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Epidemiology of respiratory pathogens from the influenza-like illness and pneumonia surveillance programmes, South Africa, 2024

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Summary

Syndromic respiratory illness surveillance programmes co-ordinated by the National Institute for Communicable Diseases, a division of the National Health Laboratory Service, include the systematic hospital-based Pneumonia Surveillance Programme (PSP) and two influenza-like illness (ILI) programmes: the systematic ILI surveillance at primary health clinics in the public sector (ILI-PHC surveillance programme) and the Viral Watch Programme (ILI-VW) at private practices. Respiratory specimens collected from enrolled individuals meeting case definitions at sentinel sites were tested for influenza, respiratory syncytial virus (RSV), *Bordetella pertussis,* and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by real-time polymerase chain reaction (PCR). In total, 7 690/7 727 samples (99.5%) were tested: 4 402 from PSP, 1 750 from ILI-PHC, and 1 538 from ILI-VW. Of the 6 152 individuals with specimens collected and tested in PSP and ILI-PHC, 6 112 (99%) had available HIV results. The HIV prevalence among patients of all ages was 20% (856/4 381) in the PSP and 14% (242/1 731) in the ILI-PHC surveillance programme. The HIV prevalence was highest in the 25–44-year age group for patients enrolled in PSP (68%, 440/643) and ILI-PHC (29%, 111/385), respectively. The 2024 influenza season began in week 17 (starting 22 April 2024) and ended in week 41 (starting 07 October 2024). The overall influenza detection rate was 13% (1 001/7 690). In the PSP, the influenza detection rate was 7% (297/4 402). The most commonly detected influenza subtypes and lineages were influenza A(H1N1)pdm09 (59%, 589/1 001) and influenza B/Victoria (33%, 334/1 001). Nine influenza A and 26 influenza B specimens could not be typed; one specimen was positive for both A(H1N1)pdm09 and B/Victoria, and one specimen was positive for A(H1N1)pdm09 and influenza B (lineage inconclusive). Among specimens positive for influenza A(H1N1)pdm09 that could be characterised with full genome sequencing, the most common subclade detected was C.1.9 (90%, 221/241), and among specimens positive for influenza B/Victoria, the most common subclade detected was C.5.6 (60%, 66/118). The RSV season preceded the influenza season and began in week 6 (starting 05 February 2024) and concluded in week 31 (starting 31 July 2024); however, RSV was detected year-round across all three surveillance programmes. The overall detection rate was 11% (857/7 690). RSV subgroup B was the most common, comprising 69% (593/857) of cases. Six specimens tested positive for both RSV A and RSV B, and 11 could not be subgrouped. Among specimens positive for RSV A that could be characterised with full genome sequencing, the most common subclade detected was A.D.5.1 (50%, 90/166), and among specimens positive for RSV B, the most common subclade detected was B.D.E.1 (90%, 401/447). Among children under five years in the PSP, the RSV detection rate was 25% (669/2 657), with 82% of cases (550/669) occurring in children under one year of age. Circulation of SARS-CoV-2 was mostly below the epidemic threshold in 2024, except for the middle and end of the year in the ILI-VW programme when detection rates went into the low threshold. No seasonality was observed. Overall, in all three surveillance programmes, the annual detection rate for SARS-CoV-2 was 4% (323/7 690). In 2024, Omicron lineage BA.2.86 (clade 23I) predominated in the first quarter of the year, with Omicron lineage JN.1 (clade 24A) predominating the remainder of the year. In 2024, *B. pertussis* cases were identified throughout the year in both the ILI-PHC and PSP platforms. A total of 79 cases were identified from 6 149 specimens tested (1%). This report highlights the evolving epidemiology of respiratory pathogens. The findings offer valuable data to support stakeholders and policymakers in making informed decisions regarding the

implementation of new or adjusted prevention and control strategies, such as planning for respiratory disease surges or vaccination programmes, including implementation of new approved RSV preventive interventions for infants.

Introduction

Surveillance programmes are used globally to monitor patterns of illness, identify seasonal changes, and characterise the epidemiology of individuals affected by specific clinical syndromes.[1,2] These programmes may also help identify populations at higher risk for severe illness. Effective, year-round, sentinel syndromic surveillance plays an important role in detecting, managing, and tracking respiratory illness, as specimens are taken systematically from all patients presenting with the syndrome. Additionally, it provides valuable information for the introduction of preventive measures and evaluating their effectiveness.[3–5]

Sentinel surveillance programmes collect data to characterise the epidemiological characteristics of individuals infected with respiratory pathogens of public health significance. These data contribute to disease burden estimates, evaluate vaccine effectiveness, and provide evidence for policymakers and stakeholders in developing and monitoring prevention strategies. Findings from respiratory illness surveillance should be compiled regularly and shared through reports and peer-reviewed publications.[3–6]

In South Africa, the Centre for Respiratory Diseases and Meningitis (CRDM) at the National Institute for Communicable Diseases (NICD), a division of the National Health Laboratory Service (NHLS), conducts sentinel site systematic respiratory illness surveillance. This includes the systematic Pneumonia Surveillance Programme (PSP) at public sector hospitals and two influenza-like illness (ILI) surveillance programmes: systematic ILI surveillance at public sector primary health clinics (ILI-PHC) and the Viral Watch Programme (ILI-VW) conducted at private general practitioner practices. This report aims to outline the epidemiology of key respiratory pathogens in South Africa in 2024, providing data to support evidence-based policies and strategies for their prevention, control, and management.

Methods

A summary of each surveillance programme is included below. Mid-turbinate nasal swabs from ILI-PHC and PSP sites were tested for four pathogens: influenza, respiratory syncytial virus (RSV), *Bordetella pertussis,* and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). ILI-VW specimens were tested for influenza, RSV, and SARS-CoV-2 only.

Description of surveillance programmes and study sites

The PSP in South Africa is a hospital-based, active, systematic, prospective, sentinel surveillance programme established in 2009, enrolling patients based on three case definitions (Table 1). In 2024, the PSP included sites in six provinces, namely Gauteng (GP), North West (NW), KwaZulu-Natal (KZN), Eastern Cape (EC), Western

Cape (WC), and Mpumalanga (MP), and fourteen hospitals (Rahima Moosa Mother and Child Hospital (GP), Helen Joseph Hospital (GP), Tembisa Hospital (GP), OR Tambo Memorial Hospital (GP), Harry Gwala Memorial Hospital (KZN), Livingstone Hospital (EC), Mapulaneng Hospital (MP), Matikwana Hospital (MP), Tintswalo (MP), Klerksdorp-Tshepong Hospital Complex (NW), Red Cross Children's Hospital (WC), Mitchell's Plain Hospital (WC), Khayelitsha District Hospital (WC), and Tygerberg Hospital (WC). Enrolment ended on 15 March 2024 for the following sites: OR Tambo Memorial Hospital, Tembisa Hospital, and Tygerberg Hospital, on 10 April 2024 for Khayelitsha District Hospital, and on 31 May 2024 for Livingstone Hospital.

The ILI-PHC programme was established in 2012 and enrols outpatients with ILI or suspected pertussis at sentinel sites in five clinics in four provinces (Harry Gwala Memorial Hospital Gateway Clinic in KZN, Jouberton Clinic in NW, Agincourt Clinic in MP, and Eastridge and Mitchell's Plain clinics in WC) (Table 1).

The ILI-VW programme was established in 1984 and is a prospective sentinel outpatient-based surveillance programme operating through a private general practitioner network.[4,6,7] General practitioners submit nasopharyngeal swabs from patients whose symptoms met the ILI case definition for laboratory testing (Table 1). This programme is active in eight provinces: EC, Free State, GP, Limpopo, MP, Northern Cape (NC), NW, and WC, with 50 general practitioners submitting specimens in the study period.

Table 1. Case definitions by age group and surveillance programme for the clinical syndromes included in the influenza-like illness – public health clinics (ILI-PHC) surveillance programme, the ILI-Viral Watch (ILI-VW) programme, and the Pneumonia Surveillance Programme (PSP), South Africa, 2024.

Case definition	Criteria	Programme
Severe respiratory illness (SRI)	2 days to <3 months: Any child hospitalised with diagnosis of sepsis/suspected sepsis, or physician-diagnosed LRTI including bronchiolitis, pneumonia, bronchitis, or pleural effusion. ≥3 months to <5 years: Any child hospitalised with physician-diagnosed LRTI including bronchiolitis, pneumonia, bronchitis, or pleural effusion. ≥5 years: Any person hospitalised with physician-diagnosed LRTI (until 31 October 2024). ≥5 years: Fever ≥38°C or self-reported fever AND cough (from 01 November 2024).	PSP
Suspected pertussis	Any infant <12 months-of-age with apnoea OR Any patient presenting with cough of any duration AND any of the following: • Paroxysms of coughing • Inspiratory whoop • Post-tussive vomiting	ILI-PHC, PSP
ILI	Any outpatient with acute fever ≥38°C or self-reported fever AND cough, presenting within 10 days of symptom onset.	ILI-PHC, ILI-VW

LRTI: lower respiratory tract infection and includes suspected pulmonary TB and suspected pertussis.

Sample and data collection

In the PSP and ILI-PHC programmes, surveillance officers screened potentially eligible patients. Consenting patients whose symptoms met the case definitions were enrolled. A case investigation form (CIF), either paper-based or electronic, was completed and uploaded to the NICD structured query language (SQL) database, and a mid-turbinate nasal swab was collected for testing. HIV status was determined through routine testing or medical record review. For the ILI-VW programme, a physician completed a short paper-based CIF, which was then submitted to the NICD and entered into a Microsoft Access database. Specimens were stored at 4°C and transported in cooler boxes with ice packs to the NICD for testing within 72 hours of collection.

Laboratory testing for influenza, RSV, SARS-CoV-2, and *Bordetella pertussis*

The CRDM laboratory at the NICD tested for influenza A and B, RSV, and SARS-CoV-2 using a commercial multiplex real-time reverse transcription polymerase chain reaction (RT-PCR) assay (Allplex™ SARS-CoV-2/FluA/FluB/RSV PCR kit, Seegene Inc., Seoul, South Korea). A specimen was considered positive for influenza A, B, or RSV if the PCR cycle threshold (Ct) was <40 for the respective target and considered positive for SARS-CoV-2 when the Ct was <40 for ≥1 of the S, N or RdRp gene targets. Influenza A, B, and RSV-positive specimens were subtyped using the United States Centers for Disease Control and Prevention (U.S. CDC) RT-PCR protocol and reagents (International Reagent Resource).[8] Positive specimens with a Ct value <35 for SARS-CoV-2 and <30 for influenza or RSV underwent sequencing using the Illumina platform (Illumina, CA, USA) as described previously.[9] A specimen was considered *B. pertussis* positive if the IS481 gene was detected with a Ct value <40 using an in-house real-time PCR assay.[10] All IS481-positive specimens were confirmed as negative for *Bordetella holmesii* using the hIS1001 gene target.

Data management and analysis

Data management was centralised at the NICD, with all electronic records stored in Microsoft Access or SQL databases. Laboratory, clinical, and demographic information were collated for all enrolled patients. The CRDM data team ensured data quality by performing checks for missing entries and duplicates.

Influenza and RSV epidemic thresholds were calculated using the Moving Epidemic Method (MEM), a sequential analysis using the R programming language, available from http://CRAN.R-project.org/web/package=mem, designed to calculate the duration, start, and end of the annual influenza epidemic.[11] We used the "original method" included in the package to determine the start of the season. The MEM uses the 40th, 90th, and 97.5th percentiles established from available years of historical data to calculate thresholds of activity. Thresholds of activity for influenza and RSV are categorised as follows: below seasonal threshold, low activity, moderate activity, high activity, and very high activity. For influenza, thresholds from outpatient influenza-like illness (ILI) in primary healthcare clinics are used as an indicator of disease transmission in the community, and thresholds from pneumonia surveillance are used as an indicator of influenza-associated morbidity and mortality. For RSV, thresholds from pneumonia surveillance from children aged <5 years were used as an indicator of RSV-associated morbidity and mortality. For influenza

and RSV, the start and end of the season were defined as once the three-week moving average of the detection rate remained above or below the seasonal threshold for two consecutive weeks, respectively. SARS-CoV-2 thresholds were calculated using the mean standard deviation method, where the seasonal threshold level was determined using the mean three-week moving average of the detection rate of the selected historical years, and severity levels are based on the mean plus one, three, or five standard deviations for moderate, high, and very high thresholds, respectively.[12] Ninety-five per cent confidence intervals (95% CIs) for detection rates were estimated using exact binomial (Clopper–Pearson) confidence intervals. All analyses were performed using the R programme language version 4.3.2[13] using RStudio version 2023.09.1 (Posit, MA, USA).

Results

Patients enrolled and tested

In ILI-VW, 1 554 patients were enrolled from 31 December 2023 through 28 December 2024 (epidemiological year 2024). Of the 1 554 specimens collected, 1 538 (99.0%) were tested for influenza, RSV, and SARS-CoV-2. In total, 6 173 patients were enrolled in ILI-PHC and PSP. Of these, 6 152 (99.7%) had specimens collected and tested for respiratory pathogens (Figure 1), of which 28% (1 750/6 152) were enrolled in the ILI-PHC and 72% (4 402/6 152) were enrolled in PSP (Figure 1).

Of the 6 152 individuals with specimens collected and tested in ILI-PHC and PSP, 6 112 (99%) had available HIV results. The HIV prevalence among patients of all ages was 20% (856/4 381) in the PSP and 14% (242/1 731) in the ILI-PHC surveillance programme (Figure 2). The HIV prevalence was among patients aged 25–44 years enrolled in ILI-PHC (29%, 111/385) and in PSP (68%, 440/643), respectively (Figure 2).

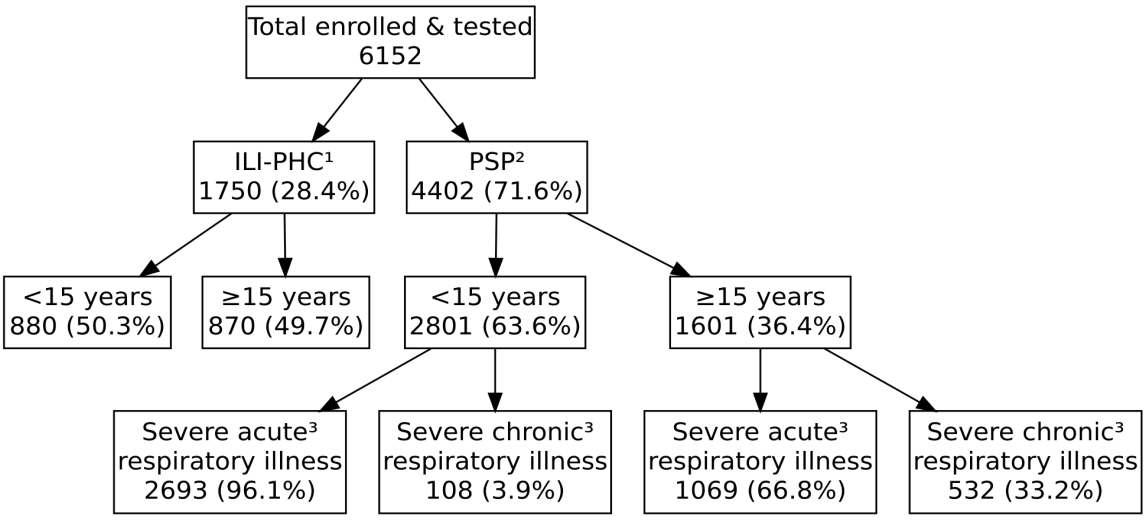

Figure 1. Numbers of individuals enrolled and specimens tested for respiratory pathogens in the Pneumonia Surveillance Programme (PSP) and influenza-like illness – public health clinics (ILI-PHC) surveillance programme, South Africa, 2024.

[1]ILI-PHC: ILI surveillance at primary health clinics in the public sector.

[2]PSP: Pneumonia Surveillance Programme.

[3]Acute patients had a symptom duration of ≤10 days at the time of admission, and chronic patients had a symptom duration of >10 days.

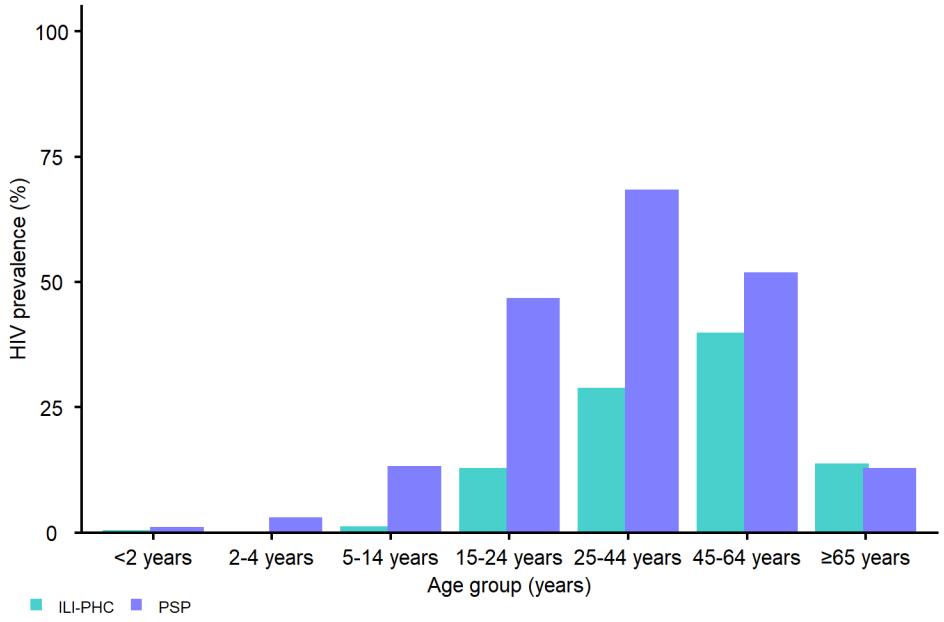

Figure 2. HIV prevalence by age group for individuals enrolled and tested in the influenza-like illness – public health clinics (ILI-PHC)[1] surveillance and Pneumonia Surveillance Programme (PSP)[2], South Africa, 2024.

[1]ILI-PHC sites were active in four provinces, including KwaZulu-Natal, Mpumalanga, the North West, and the Western Cape.

[2]PSP sites were active in six provinces, including the Eastern Cape (up to May 2024), Gauteng, KwaZulu-Natal, Mpumalanga, the North West, and the Western Cape.

Influenza, RSV, SARS-CoV-2, and *Bordetella pertussis*-associated illness among individuals enrolled in ILI-PHC

In the ILI-PHC surveillance programme, influenza was the most frequently detected pathogen among individuals under 15 years old, with a detection rate of 19% (170/880), followed by RSV at 8% (70/880), SARS-CoV-2 at 2% (20/880), and *B. pertussis* at 0.9% (8/879) (Table 2). Among individuals aged 15 years and older, influenza remained the most commonly identified pathogen at 14% (119/870), followed by SARS-CoV-2 at 4% (38/870), RSV at 3% (27/870), and *B. pertussis* at 0.7% (6/870) (Table 3). The pathogen with the highest detection rate by age was influenza in children aged 5–14 years (25%; 95% CI 21%-30%)(Figure 3).

Influenza, RSV, SARS-CoV-2, and *Bordetella pertussis*-associated illness among individuals enrolled in PSP

In the PSP surveillance programme, RSV was the most frequently detected pathogen among individuals younger than 15 years, with a detection rate of 24% (677/2 801), followed by influenza at 6% (177/2 801), SARS-CoV-2 at 2% (61/2 801), and *B. pertussis* at 2% (47/2 800) (Table 4). The in-hospital mortality rate for this age group was 1% (28/2 800).

Among individuals aged 15 years and older, influenza was the most commonly detected pathogen at 7% (120/1 601), followed by SARS-CoV-2 at 3% (51/1 601), RSV at 2% (32/1 601), and *B. pertussis* at 1% (18/1 600). The in-hospital mortality rate for this age group was higher than in children at 9% (145/1 591) (Table 5). The pathogen with the highest detection rate by age was RSV in children aged 3–5 months (37%; 95% CI 32%-42%, Figure 3).

Table 2. Demographic and clinical characteristics of patients aged <15 years enrolled and tested in the influenza-like illness – public health clinics (ILI-PHC) surveillance programme overall and individuals testing positive for influenza, respiratory syncytial virus (RSV), SARS-CoV-2, and *Bordetella pertussis*, South Africa, 2024.

Characteristic	Overall n (%) N = 880	Influenza n (%) N = 170	RSV n (%) N = 70	SARS-CoV-2 n (%) N = 20	B. pertussis n (%) N = 8	Negative[1] n (%) N = 617
Age group						
<3 months	6 (0.7)	0 (0)	0 (0)	0 (0)	0 (0)	6 (1)
3-5 months	20 (2)	0 (0)	6 (9)	1 (5)	0 (0)	13 (2)
6-11 months	81 (9)	9 (5)	8 (11)	1 (5)	3 (38)	60 (10)
12-23 months	137 (16)	21 (12)	19 (27)	5 (25)	1 (12)	92 (15)
2-4 years	311 (35)	58 (34)	28 (40)	5 (25)	2 (25)	219 (35)
5-14 years	325 (37)	82 (48)	9 (13)	8 (40)	2 (25)	227 (37)
Sex						
Female	429 (49)	83 (49)	28 (40)	10 (50)	3 (38)	307 (50)
Male	451 (51)	87 (51)	42 (60)	10 (50)	5 (62)	310 (50)
Race[2]						
Black	639 (73)	141 (83)	51 (73)	11 (55)	7 (88)	433 (70)
Other	241 (27)	29 (17)	19 (27)	9 (45)	1 (12)	184 (30)
Province						
KwaZulu-Natal	201 (23)	44 (26)	14 (20)	3 (15)	2 (25)	139 (23)
Mpumalanga	183 (21)	50 (29)	12 (17)	2 (10)	3 (38)	117 (19)
North West	188 (21)	40 (24)	20 (29)	2 (10)	1 (12)	127 (21)
Western Cape	308 (35)	36 (21)	24 (34)	13 (65)	2 (25)	234 (38)
Living with HIV						
HIV uninfected	866 (98)	170 (100)	69 (99)	19 (95)	8 (100)	605 (98)
PLWHIV	5 (0.6)	0 (0)	0 (0)	1 (5)	0 (0)	4 (0.6)
Unknown	9 (1)	0 (0)	1 (1)	0 (0)	0 (0)	8 (1)
Malnutrition[3]	1 (0.1)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)
Premature[4]	13 (1)	3 (2)	1 (1)	0 (0)	1 (12)	8 (1)
Underlying illness[5]	22 (2)	3 (2)	3 (4)	0 (0)	1 (12)	15 (2)

[1]Patients testing negative for influenza, RSV, SARS-CoV-2, and *B. pertussis*. Co-infections between pathogens may cause counts to not add up to the overall count.

[2]Other races include Coloured, Indian, and other unspecified groups.

[3]Malnutrition is defined by <-2 Z-scores (-2 standard deviations) of the mean weight for age in months and gender. This also includes any children recorded as having kwashiorkor or marasmus.

[4]Premature is defined as born before 37 completed weeks of gestation.

[5]Underlying illnesses included any of the following: asthma, other chronic lung diseases, chronic heart disease (valvular heart disease, coronary heart disease, or heart failure excluding hypertension), stroke, seizures, liver disease (cirrhosis or liver failure), renal disease (nephrotic syndrome or chronic renal failure), immunocompromising conditions excluding HIV infection (organ transplant, immunosuppressive therapy, immunoglobulin deficiency, malignancy, or autoimmune disease), diabetes, pregnancy, burns, and neurological disease (spinal cord injury or neuromuscular conditions).

PLWHIV: People living with HIV.

Table 3. Demographic and clinical characteristics of patients aged ≥15 years enrolled and tested in the influenza-like illness – public health clinics (ILI-PHC) surveillance programme overall and individuals testing positive for influenza, respiratory syncytial virus (RSV), SARS-CoV-2, and *Bordetella pertussis*, South Africa, 2024.

Characteristic	Overall n (%) N = 870	Influenza n (%) N = 119	RSV n (%) N = 27	SARS-CoV-2 n (%) N = 38	B. pertussis n (%) N = 6	Negative[1] n (%) N = 684
Age group						
15-24 years	180 (21)	28 (24)	8 (30)	6 (16)	1 (17)	139 (20)
25-44 years	394 (45)	54 (45)	9 (33)	18 (47)	3 (50)	310 (45)
45-64 years	238 (27)	30 (25)	10 (37)	11 (29)	1 (17)	188 (27)
≥65 years	58 (7)	7 (6)	0 (0)	3 (8)	1 (17)	47 (7)
Sex						
Female	482 (55)	73 (61)	17 (63)	22 (58)	3 (50)	371 (54)
Male	388 (45)	46 (39)	10 (37)	16 (42)	3 (50)	313 (46)
Race[2]						
Black	765 (88)	117 (98)	27 (100)	36 (95)	4 (67)	585 (86)
Other	105 (12)	2 (2)	0 (0)	2 (5)	2 (33)	99 (14)
Province						
KwaZulu-Natal	313 (36)	34 (29)	8 (30)	16 (42)	2 (33)	253 (37)
Mpumalanga	103 (12)	30 (25)	0 (0)	6 (16)	1 (17)	68 (10)
North West	356 (41)	54 (45)	19 (70)	14 (37)	1 (17)	270 (39)
Western Cape	98 (11)	1 (0.8)	0 (0)	2 (5)	2 (33)	93 (14)
Living with HIV						
HIV uninfected	623 (72)	82 (69)	16 (59)	34 (89)	4 (67)	491 (72)
PLWHIV	237 (27)	37 (31)	11 (41)	3 (8)	2 (33)	184 (27)
Unknown	10 (1)	0 (0)	0 (0)	1 (3)	0 (0)	9 (1)
Underlying illness[3]	125 (14)	12 (10)	3 (11)	3 (8)	2 (33)	105 (15)

[1]Patients testing negative for influenza, RSV, SARS-CoV-2, and *B. pertussis*. Co-infections between pathogens may cause counts to not add up to the overall count.

[2]Other races include Coloured, Indian, and other unspecified groups.

[3]Underlying illnesses included any of the following: asthma, other chronic lung diseases, chronic heart disease (valvular heart disease, coronary heart disease, or heart failure excluding hypertension), stroke, seizures, liver disease (cirrhosis or liver failure), renal disease (nephrotic syndrome or chronic renal failure), immunocompromising conditions excluding HIV infection (organ transplant, immunosuppressive therapy, immunoglobulin deficiency, malignancy, or autoimmune disease), diabetes, pregnancy, burns, and neurological disease (spinal cord injury or neuromuscular conditions).

PLWHIV: People living with HIV.

Table 4. Demographic and clinical characteristics of patients aged <15 years enrolled and tested in the hospital-based Pneumonia Surveillance Programme (PSP) overall and individuals testing positive for influenza, respiratory syncytial virus (RSV), SARS-CoV-2, and *Bordetella pertussis*, South Africa, 2024.

Characteristic	Overall n (%) N = 2 801	Influenza n (%) N = 177	RSV n (%) N = 677	SARS-CoV-2 n (%) N = 61	B. pertussis n (%) N = 47	Negative[1] n (%) N = 1 866
Age group						
<3 months	832 (30)	19 (11)	298 (44)	24 (39)	24 (51)	476 (26)
3-5 months	365 (13)	15 (8)	134 (20)	14 (23)	7 (15)	203 (11)
6-11 months	509 (18)	45 (25)	118 (17)	14 (23)	5 (11)	331 (18)
12-23 months	489 (17)	48 (27)	76 (11)	7 (11)	1 (2)	361 (19)
2-4 years	462 (16)	36 (20)	43 (6)	2 (3)	9 (19)	373 (20)
5-14 years	144 (5)	14 (8)	8 (1)	0 (0)	1 (2)	122 (7)
Sex						
Female	1 224 (44)	84 (47)	309 (46)	27 (44)	21 (45)	793 (42)
Male	1 577 (56)	93 (53)	368 (54)	34 (56)	26 (55)	1 073 (58)
Race[2]						
Black	2 079 (74)	143 (81)	489 (72)	43 (70)	32 (68)	1 394 (75)
Other	721 (26)	34 (19)	188 (28)	18 (30)	15 (32)	471 (25)
Unknown	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.1)
Province						
Gauteng	583 (21)	49 (28)	175 (26)	16 (26)	10 (21)	341 (18)
KwaZulu-Natal	349 (12)	16 (9)	67 (10)	4 (7)	3 (6)	261 (14)
Mpumalanga	261 (9)	25 (14)	29 (4)	4 (7)	3 (6)	201 (11)
North West	320 (11)	35 (20)	68 (10)	4 (7)	4 (9)	212 (11)
Western Cape	1 288 (46)	52 (29)	338 (50)	33 (54)	27 (57)	851 (46)
Symptom duration						
≤10 days	2 693 (96)	166 (94)	665 (98)	60 (98)	44 (94)	1 784 (96)
>10 days	108 (4)	11 (6)	12 (2)	1 (2)	3 (6)	82 (4)
Living with HIV						
HIV uninfected	2 740 (98)	175 (99)	669 (99)	60 (98)	47 (100)	1 815 (97)
PLWHIV	56 (2)	2 (1)	6 (0.9)	1 (2)	0 (0)	48 (3)
Unknown	5 (0.2)	0 (0)	2 (0.3)	0 (0)	0 (0)	3 (0.2)
Malnutrition[3]						
Yes	84 (3)	6 (3)	12 (2)	2 (3)	0 (0)	66 (4)
No	2 716 (97)	171 (97)	665 (98)	59 (97)	47 (100)	1 799 (96)
Unknown	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.1)
Premature[4]						
Yes	287 (10)	15 (8)	77 (11)	9 (15)	2 (4)	187 (10)
No	2,513 (90)	162 (92)	600 (89)	52 (85)	45 (96)	1 678 (90)
Unknown	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.1)
Underlying illness[5]						
Yes	220 (8)	14 (8)	37 (5)	3 (5)	4 (9)	164 (9)

Characteristic	Overall n (%) N = 2 801	Influenza n (%) N = 177	RSV n (%) N = 677	SARS-CoV-2 n (%) N = 61	B. pertussis n (%) N = 47	Negative[1] n (%) N = 1 866
No	2 580 (92)	163 (92)	640 (95)	58 (95)	43 (91)	1 701 (91)
Unknown	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.1)
Hospital duration						
≤5 days	2 195 (78)	143 (81)	526 (78)	49 (80)	39 (83)	1 460 (78)
>5 days	605 (22)	34 (19)	151 (22)	12 (20)	8 (17)	405 (22)
Unknown	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.1)
ICU admission						
Yes	61 (2)	5 (3)	14 (2)	3 (5)	1 (2)	39 (2)
No	2 724 (97)	172 (97)	655 (97)	57 (93)	46 (98)	1 819 (97)
Unknown	16 (0.6)	0 (0)	8 (1)	1 (2)	0 (0)	8 (0.4)
In-hospital mortality						
Yes	28 (1)	1 (0.6)	6 (0.9)	1 (2)	0 (0)	20 (1)
No	2 772 (99)	176 (99)	671 (99)	60 (98)	47 (100)	1 845 (99)
Unknown	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.1)

[1]Patients testing negative for influenza, RSV, SARS-CoV-2, and *B. pertussis*. Co-infections between pathogens may cause counts to not add up to the overall count.

[2]Other races include Coloured, Indian, and other unspecified groups.

[3]Malnutrition is defined by <-2 Z-scores (-2 standard deviations) of the mean weight for age in months and gender. This also includes any children recorded as having kwashiorkor or marasmus.

[4]Premature is defined as born before 37 completed weeks of gestation.

[5]Underlying illnesses included any of the following: asthma, other chronic lung diseases, chronic heart disease (valvular heart disease, coronary heart disease, or heart failure excluding hypertension), stroke, seizures, liver disease (cirrhosis or liver failure), renal disease (nephrotic syndrome or chronic renal failure), immunocompromising conditions excluding HIV infection (organ transplant, immunosuppressive therapy, immunoglobulin deficiency, malignancy, or autoimmune disease), diabetes, pregnancy, burns, and neurological disease (spinal cord injury or neuromuscular conditions).

PLWHIV: people living with HIV.

Table 5. Demographic and clinical characteristics of patients aged ≥15 years enrolled and tested in the hospital-based Pneumonia Surveillance Programme (PSP) overall and individuals testing positive for influenza, respiratory syncytial virus (RSV), SARS-CoV-2, and *Bordetella pertussis*, South Africa, 2024.

Characteristic	Overall n (%) N = 1,601	Influenza n (%) N = 120	RSV n (%) N = 32	SARS-CoV-2 n (%) N = 51	B. pertussis n (%) N = 18	Negative[1] n (%) N = 1,384
Age group						
15-24 years	95 (6)	3 (2)	2 (6)	3 (6)	3 (17)	84 (6)
25-44 years	648 (40)	38 (32)	9 (28)	24 (47)	6 (33)	573 (41)
45-64 years	537 (34)	55 (46)	10 (31)	15 (29)	4 (22)	454 (33)
≥65 years	321 (20)	24 (20)	11 (34)	9 (18)	5 (28)	273 (20)
Sex						
Female	784 (49)	74 (62)	18 (56)	24 (47)	8 (44)	661 (48)
Male	817 (51)	46 (38)	14 (44)	27 (53)	10 (56)	723 (52)
Race[2]						
Black	1 379 (86)	92 (77)	29 (91)	41 (80)	16 (89)	1 204 (87)
Other	222 (14)	28 (23)	3 (9)	10 (20)	2 (11)	180 (13)
Province						
Eastern Cape	41 (3)	1 (0.8)	1 (3)	2 (4)	4 (22)	33 (2)
Gauteng	615 (38)	52 (43)	5 (16)	16 (31)	8 (44)	534 (39)
KwaZulu-Natal	153 (10)	9 (8)	1 (3)	1 (2)	3 (17)	140 (10)
Mpumalanga	322 (20)	20 (17)	6 (19)	12 (24)	1 (6)	283 (20)
North West	207 (13)	28 (23)	12 (38)	10 (20)	2 (11)	158 (11)
Western Cape	263 (16)	10 (8)	7 (22)	10 (20)	0 (0)	236 (17)
Symptom duration						
≤10 days	1,069 (67)	95 (79)	22 (69)	33 (65)	9 (50)	913 (66)
>10 days	532 (33)	25 (21)	10 (31)	18 (35)	9 (50)	471 (34)
Living with HIV						
HIV uninfected	785 (49)	61 (51)	13 (41)	21 (41)	9 (50)	683 (49)
PLWHIV	800 (50)	58 (48)	18 (56)	30 (59)	9 (50)	687 (50)
Unknown	16 (1)	1 (0.8)	1 (3)	0 (0)	0 (0)	14 (1)
Underlying illness[3]						
Yes	565 (35)	47 (39)	19 (59)	21 (41)	7 (39)	473 (34)
No	1,035 (65)	73 (61)	13 (41)	30 (59)	11 (61)	910 (66)
Unknown	1 (0.1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.1)
Hospital duration						
≤5 days	551 (34)	46 (38)	8 (25)	23 (45)	4 (22)	472 (34)
>5 days	1,040 (65)	74 (62)	23 (72)	28 (55)	14 (78)	903 (65)
Unknown	10 (0.6)	0 (0)	1 (3)	0 (0)	0 (0)	9 (0.7)
ICU admission						
Yes	14 (0.9)	2 (2)	0 (0)	1 (2)	1 (6)	11 (0.8)
No	1 320 (82)	112 (93)	24 (75)	41 (80)	8 (44)	1 138 (82)
Unknown	267 (17)	6 (5)	8 (25)	9 (18)	9 (50)	235 (17)

Characteristic	Overall n (%) N = 1,601	Influenza n (%) N = 120	RSV n (%) N = 32	SARS-CoV-2 n (%) N = 51	B. pertussis n (%) N = 18	Negative[1] n (%) N = 1,384
In-hospital mortality						
Yes	145 (9)	6 (5)	5 (16)	6 (12)	4 (22)	124 (9)
No	1 446 (90)	114 (95)	26 (81)	45 (88)	14 (78)	1 251 (90)
Unknown	10 (0.6)	0 (0)	1 (3)	0 (0)	0 (0)	9 (0.7)

[1]Patients testing negative for influenza, RSV, SARS-CoV-2, and *B. pertussis*. Co-infections between pathogens may cause counts to not add up to the overall count.

[2]Other races include Coloured, Indian, and other unspecified groups.

[3]Malnutrition is defined by <-2 Z-scores (-2 standard deviations) of the mean weight for age in months and gender. This also includes any children recorded as having kwashiorkor or marasmus.

[4]Premature is defined as born before 37 completed weeks of gestation.

[5]Underlying illness included any of the following: asthma, other chronic lung diseases, chronic heart disease (valvular heart disease, coronary heart disease, or heart failure excluding hypertension), stroke, seizures, liver disease (cirrhosis or liver failure), renal disease (nephrotic syndrome or chronic renal failure), immunocompromising conditions excluding HIV infection (organ transplant, immunosuppressive therapy, immunoglobulin deficiency, malignancy, or autoimmune disease), diabetes, pregnancy, burns, and neurological disease (spinal cord injury or neuromuscular conditions).

PLWHIV: People living with HIV.

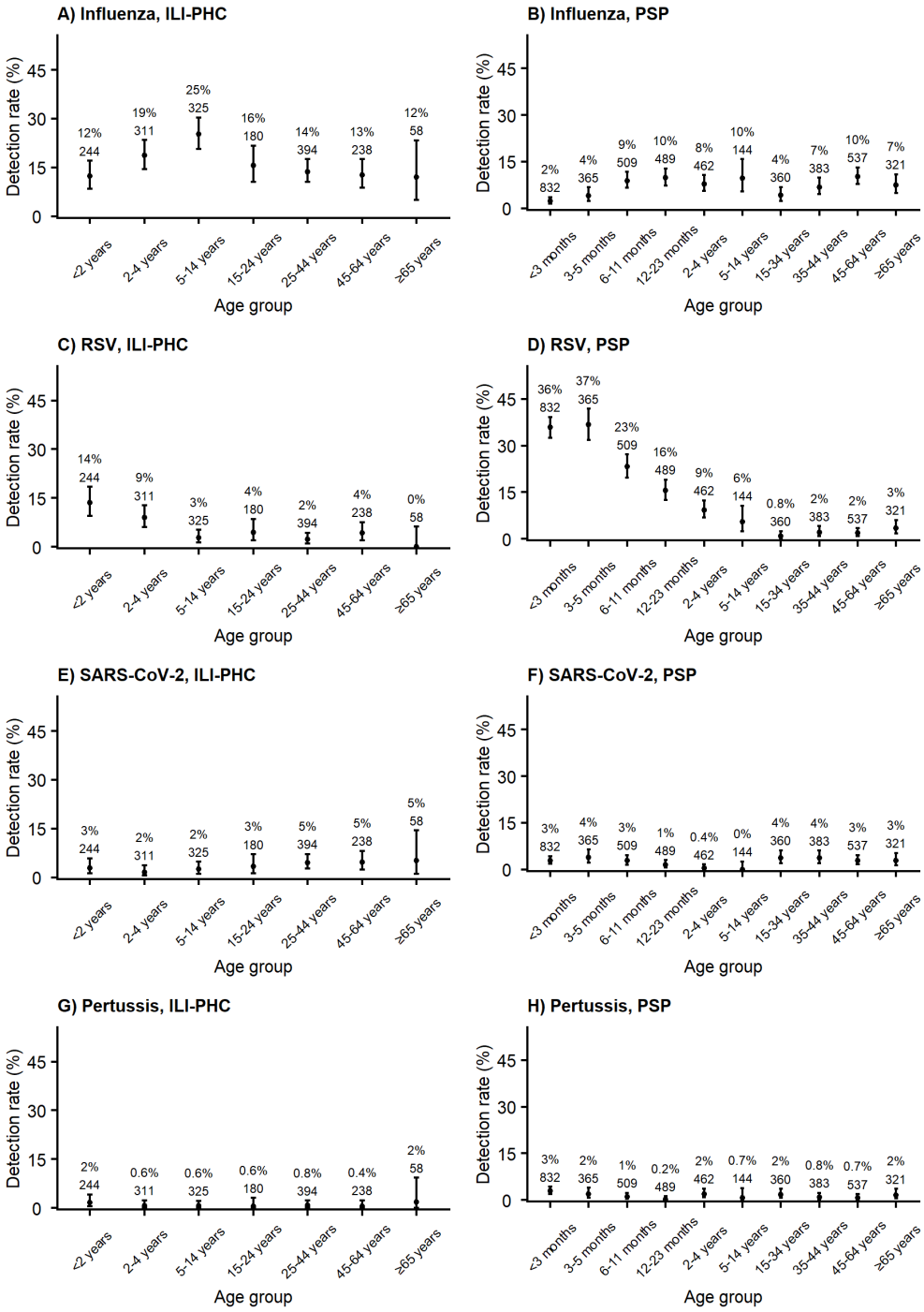

Figure 3. Detection rates (dot) with 95% confidence intervals (error bars) of influenza (A and B), respiratory syncytial virus (RSV) (C and D), SARS-CoV-2 (E and F), and *Bordetella pertussis* (G and H) in the influenza-like illness – public health clinics (ILI-PHC) and inpatient pneumonia surveillance in public hospitals (PSP) programmes by age, South Africa, 2024. The percentage above the error bar denotes the detection rate, with the denominator below.

Influenza

The 2024 influenza season began in week 17 (starting 22 April 2024) when the influenza detection rate (three-week moving average) breached the seasonal threshold and peaked in week 23 (starting 03 June 2024). Transmission peaked at the moderate level in ILI-PHC (Figure 4B), remained low in ILI-VW (Figure 4D), and influenza-associated morbidity in PSP reached the moderate level (Figure 4F). The season ended in week 41 (starting 07 October 2024).

The most commonly detected influenza subtypes and lineages were influenza A(H1N1)pdm09 (59%, 589/1001) and influenza B/Victoria (33%, 334/1001) (Figures 4A, 4C, and 4E). Among specimens positive for influenza A(H1N1)pdm09 that could be characterised with full genome sequencing, the most common subclade detected was C.1.9 (92%, 221/241) (Figures 5A and 5B), among specimens positive for influenza A(H3N2), the most common subclade detected was J.2 (86%, 19/22) (Figures 5C and 5D), and among specimens positive for influenza B/Victoria, the most common subclade detected was C.5.6 (56%, 66/118) (Figures 5E and 5F).

In the ILI-VW programme, influenza was detected in 27% (415/1538) of the tested specimens. Among these, the predominant subtypes and lineages were influenza A(H1N1)pdm09 at 69% (285/415) and B/Victoria at 27% (110/415) (Figure 4C).

In the ILI-PHC programme, out of the 1 750 specimens tested, 289 (17%) tested positive for influenza. Of these influenza-positive specimens, the predominant subtypes and lineages were influenza A(H1N1)pdm09 at 44% (127/289) and B/Victoria at 44% (126/289) (Figure 4A).

In the PSP, influenza was detected in seven per cent (297/4 402) of the tested specimens. Among these, the predominant subtypes and lineages were influenza A(H1N1)pdm09 at 60% (177/297) and B/Victoria at 33% (98/297) (Figure 4E).

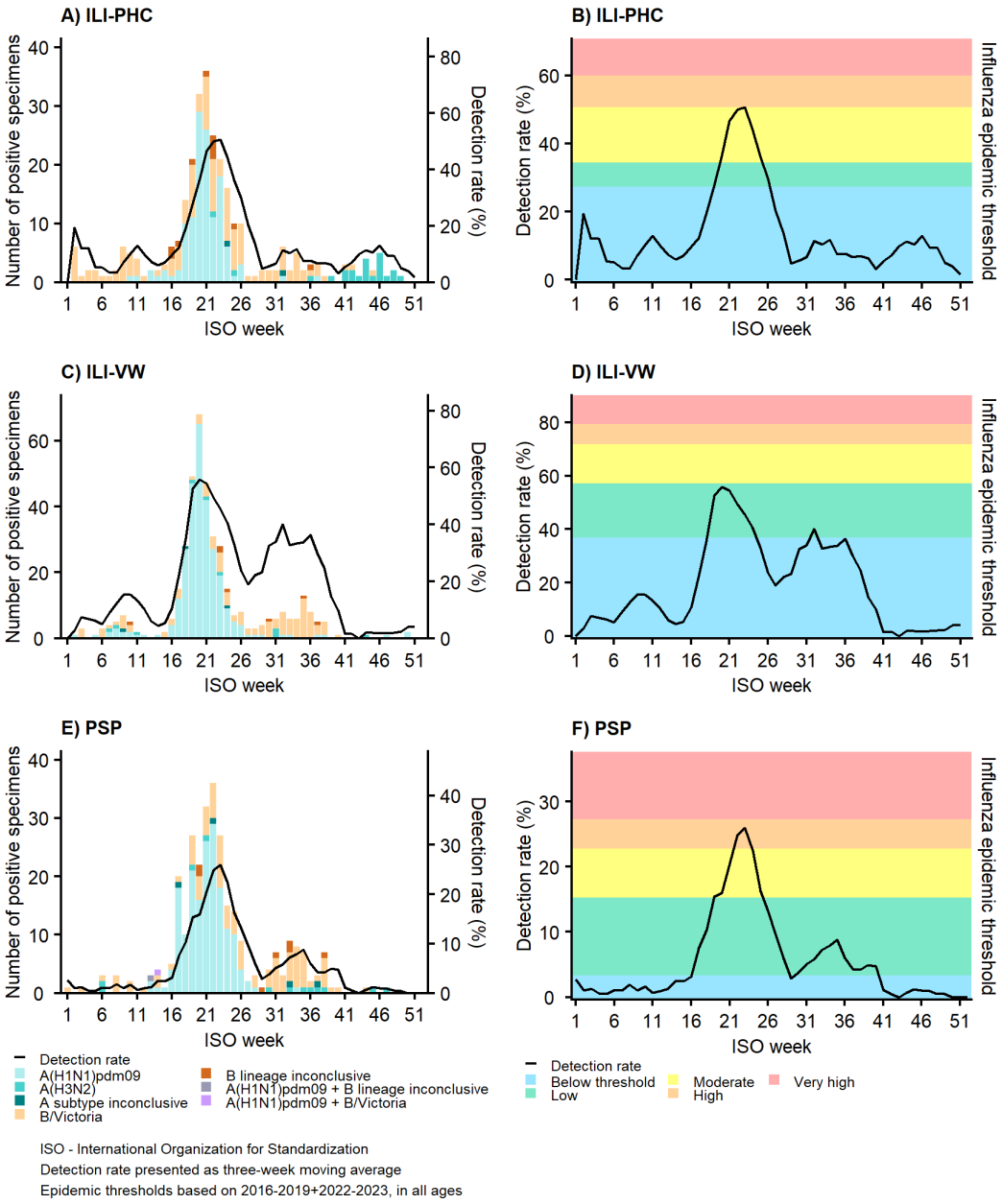

Figure 4. Number of laboratory-confirmed influenza cases and detection rate by subtype and lineage (A, C, and E) and epidemic threshold (B, D, and F) by week in all ages, from outpatient influenza-like illness (ILI) surveillance in public primary health care clinics (ILI-PHC)[1] (A-B), outpatient ILI surveillance in private general practitioner practices (ILI-VW)[2] (C-D), and inpatient pneumonia surveillance in public hospitals (PSP)[3] (E-F), South Africa, 2024.

[1]ILI-PHC sites were active in four provinces, including KwaZulu-Natal, Mpumalanga, the North West and the Western Cape.

[2]ILI-VW sites were active in eight provinces, including the Eastern Cape, Free State, Limpopo, Mpumalanga, the Northern Cape, Gauteng, the North West, and the Western Cape.

[3]PSP sites were active in six provinces, including the Eastern Cape (up to May 2024), Gauteng, KwaZulu-Natal, Mpumalanga, the North West, and the Western Cape.

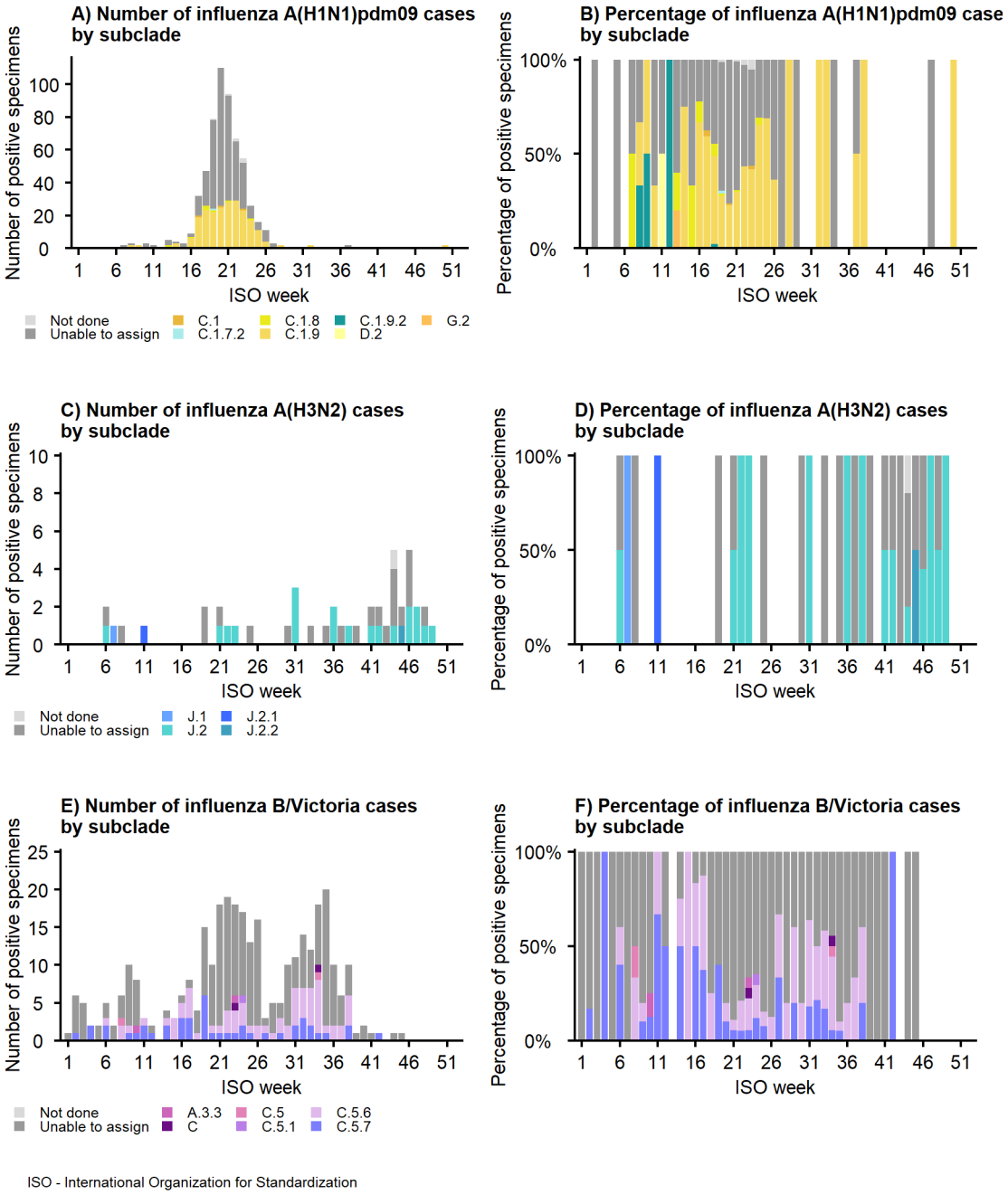

Figure 5. Combined number (A, C, and E) and percentage (B, D, and F) of influenza cases by subclade in all ages from three sentinel surveillance systems: outpatient influenza-like illness (ILI) surveillance in public primary health care clinics (ILI-PHC), outpatient ILI surveillance in private general practitioner practices (ILI-VW), and inpatient pneumonia surveillance in public hospitals (PSP), South Africa, 2024.

Respiratory syncytial virus

The RSV season preceded the influenza season and began in week six (starting 05 February 2024), when the detection rate (three-week moving average) among children aged <5 years in PSP crossed and remained above the seasonal threshold. The season peaked at moderate even in week 16 (starting 15 April 2024). The season ended in week 31 (starting 31 July 2024) (Figure 6D).

In the ILI-VW programme, RSV was detected in 3% (51/1 538) of the tested specimens. Among these, the predominant subgroup was RSV B at 76% (39/51). The percentage of RSV A was 20% (10/51), and two specimens could not be further characterised due to minimal viral genetic material (Ct ≥35) (Figure 6A).

Among specimens positive for RSV A that could be characterised with full genome sequencing, the most common subclade detected was A.D.5.1 (50%, 90/166) (Figures 7A and 7B), and among specimens positive for RSV B, the most common subclade detected was B.D.E.1 (90%, 401/447) (Figures 7C and 7D).

In the ILI-PHC programme, out of the 1 750 specimens tested, 97 (6%) tested positive for RSV. Of these RSV-positive specimens, the predominant subgroup was RSV B at 81% (79/97). RSV A was detected from 16 (16%) of specimens positive for RSV. There was one RSV A and B co-infection and one specimen that could not be subgrouped due to minimal viral genetic material (Figure 6B).

In the PSP, RSV was detected in 16% (709/4 402) of the tested specimens. Among these, the predominant subgroup was also RSV B at 67% (475/709), and 31% (221/709) subgrouped as RSV A. There were five RSV A and B co-infections and eight specimens that could not be subgrouped due to minimal viral genetic material (Figure 6C).

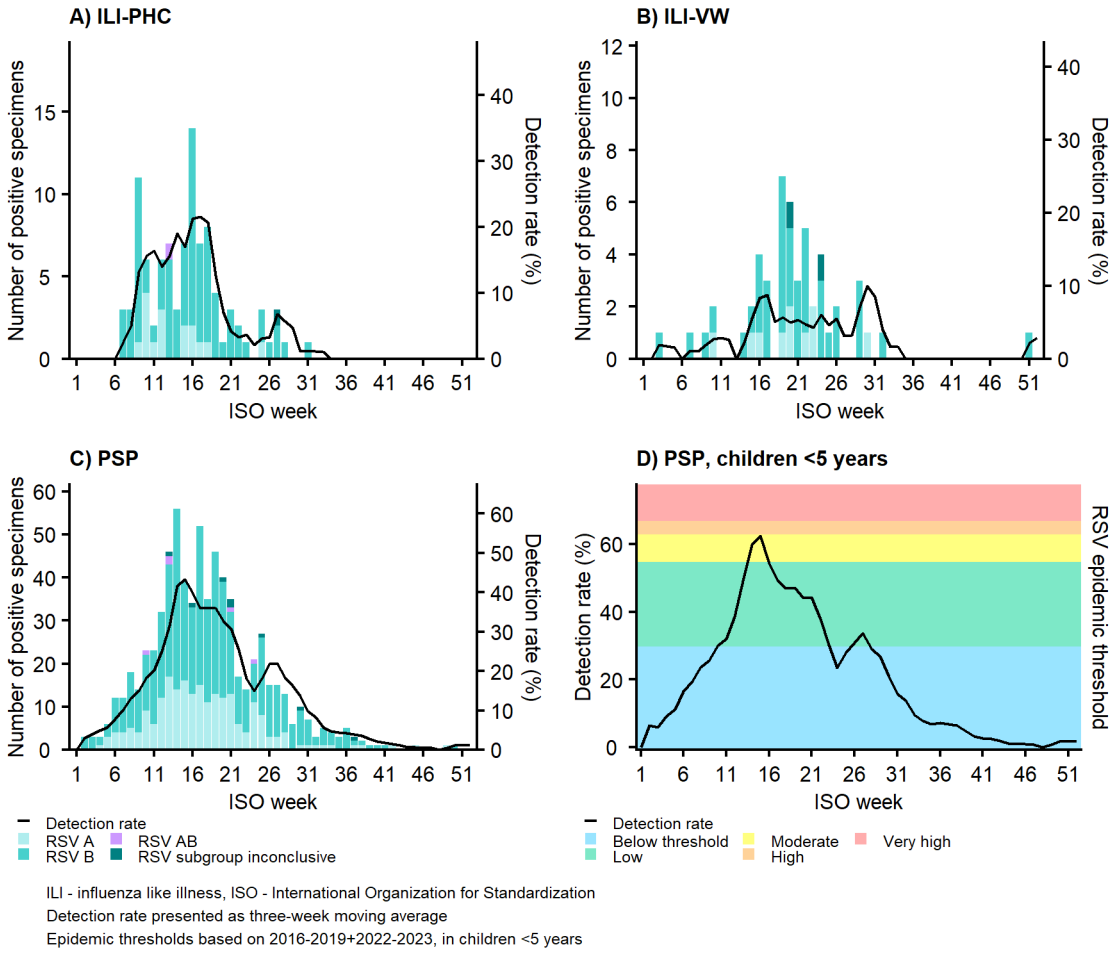

Figure 6. Number of laboratory-confirmed respiratory syncytial virus (RSV) cases and detection rate by subtype and lineage (A, B, and C) and epidemic threshold (D) by week in all ages, from outpatient influenza-like illness (ILI) surveillance in public primary health care clinics (ILI-PHC) (A), outpatient ILI surveillance in private general practitioner practices (VW) (B), and inpatient pneumonia surveillance in public hospitals (PSP) (C-D), South Africa, 2024.

[1]ILI-PHC sites were active in four provinces, including KwaZulu-Natal, Mpumalanga, the North West, and the Western Cape.

[2]ILI-VW sites were active in eight provinces, including the Eastern Cape, Free State, Limpopo, Mpumalanga, the Northern Cape, Gauteng, the North West, and the Western Cape.

[3]PSP sites were active in six provinces, including the Eastern Cape (up to May 2024), Gauteng, KwaZulu-Natal, Mpumalanga, the North West, and the Western Cape.

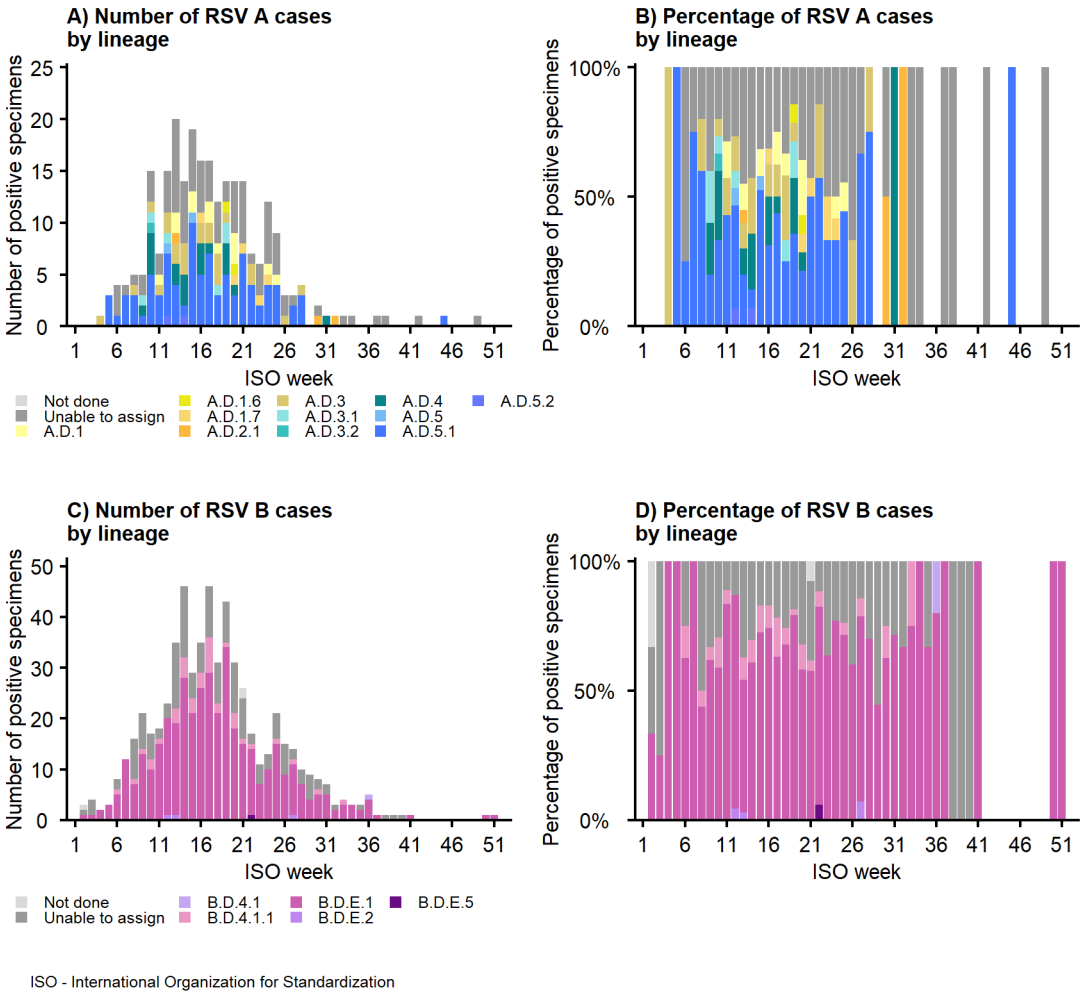

Figure 7. Combined number (A and C) and percentage (B and D) of respiratory syncytial virus (RSV) A and B cases by lineage in all ages from three sentinel surveillance systems: outpatient influenza-like illness (ILI) surveillance in public primary health care clinics (ILI-PHC), outpatient ILI surveillance in private general practitioner practices (VW), and inpatient pneumonia surveillance in public hospitals (PSP), South Africa, 2024.

SARS-CoV-2

SARS-CoV-2 circulated throughout the year (Figures 8B, 8F), with a brief increase to a low threshold from week 28 through week 31 (08 July – 04 August 2024) in the ILI-VW programme (Figure 8D). Detection rates increased again slowly from week 41 (starting 07 October) until the end of the year, breaching the low threshold in all programmes in the final two weeks of the year (Figures 8B, 8D, and 8F). Overall, the annual detection rate for SARS-CoV-2 was 4% (323/7 690). In 2024, Omicron lineage BA.2.86 (clade 23I) predominated in the first quarter of the year, with Omicron lineage JN.1 (clade 24A) predominating the remainder of the year (Figures 8A, 8C, E8, 9A, and 9B). The SARS-CoV-2 detection rate was 10% (153/1 538) in ILI-VW, 3% (58/1 750) in ILI-PHC and 3% (112/4 402) in PSP.

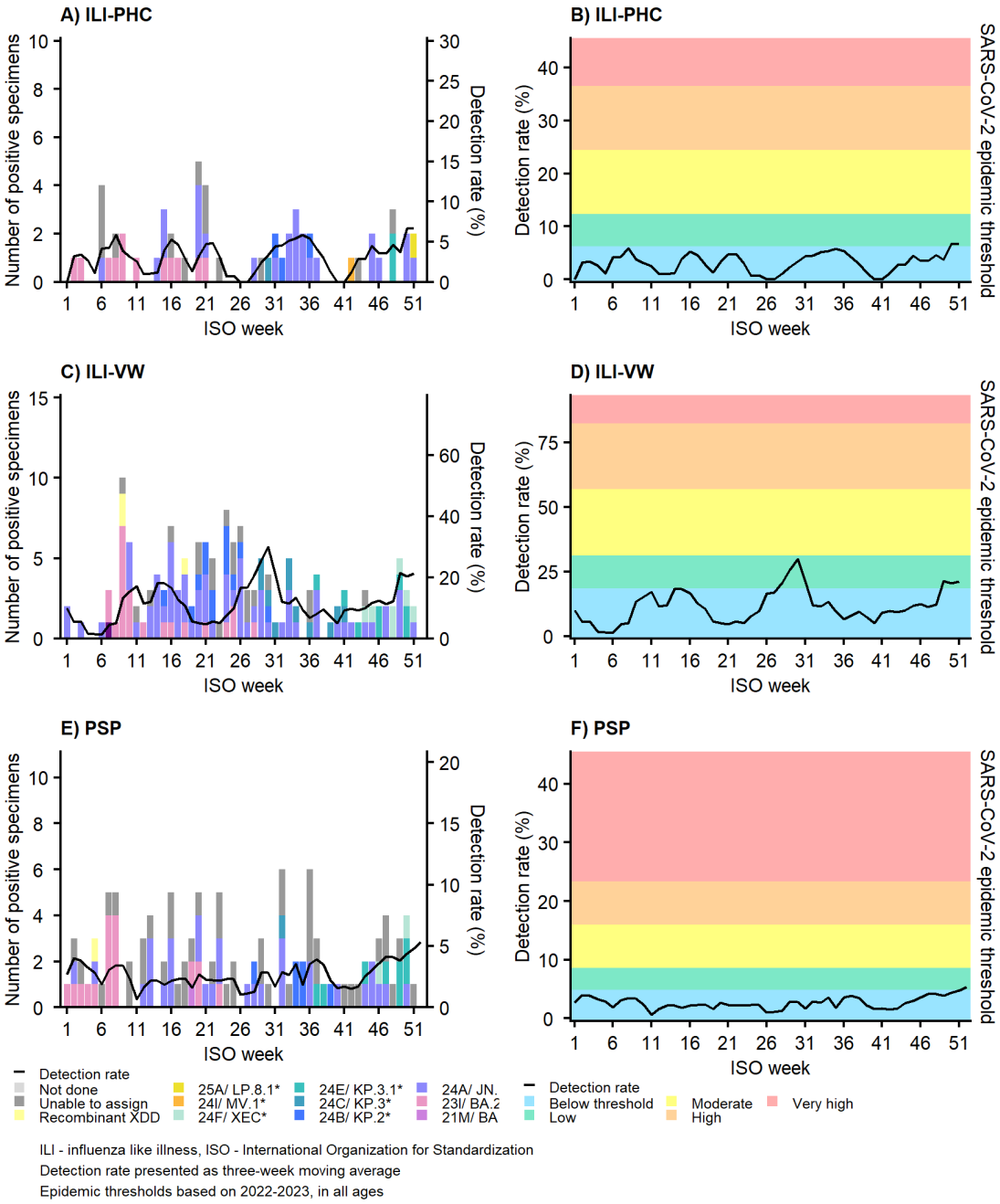

Figure 8. Number of laboratory-confirmed SARS-CoV-2 cases and detection rate by variant (A, C, and E) and epidemic threshold (B, D, and F) by week in all ages, from outpatient influenza-like illness (ILI) surveillance in public primary health care clinics (ILI-PHC) (A), outpatient ILI surveillance in private general practitioner practices (VW) (B), and inpatient pneumonia surveillance in public hospitals (PSP) (C-D), South Africa, 2024.

[1]ILI-PHC sites were active in four provinces, including KwaZulu-Natal, Mpumalanga, the North West, and the Western Cape.

[2]ILI-VW sites were active in eight provinces, including the Eastern Cape, Free State, Limpopo, Mpumalanga, the Northern Cape, Gauteng, the North West, and the Western Cape.

[3]PSP sites were active in six provinces, including the Eastern Cape (up to May 2024), Gauteng, KwaZulu-Natal, Mpumalanga, the North West, and the Western Cape.

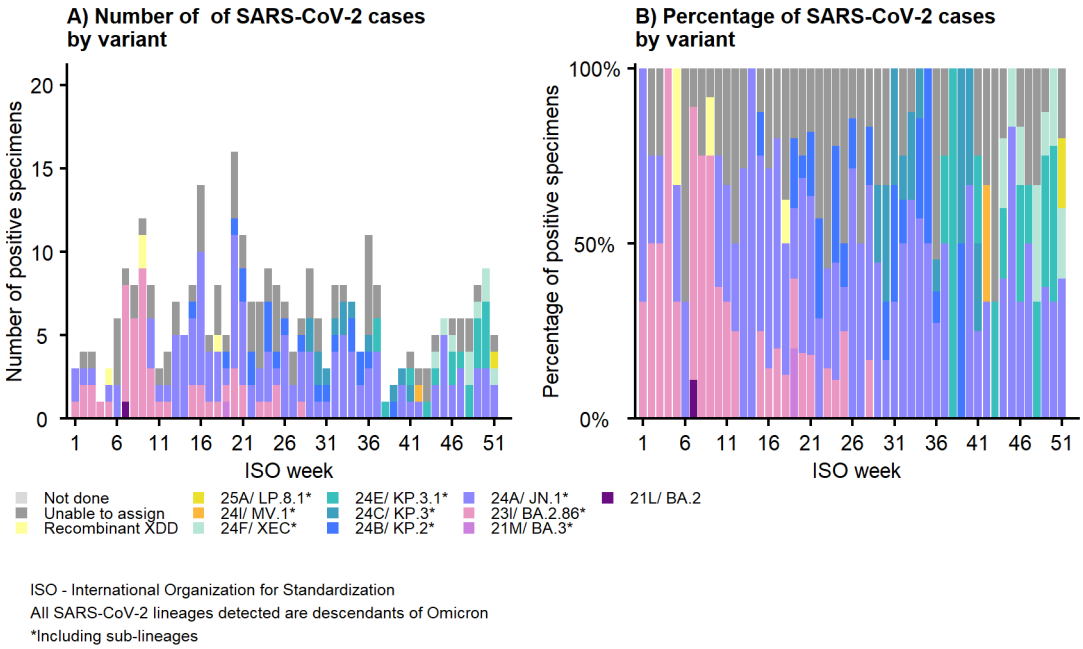

Figure 9. Combined number (A) and percentage (B) of SARS-CoV-2 cases by Omicron subclade and lineage in all ages from three sentinel surveillance systems: outpatient influenza-like illness (ILI) surveillance in public primary health care clinics (ILI-PHC), outpatient ILI surveillance in private general practitioner practices (VW), and inpatient pneumonia surveillance in public hospitals (PSP), South Africa, 2024.

Bordetella pertussis

B. pertussis circulation remained low throughout the year, with only sporadic cases detected from ILI-PHC (Figure 10A) and weekly detection rates remaining below 10% in PSP (Figure 10B). A total of 79 cases were identified from 6 149 specimens tested (1%). The detection rate for *B. pertussis* was 0.8% (14/1 749) from ILI-PHC and 1% (65/4 400) from PSP.

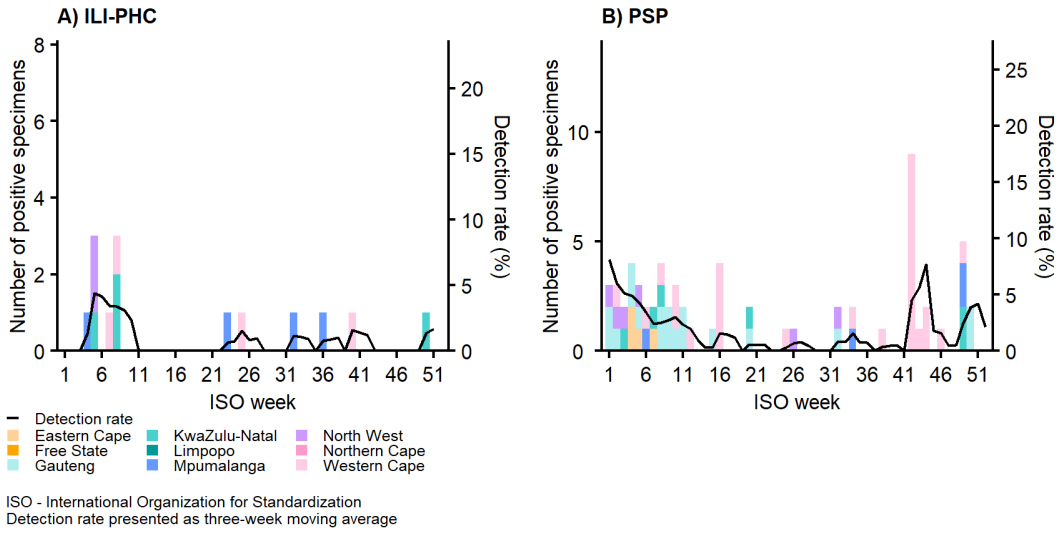

Figure 10. Number of laboratory-confirmed *Bordetella pertussis* cases and detection rate by province and week in all ages, from outpatient influenza-like illness (ILI) surveillance in public primary health care clinics (ILI-PHC) (A) and inpatient pneumonia surveillance in public hospitals (PSP), South Africa, 2024.

[1]PSP Eastern Cape site closed on 31 May 2024.

Discussion

In 2024, we tested samples from over 7 500 individuals presenting to syndromic surveillance sites with ILI or LRTI for the presence of respiratory pathogens. The influenza season was mostly moderate, with influenza A(H1N1)pdm09 predominating. The RSV season was also moderate, with both RSV A and B being detected, although RSV B was predominant. Circulation of SARS-CoV-2 occurred throughout the year, with no clear seasonal pattern, and *B. pertussis* detection was sporadic.

The influenza season occurred from 22 April through 07 October 2024, which is typical timing compared to previous seasons, although the season was longer than reported previously.[7] Similar to the 2023 season, the 2024 influenza season was moderate based on transmission levels and morbidity. The predominant subtype detected in 2024 was influenza A(H1N1)pdm09, with influenza B/Victoria circulation towards the end of the season in all programmes and influenza A(H3N2) in ILI PHC from week 41. The 2023 season showed mostly influenza A(H1N1)pdm09 detected with very limited influenza B/Victoria circulation.[14] We did not detect any B/Yamagata in the 2024 season, with this lineage last described in South Africa in 2019,[15] similar to what has been observed globally.[16] During the 2024 influenza season in other Southern Hemisphere countries, Australia observed a predominant influenza A(H3N2) season; some South American countries, such as Argentina and Chile, also saw an A(H3N2) season with the B/Victoria tail, whereas Paraguay and Brazil saw both A(H1N1)pdm09 and A(H3N2) circulating with the B(Victoria) tail. Ecuador saw an A(H1N1)pdm09 season with the B/Victoria tail.[17]

The detection rate of influenza in outpatients was the highest in children aged 5–14 years and the highest in inpatients aged 1–2 years, 5–14 years, and 45–64 years. This highlights that although children aged 5–14 years may not be at the highest risk for severe disease, their high infection rates contribute to overall influenza burden in the population.[18] Of inpatients 15 years and older testing positive for influenza, half were PLWHIV, and 40% had underlying conditions other than HIV. Extremes of age and underlying conditions are known risk factors for severe influenza disease.[1,2] The World Health Organization (WHO) recommends the vaccination of individuals at risk for severe disease, including older adults, pregnant women, and those with underlying conditions.[19] In South Africa, risk groups targeted for the National Department of Health (NDoH) seasonal influenza campaign are healthcare workers, individuals aged ≥65 years, those with specific underlying conditions (including HIV), and pregnant women.[20] Sentinel influenza surveillance is an important part of pandemic preparedness and complements targeted surveillance for emerging zoonotic influenza viruses amongst people potentially exposed to avian or other influenza viruses at the animal-human interface. Suspected zoonotic influenza in humans or a cluster of unexplained respiratory illness in humans is a category 1 notifiable medical condition (NMC). Updated case definitions are available in the NMC case definitions flipchart on the NICD website.[21]

The detection rate of RSV in hospitalised patients was highest in children younger than six months, decreasing with increasing age, but still high in those aged 12–23 months. Over 60% of children <15 years of age testing positive for RSV in inpatient surveillance were aged <6 months. The high burden of RSV disease in young infants underscores the need to prioritise implementation of the recently approved maternal RSV vaccine and long-acting monoclonal antibodies for use in infants.[22] Clinical trials and post-implementation studies have demonstrated that these products lead to substantial reductions in infant hospitalisations during the first 3–6 months of life.[22–25] The WHO recommends that all countries should introduce products for RSV prevention in infants given the high disease burden.[26] RSV vaccination has also been introduced in older adults in some high-income countries, with over 70% effectiveness against severe RSV-associated disease in adults over 60 years.[23,26,27] In our inpatient surveillance amongst patients 15 years and older, while detection rates are low, a third of cases are in adults aged 65 years and older. The in-hospital mortality for adult inpatients with RSV infection was 16%.

Detection rates for SARS-CoV-2 were lower compared to influenza and RSV, with similar detection rates across age groups but remaining below five per cent. All SARS-CoV-2 lineages circulating were derived from the Omicron variant, and while the dominant lineage circulating changed from Omicron lineage BA.2.86 to JN.1, no specific increases or signals for more severe disease were linked to the emergence of this or any other lineages. South Africa also performs wastewater surveillance, and the circulation of SARS-CoV-2 throughout the year was also reported from wastewater, along with the increase towards the end of the year.[28] However, even with the increase at the end of the year, transmission and morbidity remained low. The seasonal thresholds for SARS-CoV-2 used in this report were estimated using the mean plus standard deviation method as described by Sinnathamby *et al*.[12] For this report, threshold estimation was necessarily limited to two post-pandemic years of data, during which substantial SARS-CoV-2 transmission, including

Omicron-driven waves in 2022, continued to occur. As a result, the derived thresholds may be higher than would be expected under more stable endemic conditions. Nonetheless, these estimates provide a pragmatic starting point for monitoring future trends, and thresholds will be refined iteratively as additional years of post-pandemic data become available.

The WHO has highlighted the importance of sustained influenza and SARS-CoV-2 surveillance, especially genomic surveillance to track the emergence of new potential SARS-CoV-2 variants and influenza subtypes and lineages.[29] In addition, sufficient numbers of individuals enrolled in surveillance programmes are essential for vaccine effectiveness estimation and to identify and evaluate the emergence of new influenza lineages. However, surveillance capacity was reduced in 2024 due to funding constraints, resulting in the closure of five hospital surveillance sites before the start of the influenza season, including two sites in the GP, one in the EC, and two in the WC. Additional site closures remain possible should further funding reductions occur. These losses have reduced geographical representativeness and limited sample sizes available for genomic analyses, risk factor assessments, and the monitoring of temporal trends, potentially constraining the sensitivity of the surveillance system to detect emerging patterns. Ongoing national respiratory viral surveillance is an essential component of pandemic preparedness, and sustaining these programmes should be prioritised.

Following the increased detection of pertussis after the COVID-19 pandemic from mid-2022 to 2023,[14,30] we observed low detection levels in both outpatient and inpatient surveillance in 2024. The detection rate among inpatients was the highest in children younger than six months, with over half of pertussis cases in children being in infants younger than three months. South Africa implemented maternal vaccination for pertussis in 2024, which will help protect this vulnerable age group.[31] Pertussis is a category 1 NMC, yet clinical suspicion and testing for pertussis are highly variable, likely leading to substantial underestimation of burden. Ongoing sentinel surveillance will be important to describe the epidemiology and the impact of this intervention through a systematic programme.

Conclusion

In 2024, influenza remained the most frequently detected respiratory pathogen among adults presenting with ILI or hospitalised with lower respiratory tract infection, whereas RSV was the predominant pathogen in children, particularly in those hospitalised with pneumonia. The highest burden of RSV was observed in infants under six months, highlighting a critical target population for preventive interventions, including maternal RSV immunisation as well as long-acting monoclonal antibodies for infants. These findings underscore the continuing impact of RSV on young children and the importance of age-targeted strategies for respiratory pathogen prevention in South Africa.

Recommendations

- Considering that influenza and RSV seasons have returned to typical pre-pandemic patterns, influenza vaccination among risk groups is strongly recommended to protect against infection and severe illness. Ideally, the influenza vaccine should be administered prior to the start of the influenza season, although it may also be beneficial if administered after influenza circulation has started. Individuals at risk for severe influenza illness are strongly encouraged to vaccinate, either at a public health clinic or privately through general practitioners and pharmacies. High-risk groups include pregnant women and women during the six-week post-partum period, individuals living with HIV, those with chronic conditions such as diabetes, lung disease, tuberculosis, heart disease, renal disease, and obesity, and older individuals (aged ≥65 years). Healthcare workers are also recommended to receive influenza vaccination.
- To minimise the transmission of seasonal influenza and RSV, non-pharmaceutical interventions recommended during the COVID-19 pandemic (social distancing, staying home when ill, wearing masks, and hand washing/sanitising) can be utilised by persons experiencing respiratory symptoms and during periods of high virus circulation, especially when in contact with individuals at risk of severe respiratory disease.
- The Department of Health should implement RSV prevention strategies for infants. These are maternal immunisation and single-dose long-acting infant monoclonal antibodies.
- To reduce the burden of pertussis, it is crucial for National and Provincial Departments of Health to enhance routine immunisation coverage and promote maternal immunisation strategies. Strengthening the Expanded Programme on Immunisation will ensure high uptake of the pertussis-containing vaccine (DTaP) in infants and young children, including receiving all scheduled doses at six, 10, and 14 weeks of age as well as, importantly, boosters at 18 months and six years for which coverage rates are low. Catch-up campaigns can address missed vaccinations due to pandemic-related disruptions. Additionally, vaccinating pregnant women with Tdap during the second or third trimester (27–36 weeks) will provide passive immunity to newborns, who are at the highest risk of severe disease.
- Syndromic respiratory illness surveillance should be sustained (and expanded, should resources become available) to allow ongoing systematic monitoring of disease trends, circulating strains, impact of intervention(s), identification of outbreaks, and risk factors for severe illness due to respiratory pathogens. Weekly and annual reports can help to inform policymakers (such as the NDoH or WHO) for decision-making. This is especially important as new vaccines and monoclonal antibodies to prevent RSV become available, and as maternal pertussis vaccination is included in the South African routine vaccination programme.

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Conflict of interest

The authors report no conflict of interest, other than the source of funding noted above.

Ethics clearance/considerations

The Severe Acute Respiratory Infection and SRI protocols were approved by the University of the Witwatersrand Human Research Ethics Committee (Wits HREC) (protocol number M081042), the University of

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