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The epidemiology of amoebiasis in the Northern Territory of Australia over 20 years (2005 – 2024)

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Abstract

Amoebiasis is an important parasitic cause of morbidity and mortality worldwide and is known to be endemic in Northern Australia. The Northern Territory is the only jurisdiction in Australia where amoebiasis is notifiable. The epidemiology of amoebiasis across Australia is not well described. We undertook this retrospective study to describe the epidemiology of amoebiasis in the Northern Territory from 1 January 2005 to 30 June 2024. Data were obtained from the Northern Territory Notifiable Disease System. Of the 26 cases identified, most were men (81%), non-Indigenous (88%) and with infection overseas acquired (69%). Most had extra-intestinal manifestations (65%), and most required hospitalisation (54%). There was one death related to amoebic splenic abscess. Of the seven locally acquired cases, all resided in the Top End and Katherine regions, and two were children. The highest annual incidence occurred in 2024, all of whom were returned travellers. This study highlights that amoebiasis in the Northern Territory is both endemic and overseas acquired, and that clinicians should consider this differential diagnosis in people presenting with gastrointestinal symptoms and initiate timely testing and appropriate treatment.

Keywords: amoebiasis; epidemiology; *Entamoeba histolytica*; Northern Territory; Australia

Introduction

Amoebiasis is a disease caused by the intestinal protozoan parasite *Entamoeba histolytica*, transmitted by ingestion of cysts via contaminated food and water, from unwashed hands, or during oro-anal sexual contact. It is a disease of global distribution, reported to cause up to 100,000 deaths a year,[1,2] and is the third-leading parasitic cause of mortality after malaria and schistosomiasis.[3] Amoebiasis is endemic in Australia, with locally acquired disease occurring in northern Australia, including the Northern Territory (NT).[4,5] High-risk populations include Aboriginal and Torres Strait Islander people,[3] men who have sex with men, and immigrants and returned travellers from countries of high endemicity (e.g. South East Asia).[6,7] Clinical manifestations range from asymptomatic carriage to invasive disease. Amoebic colitis and amoebic liver abscess are the most common invasive manifestations observed in Australia.[8] Clinical diagnosis of amoebiasis can be difficult due to the non-specific nature of symptoms, potential for prolonged asymptomatic carriage, and low index of suspicion among clinicians working in areas of low endemicity.[1,7]

The NT, which is the only jurisdiction in Australia where amoebiasis is notifiable,[9] has an area of 1,349,129 square kilometres with a population of 254,263.[10] Around 31% of the population identify as Aboriginal people, and a significant proportion of the population live in regional, remote or very remote areas.[11] While the NT only accounts for 1% of Australia's total population, the challenges in providing timely healthcare are complex and costly, in the context of sparsely dispersed remote communities compounded by the transient nature of the health workforce. While it is known that amoebiasis has been acquired in the NT, the diagnosis and treatment of amoebiasis is challenging, and is under-described in the literature.

Across Australia, there have been sporadic case reports and jurisdictional case series published.[4,5,7,12] A retrospective study in Western Sydney, New South Wales, including cases from 2005 to 2016, estimated a yearly incidence rate of 0.2–1.1 infections per 100,000 population.[12] This study aims to contribute to the literature regarding amoebiasis in Australia, with an examination of the epidemiology of notified cases of amoebiasis in the NT over a 20-year period from 2005 to 2024.

Methods

We conducted a retrospective descriptive data analysis on all cases of amoebiasis notified in the NT from 1 January 2005 to 30 June 2024. Only confirmed cases of amoebiasis are notified as per the NT's surveillance case definition (see Appendix A).

Data were extracted from the Northern Territory Notifiable Disease System (NTNDS). Information on exposures, treatment and outcomes was obtained from paper-based questionnaires, the NT Centre for Disease Control's (NT CDC) Public Health Management REDCap database, and clinical notes from the NT hospital electronic medical records. Data were transcribed into a password-protected Microsoft Excel spreadsheet stored on a secure network drive. Variables collected included age; sex; NT region of residence; exposure risk factors; presenting symptoms; place of acquisition (where known); duration and severity of illness; hospitalisation; and treatment given and outcome (where known). Descriptive analysis was performed by time, place and person, and frequencies, proportions, and crude incidence rates were calculated.

Ethics

The study received ethics approval from the Northern Territory Human Research Ethics Committee (HREC-2024-4901).

Results

Over the study period, 26 cases of amoebiasis were notified with a median of two cases per year (range 0–5 cases; Figure 1). The highest annual number of notifications occurred in 2024, with five confirmed cases notified (Figure 1). Notably, there were no notifications between 2020 and 2023.

Most cases (62%) were imported, mainly from countries in the Asia Pacific region including Indonesia, the Philippines, India, Cambodia, Thailand, and Timor-Leste (Table 1).

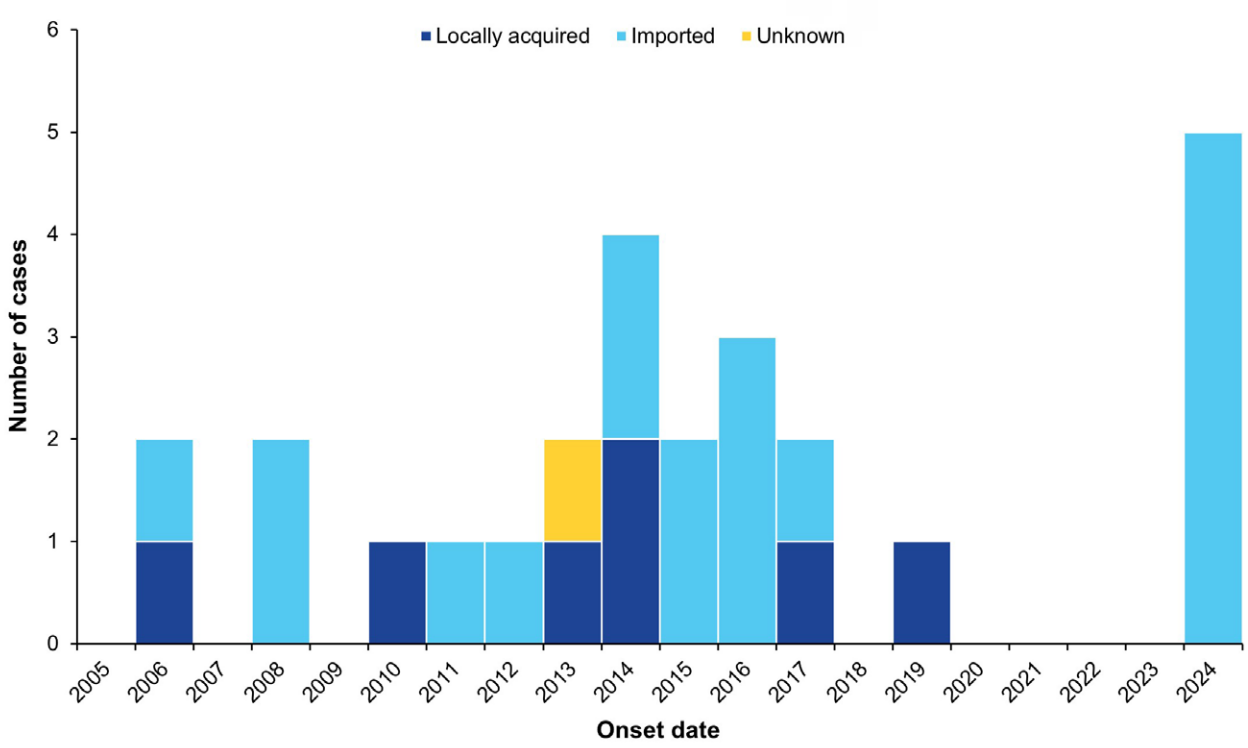
The median age of cases was 47 years old (range 3–90 years), and most cases were male (81%). Most cases were also non-Indigenous (88%). Only two cases were children.

Serology was the most commonly used diagnostic test, followed by polymerase chain reaction (PCR) testing. The most preferred diagnostic test changed over time, with more recent cases diagnosed with PCR exclusively. Only three cases had hepatic abscess fluid tested with PCR, and all of these occurred in 2024. This reflects changes in the availability of nucleic acid testing methodologies for different specimen types in NT laboratories over time.

Fourteen cases (54%) received care in hospital settings; the remainder were diagnosed and treated in community-based settings. We could only confirm from hospital documentation that 38% of cases received the appropriate recommended treatment on their first presentation, i.e. metronidazole for trophozoite eradication. We could only confirm from hospital documentation that 46% of cases received an intraluminal agent (for intestinal cyst eradication) during their treatment. The median length of stay for a hospital admission related to amoebiasis management was 9 days (range 1–25 days).

Of the 14 cases documented to have had hepatic abscess, 11 had a drainage performed. Information was not readily available regarding the indication for drainage, recognising that drainage is not routinely recommended for amoebic hepatic abscess. Only two cases experienced relapse of their infection (unclear whether a treatment failure), and one case died of complications related to amoebic splenic abscess.

Figure 1: Amoebiasis notifications in the Northern Territory of Australia by year and place of acquisition, January 2005 – June 2024



Considering the locally acquired cases, all resided in and around Darwin (Top End region) and Katherine (Big Rivers region), which have a more tropical climate compared to the rest of the NT. Two of the three cases who identified as Aboriginal had locally acquired infection, and both of the two cases in children were locally acquired. Four of the seven (57%) presented to hospital, and three (43%) had amoebic abscesses. The case who died with amoebic splenic abscess had a locally acquired infection, and multiple existing comorbidities including end-stage renal failure.

The annual crude incidence rate during the study period was calculated to range from 0 cases per 100,000 people per year to 1.97 cases per 100,000 people per year (in 2024).

Table 1: Characteristics of cases of amoebiasis notified in the Northern Territory, Australia, January 2005 – June 2024

Category	Characteristic	Number (n)	Percentage (%)
Sex	Male	21	81
	Female	5	19
Age	18 years and older	24	92
	< 18 years	2	8
Region of residence	Top End	19	73
	Big Rivers	5	19
	Barkly	1	4
	Central Australia	1	4
Place of acquisition	Overseas (imported)	18	69
	Australia (local)	7	27
	Unknown	1	4
Ethnicity	Non-Indigenous	23	88
	Aboriginal	3	12
Type of infection	Extra-intestinal	17	65
	Intestinal	9	35
Diagnostic test[a]	Serology only	12	46
	PCR only	9	35
	Microscopy only	2	8
	Serology and microscopy	1	4
	PCR and microscopy	1	4
	PCR, serology and microscopy	1	4
Hospitalised	Yes	14	54
	No	12	46
Drainage of abscess performed	Yes	11	42
	No	3	12
	(Not applicable)	(12)	(46)
Intraluminal agent prescribed	Yes	12	46
	Unknown	12	46
	No	2	8
Appropriate treatment at first presentation	Yes	10	38
	Unknown	10	38
	No	6	24
Died	No	25	96
	Yes	1	4

a PCR: polymerase chain reaction.

Discussion

This is the first study describing the epidemiology of amoebiasis over time in the NT. We found the burden of disease to be higher for males, non-Indigenous people, and those living around Darwin in the Top End region. Male predominance of amoebiasis and a predisposition for hepatic abscess has also been reported in other studies in Australia and internationally.[7,12,13] We found that, although amoebiasis is endemic in the NT, most cases continue to be acquired overseas, with the last locally acquired infection occurring in the NT in 2019. A record number of cases were notified in 2024, perhaps reflecting increased travel and overseas exposures in combination with advancing methods of detecting *E. histolytica* in NT laboratories. We calculated the annual incidence rate over the study period to be between 0 and 1.97 cases per 100,000 population, which is similar to estimates calculated by Domazetovska et al. (2018) in their Western Sydney retrospective study.[12]

We found that locally acquired cases were possibly more likely to be children, to identify as Aboriginal, and to have more severe illness and poor outcomes than cases acquiring their infection overseas. Unfortunately, with such small numbers reported, a statistical analysis was not possible to determine if differences were significant – this could be addressed in a future study using a wider sample of cases from Australia. There may be differences in type of risk exposure and healthcare seeking behaviours between locally and overseas acquired cases; however, this requires further examination.

Prior to the introduction of nucleic acid testing (PCR) in late 2012, cases of amoebiasis were notified on the basis of serology or microscopic identification of *E. histolytica*. *E. histolytica* and *E. dispar* are morphologically identical under microscopy,[13] therefore stool samples may have been misclassified. Subsequently, the more sensitive and specific PCR method has likely resulted in increased capture of cases which may have been missed with microscopy and serology, and has resulted in increased notification of cases since 2012, which is shown in the data. Additionally, the testing of other fluids such as abscess fluid is now available in the NT: detection from abscesses was only noted in 2024 in this study, and represents an advancement of technological capacity in the NT which may further enhance the detection and management of amoebiasis.

We also noted that of the 14 cases documented to have amoebic hepatic abscess, 11 had a drainage performed. The surgical drainage of amoebic hepatic abscess is not routinely recommended, and this proportion is perhaps surprising. We were not able to find information on the indication for abscess drainage, however, the unexpectedly large proportion may represent delay in presentation and diagnosis of amoebic hepatic abscess, with larger abscesses or with patients presenting more clinically unwell. This also requires further exploration to understand this finding.

Amoebiasis is an important differential for clinicians in the NT to consider for presentations with otherwise unexplained gastrointestinal symptoms, particularly in the context of recent overseas travel. *E. histolytica* thrives in tropical environments and transmits well in settings where good hygiene is hard to maintain; for example, where there is crowding in housing, poor sewage drainage and management, and no running water. These are risk factors which are present in the NT as well as in neighbouring countries across South-East Asia, where many people travel to and from every year. It is important for clinicians to take a travel history, and to consider a sexual history, when assessing people with gastrointestinal symptoms that may be consistent with amoebiasis.

There are limitations to this study. It was found that information on risk factors, management and treatment was not available for all notified cases, particularly those managed in community, despite an extensive review of the available records. This reflects a need for more systematic collection and recording of information about amoebiasis notifications by the public health unit. Additionally, due to the small number of notifications received, further statistical analysis of the data could not be completed to identify significant differences between risk factors and outcomes for cases, including between locally acquired and overseas acquired cases.

Conclusion

Amoebiasis is an uncommon cause of gastroenteritis in the NT, but can lead to severe complications when untreated. Clinicians should consider amoebiasis in their differentials for patients presenting with gastroenteritis, colitis, hepatic abscess or other complications without another explanatory cause, and where the patient has recently travelled to tropical areas including the Top End of the NT. Treatment should always include an intraluminal agent to eradicate colonisation. We recommend that further research could be undertaken on pooled data within the Australian context to further describe national epidemiological trends, and identify areas for clinical improvement in the detection and early management of amoebiasis.

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References

1. Bercu TE, Petri WA, Behm BW. Amebic colitis: new insights into pathogenesis and treatment. *Curr Gastroenterol Rep*. 2007;9(5):429–33. doi: https://doi.org/10.1007/s11894-007-0054-8.

2. Nasrallah J, Akhoundi M, Haouchine D, Marteau A, Mantelet S, Wind P et al. Updates on the worldwide burden of amoebiasis: a case series and literature review. *J Infect Public Health*. 2022;15(10):1134–41. doi: https://doi.org/10.1016/j.jiph.2022.08.013.

3. Outtara M, N'Guéssan NA, Yapi A, N'Goran EK. Correction: prevalence and spatial distribution of *Entamoeba histolytica/dispar and Giardia lamblia among school children in Agboville Area (Côte d'Ivoire). PLOS Negl Trop Dis*. 2010;4(2). doi: https://doi.org/10.1371/annotation/a28fd8eb-b0a9-47f1-935c-7912050dc19b.

4. van Hal SJ, Stark DJ, Fotedar R, Marriott D, Ellis JT, Harkness JL. Amoebiasis: current status in Australia. *Med J Aust*. 2007;186(8):412–6. doi: https://doi.org/10.5694/j.1326-5377.2007.tb00975.x.

5. McCarthy JS, Peacock D, Trown KP, Bade P, Petri WA, Currie BJ. Endemic invasive amoebiasis in northern Australia. *Med J Aust*. 2002;177(10):570. doi: https://doi.org/10.5694/j.1326-5377.2002.tb04957.x.

6. Weinke T, Friedrich-Jaenicke B, Hopp P, Janitschke K. Prevalence and clinical importance of *Entamoeba histolytica* in two high-risk groups: travelers returning from the tropics and male homosexuals. *J Infect Dis*. 1990;161(5):1029–31. doi: https://doi.org/10.1093/infdis/161.5.1029.

7. Stark DJ, Fotedar R, Ellis JT, Harkness JL. Locally acquired infection with *Entamoeba histolytica* in men who have sex with men in Australia. *Med J Aust*. 2006;185(8):417. doi: https://doi.org/10.5694/j.1326-5377.2006.tb00636.x.

8. Arora A, Sandip S, Mukund A, Patidar Y. Fulminant necrotizing amoebic colitis. *Travel Med Infect Dis*. 2012;10(5–6):270–1. doi: https://doi.org/10.1016/j.tmaid.2012.03.009.

9. Northern Territory Government Register of Legislation (NT Legislation). *Notifiable Diseases Act 1981*. [Legislation.] Darwin: NT Legislation; 27 November 2023. [Accessed on 25 November 2024.] Available from: https://legislation.nt.gov.au/Legislation/NOTIFIABLE-DISEASES-ACT-1981.

10. Northern Territory Government Department of Treasury and Finance. Northern Territory Economy: Population. [Webpage.] Darwin: Northern Territory Government; 2024. [Accessed on 25 November 2024.] Available from: https://nteconomy.nt.gov.au/population.

11. Australian Bureau of Statistics. Snapshot of Northern Territory: high level summary data for Northern Territory in 2021. [Webpage.] Canberra: Australian Bureau of Statistics; 28 June 2022. [Accessed on 25 November 2024.] Available from: https://www.abs.gov.au/articles/snapshot-nt-2021.

12. Domazetovska A, Lee R, Adhikari C, Watts M, Gilroy N, Stark D et al. A 12-year retrospective study of invasive amoebiasis in Western Sydney: evidence of local acquisition. *Trop Med Infect Dis*. 2018;3(3):73. doi: https://doi.org/10.3390/tropicalmed3030073.

13. United States Centers for Disease Control and Prevention (US CDC). *Laboratory diagnosis of amoebiasis. Entamoeba histolytica and Entamoeba dispar*. Atlanta: United States Government Department of Health and Human Services, US CDC. [Accessed on 25 November 2024.] Available from: https://www.cdc.gov/dpdx/resources/pdf/benchaids/entamoeba_benchaid.pdf.

14. NT Heath, Centre for Disease Control (NT CDC). *Amoebiasis. Notifiable Diseases Public Health Management Guide (fourth edition)*. Darwin: NT CDC; August 2024. Available from: http://internal.health.nt.gov.au/teamsites/cdc/Public%20Health%20Response/Notifiable%20diseases%20public%20health%20management%20guide%204th%20edition.pdf.

Appendix A

Northern Territory amoebiasis surveillance case definition[a]

Reporting: only **confirmed cases** should be notified.

Confirmed cases

A confirmed case requires:

1. **Laboratory definitive evidence**

OR

2. **Laboratory suggestive evidence** AND **clinical evidence**

Laboratory definitive evidence[b]

Definitive detection of *Entamoeba histolytica* cysts or trophozoites in stool or extra-intestinal tissue.

Laboratory suggestive evidence

1. Demonstration of specific antibody against *Entamoeba histolytica* by indirect heamagglutination.

OR

2. Microscopic evidence of *Entamoeba histolytica/dispar* in stool or abscess fluid.

Clinical evidence

Clinically compatible illness involving fever, bloody diarrhoea, abdominal discomfort or evidence of extra-intestinal disease (e.g. liver abscess).

a Ref.14.

b Definitive detection should involve a method which distinguishes between *E. histolytica* and *E. dispar* (or *E. hartmani*). This might include a nucleic acid test, an immunologic assay, the presence of intra-cytoplasmic red cells in trophozoites, or the presence of trophozoites in certain extra-intestinal tissues.