

Database Search Strategies

MEDLINE Search Strategy

1. *exp Neisseria meningitidis/*
2. *Neisseria meningitidis.mp.*
3. *Meningitidis.mp.*
4. *Meningitides.mp.*
5. *Neisseria meningitis.mp.*
6. *Meningococc* serogroup*.mp.*
7. *1 or 2 or 3 or 4 or 5 or 6*
8. *Meningitis/*
9. *Meningitis, bacterial/*
10. *Exp meningitis, meningococcal/*
11. *Meningitis.mp.*
12. *Meningococc*.mp.* → Captures: *Meningococcosis, Meningococc* infection*, Meningococc* disease*, Meningococcal, Meningococcaemia, Meningococcemia, Meningococcus, Invasive Meningococcal Disease*
13. *exp Meningococcal Infections/*
14. *Waterhouse Friderichsen Syndrome.mp.*
15. *Sepsis/*
16. *Sepsis.mp.*
17. *Septic*.mp.* → Captures: *Septic, Septicemia, Septicaemia*
18. *Bacteremia/*
19. *Bacteremia.mp.*
20. *Bacteraemia.mp.*
21. *Neisseriaceae infections/*
22. *Neisseriaceae infection*.mp.*
23. *IMD.mp.*
24. *8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23*
25. *Serogroup/*
26. *Serogroup*.mp.*
27. *Subtype*.mp.*
28. *Capsular group*.mp.*
29. *Serotyping/*
30. *Serotyp*.mp.*
31. *Epidemiology/*
32. *Epidemiology.mp.*
33. *Meningitis belt.mp.*
34. *Epidemic*.mp.*
35. *Outbreak*.mp.*
36. *25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35*
37. *7 and 24 and 36*
38. *limit 37 to (humans and yr="2010-Current")*

1355 results as of 1437 16 October 2017

Embase Search Strategy

1. *exp Neisseria meningitidis/*
2. *Neisseria meningitidis.mp.*
3. *Meningitidis.mp.*
4. *Meningitides.mp.*
5. *Neisseria meningitis.mp.*
6. *Meningococc* serogroup*.mp.*
7. *1 or 2 or 3 or 4 or 5 or 6*
8. *Meningitis/*
9. *Meningitis.mp.*
10. *Bacterial meningitis/*
11. *exp Meningococcosis/*
12. *Meningococc*.mp.* → Captures: *Meningococcosis, Meningococc* infection*, Meningococc* disease*, Meningococcal, Meningococcaemia, Meningococcemia, Meningococcus, Invasive Meningococcal Disease*
13. *Waterhouse Friderichsen Syndrome.mp.*
14. *Sepsis/*
15. *Sepsis.mp.*
16. *Septic*.mp.* → Captures: *Septic, Septicemia, Septicaemia*
17. *Bacteremia/*
18. *Bacteremia.mp.*
19. *Bacteraemia.mp.*
20. *Neisseriaceae infection/*
21. *Neisseriaceae infection*.mp.*
22. *IMD.mp.*
23. *8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22*
24. *Serotype/*
25. *Serotyping/*
26. *Serotyp*.mp.*
27. *Serogroup*.mp.*
28. *Subtype*.mp.*
29. *Capsular group*.mp.*
30. *Epidemiology/*
31. *Epidemiology.mp.*
32. *Meningitis belt.mp.*
33. *Epidemic*.mp.*
34. *Outbreak*.mp.*
35. *24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34*
36. *7 and 23 and 35*
37. *limit 36 to (humans and yr="2010-Current")*

1734 results as of 1440 16 October 2017

Global Health Database

1. *exp Neisseria meningitidis/*
2. *Neisseria meningitidis.mp.*
3. *Meningitidis.mp.*
4. *Meningitides.mp.*
5. *Neisseria meningitis.mp.*
6. *Meningococcal serogroup\$.mp.*
7. *Meningococcus serogroup\$.mp.*
8. *1 or 2 or 3 or 4 or 5 or 6 or 7*
9. *Meningitis/*
10. *Bacterial meningitis/*
11. *Meningitis.mp.*
12. *Meningococcosis.mp.*
13. *Meningococcal.mp.*
14. *Meningococcus.mp.*
15. *Meningococci.mp.*
16. *Meningococc?emia.mp.*
17. *Waterhouse Friderichsen Syndrome.mp.*
18. *exp Sepsis/*
19. *Sepsis.mp.*
20. *Septic\$.mp. → Captures: Septic, Septicemia, Septicaemia*
21. *Bacteraemia/*
22. *Bacter?emia.mp.*
23. *Neisseriaceae infection\$.mp. → No results found*
24. *IMD.mp.*
25. *9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24*
26. *Serogroup\$.mp.*
27. *Subtype\$.mp.*
28. *Capsular group\$.mp.*
29. *Serotypes/*
30. *Serotyp\$.mp.*
31. *Epidemiology/*
32. *Epidemiology.mp.*
33. *Meningitis belt.mp.*
34. *Epidemics/*
35. *Epidemic\$.mp.*
36. *Outbreaks/*
37. *Outbreak\$.mp.*
38. *26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37*
39. *8 and 25 and 38*
40. *limit 39 to (humans and yr="2010-Current")*

1712 Results as of 1447 16 October 2017

Web of Science Search Strategy (free text searches)

((Neisseria meningitidis) or (meningitidis) or (Neisseria meningitis) or (Meningitides) or (Meningococc serogroup*)) AND ((Meningitis) or (Meningococc*) or (Waterhouse Friderichsen Syndrome) or (Sepsis) or (Septic*) or (Bacteremia) or (Neisseriaceae infection*) or (IMD)) AND ((Serogroup*) or (Subtype*) or (Capsular group*) or (Serotyp*) or (Epidemiology) or (Meningitis belt) or (Epidemic*) or (Outbreak*))*

Date Limiters: 2010 to 2017

1593 Results as of 1501 16 October 2017

Current Contents Connect Search

((Neisseria meningitidis) or (meningitidis) or (Neisseria meningitis) or (Meningitides) or (Meningococc serogroup*)) AND ((Meningitis) or (Meningococc*) or (Waterhouse Friderichsen Syndrome) or (Sepsis) or (Septic*) or (Bacteremia) or (Neisseriaceae infection*) or (IMD)) AND ((Serogroup*) or (Subtype*) or (Capsular group*) or (Serotyp*) or (Epidemiology) or (Meningitis belt) or (Epidemic*) or (Outbreak*))*

Date Limiters: 2010 to 2017

1116 Results as of 1508 16 October 2017

Global Health Library

Includes: AIM (AFRO), LILACS (AMRO/PAHO), IMEMR (EMRO), IMSEAR (SEARO), WPRIM (WPRO), WHOLIS (KMS)

((Neisseria meningitidis) or (meningitidis) or (Neisseria meningitis) or (Meningitides) or (Meningococc serogroup*)) AND ((Meningitis) or (Meningococc*) or (Waterhouse Friderichsen Syndrome) or (Sepsis) or (Septic*) or (Bacteremia) or (Neisseriaceae infection*) or (IMD)) AND ((Serogroup*) or (Subtype*) or (Capsular group*) or (Serotyp*) or (Epidemiology) or (Meningitis belt) or (Epidemic*) or (Outbreak*))*

Filters: 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017

127 Results as of 1514 16 October 2017

Table S1. African Meningitis Belt Comparisons.

Country	Study	Year	Reason Selected Study was Chosen
Burkina Faso	Ky-Ba A, Sanou M, Tranchot JD, Christiasen PA, Ouedraogo AS, Tamboura Met al. (1)	Jan 2010 to Dec 2010	Ky-Ba et al was the most representative study with the largest sample size.
	Delrieu I, Yaro S, Tamekloé TAS, Njanpop-Lafourcade BM, Tall H, Jaillard Pet al. (2)	Jan 2010 to Dec 2010 (outbreak)	
	Delrieu I, Yaro S (2)	Jan 2010 to Dec 2010 (surveillance)	
	Novak RT, Kambou JL, Diomandé FVK, Tarbangdo TF, Ouédraogo-Traoré R, Sangaré Let al. (3)	Jan 2010 to Dec 2010	
	Intercountry Support Team—West Africa (4)	Jan 2010 to Dec 2010	
	Ky-Ba A, Sanou M (1)	Jan 2011 to Dec 2011	Ky-Ba et al was the most representative study with the largest sample size that was not represented in a bar chart (Novak). Author contact was attempted to acquire the raw data from Novak with no response.
	Novak RT, Kambou JL (3)	Jan 2011 to Dec 2011	
	Intercountry Support Team—West Africa (5)	Jan 2011 to Dec 2011	
	MacNeil JR, Medah I, Koussoubé D, Novak RT, Cohn AC, Diomande FVKet al. (6)	Jan 2012 to Dec 2012	MacNeil et al was the most representative study with the largest sample size.
	Cibrelus L, Medah I, Koussoubé D, Yélbeogo D, Fernandez K, Lingani Cet al. (7)	Jan 2012 to Apr 2012	
	Ky-Ba A, Sanou M (1)	Jan 2012 to Dec 2012	
	Savadogo M, Kyélem N, Yelbeogo D, Koussoubé D, Tarbagdo F and Ouédraogo A (8)	Jan 2012 to Apr 2012	
	Ky-Ba A, Sanou M (1)	Jan 2013 to Dec 2013	Ky-Ba et al was the most representative study with the largest sample size.
	Intercountry Support Team—West Africa (9)	Jan 2013 to Dec 2013	
	Ky-Ba A, Sanou M (1)	Jan 2014 to Dec 2014	Ky-Ba et al was the most representative study with the largest sample size.
	Intercountry Support Team—West Africa (10)	Jan 2014 to Dec 2014	
Cameroon	Massenet D, Birguel J, Azowé F, Ebong C, Gake B, Lombart JP et al. (11)	Jan 2010 to Dec 2010	Although representing a region of Cameroon, Massenet et al (2013) had a larger sample size than WHO (2010) and Massenet et al (2011). This study still represented a large representation of Cameroon.
	Massenet D, Vohod D, Hamadicko H and Caugant DA (12)	Jan 2010 to Dec 2010	
	Intercountry Support Team—West Africa (4)	Jan 2010 to Dec 2010	

Chad	Intercountry Support Team—West Africa (4)	Jan 2010 to Dec 2010	WHO had a larger sample size than Gamougam.
	Gamougam K, Daugla DM, Toralta J, Ngadoua C, Fermon F, Page AL et al. (13)	Jan 2010 to Jun 2010	
	Gamougam K, Daugla DM (13)	Jan 2011 to Jun 2011	Gamougam had a larger sample size than WHO.
	Intercountry Support Team—West Africa (5)	Jan 2011 to Sep 2011	
	Daugla DM, Gami JP, Gamougam K, Naibei N, Mbainadji L, Narbé Met al. (14)	Jan 2011 to Jun 2012	Daugla et al and Gamougam et al reported the same data. One had to be selected over the other, but either would have been acceptable. They both had a greater samples size than WHO.
	Gamougam K, Daugla DM (13)	Jan 2011 to Jun 2012	
	Intercountry Support Team—West Africa (15)	Jan 2012 to Nov 2012	
The Gambia	Intercountry Support Team—West Africa (15)	Jan 2012 to Dec 2012	Although the Hossain articles had a much larger sample size, the WHO surveillance report is more representative than the outbreak reports.
	Hossain MJ, Roca A, Mackenzie GA, Jasseh M, Hossain I, Muhammad Set al. (16)	Feb 2012 to Jun 2012	
	Hossain MJ, Roca A, Mackenzie GA, Jasseh M, Hossain MI, Muhammad Set al. (17)	Feb 2012 to Jun 2012	
Ghana	Intercountry Support Team—West Africa (18)	Jan 2015 to Dec 2015	The WHO reports covered a greater time period.
	Intercountry Support Team—West Africa (19)	Jan 2016 to Dec 2016	
	Kwambana-Adams BA, Asiedu-Bekoe F, Sarkodie B, Afreh OK, Kuma GK, Owusu-Okyere Get al. (20)	Dec 2015 to Apr 2016	
Mali	Intercountry Support Team—West Africa (19)	Jan 2016 to Dec 2016	WHO covered a greater time period.
	MenAfriNet (21)	Jan 2016 to Mar 2016	
Niger	Collard JM, Issaka B, Zaneidou M, Hugonnet S, Nicolas P, Taha MK et al. (22)	Jan 2010 to Dec 2010	Collard et al had the larger sample size.
	Intercountry Support Team—West Africa (4)	Jan 2010 to Dec 2010	
	Collard JM, Issaka B (22)	Jan 2010 to Dec 2011	Collard et al had the larger sample size.

	Intercountry Support Team—West Africa (5)	Jan 2011 to Nov 2011	
Senegal	Intercountry Support Team—West Africa (15)	Jan 2012 to Dec 2012	Although Ndow et al had a much larger sample size, the WHO surveillance report is more representative than the conference abstract as it reports on more than one serogroup. Although Ba et al had a larger sample size than the WHO report, the number of cases for each serogroup were unclear as the reported cases in the text did not match the graphs.
	Ndow G, Manga NM, Ba IO, Ka D, Cisse-Diallo V, Diop SA et al. (23)	2012	
	Ba ID, Deme-Ly I, Thiongane A, Diop A, Sonko A, Keita LMet al. (24)	Jan 2012 to Dec 2012	
Togo	Intercountry Support Team—West Africa (19)	Jan 2016 to Dec 2016	WHO had a larger sample size and represented a longer time period.
	MenAfriNet (21)	Jan 2016 to Mar 2016	
Studies listed in bold were selected for inclusion in the meta-analysis.			

Table S2. Laboratory Capacity Questionnaire.

Name of country			
Pathogens routinely tested for as part of bacterial meningitis surveillance			
<i>Neisseria meningitidis</i> (Nm)			
<i>Streptococcus pneumoniae</i> (Sp)			
<i>Haemophilus influenzae</i> (Hi)			
Area under surveillance	Nm	Sp	Hi
Entire country			
Part of country (use space below to name all cities/districts/provinces included)			
Population under surveillance	Nm	Sp	Hi
<5 yrs			
5-19 yrs			
20-64 yrs			
>65 yrs			
High risk groups – military/police, college/university students (Specify)			
Are you part of a surveillance network? If yes, please name			
Type of surveillance	Nm	Sp	Hi
Type of surveillance (Indicate whether sentinel/ population based/ national)			
Active surveillance (syndromic) (also indicate date of start)			
Passive surveillance (syndromic) (also indicate date of start)			
Active surveillance (Lab confirmed) (also indicate date of start)			
Passive surveillance (Lab confirmed) (also indicate date of start)			
Pathogen detection (check all that apply)	Nm	Sp	Hi
PCR			
Culture			
Latex agglutination			
Antigen detection (Binax)			
Other (specify)			
Number and names of labs in country that are capable of pathogen detection (use space below for names of labs)			
Number and names of labs involved in pathogen detection that are part of global EQA/QC process (use below for names of labs)			

Is serogrouping/serotyping routinely performed?	Nm	Sp	Hi
On all specimens			
On a subset (specify)			
Not performed			
Number and names of labs in country that are capable of serogrouping (use space below for names of labs)			
If no labs in country, where do you send for serogrouping?			
Number and names of labs involved in serogrouping that are part of global EQA/QC process (use space below for names of labs)			
Serogrouping/ Serotyping procedures (check all that apply)	Nm	Sp	Hi
Quellung			
Slide agglutination			
Latex agglutination			
PCR			
Other (specify)			
Are serogrouping and serotyping performed together? If yes, skip the next section.			
Yes			
No			
Serotyping			
Number and names of labs in country that are capable of serotyping (use space below for names of labs)			
If no labs in country, where do you send for serotyping?			
Number and names of labs involved in serotyping that are part of global EQA/QC process (use space below for names of labs)			
Antimicrobial Resistance (AMR)			
Number and names of labs in country capable of testing for AMR in <i>N. meningitidis</i> (use space below for names of labs)			

Number and names of labs in country capable of testing for AMR in <i>S. pneumoniae</i> (use space below for names of labs)			
If no labs in country, where do you send for AMR?			
Which antibiotics are tested for AMR in <i>N. meningitidis</i>?			
Which antibiotics are tested for AMR in <i>S. pneumoniae</i>?			
AMR detection method (check all that apply)	Nm	Sp	
Broth dilution MIC			
Agar dilution MIC			
Disk diffusion			
Antimicrobial gradient method/ Etest			
Automated instruments			
Other (specify)			
AMR not performed			
Type of resources (check all that apply)	Nm	Sp	Hi
Government lead			
Academic lead			
Private lead			
Other (specify)			
Purpose of systems (check all that apply)	Nm	Sp	Hi
Disease burden estimates/presence of disease/serogroup and serotype distribution			
Outbreak detection/prediction			
Develop prevention guidelines/policies for vaccination			
Measure for the impact of interventions – vaccination			
Is a meningococcal vaccine being used?			
Routinely			
Selectively (for target indications)			
In supplementary immunization campaigns			
Specify which vaccines are in use:			

Is a pneumococcal vaccine being used?			
Routinely			
Selectively (for target indications)			
In supplementary immunization campaigns			
Specify which vaccines are in use:			
Is a Hib vaccine being used?			
Routinely			
Selectively (for target indications)			
In supplementary immunization campaigns			
Specify which vaccines are in use:			
What is the scale of vaccination use?	Nm	Sp	Hi
National EPI program (indicate type of vaccine and date started)			
Private sector (indicate type of vaccine and date started)			
Estimated vaccine uptake			
Are there any prevention guidelines/policies for vaccination? If yes, please provide details.			
Do you have national guidelines / recommendations for control of meningococcal meningitis outbreaks? If yes, please provide details.			
What are the specimen storage procedures at surveillance sites?			
What are the specimen shipping procedures?			

Table S3. Summary of Serogroup Data by Study. If supplementary data were received from the author, the study is marked with an (*). The serogroups with assumed zeroes are marked with an (†).

Study	Country/Countries	Year(s) Included	Age Group	Sample Size	Contribution To Analysis
African Region (AFRO)					
Réseau Algérien de Surveillance de la Résistance des Bactéries aux Antibiotiques (AARN) (25)	Algeria	2010	All Ages	25	NmA, NmB, NmC, NmW, NmY, Other
Réseau Algérien de Surveillance de la Résistance des Bactéries aux Antibiotiques (AARN) (26)	Algeria	2011	All Ages	24	NmA, NmB, NmC, NmW, NmY, Other
Réseau Algérien de Surveillance de la Résistance des Bactéries aux Antibiotiques (AARN) (27)	Algeria	2015	All Ages	22	NmA, NmB, NmC, NmW, NmY
Njanpop-Lafourcade BM, Hugonnet S, Djogbe H, Kodjo A, N'Douba AK, Taha MKet al. (28)	Benin (Northern Benin)	Jan–Jun 2012	All Ages	71	NmW, NmX
Ky-Ba A, Sanou M (1)	Burkina Faso	2010, 2011, 2013, 2014	All Ages	2010: 229 2011: 273 2013: 259 2014: 215	NmA, NmW, NmX
MacNeil JR, Medah I (6)	Burkina Faso	2012	All Ages	1663	NmB, NmC, NmW, NmX
Massenet D, Birguel J (11)	Cameroon (Norther Cameroon: Far North, North, and Adamawa)	2010	All Ages	41	NmA, NmB [†] , NmC [†] , NmW, NmX [†] , NmY [†]
Gamougam K, Daugla DM (13)	Chad	Jan–Jun 2011	All Ages	159	NmA, NmW, NmX
Daugla DM, Gami JP (14)	Chad	Jan–Jun 2012	All Ages	65	NmA, NmW, NmX
Mihret W, Lema T, Merid Y, Kassu A, Abebe W, Moges Bet al. (29)	Ethiopia (Gondar, Addis Ababa, and Hawassa)	Feb 2012–Jun 2013	All Ages	27	NmA, NmB, NmC, NmW, NmX, NmY, Other
Collard JM, Issaka B (22)	Niger	2010, 2011	All Ages	2010: 921 2011: 410	NmA, NmB [†] , NmC [†] , NmW, NmX [†] , NmY, Other
National Institute for Communicable Diseases (NICD) (30)	South Africa	2010	All Ages	334	NmA, NmB, NmC, NmW, NmX, NmY
National Institute for Communicable Diseases (NICD) (31)	South Africa	2011	All Ages	275	NmA, NmB, NmC, NmW, NmX, NmY
National Institute for Communicable Diseases (NICD) (32)	South Africa	2012	All Ages	176	NmA, NmB, NmC, NmW, NmX [†] , NmY, Other
National Institute for Communicable Diseases (NICD) (33)	South Africa	2013	All Ages	190	NmA, NmB, NmC, NmW, NmX [†] , NmY, Other
National Institute for Communicable Diseases (NICD) (34)	South Africa	2014	All Ages	156	NmA, NmB, NmC, NmW, NmX, NmY, Other
National Institute for Communicable Diseases (NICD) (35)	South Africa	2015	All Ages	127	NmA, NmB, NmC, NmW, NmX, NmY, Other
Intercountry Support Team—West Africa (4)	Chad, Ghana, Mali, Nigeria	2010	All Ages	Chad: 62 Ghana: 28 Mali: 36 Nigeria: 101	Chad, Ghana, Mali: NmA, NmB, NmC, NmW, NmX, NmY Nigeria: NmA, NmW
Intercountry Support Team—West Africa (5)	Cameroon, Mali	Cameroon: Jan–Jul 2011 Mali: Jan–Nov 2011	All Ages	Cameroon: 92 Mali: 29	NmA, NmB, NmC, NmW, NmX, NmY

Intercountry Support Team—West Africa (15)	Cameroon, Cote d'Ivoire, The Gambia, Ghana, Mali, Niger, Senegal	Cameroon: Jan–May 2012 Cote d'Ivoire: 2012 Gambia: 2012 Ghana: 2012 Mali: 2012 Niger: 2012 Senegal: 2012	All Ages	Cameroon: 19 Cote d'Ivoire: 90 Gambia: 28 Ghana: 32 Mali: 94 Niger: 22 Senegal: 22	NmA, NmB, NmC, NmW, NmX, NmY
Intercountry Support Team—West Africa (9)	Ghana, Guinea	Ghana: 2013 Guinea: 2013	All Ages	Ghana: 18 Guinea: 15	NmA, NmB, NmC, NmW, NmX, NmY
Intercountry Support Team—West Africa (10)	Ghana, Niger, Nigeria	2014	All Ages	Ghana: 45 Niger: 24 Nigeria: 38	NmA, NmB, NmC, NmW, NmX, NmY
Intercountry Support Team—West Africa (18)	Burkina Faso, Ethiopia, Ghana, Guinea, Mali, Niger, Nigeria, Togo	Burkina Faso: 2015 Ethiopia: Jan–Nov 2015 Ghana: 2015 Guinea: Jan–Oct 2015 Mali: 2015 Niger: 2015 Nigeria: Jan–Oct 2015 Togo: 2015	All Ages	Burkina Faso: 258 Ethiopia: 16 Ghana: 34 Guinea: 74 Mali: 23 Niger: 1390 Nigeria: 20 Togo: 36	NmA, NmB, NmC, NmW, NmX, NmY
Intercountry Support Team—West Africa (19)	Burkina Faso, Central African Republic, Ghana, Mali, Niger, Togo	2016	All Ages	Burkina Faso: 176 Central African Republic: 54 Ghana: 201 Mali: 44 Niger: 352 Togo: 307	NmA, NmB, NmC, NmW, NmX, NmY
Region of the Americas (AMRO)					
Regueira M and Corso A (36)	Argentina	2015	All Ages	93	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Regueira M, Corso A, Efron A and Gagetti P (37)	Argentina	2016	All Ages	80	NmA, NmB, NmC, NmW, NmX, NmY, Other
Silva de Lemos A, Outeiro Gorla M, Cobo Zanella R, Grassi Almeida S, Bokermann S and De Cunto Brandileone M (38)	Brazil	2015	All Ages	218	NmA, NmB, NmC, NmW, NmX, NmY, Other
Li YA, Tsang R, Desai S and Deehan H (39)*	Canada	2010, 2011	All Ages	2010: 143 2011: 163	NmA, NmB, NmC, NmW, NmX, NmY, Other
Tsang RS, Law DK, Deng S and Hoang L (40)	Canada	2013–2015	All Ages	277	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Instituto de Salud Pública de Chile (ISP) (41)	Chile	2013	All Ages	136	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Instituto de Salud Pública de Chile (ISP) (42)	Chile	2014	All Ages	140	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Instituto de Salud Pública de Chile (ISP) (43)	Chile	2015	All Ages	120	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Instituto de Salud Pública de Chile (ISP) (44)	Chile	2016	All Ages	106	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Centers for Disease Control and Prevention (CDC) (45)*	United States	2010	All Ages	56	NmA, NmB, NmC, NmW, NmY, Other
Centers for Disease Control and Prevention (CDC) (46)*	United States	2011	All Ages	75	NmA, NmB, NmC, NmW, NmY, Other
Centers for Disease Control and Prevention (CDC) (47)*	United States	2012	All Ages	57	NmA, NmB, NmC, NmW, NmY, Other
Centers for Disease Control and Prevention (CDC) (48)*	United States	2013	All Ages	53	NmA, NmB, NmC, NmW, NmY, Other

Centers for Disease Control and Prevention (CDC) (49)*	United States	2014	All Ages	53	NmA, NmB, NmC, NmW, NmY, Other
Centers for Disease Control and Prevention (CDC) (50)*	United States	2015	All Ages	46	NmA [†] , NmB, NmC, NmW, NmY, Other
Pan American Health Organization (PAHO) (51)	Argentina, Brazil, Chile, Colombia, Mexico, Uruguay, Venezuela	2010	All Ages	Argentina: 134 Brazil: 645 Chile: 56 Colombia: 17 Mexico: 17 Uruguay: 20 Venezuela: 18	NmA, NmB, NmC, NmW, NmX, NmY, Other
Pan American Health Organization (PAHO) (52)	Argentina, Brazil, Chile, Colombia, Uruguay, Venezuela	2011	All Ages	Argentina: 152 Brazil: 582 Chile: 62 Colombia: 25 Uruguay: 27 Venezuela: 26	Argentina: NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other Brazil: NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other Chile: NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other [†] Colombia: NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other [†] Uruguay: NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other [†] Venezuela: NmA [†] , NmB, NmC, NmW [†] , NmX [†] , NmY, Other
Pan American Health Organization (PAHO) (53)	Argentina, Brazil, Chile, Colombia, Uruguay, Venezuela	2012	All Ages	Argentina: 173 Brazil: 513 Chile: 100 Colombia: 30 Uruguay: 22 Venezuela: 28	Argentina: NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other Brazil: NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other [†] Chile: NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other [†] Colombia: NmA [†] , NmB, NmC, NmW [†] , NmX [†] , NmY, Other [†] Uruguay: NmA [†] , NmB, NmC, NmW [†] , NmX [†] , NmY [†] , Other Venezuela: NmA [†] , NmB, NmC, NmW [†] , NmX [†] , NmY, Other [†]
Pan American Health Organization (PAHO) (54)	Argentina, Brazil, Colombia, Venezuela	2013	All Ages	Argentina: 155 Brazil: 384 Colombia: 34 Venezuela: 24	Argentina: NmA [†] , NmB, NmC, NmW, NmX, NmY, Other [†] Brazil: NmA [†] , NmB, NmC, NmW, NmX, NmY, Other Colombia: NmA [†] , NmB, NmC, NmW [†] , NmX [†] , NmY, Other Venezuela: NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Pan American Health Organization (PAHO) (55)	Argentina, Brazil, Colombia, Venezuela	2014	All Ages	Argentina: 149 Brazil: 308 Colombia: 41 Venezuela: 16	Argentina: NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other [†] Brazil: NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other Colombia: NmA [†] , NmB, NmC, NmW [†] , NmX [†] , NmY, Other [†] Venezuela: NmA [†] , NmB, NmC, NmW [†] , NmX [†] , NmY [†] , Other [†]
Eastern Mediterranean Region (EMRO)					
Razki A, Zerouali K, Belabbas H, Bouayad A, Elmdaghri N, Deghmane AE et al. (56)	Morocco	2011–2016	All Ages	143	NmB, NmC, NmW, NmY
Intercountry Support Team—West Africa (15)	Sudan (located within the African Meningitis Belt)	Jan–Jun 2012	All Ages	20	NmA, NmB, NmC, NmW, NmX, NmY
European Region (EURO)					
National Reference for Meningococcal Disease (57)	Austria	2010	All Ages	80	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other [†]
National Reference for Meningococcal Disease (58)	Austria	2011	All Ages	60	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
National Reference for Meningococcal Disease (59)	Austria	2012	All Ages	50	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
National Reference for Meningococcal Disease (60)	Austria	2013	All Ages	55	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other [†]
National Reference for Meningococcal Disease (61)	Austria	2014	All Ages	35	NmA, NmB, NmC, NmW, NmX, NmY, Other
National Reference for Meningococcal Disease (62)	Austria	2015	All Ages	23	NmA, NmB, NmC, NmW, NmX, NmY, Other
National Reference for Meningococcal Disease (63)	Austria	2016	All Ages	31	NmA, NmB, NmC, NmW, NmX, NmY, Other
Bertrand S, Carion F and Stragier P (64)	Belgium	2010	All Ages	96	NmA, NmB, NmC, NmW, NmX, NmY, Other
Bertrand S, Mattheus W, Vanhoof R and Carion F (65)	Belgium	2011	All Ages	112	NmA, NmB, NmC, NmW, NmX, NmY, Other

Bertrand S, Mattheus W and Vanhoof R (66)	Belgium	2012	All Ages	123	NmA, NmB, NmC, NmW, NmX, NmY, Other
Bertrand S, Mattheus W and Vanhoof R (67)	Belgium	2013	All Ages	134	NmA, NmB, NmC, NmW, NmX, NmY, Other
Bertrand S, Mattheus W and Vanhoof R (68)	Belgium	2014	All Ages	87	NmA, NmB, NmC, NmW, NmX, NmY, Other
Bertrand S, Mattheus W, Vanhoof R and Ceyskens P (69)	Belgium	2015	All Ages	98	NmA, NmB, NmC, NmW, NmX, NmY, Other
Čeljuska-Tošev E, Bukovski-Simonoski S, Gužvinac M, Kovačević G and Knezović I (70)	Croatia (Zagreb)	2010	All Ages	24	NmB, NmC, NmW, NmY
Bröker M, Bukovski S, Culic D, Jacobsson S, Koliou M, Kuusi Met al. (71)	Croatia	2012	All Ages	20	NmB
Bröker M, Emonet S, Fazio C, Jacobsson S, Koliou M, Kuusi Met al. (72)	Croatia	2013	All Ages	26	NmB
Křížová P, Musílek M, Vacková Z and Kozáková J (73)	Czech Republic	2010	All Ages	51	NmA, NmB, NmC, NmW, NmX [†] , NmY
Křížová P, Musílek M, Vacková Z and Kozáková J (74)	Czech Republic	2011	All Ages	54	NmA [†] , NmB, NmC, NmW, NmX, NmY
Křížová P, Musílek M, Vacková Z and Kozáková J (75)	Czech Republic	2012	All Ages	58	NmA, NmB, NmC, NmW, NmX [†] , NmY
Křížová P, Musílek M, Vacková Z and Kozáková J (76)	Czech Republic	2013	All Ages	51	NmA [†] , NmB, NmC, NmW, NmX, NmY
Křížová P, Musílek M, Vacková Z, Bečvářová Z, Kozáková J and Šebestová H (77)	Czech Republic	2014	All Ages	37	NmA [†] , NmB, NmC, NmW, NmX, NmY
Křížová P, Musílek M, Vacková Z, Bečvářová Z, Kozáková J and Šebestová H (78)	Czech Republic	2015	All Ages	46	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Křížová P, Musílek M, Vacková Z, Jandová Z, Kozáková J and Šebestová H (79)	Czech Republic	2016	All Ages	39	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY
Rasmussen JN, Valentiner-Branth P, Hoffmann S and Mygh A (80)	Denmark	2010	All Ages	65	NmA, NmB, NmC, NmW, NmX, NmY, Other
Bjerre C, Valentiner-Branth P, Dalby T and Hoffmann S (81)	Denmark	2011	All Ages	84	NmA, NmB, NmC, NmW, NmX, NmY, Other [†]
Suppli CH, Valentiner-Branth P and Hoffmann S (82)	Denmark	2012	All Ages	55	NmA, NmB, NmC, NmW, NmX, NmY, Other [†]
Suppli CH, Valentiner-Branth P and Hoffmann S (83)	Denmark	2013	All Ages	44	NmA, NmB, NmC, NmW, NmX, NmY, Other [†]
Voss S, Suppli CH, Valentiner-Branth P and Hoffmann S (84)	Denmark	2014	All Ages	40	NmA, NmB, NmC, NmW, NmX, NmY, Other [†]
Espenhain L, Suppli CH, Valentiner-Branth P, Fuursted K and Hoffmann S (85)	Denmark	2015	All Ages	25	NmA, NmB, NmC, NmW, NmX, NmY, Other
Valentiner-Branth P, Andersen P, Christiansen A, Krause T, Ertner G, Nørgaard Jet al. (86)	Denmark	2016	All Ages	28	NmA [†] , NmB, NmC [†] , NmW, NmX, NmY, Other
National Institute for Health and Welfare (THL) (87)	Finland	2010	All Ages	32	NmA, NmB, NmC, NmW, NmY
National Institute for Health and Welfare (THL) (88)	Finland	2011	All Ages	33	NmA, NmB, NmC, NmW, NmY
National Institute for Health and Welfare (THL) (89)	Finland	2012	All Ages	29	NmA, NmB, NmC, NmW, NmY
National Institute for Health and Welfare (THL) (90)	Finland	2013	All Ages	20	NmA, NmB, NmC, NmW, NmY

National Institute for Health and Welfare (THL) (91)	Finland	2014	All Ages	18	NmA, NmB, NmC, NmW, NmY
National Institute for Health and Welfare (THL) (92)	Finland	2015	All Ages	20	NmA, NmB, NmC, NmW, NmY
Toropainen M, Vainio A and Kuusi M (93)	Finland	2016	All Ages	18	NmA [†] , NmB, NmC, NmW, NmY
Châtelet IPd, Taha MK, Lepoutre A, Maine C, Deghmane AE and Lévy-Bruhl D (94)	France	2010	All Ages	483	NmA, NmB, NmC, NmW, NmX, NmY, Other
Châtelet IPd, Taha MK, Lepoutre A, Maine C, Deghmane AE and Lévy-Bruhl D (95)	France	2011	All Ages	530	NmA, NmB, NmC, NmW, NmX, NmY, Other
Barret AS, Deghmane AE, Lepoutre A, Fonteneau L, Maine C, Taha MK et al. (96)*	France	2012	All Ages	539	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Santé Publique France (97)*	France	2013	All Ages	561	NmA [†] , NmB, NmC, NmW, NmX, NmY, Other
Santé Publique France (98)	France	2014	All Ages	412	NmA [†] , NmB, NmC, NmW, NmX, NmY, Other [†]
Santé Publique France (99)	France	2015	All Ages	453	NmA [†] , NmB, NmC, NmW, NmX, NmY, Other
Santé Publique France (100)	France	2016	All Ages	506	NmA [†] , NmB, NmC, NmW, NmX, NmY, Other
Robert Koch Insitut (RKI) (101)	Germany	2010	All Ages	344	NmA, NmB, NmC, NmW, NmX [†] , NmY, Other
Robert Koch Insitut (RKI) (102)	Germany	2011	All Ages	309	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other [†]
Robert Koch Insitut (RKI) (103)	Germany	2012	All Ages	307	NmA, NmB, NmC, NmW, NmX [†] , NmY, Other [†]
Robert Koch Insitut (RKI) (104)	Germany	2013	All Ages	289	NmA, NmB, NmC, NmW, NmX [†] , NmY, Other [†]
Robert Koch Insitut (RKI) (105)	Germany	2014	All Ages	240	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other [†]
Robert Koch Insitut (RKI) (106)*	Germany	2015	All Ages	251	NmA, NmB, NmC, NmW, NmX, NmY, Other
Robert Koch Insitut (RKI) (107)	Germany	2016	All Ages	280	NmA, NmB, NmC, NmW, NmX [†] , NmY, Other
Theano G (108)*	Greece	2010–2016	All Ages	2010: 43 2011: 48 2012: 53 2013: 50 2014: 55 2015: 50 2016: 31	NmA, NmB, NmC, NmW, NmX, NmY, Other
Health Protection Surveillance Centre (HPSC) (109)*	Ireland	2010	All Ages	98	NmB, NmC, NmW, NmY, Other
Health Protection Surveillance Centre (HPSC) (110)*	Ireland	2011	All Ages	88	NmB, NmC, NmW, NmY, Other
Health Protection Surveillance Centre (HPSC) (111)*	Ireland	2012	All Ages	60	NmB, NmC, NmW, NmY, Other
Health Protection Surveillance Centre (HPSC) (112)*	Ireland	2013	All Ages	73	NmB, NmC, NmW, NmY, Other
Health Protection Surveillance Centre (HPSC) (113)*	Ireland	2014	All Ages	80	NmB, NmC, NmW, NmY, Other
Health Protection Surveillance Centre (HPSC) (114)*	Ireland	2015	All Ages	67	NmB, NmC, NmW, NmY, Other
Higher Institute of Health (ISS) (115)	Italy	2011–2016	All Ages	2011: 117 2012: 107 2013: 116 2014: 115 2015: 143 2016: 187	NmA, NmB, NmC, NmW, NmX, NmY
Egorova E, Otorbaeva D, Ronveaux O and Wasley A (116)*	Kyrgyzstan	Jan 2014–Jul 2015	All Ages	2014: 23 2015: 47	NmA, NmB, NmC

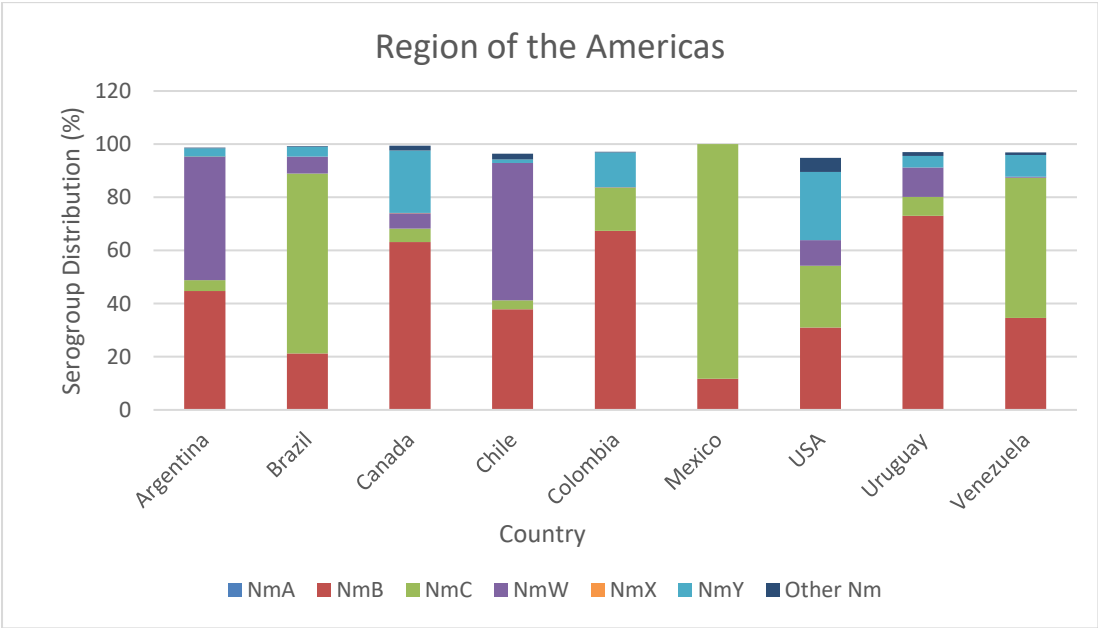
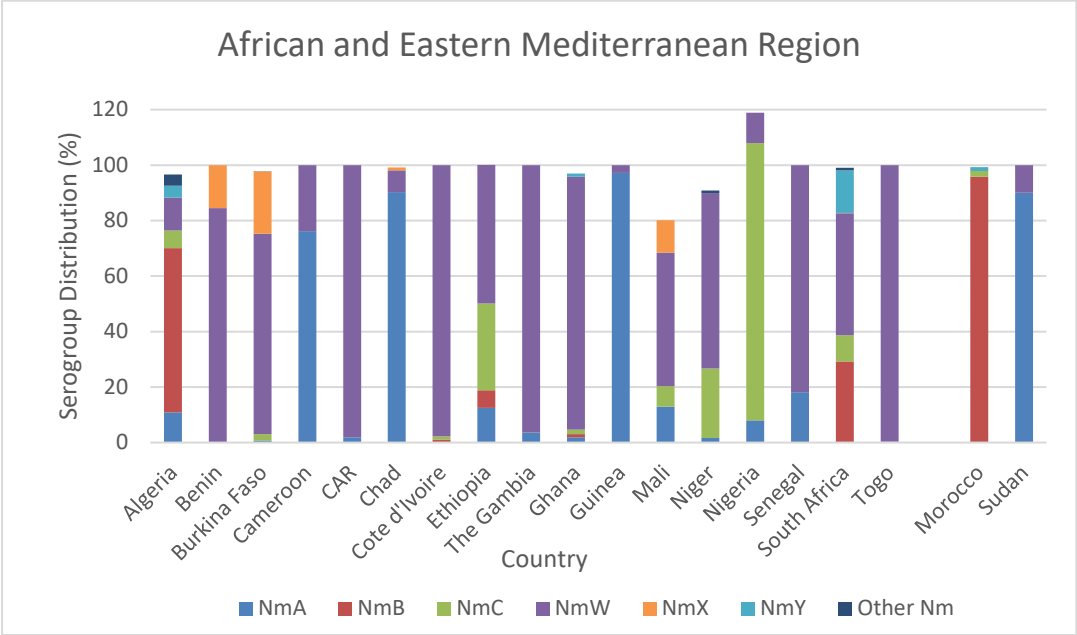
Netherlands Reference Laboratory for Bacterial Meningitis (117)	Netherlands	2010	All Ages	132	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Netherlands Reference Laboratory for Bacterial Meningitis (118)	Netherlands	2011	All Ages	90	NmA [†] , NmB, NmC, NmW, NmX, NmY, Other
Netherlands Reference Laboratory for Bacterial Meningitis (119)	Netherlands	2012	All Ages	81	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Netherlands Reference Laboratory for Bacterial Meningitis (120)	Netherlands	2013	All Ages	111	NmA [†] , NmB, NmC, NmW, NmX, NmY, Other
Netherlands Reference Laboratory for Bacterial Meningitis (121)	Netherlands	2014	All Ages	73	NmA [†] , NmB, NmC, NmW, NmX, NmY, Other
Netherlands Reference Laboratory for Bacterial Meningitis (122)	Netherlands	2015	All Ages	84	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other [†]
Van Der Ende A, Arends A, Feller M, Keijzers W, Schurman I, Knol Met al. (123)	Netherlands	2016	All Ages	154	NmA [†] , NmB, NmC, NmW, NmX, NmY, Other [†]
Blystad H, Caugant DA, Haugen IL, Rønning K, Steens A, Steinbakk Met al. (124)	Norway	2011	All Ages	37	NmB, NmC, NmW, NmY, Other [†]
Blystad H, Caugant DA, Haugen IL, Konsmo K, Steens A, Steinbakk Met al. (125)	Norway	2012	All Ages	24	NmB, NmC, NmW, NmY, Other [†]
Blystad H, Caugant DA, Haugen IL, Konsmo K, Steens A, Steinbakk Met al. (126)	Norway	2013	All Ages	25	NmB, NmC, NmW, NmY, Other
Caugant DA, Haugen IL, Konsmo K, Nordstrand K, Steinbakk M, Storsæter Jet al. (127)	Norway	2014	All Ages	16	NmB, NmC, NmW, NmY, Other [†]
Caugant DA, Haugen IL, Konsmo K, Nordstrand K, Steinbakk M, Storsæter Jet al. (128)	Norway	2015	All Ages	18	NmB, NmC, NmW, NmY, Other [†]
Berg A, Caugant DA, Haugen IL, Konsmo K, Steinbakk M, Storsæter Jet al. (129)	Norway	2016	All Ages	23	NmB, NmC [†] , NmW, NmY, Other [†]
Skoczyńska A, Kuch A, Waśko I, Gołębiewska A, Ronkiewicz P, Markowska Met al. (130)	Poland	2010–2011	All Ages	2010: 204 2011: 259	NmB, NmC, NmW, NmY
Waśko I, Kuch A, Kiedrowska M, Gołębiewska A, Ronkiewicz P, Wróbel Iet al. (131)	Poland	2015–2016	All Ages	358	NmB, NmC, NmW, NmY
Simões MJ and Fernandes T (132)	Portugal	2010–2014	All Ages	2010: 60 2011: 68 2012: 55 2013: 54 2014: 43	NmA, NmB, NmC, NmW, NmY, Other
Institutul National de Sanatate Publica (INSP) (133)	Romania	2010	All Ages	15	NmA, NmB, NmC, Other
Institutul National de Sanatate Publica (INSP) (134)	Romania	2015	All Ages	27	NmA, NmB, NmC
Koroleva I, Beloshitskiy G, Zakroeva I, Melnikova A, Koroleva M, Shipulin Get al. (135)*	Russian Federation	2011	All Ages	527	NmA, NmB, NmC, NmW, NmX, NmY, Other
Koroleva I, Beloshitskiy I, Zakroeva I and Koroleva M (136)	Russian Federation	2014	All Ages	391	NmA, NmB, NmC
Koroleva I, Melnikova A and Koroleva M (137)	Russian Federation	2016	All Ages	294	NmA, NmB, NmC, NmW, NmY

Kruzliková A (138)	Slovakia	2015–2016	All Ages	43	NmB, NmC, NmW, NmY
Garrido Estepa M, Manguña Guzmán M and Cano Portero R (139)	Spain	Oct 2009–Sep 2013	All Ages	Oct 2009–Sep 2010: 425 Oct 2010–Sep 2011: 412 Oct 2011–Sep 2012: 356 Oct 2012–Sep 2013: 260	NmA, NmB, NmC, NmW, NmY, Other
National Center of Epidemiology: Health Institute Carlos III (ISCIII) (140)	Spain	Oct 2013–Sep 2014	All Ages	149	NmA, NmB, NmC, NmW, NmY, Other
National Center of Epidemiology: Health Institute Carlos III (ISCIII) (141)	Spain	Oct 2014–Aug 2016	All Ages	Oct 2014–Sep 2015: 189 Oct 2015–Aug 2016: 163	NmA, NmB, NmC, NmW, NmY, Other
Public Health Agency Sweden (142)	Sweden	2010–2016	All Ages	2010: 65 2011: 62 2012: 99 2013: 72 2014: 45 2015: 48 2016: 56	2010–2013, 2016: NmA [†] , NmB, NmC, NmW, NmY, Other [†] 2014, 2015: NmA [†] , NmB, NmC, NmW, NmY, Other
Ninet B and Schrenzel J (143)	Switzerland	2010	All Ages	39	NmA [†] , NmB, NmC, NmW, NmY
Emonet S and Schrenzel J (144)	Switzerland	2011	All Ages	60	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Hinrikson H, Emonet S and Schrenzel J (145)	Switzerland	2012	All Ages	34	NmA, NmB, NmC, NmW, NmX, NmY, Other
Hinrikson H, Emonet S and Schrenzel J (146)	Switzerland	2013	All Ages	42	NmA [†] , NmB, NmC, NmW, NmX, NmY, Other [†]
Hinrikson H, Emonet S and Schrenzel J (147)	Switzerland	2014	All Ages	35	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other [†]
Hinrikson H, Emonet S and Schrenzel J (148)	Switzerland	2015	All Ages	40	NmA [†] , NmB, NmC, NmW, NmX, NmY, Other [†]
Ceyhan M, Gürler N, Ozsurekci Y, Keser M, Aycan AE, Gurbuz Vet al. (149)	Turkey	2011–2012	<18 yrs	46	NmA, NmB, NmC, NmW, NmY, Other
Ceyhan M, Ozsurekci Y, Gürler N, Karadag Oncel E, Camcioglu Y, Salman Net al. (150)	Turkey	2013, 2014	<18 yrs	2013: 19 2014: 66	NmA, NmB, NmC, NmW, NmY, Other
Ladhani SN, Flood JS, Ramsay ME, Campbell H, Gray SJ, Kaczmarek E al. (151)	United Kingdom (England and Wales)	Jul 2009–Jun 2011	All Ages	Jul 2009–Jun 2010: 886 Jul 2010–Jun 2011: 1024	NmA, NmB, NmC, NmW, NmX, NmY, Other
Public Health England (152)	United Kingdom (England and Wales)	Jul 2011–Jun 2012	All Ages	759	NmA, NmB, NmC, NmW, NmX, NmY, Other
Public Health England (153)	United Kingdom (England)	Jul 2012–Jun 2013	All Ages	766	NmA, NmB, NmC, NmW, NmX, NmY, Other
Public Health England (154)	United Kingdom (England)	Jul 2013–Jun 2014	All Ages	630	NmA, NmB, NmC, NmW, NmX, NmY, Other
Public Health England (155)	United Kingdom (England)	Jul 2014–Jun 2015 Jul 2015–Jun 2016	All Ages	Jul 2014–Jun 2015: 720 Jul 2015–Jun 2016: 799	NmA, NmB, NmC, NmW, NmX, NmY, Other
Public Health England (156) Public Health England (157)	United Kingdom (England)	Jul 2015–Dec 2016	All Ages	331	NmA, NmB, NmC, NmW, NmX, NmY, Other
Public Health Wales (158)	United Kingdom (Wales)	2013–2016	All Ages	2013: 53 2014: 46 2015: 39 2016: 43	NmB, NmC, NmW, NmY
Public Health Agency (PHA) (159)*	United Kingdom (Northern Ireland)	2010–2016	All Ages	2010: 37 2011: 42 2012: 33 2013: 34 2014: 29 2015: 28	NmB, NmC, NmW, NmY, Other

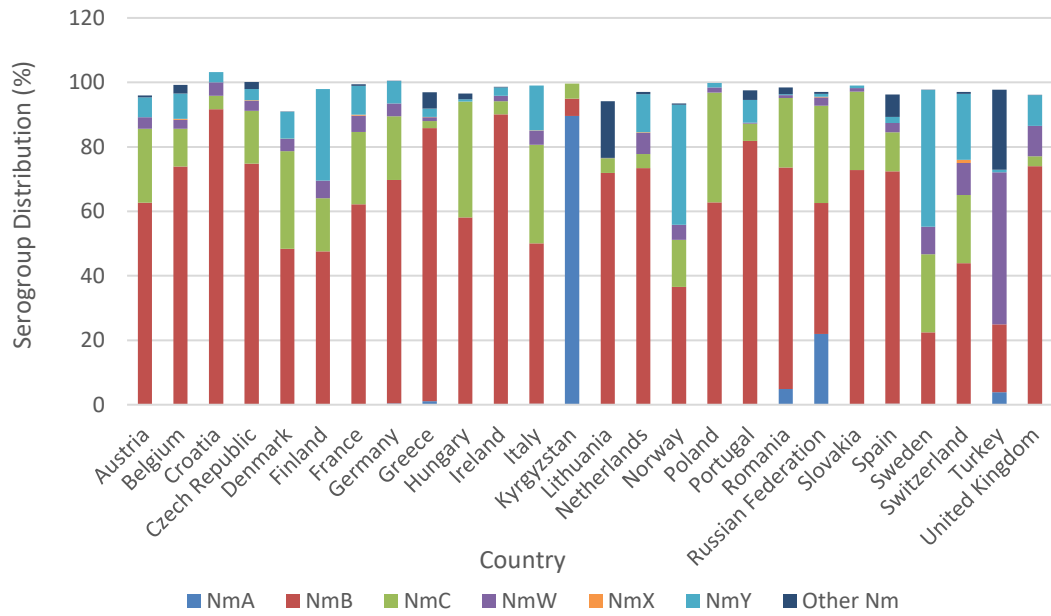
				2016: 20	
McDonald E, Denham B, McMenamin J and Cameron C (160)*	United Kingdom (Scotland)	2010	All Ages	42	NmB, NmC, NmW, NmY, Other
McDonald E, Denham B, Smith-Palmer A and McMenamin J (161)	United Kingdom (Scotland)	2011	All Ages	54	NmB, NmC, NmW, NmY, Other [†]
Wissmann BV, Denham B, Smith-Palmer A and Cameron C (162)	United Kingdom (Scotland)	2012	All Ages	52	NmB, NmC, NmW, NmY, Other [†]
The Vaccine Preventable Diseases Team and the Scottish <i>Haemophilus Legionella</i> Meningococcus and Pneumococcus Reference Laboratory (SHLMPRL) (163)	United Kingdom (Scotland)	2013	All Ages	47	NmB, NmC, NmW, NmY, Other [†]
The Vaccine Preventable Diseases Team and the Scottish <i>Haemophilus Legionella</i> Meningococcus and Pneumococcus Reference Laboratory (SHLMPRL) (164)	United Kingdom (Scotland)	2014	All Ages	61	NmB, NmC, NmW, NmY, Other [†]
The Vaccine Preventable Diseases Team and the Scottish <i>Haemophilus Legionella</i> Meningococcus and Pneumococcus Reference Laboratory (SHLMPRL) (165)	United Kingdom (Scotland)	2015	All Ages	73	NmB, NmC, NmW, NmY, Other [†]
Health Protection Scotland Immunisation team and the Scottish <i>Haemophilus Legionella</i> Meningococcus and Pneumococcus Reference Laboratory (SHLMPRL) (166)	United Kingdom (Scotland)	Jan–Sep 2016	All Ages	72	NmB, NmC, NmW, NmY, Other
European Centre for Disease Prevention and Control (ECDC) (167)	Hungary, Italy, Lithuania, Norway, Poland, Portugal, Romania, Slovakia	Hungary: 2010–2015 Italy: 2010 Lithuania: 2010–2015 Norway: 2010 Poland: 2012–2014 Portugal: 2015 Romania: 2011–2014 Slovakia: 2010–2012	All Ages	Hungary, 2010: 33 Hungary, 2011: 62 Hungary, 2012: 51 Hungary, 2013: 45 Hungary, 2014: 29 Hungary, 2015: 34 Italy, 2010: 110 Lithuania, 2010: 16 Lithuania, 2011: 32 Lithuania, 2012: 53 Lithuania, 2013: 76 Lithuania, 2014: 53 Lithuania, 2015: 55 Norway, 2010: 39 Poland, 2012: 225 Poland, 2013: 195 Poland, 2014: 130 Portugal, 2015: 60 Romania, 2011: 36 Romania, 2012: 32 Romania, 2013: 37 Romania, 2014: 40 Slovakia, 2010: 31 Slovakia, 2011: 15 Slovakia, 2012: 29	NmA, NmB, NmC, NmW, NmX, NmY, Other 2012: NmA, NmB, NmC, NmW, NmY, Other
South East Asia Region (SEARO)					
Majumdar T, Bhattacharya S, Barman D and Baidya S (168)	India	2010	All Ages	71	NmA, NmC [†] , Other [†]
Western Pacific Region (WPRO)					

NNDSS Annual Report Writing Group (169)	Australia	2010	All Ages	207	NmA [†] , NmB, NmC, NmW, NmY
Lahra MM and Enriquez RP (170)	Australia	2011	All Ages	219	NmA [†] , NmB, NmC, NmW, NmY, Other
Lahra MM and Enriquez RP (171)	Australia	2012	All Ages	201	NmA [†] , NmB, NmC, NmW, NmY, Other
Lahra MM and Enriquez RP (172)	Australia	2013	All Ages	142	NmA [†] , NmB, NmC, NmW, NmY, Other
Lahra MM and Enriquez RP (173)	Australia	2014	All Ages	161	NmA [†] , NmB, NmC, NmW, NmY, Other
Lahra MM, Enriquez RP and National Neisseria Network (174)	Australia	2015	All Ages	172	NmA [†] , NmB, NmC, NmW, NmY
Lahra MM and Enriquez RP (175)	Australia	Jan–Sep 2016	All Ages	155	NmA, NmB, NmC, NmW, NmY
Li J-h, Li Y-x, Wu D, Ning G-j, Shao Z-J and Yin Z-d (176)*	China	2010–2014	All Ages	2010: 74 2011: 70 2012: 61 2013: 74 2014: 49	NmA, NmB, NmC, NmW, NmY, Other
National Institute of Infectious Diseases (NIID) (177)	Japan	2013–2014	All Ages	41	NmB, NmC, NmW, NmY, Other
Lopez L, Sexton K and Carter P (178)	New Zealand	2010	All Ages	81	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Lopez L, Sexton K and Carter P (179)	New Zealand	2011	All Ages	100	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Lopez L and Sexton K (180)	New Zealand	2012	All Ages	68	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other [†]
Lopez L and Sherwood J (181)	New Zealand	2013	All Ages	57	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Institute of Environmental Science and Research Ltd (ESR) (182)	New Zealand	2014	All Ages	36	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other
Institute of Environmental Science and Research Ltd (ESR) (183)	New Zealand	2015	All Ages	59	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other [†]
Institute of Environmental Science and Research Ltd (ESR) (184)	New Zealand	2016	All Ages	67	NmA [†] , NmB, NmC, NmW, NmX [†] , NmY, Other

Visual Representation of Serogroup Distribution Estimates by WHO Region



European Region



Western Pacific and South-East Asia Regions

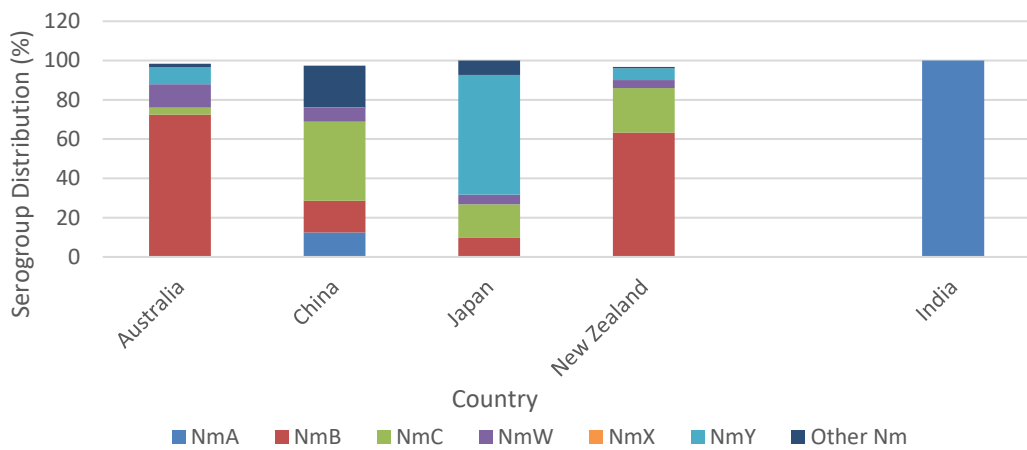


Figure S1. Visual Representation of Included Data for the African and Eastern Mediterranean WHO Regions.

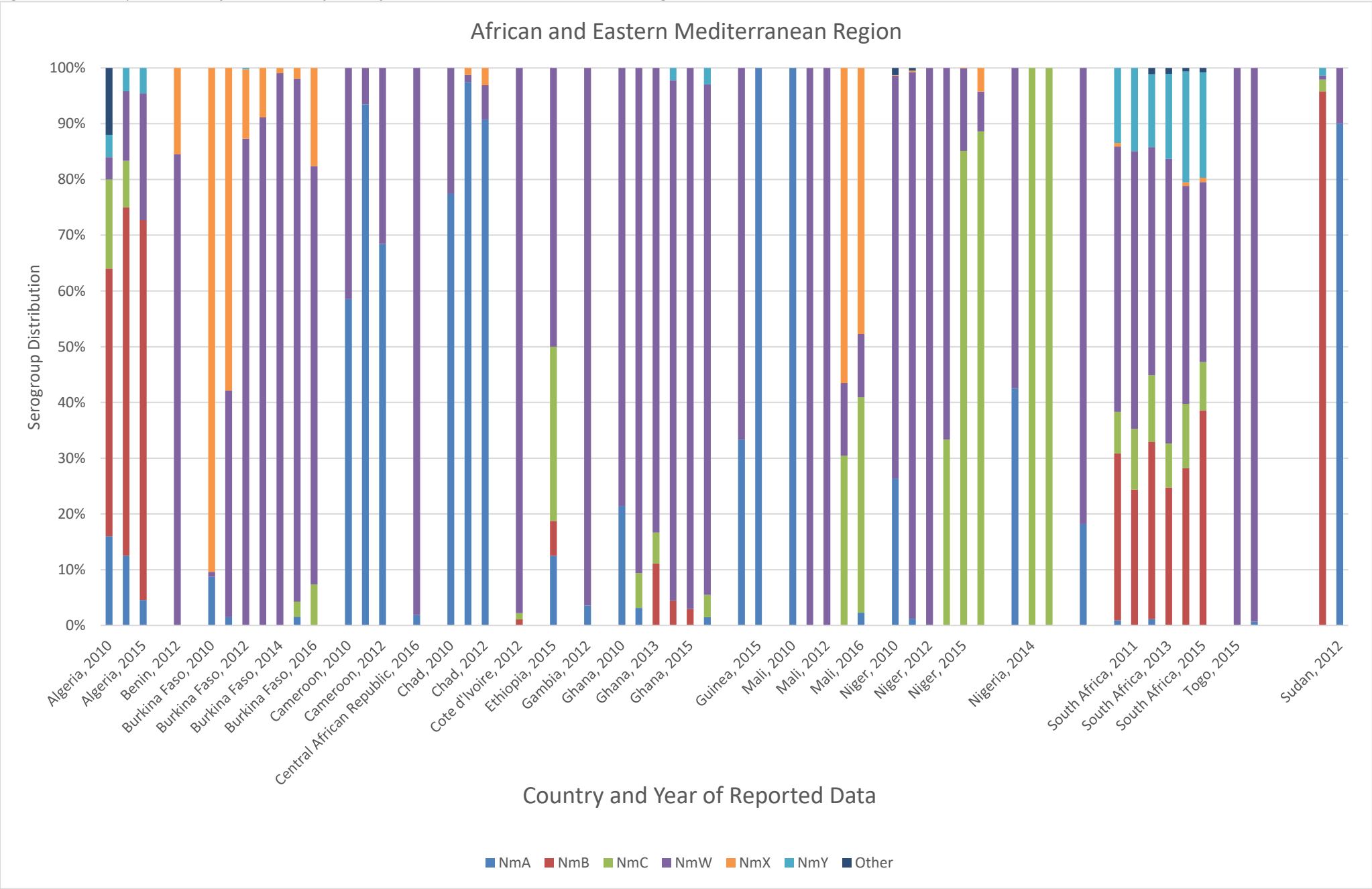


Figure S2. Visual Representation of Included Data for the WHO Region of the Americas.

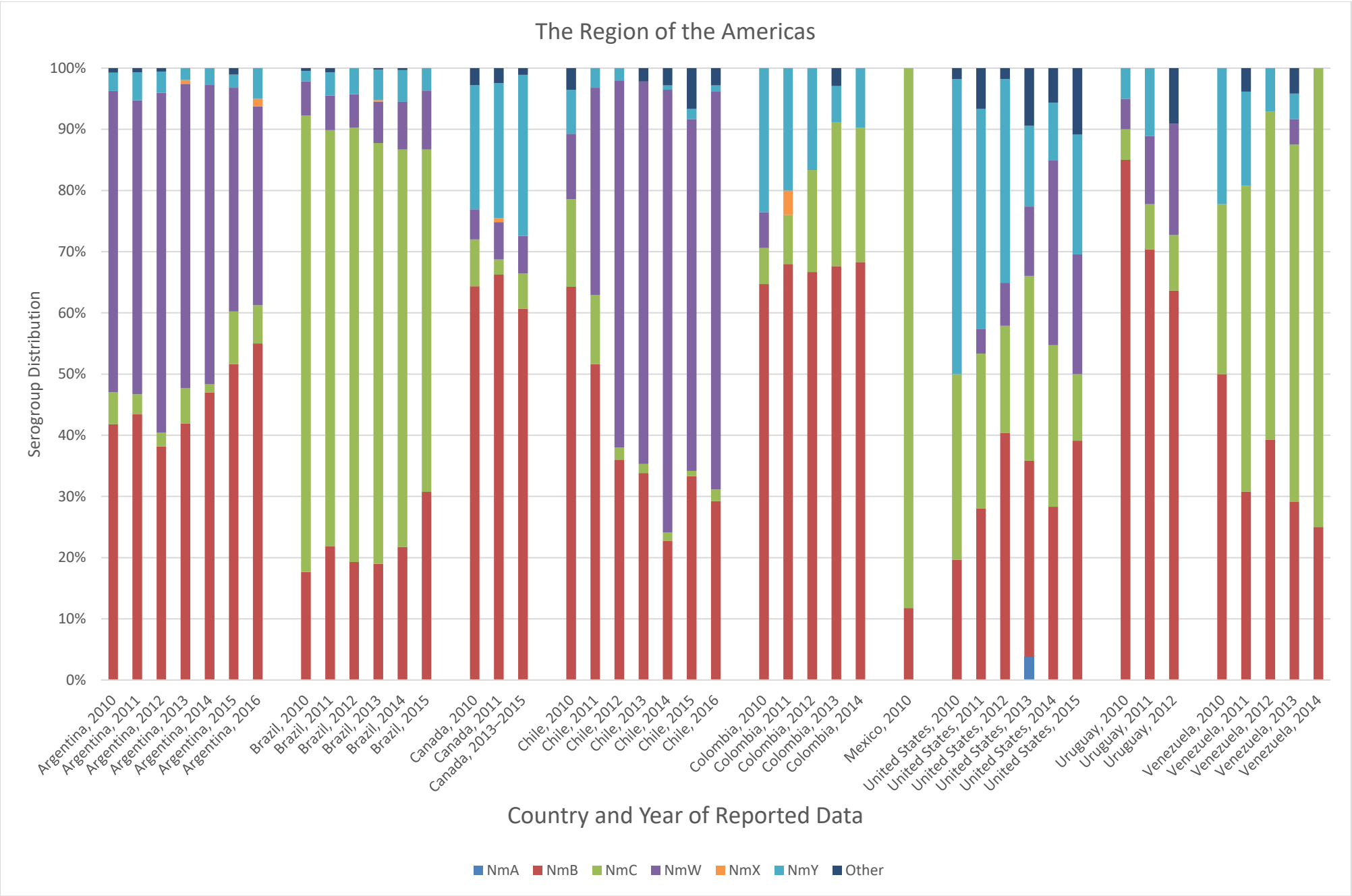


Figure S3. Visual Representation of Included Data for the European WHO Region.

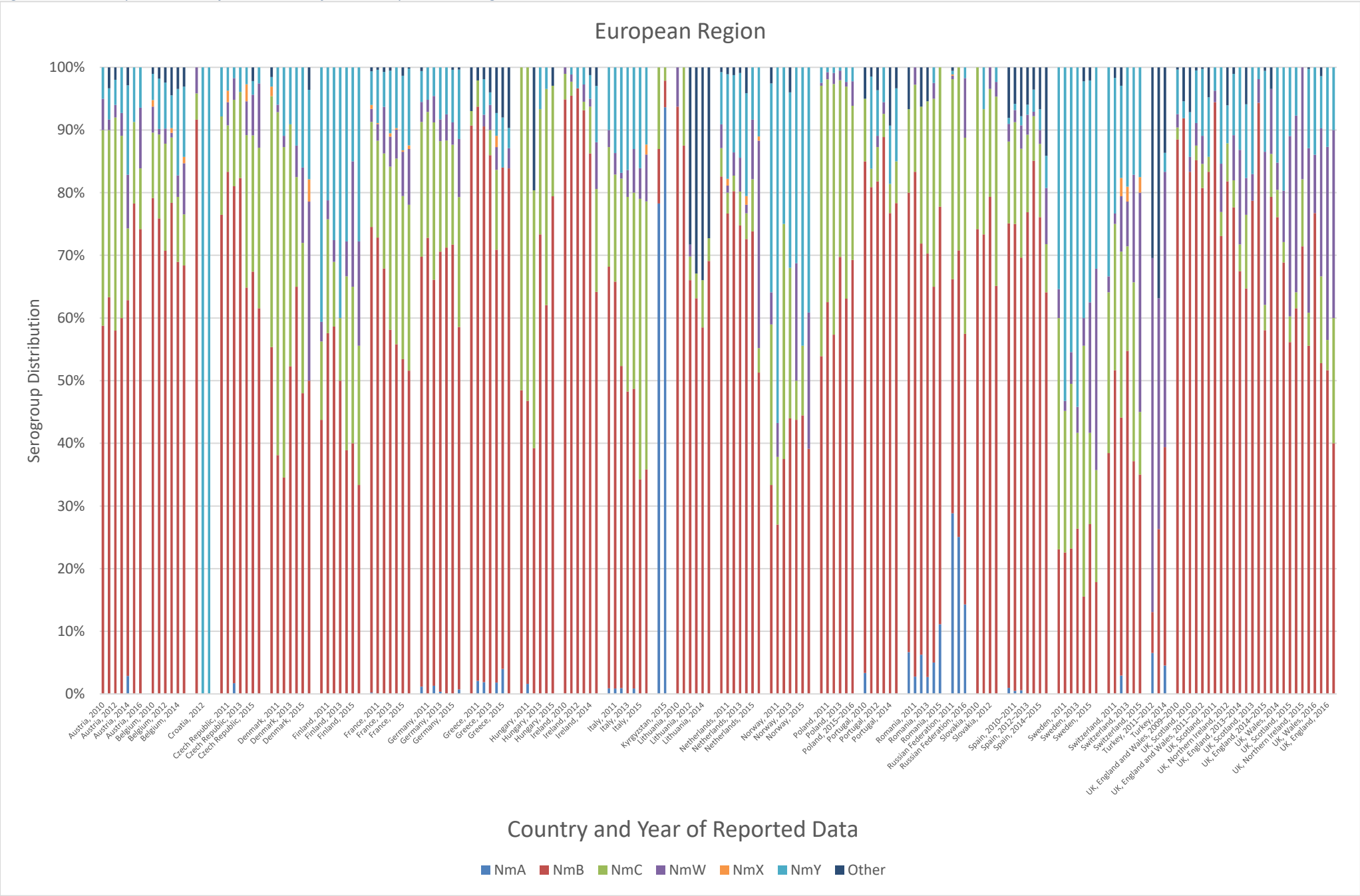


Figure S4. Visual Representation of Included Data for the Western Pacific and South-East Asia Regions.

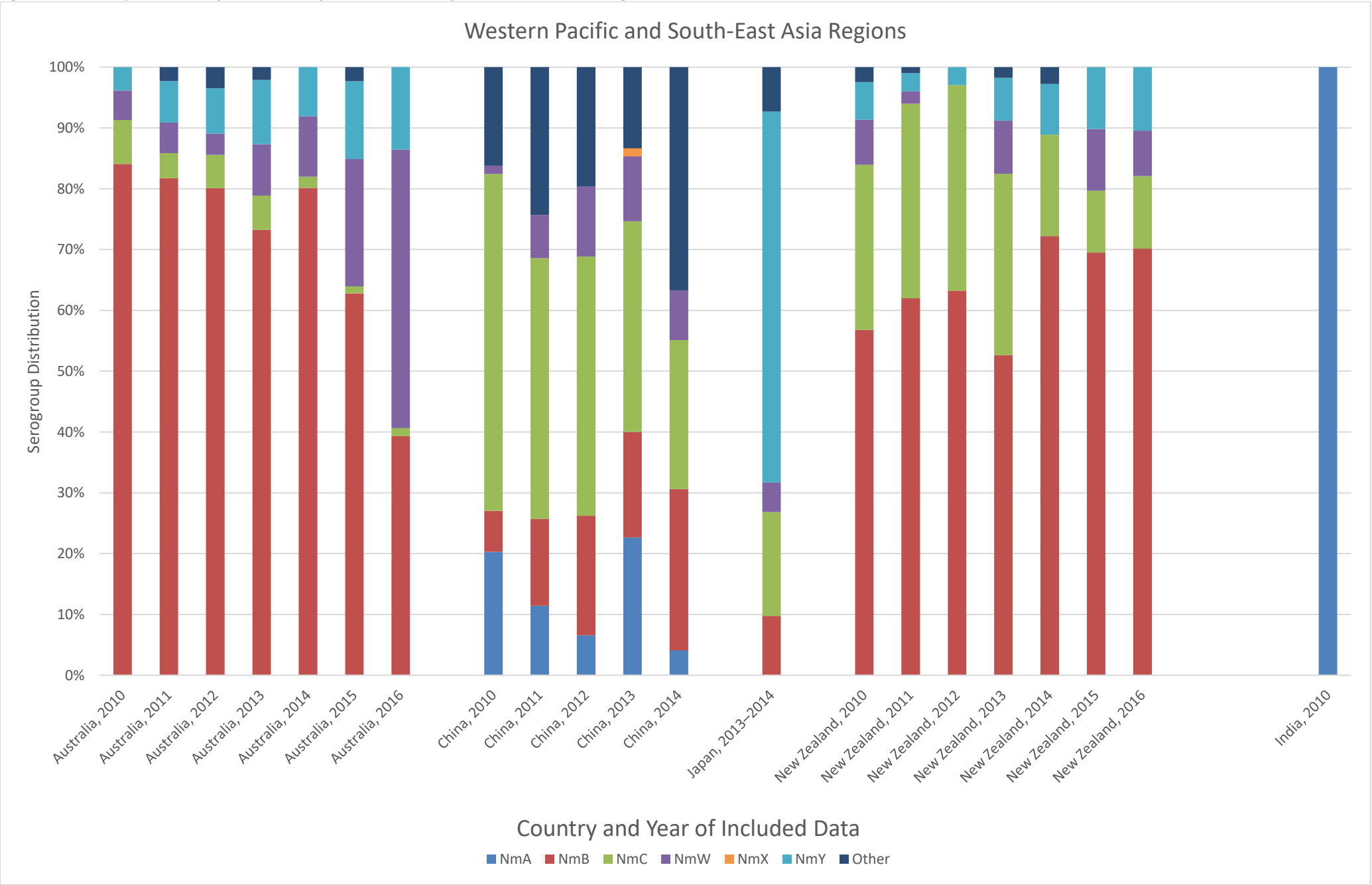


Table S4. Meta-analysis Heterogeneity.

Country	NmA p-value	NmA I ²	NmB p-value	NmB I ²	NmC p-value	NmC I ²	NmW p-value	NmW I ²	NmX p-value	NmX I ²	NmY p-value	NmY I ²	Other Nm p-value	Other Nm I ²
African (AFRO)														
Algeria	0.47	0.00%	0.37	0.37%	0.08	60.98%	0.17	43.46%	—	—	0.99	0.00%	—	—
Benin	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Burkina Faso	<0.01	92.66%	—	—	<0.01	96.18%	<0.01	99.56%	<0.01	99.43%	0.79	0.00%	—	—
Cameroon	<0.01	91.82%	0.88	0.00%	0.88	0.00%	<0.01	91.82%	0.88	0.00%	0.88	0.00%	—	—
Central African Republic	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Chad	<0.01	90.23%	—	—	—	—	<0.01	92.18%	0.33	10.33%	—	—	—	—
Cote d'Ivoire	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ethiopia	—	—	—	—	—	—	—	—	—	—	—	—	—	—
The Gambia	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ghana	0.01	68.48%	0.02	63.20%	0.24	25.42%	0.22	27.99%	0.96	0.00%	0.79	0.00%	—	—
Guinea	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mali	<0.01	98.34%	0.99	0.00%	<0.01	93.83%	<0.01	98.88%	<0.01	96.06%	0.99	0.00%	—	—
Niger	<0.01	99.26%	0.90	0.00%	<0.01	99.88%	<0.01	99.76%	<0.01	86.94%	0.90	0.00%	—	—
Nigeria	<0.01	96.53%	—	—	—	—	<0.01	97.73%	—	—	—	—	—	—
Senegal	—	—	—	—	—	—	—	—	—	—	—	—	—	—
South Africa	0.26	22.51%	0.06	53.75%	0.43	0.00%	<0.01	72.52%	0.47	0.00%	0.40	3.15%	0.98	0.00%
Togo	—	—	—	—	—	—	—	—	—	—	—	—	—	—
The Americas (AMRO)														
Argentina	1.00	0.00%	0.15	36.56%	0.07	47.87%	0.01	64.51%	0.73	0.00%	0.83	0.00%	0.75	0.00%
Brazil	1.00	0.00%	<0.01	71.27%	<0.01	82.96%	0.27	22.34%	0.83	0.00%	0.02	63.08%	0.31	15.46%
Canada	0.97	0.00%	0.48	0.00%	0.09	57.89%	0.88	0.00%	0.41	0.00%	0.34	7.55%	0.35	4.19%
Chile	1.00	0.00%	<0.01	84.48%	<0.01	74.13%	<0.01	93.46%	1.00	0.00%	0.07	48.58%	0.03	56.34%
Colombia	1.00	0.00%	1.00	0.00%	0.34	10.77%	0.63	0.00%	0.73	0.00%	0.31	16.69%	0.83	0.00%
Mexico	—	—	—	—	—	—	—	—	—	—	—	—	—	—
United States	0.53	0.00%	0.18	34.84%	0.11	44.09%	<0.01	86.65%	—	—	<0.01	84.74%	0.23	27.11%
Uruguay	0.99	0.00%	0.29	18.65%	0.91	0.00%	0.46	0.00%	0.99	0.00%	0.20	38.61%	0.19	40.06%
Venezuela	1.00	0.00%	0.56	0.00%	0.09	49.67%	0.82	0.00%	1.00	0.00%	0.14	41.73%	0.73	0.00%
Eastern Mediterranean (EMRO)														
Morocco	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sudan	—	—	—	—	—	—	—	—	—	—	—	—	—	—
European (EURO)														
Austria	0.87	0.00%	0.49	0.00%	0.03	58.06%	0.43	0.00%	1.00	0.00%	0.70	0.00%	0.51	0.00%
Belgium	1.00	0.00%	0.28	19.69%	0.43	0.00%	0.05	55.32%	0.69	0.00%	0.15	38.64%	0.73	0.00%
Croatia	—	—	—	—	—	—	—	—	—	—	0.24	29.00%	—	—
Czech Republic	0.96	0.00%	0.10	44.10%	0.18	32.38%	0.07	49.10%	0.79	0.00%	0.86	0.00%	—	—
Denmark	1.00	0.00%	0.03	55.99%	<0.01	90.25%	<0.01	79.04%	0.73	0.00%	0.09	45.40%	0.73	0.00%
Finland	1.00	0.00%	0.52	0.00%	0.61	0.00%	0.17	34.40%	—	—	0.43	0.00%	—	—
France	0.94	0.00%	<0.01	94.84%	<0.01	89.02%	<0.01	85.41%	0.39	5.26%	<0.01	79.68%	0.14	37.83%

Country	NmA p-value	NmA I ²	NmB p-value	NmB I ²	NmC p-value	NmC I ²	NmW p-value	NmW I ²	NmX p-value	NmX I ²	NmY p-value	NmY I ²	Other Nm p-value	Other Nm I ²
Germany	0.07	47.69%	<0.01	70.94%	0.12	40.98%	0.01	67.23%	1.00	0.00%	0.02	59.10%	0.56	0.00%
Greece	0.70	0.00%	0.06	50.96%	0.02	60.84%	0.43	0.00%	0.96	0.00%	0.19	31.08%	0.57	0.00%
Hungary	0.96	0.00%	<0.01	78.91%	<0.01	77.29%	1.00	0.00%	1.00	0.00%	0.19	32.73%	<0.01	79.52%
Ireland	—	—	<0.01	87.30%	<0.01	76.57%	0.17	36.11%	—	—	0.03	60.53%	0.42	0.08%
Italy	0.57	0.00%	<0.01	88.75%	<0.01	85.99%	0.13	39.31%	—	—	0.70	0.00%	—	—
Kyrgyzstan	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Lithuania	1.00	0.00%	0.01	68.10%	0.48	0.00%	0.48	0.00%	0.99	0.00%	1.00	0.00%	<0.01	87.59%
Netherlands	1.00	0.00%	<0.01	85.30%	0.75	0.00%	<0.01	93.22%	0.72	0.00%	0.39	4.27%	0.26	22.50%
Norway	—	—	0.79	0.00%	<0.01	70.70%	0.02	59.67%	—	—	0.19	31.67%	0.89	0.00%
Poland	0.98	0.00%	<0.01	75.13%	<0.01	82.69%	0.10	46.48%	—	—	0.35	9.81%	0.98	0.00%
Portugal	0.59	0.00%	0.67	0.00%	0.69	0.00%	0.72	0.00%	—	—	<0.01	70.98%	0.17	35.36%
Romania	0.79	0.00%	0.53	0.00%	0.64	0.00%	0.62	0.00%	1.00	0.00%	0.72	0.00%	0.18	35.55%
Russian Federation	<0.01	91.66%	0.16	45.17%	0.26	25.02%	—	—	—	—	—	—	—	—
Slovakia	0.97	0.00%	0.63	0.00%	0.66	0.00%	0.74	0.00%	—	—	0.46	0.00%	0.97	0.00%
Spain	0.45	0.00%	<0.01	71.07%	<0.01	70.16%	<0.01	63.84%	—	—	0.04	54.75%	0.03	56.58%
Sweden	1.00	0.00%	0.79	0.00%	0.01	66.26%	<0.01	84.36%	—	—	0.06	50.78%	0.66	0.00%
Switzerland	0.84	0.00%	0.33	13.60%	0.29	19.38%	<0.01	81.87%	0.53	0.00%	0.50	0.00%	0.72	0.00%
Turkey	0.48	0.00%	<0.01	86.03%	0.92	0.00%	0.27	23.08%	—	—	0.44	0.00%	0.03	70.98%
United Kingdom	0.90	0.00%	<0.01	95.88%	<0.01	63.05%	<0.01	96.29%	1.00	0.00%	<0.01	63.11%	<0.01	56.35%
South-East Asian (SEARO)														
India	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Western Pacific (WPRO)														
Australia	1.00	0.00%	<0.01	94.84%	0.01	64.90%	<0.01	96.10%	—	—	0.01	64.54%	0.05	58.19%
China	<0.01	73.24%	0.04	60.95%	0.01	69.68%	0.07	53.18%	0.84	0.00%	1.00	0.00%	0.04	61.15%
Japan	—	—	—	—	—	—	—	—	—	—	—	—	—	—
New Zealand	1.00	0.00%	0.27	21.50%	<0.01	73.74%	<0.01	68.59%	1.00	0.00%	0.32	13.98%	0.56	0.00%

Table S5. Studies not considered for inclusion in analysis based upon sample size <15 (per year average). Studies marked with an (*) were included in the analysis for other countries/time periods.

African Region (AFRO)		
Study	Country	Year(s)
Réseau Algérien de Surveillance de la Résistance des Bactéries aux Antibiotiques (AARN) (185)	Algeria	2012, 2013
Réseau Algérien de Surveillance de la Résistance des Bactéries aux Antibiotiques (AARN) (186)	Algeria	2014
Nambei WS, Gamba EP, Gbangbangai E, Ouambita RM, Dalengat-Vogbia Z, Nana Ret al. (187)	Central African Republic	2012
Dalecha D (188)	Ethiopia	2011
Mihret W, Lema T (29)	Ethiopia	2012, 2013
Traore FA, Sako FB, Sylla D, Kader DS, Bangoura M, Traore Met al. (189)	Guinea	2013
Ba ID, Deme-Ly I (24)	Senegal	2010, 2011, 2012
Caugant DA, Kristiansen PA, Wang X, Mayer LW, Taha MK, Ouedraogo Ret al. (190)	Uganda	2010
Intercountry Support Team—West Africa (4)*	Code d'Ivoire, Democratic Republic of the Congo, Togo	2010
Intercountry Support Team—West Africa (5)*	Ghana, Nigeria, Togo	2011
Intercountry Support Team—West Africa (15)*	Benin, Central African Republic, Democratic Republic of the Congo, Nigeria, Togo	2012
Intercountry Support Team—West Africa (9)*	Benin, Cameroon, Chad, Cote d'Ivoire, Democratic Republic of the Congo, The Gambia, Mali, Mauritania, Niger, Nigeria, Senegal, South Sudan, Sudan, Togo	2013
Intercountry Support Team—West Africa (10)*	Benin, Democratic Republic of the Congo, The Gambia, Guinea, Mali, Senegal, Togo	2014
Intercountry Support Team—West Africa (18)*	Benin, Cameroon, Chad, Cote d'Ivoire, The Gambia, Mauritania, Senegal	2015
Intercountry Support Team—West Africa (19)*	Benin, Cameroon, Central African Republic, Chad, Cote d'Ivoire, Guinea	2016
Region of the Americas (AMRO)		
Study	Country	Year(s)
Tsang RSW, Law DKS, Gad RR, Mailman T, German G and Needle R (191)	Canada	2012
Chanto G (192)	Costa Rica	2010–2015
Chacon-Cruz E, Martinez-Longoria CA, Llausas-Magana E, Luevanos-Velazquez A, Vazquez-Narvaez JA, Beltran Set al. (193)	Mexico	2010–2013
Cabrera-Gaytan DA, Perez-Perez GF, Arriaga-Nieto L, Vallejos-Paras A, Padilla-Velazquez R and Grajales-Muniz C (194)	Mexico	2012–2014
Pan American Health Organization (PAHO) (51)*	Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Nicaragua, Panama, Paraguay, Peru	2010
Pan American Health Organization (PAHO) (52)*	Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama, Paraguay	2011
Pan American Health Organization (PAHO) (53)*	Bolivia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Honduras, Mexico, Nicaragua, Paraguay, Peru	2012
Pan American Health Organization (PAHO) (54)*	Bolivia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay	2013
Pan American Health Organization (PAHO) (55)*	Bolivia, Costa Rica, Cuba, Dominican Republic, El Salvador, Mexico, Paraguay, Uruguay	2014
Eastern Mediterranean Region (EMRO)		
Study	Country	Year(s)
Husain EH, Barakat M and Al-Saleh M (195)	Kuwait	2010–2013
Intercountry Support Team—West Africa (9)*	Sudan	2013
European Region (EURO)		
Study	Country	Year(s)

Bukovski S, Vacca P, Anselmo A, Knezovic I, Fazio C, Neri A et al. (196)	Croatia	2009–2014
Klismanic Z, Juretic KB and Tripkovic I (197)	Croatia	2010
Bukovski S, Švigelj A and Kaić B (198) <i>Although this study has an average of >15 cases per year, there were <15 in 2016 and in 2017. Therefore, it was not included in the analysis.</i>	Croatia	2015–2017
Eloshvili M, McHedlishvili I and Imnadze P (199)	Georgia	2009–2011
Infectious Disease Prevention and Control Unit (200)	Malta	2010–2012
National Reference Laboratory for Meningococcus and Haemophilus (NRLMH) (201)	Serbia	2009–2014
European Centre for Disease Prevention and Control (ECDC) (167)*	Bulgaria, Cyprus, Estonia, Iceland, Latvia, Luxembourg, Malta, Slovakia, Slovenia	Bulgaria: 2015; Cyprus: 2010–2015; Estonia: 2010–2012; Iceland: 2010–2015; Latvia: 2010–2015; Luxembourg: 2010, 2014; Malta: 2013–2015; Slovakia: 2013, 2014; Slovenia: 2010–2015
South-East Asian Region (SEARO)		
Study	Country	Year(s)
Majumdar T, Bhattacharya S (168)*	India	2011, 2012
Western Pacific Region (WPRO)		
Study	Country	Year(s)
National Institute of Infectious Diseases (NIID) (202)	Japan	2015

Table S6. Antibiotics Tested for antimicrobial susceptibility.

Antibiotics Tested for Antimicrobial Susceptibility	Algeria	Burkina Faso	Cameroon	CAR	Cote d'Ivoire	DRC	Eritrea	Ethiopia	Ghana	Kenya	Madagascar	Mali	Mauritania	Mozambique	Niger	Rwanda	Senegal	Tanzania	Togo	Uganda	Sudan	Azerbaijan	Bulgaria	Czech Republic	Denmark	Estonia	Georgia	Greece	Ireland	Latvia	Luxembourg	Malta	Norway	Poland	Portugal	Scotland	Slovakia	Spain	Sweden	Bangladesh	Nepal	Sri Lanka	Cambodia	Mongolia	Philippines			
Penicillins																																																
Amoxicillin			✓		✓						✓																✓																					
Amoxicillin + clavulanate		✓														✓			✓																										✓			
Ampicillin	✓	✓		✓§		✓		✓	✓	✓				✓	✓	✓				✓							✓		✓	✓	✓								✓				✓	✓				
Penicillin G/ BenzylPenicillin/ Penicillin	✓	✓	✓	✓§	✓			✓			✓				✓	✓		✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓			
Penicillin on oxacillin disk																																													✓			
Oxacillin			✓	✓§	✓	✓						✓				✓			✓																													
Second Generation Cephalosporins																																																
Cefaclor																												✓																				
Cefuroxime										✓																																						
Cefoxitin																																										✓						
Third Generation Cephalosporins																																																
Cefixime																								✓																								
Ceftazidime										✓																																				§		
Cefotaxime	§		§	✓§		✓		*		✓	✓					✓		✓		✓						✓	✓	✓	✓			✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	§		§	✓§
Ceftriaxone	§	✓	§	✓§	✓	✓	✓	*	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓				✓	§	✓	§	✓	§	✓§	
Fourth Generation Cephalosporins																																																
Cefepime										✓																																						
Fluroquinolones																																																
Ciprofloxacin	✓	✓	✓	*			✓	*	✓		✓		✓			✓		✓		✓		✓	✓	✓	✓	*	✓	✓	✓		✓	✓	†	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
Ciprofloxacin + nalidixic acid																																															*	
Levofloxacin								*																																							*	
Nalidixic Acid				✓			✓																																									
Ofloxacin																																										✓						
Chloramphenicol																																																
Chloramphenicol	✓		✓	*	✓	✓	✓	*	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓				✓	✓					†	✓		✓				✓		✓	✓	✓	✓	✓	✓	

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