



Vaccine-Preventable Diseases Reported in North Carolina, 2014

Controlling vaccine-preventable diseases (VPDs) requires the consistent, concerted and coordinated efforts of public health agencies and healthcare providers to rapidly identify and report suspected cases, and swiftly implement control measures. Although many VPDs are at or near record low levels, maintaining high immunization rates is still critical to prevent reemergence, as has been seen nationally with recent increases in both pertussis and measles cases. This annual surveillance report summarizes VPDs reported in North Carolina during 2014 and includes information on the 12 VPDs listed in the table below. Additional details about diseases for which cases were reported are presented on subsequent pages.

Report Specifications. Notable information about this report includes:

- Cases presented include those classified as confirmed or probable.
- Case counts are based on the earliest date of illness identification, typically onset date. Therefore, case counts in this report will differ from those included in national summaries, which are usually based on the date when cases were closed and reported to the Centers for Disease Control and Prevention.
- Unless otherwise noted, ages are based on date when the case was entered in the North Carolina Electronic Disease Surveillance System.
- Cases presented include only those for which public health investigation had been completed by March 31, 2015.
- Incidence rates are based on mid-year population estimates obtained from the North Carolina Office of State Budget and Management. Rates for 2014 were calculated using 2013 population estimates. The Hispanic population was estimated to be 8.9% of the total North Carolina population based on 2013 United States Census Bureau data.
- Note that estimates of rates based on a small number of cases are unstable and can fluctuate widely. Therefore, these estimates should be interpreted with caution. Ninety-five percent confidence intervals are shown for demographic-specific rates.

Surveillance Overview. There were no significant* changes in the number of cases of any individual VPDs reported in 2014 compared with the average of the previous five years (2009–2013). No cases of diphtheria, polio, rubella, congenital rubella syndrome or tetanus were reported. The single case of measles and three cases of mumps all resulted from exposures outside of North Carolina. The recent resurgence in pertussis cases, which began in late 2011, continues. Seven hundred and eighty pertussis cases were reported in 2014, the highest number since 1991 (earliest year for which data are available electronically).

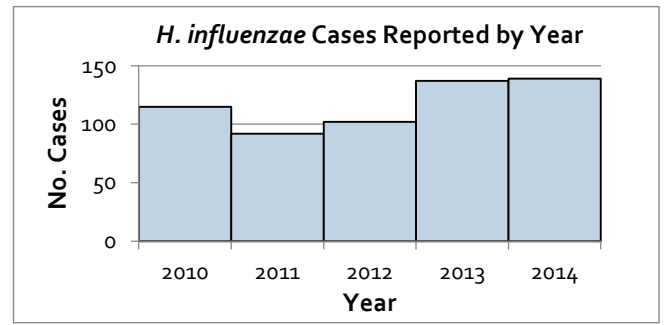
<i>Disease</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>Five-year average</i>	<i>2014</i>	<i>Significant Change*</i>
Diphtheria	0	0	0	0	0	0	0	--
<i>Haemophilus influenzae, invasive disease</i>	125	115	92	102	140	115	139	--
Hepatitis A	44	45	29	38	42	40	44	--
Measles	0	1	1	0	22	5	1	--
Meningococcal invasive disease	30	13	16	8	9	15	10	--
Mumps	4	11	9	2	4	6	3	--
Pertussis	224	289	206	626	625	394	780	--
Pneumococcal meningitis	33	32	24	38	35	35	35	--
Polio	0	0	0	0	0	0	0	--
Rubella	0	0	1	0	0	0	0	--
Congenital rubella syndrome	0	0	0	0	0	0	0	--
Tetanus	0	1	0	0	0	0	0	--

* ↑ = significant increase (≥ 2 standard deviations above average) ↓ = significant decrease (≥ 2 standard deviations below average) -- = no significant change

Haemophilus influenzae , invasive disease, 2014

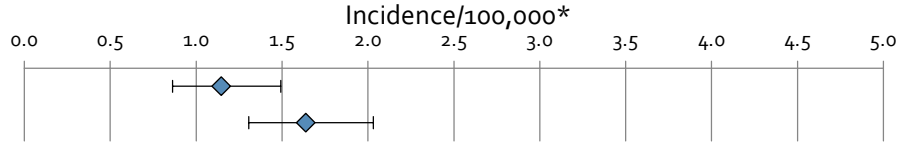
Annual Summary

	2010	2011	2012	2013	2014	
Incidence / 100,000	1.2	1.0	1.0	1.4	1.4	
No. cases	115	92	102	137	139	
Serotypes	type b, <5 years	1%	0%	0%	0%	
	type b, ≥ 5 years	3%	0%	1%	0%	
	non-b, typeable	25%	24%	20%	21%	24%
	nontypeable	63%	66%	70%	67%	65%
	unknown	7%	10%	10%	9%	10%

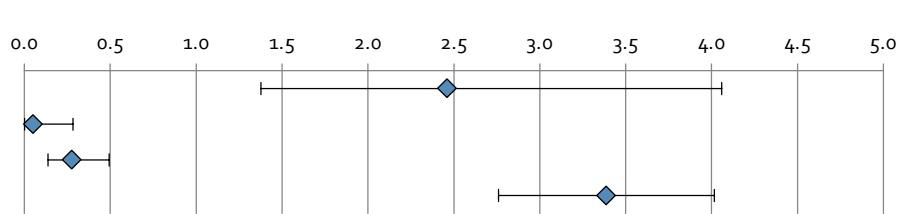


Case Demographics, 2014

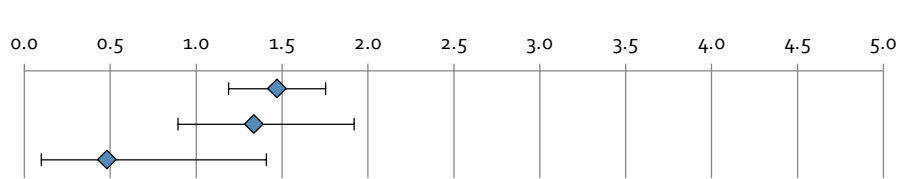
Sex	No. cases	% of total	Incidence/100,000
Male	55	40%	1.1
Female	83	60%	1.6
Unknown	1	1%	--



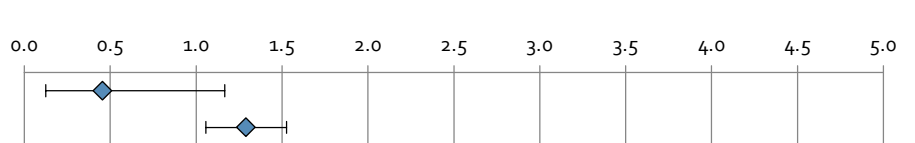
Age Group	No. cases	% of total	Incidence/100,000
Under 5 yrs.	15	11%	2.5
5-19 yrs.	1	1%	0.1
20-49 yrs.	11	8%	0.3
50+ yrs.	112	81%	3.4
Unknown	0	0%	--



Race	No. cases	% of total	Incidence/100,000
White	104	75%	1.5
Black	29	21%	1.3
Other or multiple	3	2%	0.5
Unknown	3	2%	--



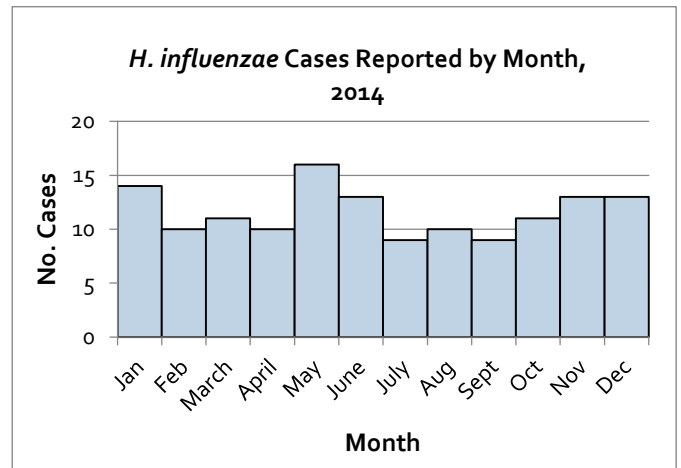
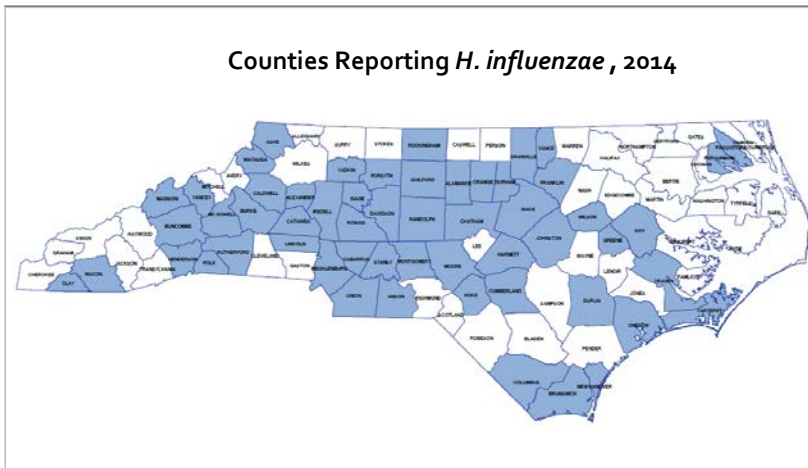
Hispanic Ethnicity	No. cases	% of total	Incidence/100,000
Yes	4	3%	0.5
No	116	83%	1.3
Unknown	19	14%	--



*Point estimates and 95% confidence intervals are shown

Geographic Distribution

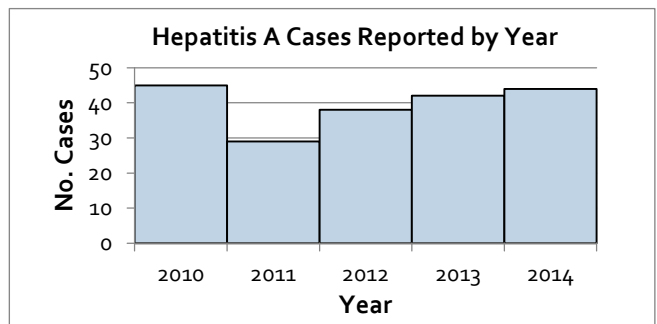
Cases By Month



Hepatitis A, 2014

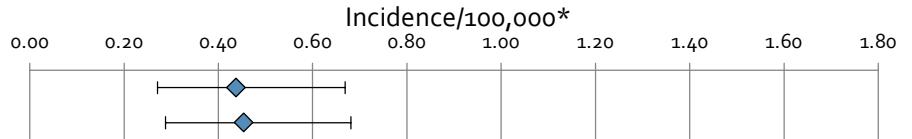
Annual Summary

	2010	2011	2012	2013	2014
Incidence / 100,000	0.47	0.30	0.39	0.43	0.45
No. cases	45	29	38	42	44

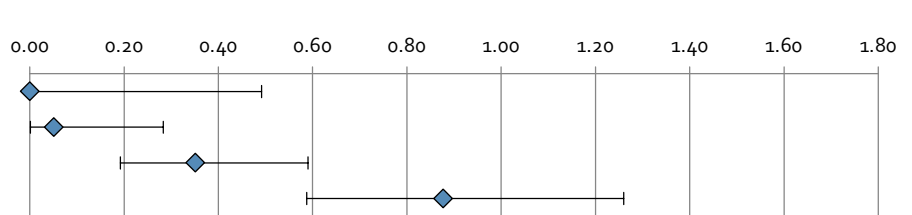


Case Demographics, 2014

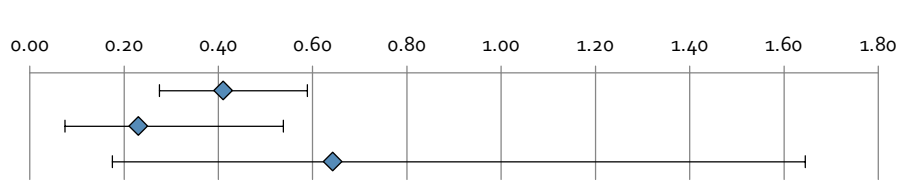
Sex	No. cases	% of total	Incidence/100,000
Male	21	48%	0.44
Female	23	52%	0.45
Unknown	0	0%	--



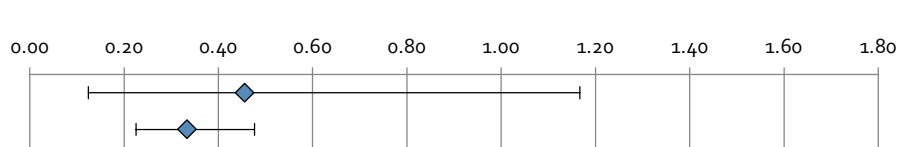
Age Group	No. cases	% of total	Incidence/100,000
Under 5 yrs.	0	0%	0.00
5-19 yrs.	1	2%	0.05
20-49 yrs.	14	32%	0.35
50+ yrs.	29	66%	0.88
Unknown	0	0%	--



Race	No. cases	% of total	Incidence/100,000
White	29	66%	0.41
Black	5	11%	0.23
Other or multiple	4	9%	0.64
Unknown	6	14%	--



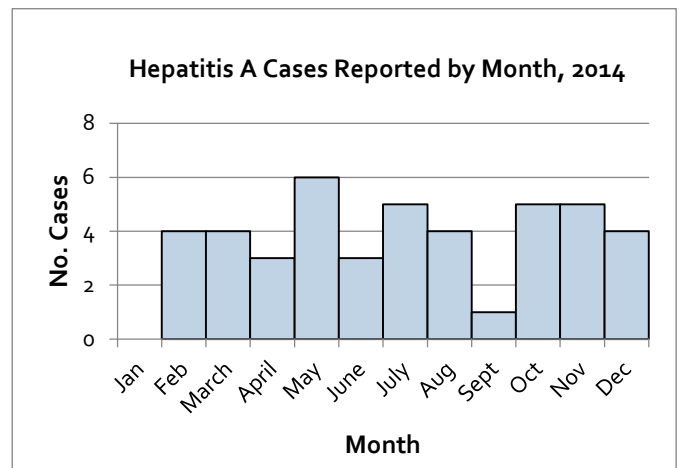
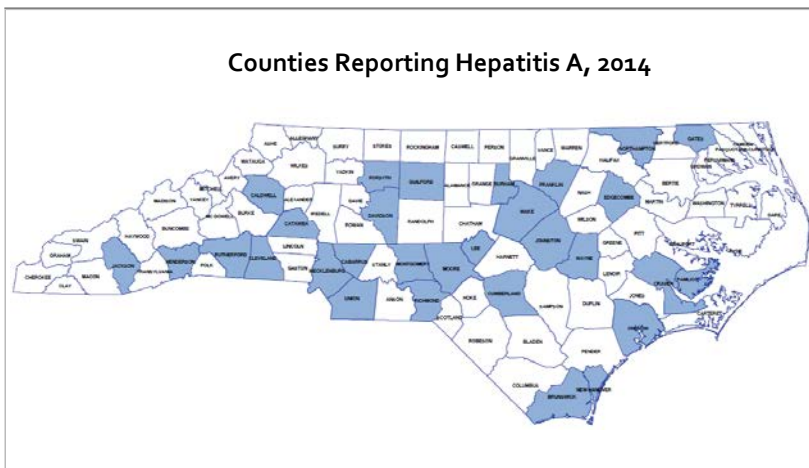
Hispanic Ethnicity	No. cases	% of total	Incidence/100,000
Yes	4	9%	0.46
No	30	68%	0.33
Unknown	10	23%	--



*Point estimates and 95% confidence intervals are shown

Geographic Distribution

Cases By Month



Measles, 2014

2014 Case Summary

A single case of measles was reported in December 2014 in Mecklenburg County. The case-patient was an unimmunized, adult female with recent travel to India. The case-patient developed fever, cough, coryza and conjunctivitis nine days after her return; rash developed two days later. Although the case-patient sought medical care on the second day following rash onset, measles was not initially suspected. Local and state public health officials were notified when measles was suspected during a second emergency room visit on the sixth day after rash onset. The case was laboratory confirmed at the NC State Laboratory of Public Health by serological testing.

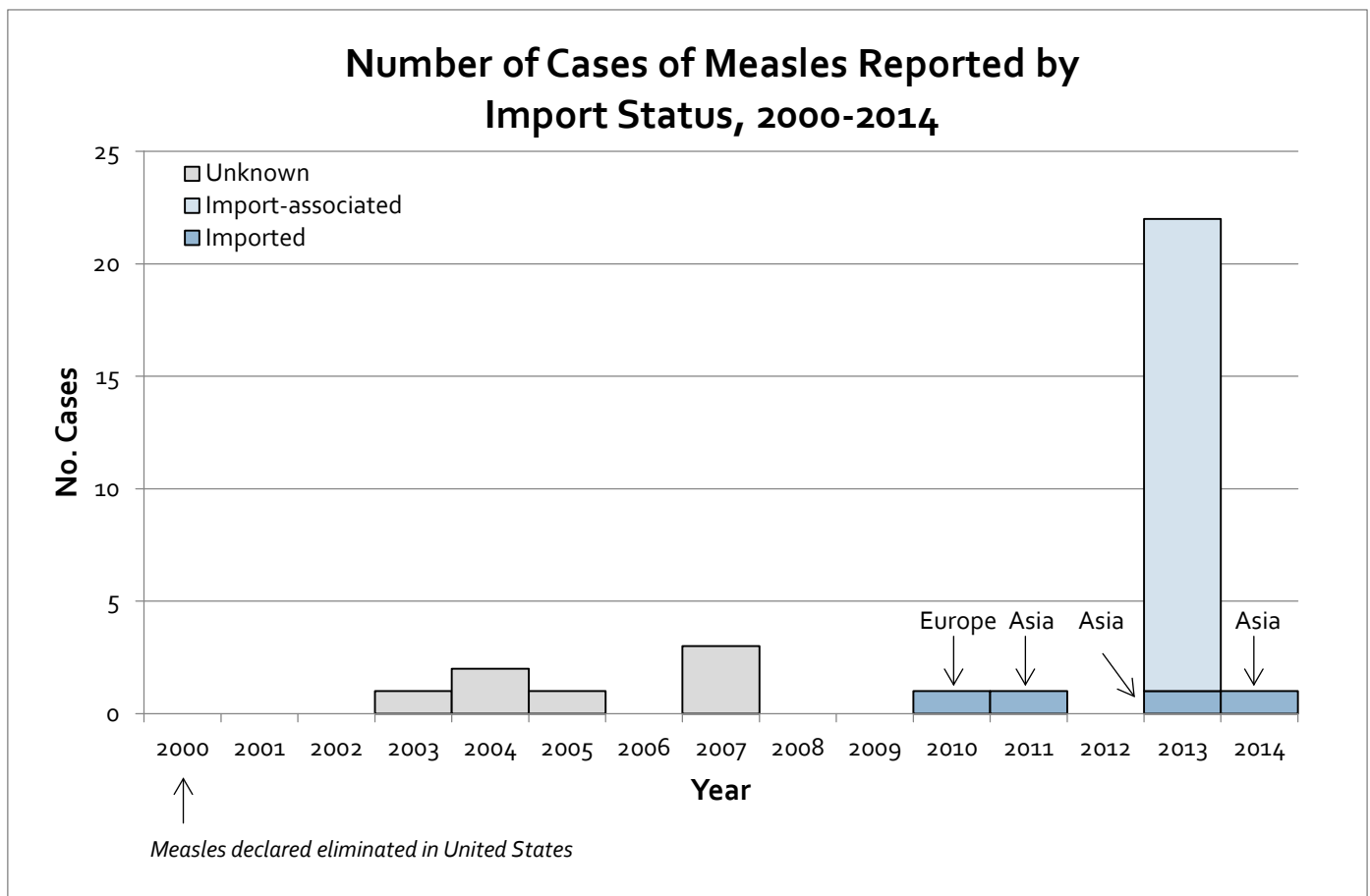
Contact identification was initiated at the time of the initial report, prior to laboratory confirmation. A total of 87 contacts were identified; 68 North Carolina residents and 19 South Carolina residents. South Carolina contacts were referred to the South Carolina Department of Health and Environmental Control for follow-up. Of the North Carolina contacts, 24 (35%) were exposed in the healthcare setting, 1 (<1%) in the household and 43 (63%) in other settings. Fifty-five contacts (81%) had proof of immunity. No contacts received MMR for post-exposure prophylaxis; one contact received immune globulin. Five exposed persons were issued quarantine orders. No secondary cases were identified among the 68 North Carolina contacts.

Of note, the circumstances surrounding the importation and diagnosis of the 2014 case were similar to that of a 2013 case that became the source of a 23-case outbreak.* Whereas the 2014 case returned to a highly-immunized community, the 2013 case returned to a community with low vaccine coverage. Because the importation of measles into North Carolina continues to occur, maintaining high immunization rates is essential to prevent outbreaks.

*Additional information about the 2013 outbreak can be found here:

http://epi.publichealth.nc.gov/cd/rubeola/provider_memo_rubeola_08062013.pdf

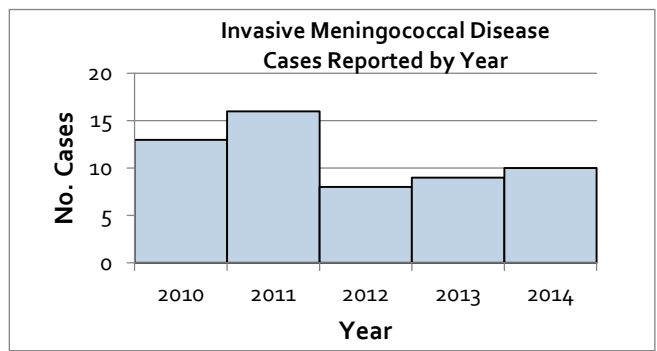
Measles Cases by Year



Meningococcal Invasive Disease, 2014

Annual Summary

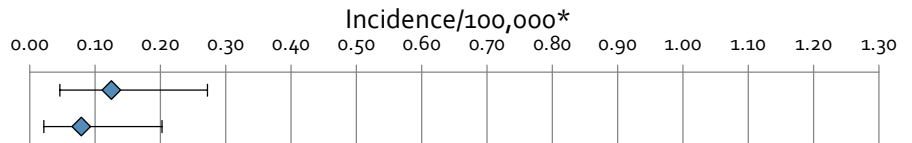
	2010	2011	2012	2013	2014	
Incidence / 100,000	0.14	0.17	0.08	0.09	0.10	
No. of cases	13	16	8	9	10	
Serogroups	A	0%	6%	0%	0%	0%
	C	15%	13%	13%	11%	10%
	Y	62%	50%	50%	33%	30%
	W-135	0%	0%	0%	0%	10%
	B	15%	25%	25%	33%	40%
	Unknown	8%	6%	13%	22%*	10%



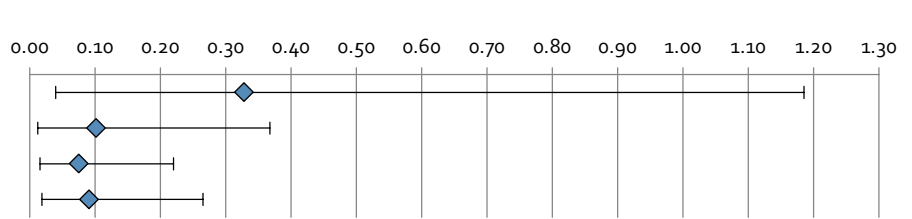
*1 unknown, 1 could not distinguish between C & W-135

Case Demographics, 2014

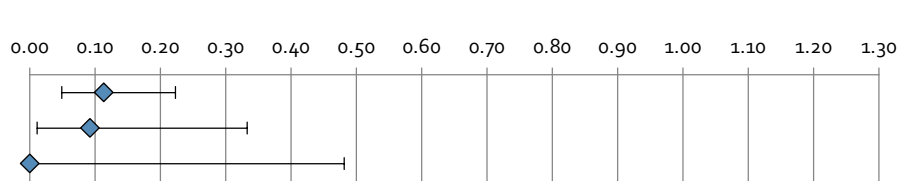
Sex	No. cases	% of total	Incidence/100,000
Male	6	60%	0.13
Female	4	40%	0.08
Unknown	0	0%	--



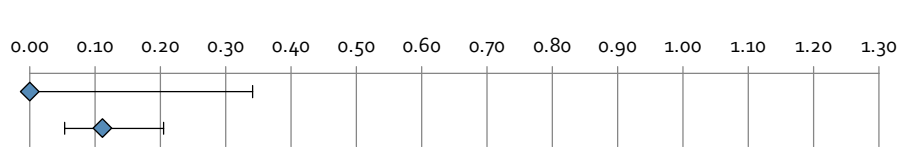
Age Group	No. cases	% of total	Incidence/100,000
Under 5 yrs.	2	20%	0.33
5-19 yrs.	2	20%	0.10
20-49 yrs.	3	30%	0.08
50+ yrs.	3	30%	0.09
Unknown	0	0%	--



Race	No. cases	% of total	Incidence/100,000
White	8	80%	0.11
Black	2	20%	0.09
Other or multiple	0	0%	0.00
Unknown	0	0%	--



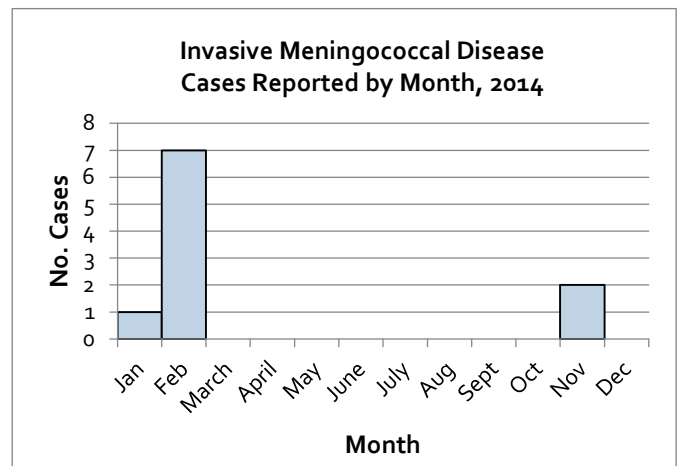
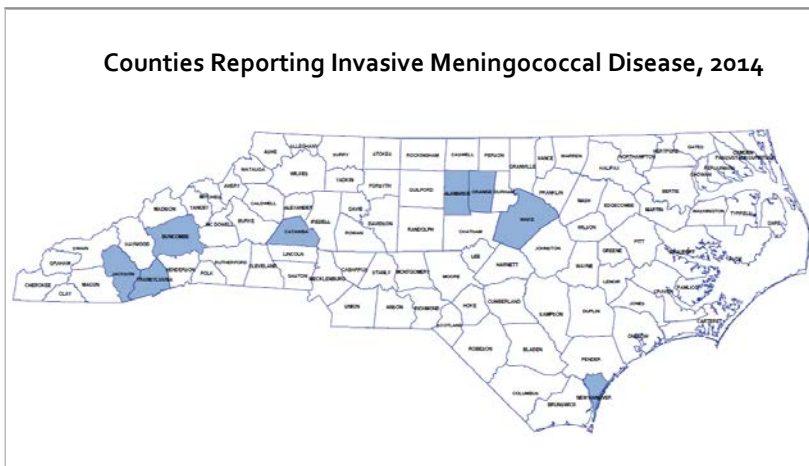
Hispanic Ethnicity	No. cases	% of total	Incidence/100,000
Yes	0	0%	0.00
No	10	100%	0.11
Unknown	0	0%	--



*Point estimates and 95% confidence intervals are shown

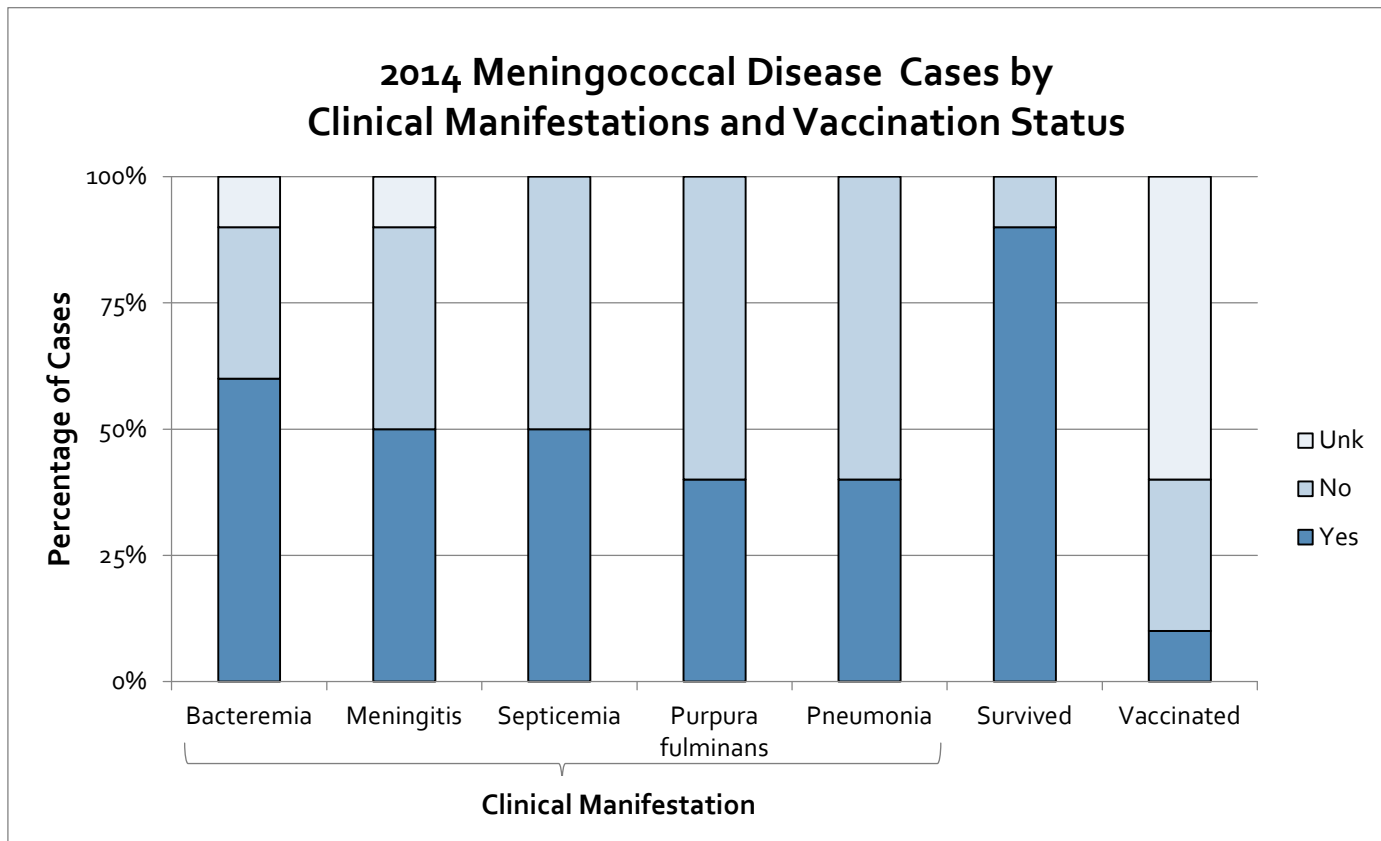
Geographic Distribution

Cases By Month

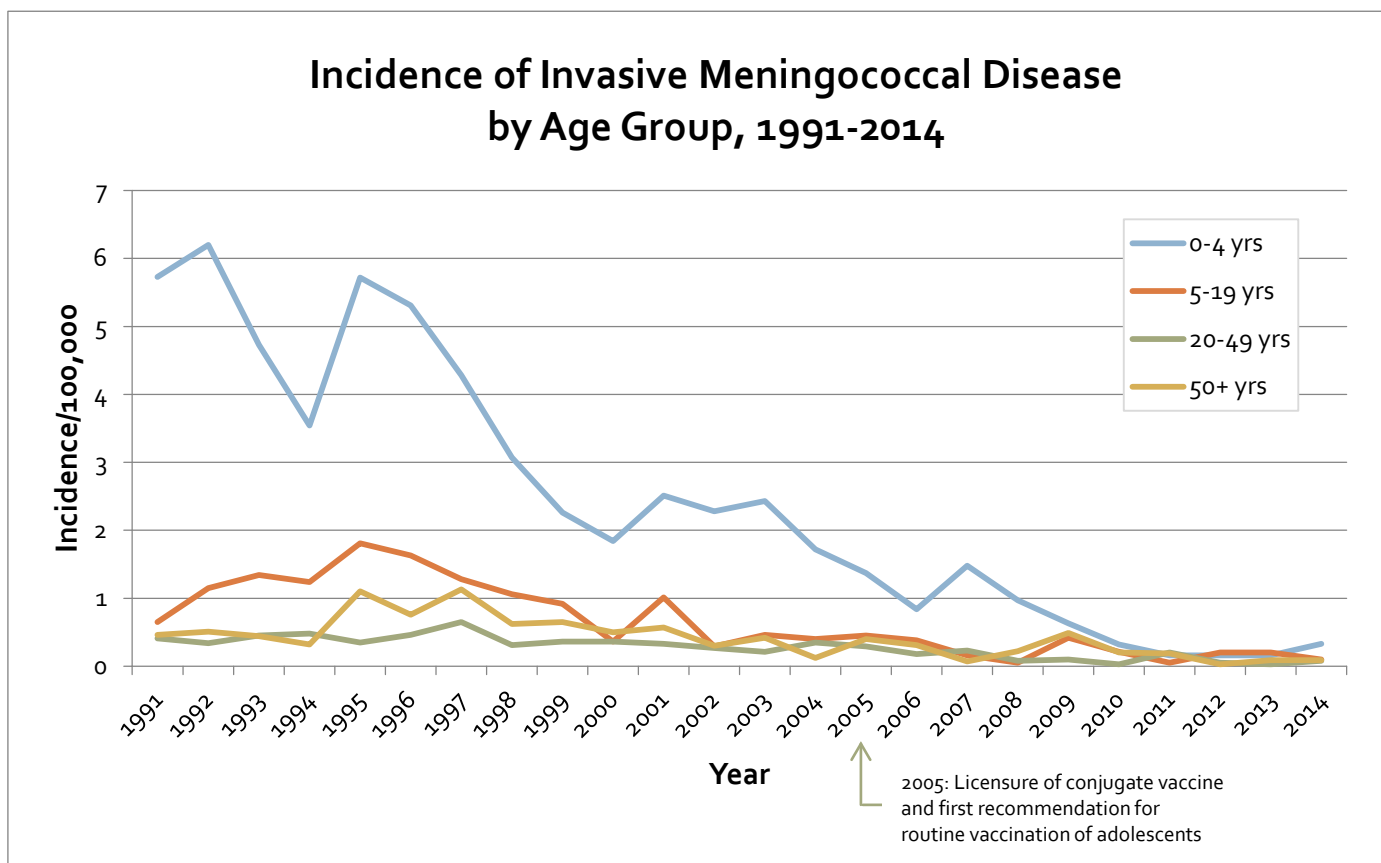


Meningococcal Invasive Disease, 2014 (continued)

2014 Case Summary



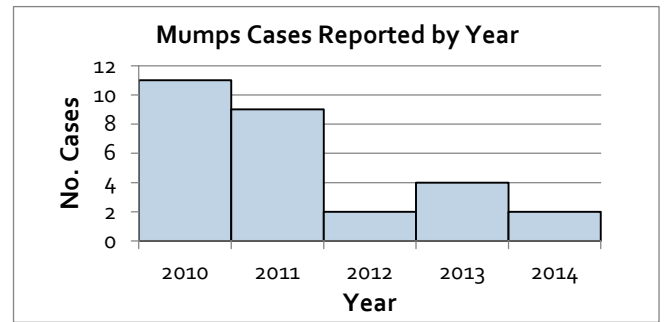
Meningococcal Disease Incidence by Age Group



Mumps, 2014

Annual Summary

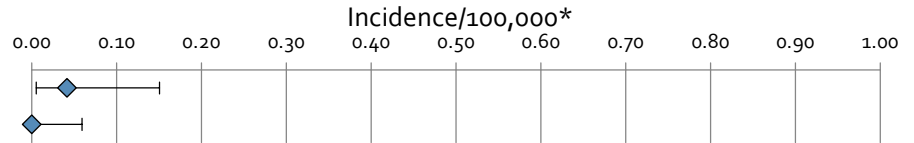
	2010	2011	2012	2013	2014
Incidence / 100,000	0.11	0.09	0.02	0.04	0.02
No. cases	11	9	2	4	2
Confirmed	91%	100%	50%	0%	0%
Probable	9%	0%	50%	100%	100%
Unvaccinated or unknown immune status*	45%	56%	50%	25%	100%



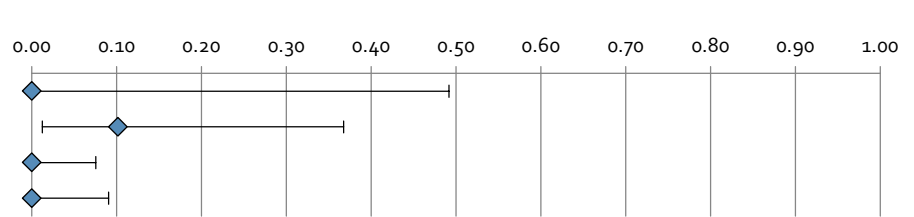
*Cases born before 1957 are considered immune

Case Demographics, 2014

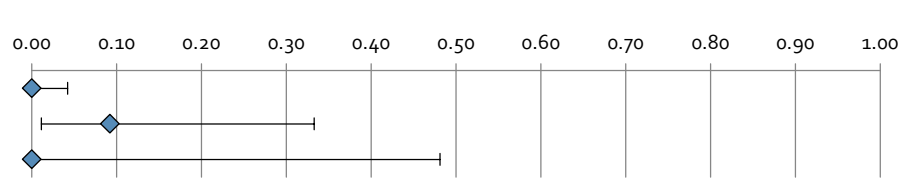
Sex	No. cases	% of total	Incidence/100,000
Male	2	100%	0.04
Female	0	0%	0.00
Unknown	0	0%	--



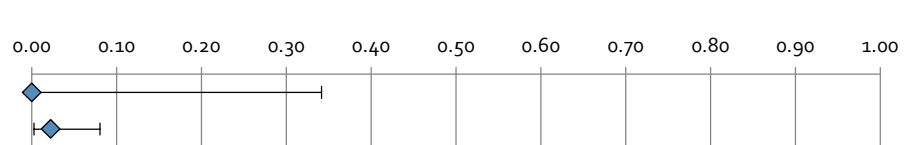
Age Group	No. cases	% of total	Incidence/100,000
Under 5 yrs.	0	0%	0.00
5-19 yrs.	2	100%	0.10
20-49 yrs.	0	0%	0.00
50+ yrs.	0	0%	0.00
Unknown	0	0%	--



Race	No. cases	% of total	Incidence/100,000
White	0	0%	0.00
Black	2	100%	0.09
Other or multiple	0	0%	0.00
Unknown	0	0%	--



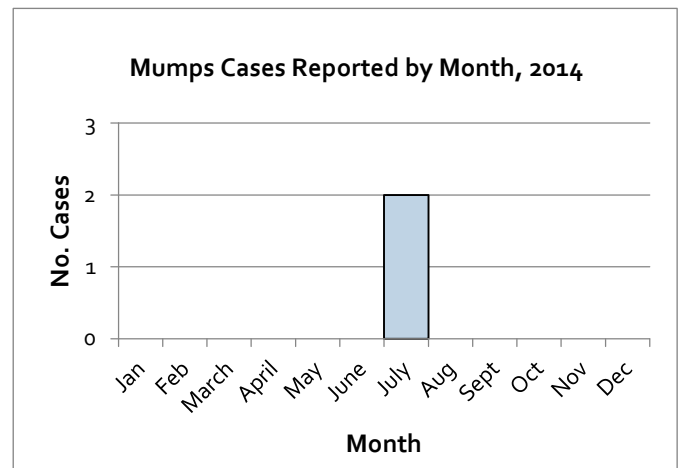
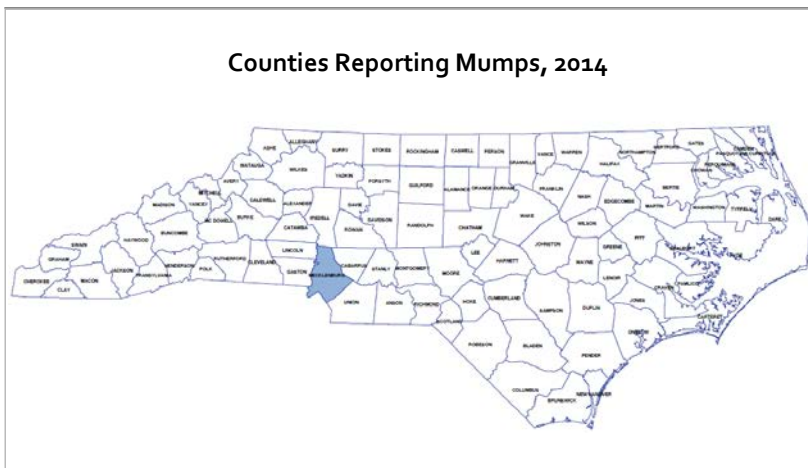
Hispanic Ethnicity	No. cases	% of total	Incidence/100,000
Yes	0	0%	0.00
No	2	100%	0.02
Unknown	0	0%	--



*Point estimates and 95% confidence intervals are shown

Geographic Distribution

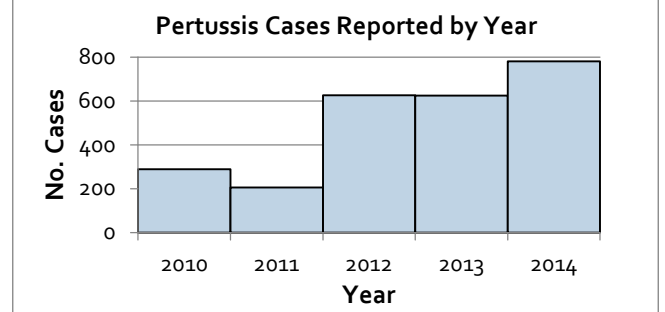
Cases By Month



Pertussis, 2014

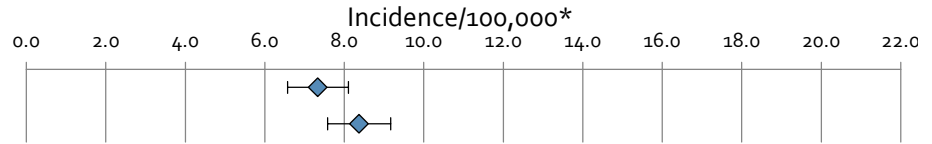
Annual Summary

	2010	2011	2012	2013	2014
Incidence / 100,000	3.0	2.1	6.4	6.3	7.9
No. cases	289	206	626	625	780
Culture confirmed	17%	8%	11%	8%	7%
PCR confirmed	33%	27%	42%	53%	44%
Epi-link confirmed	11%	18%	11%	10%	14%
Probable	40%	47%	37%	28%	35%

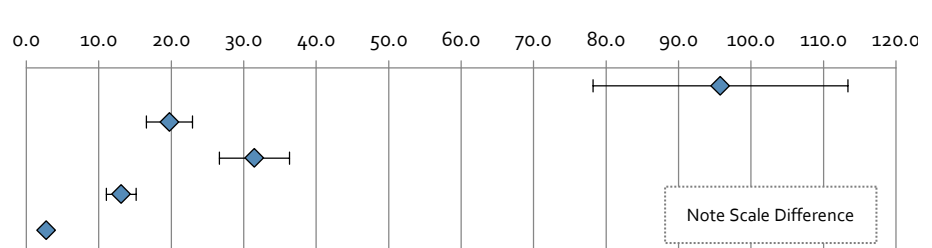


Case Demographics, 2014

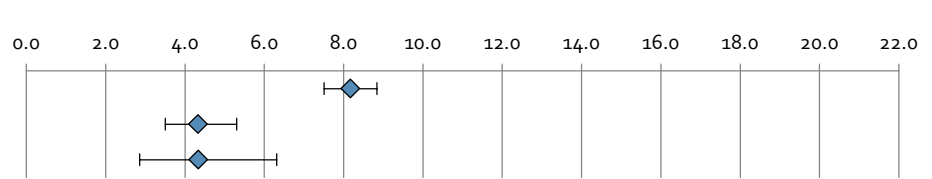
Sex	No. cases	% of total	Incidence/100,000
Male	352	45%	7.3
Female	424	54%	8.4
Unknown	4	1%	--



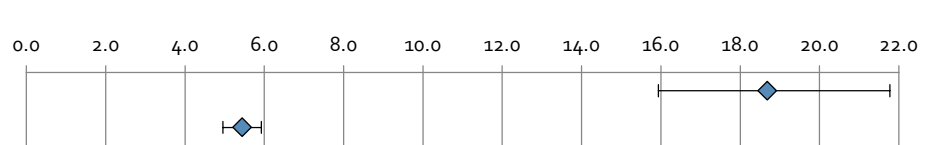
Age Group	No. cases	% of total	Incidence/100,000
Infants (<1 yr.)	114	15%	95.8
1-6 yrs.	148	19%	19.8
7-10 yrs.	162	21%	31.5
11-19 yrs.	156	20%	13.1
20+ yrs.	200	26%	2.7
Unknown	0	0%	--



Race	No. cases	% of total	Incidence/100,000
White	578	74%	8.2
Black	94	12%	4.3
Other or multiple	27	3%	4.3
Unknown	81	10%	--



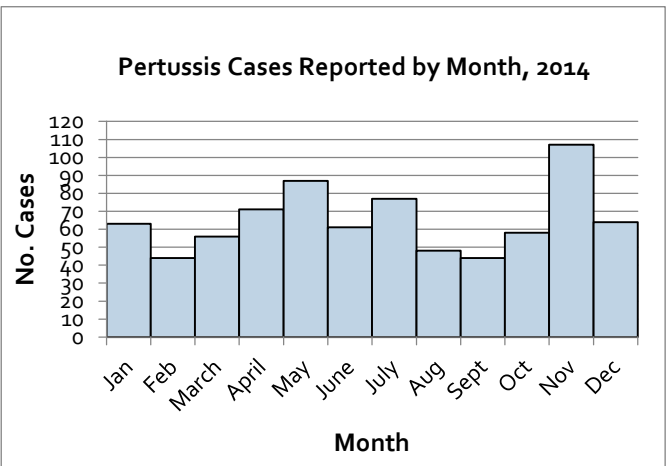
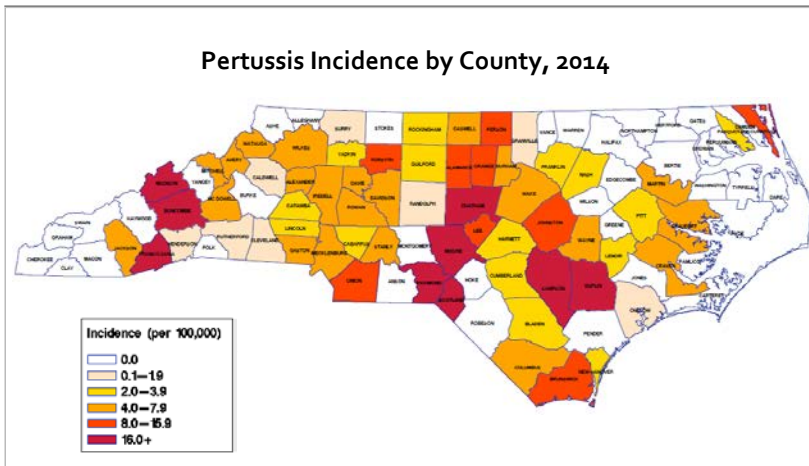
Hispanic Ethnicity	No. cases	% of total	Incidence/100,000
Yes	164	21%	18.7
No	489	63%	5.4
Unknown	127	16%	--



*Point estimates and 95% confidence intervals are shown

Geographic Distribution

Cases By Month

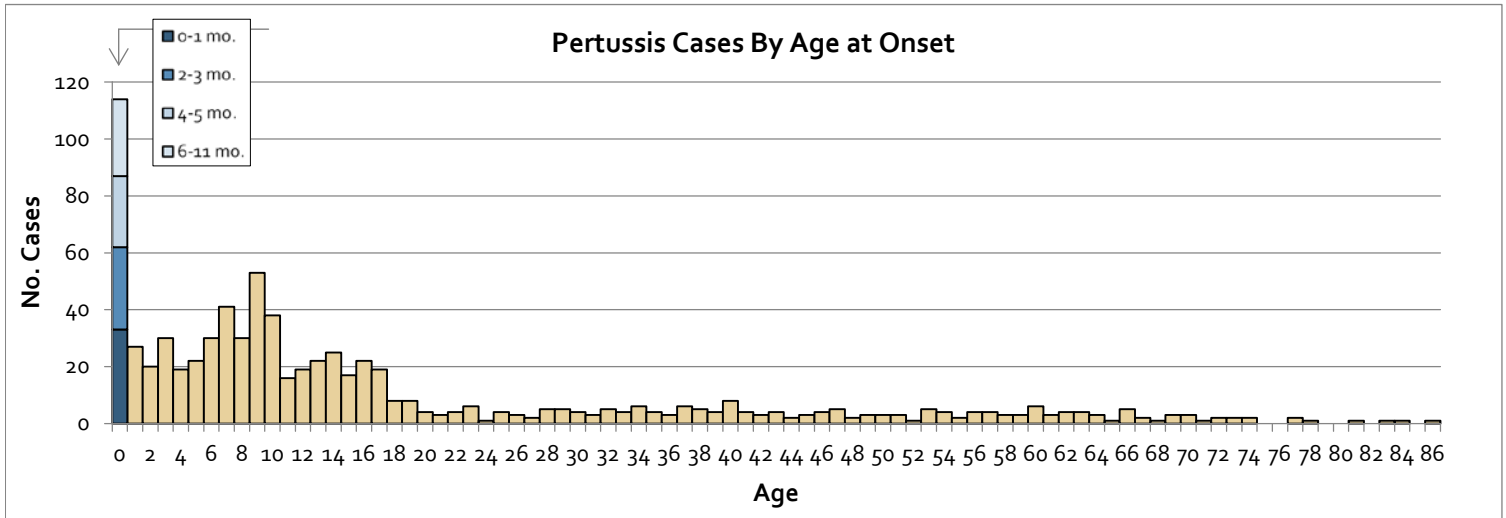


Pertussis, 2014 (continued)

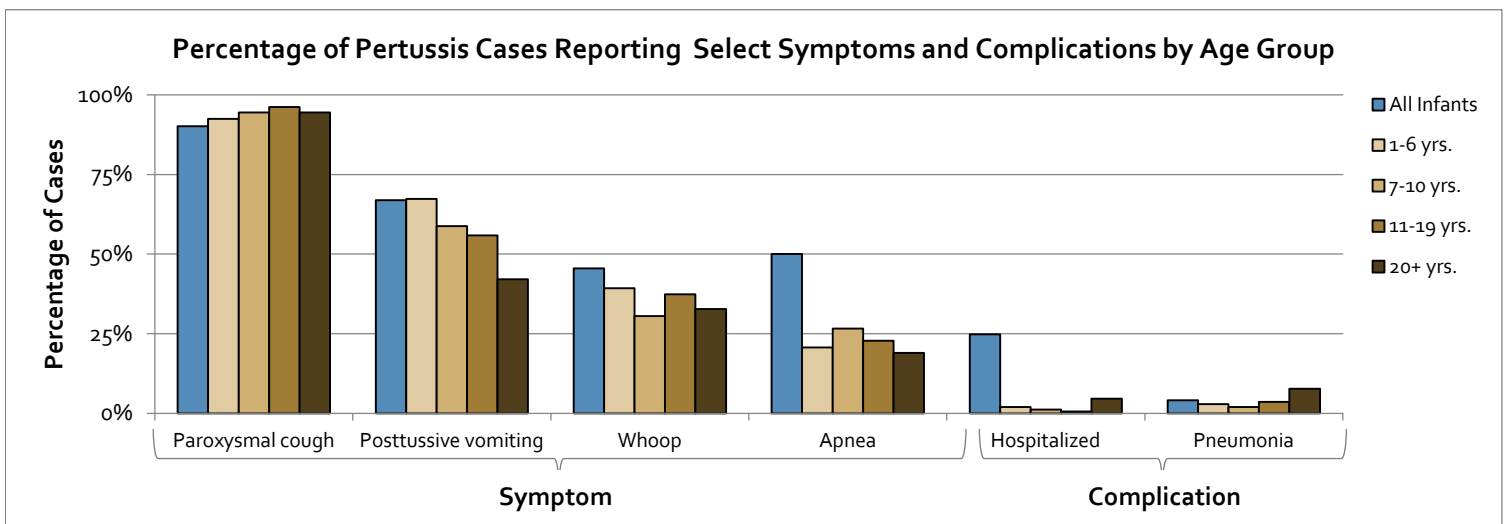
Pertussis Cases by County and Month														Incidence
County	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	/100,000
Duplin County	2	8	20	23	57	15	10	2	.	.	.	1	138	229.6
Sampson County	.	.	.	1	2	5	19	3	.	1	4	1	36	56.0
Transylvania County	.	.	.	.	.	.	.	.	.	.	16	2	18	54.2
Chatham County	1	.	.	.	.	.	.	.	4	18	8	2	33	48.8
Moore County	.	2	7	4	3	6	4	2	5	.	1	1	35	38.1
Madison County	1	.	.	.	.	2	3	.	.	.	.	.	6	28.1
Scotland County	.	.	.	6	3	.	1	.	.	.	.	.	10	27.6
Buncombe County	2	10	5	6	4	1	5	4	3	4	15	6	65	26.1
Richmond County	1	3	.	4	.	.	.	.	1	.	2	.	11	23.9
Lee County	.	.	.	.	1	2	.	.	.	4	1	1	9	15.2
Forsyth County	5	2	1	3	1	1	2	4	4	6	13	9	51	14.1
Person County	.	.	.	.	1	.	2	2	.	.	.	.	5	12.8
Brunswick County	.	1	.	6	3	1	1	.	2	.	.	.	14	12.1
Johnston County	2	1	.	.	1	3	3	1	2	1	6	1	21	11.8
Union County	4	1	4	2	2	1	1	2	3	1	3	.	24	11.3
Alamance County	2	.	.	1	1	2	.	.	.	.	3	5	14	9.1
Orange County	.	.	.	.	.	.	1	.	3	3	2	3	12	8.6
Currituck County	1	.	.	.	.	.	.	.	.	.	1	.	2	8.2
Davidson County	3	3	4	1	.	1	.	.	.	1	.	.	13	7.9
Jackson County	.	.	1	.	.	.	.	.	.	.	1	1	3	7.4
Wayne County	.	1	1	.	.	3	1	1	1	.	.	1	9	7.2
Durham County	.	.	2	1	.	2	2	6	.	2	4	1	20	7.0
Columbus County	.	.	.	.	1	2	.	1	.	.	.	.	4	6.9
Craven County	1	.	1	.	.	.	.	1	1	.	1	2	7	6.7
McDowell County	1	1	.	1	.	.	.	.	.	.	.	.	3	6.6
Mitchell County	.	.	.	.	.	.	.	.	.	.	1	.	1	6.5
Beaufort County	.	.	.	.	.	.	.	.	.	1	1	1	3	6.3
Gaston County	3	1	2	2	.	1	.	1	.	1	1	1	13	6.2
Watauga County	.	.	.	.	.	.	.	1	2	.	.	.	3	5.7
Avery County	.	.	.	.	.	1	.	.	.	.	.	.	1	5.6
Wake County	5	2	3	3	1	1	9	4	3	9	5	8	53	5.5
Alexander County	.	.	.	.	.	1	.	.	.	.	1	.	2	5.3
Stanly County	.	.	1	.	2	.	.	.	.	.	.	.	3	4.9
Davie County	.	.	.	.	.	.	.	.	2	.	.	.	2	4.8
Mecklenburg County	14	2	1	1	1	4	2	3	3	3	4	5	43	4.3
Rowan County	1	1	.	1	1	.	2	.	.	.	.	.	6	4.3
Wilkes County	1	.	.	.	.	.	1	.	.	.	1	.	3	4.3
Caswell County	.	.	.	.	.	.	.	.	1	.	.	.	1	4.2
Iredell County	4	.	.	.	.	.	.	.	1	.	.	2	7	4.2
Martin County	.	.	.	1	.	.	.	.	.	.	.	.	1	4.2
Lincoln County	1	1	.	.	.	.	.	.	.	.	1	.	3	3.8
Guilford County	1	2	2	1	.	.	2	4	.	.	2	5	19	3.7
Pitt County	2	.	.	.	1	1	1	1	.	.	.	.	6	3.5
Lenoir County	2	.	.	.	.	.	.	.	.	.	.	.	2	3.4
Cabarrus County	1	.	.	1	.	1	.	.	1	1	1	.	6	3.2
Franklin County	.	1	.	.	.	.	1	.	.	.	.	.	2	3.2
Harnett County	.	.	.	.	.	.	1	2	.	.	.	1	4	3.2
Bladen County	.	.	.	.	.	.	.	1	.	.	.	.	1	2.8
Catawba County	.	.	.	1	1	1	.	.	.	.	1	.	4	2.6
Yadkin County	.	.	.	.	.	.	.	.	.	.	.	1	1	2.6
Pasquotank County	.	.	.	.	.	.	.	.	.	.	1	.	1	2.5
New Hanover County	.	.	.	.	.	.	1	1	.	2	.	1	5	2.3
Rockingham County	1	.	.	.	.	.	.	.	.	.	1	.	2	2.2
Cumberland County	1	.	.	.	.	2	.	.	2	.	2	.	7	2.1
Nash County	.	1	.	.	.	.	1	.	.	.	.	.	2	2.1
Henderson County	.	.	.	.	.	.	.	.	.	.	.	2	2	1.8
Granville County	.	.	.	.	.	.	1	.	.	.	.	.	1	1.7
Rutherford County	.	.	.	.	.	.	.	.	.	.	1	.	1	1.5
Randolph County	.	.	1	.	.	.	.	.	.	.	1	.	2	1.4
Surry County	.	.	.	.	.	.	.	.	.	.	1	.	1	1.4
Caldwell County	.	.	.	.	.	1	.	.	.	.	.	.	1	1.2
Cleveland County	.	.	.	1	.	.	.	.	.	.	.	.	1	1.0
Onslow County	.	.	.	.	.	.	.	1	.	.	.	.	1	0.5
North Carolina	63	44	56	71	87	61	77	48	44	58	107	64	780	7.9

Pertussis, 2014 (continued)

Age Distribution



Clinical Information																				
	Infant Age Groups				Age Groups					All Ages										
	0-1 mo.	2-3 mo.	4-5 mo.	6-11 mo.	All Infants	1-6 yrs.	7-10 yrs.	11-19 yrs.	20+ yrs.											
No. cases	33	29	25	27	114	148	162	156	200	780										
Symptoms (No. cases, % of known responses)																				
Paroxysmal cough	29	91%	26	90%	24	96%	22	85%	101	90%	134	92%	153	94%	150	96%	188	94%	726	94%
Posttussive vomiting	21	66%	16	59%	14	56%	22	88%	73	67%	99	67%	94	59%	85	56%	83	42%	434	57%
Whoop	13	43%	11	46%	11	50%	11	44%	46	46%	55	39%	47	31%	52	37%	63	33%	263	36%
Apnea	14	47%	15	63%	13	54%	9	38%	51	50%	29	21%	41	27%	32	23%	36	19%	189	26%
Complications (No. cases, % of known responses)																				
Hospitalized	15	45%	6	21%	6	24%	1	4%	28	25%	3	2%	2	1%	1	1%	9	5%	43	6%
Pneumonia	2	8%	1	4%	0	0%	1	4%	4	4%	4	3%	3	2%	5	4%	14	8%	30	4%
Seizures	0	0%	0	0%	1	4%	0	0%	1	1%	1	1%	0	0%	0	0%	0	0%	2	0%
Encephalopathy	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Died	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%



Pertussis, 2014 (continued)

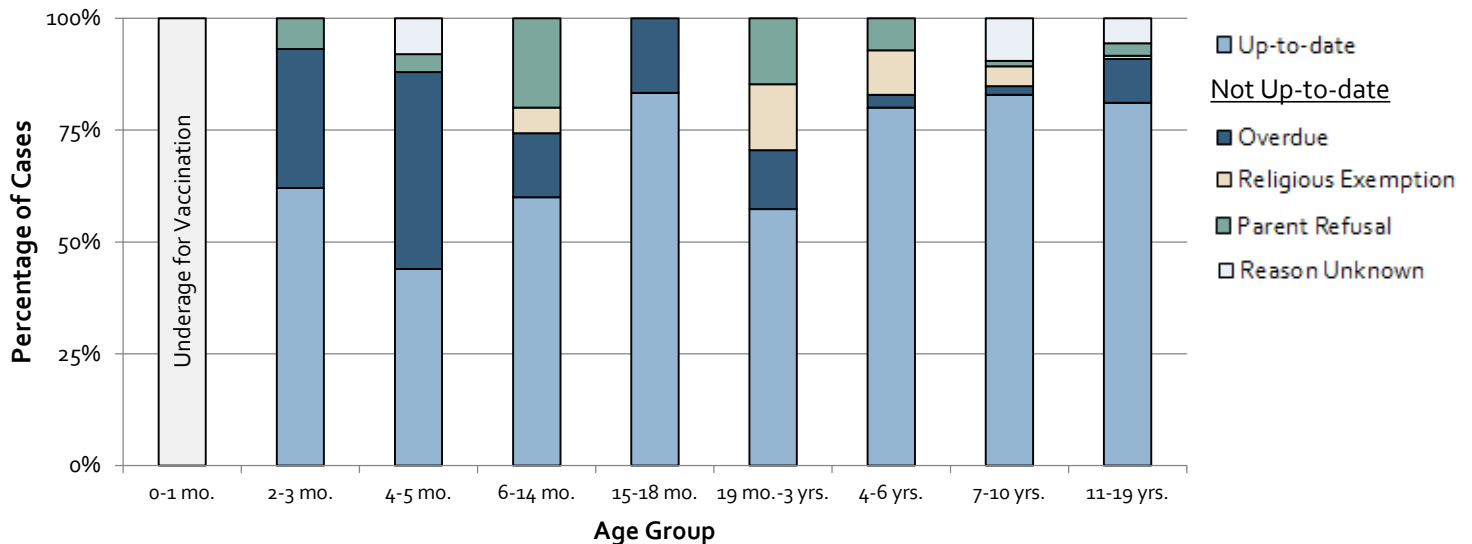
Vaccination Status of Children and Adolescents by Age Group*

Age Group	0-1 mo.		2-3 mo.		4-5 mo.		6-14 mo.		15-18 mo.		19 mo.-3 yrs.		4-6 yrs.		7-10 yrs.		11-19 yrs.	
No. of cases	33		29		25		36		6		62		72		165		152	
Vaccine Type	DTaP/DTP																Tdap	
Expected doses	0		1		2		3		3-4		4		4-5		5†		1+	
<i>Documented doses of pertussis-containing vaccine</i>																		
0	33	100%	11	38%	6	24%	10	28%	1	17%	19	31%	12	17%	8	5%	27	18%
1			18	62%	8	32%	1	3%	0	0%	1	2%	1	1%	4	2%	115	76%
2					11	44%	3	8%	0	0%	0	0%	0	0%	3	2%	1	1%
3							21	58%	3	50%	6	10%	1	1%	4	2%		
4									2	33%	35	56%	20	28%	20	12%		
5+													36	50%	119	72%		
Unknown	0	0%	0	0%	0	0%	1	3%	0	0%	1	2%	2	3%	7	4%	9	6%
<i>Up-to-date (of known status)</i>																		
Yes			18	62%	11	44%	21	60%	5	83%	35	57%	56	80%	131	83%	116	81%
No			11	38%	14	56%	14	40%	1	17%	26	43%	14	20%	27	17%	27	19%
Overdue			9	82%	11	79%	5	36%	1	0%	8	31%	2	14%	3	11%	14	52%
Religious Exemption			0	0%	0	0%	2	14%	0	0%	9	35%	7	50%	7	26%	1	4%
Parent Refusal			2	18%	1	7%	7	50%	0	0%	9	35%	5	36%	2	7%	4	15%
Unknown			0	0%	2	14%	0	0%	0	0%	0	0%	0	0%	15	56%	8	30%

*Vaccination data were provided by the NC Immunization Branch. Vaccination history was obtained using documentation provided in NC EDSS or in the North Carolina Immunization Registry. Ages are based on date of symptom onset.

†A child aged 7 through 10 years is considered up-to-date if he/she has received five valid DTaP/DTP doses or if his/her fourth DTaP/DTP dose was given on or after the fourth birthday.

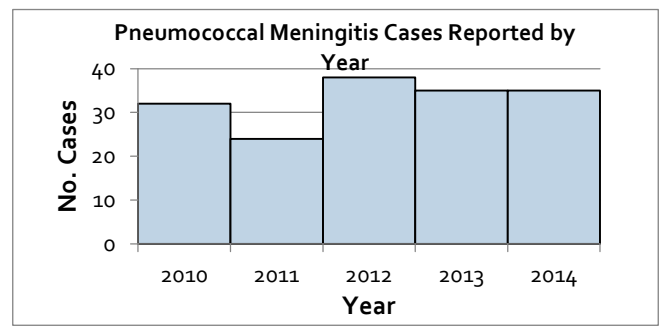
Percentage of Pertussis Cases by Up-to-date Status and Reason Not Up-to-date by Age Group, North Carolina, 2014



Pneumococcal Meningitis, 2014

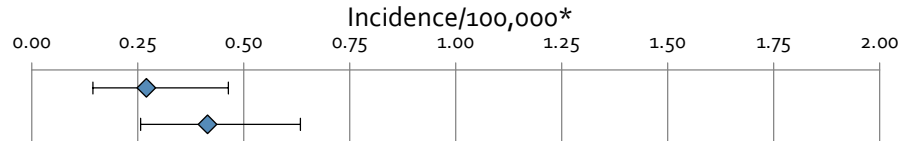
Annual Summary

	2010	2011	2012	2013	2014
Incidence / 100,000	0.33	0.25	0.39	0.35	0.35
No. cases	32	24	38	35	35
<5 yrs.	16%	4%	13%	6%	9%
≥ 5 yrs.	84%	96%	87%	94%	91%
Unvaccinated or unknown vaccination status (<5 yrs. only)	20%	100%	20%	0%	67%

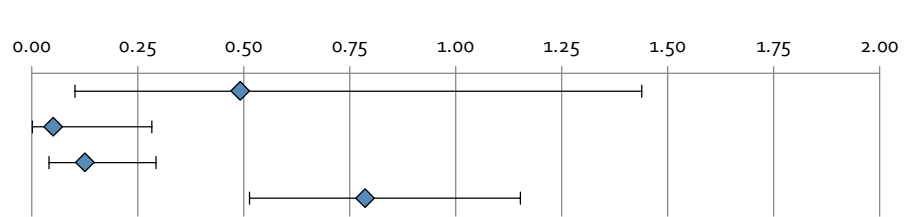


Case Demographics, 2014

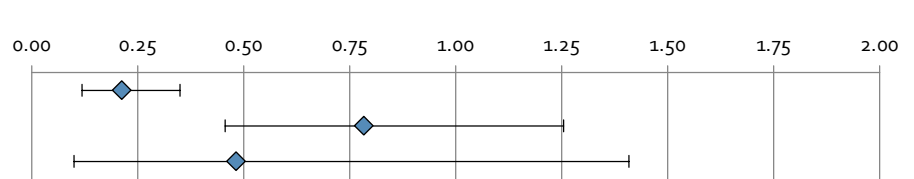
Sex	No. cases	% of total	Incidence/100,000
Male	13	37%	0.27
Female	21	60%	0.41
Unknown	1	3%	--



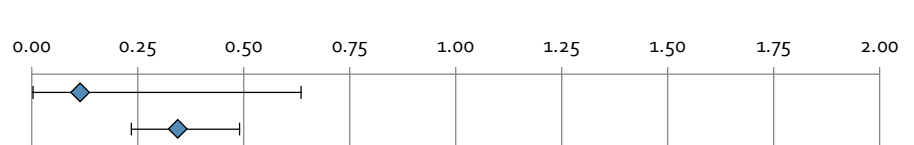
Age Group	No. cases	% of total	Incidence/100,000
Under 5 yrs.	3	9%	0.49
5-19 yrs.	1	3%	0.05
20-49 yrs.	5	14%	0.13
50+ yrs.	26	74%	0.79
Unknown	0	0%	--



Race	No. cases	% of total	Incidence/100,000
White	15	43%	0.21
Black	17	49%	0.78
Other or multiple	3	9%	0.48
Unknown	0	0%	--



Hispanic Ethnicity	No. cases	% of total	Incidence/100,000
Yes	1	3%	0.11
No	31	89%	0.35
Unknown	3	9%	--



*Point estimates and 95% confidence intervals are shown

Geographic Distribution

Cases By Month

