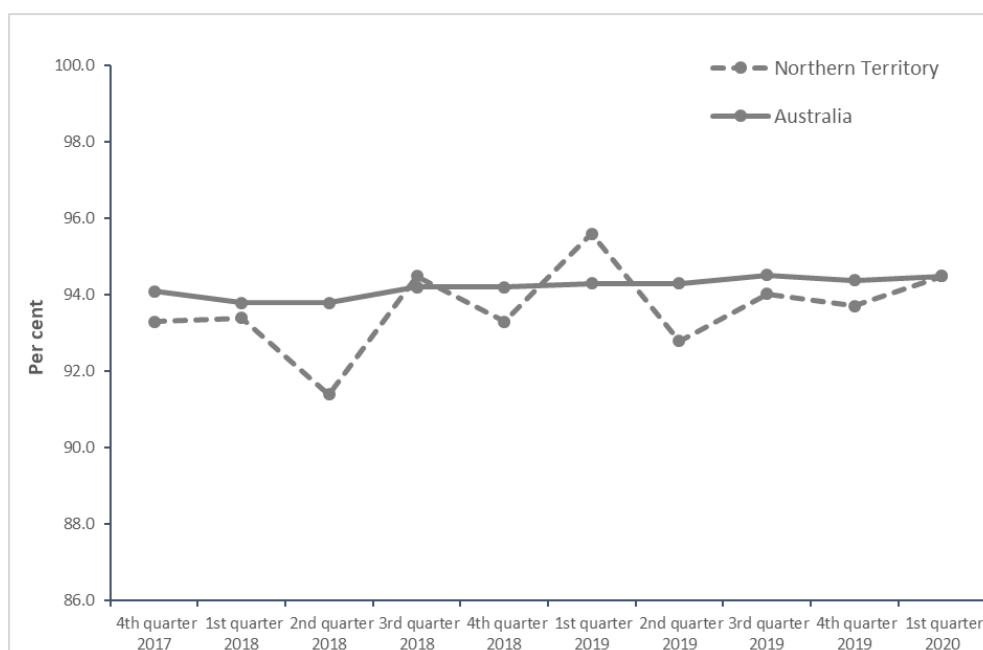
For the most part, NT coverage was lower than the Australian rate, possibly related to higher vaccination coverage in the larger jurisdictions where a requirement for enrolment in childcare through the “No Jab, No Pay” policy is full vaccination coverage unless medically exempt.¹ This policy is not enforced in the NT. Instead, parents and carers are encouraged to provide a copy of their child's immunisation records to childcare.

For children aged 24–27 months, the Australian immunisation coverage rate rose steadily from just under 91% to around 92%. In June 2018, NT immunisation coverage was noted to be well below the

Australian rate prompting a concerted effort by immunisation staff in the NT Centres for Disease Control (CDC) to undertake extensive data cleaning and focus efforts on improving coverage among children who were behind schedule. As a result of this, immunisation coverage of NT children aged 24–27 months rose to just over 92% in October 2019, exceeding the Australian rate.

Immunisation coverage in children aged 60 to 63 months in Australia almost reached the childhood coverage target of 95% required to achieve herd immunity for many vaccine-preventable diseases, particularly measles. Coverage is generally higher in this age cohort due to several jurisdictions having introduced policies that require children to be immunised before attending childcare or preschool, or greatly encouraged in others, including the NT. In contrast, immunisation coverage in NT children aged 60 to 63 months generally trailed below that of Australian children until 2020 when it peaked at 96%.

Figure 1. Quarterly trends in immunisation coverage among children aged 12–15 months in the Northern Territory and Australia, 2017–2020



In the last week of April 2020, World Immunisation Week will celebrate the importance of vaccines. Despite remarkable success in the prevention of vaccine-preventable disease, not all countries are economically positioned to take advantage of this cost-effective intervention with nearly 20 million children unvaccinated and under-vaccinated worldwide.

Consequently, in 2020 the World Health Organisation is promoting a campaign to encourage the administration of vaccines worldwide, particularly areas of low uptake, and to promote people who develop, deliver and receive vaccine as champions working to protect the health of everyone.²

Figure 2. Quarterly trends in immunisation coverage among children aged 24–27 months in the Northern Territory and Australia, 2017–2020

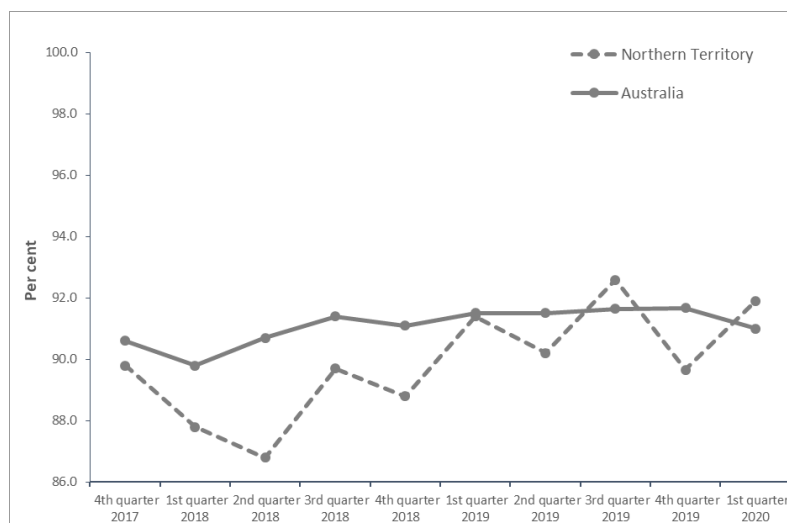
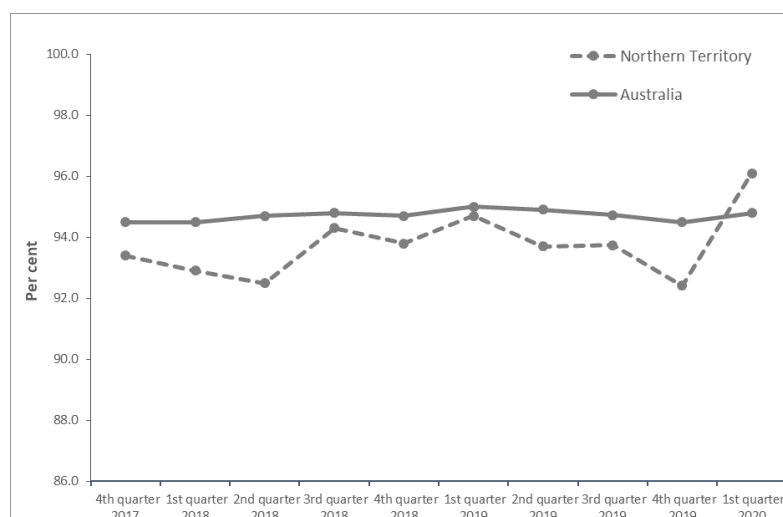


Figure 3. Quarterly trends in immunisation coverage among children aged 60–63 months in the Northern Territory and Australia, December 2017–2020



References

1. Victorian Government Department of Health. No Jab No Pay for early childhood education and care services. 2020. Available at: <https://www2.health.vic.gov.au/public-health/immunisation/vaccination-children/no-jab-no-play/frequently-asked-questions>
2. WHO. World Immunisation Week. 2020. Available at: <https://www.who.int/news-room/campaigns/world-immunization-week/world-immunization-week-2020>

Meningococcal ACWY disease

Karen Dempsey

Epidemiologist, Centre for Disease Control, Public Health Unit, Top End Health Service

Territorians in the high risk age group from 1 to 19 years of age are targeted for vaccination against 4 strains of meningococcal disease. Achieving at least 80% coverage with MenACWY vaccine has been the aim of health care providers in the NT since inception of the vaccine in 2017. How close the NT is to achieving this aim is shown in the following tables for 4 age group cohorts who were administered vaccine during the period 01/09/2017 to 31/03/2020.

Coverage against meningococcal ACWY continued to improve with highest coverage occurring among babies and children administered MenACWY vaccine through the routine immunisation schedule (93% for Aboriginal children and 88% for non-Aboriginal). Vaccine coverage in this age group consistently exceeded the 80% threshold across all health districts in the NT, with highest coverage rates occurring for all children in the Central Australian health districts.

Adolescents aged 15 to 19 years are also administered MenACWY vaccine through the routine immunisation schedule. Similar to babies and young children, coverage among this age group also continued to improve, increasing from 77% to 79% among Aboriginal children and 71% to 73%

among non-Aboriginal children. Vaccine coverage in this age group exceeded the 80% threshold across most health districts in the NT, with the exception of Darwin Urban and Katherine.

Children aged between 5 to 9 years and 10 to 14 years are not in the age groups to receive MenACWY vaccine through routine immunisation schedules. Consequently coverage in these age groups tends to be lower than those age groups scheduled to receive this immunisation.

There were however, promising signs with the biggest improvement in coverage occurring among non-Aboriginal children from 54% to 57% for those aged 5–9 years of age and 41% to 46% for those aged 10–14 years of age. In contrast, there was less improvement among Aboriginal children in these age groups but coverage continued to be much higher than their non-Aboriginal counterparts.

Coverage at the health district level showed similar pattern to previous quarters. Highest coverage occurred in Central Australia and lowest in Darwin Urban. Irrespective, Darwin Urban showed the greatest improvement with coverage rates rising by almost 10% over the past 3 months.

Table 1. Meningococcal ACWY vaccine coverage by age group and Indigenous status: Northern Territory children and adolescents aged 1 to 19 years inclusive, 01/09/2017 to 31/03/2020

Age cohort	Aboriginal	Non-Aboriginal
1 to 4 years	93.1%	88.0%
5 to 9 years	76.4%	57.2%
10 to 14 years	71.3%	45.5%
15 to 19 years	79.1%	73.4%
Total	78.9%	65.3%

**Table 2. Meningococcal ACWY vaccine coverage by age group and health district:
Northern Territory children**

Age cohort	Darwin Urban	Darwin Rural	East Arnhem	Katherine	Barkly	Alice Springs Urban	Alice Springs Rural
1 to 4 years	85.6%	87.2%	85.9%	87.2%	89.8%	111.0%	109.8%
5 to 9 years	51.6%	85.5%	72.4%	82.5%	88.9%	78.5%	92.1%
10 to 14 years	39.7%	89.1%	66.8%	75.6%	95.6%	68.9%	92.3%
15 to 19 years	67.8%	96.7%	79.8%	75.9%	89.0%	96.9%	74.8%
Total	60.1%	89.6%	75.1%	80.1%	90.8%	87.3%	91.2%

Northern Territory Malaria Notifications October to December 2019

Number of cases	Origin of Infection	Agent	Chemoprophylaxis	NT Region
1	Uganda	<i>Plasmodium ovale</i>	No	Darwin
1	Nigeria	<i>P. ovale</i>	Doxycycline	Darwin
1	Democratic Republic of Congo	<i>P. malariae</i>	No	Darwin

Of note, nil notifications have been found for January – March 2020.



Enteric disease in the Northern Territory in 2019 – a brief summary

Anthony Draper¹ and Rowena Boyd²

¹ Epidemiologist, Centre for Disease Control, Public Health Unit, Top End Health Service

² Clinic Nurse Specialist, Centre for Disease Control, Public Health Unit, Top End Health Service

ABSTRACT

In 2019, there were 1,217 notifications of foodborne disease in the Northern Territory which was 12% less than the previous year and 7% less than the 5 year mean. Salmonellosis notifications accounted for 37% of all foodborne disease notifications in 2019 followed by campylobacteriosis (36%) and shigellosis (25%). Notifications of non-foodborne disease were also less than previous years (234 compared to 5 year mean of 322). There were 21 foodborne and non-foodborne disease outbreaks investigated in 2019.

Key words: OzFoodNet, salmonellosis, typhoid, shigellosis, campylobacteriosis, cryptosporidiosis, outbreak, Northern Territory, enteric disease.

INTRODUCTION

The Northern Territory (NT) has had an OzFoodNet epidemiologist since 2003. The position is based in the Centre for Disease Control, Public Health Unit, Top End Health Service (Darwin) with a service level agreement with the Central Australian Health Service (CAHS). The position is funded by the Australian Commonwealth Department of Health. The purpose of the position is to enhance enteric and foodborne disease surveillance in the NT and to assist with foodborne and non-foodborne illness investigations both within the NT and across Australia.

METHODS

Enteric disease notification data were extracted from the NT Notifiable Diseases System (NTNDS) and analysed from the data warehouse using Business Intelligence. Population figures were obtained from the NT Department of Health's Research and Innovation branch population data.¹

Outbreak investigation data were extracted from the OzFoodNet outbreak register.

Intercooled Stata 13.1 was used to calculate rate ratios (RR) with 95% confidence intervals (CI).

RESULTS AND DISCUSSION

There were 1,217 notifications of foodborne or potentially foodborne disease* reported in the NT. This is 12% less than 2018 (1,391) and 7% less than the 5 year mean (1,313). Salmonellosis notifications accounted for 37% of the foodborne disease notifications followed by campylobacteriosis (36%) and shigellosis (25%).

There were 234 notifications of non-foodborne enteric disease in the NT in 2019. This was 14% less than 2018 (274) and 27% lower than the 5 year mean (322). Cryptosporidiosis accounted for 62% of these non-foodborne disease notifications. Rotavirus (84 cases) accounted for 36% of non-foodborne disease notifications and were approximately half the number of the previous 5 year mean (170 cases).

There were 21 investigations undertaken in 2019; 1 foodborne or suspected foodborne disease outbreak investigation; 13 non-foodborne outbreak investigations; 7 investigations following triggers of emergency department syndromic surveillance system alerts; and 1 Salmonella cluster investigation.

Summary of enteric diseases under surveillance in the NT

Salmonellosis

There were 449 notifications of salmonellosis in the NT which is 22% less

*This includes total number of notifications for amoebiasis, botulism, brucellosis, campylobacteriosis, cholera, salmonellosis, shigellosis, STEC/VTEC, typhoid, yersiniosis, ciguatera, *Vibrio* food poisoning, and listeriosis. It does not include rotavirus, cryptosporidiosis, hepatitis A and hepatitis E.

then the previous 5 year mean (575 cases) and 19% less than the number of notifications in 2018 (553 cases). The overall rate of salmonellosis was 181 cases per 100,000 population. The 0-4 year age group represented 48% of all salmonellosis notifications with 217 cases and a rate of 1,181 cases per 100,000.

The rate of salmonellosis in the Aboriginal population was 158 cases per 100,000 population (118 cases) which is less than the 2018 rate of 218 cases per 100,000 (167 cases). In 2019, the rate in the non-Aboriginal population was 187 cases per 100,000 (324 cases). This was the sixth consecutive year that the rates of salmonellosis in Aboriginal and non-Aboriginal Territorians did not differ significantly from each other (RR 0.8, 95% CI 0.6-1.0, p=0.02). Figure 1 shows the rate of salmonellosis by Indigenous status and age group in the NT in 2019.

In the NT, salmonellosis notifications normally increase during the warmer, more humid months. In 2019 the highest number of notifications was at the end of the wet season in May (49 cases) and at the start of the 2019/2020 wet season in December 2019 (53 cases).

The NT consistently observes higher rates of salmonellosis than the rest of Australia (Figure 2) largely due to the high number of children <5 years old who contract salmonellosis, usually from environmental rather than food sources.²

In 2019, 96% (429/449) of salmonellosis notifications were identified to the serovar level compared to 94% of salmonellosis notifications in 2018. The widespread use of faecal multiplex PCR assays began in 2013 and this has resulted in an increase in salmonellosis notifications detected by PCR but which are culture negative for *Salmonella* Spp.

In 2019, the serovar with the highest number of notifications was again *Salmonella* Saintpaul (n=76) which was also the highest in 2018, 2017 and 2016, followed by *S. Virchow* (n=48), *S. Typhimurium* (n=45) and *S. Chester* (n=21). *S. Ball*, *S. Virchow*, *S. Lansing*, *S. Reading*, *S. Anatum*, *S. Hvittingfoss* and *S. Saintpaul* are all considered environmental serovars and are traditionally the most commonly notified serovars in the NT. Table 1. shows the *Salmonella* serovars notified in the NT in 2019.

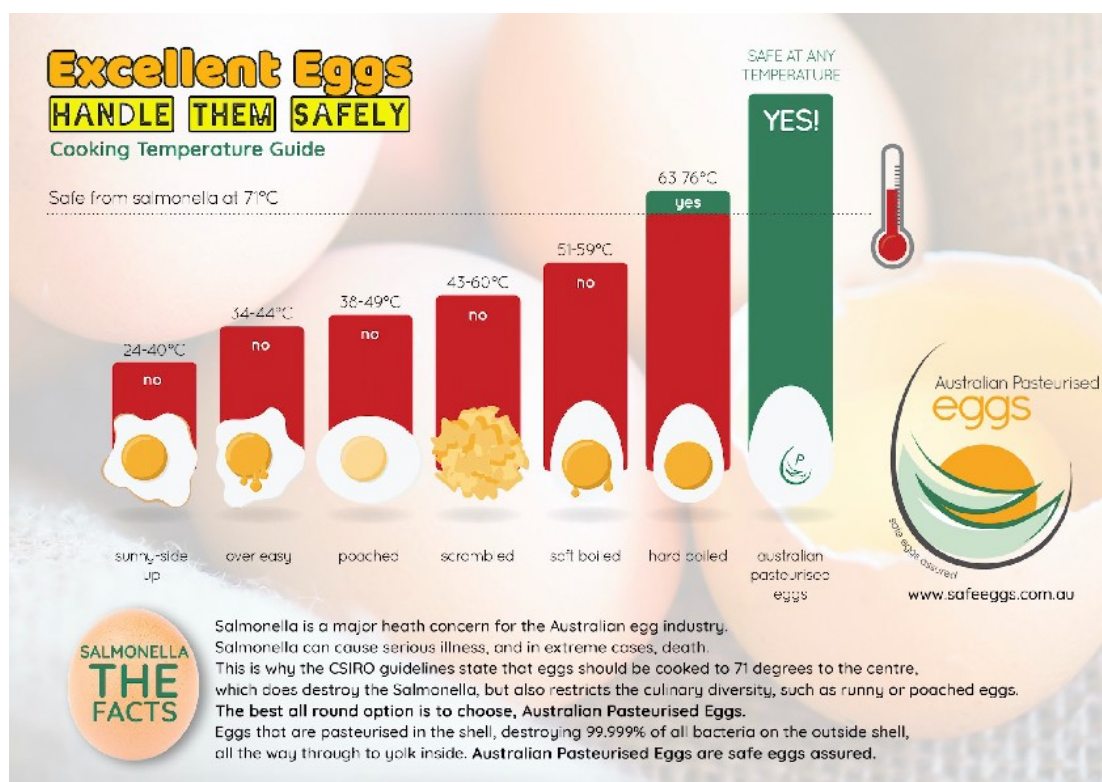


Figure 1. Salmonellosis notifications and rates, by age and Indigenous status, Northern Territory, 2019

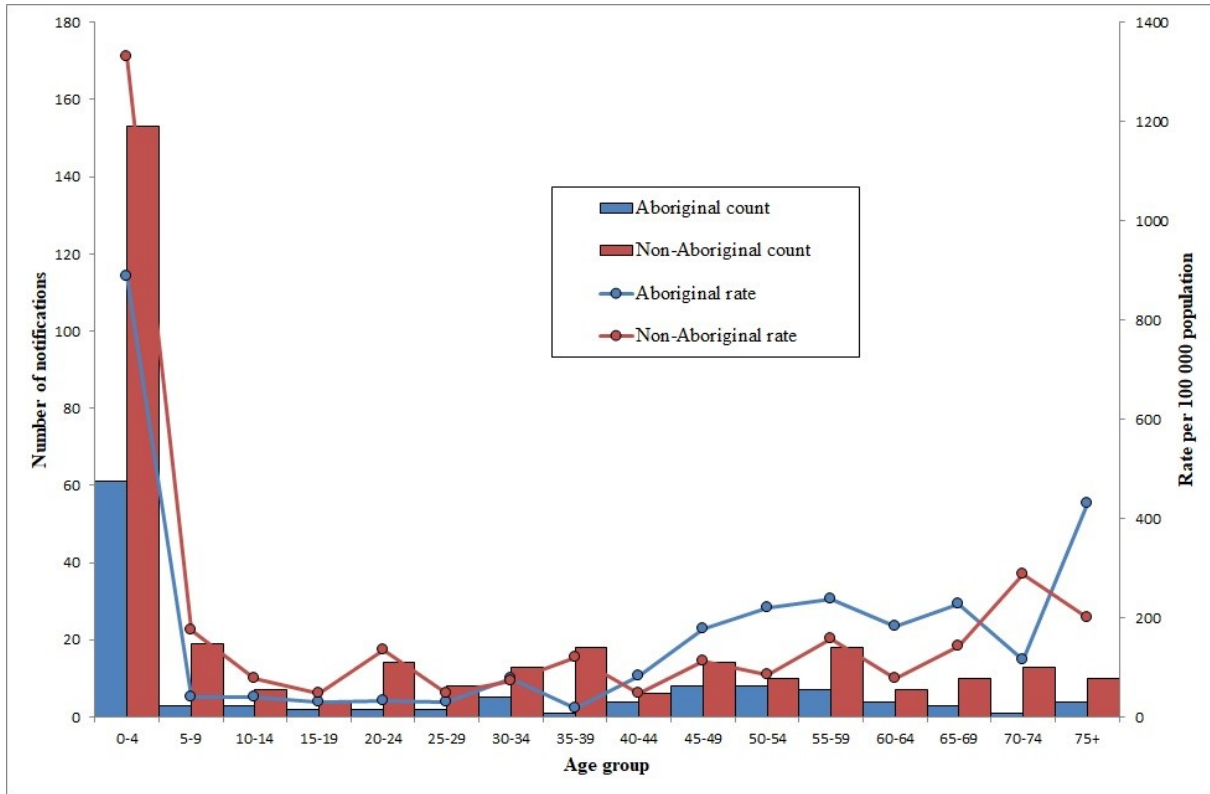


Figure 2. Notifications and rate of disease of salmonellosis in the Northern Territory and Australia, 2010-2019

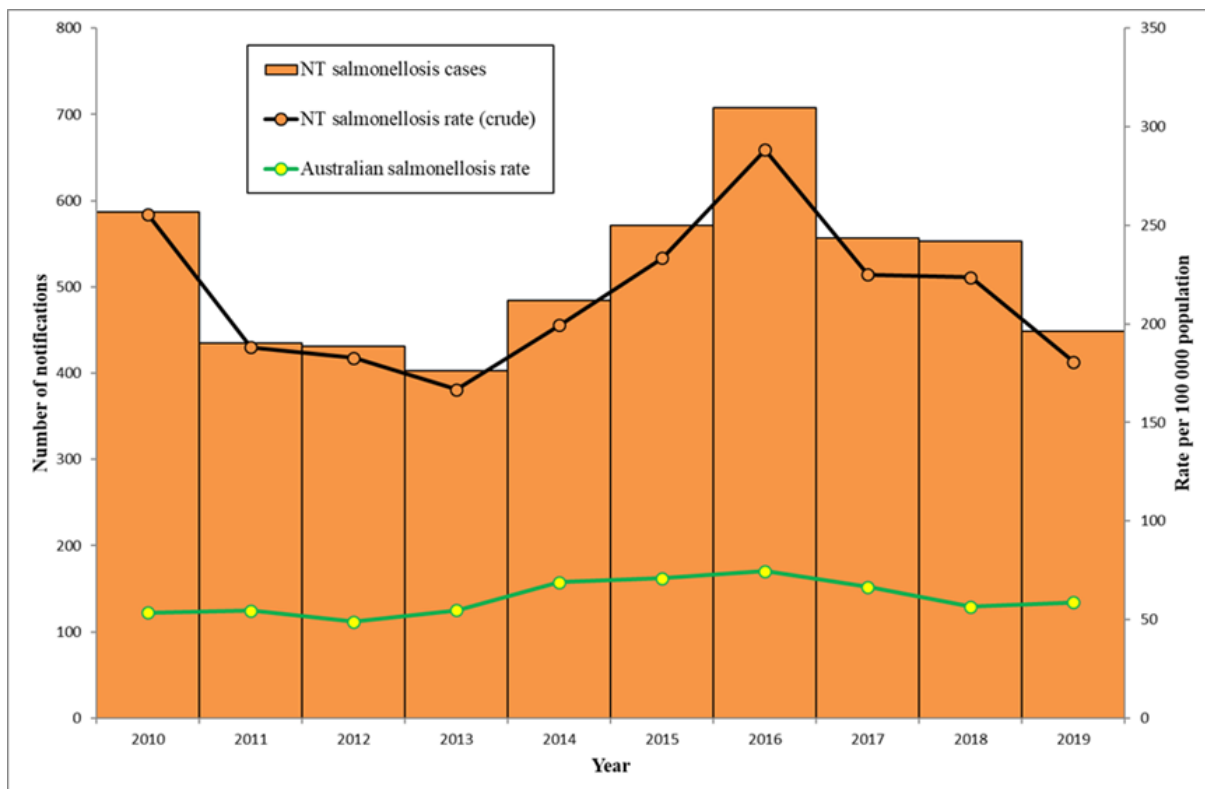


Table 1. Salmonella serovars notified in the Northern Territory in 2019

Serovar	Count	Serovar	Count	Serovar	Count
S. Saintpaul	76	S. Agona	4	S. Johannesburg	1
S. Virchow	48	S. Muenchen	4	S. Lohbruegge subsp IV	1
S. Typhimurium	45	S. subsp I	4	S. Mississippi	1
S. Chester	21	S. Zanzibar	4	S. Montevideo	1
Serovar unknown	20	S. Adelaide	3	S. Ohio	1
S. Lansing	19	S. Corvallis	3	S. Ohlstedt	1
S. subsp I ser 16:l,v:-	14	S. Kentucky	3	S. Oranienburg	1
S. Enteritidis	12	S. Orion	3	S. Panama	1
S. Hvittingfoss	12	S. Rubislaw	3	S. Schwarzengrund	1
S. Anatum	11	S. Eastbourne	2	S. Singapore	1
S. Chailey	11	S. Kinondoni	2	S. subsp 1 ser 6,7:-:1,5	1
S. Havana	11	S. Mbandaka	2	S. subsp IIIb	1
S. Ball	10	S. Muenster	2	S. subsp IIIb 53:z10:z35	1
S. Reading	9	S. Poona	2	S. subsp IIIb 61:l,v:z35	1
S. Litchfield	8	S. Stanley	2	S. subsp I ser 4,5,12:i:-	1
S. Mgulani	8	S. subsp I 3,10	2	S. subsp IV	1
S. Para B bv Java	7	S. Tennessee	2	S. subsp IV 43:z4,z23:-	1
S. Weltevreden	7	S. Wandsworth	2	S. subsp IV 6,7:z4,z23:-	1
S. Infantis	6	S. Albany	1	S. Thompson	1
S. Cerro	5	S. Bronx	1	S. Urbana	1
S. Newport	5	S. Give	1	S. Worthington	1
S. Senftenberg	5	S. Heidelberg	1		
S. Aberdeen	4	S. Jangwani	1		
				TOTAL	449

Shigellosis

There were 310 notifications of shigellosis in the NT in 2019 compared to 432 in 2018. The number of notifications was 16% more than the previous 5 year mean (268 cases).

The most commonly reported biotype of *Shigella* was *Shigella flexneri* 2b (116 cases, 37% of all notifications). This was the second consecutive year there has been a decrease in the number of notifications. The overall rate of shigellosis was 125 cases per 100,000 population which is 10 times the rate in the rest of Australia (Figure 3). The majority of cases (262/310, 92%) were in Aboriginal people.

There has been a widespread and sustained increase of *S. flexneri* 2b in the NT and neighbouring jurisdictions since early 2017.³ The initial case was notified in late 2016 and cases were notified sporadically until May 2017 when there was a marked increase which coincided with an outbreak of rotavirus in Central Australia.

In response to the increase, the CDC has been asking clinicians to treat all notified

cases of shigellosis as well as to assist clients to report housing faults so that they may be repaired quickly. Notifications of shigellosis due to this biotype were sustained for some time but have been slowly decreasing (Figure 4). The 116 cases of *S. flexneri* 2b notified in 2019 were approximately half the number of cases notified in 2017 at the peak of the outbreak.

The highest number of shigellosis notifications (120) and rate of disease was seen in the 0-4 year age group, with 653 cases per 100,000 population (Figure 5). Of the 120 cases recorded in this age group, 107 (89%) were Aboriginal people.

Shigellosis is more commonly reported in the Aboriginal population. The rate of shigellosis in the Aboriginal population was 350 cases per 100,000 population (262 cases) compared to 24 cases per 100,000 population in the non-Aboriginal population (42 cases), with a rate ratio of 14.5 (95% CI 10.4-20.6, $p < 0.0001$). Of the 42 non-Aboriginal shigellosis cases, at least 18 were known to have acquired their infection overseas.

Figure 3. Notifications and rate of disease of shigellosis in the Northern Territory and Australia, 2010-2019

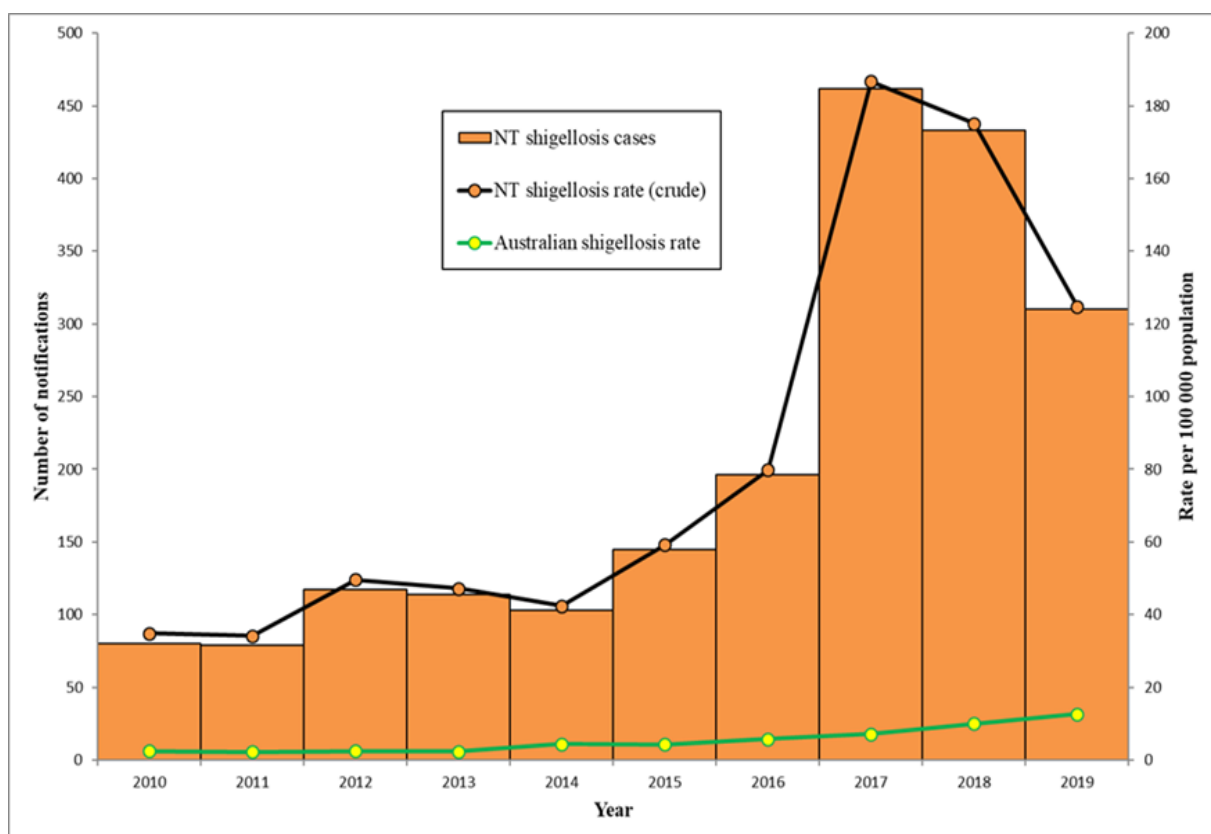


Figure 4. *Shigella flexneri* 2b in the Northern Territory, 2015-2019

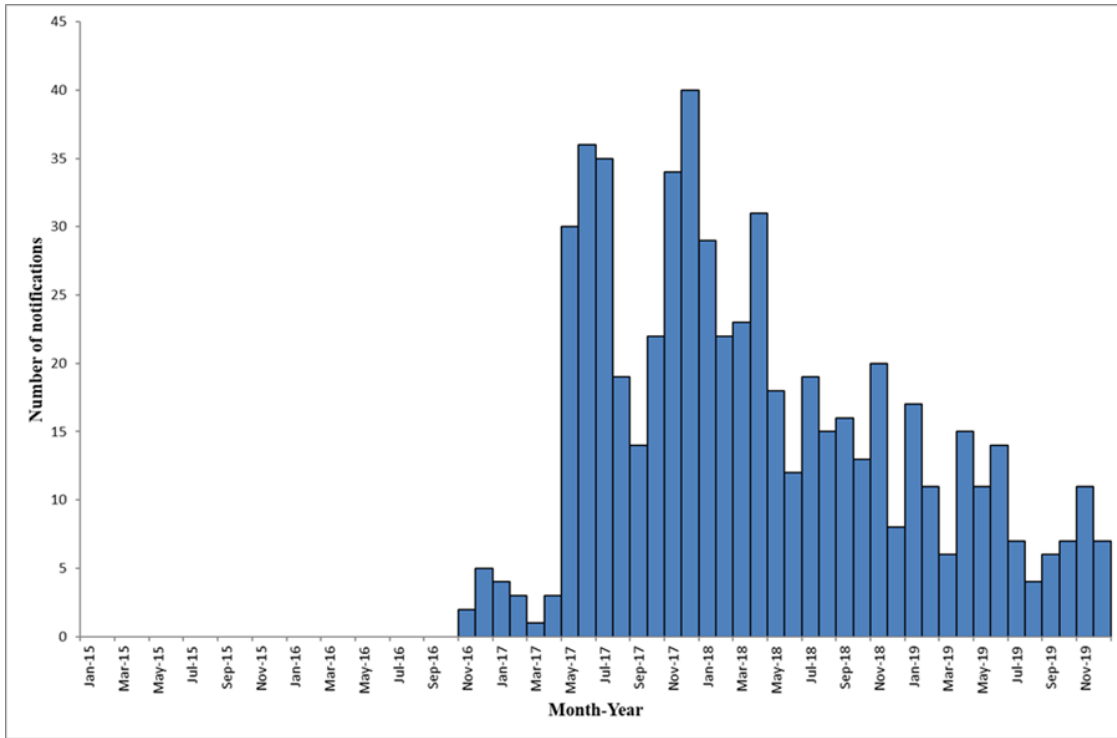
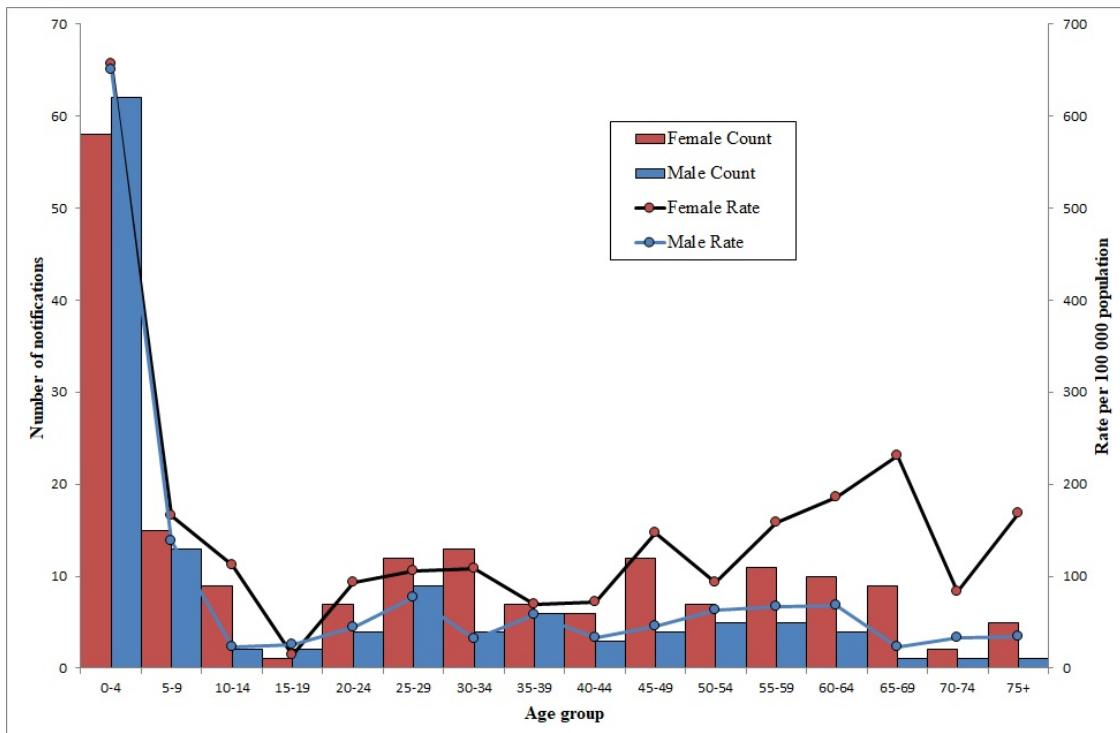


Figure 5. Shigellosis notifications and rate of diseases, by age and gender, Northern Territory, 2019



As in previous years, there were higher rates of disease seen among older Aboriginal people, particularly females (Figure 5). This may (in part) be a reflection of cultural practices where aunts and grandmothers are

often involved in the care of young children in Aboriginal populations. In 2019, the rate of shigellosis was 1.6 times (95% CI 1.2-2.0, $p < 0.001$) higher in females compared to males.

Campylobacteriosis

There were 436 notifications of campylobacteriosis in the NT which was 13% higher than the previous 5 year mean of 386 cases per year. The overall rate of campylobacteriosis was 176 cases per 100,000.

The highest number of cases and rate of disease was seen in the 0-4 year age group with 139 case notifications and a rate of 757 cases per 100,000.

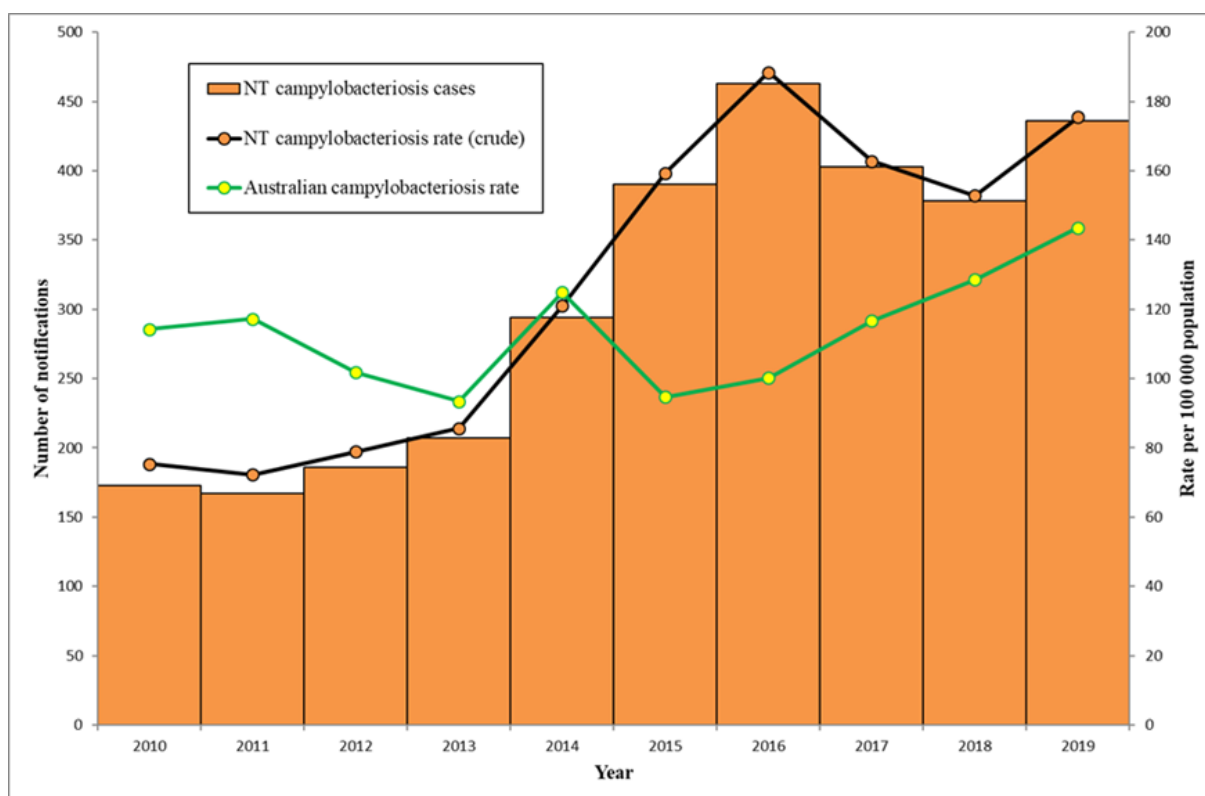
This age group represented 32% of all campylobacteriosis notifications in the NT. The rate of disease in this age group was significantly higher in the Aboriginal population (1,341 cases per 100,000) than

the non-Aboriginal population (374 cases per 100,000) with a rate ratio of 3.6 (95% CI 2.5 - 5.3, $p < 0.0001$).

In the remaining population (>4 years old), the non-Aboriginal rate of campylobacteriosis (137 cases per 100,000) was significantly higher than the rate in the Aboriginal population (74 cases per 100,000) with a rate ratio of 1.9 (95% CI 1.4-2.6, $p < 0.0001$).

There has been an increase in the rate of campylobacteriosis across Australia since the introduction of culture independent testing by private pathology laboratories in late 2013 (Figure 6).

Figure 6. Campylobacteriosis notifications and rates of disease in the Northern Territory and Australia, 2010-2019



Cryptosporidiosis

In 2019, there were 144 notifications of cryptosporidiosis compared to the 5 year mean of 138 cases per year. Of the 144 cases, 108 (75%) occurred in the 0-4 year age group. The rate of disease was twice as high in the Aboriginal population with 88 cases per 100,000 (66 cases) compared to 43 cases per 100,000 (74 cases) in the non-Aboriginal population (RR 2.1, 95% CI 1.5-2.9, $p = <0.0001$).

Hepatitis A

There were 3 cases of hepatitis A notified in the NT in 2019 compared to a 5 year mean of 2 cases per year. Two acquired their infection overseas; one acquired their infection in India and the other in Indonesia.

There was 1 locally acquired case of hepatitis A in 2019. No high-risk exposures or foods were identified but the case did receive visitors from Bangladesh during their incubation period.

Since 2006, nearly all cases of hepatitis A reported in the NT have been overseas acquired. This is due largely to the introduction of the funded vaccine for all Aboriginal children under 5 in the Northern Territory (along with South Australia and Western Australia) in 2005. There have been only 7 cases of locally acquired hepatitis A reported in the NT since 2006. Many of the cases have been people living in Australia who have returned to their country of birth for a holiday or to visit family.

Typhoid

There was 1 case of typhoid notified in 2019, imported from India. In the previous 5 years there were 5 cases, all in people returning from typhoid endemic countries. Since 2012 all notified cases were either returning to their birth countries or visiting family members in typhoid endemic countries. This type of traveller is less likely to seek pre-travel health advice and seek vaccination.⁴

Paratyphoid

There were no cases of paratyphoid notified in 2019 (5 year mean = 5.6 cases per year). In 2016, paratyphoid fever became a notifiable disease in its own right. Previously, infections caused by *Salmonella* Paratyphi, *Salmonella* Paratyphi A and *Salmonella* Paratyphi B were notified as salmonellosis.

Shigatoxin producing *Escherichia coli* (STEC)/haemolytic uraemic syndrome (HUS)

There were no cases of HUS reported in the NT in 2019. The last reported case was in 2018 with a 5 year mean of 0.4 cases per year.

There were 2 cases of STEC reported compared to a 5 year mean of 1.6 cases per year.

Yersiniosis

There were 17 cases of yersiniosis notified in 2019 compared to 16 notified in 2018 and a 5 year mean of 14 cases per year. Notifications of yersiniosis have increased since the introduction of culture independent testing in 2013.

Listeriosis

Listeriosis is not often reported in the NT and in 2019 no cases were notified. The last case was reported in 2015.

Amoebiasis

There was 1 case of amoebiasis notified in 2019. The case was a 30-year-old non-Aboriginal male with no history of overseas travel and no obvious exposures. The case had *Entamoeba histolytica* detected by PCR in a stool sample and also by serology. The case had no extra-intestinal spread.

Ciguatera

There were no cases of ciguatera fish poisoning notified in 2018. Ciguatera fish poisoning was made a notifiable disease in the NT in 2010 and there have only been 2 cases notified (1 in 2013, 1 in 2016).

Vibrio food poisoning

There were no cases of *Vibrio* food poisoning notified in the NT in 2019. There are usually 1-2 cases notified per year (5 year mean 1.6 cases).

Botulism

There were no cases of botulism notified in 2019. There has only ever been 1 notification of botulism in the NT and that was in the year 2000.

Outbreak Investigations

There were 21 outbreak investigations undertaken in 2019; 1 foodborne or suspected foodborne disease outbreak investigation; 13 non-foodborne outbreak investigations; 7 investigations following triggers of emergency department syndromic surveillance system alerts; and 1 *Salmonella* cluster investigation. Selected investigations are briefly summarised below:

- **An outbreak of food poisoning during a military exercise**

There was an outbreak of diarrhoea that affected 14/30 people on a military exercise. Symptoms included diarrhoea (14/14, 100%) and vomiting (14/14, 100%). Four cases subsequently tested positive for norovirus. The epidemiological investigation and laboratory results indicates that the transmission was likely due to food contaminated by a food handler or drink contaminated by a food handler. Environmental health conducted an inspection of the kitchen supplying the sandwiches implicated by the epidemiological investigation and found no major concerns.

- **A cluster of *Salmonella* Saintpaul associated with pawpaw**

In December 2019 there were 14 notifications of *Salmonella* Saintpaul compared to a 5 year mean for the month of December of 8 cases (expected range 2.3 - 13.7). Follow up of cases revealed that a number of cases reported eating foods from markets in Darwin, including pawpaw salads and ripened pawpaws. Samples of *S. Saintpaul* were detected on pawpaws in that jurisdiction.

Some cases reported eating pawpaws from their own backyard trees. This coincided with an increase in *S. Saintpaul* in South Australia. In the NT, EH officers collected a variety of whole, cut, unripened and ripened pawpaw from a number of market stalls, retailers and farms. Samples of uncut red and green pawpaw from a market stall, green pawpaw salad from another market stall, and a whole pawpaw collected directly from a tree on a farm all tested positive for *S. Saintpaul*. EH officers visited market stall owners preparing and selling green and ripened pawpaws and provided advice around sanitizing and storing fruit prior to consumption. They also visited some farms and packers of pawpaws who supply both NT and interstate markets and provided advice and instruction on improving sanitation, cleaning and sanitising surfaces, removing animals/pets from packing areas and general fruit washing and hygiene. *S. Saintpaul* is the most commonly notified serovar in the NT. Investigating increases in notifications against a high background is often difficult and it is noted that this investigation resulted in significant public health benefit.

Acknowledgments

Firstly we would like to acknowledge the support of Mary Verus who retired in January 2019. Mary was the Data Manager at the NT Centre for Disease Control and had worked in the unit since January 1994. We would also like to thank Dr Peter Markey, Kelly Lomas, Dr Vicki Krause and the staff at the NT CDC Public Health Units around the NT, including Northern Territory Government Environmental Health Officers. Thanks also goes to staff from the Northern Territory Government Pathology Service (NTGPS). Western Diagnostic Pathology, Sullivan and Nicolaidis Pathology, Australian Clinical Labs, PathWest, SA Pathology and the Microbiology Diagnostic Unit at Melbourne University (MDU).

References

1. Northern Territory Department of Health, Staff Intranet. *Research, Reporting and Analysis*. Data from Research and Innovation Branch.
2. Williams S, Patel M, Markey P, Muller R, Benedict S, Ross I, Heuzenroeder M, Davos D, Cameron S & Krause V. Salmonella in the tropical household environment – Everyday, everywhere. *Journal of Infection*. 2015;71(6):642-648. Available at: [https://www.journalofinfection.com/article/S0163-4453\(15\)00289-3/abstract](https://www.journalofinfection.com/article/S0163-4453(15)00289-3/abstract)
3. Draper ADK, Markey PG. *Shigella flexneri* 2b in the Northern Territory in 2017. *The Northern Territory Disease Control Bulletin*. 2017;24(4):1-6. Available at: <https://digitallibrary.health.nt.gov.au/prodjspui/bitstream/10137/506/557/Vol%2024%20no%204%20December%202017.pdf>
4. Balzat L. Typhoid notifications and the health response in the Northern Territory: a case series. *The Northern Territory Disease Control Bulletin*. 2012;19(4):4-10. Available at: <https://digitallibrary.health.nt.gov.au/prodjspui/bitstream/10137/506/417/Vol.%2019%20no%204%20December%202012.pdf>



Abstracts from peer reviewed published articles related to the Northern Territory

The End Rheumatic Heart Disease in Australia Study of Epidemiology (ERASE) Project: data sources, case ascertainment and cohort profile

Katzenellenbogen JM, Bond-Smith D, Seth RJ, Dempsey K, Cannon J, Nedkoff L, Sanfilippo FM, de Klerk N, Hung J, Geelhoed E, Williamson D, Wyber R, Ralph AP, Bessarab D

Clinical Epidemiology. 2019;11:997-1010
<https://doi.org/10.2147/CLEP.S224621>

Acute rheumatic fever (ARF) and rheumatic heart disease (RHD) persist as public health issues in developing countries and among disadvantaged communities in high-income countries, with rates in Aboriginal and Torres Strait Islander peoples in Australia among the highest recorded globally. A robust evidence base is critical to support policy recommendations for eliminating RHD, but available data are fragmented and incomplete. The End RHD in Australia: Study of Epidemiology (ERASE) Project aims to provide a comprehensive database of ARF and RHD cases in Australia as a basis for improved monitoring and to assess prevention and treatment strategies. The objective of this paper is to describe the process for case ascertainment and profile of the study cohort.

The ERASE database has been built using linked administrative data from RHD registers, inpatient hospitalizations, and death registry data from 2001 to 2017 (mid-year). Additional linked datasets are available. The longitudinal nature of the data is harnessed to estimate onset and assess the progression of the disease. To accommodate systematic limitations in diagnostic coding for RHD, hospital-only identified RHD has been determined using a purposefully developed prediction model.

Of 132,053 patients for whom data were received, 42,064 are considered true cases of ARF or RHD in the study period. The patient population under 60 years in the compiled dataset is more than double the number of patients identified in ARF/RHD registers (12,907 versus 5,049). Non-registered patients were more likely to be older, non-Indigenous, and at a later disease stage.

The ERASE Project has created an unprecedented linked administrative database on ARF and RHD in Australia. These data provide a critical baseline for efforts to end ARF/RHD in Australia. The methodological work conducted to compile this database resulted in significant improvements in the robustness of epidemiological estimates and entails valuable lessons for ARF/RHD research globally.

Keywords: rheumatic fever, rheumatic heart disease, indigenous, epidemiology, linked data

Antimicrobial resistance and antibiotic use in Timor-Leste: building surveillance capacity with a One Health approach.

Francis JR, Sarmiento N, Draper AD, Marr I, Ting S, Fancourt N, Alves L, Champlin K, Bongers A, Yan J

Communicable Diseases Intelligence. 2020;44
<https://doi.org/10.33321/cdi.2020.44.1>

The Menzies School of Health Research (Menzies) has been awarded a Fleming Fund country grant to work with the Timor-Leste Ministry of Health (MoH) and Ministry of Agriculture and Fisheries (MAF) on a One Health project to build capacity for

surveillance of antimicrobial resistance (AMR) and antimicrobial use (AMU) in the human and agriculture sectors in Timor-Leste. The Fleming Fund is a £265 million United Kingdom (UK) aid investment to tackle AMR in low- and middle-income countries around the world. The program is managed by the UK Department of Health and Social Care, in partnership with Mott MacDonald, the Fleming Fund Grant Management Agent.

One Health approach to antimicrobial resistance

Antimicrobial resistance poses an enormous risk to human and animal health globally. Rates of AMR are escalating, particularly affecting people in low- and middle-income countries, with corresponding high rates of AMR in animals observed in similar settings. Strategies for reducing the impact of AMR include infection prevention and control through vaccination and improved water, sanitation and hygiene, as well as limiting unnecessary use of antibiotics. The problem of AMR is one that exemplifies the need for a One Health approach to finding solutions.

The Removal of Subterranean Stormwater Drain Sumps as Mosquito Breeding Sites in Darwin, Australia

Warchot A, Whelan P, Brown J, Vincent T, Carter J, Kurucz N

Trop Med Infect Dis. 2020;5(1):9
<https://doi.org/10.3390/tropicalmed5010009>

The Northern Territory Top End Health Service, Medical Entomology Section and the City of Darwin council carry out a joint Mosquito Engineering Program targeting the rectification of mosquito breeding sites in the City of Darwin, Northern Territory, Australia. In 2005, an investigation into potential subterranean stormwater breeding sites in the City of Darwin commenced, specifically targeting roadside stormwater side entry pits.

There were 79 side entry pits randomly investigated for mosquito breeding in the Darwin suburbs of Nightcliff and Rapid Creek, with 69.6% of the pits containing water holding sumps, and 45.6% of those water holding sumps breeding endemic mosquitoes. *Culex quinquefasciatus* was the most common mosquito collected, accounting for 73% of all mosquito identifications, with the potential vector mosquito *Aedes notoscriptus* also recovered from a small number of sumps. The sumps were also considered potential dry season maintenance breeding sites for important exotic *Aedes* mosquitoes such as *Aedes aegypti* and *Aedes albopictus*, which are potential vectors of dengue, chikungunya and Zika virus. Overall, 1,229 side entry pits were inspected in ten Darwin suburbs from 2005 to 2008, with 180 water holding sumps identified and rectified by concrete filling.

Keywords: exotic mosquitoes; sump; subterranean storm water drain; maintenance breeding site; rectification

Opportunistic pathogens and large microbial diversity detected in source-to-distribution drinking water of three remote communities in Northern Australia

Kaestli M, O'Donnell M, Rose A, Webb JR, Mayo M, Currie B, Gibb K

PLOS Neglected Tropical Diseases. 2019;13(9):e0007672
<https://doi.org/10.1371/journal.pntd.0007672>

In the wet-dry tropics of Northern Australia, drinking water in remote communities is mostly sourced from bores accessing groundwater. Many aquifers contain naturally high levels of iron and some are shallow with surface water intrusion in the wet season. Therefore, environmental bacteria such as iron-cycling bacteria promoting biofilm formation in pipes or opportunistic pathogens can occur in these waters.

An opportunistic pathogen endemic to northern Australia and Southeast Asia and emerging worldwide is *Burkholderia pseudomallei*. It causes the frequently fatal disease melioidosis in humans and animals. As we know very little about the microbial composition of drinking water in remote communities, this study aimed to provide a first snapshot of the microbiota and occurrence of opportunistic pathogens in bulk water and biofilms from the source and through the distribution system of three remote water supplies with varying iron levels.

Using 16s-rRNA gene sequencing, we found that the geochemistry of the groundwater had a substantial impact on the untreated microbiota. Different iron-cycling bacteria reflected differences in redox status and nutrients. We cultured and sequenced *B. pseudomallei* from bores with elevated iron and from a multi-species biofilm which also contained iron-oxidizing *Gallionella*, nitrifying *Nitrospira* and amoebae. *Gallionella* are increasingly used in iron-removal filters in water supplies and more research is needed to examine these interactions.

Similar to other opportunistic pathogens, *B. pseudomallei* occurred in water with low organic carbon levels and with low heterotrophic microbial growth. No *B. pseudomallei* were detected in treated water, however, abundant DNA of another opportunistic pathogen group, non-tuberculous mycobacteria was recovered from treated parts of one supply. Results from this study will inform future studies to ultimately improve management guidelines for water supplies in the wet-dry tropics.

Keywords: water resources; bacterial biofilms; microbiome; water management; opportunistic pathogens; bacteria; amoebas; ribosomal RNA

Invasive group A *Streptococcus* disease in Australian children: 2016 to 2018 – a descriptive cohort study

Oliver J, Thielemans E, McMinn A, Baker C, Britton, P, Clark JE, Marshall HS, Blyth, CC, Francis J, Buttery J, Steer A, Crawford NW on behalf of the PAEDS investigators

BMC Public Health. 2019;19:1750

<https://doi.org/10.1186/s12889-019-8085-2>

Objectives

Invasive group A *Streptococcus* (iGAS) disease is serious and sometimes life-threatening. The Paediatric Active Enhanced Disease Surveillance (PAEDS) Network collects voluntary notifications from seven major Australian paediatric hospitals on patients with certain conditions, including iGAS disease. Our aims were to: 1) Describe the epidemiological distribution of paediatric iGAS disease in Australia and correlate this with influenza notifications, 2) Identify GAS strains commonly associated with invasive disease in children.

Methods

iGAS and influenza notification data were obtained (from the PAEDS Network and the Australian Institute of Health and Welfare, respectively, for the period 1 July 2016 to 30 June 2018). Included iGAS patients had GAS isolated from a normally sterile body site. Data were described according to selected clinical and demographic characteristics, including by age group and Australian State, with proportions and minimum incidence rates estimated.

Results

A total of 181 patients were identified, with most (115, 63.5%) <5 years old. The mean annual minimum incidence rate was 1.6 (95% confidence interval: 1.1–2.3) per 100,000 children across the study period. An epidemiological correlation with the

seasonal burden of influenza was noted. Contact prophylaxis was not consistently offered. Of 96 patients with *emm*-typing results available, 72.9% showed *emm*-1, -4 or -12.

Conclusions

Robust surveillance systems and cohesive patient management guidelines are needed. Making iGAS disease nationally notifiable would help facilitate this. Influenza vaccination may contribute to reducing seasonal increases in iGAS incidence. The burden of disease emphasises the need for ongoing progress in GAS vaccine development.

Keywords: Group A Streptococcus; child health; infectious diseases; public health; invasive

Research complexity in the remote Australian Indigenous context: a way forward

Kildea S, Roe Y

The Lancet 2019 Nov;7(11):E1474-E1475
[https://doi.org/10.1016/S2214-109X\(19\)30403-6](https://doi.org/10.1016/S2214-109X(19)30403-6)

No abstract

Summary

Prevalence of sexually transmitted infections (STIs) across remote Australia have shown little change in 20 years and untreated infections such as chlamydia, gonorrhoea and trichomonas can have long-term sequelae such as infertility or adverse outcomes of pregnancy. Opportunities for enhancement of continuous quality improvement programmes to increase STI screening may be achieved by community engagement activities including health service redesign, workforce strengthening and embedding Aboriginal governance and control.



Centre for Disease Control

Shigellosis

What is shigellosis?

Shigellosis is an infection of the bowel (gut) caused by the bacteria called *Shigella*.

How is it spread?

Spread can occur by eating food or drinking water that has been contaminated by very small amounts of faeces (i.e. 'poo') from infected people.

Spread can also occur through oral-anal contact.

What are the symptoms?

Symptoms usually develop between 1 to 3 days after becoming infected but may take up to a week to appear.

Most people with *Shigella* infection experience diarrhoea (sometimes with blood or mucus), fever, vomiting and stomach cramps.

The illness usually lasts 3 to 4 days but may last longer, particularly in very young, elderly and severely underweight people.

Some infected people only have a very mild illness or no symptoms at all.

What is the infectious period?

People with shigellosis can pass the infection on to others while they are ill and for up to 4 weeks after their diarrhoea has stopped. Antibiotic treatment will help stop spread of the infection to other people.

Who is at risk?

The most severe infections occur in very young, elderly and severely underweight people.

Children who attend childcare facilities are at greater risk of infections. Spread occurs when children share toys or food that have become

contaminated and place it in their mouths.

Particular care has to be taken wherever there are children in nappies.

Travelers to developing countries or to remote communities where sanitation and hygiene are poor are at higher risk of contracting diarrhoeal illness.

Men or women who have anal sex are more at risk of shigellosis through oral-anal contact.

What is the treatment?

It is important to prevent and/or treat dehydration caused by vomiting or diarrhoea. Anyone with vomiting or diarrhoea should drink extra fluids to avoid dehydration. Drinking oral glucose/electrolyte solution is very effective. If children do not want to drink this solution, diluted fruit juice may be given (1 part juice to 4 parts water).

Continue to offer normal feeds to babies plus extra fluids in between feeds.

Children with diarrhoea, who vomit or who do not want extra fluids should see a doctor.

Anyone with diarrhoea that will not stop or severe diarrhoea, or who have symptoms that worry them, should see a doctor.

Do not take medicine that stops vomiting or diarrhoea, especially do not give to children, except when prescribed by a doctor.

When the diagnosis of shigellosis is confirmed by a lab test, the doctor may prescribe antibiotics. This can reduce the risk of complications and the spread of infection to others.

Centre for Disease Control

How can shigellosis be prevented?

Good hygiene is the best way to prevent shigellosis.

Hands should be washed thoroughly with warm soapy water:

- after going to the toilet
- before preparing or handling food
- after every nappy change
- after changing soiled linen.

Other measures:

- never change nappies on tables or benches where food is prepared or eaten
- clean nappy changing areas with warm soapy water and disinfectant after every nappy change
- clean books, toys, equipment, furnishings, floors and toilets regularly (including toilet door handles)
- wash raw fruit and vegetables carefully before eating

- make sure that toilets and bathrooms in the home are working. If you rent, tell your landlord or housing provider if your toilet or plumbing is broken.

How can it be controlled?

Anyone with diarrhoea should not go to childcare/school for 24 hours after the diarrhoea has stopped.

People with diarrhoea should not prepare or handle food that will be eaten by others.

Anyone with diarrhoea should not swim, wade or paddle in public pools.

Doctors and public health workers are interested in preventing outbreaks of diarrhoea. If there are 2 or more people with diarrhoea in a group or family, call the local Centre for Disease Control.

For more information contact the Centre for Disease Control in your region

Alice Springs	8951 7540
Darwin	8922 8044
Katherine	8973 9049
Nhulunbuy	8987 0357
Tennant Creek	8962 4259

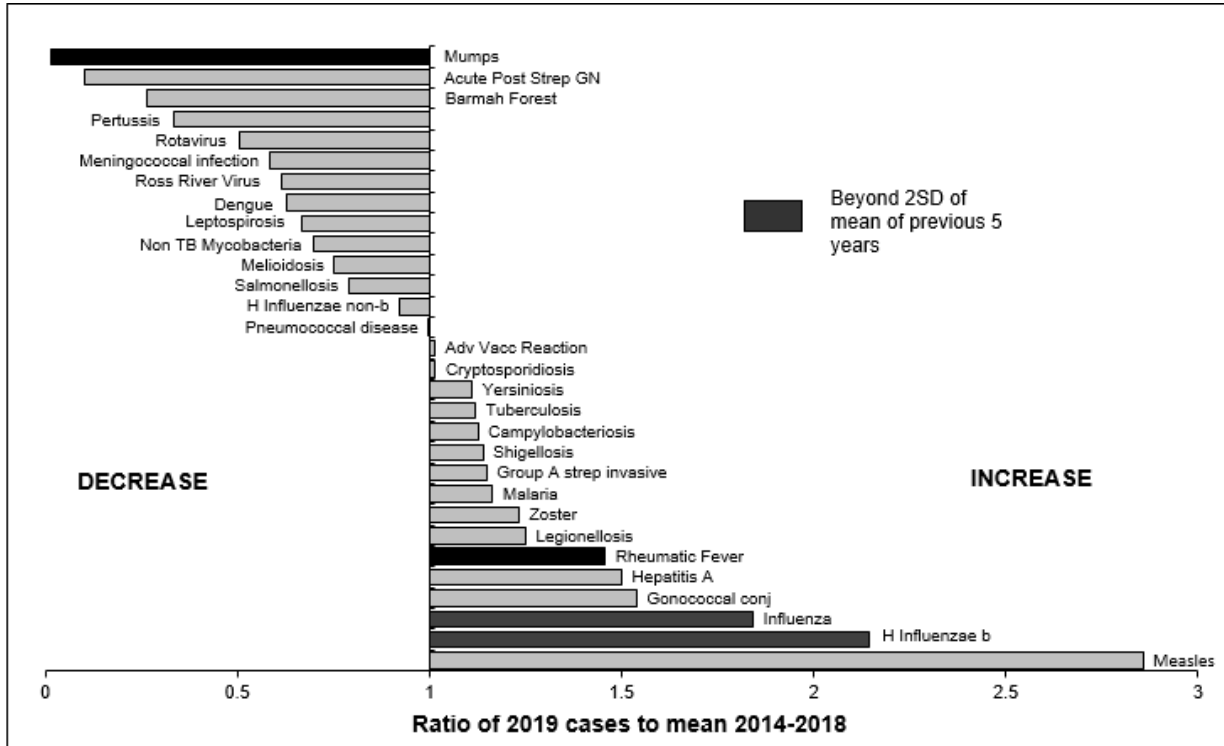
or

<https://health.nt.gov.au/professionals/centre-for-disease-control/cdc-contacts>

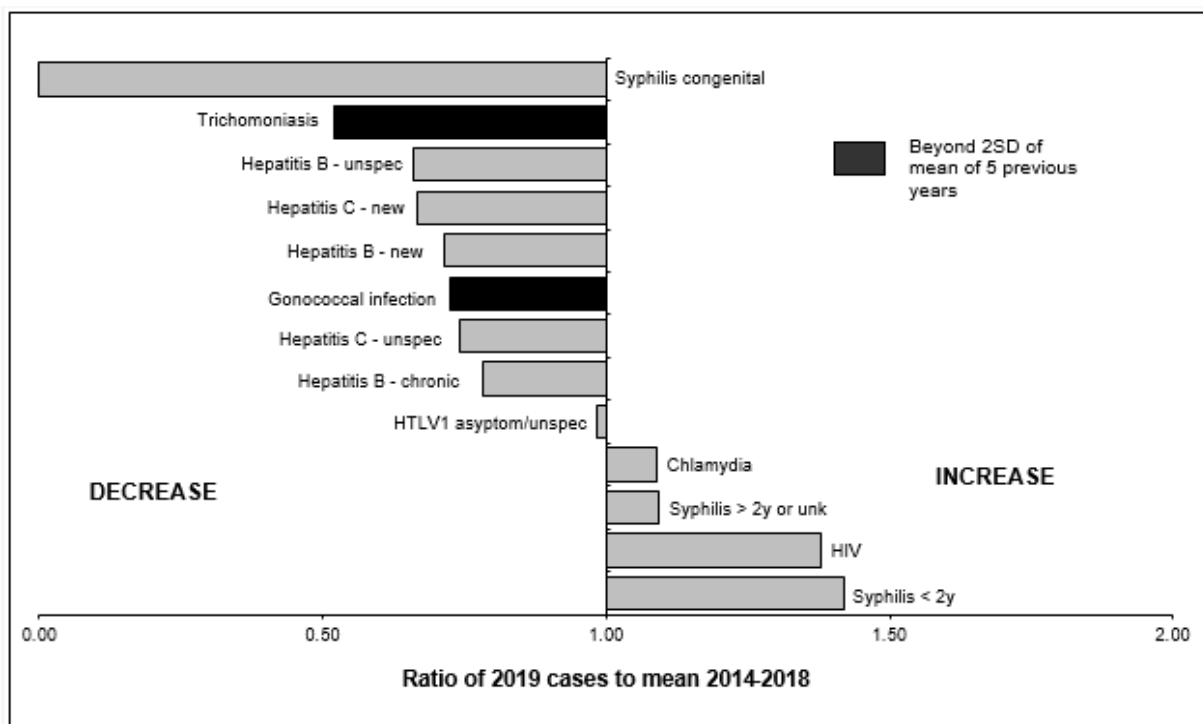
NORTHERN TERRITORY NOTIFICATIONS BY ONSET DATE AND DISTRICT
1 January-31 December 2018 and 2019

	Alice Springs		Barkly		Darwin		East Arnhem		Katherine		NT	
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
Acute Post Strep GN	3	1	2	0	6	2	4	0	5	2	20	5
Adv Vacc Reaction	5	4	0	2	55	46	5	2	4	3	69	57
Amoebiasis	0	0	0	0	1	0	0	0	0	0	1	0
Barmah Forest	0	0	1	0	3	4	0	1	1	0	5	5
Campylobacteriosis	94	118	12	16	216	250	11	10	38	41	371	435
Chickenpox	12	27	3	0	43	61	12	4	4	5	74	97
Chikungunya	0	0	0	0	0	1	0	0	0	0	0	1
Chlamydia	805	976	106	105	1304	1454	260	194	335	354	2810	3083
Chlamydial conj	16	10	19	17	7	6	0	0	0	5	42	38
Cholera	0	0	0	0	0	1	0	0	0	0	0	1
Crusted scabies	6	16	2	5	29	22	12	10	10	7	59	60
Cryptosporidiosis	47	34	11	9	24	85	8	10	17	5	107	143
Dengue	1	3	0	0	27	32	0	2	0	0	28	37
Gastro - related cases	1	0	1	0	0	0	0	1	0	0	2	1
Gonococcal conj	0	1	0	0	1	1	0	0	1	2	2	4
Gonococcal infection	1058	660	130	57	428	338	210	110	317	198	2143	1363
Gonococcal neon ophth	1	1	0	0	0	0	0	0	1	0	2	1
Group A strep invasive	36	35	2	7	25	31	4	1	10	5	77	79
Hepatitis A	0	0	0	0	2	3	0	0	0	0	2	3
Hepatitis B - chronic	7	4	0	1	15	14	4	1	2	1	28	21
Hepatitis B - new	2	1	0	1	3	0	0	0	0	1	5	3
Hepatitis B - unspec	17	16	0	0	62	61	2	3	3	1	84	81
Hepatitis C - new	0	1	0	0	0	1	0	0	0	0	0	2
Hepatitis C - unspec	25	22	2	3	112	105	1	4	11	7	151	141
Hepatitis D	0	0	0	0	0	1	0	0	0	0	0	1
Hepatitis E	0	0	0	0	0	3	0	0	0	0	0	3
H Influenzae b	0	2	0	0	1	0	0	1	0	0	1	3
H Influenzae non-b	0	1	0	0	2	5	0	0	1	1	3	7
HIV	9	7	2	1	29	28	0	1	2	0	42	37
HTLV1 asyptom/unspec	68	58	1	4	4	0	0	0	3	0	76	62
HTLV1 TSP	1	0	0	0	0	0	0	0	0	0	1	0
HUS	1	0	0	0	0	0	0	0	0	0	1	0
Influenza	42	580	8	130	928	904	148	73	93	191	1219	1878
Lead - elevated	5	2	2	0	28	51	45	35	9	6	89	94
Legionellosis	0	0	0	0	0	4	0	0	0	0	0	4
Leptospirosis	0	0	0	0	6	3	0	0	1	1	7	4
LGV	0	0	0	0	0	0	0	1	0	0	0	1
Malaria	2	3	0	0	15	14	0	0	1	0	18	17
Measles	0	0	0	0	0	32	0	0	0	0	0	32
Melioidosis	1	0	0	0	53	39	7	5	4	1	65	45
Meningococcal infection	4	2	1	1	6	2	2	0	0	2	13	7
Mumps	6	0	0	0	3	1	4	0	24	0	37	1
MVE	0	0	0	0	1	0	0	0	0	0	1	0
Non TB Mycobacteria	1	1	0	0	9	5	0	0	0	0	10	6
Pertussis	16	2	2	0	38	31	1	2	14	2	71	37
Pneumococcal disease	35	37	1	5	16	11	4	3	6	5	62	61
Q Fever	0	2	0	0	0	0	0	0	0	0	0	2
Rheumatic Fever	54	98	10	15	40	56	23	23	28	17	155	209
Rheumatic heart disease	0	40	0	4	0	33	1	15	0	10	1	102
Ross River Virus	7	6	4	5	89	121	11	10	17	19	128	161
Rotavirus	85	37	26	2	43	43	1	1	10	4	165	87
Salmonellosis	82	46	12	19	360	312	26	16	63	60	543	453
Shigellosis	206	115	17	29	65	86	39	32	100	44	427	306
STEC/VTEC	1	1	1	0	2	0	0	0	0	1	4	2
Strongyloidiasis extra-int	0	0	0	0	0	0	0	0	1	0	1	0
Syphilis	110	103	14	14	181	184	62	46	58	74	425	421
Syphilis congenital	0	0	0	0	0	0	0	0	1	0	1	0
Trichomoniasis	1063	582	203	145	1135	617	527	229	553	290	3481	1863
Tuberculosis	6	1	0	0	13	23	1	0	0	4	20	28
Typhoid	0	1	0	0	0	0	0	0	0	0	0	1
Typhus	0	0	0	0	1	1	0	0	0	0	1	1
Varicella - unspec	4	1	0	0	4	5	0	0	0	0	8	6
Vibrio food poisoning	0	0	0	0	3	0	1	0	0	0	4	0
Vibrio invasive	0	0	1	0	1	0	0	0	0	0	2	0
Yersiniosis	2	1	0	0	10	14	0	0	2	1	14	16
Zika	0	0	0	0	0	0	0	0	0	1	0	1
Zoster	75	58	5	10	306	340	19	18	38	44	443	470
Sum:	4,022	3,717	601	607	5,755	5,487	1,455	864	1,788	1,415	13621	12090

**Ratio of the number of notifications in 2019 to the 5 year mean (2014–2018):
Selected diseases**



**Ratio of the number of notifications in 2019 to the 5 year mean (2014–2018):
Sexually transmitted infections**



Comments on notifications

Mumps

There was only 1 case of mumps notified in 2019, compared with an annual mean of 67 over the past 5 years. This was the lowest figure since 2014. Recent outbreaks have led to focussed vaccination catch-up programs which have hopefully had a herd effect to prevent community transmission.

Acute rheumatic fever

There were 175 cases of definite acute rheumatic fever (ARF) diagnosed in 2019 which is 22% more than the expected 5 year mean of 143. There was also 34 probable cases recorded. Probable cases became notifiable in 2019 and will be reported alongside definite cases in future *NT Bulletins*.

Trichomoniasis

There were 1,863 cases of trichomoniasis notified in 2019, about half the expected number of 3,577. This was due to a problem with the notification process, which occurred between March and September and unfortunately was not able to be corrected retrospectively.

Gonococcal infection

There were 1,362 cases of gonococcal infection in 2019 which was 26% fewer than the 5 year mean of 1,881. Notifications of gonococcal infection have been decreasing since the middle of 2018; the cause of the

decrease is unlikely to be due to decrease testing and is still being investigated.

Invasive *Haemophilus influenzae* type b (Hib)

There were only 3 cases of Hib in 2019 but this was the most since 2004, with case numbers usually varying from between 0 and 2 cases per year. Two of the cases were in infants (aged 4 months and 14 months) and both were up-to-date with Hib immunisations. In both cases eligible household contacts were fully-immunised and there was no household spread. The third case was in a 68 year old woman.

Influenza

There were 1,878 cases of influenza in 2019, which was 84% higher than the 5 year mean of 1019. 2019 was a very atypical year for flu activity in the NT and nationally. The Top End had a very large and sudden flu season from November 2018 to January 2019 followed by a slow rise in cases from March till August when it peaked at 40 per week and then a slow decrease which continued to mid-October. The Centre had 2 seasons; one which peaked in mid-April at 80 per week and a second which peaked in early December. These patterns were unprecedented in both the Top End and Centre. See the Top End and Centre cases over the year 2019 in the Figure below.

Figure: Top End and Central Australia influenza cases weekly for 2019

