NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES
Division of the National Health Laboratory Service

Centre for Respiratory Diseases and Meningitis
National Institute for Communicable Diseases
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Cumulative invasive pneumococcal disease case numbers reported by the GERMS-SA surveillance programme, 1 January 2012 to 30 April 2019

GERMS-SA surveillance programme

- GERMS-SA is a national, active, laboratory-based surveillance system initiated in 2003.
- Invasive pneumococcal disease (IPD) cases defined as hospitalised individuals with *Streptococcus pneumoniae* detected from normally sterile-site specimens (e.g. cerebrospinal fluid, blood or joint fluid).
- Repeat isolates from the same individual within 21 days were excluded.
- ~190 laboratories each year send reports and isolates.
- Age, sex, date of specimen collection, and source of specimen were captured.
- Pneumococcal isolates were serotyped by Quellung reaction using specific antisera (Statens Serum Institute, Copenhagen, Denmark). Culture-negative/bacterial antigen detection test positive, or isolates that lost viability were confirmed positive using a real-time *lyt*A PCR[1] and serotyped using an adaption from the method described by Azzari *et al*.[2] This molecular assay includes targets for 42 serotypes and covers all serotypes included in PCV13. Only samples with an initial *lytA* PCR ct value of ≤35 were included. Where ct value was ≤35 but no serotype could be identified by including the 42 targets, serotype was classified as non-vaccine type. Where *lytA* PCR ct value was ≥36, serotype was classified as unknown and was not included in graphs. Where the PCR target could not distinguish between vaccine and non-vaccine serotype, serotype was classified as unknown and not included in the figures (targets: 18ABC, 18ABCF, 7AF, 9ALVN and 9AV).
- **Cumulative graph case numbers include viable isolates and those non-viable but characterised using molecular diagnostic techniques.**
- Figures 1 – 3 are for cases < 5 years, and Figures 4 – 6 for cases 5 years and older. Cases with unknown age were excluded from the figures.
- There are three graphs for each age group:
  - Disease caused by any of the seven serotypes in PCV7 (4, 6B, 9V, 14, 18C, 19F and 23F)
  - Disease caused by any of the six additional serotypes in PCV13 but not in PCV7 (1, 3, 5, 6A, 7F, 19A)
  - Disease caused by any serotypes not in PCV13
- Figures showing number of viable isolates submitted to GERMS-SA from 2008 to 2012 can be found in the appendix at the end of this report.
- More information on the GERMS-SA system available at: http://www.nicd.ac.za/centres/division-of-public-health-surveillance-and-response/

PCV vaccine introduction in South Africa

- The 7-valent pneumococcal conjugate vaccine (PCV7) was introduced into the South African Expanded Programme on Immunisation in April 2009, with no catch-up vaccination campaign.
- There was a graded replacement of PCV7 by 13-valent pneumococcal conjugate vaccine (PCV13) in 2011. By June 2011 all provinces were using PCV13.

- There was a limited PCV13 catch-up campaign in 2011 and 2012.
- WHO/UNICEF vaccine coverage estimates for receiving a third dose of the PCV vaccine in South Africa are 10% in 2008, 58% in 2009, 62% in 2011, 70% in 2012, 69% in 2013, 72% in 2014, 77% 2015, 69% in 2016 and 60% in 2017.[3]
- The effect of the vaccine on IPD in South Africa has been described.[4]

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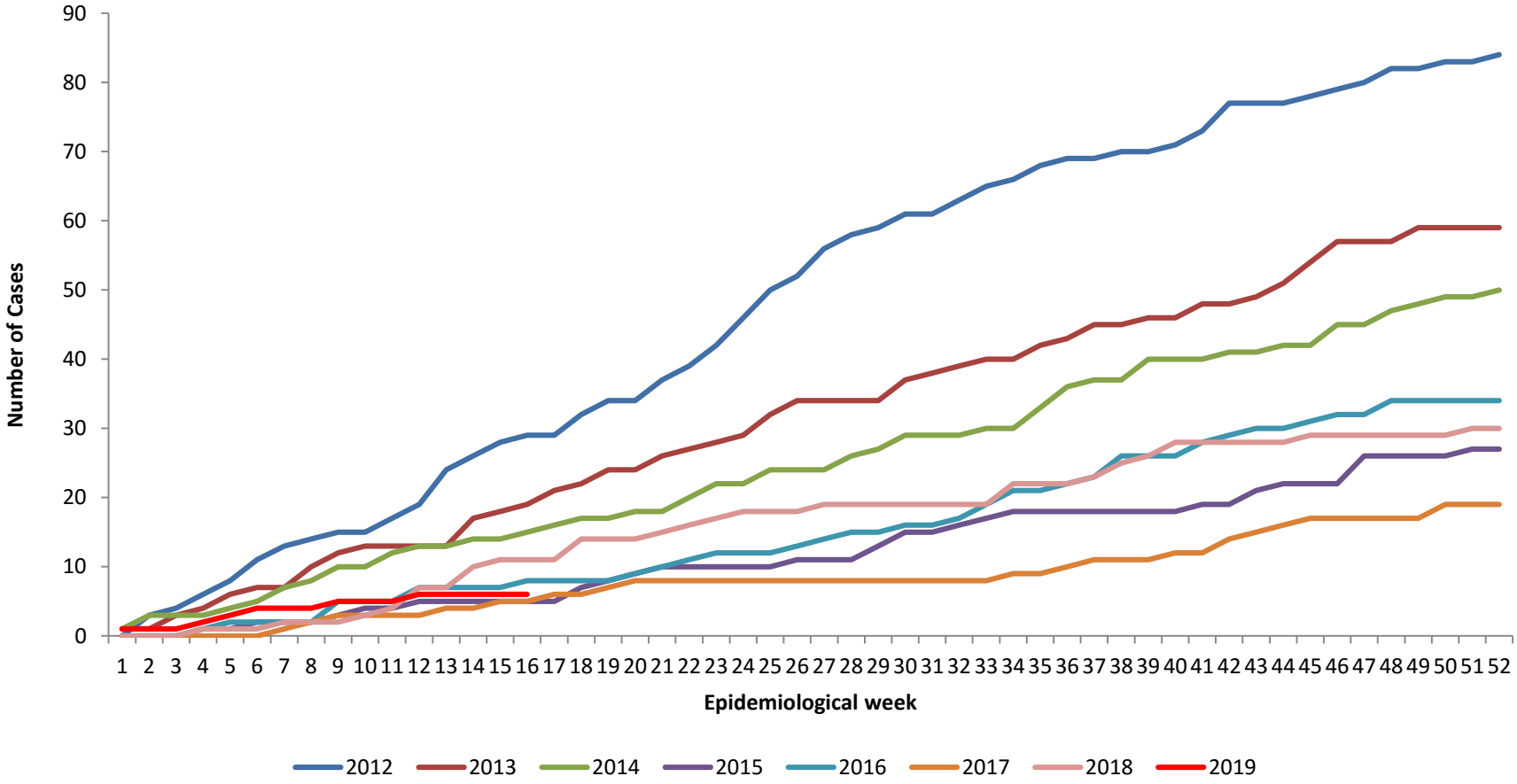

Figure 1. Cumulative weekly number of disease episodes of invasive pneumococcal disease due to any of the seven serotypes (4, 6B, 9V, 14, 18C, 19F and 23F) in PCV7: children <5 years of age in South Africa, from 2012 to date. Viable isolates and those serotyped using molecular techniques included.

Data are provisional as reported to date.

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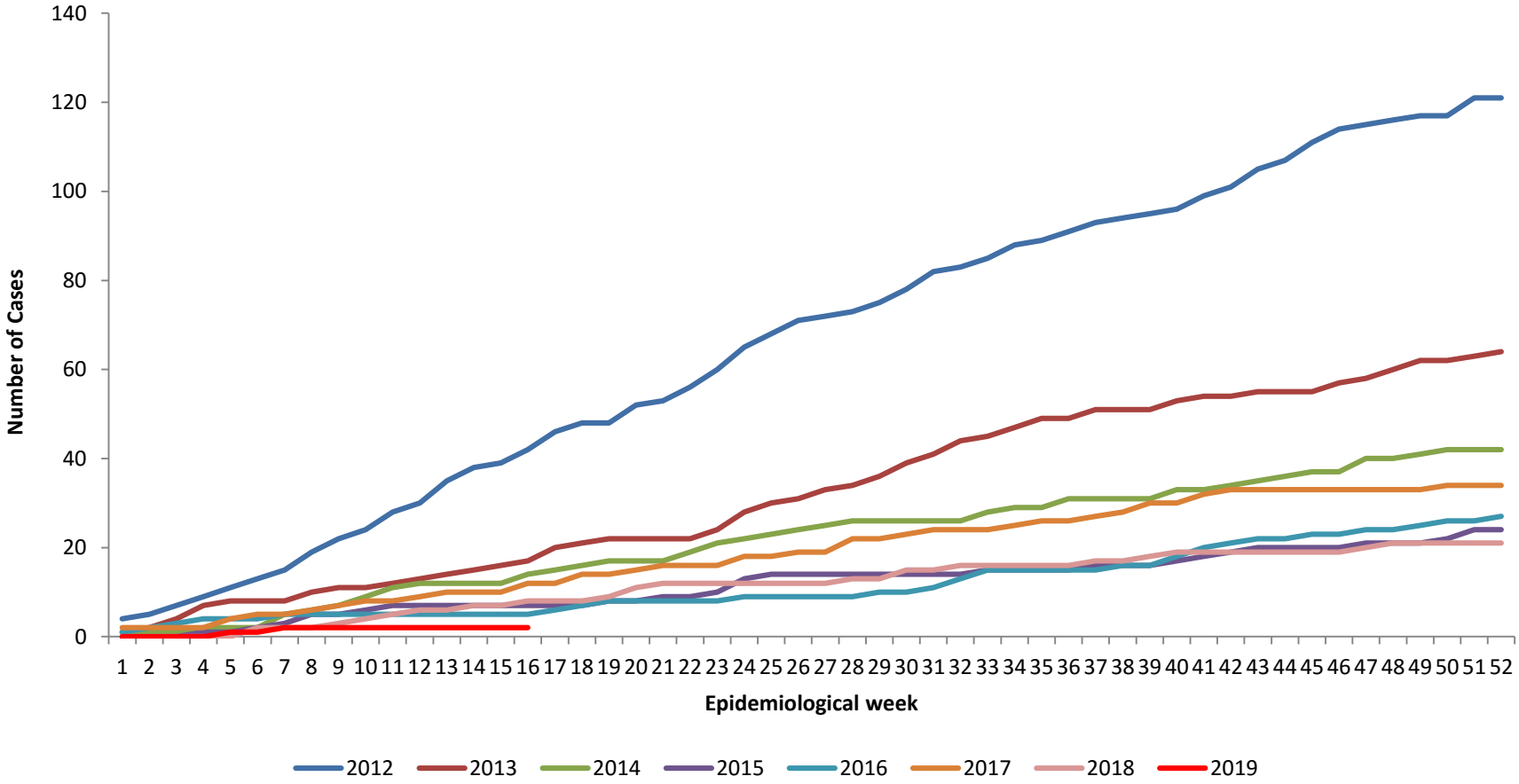

Figure 2. Cumulative weekly number of disease episodes of invasive pneumococcal disease due to any of the six additional (1, 3, 5, 6A, 7F, 19A) serotypes in PCV13 but not in PCV7: children <5 years of age in South Africa, from 2012 to date. Viable isolates and those serotyped using molecular techniques included. (Note: There is reported cross protection between 6A and 6B which is included in PCV7[5])

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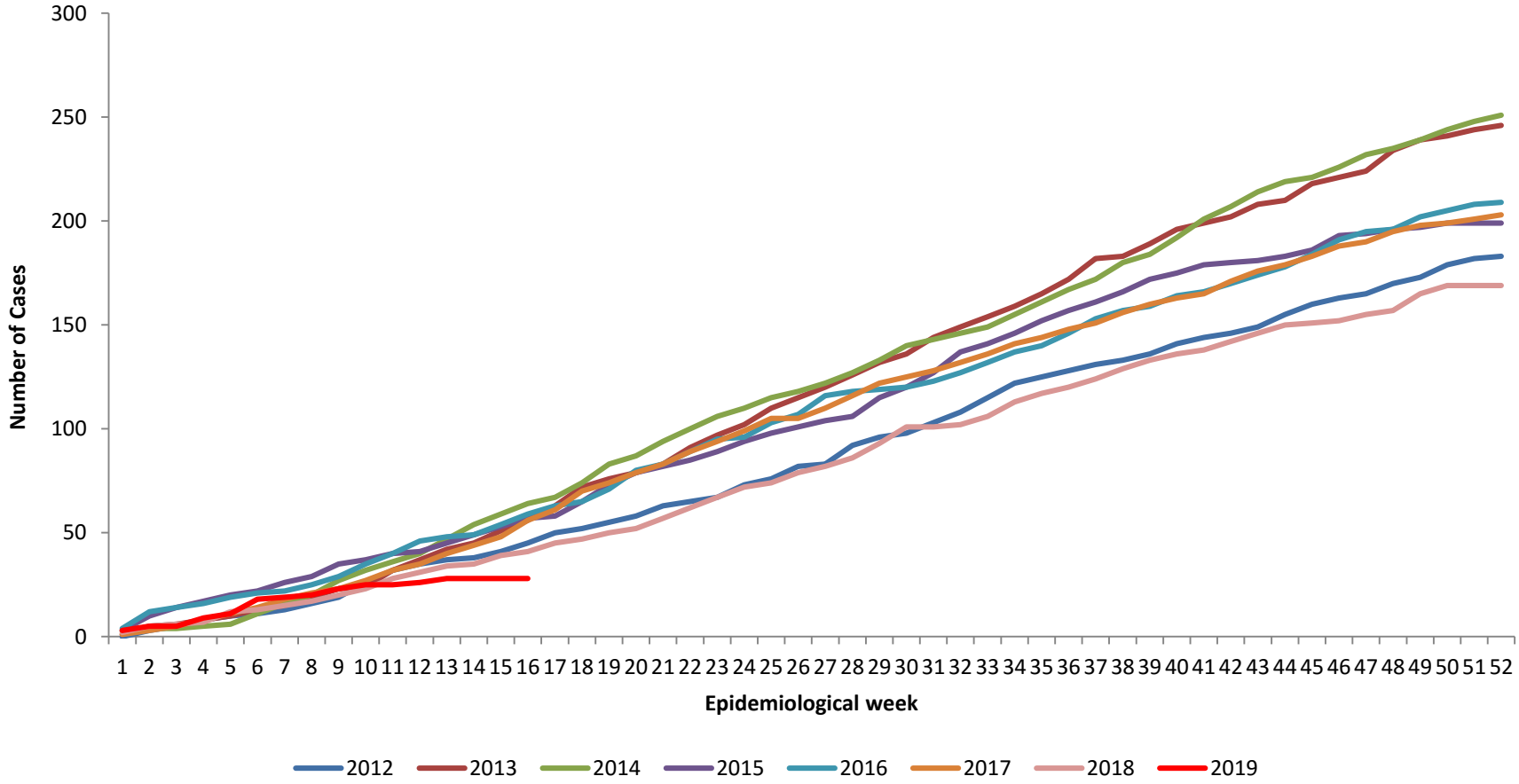

Figure 3. Cumulative weekly number of disease episodes of invasive pneumococcal disease due to any of the serotypes not in PCV13: children <5 years of age in South Africa, from 2012 to date. Viable isolates and those serotyped using molecular techniques included.

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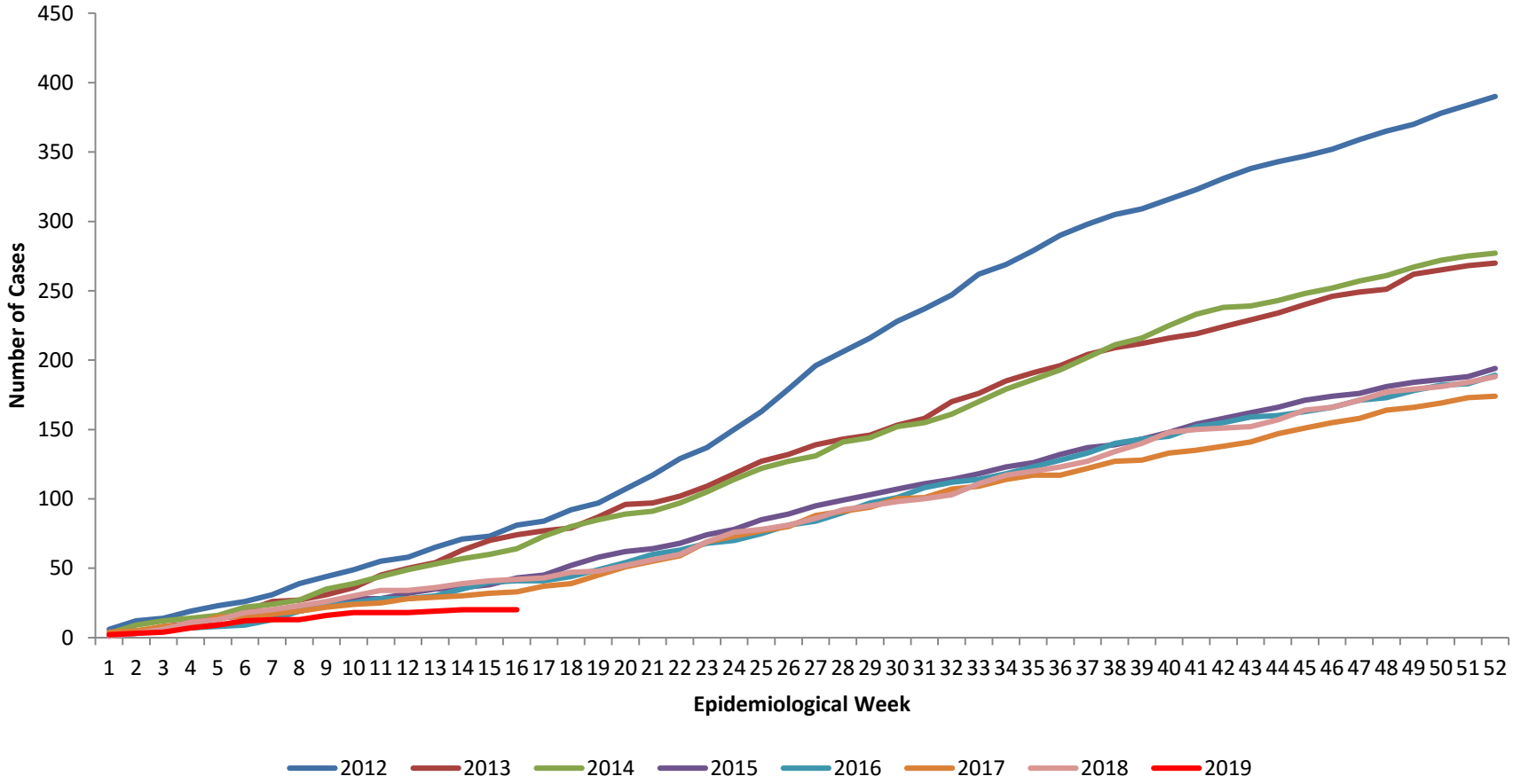

Figure 4. Cumulative weekly number of disease episodes of invasive pneumococcal disease due to any of the seven serotypes (4, 6B, 9V, 14, 18C, 19F and 23F) in PCV7: individuals ≥5 years of age in South Africa, from 2012 to date. Viable isolates and those serotyped using molecular techniques included.

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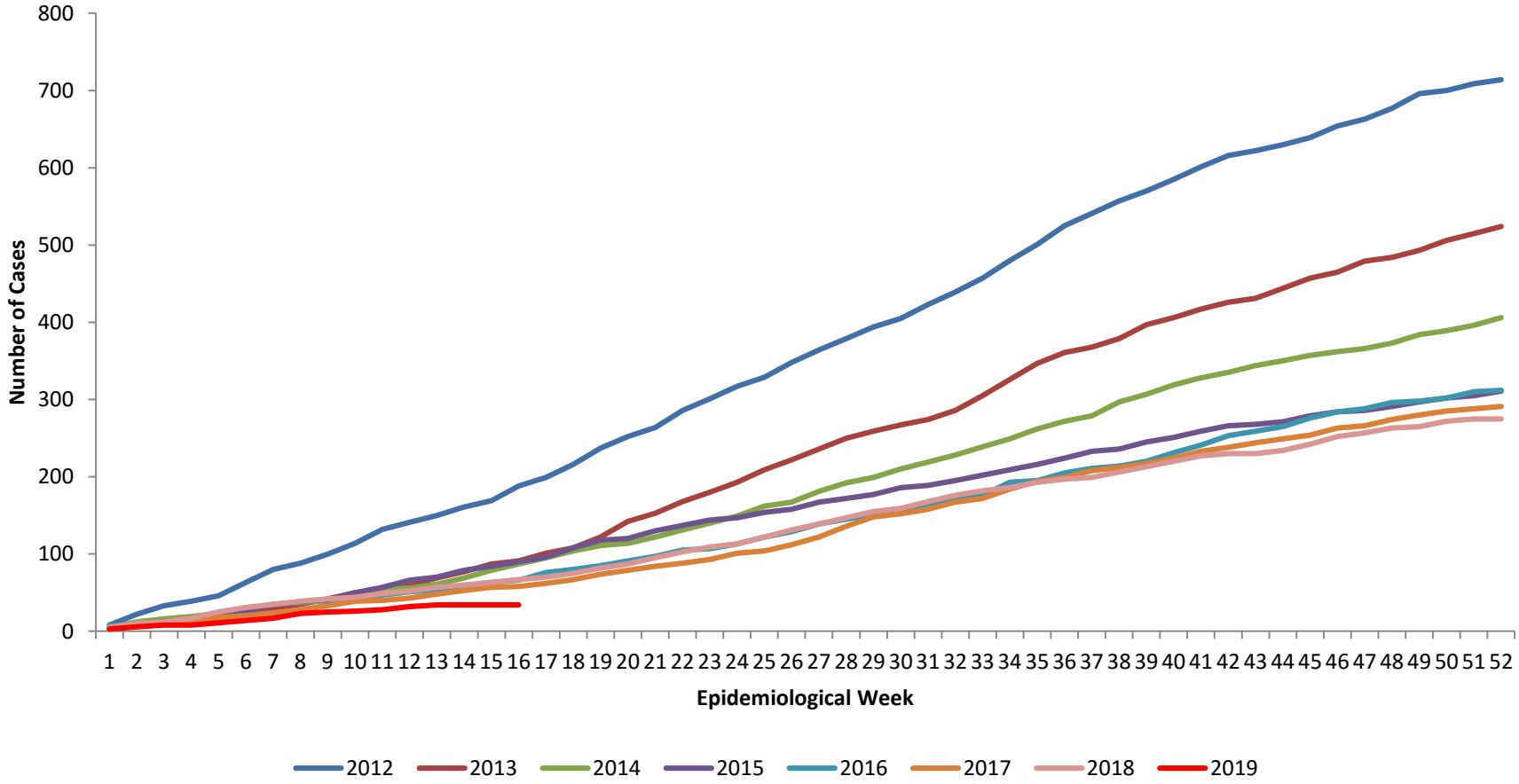

Figure 5: Cumulative weekly number of disease episodes of invasive pneumococcal disease due to any of the six additional (1, 3, 5, 6A, 7F, 19A) serotypes in PCV13 but not in PCV7: individuals ≥5 years of age in South Africa, from 2012 to date. Viable isolates and those serotyped using molecular techniques included (Note: There is reported cross protection between 6A and 6B which is included in PCV7[5])

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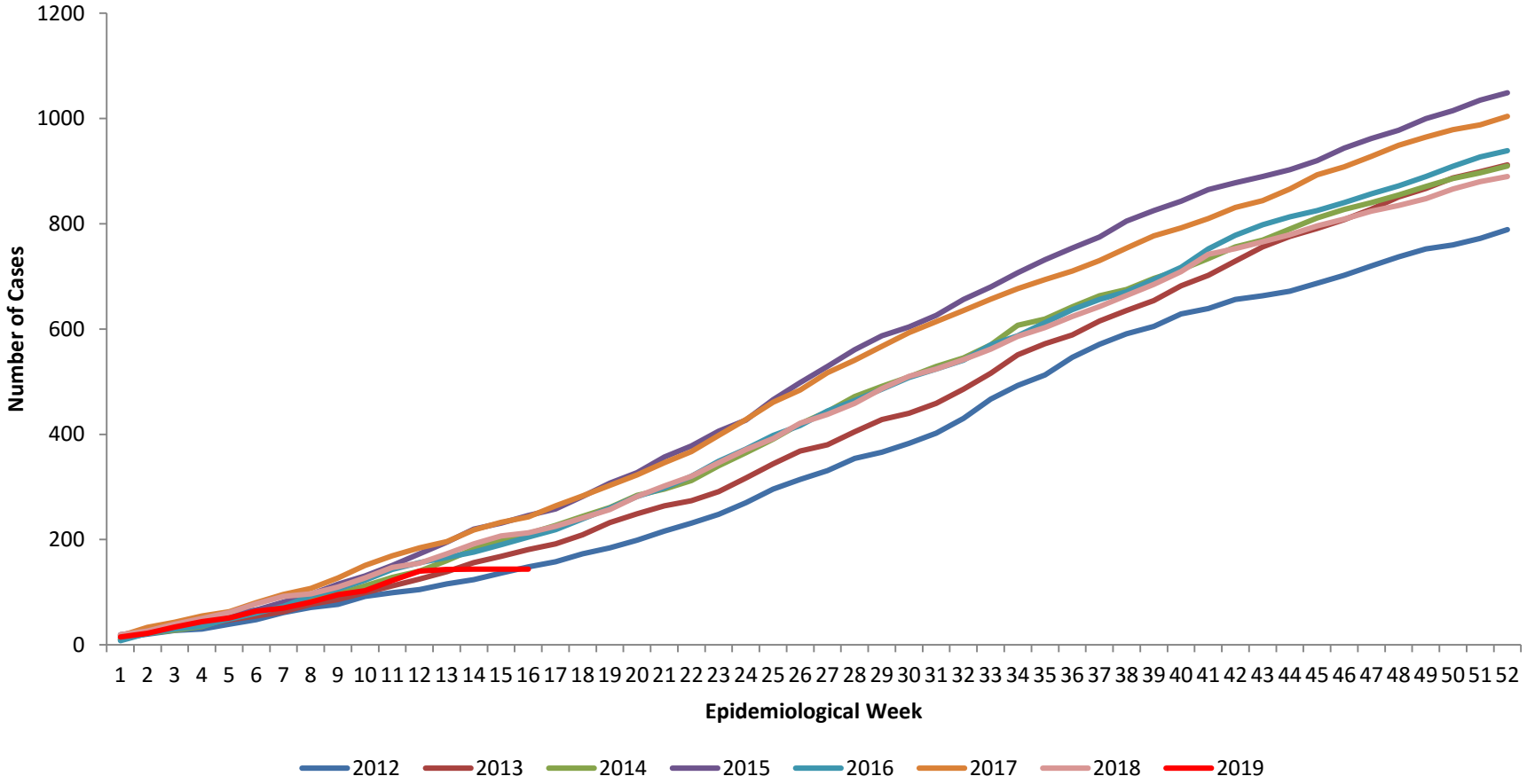

Figure 6. Cumulative weekly number of disease episodes of invasive pneumococcal disease due to any of the serotypes not in PCV13: individuals ≥5 years of age in South Africa, from 2012 to date. Viable isolates and those serotyped using molecular techniques included.

Data are provisional as reported to date.

Missing information

Age was unknown for 916 of the cases (Table 1). By the time that this report was produced there was only three viable isolates from 2018 and four viable isolates from cases from 2019 with pending serotype results (Table 2). For 84 isolates in the 8-year period, serotype could not be identified due to high ct value during *lytA* PCR, or PCR serotype target not distinguishing between vaccine and non-vaccine serotype.

Table 1. Isolates with missing age; number of viable, non-viable isolates and audit cases identified, January 2012 to date.

	Age missing, n(%)	Viable, n(%)	Non-viable, n(%)	Audit/missing isolates, n(%)	Capture delays*, n(%)	Total
2012	248 (8)	2,160 (67)	273 (8)	789 (24)	0 (0)	3,222
2013	138 (5)	1,932 (67)	268 (9)	665 (23)	0 (0)	2,865
2014	165 (6)	1,752 (64)	291 (11)	688 (25)	0 (0)	2,731
2015	157 (6)	1,700 (65)	208 (8)	727 (28)	0 (0)	2,635
2016	48 (2)	1,578 (65)	197 (8)	658 (27)	0 (0)	2,433
2017	70 (3)	1,535 (63)	280 (11)	625 (26)	0 (0)	2,440
2018	75 (3)	1,340 (58)	316 (14)	660 (28)	6 (0)	2,322
2019	15 (4)	215 (64)	46 (14)	2 (1)	72 (21)	335

*For 78 cases reported to CRDM, viability is unknown due to capturing delays. Total cases reported for 2018 = 2,322 and 2019 to date = 335.

Table 2. Cases where serotype was not available at the time this report was produced

	Not typed	Unknown serotype	Viable, serotype pending	Non-viable, serotype pending	Viability unknown, serotype pending	Total serotypes pending
2012	39	12	0	0	0	0
2013	40	12	0	0	0	0
2014	0	51	0	0	0	0
2015	0	45	0	0	0	0
2016	2	35	0	0	0	0
2017	3	51	0	0	0	0
2018	0	37	3	9	6	18
2019	0	5	4	12	72	88
Total	84	244	7	21	78	106

* Viability unknown due to capturing delays

Data Source

National Institute for Communicable Diseases | GERMS-SA

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3. World Health Organization [Internet] WHO-UNICEF estimates of PCV3 coverage. 2017 [cited 21 July 2017]. Available from: http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tswucoveragepcv3.html.
4. von Gottberg A, de Gouveia L, Tempia S, Quan V, Meiring S, von Mollendorf C, et al. Effects of vaccination on invasive pneumococcal disease in South Africa. N. Engl. J. Med. 2014;371(20):1889-99.
5. Whitney CG, Pilishvili T, Farley MM, Schaffner W, Craig AS, Lynfield R, et al. Effectiveness of seven-valent pneumococcal conjugate vaccine against invasive pneumococcal disease: A matched case-control study. The Lancet. 2006;368(9546):1495-502.

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Next update: 31 July 2019

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Appendix: Cumulative invasive pneumococcal disease case numbers reported by the GERMS-SA surveillance programme, January 2005 to December 2012

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- ~190 laboratories each year send reports and isolates.
- Age, sex, date of specimen collection, and source of specimen were captured.
- Pneumococci were serotyped by Quellung reaction using specific antisera (Statens Serum Institute, Copenhagen, Denmark).
- **Only viable isolates are included in cumulative graph case numbers as molecular diagnostic techniques were only introduced in 2007.**
- Figures 1 – 3 are for cases < 5 years, and Figures 4 – 6 for cases 5 years and older. Cases with unknown age were excluded from the figures.
- There are three graphs for each age group:
  - Disease caused by any of the seven serotypes in PCV7 (4, 6B, 9V, 14, 18C, 19F and 23F)
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- WHO/UNICEF vaccine coverage estimates for receiving a third dose of the PCV vaccine in South Africa are 10% in 2008, 58% in 2009, 62% in 2011, 70% in 2012, 69% in 2013, 72% in 2014, 77% 2015 and 59% in 2016.[1]

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Appendix: Cumulative invasive pneumococcal disease case numbers reported by the GERMS-SA surveillance programme, 1 January 2005 to December 2012

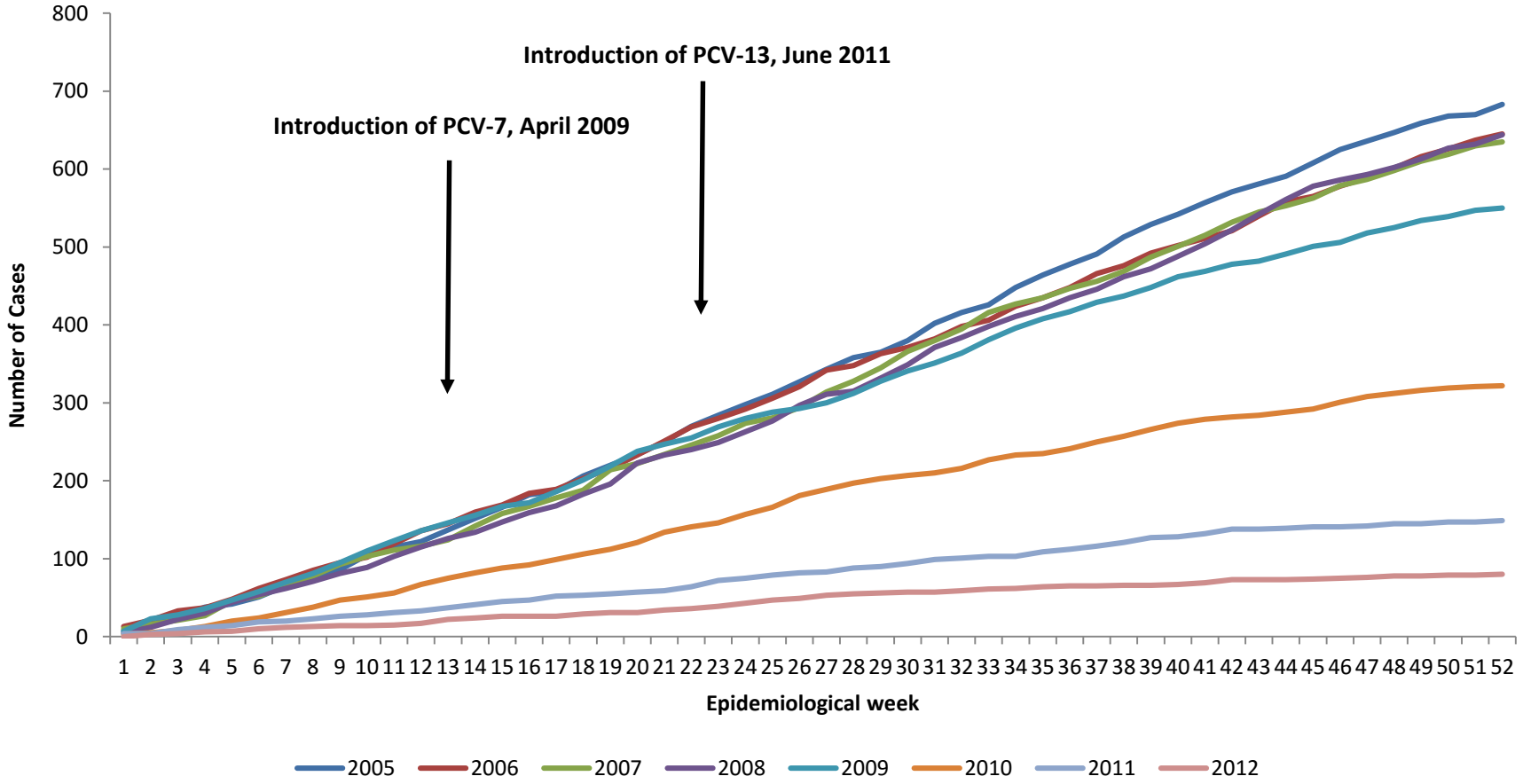

Figure 1. Cumulative weekly number of disease episodes of invasive pneumococcal disease due to any of the seven serotypes (4, 6B, 9V, 14, 18C, 19F and 23F) in PCV-7: children <5 years of age in South Africa, from 2005 to 2012. Only viable isolates serotyped using Quellung method included.

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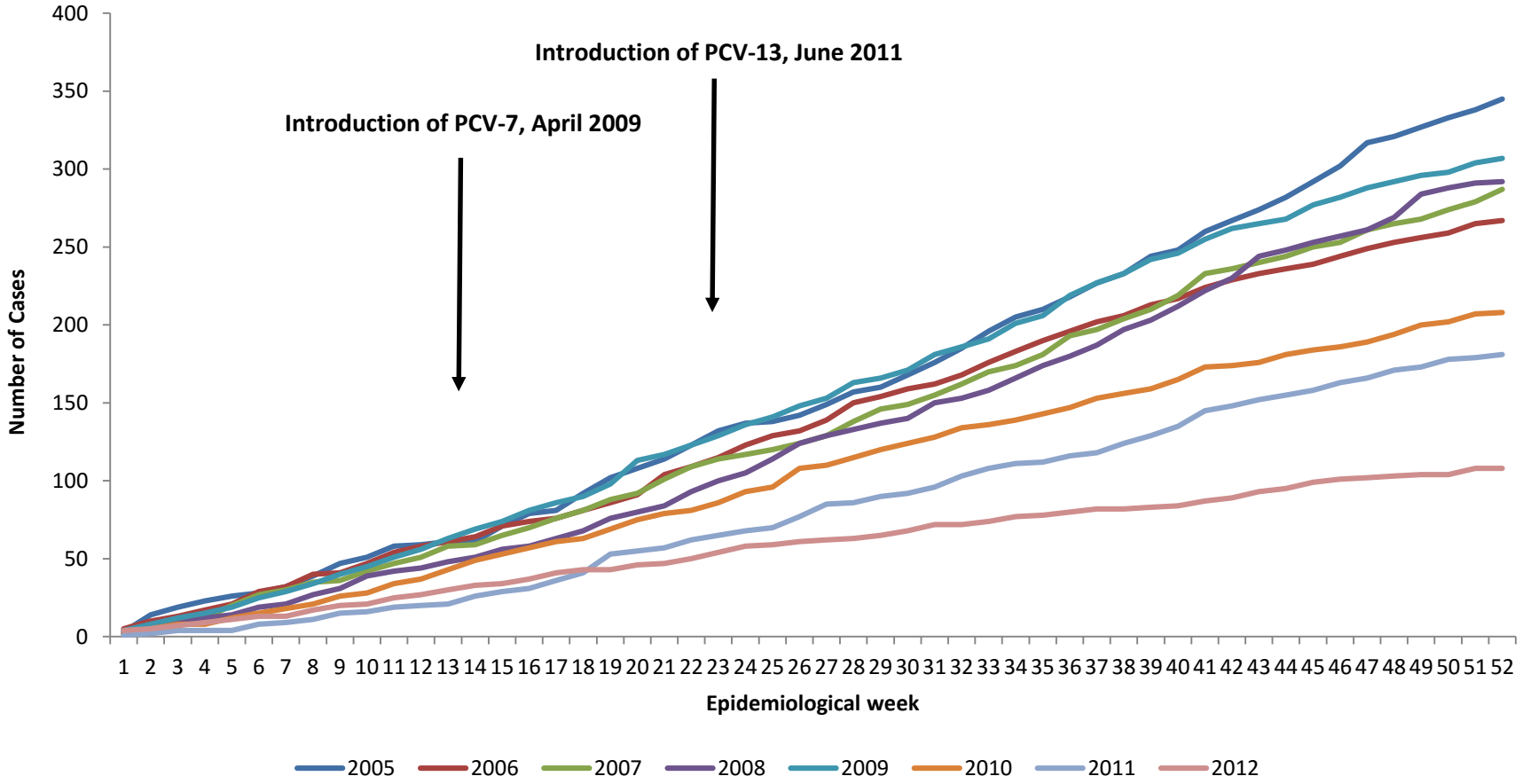

Figure 2. Cumulative weekly number of disease episodes of invasive pneumococcal disease due to any of the six additional (1, 3, 5, 6A, 7F, 19A) serotypes in PCV-13 but not in PCV7: children <5 years of age in South Africa, from 2005 to 2012. Only viable isolates serotyped using Quellung method included. (Note: There is reported cross protection between 6A and 6B which is included in PCV7[5])

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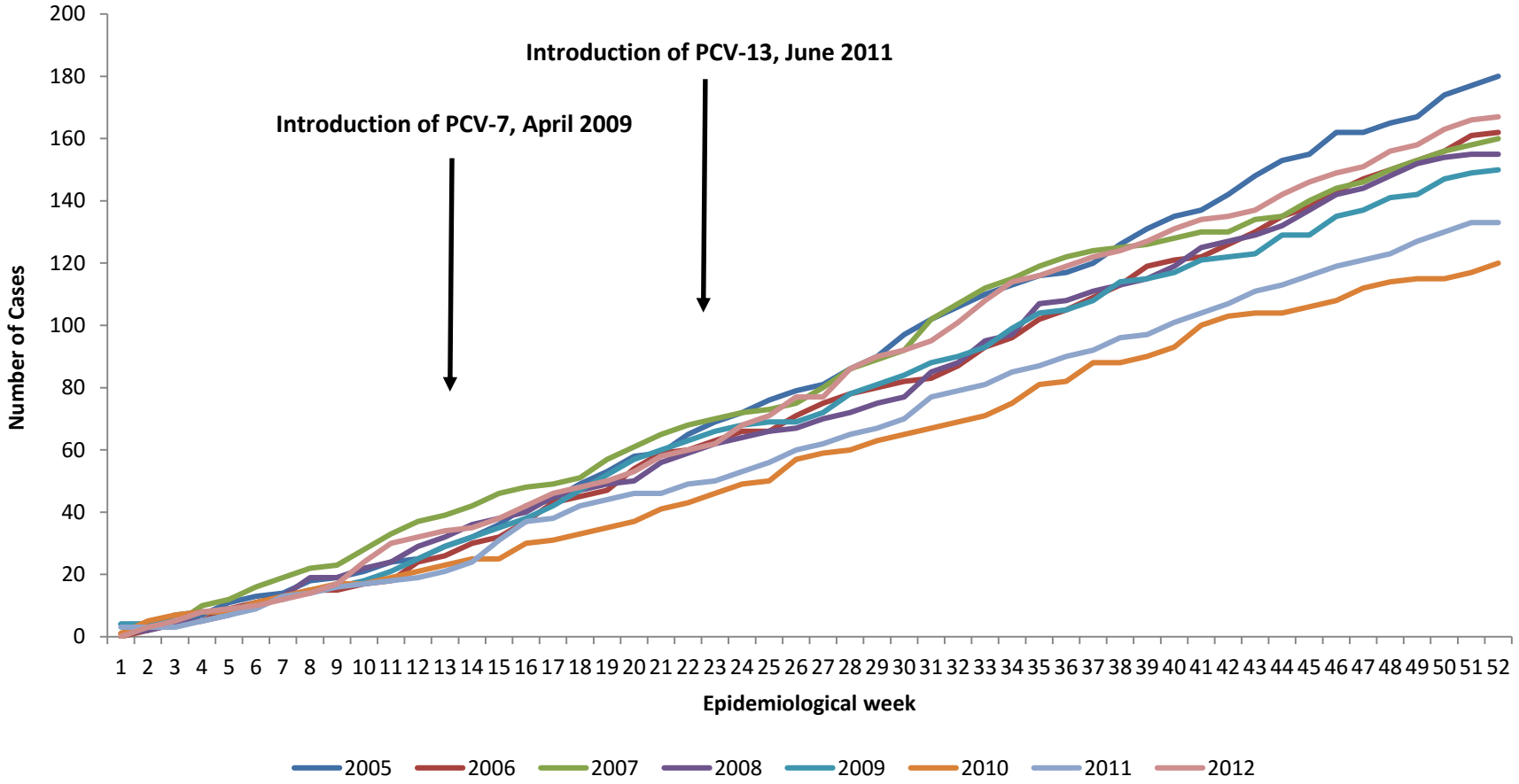

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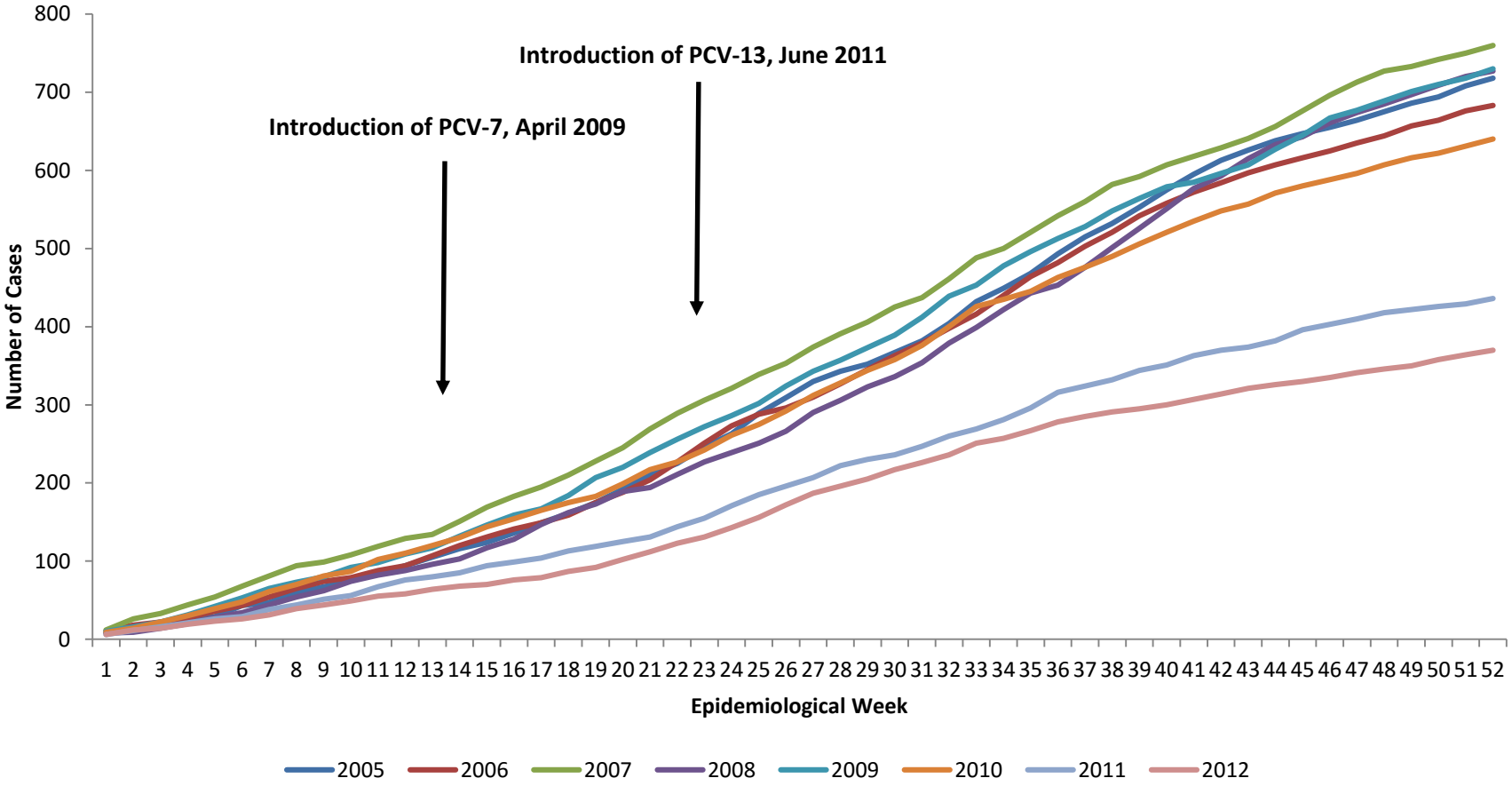

Figure 4. Cumulative weekly number of disease episodes of invasive pneumococcal disease due to any of the seven serotypes (4, 6B, 9V, 14, 18C, 19F and 23F) in PCV-7: Individuals ≥5 years of age in South Africa, from 2005 to 2012. Only viable isolates serotyped using Quellung method included.

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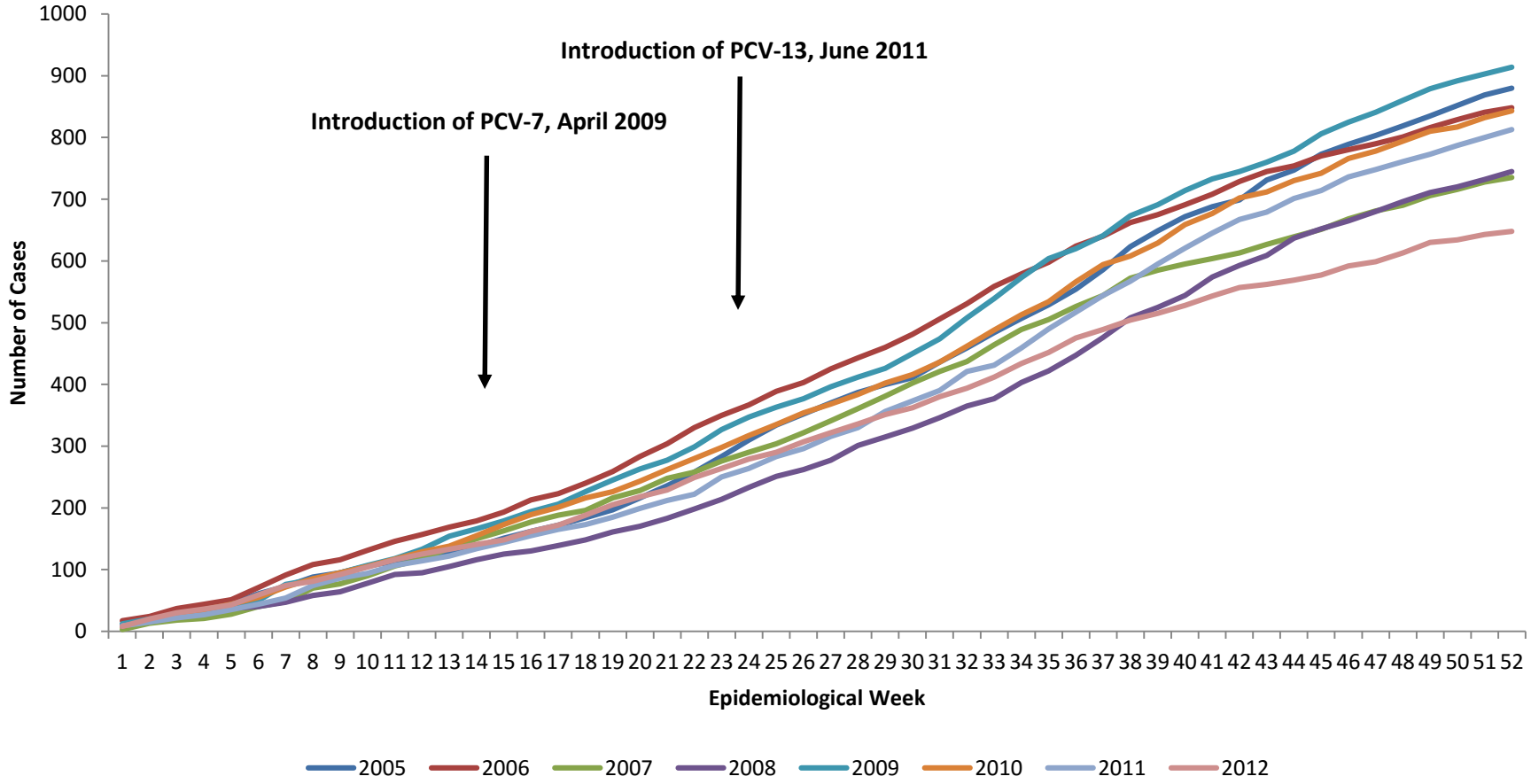

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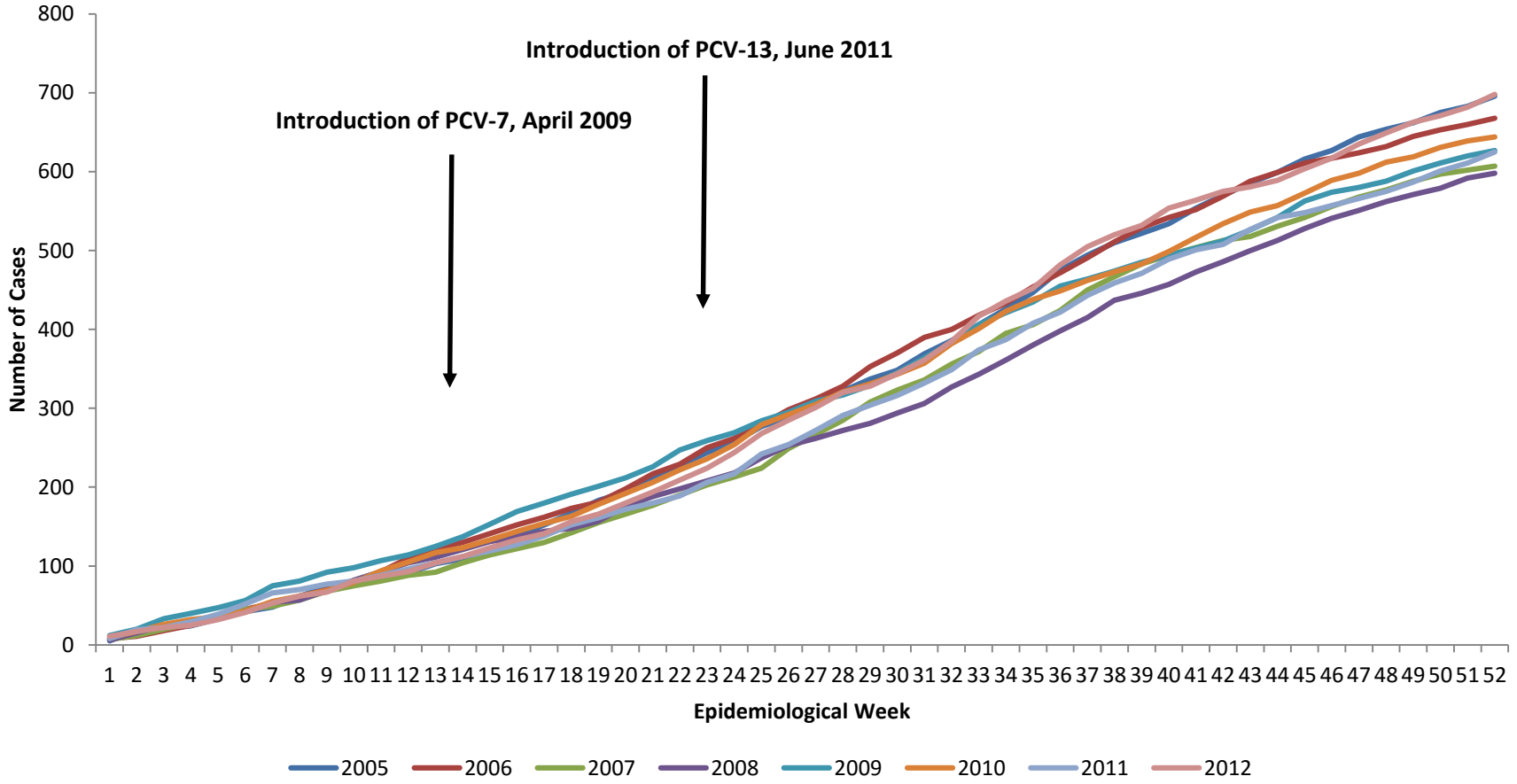

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Appendix: Cumulative invasive pneumococcal disease case numbers reported by the GERMS-SA surveillance programme, 1 January 2005 to December 2012

Missing information

Table 1. Isolates with missing age; number of viable and non-viable isolates and audit cases identified, 2005-2012

	Age missing, n(%)	Viable, n(%)	Non-viable, n(%)	Audit, n(%)	Total
2005	236 (5)	3,650 (75)	380 (8)	856 (18)	4,886
2006	223 (5)	3,419 (72)	444 (9)	868 (18)	4,731
2007	217 (5)	3,329 (70)	597 (13)	816 (17)	4,742
2008	208 (4)	3,327 (69)	576 (12)	932 (19)	4,835
2009	161 (3)	3,387 (71)	532 (11)	841 (18)	4,760
2010	141 (3)	2,873 (68)	515 (12)	809 (19)	4,197
2011	218 (6)	2,409 (63)	451 (12)	944 (25)	3,804
2012	248 (8)	2,160 (67)	344 (11)	718 (22)	3,222

References

1. World Health Organization [Internet] WHO-UNICEF estimates of PCV3 coverage. 2017 [cited 21 July 2017]. Available from: http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tswucoveragepcv3.html.

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