

2024 GERMS-SA: Annual surveillance review – Key findings

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Summary

In 2024, GERMS-SA celebrated 21 years of surveillance and reported on 12 657 laboratory-confirmed cases of bacterial, fungal, and parasitic infections, detected at over 220 National Health Laboratory Service (NHLS) and private laboratories. Unfortunately, case ascertainment was affected by the NHLS cyberattack, particularly during June and July. Highlights from each pathogen category are:

- i. Opportunistic infections, especially cryptococcosis, remained significant contributors to severe disease and mortality across all age groups.
- ii. Vaccine-preventable diseases showed persistent burden and evolving epidemiology, i.e., *Haemophilus influenzae* disease remained most common in infants; group B streptococcus continued to cause substantial neonatal and adult disease; and, in the Western Cape province, invasive pneumococcal disease exhibited a bimodal age pattern, high mortality, and continued dominance of non-PCV13 serotypes.
- iii. Among epidemic-prone diseases, invasive meningococcal disease increased to the highest levels seen in recent years, driven by serogroups B, W, and Y; enteric fever continued to decline overall but remained concentrated in the Gauteng province with several small clusters linked to contaminated water systems; and Nontyphoidal *Salmonella*, *Shigella*, and *Listeria* cases remained within expected ranges, with notable provincial variation and high burdens in young children.
- iv. Neglected tropical disease pilot surveillance on schistosomiasis and soil-transmitted helminthiasis in the Limpopo and Mpumalanga provinces demonstrated high diagnostic confirmation rates but revealed marked under-submission of specimens and significant variability between the two provinces.

Overall Enhanced Surveillance Site (ESS) performance improved, with an 87% case investigation form completion and 57% completion via patient interview. Challenges remain in timely detection of hospitalised patients at ESS and specimen submission from all sites. GERMS-SA continues to generate high-quality laboratory and clinical data essential for informing public health policy, vaccine planning, antimicrobial stewardship, and outbreak response. The comprehensive GERMS-SA 2024 Annual Surveillance Review is accessible at <https://www.nicd.ac.za/internal-publications/germs-sa/>.

Introduction

GERMS-SA is a national, population-based laboratory surveillance programme that monitors bacterial, fungal, and parasitic infections across South Africa.¹ 2024 was the first time the GERMS-SA platform included surveillance of neglected tropical parasitic diseases of public health importance, specifically schistosomiasis and soil-transmitted helminth (STH) infections. GERMS-SA operates through a collaboration between the National Institute for Communicable Diseases (NICD), a division of the National Health Laboratory Service (NHLS), public and private clinical microbiology laboratories, and 30 selected public hospitals. The surveillance system consists of two



components: i) national core laboratory surveillance, which documents laboratory-confirmed cases of specific pathogens and facilitates the submission of isolates or positive specimens to the NICD for confirmation and further characterisation; and ii) enhanced sentinel surveillance (ESS), conducted at selected public hospitals, where additional clinical information is collected for patients with laboratory-confirmed infections identified through the core laboratory surveillance platform.

GERMS-SA was formed through the consolidation of several earlier laboratory-based surveillance initiatives and has operated continuously since the early 2000s. Its longevity and stability enable the programme to generate high-quality, strategic information on trends in major infectious diseases, including vaccine-preventable illnesses, epidemic-prone diseases, healthcare-associated bloodstream infections, AIDS-related opportunistic infections, and neglected tropical diseases (NTDs). This report summarises key findings from 2024, as reported in the GERMS-SA 2024 Annual Surveillance Review, which is accessible at <https://www.nicd.ac.za/internal-publications/germs-sa/>.

Aim and objectives

The primary aim of GERMS-SA is to systematically collect, consolidate, and analyse data on priority infectious diseases to provide accurate, quality-assured surveillance information for clinical managers and public health policymakers. This information supports planning, implementation, and evaluation of health interventions by:

- Estimating disease burden (case counts and incidence rates) for selected bacterial, fungal, and parasitic infections;
- Describing the epidemiology of pathogens under surveillance;
- Assessing the impact of current and future vaccines on vaccine-preventable diseases;
- Monitoring existing and emerging antimicrobial resistance patterns;
- Evaluating the influence of antiretroviral therapy and HIV programme interventions on opportunistic infections; and
- Exploring molecular epidemiology to deepen understanding of circulating pathogens.

Methods

GERMS-SA surveillance methods have been described previously.¹ In essence, public and private microbiology laboratories (nationally) submit culture-positive isolates on Dorset transport media and matching GERMS-SA case definitions to the NICD, where reference laboratories confirm the organism, do antimicrobial susceptibility testing, serogrouping/serotyping on viable isolates (or on PCR-confirmed culture-negative specimens), and molecular characterisation. Laboratories submit case reports to the NICD using standardised case definitions and laboratory case report forms containing patient demographics, type of specimen, and laboratory test results (https://www.nicd.ac.za/wp-content/uploads/2024/02/GERMS-SA-case-definitions-for-isolate-submission-to-Reference-Laboratories-for-2024_Version-22_Final.pdf).



Cryptococcal isolates were sent only until 30 June 2024 from NHLS laboratories that served hospitals with flucytosine access and from the Western Cape province. In 2024, 222 clinical microbiology laboratories across South Africa contributed data. Diseases under surveillance in 2024 included:

- Opportunistic infections associated with HIV, e.g., cryptococcosis (all specimens) and Nontyphoidal *Salmonella* (NTS) species (all specimens);
- Potentially vaccine-preventable diseases, e.g., *Haemophilus influenzae*, including type b (Hib), *Streptococcus pneumoniae* (all normally sterile sites), and *Streptococcus agalactiae* (all normally sterile sites and non-sterile body sites on patients with intra-uterine sepsis);
- Epidemic-prone diseases, e.g., *Neisseria meningitidis* (all normally sterile sites), *Salmonella enterica* serotype Typhi, *Salmonella enterica* serotypes Paratyphi A, B, and C, *Shigella* species, *Vibrio cholerae*, *Listeria* species (any specimen), and *Streptococcus pyogenes* (all normally sterile sites); and
- NTDs, e.g., schistosomiasis (*Schistosoma* species; urine or stool specimens) and STH (*Ascaris lumbricoides*, *Trichuris trichiura*, *Necator americanus*, *Ancylostoma duodenale*, and *Strongyloides stercoralis*; any positive specimen).

Enhanced sentinel surveillance was conducted at 30 public-sector hospital sites, including at least one per province and consisting of mostly tertiary academic centres all linked to an NHLS microbiology laboratory. At these sites, trained surveillance officers (nurses) completed electronic case investigation forms (CIFs) using REDCap for patients with any of the above laboratory-confirmed conditions for 2024. CIFs were populated through patient interviews and/or medical record reviews and captured details such as clinical characteristics at time of culture, antimicrobial treatment, vaccination history, HIV status, and discharge or death for that admission. Follow-up continued only for the duration of hospitalisation, up to a maximum of 30 days.

Data management was centralised at the NICD. Laboratory, clinical, and demographic information were stored in a Microsoft Access database. To improve case ascertainment, an audit was conducted across NHLS laboratories using the NICD Surveillance Data Warehouse (SDW). All cryptococcosis (from 01 July 2024, when isolates were no longer submitted from the Western Cape and those laboratories servicing hospitals with access to flucytosine) and additional laboratory-confirmed cases not previously reported/submitted for other organisms were incorporated into the surveillance dataset.

National population denominators were derived from Statistics South Africa (Stats-SA) mid-year population estimates and the Thembeisa model version 4.6 (for the HIV-infected population).^{2,3} Incidence in the general population and among people living with HIV was calculated per 100 000 persons. No hospital or laboratory population denominators were used. Statistical analyses used Mantel–Haenszel chi-square tests, with $p < 0.05$ considered significant.



Data quality was monitored throughout the surveillance pathway. Laboratories were encouraged to submit $\geq 80\%$ of eligible isolates (those matching the case definitions for 2024), and ESS sites were expected to complete CIFs for $\geq 90\%$ of cases, with at least 70% completed via patient interview, following patient consent. Regular data audits and ongoing training supported performance improvement. GERMS-SA findings are disseminated annually through national reports, scientific meetings, and peer-reviewed publications. Programme direction and priorities are reviewed each year by the principal investigators.

Results and discussion

A total of 12 657 surveillance cases was detected in 2024 (including audit cases). The audit of the NICD SDW identified 3 729 cryptococcosis cases and 2 334 cases of other pathogens not sent to the NICD. A total of 6 594 isolates/residual specimens were sent by the clinical microbiology laboratories to the NICD for further characterisation. At ESS, 87% (2 477/2 851) of cases had a CIF completed (target=90%), and 65% (1 609/2 477) of CIFs were completed by patient interview, still missing the target of 70% but an improvement from 2023 (44%, 1 956/4 408). HIV information from case patients at ESS was collected for the organisms listed in Table 1.

Table 1. Numbers and percentages of patients diagnosed with laboratory-confirmed invasive disease at GERMS-SA enhanced surveillance sites (ESS), including those with confirmed HIV-1 infection, South Africa, 2024.

Pathogen	Case patients at ESS, n	Case patients with completed case investigation forms, n (%)*		Case patients with known HIV status, n (%)		Case patients with confirmed HIV infection, n (%)	
<i>Cryptococcus</i> species	779	682	88	655	96	628	96
<i>Neisseria meningitidis</i>	44	41	93	39	95	7	18
<i>Streptococcus pneumoniae</i> [^]	828	735	89	711	97	366	51
<i>Haemophilus influenzae</i> [^]	96	90	94	84	93	31	37
<i>Streptococcus pyogenes</i>	369	323	88	304	94	83	27
<i>Streptococcus agalactiae</i> [^]	412	369	90	356	96	66	19
Enteric fever	33	23	70	15	65	1	7
<i>Shigella</i> spp	263	195	74	147	75	37	25
<i>Listeria monocytogenes</i>	27	19	70	5	26	4	80
Total	2 851	2 477	87	2 316	94	1 223	53

This table includes organisms at enhanced surveillance sites (ESS) with completed case investigation forms. *The percentage (in brackets) in each cell was calculated using the numerator from that cell and the corresponding denominator from the cell to the left.

[^] Co-infections were counted separately under each pathogen: three *Streptococcus pneumoniae* and *Haemophilus influenzae* mixed episodes, one *Streptococcus pyogenes* and *Haemophilus influenzae* mixed episode, and one *Neisseria meningitidis* and *Haemophilus influenzae* mixed episode.



Opportunistic infections

Cryptococcosis: In 2024, 4 023 episodes of laboratory-confirmed cryptococcal disease were reported, including 3 729 first episodes (93% of total) and 294 recurrent episodes (laboratory confirmation 30 days or more after the first laboratory confirmation). Compared to 2023, a notable decrease in the monthly number of cases was observed from May to August 2024. A majority (93%, 3 489/3 729) of the incident cases were diagnosed as cryptococcal meningitis (laboratory tests on cerebrospinal fluid positive for *Cryptococcus* species), 4% (151/3 729) as fungaemia (*Cryptococcus* species cultured from blood), and 2% (89/3 729) as culture-positive disease in other organ systems. The national incidence risk of laboratory-confirmed cryptococcosis declined from 54 (95% confidence interval [CI], 52-55) in 2023 to 48 (95% CI, 46-49) cases per 100 000 people living with HIV in 2024 (Table 2). The highest incidence risk of cryptococcal disease in the general population was recorded among males aged 40–44 years (males accounted for 61% (2 250/3 694) of the cases) (Figure 1). Age was known for 3 514 (94%) case patients; their median age was 38 years (interquartile range [IQR], 32-46 years), and children younger than 15 years accounted for only 3% (112/3 514) of cases.

At ESS, of 779 case-patients with a first episode reported, there were 655 patients with known HIV status, and 96% (n=628) were living with HIV (Table 1). More than half of patients with HIV (57%, 362/628) had previously received antiretroviral therapy (ART) or were on ART at the time of their cryptococcal disease diagnosis. Nearly all case-patients living with HIV had advanced immunosuppression (93%, 514/553 with CD4 cell count available, had a CD4 cell count of <200 cells/ μ l). An unsuppressed viral load of <400 copies/mL was found in 26% (108/408), 13% (53/408) had viral loads of 400–10 000 copies/mL, and 60% (247/408) had viral loads of >10 000 copies/mL. Most of the case patients received antifungal therapy in hospital (89%, 596/669); 57% (325/570) received a flucytosine-containing induction regimen. At ESS, of 670 patients with a first episode of cryptococcal disease who had an in-hospital outcome recorded, 35% (234/670) died. The crude in-hospital mortality was similar among individuals who did not receive a flucytosine-containing induction regimen (36%, 88/243) compared to those who did (31%, 107/345; p=0.21).

Cryptococcal disease remains a major burden. Although reported cases declined in 2024, this likely reflects data interruptions from the cyberattack against the NHLS during that period. Ongoing hospitalisation with advanced HIV disease, persistent antifungal stock-outs despite improved flucytosine use, and high in-hospital mortality highlight the urgent need for integrated HIV care and uninterrupted access to early diagnosis and essential antifungal therapy.



Table 2. Number of cases and incidence of cryptococcal meningitis or culture-positive cryptococcal disease detected by GERMS-SA by province, South Africa, 2023-2024, n=7 888.

Province	2023		2024	
	n*	Incidence risk (95% CI)†	n*	Incidence risk (95% CI)†
Eastern Cape	683	76 (71–82)	623	69 (63–74)
Free State	131	31 (26–36)	123	29 (24–33)
Gauteng	920	47 (44–50)	825	41 (39–44)
KwaZulu-Natal	929	47 (44–50)	810	41 (38–44)
Limpopo	303	47 (42–52)	321	49 (44–54)
Mpumalanga	302	41 (36–45)	289	39 (34–43)
Northern Cape	54	56 (41–71)	62	64 (48–80)
North West	292	56 (49–62)	226	43 (37–48)
Western Cape	535	107 (98–116)	450	88 (80–96)
South Africa	4 149	54 (52–55)	3 729	48 (46–49)

*These case numbers exclude patients who tested positive for cryptococcal antigenaemia through reflex testing.

†Incidence risk was calculated using mid-year population denominators determined by the Thembisa model and is expressed as cases per 100 000 HIV-infected persons (refer to Table 1).

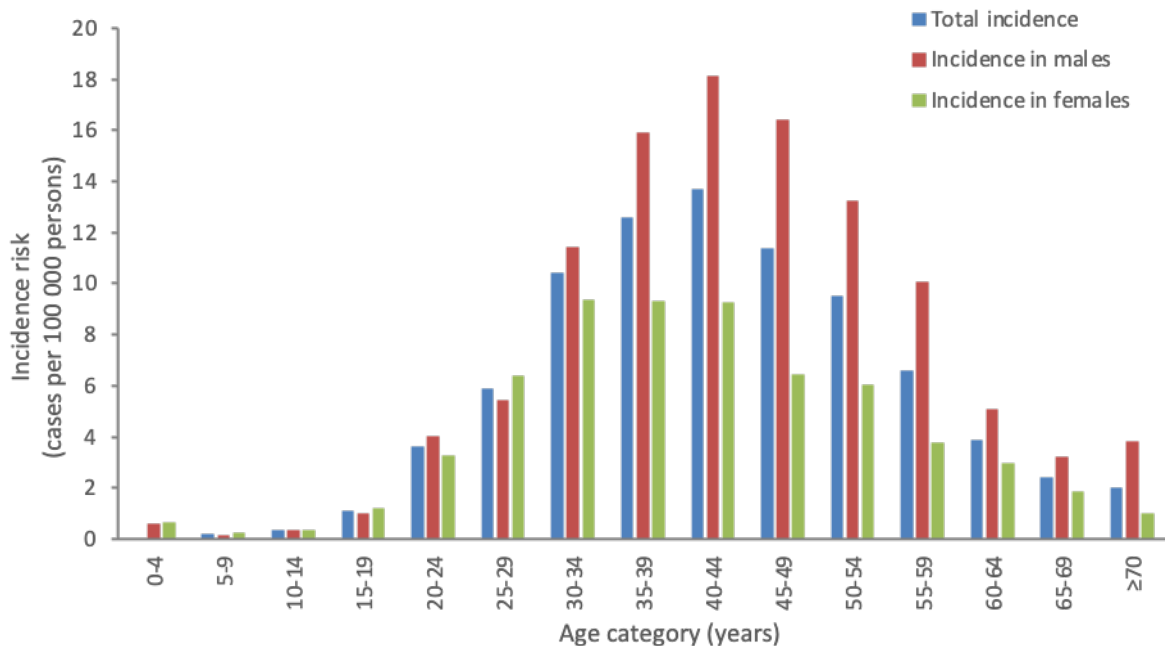


Figure 1. Number of cases and incidence of cryptococcal meningitis or culture-positive cryptococcal disease detected by GERMS-SA, by sex and age group, South Africa, 2023-2024, n= 7 888.



Non-typhoidal Salmonellosis: A total of 3 294 cases of non-typhoidal salmonellosis, from all sample sites, were reported through the surveillance programme in 2024. Numbers were marginally higher than in 2023 (n=3 162) and 2022 (n=3 185). In 2024, 30% (986/3 294) of episodes were indicative of invasive disease (Table 3). The highest numbers of cases of invasive disease were reported from the Gauteng (40%, 392/986) province, followed by the Western Cape (24%, 239/986) and Eastern Cape (10%, 95/986) provinces. Gauteng also reported the highest number of cases of non-invasive disease (45%, 1 031/2 308), followed by the Western Cape (21%, 478/2 308). In keeping with previous years, a seasonal prevalence was noted for non-invasive disease, with lower numbers of cases identified in the winter months. No overt seasonal pattern was noted with invasive disease (Figure 2). Non-invasive disease was highest in children younger than five years (23%, 521/2 308), followed by people ≥65 years of age (15%, 337/2 308). In contrast, invasive disease was most common in people aged 35–44 years (20%, 195/986), followed by children younger than five years (16%, 161/986). Overall, stool specimens accounted for 61% (2 022/3 294) of the total cases.

A total of 1 311 viable isolates was received and serotyped; this included isolates submitted as part of routine laboratory-based surveillance as well as isolates submitted for outbreak investigation purposes. Two serovars accounted for the majority of the cases: *Salmonella* Enteritidis (77%, 1 003/1 311) and *Salmonella* Typhimurium (13%, 176/1 311). *Salmonella* Enteritidis was the commonest serovar in all provinces. Antimicrobial susceptibility testing was not routinely performed but was offered on request. Of the two isolates tested, both were non-susceptible to ciprofloxacin but remained susceptible to azithromycin, based on CLSI breakpoints.

Table 3. Number of cases of invasive and non-invasive nontyphoidal salmonellosis by province, South Africa, 2024, n=3 294 (including audit reports).

Province	Non-invasive nontyphoidal salmonellosis (%)	Invasive nontyphoidal salmonellosis (%)	Total (%)
Eastern Cape	189 (8)	95 (10)	284 (9)
Free State	105 (5)	41 (4)	146 (4)
Gauteng	1031 (45)	392 (40)	1423 (43)
KwaZulu-Natal	189 (8)	85 (9)	274 (8)
Limpopo	42 (2)	39 (4)	81 (2)
Mpumalanga	98 (4)	26 (3)	124 (4)
Northern Cape	50 (2)	17 (2)	67 (2)
North West	126 (5)	52 (5)	178 (5)
Western Cape	478 (21)	239 (24)	717 (22)
South Africa	2 308 (70)	986 (30)	3 294

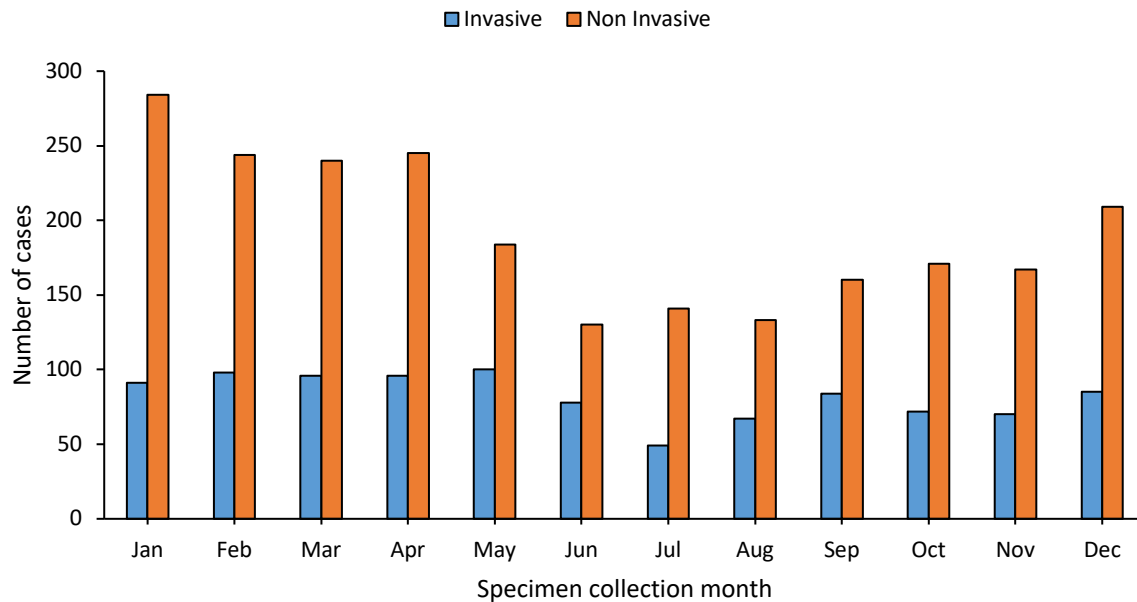


Figure 2. Number of cases of non-invasive (n=2 308) and invasive (n=986) nontyphoidal salmonellosis by month, South Africa, 2024.

Vaccine-preventable diseases

Invasive *Haemophilus influenzae*: In 2024, 225 episodes of invasive *Haemophilus influenzae* (HI) disease were detected through the GERMS-SA programme, with a national incidence risk of 0.36 per 100 000 population. Incidence remained highest in infants (3.63 per 100 000) and children 1–4 years of age (0.75 per 100 000) (Figure 3) and continued to be elevated in the Western Cape (1.03 per 100 000 population) (Table 4). Among cases with known serotypes, non-typeable HI predominated, followed by serotype b (Hib), with most infections detected from blood specimens. Ampicillin non-susceptibility decreased overall compared with 2023 (13% (10/79) in 2024 versus 20% (30/148) in 2023).

At enhanced surveillance sites, 94% (90/96) of HI episodes had clinical information collected. Of those tested for HIV, 37% (31/84) were living with HIV (Table 1). Conditions predisposing to HI disease were reported in 71% (64/90) of patients – the most common included prematurity (born <37 weeks gestation) in infants (64%, 7/11) and ever having tuberculosis (19%, 17/90). Twenty-three per cent (21/90) of patients died in hospital. Deaths occurred with all serotypes and in all age categories. Of patients from ESS with meningitis, 21% (3/14) died, and 27% (4/11) who were discharged from hospital suffered long-term sequelae. All children with Hib disease and vaccination histories available were appropriately vaccinated for age; however, one child (who had received four doses of vaccine) was severely immunocompromised. Close monitoring is needed to detect patterns of vaccine failures.

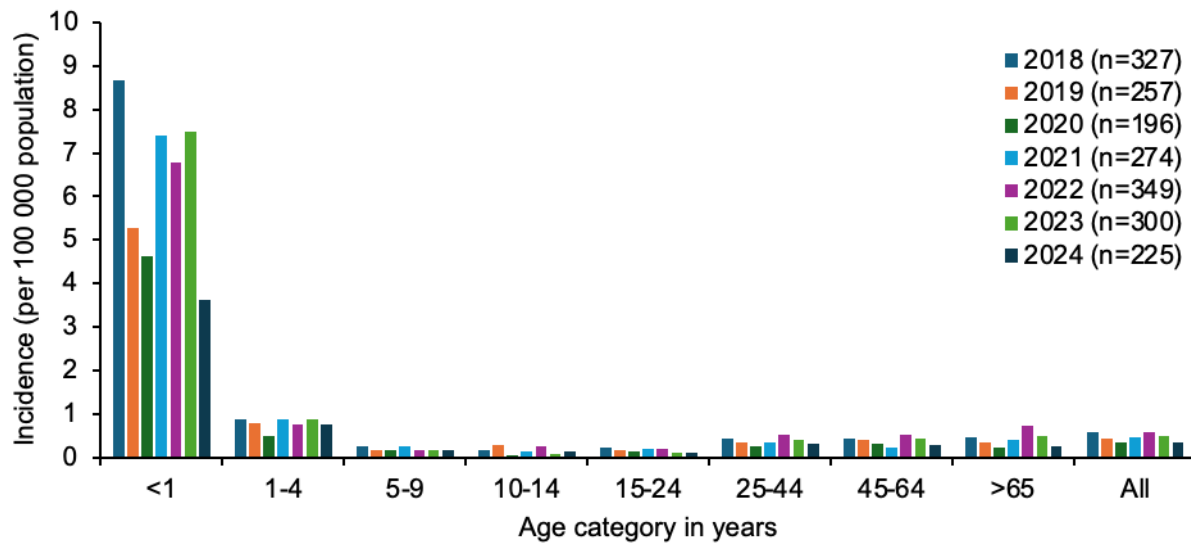


Figure 3. Incidence of invasive *Haemophilus influenzae* disease by age category, South Africa, 2018–2024 (N=1 928).

Table 4. Number of cases and incidence of invasive *Haemophilus influenzae* disease reported to GERMS-SA by serotype and province, South Africa, 2024, N=225*.

Province	Serotype								Total	Incidence per 100 000 population†
	Serotype							Non-typeable		
	not available	a	b	c	d	e	f			
Eastern Cape	11	1	4	0	0	0	1	7	24	0.33
Free State	6	0	1	0	0	1	2	1	11	0.36
Gauteng	34	2	11	0	1	1	3	14	66	0.41
KwaZulu-Natal	14	1	1	0	0	0	0	5	21	0.17
Limpopo	4	0	1	0	1	0	0	0	6	0.09
Mpumalanga	7	0	0	0	0	0	0	2	9	0.18
Northern Cape	4	0	0	0	0	0	0	1	5	0.36
North West	2	1	1	0	0	0	0	1	5	0.12
Western Cape	33	6	6	0	1	3	3	26	78	1.03
South Africa	115	11	25	0	3	5	9	57	225	0.36

*110 (49%) with specimens or viable isolates available for serotyping.

†Incidence was calculated based on population denominators provided by Stats-SA and is expressed as cases per 100 000 population.



Invasive *Streptococcus pneumoniae*: In 2024, 1 927 cases of invasive pneumococcal disease (IPD) were reported (incidence 3.06 per 100 000), similar to 2023 but still below pre-COVID levels. The Western Cape had the highest incidence (8.45 per 100 000) (Table 5). Disease showed a bimodal age distribution, with peaks in infants (14.02 per 100 000) and adults aged 45–64 years (4.76 per 100 000). Slightly more than half of cases occurred in males (52%, 948/1 823). Among isolates tested⁴, 32% (355/1 125) were penicillin non-susceptible and 7% (80/1 125) ceftriaxone non-susceptible. The top three serotypes (in order) occurring in children <5 years-of-age included serotypes 8, 10A and 19F, whilst in persons >5 years-of-age serotypes 8, 4 and 3 dominated (Figures 4a and 4b). Vaccine serotype distribution was 16% (203/1 287) for isolates covered by PCV10 (SII), 32% (413/1 287) for PCV13, and 63% (813/1 287) for PPV23.

At enhanced surveillance sites, clinical data were available for 89% (735/828) of patients. (Table 1). In-hospital mortality was high (33%, 247/735), ranging from 30% (19/63) in infants to 50% (33/66) in adults ≥65 years of age. HIV prevalence among tested patients was 51% (366/711) (Table 1). Two-thirds (67%, 493/735) had at least one non-HIV risk factor for IPD, with previous tuberculosis, diabetes, or chronic lung disease being the most frequent. Prematurity affected 19% (12/63) of infants. Of 162 people at ESS with pneumococcus detected in CSF, 44% (71/162) died during their hospitalisation and 25% (23/91) of survivors experienced sequelae such as seizures, limb weakness, hearing loss, or visual impairment at discharge from hospital. In children <10 years of age, 86% (108/125) of IPD was caused by non-PCV13 serotypes. Of six fully vaccinated children who developed vaccine-type IPD (from serotypes 19A, 19F and 3), three had underlying risk factors for disease. These data demonstrate the importance of continued monitoring following the national switch to PCV10 (SII) in April 2024, which excludes serotypes 3, 4, and 18C previously covered by PCV13.



Table 5. Number of cases and incidence of invasive pneumococcal disease reported to GERMS-SA by province, South Africa, 2019-2024, N=10 747 (including audit cases).

Province	2019		2020		2021		2022		2023		2024	
	n	Incidence *	n	Incidence *	n	Incidence *	n	Incidence *	n	Incidence *	n	Incidence *
Eastern Cape	274	4.23	136	2.10	201	3.10	223	3.45	233	3.60	269	3.75
Free State	83	2.90	62	2.16	70	2.43	62	2.16	62	2.16	77	2.53
Gauteng	774	5.08	377	2.42	466	2.98	511	3.22	538	3.33	580	3.64
KwaZulu-Natal	237	2.14	101	0.90	119	1.03	165	1.46	163	1.43	165	1.34
Limpopo	96	1.65	52	0.88	45	0.76	69	1.15	67	1.11	57	0.89
Mpumalanga	102	2.20	41	0.87	56	1.18	52	1.09	40	0.83	43	0.85
Northern Cape	89	8.02	26	2.33	25	2.23	27	2.42	25	2.23	33	2.40
North West	66	1.67	36	0.90	31	0.79	48	1.18	57	1.38	64	1.54
Western Cape	631	9.34	417	6.07	538	7.80	704	10.08	622	8.77	639	8.45
South Africa	2 352	4.07	1 249	2.14	1 551	2.64	1 861	3.15	1 807	3.02	1 927	3.06

*Incidence was calculated based on population denominators provided by Stats-SA and is expressed as cases per 100 000 population.

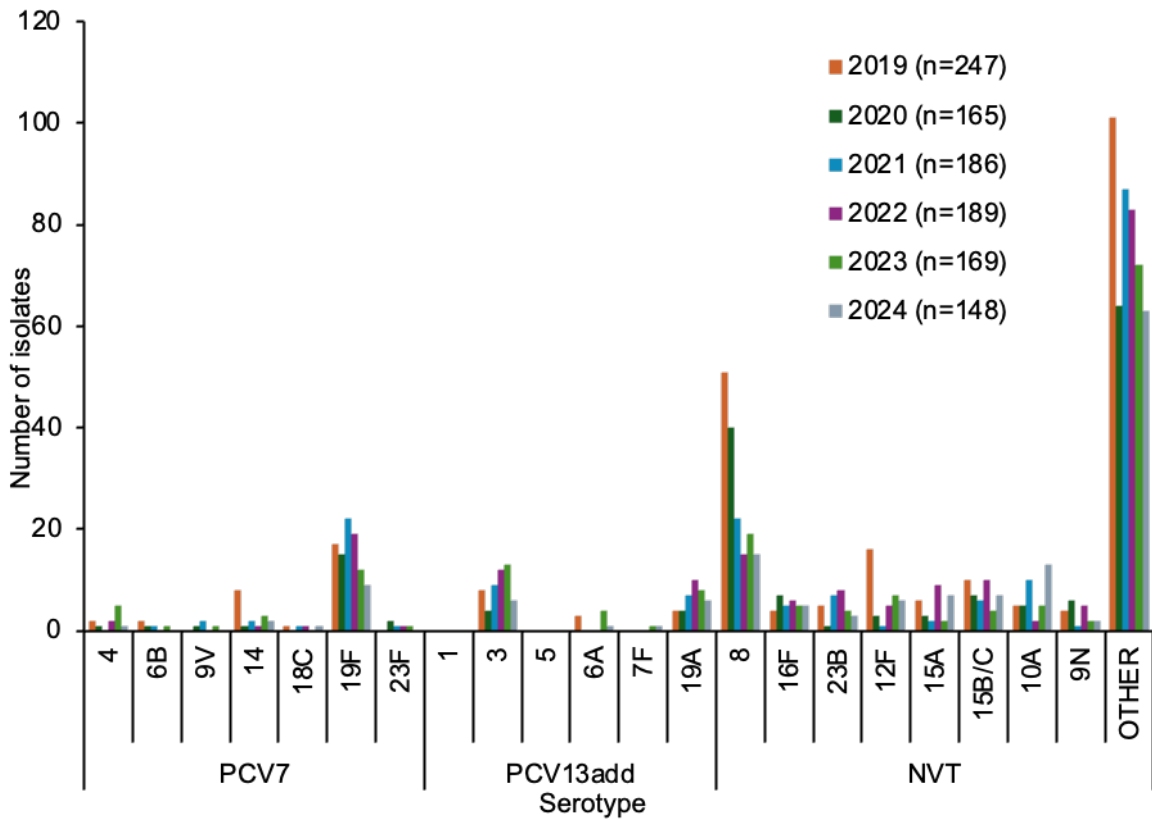


Figure 4a. Most common pneumococcal serotypes causing laboratory-confirmed, invasive pneumococcal disease, reported to GERMS-SA, in children <5 years-of-age, South Africa, 2019–2024 (N=1 642).

2019: N=361, n=114 without serotype; 2020: N=224, n=59 without serotype; 2021: N=264, n=78 without serotype; 2022: N=275, n=86 without serotype; 2023: N=245, n=76 without serotype; 2024: N=273, n=125 without serotype.

Footnote: PCV7: seven-valent pneumococcal conjugate vaccine; PCV13add: additional serotypes in the thirteen-valent pneumococcal conjugate vaccine; NVT: non-PCV13 serotypes.

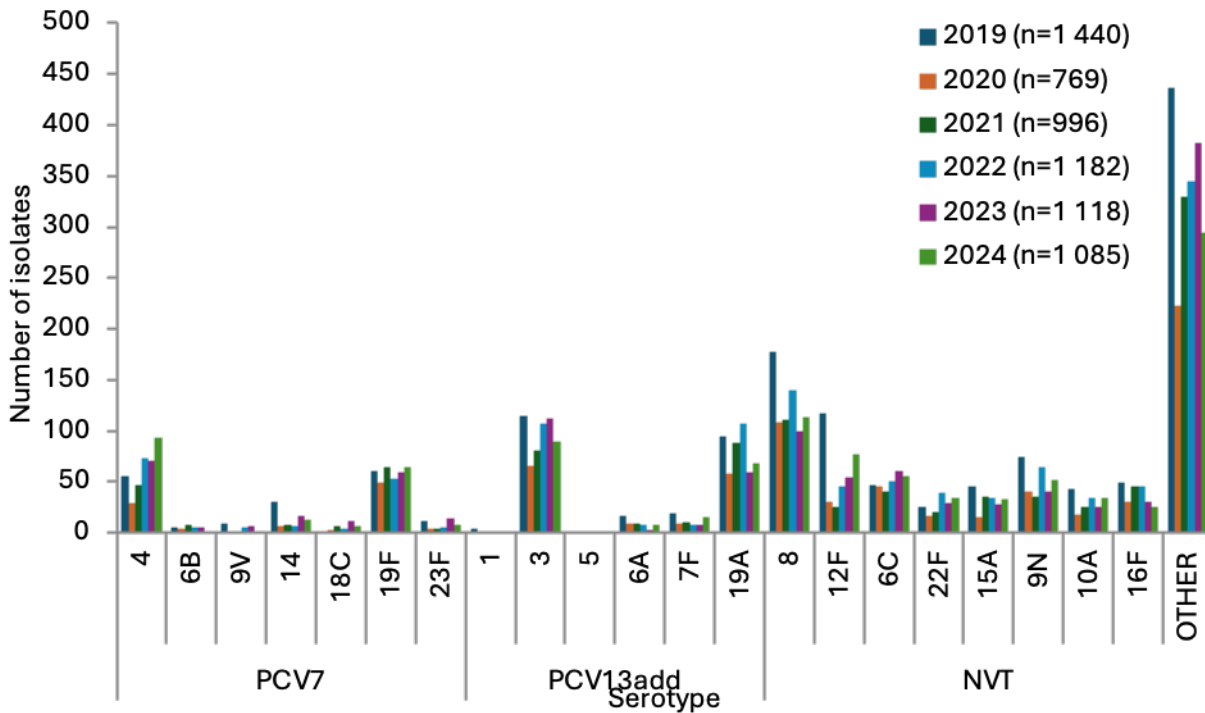


Figure 4b. Most common pneumococcal serotypes causing laboratory-confirmed, invasive pneumococcal disease, reported to GERMS-SA, in adults and children ≥ 5 years-of-age, South Africa, 2019-2024 (N=8 756).

2019: N=1 952, n=512 without serotype; 2020: N=993, n=224 without serotype; 2021: N=1 249, n=253 without serotype; 2022: N=1 544, n=362 without serotype; 2023: N=1 436, n=318 without serotype; 2024: N=1 582, n=497 without serotype.

Footnote: PCV7: seven-valent pneumococcal conjugate vaccine; PCV13add: additional serotypes in the thirteen-valent pneumococcal conjugate vaccine; NVT: non-PCV13 serotypes.

Invasive group B Streptococcus (*Streptococcus agalactiae*): In 2024, 862 cases of invasive group B streptococcus (GBS) were reported nationally, with just over two-fifths of isolates submitted to the NICD for further characterisation. The national incidence was 1.37 per 100 000 population, lower than the post-COVID-19 peak in 2021. Infants carried the highest burden of disease (37.09 per 100 000 or 0.37 per 1 000 live births) with a second peak in people >64 years-of-age (1.09 per 100 000 population) (Table 6). In infants, early-onset disease (<7 days of life) (0.23/1 000 live births) was more common than late-onset disease (7–90 days) (0.12/1 000 live births). The Western Cape, Gauteng, Free State, and KwaZulu-Natal reported the highest provincial rates (Table 6).

Blood and CSF were the predominant specimen types in infants, while blood and genitourinary specimens were most common in people >1 year-of-age, especially women of reproductive age. Females accounted for 57%



(457/798) of cases. Serotype III and Ia were the most frequently detected across all age groups and specimen types, with an increase in non-typeable isolates compared to previous years (Figure 5). Most isolates (97%, 342/352) remained susceptible to penicillin⁴, whilst 65% (229/352) and 5% (19/352) were susceptible to erythromycin and tetracycline, respectively.

At enhanced surveillance sites, 40% (146/369) of cases occurred in infants, 26% (97/369) were pregnancy-associated, and 34% (126/369) occurred in older children and adults. Overall, in-hospital mortality was 18% (65/369): 19% (27/146) in infants, 0% with pregnancy-associated disease and 30% (38/126) in other presentations >1 year of age. Of those tested for HIV, 19% (66/356) were HIV-infected (Table 1). Infant risk factors included prematurity (36%, 53/146), very low birth weight (< 1500 g) (13%, 19/146), and prior maternal complications such as premature rupture of membranes (24%, 35/146). Nearly half of pregnancies affected by maternal GBS infection resulted in foetal or neonatal death (44%, 43/97). Among non-pregnant adults, common risk factors included diabetes, smoking, overcrowding, alcohol use, and obesity. GBS remained a major contributor to neonatal and adult invasive infections, with high mortality. Continued surveillance, early identification of maternal risk, and future strategies such as maternal vaccination remain important for reducing disease burden.

Table 6. Number of cases and incidence of invasive group B streptococcal disease reported to GERMS-SA by province and age category*, South Africa, 2024, N=862 (age unknown for n=34, audit cases included).

Province	Early onset (<7 days)		Late onset (7-90 days)		Age category ≥1 year		All ages	
	Incidence		Incidence		Incidence		n	Incidence
	n	(per 1 000 live births*)	n	(per 1 000 live births*)	n	(per 100 000 population)	000	(per 100 000 population)
Eastern Cape	8	0.06	14	0.10	29	0.41	55	0.77
Free State	12	0.21	5	0.09	18	0.60	40	1.31
Gauteng	122	0.44	56	0.20	173	1.10	373	2.34
KwaZulu-Natal	64	0.26	21	0.08	63	0.52	157	1.28
Limpopo	8	0.05	10	0.06	20	0.32	38	0.59
Mpumalanga	14	0.13	1	0.01	7	0.14	23	0.45
Northern Cape	1	0.04	2	0.07	4	0.30	7	0.51
North West	12	0.16	3	0.04	8	0.20	24	0.58
Western Cape	33	0.25	35	0.27	67	0.90	145	1.92
South Africa	274	0.23	147	0.12	389	0.63	862	1.37

*N=18 episodes in infants aged >90 days and less than one year were excluded from the above.

Denominators included mid-year population estimates from Stats-SA.

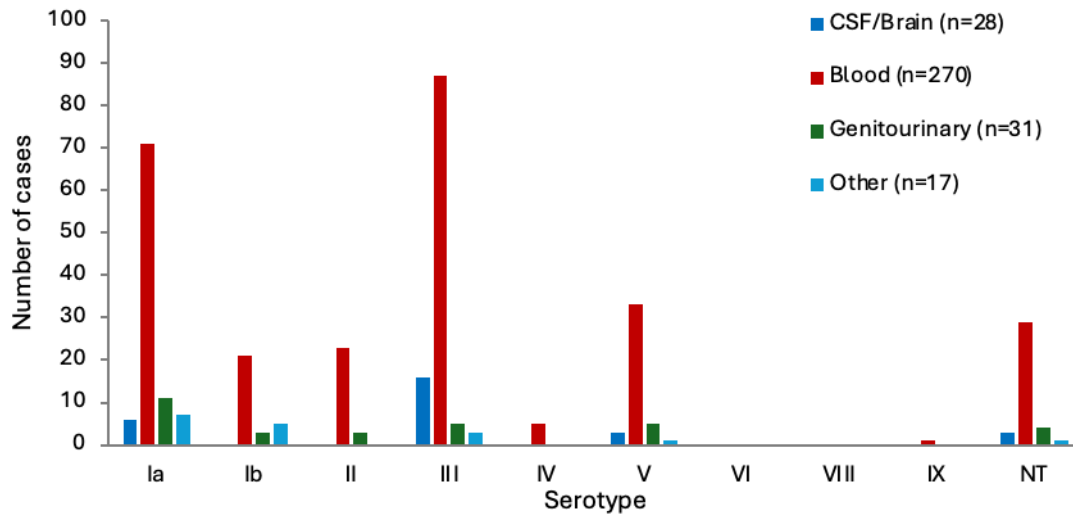


Figure 5. Numbers of cases of laboratory-confirmed, invasive group B streptococcal disease by serotype and specimen type, reported to GERMS-SA, South Africa, 2024, N=862 (typing done for n=346).

Epidemic-prone diseases (notifiable medical conditions)

Invasive *Neisseria meningitidis*: In 2024, 150 cases of invasive meningococcal disease (IMD) were reported in South Africa, a 40% increase from 2023 (n=107) and the highest incidence (0.24 per 100 000) seen in recent years, surpassing pre-pandemic levels (Figure 6). The Western Cape had the highest incidence (Table 7), and over half of cases occurred in children under 15 years of age, with infants <1 year of age (2.4 episodes per 100 000) showing the greatest risk. Most cases were confirmed from CSF (57%, 85/150) or blood (42%, 63/150) and occurred mainly between May and October. Among episodes with serogroup data (75%, 100/150), serogroup B (35%) was the most common (especially in infants), followed by W (26%), Y (26%), and C (10%). Antimicrobial susceptibility⁴ remained favourable: 69% (43/62) of isolates were penicillin-susceptible (only one isolate was penicillin-resistant), and all were susceptible to third-generation cephalosporins, ciprofloxacin, and rifampicin.

Enhanced surveillance data (93%, 41/44) (Table 1) showed a median age of seven years (IQR 1–31 years), predominantly meningitis presentations (90%, 37/41), a 12% (5/41) in-hospital case fatality, and one-third of survivors (12/36) discharged with sequelae (commonly seizures and neurological deficits).

Although an increase has been noted in 2024, IMD still occurs infrequently. Importantly, meningococcal disease has a poor outcome in those affected, even when adequate antibiotic treatment is provided; therefore, clinicians are urged to consider the diagnosis in any person presenting with fever and/or headache with rapid clinical deterioration.

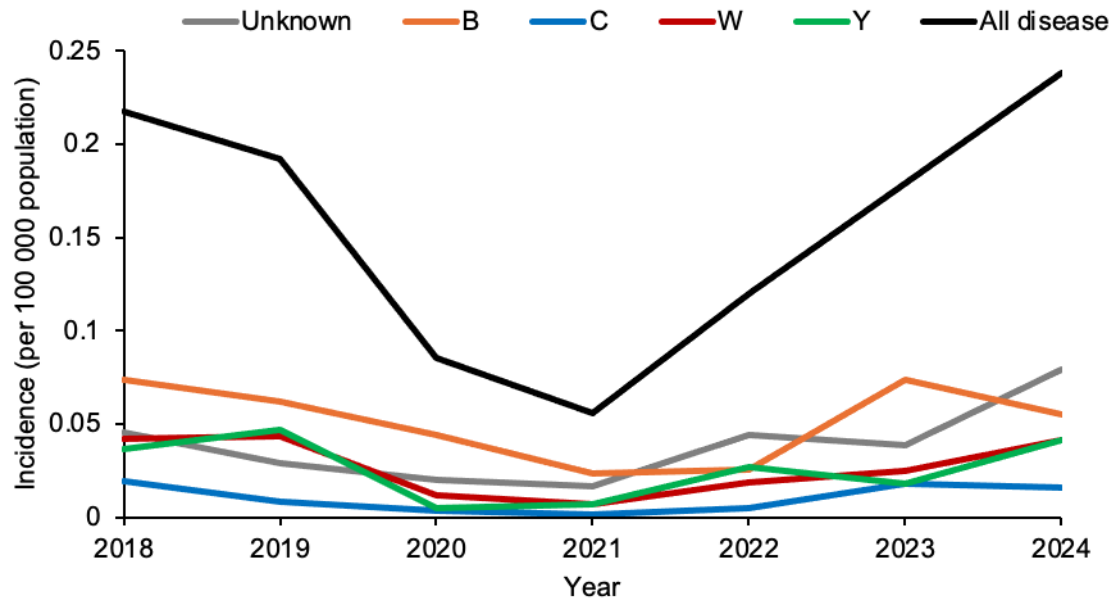


Figure 6. Incidence of invasive meningococcal disease by serogroup, South Africa, 2018–2024 (N=646).

Table 7. Number of cases and incidence of meningococcal disease reported to GERMS-SA by province, South Africa, 2019–2024, N=522 (including audit cases).

Province	2019		2020		2021		2022		2023		2024	
	n	Incidence	n	Incidence	n	Incidence	n	Incidence	n	Incidence	n	Incidence
Eastern Cape	1	0.18	6	0.09	5	0.07	5	0.07	12	0.15	25	0.35
Free State	3	0.10	0	0.00	0	0.00	3	0.10	4	0.13	5	0.16
Gauteng	3	0.24	1	0.06	8	0.05	23	0.14	32	0.21	39	0.24
KwaZulu-Natal	1	0.12	4	0.03	3	0.03	6	0.05	9	0.08	8	0.06
Limpopo	2	0.03	1	0.02	0	0.00	3	0.05	2	0.03	3	0.05
Mpumalanga	1	0.02	1	0.02	1	0.02	2	0.04	0	0.00	0	0.00
Northern Cape	1	0.08	0	0.00	0	0.00	1	0.08	3	0.22	7	0.51
North West	4	0.10	1	0.02	1	0.02	2	0.05	2	0.05	2	0.05
Western Cape	3	0.56	2	0.39	15	0.20	26	0.35	43	0.56	61	0.81
South Africa	1	0.19	5	0.08	33	0.05	71	0.12	107	0.18	150	0.24

*Incidence was calculated based on population denominators provided by Stats-SA and is expressed as cases per 100 000 population.



Enteric fever (typhoid and paratyphoid fever): *Salmonella enterica* serotype Typhi and *S. enterica* serotypes Paratyphi A, Paratyphi B, and Paratyphi C: A total of 139 laboratory-confirmed enteric fever cases was reported in 2024, continuing the decline from the peak in 2022 (204 cases). *Salmonella* Paratyphi accounted for 14% (19/139) of the reported cases. Enteric fever remains endemic, with case numbers staying below 150 per year since 2006, except for recent increases in 2021–2023. Consistent with previous patterns, the 5–14-year age group accounted for the highest proportion of cases (Table 8), and most infections were detected through blood cultures (77%, 107/139). Cases occurred in eight provinces and were concentrated in Gauteng (54%, 75/139) (particularly the City of Tshwane) and the Western Cape (16.5%, 23/139) (Table 9). While most infections were sporadic, several small localised outbreaks were identified. Enteric fever remains underdiagnosed, as culture is required for confirmation, and clinician-testing behaviours vary, which may partially explain provincial differences. In 2024, 19 of 139 enteric fever cases were *Salmonella* Paratyphi A, and most were from Tshwane. This is the highest reported number of paratyphoid fever cases since 2003.

Antimicrobial susceptibility remained generally favourable: 90% (81/90) of isolates were ciprofloxacin-susceptible, although resistance increased to 10% (9/90) compared to 2% (3/129) in 2023 and was most common in the Western Cape. All tested isolates were susceptible to azithromycin. No deaths were reported from enhanced surveillance sites. Whole-genome sequencing identified eight clusters of *S. Typhi* and *S. Paratyphi* infections across provinces. No clear epidemiological links were found, but patterns strongly suggest contaminated municipal water as a likely source of several clusters. Reporting on typhoid fever clusters linked to outbreaks in 2024 can be accessed at <https://www.nicd.ac.za/typhoid-fever-updates/>.

Table 8. Number of cases of *Salmonella* Typhi and *Salmonella* Paratyphi by age category, South Africa, 2024, n=139 (including audit reports).

Age category (years)	S. Paratyphi (%)	S. Typhi (%)	Total (%)
0–4	4 (21)	15 (79)	19 (14)
5–14	11 (18)	49 (82)	60 (43)
15–24	1 (5)	20 (95)	21 (15)
25–34	2 (14)	12 (86)	14 (10)
35–44	1 (13)	7 (88)	8 (6)
45–54		6 (100)	6 (4)
55–64		4 (100)	4 (3)
≥ 65		1 (100)	1 (1)
Unknown		6 (100)	6 (4)
Total	19 (14)	120 (86)	139 (100)



Table 9. Number of cases of *Salmonella* Typhi and Paratyphi by health sector and province, South Africa, 2024, n=139 (including audit reports, missing isolates, and mixed and contaminated cultures).

Province	Private sector (%)	Public sector (%)	Total (%)
Eastern Cape	1 (33)	2 (67)	3 (2)
Free State	0	3 (100)	3 (2)
Gauteng	13 (17)	62 (83)	75 (54)
KwaZulu-Natal	0	14 (100)	14 (10)
Limpopo	1 (50)	1 (50)	2 (1)
Mpumalanga	2 (25)	6 (75)	8 (6)
Northern Cape	0	0	0
North West	1 (9)	10 (91)	11 (8)
Western Cape	2 (9)	21 (91)	23 (17)
South Africa	20 (14)	119 (86)	139 (100)

Shigella species infections: In 2024, 921 culture-confirmed shigellosis cases were reported, similar to 2022 and 2023. Most cases were identified in the public sector (73%, 670/921), with the highest numbers from the Western Cape (39%, 358/921), Gauteng (24%, 217/921), and the Eastern Cape (13%, 120/921). The majority of infections were non-invasive diarrhoeal disease (90% from stool/rectal swabs), while invasive disease (blood culture) remained uncommon (5%, 48/921) and mainly affected children <5 years-of-age. Children under five carried the highest burden of disease (31%, 288/921), followed by those aged 5–14 years of age (13%, 124/921). Cases peaked in January, March, and April, with no clear seasonal pattern overall.

Among 572 serotyped isolates, *S. flexneri* 2a was the most common (44%, 254/572), followed by *S. sonnei* (19%, 109/572) and *S. flexneri* 3a (12%, 68/572), with notable provincial differences in serotype distribution (Figure 7). Antimicrobial susceptibility⁴ was high: 98% (669/684) were ciprofloxacin-susceptible and 99% (675/684) azithromycin-susceptible. Enhanced surveillance sites (29%, 263/921 of cases) showed that 52% (102/195) of patients were ≤15 years of age, and 25% (37/147) of those with known HIV status were HIV-infected, many with low CD4 counts. The in-hospital case-fatality ratio was 3% (6/183). Transmission is largely person-to-person, and disease typically presents as non-invasive diarrhoea.

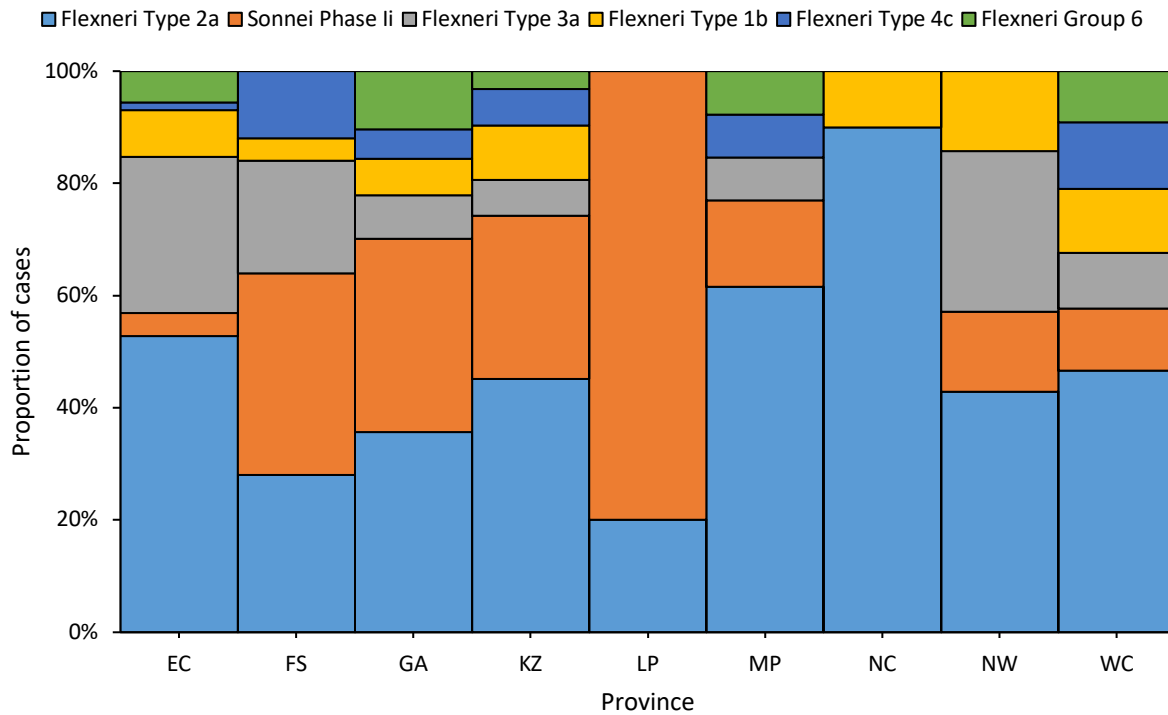


Figure 7. Proportions of the most common *Shigella* species and serotypes by province, South Africa, 2024 (572/921)*. *Includes *Shigella* isolates from invasive and non-invasive cases. Twenty-eight different serovars of *Shigella* were identified, with the six most common serovars in the figure above accounting for 62% (572/921) of the total.

Listeria monocytogenes infections: In 2024, 73 cases of listeriosis were reported, fewer than in 2023 and below the expected annual range for sporadic disease (119–298 cases). Cases occurred in all provinces, mainly Gauteng (33%, 24/73), Western Cape (25%, 18/73), and KwaZulu-Natal (19%, 14/73). Patients ranged from newborns to 90 years-of-age (median 35 years). Most cases occurred among adults aged 15–49 years (29%, 21/73), neonates ≤ 28 days (23%, 17/73), and the elderly (≥ 65 years) (18%, 13/73). The majority of isolates came from blood cultures (70%, 51/73) and CSF (23%, 17/73). Data from enhanced surveillance showed an in-hospital case-fatality of 16% (3/19).

Vibrio cholerae infections: In 2024, 13 laboratory-confirmed cholera cases were detected across three provinces: Limpopo (11 cases), Gauteng (1 case), and Mpumalanga (1 case). All were confirmed via culture, serotyping, and PCR, and all isolates were toxigenic *Vibrio cholerae* O1;12 serogroup Ogawa, and one was serogroup Inaba. Whole-genome sequencing identified two sequence types: ST69 (6 isolates) and ST75 (7 isolates).

Cases occurred mainly in adults aged 25–44 years, with two cases in children aged 5–14 years. All 12 tested isolates were susceptible to ciprofloxacin and azithromycin. National reporting through the NMC system recorded 162 cholera notifications, including the 13 confirmed cases, and 149 suspected cases (including five deaths among the



suspected cases). Cholera activity has significantly decreased since the 2023 outbreak. Surveillance continues to monitor the ongoing presence of ST75, previously identified as a non-epidemic but emerging lineage in South Africa. Non-toxicogenic *V. cholerae* strains are not classified as cholera and do not require a public health response.

Invasive group A Streptococcus (*Streptococcus pyogenes*): In 2024, 708 cases of invasive group A streptococcal disease was recorded by GERMS-SA. Just over half (52%, 367/708) had isolates submitted to the reference laboratory, while the rest were detected through molecular testing or NHLS audit. The updated case definition for 2024, now limited to sterile-site specimens, likely contributed to the lower national incidence of 1.12 per 100 000 population compared to 2023 (1.54 per 100 000). Incidence was highest in the Western Cape (3.13 per 100 000) (Table 10). Incidence by age followed a bimodal pattern, peaking in infants (4.14 per 100 000) and again in adults over 64 years-of-age (1.67 per 100 000 population) (Figure 8). Most cases occurred in males (56%, 389/692) and were diagnosed from blood cultures. Antibiotic resistance⁴ remained rare, with only two of 367 isolates resistant to penicillin and one showing intermediate resistance to erythromycin, supporting the continued efficacy of first-line antibiotics.

At ESS, 88% (323/369) of people with invasive group A strep had clinical data collected (Table 1). Twenty-seven per cent (88/323) had bacteraemia without focus, 22% (72/323) had streptococcal toxic shock syndrome, 10% (31/323) had necrotising fasciitis, and 4% (13/323) had pregnancy/postpartum-associated disease. The remainder had other forms of invasive group A strep, of which most included an underlying skin/joint/bone infection. Twenty-four per cent (77/323) of infections were healthcare-associated (occurred after 48 hours of admission). In-hospital mortality was 25% (79/323), highest among those with toxic shock syndrome (43% (31/72)). Common risk factors for infection included burns, trauma, recent surgery, diabetes, homelessness, and obesity. HIV co-infection was present in 27% (83/304) of cases with known status (Table 1).



Table 10. Number of cases and incidence of invasive group A streptococcal disease reported to GERMS-SA by province, South Africa, 2019–2024, N=4 795 (including audit cases).

Province	2019		2020		2021		2022		2023		2024*	
	n	Incidence	n	Incidence	n	Incidence	n	Incidence	n	Incidence	n	Incidence
Eastern Cape	143	2.19	71	1.10	150	2.32	120	1.85	75	1.16	74	1.03
Free State	22	0.77	11	0.38	21	0.73	35	1.22	26	0.90	33	1.08
Gauteng	200	1.31	95	0.61	174	1.11	259	1.63	327	2.03	238	1.49
KwaZulu-Natal	162	1.47	49	0.44	93	0.83	96	0.85	74	0.65	84	0.68
Limpopo	7	0.12	5	0.09	10	0.17	19	0.32	25	0.41	13	0.20
Mpumalanga	11	0.24	9	0.19	23	0.49	20	0.42	19	0.39	16	0.32
Northern Cape	7	0.63	7	0.63	3	0.27	2	0.18	6	0.54	3	0.22
North West	2	0.05	3	0.07	9	0.22	10	0.25	11	0.27	10	0.24
Western Cape	416	6.16	262	3.82	266	3.85	375	5.37	357	5.04	237	3.13
South Africa	970	1.68	512	0.88	749	1.28	936	1.58	920	1.54	708	1.12

Incidence was calculated based on population denominators provided by Stats-SA and is expressed as cases per 100 000 population.

*2024 case definition changed to only include specimens from invasive specimen sites (previously non-invasive sites were included if accompanied by a diagnosis of necrotising fasciitis or streptococcus toxic shock syndrome).

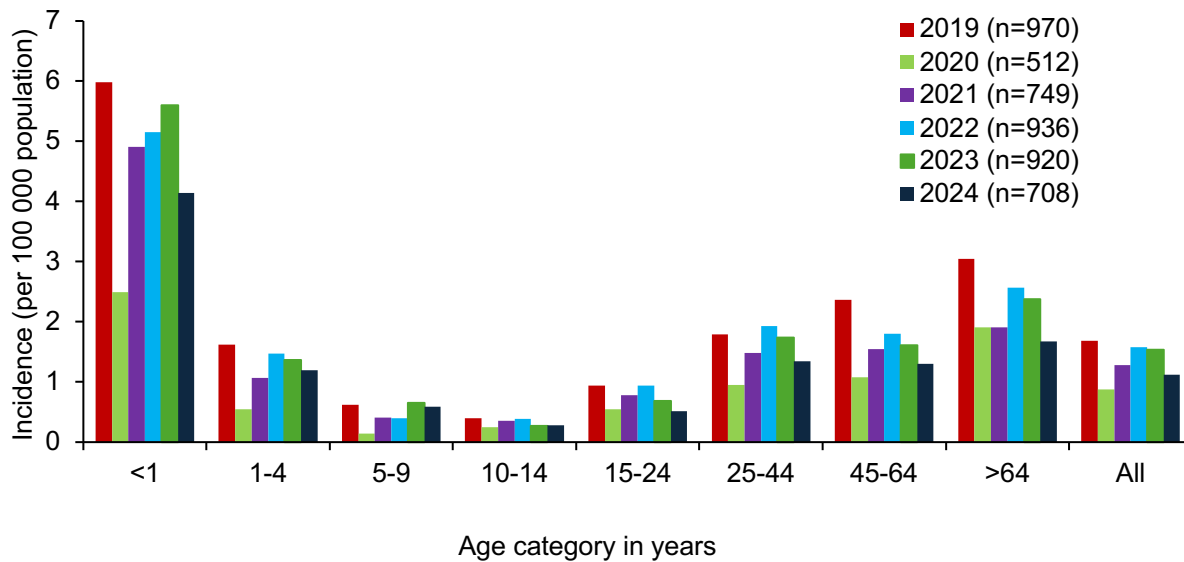


Figure 8. Incidence of invasive *Streptococcus pyogenes* by age category, South Africa, 2019–2024 (N=4 795). Age unknown for 159: 2019 n=15; 2020 n=30; 2021 n=23; 2022 n=32; 2023 n=87; 2024 n=15.



Schistosomiasis and Soil-Transmitted Helminthiases in the Limpopo and Mpumalanga provinces, 2024

In 2024, GERMS-SA launched a pilot project in Limpopo and Mpumalanga to strengthen laboratory-based surveillance for schistosomiasis and STH. Both have been notifiable medical conditions in South Africa since 2017. Participating NHLS laboratories submitted residual microscopy-positive urine and stool specimens to the NICD Parasitology Reference Laboratory (PRL) for confirmatory testing and molecular characterisation. The project aimed to assess diagnostic quality, improve national monitoring of these NTDs, and evaluate the feasibility of expanding surveillance to other provinces. A special request was made in January 2024 to submit all samples – positive and negative – to establish a diagnostic baseline.

Between January and December 2024, the NICD received 741 specimens, 78% (576/741) from Mpumalanga and 22% (165/741) from Limpopo, with large quarterly variation in submissions (Figure 9). Of the negative samples received, 92% (97/106) were confirmed as negative by the NICD and 8% (9/106) were identified as *S. haematobium*. Most specimens (85%, 628/741) were reported as *Schistosoma haematobium*-positive by the submitting laboratories, with only one sample reported as *S. mansoni*-positive. Of these positives, the NICD confirmed 617/629 (98%) – 569/629 by microscopy and 48/569 by PCR. There were 15 mixed *Schistosoma* species infections detected – mostly *S. haematobium* with *S. mansoni*; these were not detected by the submitting laboratories. Although STHs formed part of the pilot scope, no STH-positive specimens were submitted to PRL. However, SDW audit data identified five STH-positive results (three hookworm, one *Ascaris*, one *Trichuris*) that laboratories did not forward for verification.

Audit findings revealed substantial under-submission of specimens for surveillance: of 6 918 valid *Schistosoma*-positive results identified in SDW data from participating laboratories, only 629 (9%) were sent to the NICD. For STHs, none of the audited positives were submitted. Estimated schistosomiasis incidence was 86.2 per 100 000 in Limpopo and 29.2 per 100 000 in Mpumalanga, while STH incidence remained <0.1 per 100 000.

To address these gaps, the NICD and GERMS-SA teams provided targeted support throughout the year, including microscopy training, stakeholder engagement, and routine feedback to improve specimen quality and submission practices. Overall, the pilot demonstrated the feasibility of laboratory-based NTD surveillance but highlighted the need to strengthen specimen submission pathways, improve laboratory compliance, and enhance integration with routine NHLS data. Continued investment will enable expansion to additional provinces in 2025 and support a more accurate national response to parasitic NTDs.

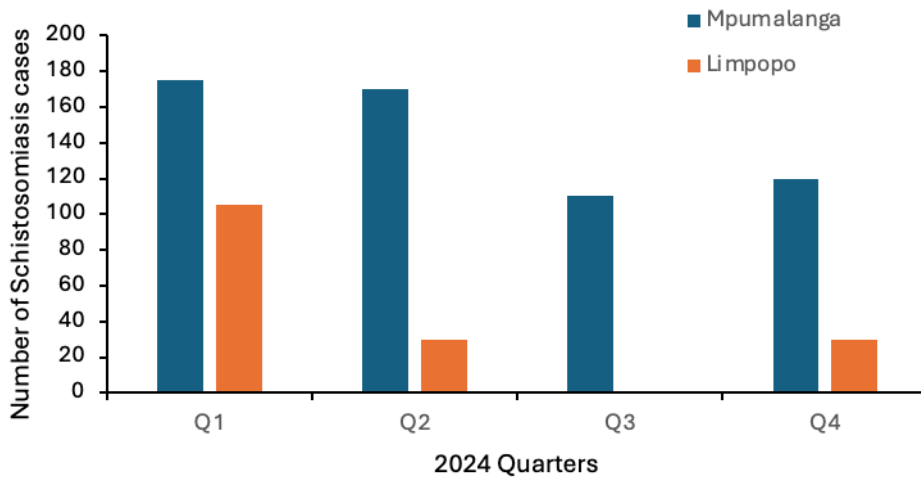


Figure 9. Sample submissions of schistosomiasis cases by province and quarter, Mpumalanga and Limpopo provinces, South Africa, 2024 (N=741).

Limitations

Laboratory-based surveillance is shaped by patients' healthcare-seeking behaviours and clinicians' specimen-collection practices and is further constrained by the capacity of diagnostic and reference laboratories. As a result, incidence figures represent minimum estimates, particularly in the private sector where audits for missing isolates have not yet been implemented.

Public laboratories have faced staffing shortages and supply-chain challenges, which have adversely affected the number, viability, and quality of isolates received by NICD reference laboratories. In addition, the NHLS cyberattack appears to have influenced audit completeness for episodes in June and July especially. Only isolates received at NICD reference units undergo antimicrobial susceptibility testing or serotyping/serogrouping; therefore, missing, non-viable, or unaudited isolates cannot be further characterised.

The ESS sites were selected for convenience and consist mostly of tertiary hospitals, meaning that they may not be representative of all hospital sites in South Africa. Furthermore, challenging record-keeping systems in many public hospitals limit the availability of clinical data from ESS sites, and although patient interviews are encouraged, they are not always feasible.



Conclusion

GERMS-SA remains a critical national platform for monitoring major infectious diseases, providing high-quality laboratory and clinical data across South Africa's public and private sectors. Disease burden remains substantial, particularly for opportunistic infections such as cryptococcosis, bacterial vaccine-preventable diseases such as IPD, and neonatal disease due to GBS. Serotype and strain patterns are shifting, with increases in non-vaccine serotypes (IPD), fluctuation of *Haemophilus influenzae* serotypes, expansion of meningococcal serogroups B, W, and Y, and rising paratyphoid detections. These changes have implications for vaccine selection, clinical management, and outbreak readiness. Mortality remains high for several conditions, including cryptococcosis, IPD meningitis, invasive GAS, and neonatal GBS, highlighting ongoing gaps in early diagnosis, treatment access, and HIV programme integration. The schistosomiasis/STH pilot demonstrated feasibility for national expansion but revealed major surveillance gaps in specimen submission and laboratory compliance. Enhanced sentinel surveillance continues to add value, but limitations in patient interviews, clinical documentation, and hospital record systems hinder the completeness of clinical outcome reporting. Audit data show persistent under-submission of isolates, limited private-sector reporting, and inconsistent participation across laboratories and ESS sites. The NHLS cyberattack contributed to missed audit cases across multiple pathogens, particularly cryptococcosis. Overall, GERMS-SA data highlight both progress in surveillance performance and key areas requiring strengthened systems, laboratory capacity, diagnostic quality, and programmatic response across priority pathogens.

Recommendations

1. Strengthen laboratory submission of isolates and the audit systems. To improve isolate and specimen submission rates towards the $\geq 80\%$ target across all pathogens, NHLS microbiology laboratories could implement automated alerts and routine feedback loops to enhance isolate submissions. In addition, clinical microbiology laboratories should ensure adequate preparation of isolates (incubation of Dorsets for 24 hours prior to transport) to lessen their non-viability when reaching the NICD. To improve complete case ascertainment in private and public sector, GERMS-SA management teams need to work with NICD IT to prioritise interventions for auditing the private-sector laboratories. The GERMS-SA data-management team needs to review the audit period affected by the NHLS cyberattack to ensure restored data completeness.

2. Improve diagnostic and clinical management pathways. Early detection and management of opportunistic infections, especially cryptococcosis, could be enhanced in all hospitals through strengthened HIV testing, earlier ART initiation, and reliable access to flucytosine and amphotericin B.

3. Address vaccine-preventable disease burden. NICD reference laboratories, through the GERMS-SA surveillance programme, should continue monitoring serotype shifts of invasive pneumococcal disease following the national switch from PCV13 to PCV10 (SII), and evaluate implications for future pneumococcal vaccine policy (e.g., PCV15,



PCV20 and life-course vaccination opportunities). All healthcare workers should use all patient/parent interactions to promote routine vaccine uptake and participation in vaccination campaigns to reduce the emergence of vaccine preventable diseases covered by the EPI.

4. Enhance outbreak detection and environmental surveillance. Local and national government should strengthen water-quality surveillance in municipalities with recurrent enteric fever clusters. NICD scientists are to expand genomic sequencing capacity to investigate emerging serotypes and link clusters across provinces.

5. Expand and consolidate NTDs surveillance. The Parasitology Reference Laboratory at the NICD should address gaps identified in the schistosomiasis/STH pilot by improving specimen submission, transport, and laboratory engagement; and secure funding to expand NTD surveillance to additional provinces going forward.

6. Strengthen ESS site performance and clinical data quality. To increase completion of patient interviews toward the 70% target, the GERMS-SA management team should provide targeted training to surveillance officers to address documentation gaps in enhanced surveillance hospitals. The NICD, NHLS, Department of Health (DoH), and local hospitals should work towards enhancing integration between hospital, NHLS, and GERMS-SA IT platforms.

7. Oversight, training, and communication. The GERMS-SA management team should maintain regular engagement between NHLS laboratories, ESS coordinators, and NICD reference centres to sustain quality improvement; and use GERMS-SA findings to inform national guidelines, training curricula, and policy decision-making through liaison with provincial and national stakeholders.

For more information, please visit the full GERMS-SA 2024 report at <https://www.nicd.ac.za/internal-publications/germs-sa/>.

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Ethics

Ethics approval for the surveillance programme has been obtained from the Human Research Ethics Committee (Medical), University of the Witwatersrand (clearance number M230985), and from relevant university and provincial ethics committees for all ESS. Signed informed consent was obtained for patients who were interviewed at sentinel sites.

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The NICD/NHLS funds these surveillance activities.

Conflicts of interest

The authors declare no conflicts of interest.

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