

Vaccine-Preventable Diseases Reported in North Carolina, 2013

Controlling vaccine-preventable diseases (VPDs) requires the consistent, concerted and coordinated efforts of public health agencies and private partners to improve and sustain high immunization coverage, rapidly identify and report suspected cases, and swiftly implement control measures. Although most VPDs are at or near record low levels, the occurrence of the first measles outbreak in North Carolina in more than 20 years and the continued high numbers of pertussis cases serve as reminders that VPDs are still a real threat to all residents of our state.

This annual surveillance report summarizes VPDs reported in North Carolina during 2013 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 based on the date when cases were closed and reported to the Centers for Disease Control and Prevention (CDC).
- *Cases presented include only those that had been reported and closed as of March 2, 2014.
- *Incidence rates are based on mid-year population estimates obtained from the NC Office of State Budget and Management. 2013 rates are calculated using 2012 population estimates. The Hispanic population was estimated to be 8.7% of the total North Carolina population based on 2012 US 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. VPDs continue to occur at record low levels, both nationally and in North Carolina. In 2013, no cases of diphtheria, polio, rubella, congenital rubella syndrome or tetanus were reported in our state. With the exception of measles, there were no significant changes* in the number of cases of VPDs reported compared to the average of the previous five-years (2008–2012).

The increase in measles cases during 2013 was a result of an import-associated case that led to the first measles outbreak in our state in over 20 years. A total of 23 outbreak-associated cases (including 1 out-of-state resident) were identified over a five-week period. The number of pertussis cases reported in 2013 was similar to the number of cases reported in 2012. The numbers of reported pertussis cases in both 2012 and 2013 were significantly greater than the annual number of cases reported prior to 2012. This increasing trend in reported cases is being seen at the national level as well.

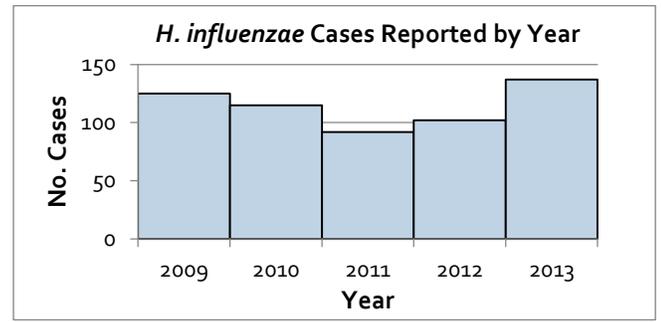
Number of Cases of VPDs Reported in North Carolina, 2008-2013								
Disease	2008	2009	2010	2011	2012	Five-year average	2013	Significant Change*
Diphtheria	0	0	0	0	0	0	0	
<i>Haemophilus influenzae</i> , invasive disease	82	125	115	92	102	103	137	
Hepatitis A	61	44	45	29	38	43	42	
Measles	0	0	1	1	0	0	22	↑
Meningococcal invasive disease	16	30	13	16	8	17	9	
Mumps	15	4	11	9	2	8	4	
Pertussis	315	224	289	206	626	332	622	
Pneumococcal meningitis	32	33	32	24	38	32	35	
Polio	0	0	0	0	0	0	0	
Rubella	0	0	0	1	0	0	0	
Congenital rubella syndrome	0	0	0	0	0	0	0	
Tetanus	0	0	1	0	0	0	0	

* ↑ = significant increase (≥ 2 standard deviations above average) ↓ = significant decrease (≥ 2 standard deviations below average)

Haemophilus influenzae , invasive disease, 2013

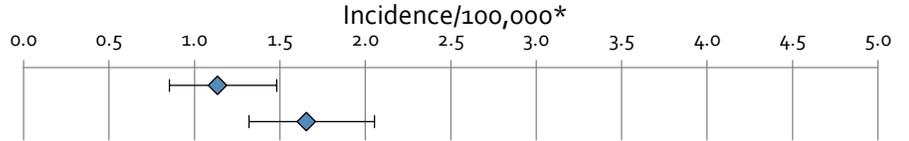
Annual Summary

Year	2009	2010	2011	2012	2013	
Incidence / 100,000	1.3	1.2	1.0	1.0	1.4	
No. cases	125	115	92	102	137	
Serotypes	type b, <5 years	0%	1%	0%	0%	0%
	type b, ≥ 5 years	4%	3%	0%	1%	2%
	non-b, typeable	25%	25%	24%	20%	21%
	nontypeable	51%	63%	66%	70%	67%
	unknown	20%	7%	10%	10%	9%

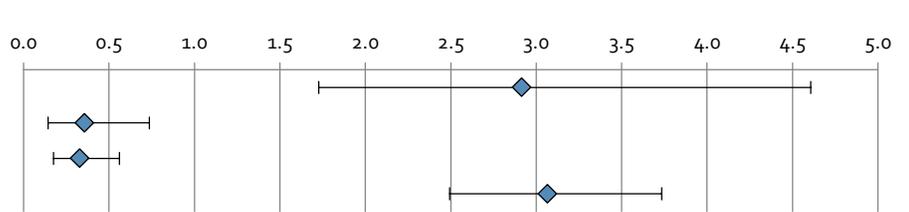


Case Demographics, 2013

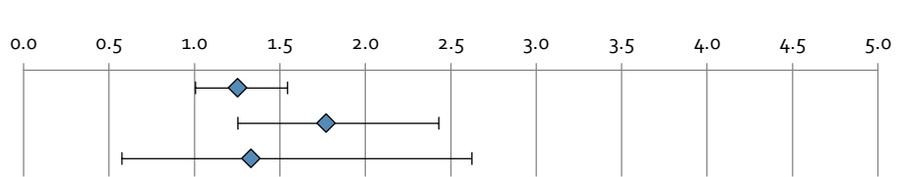
Sex	No. cases	% of total	Incidence/100,000
Male	54	39%	1.1
Female	83	61%	1.7
Unknown	0	0%	--



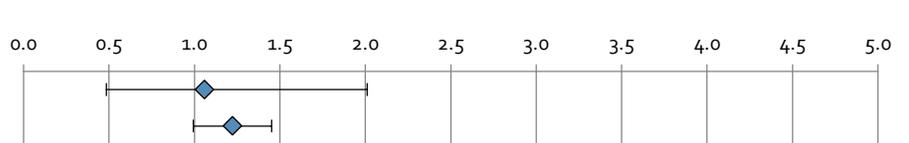
Age Group	No. cases	% of total	Incidence/100,000
Under 5 yrs.	18	13%	2.9
5-19 yrs.	7	5%	0.4
20-49 yrs.	13	9%	0.3
50+ yrs.	99	72%	3.1
Unknown	0	0%	--



Race	No. cases	% of total	Incidence/100,000
White	88	64%	1.3
Black	38	28%	1.8
Other or multiple	8	6%	1.3
Unknown	3	2%	--



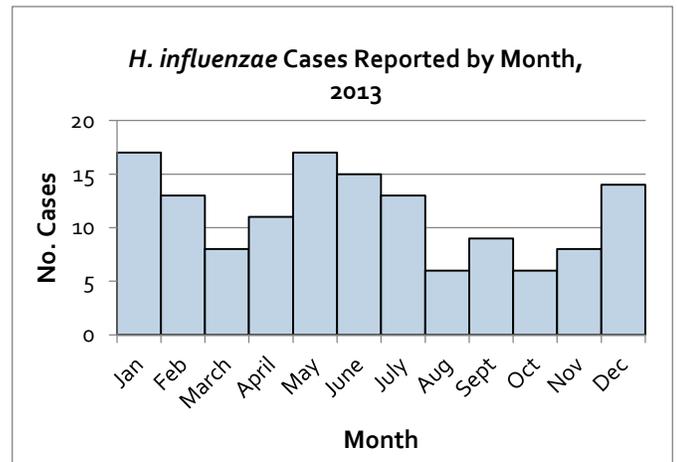
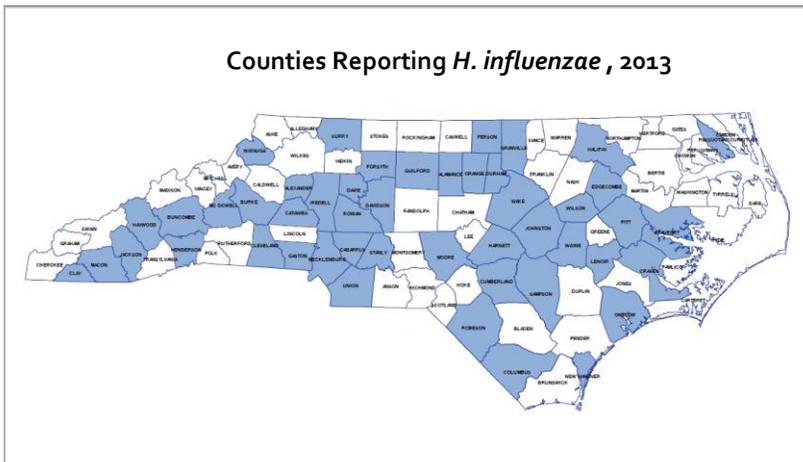
Hispanic Ethnicity	No. cases	% of total	Incidence/100,000
Yes	9	7%	1.1
No	109	80%	1.2
Unknown	19	14%	--



*Point estimates and 95% confidence intervals are shown

Geographic Distribution

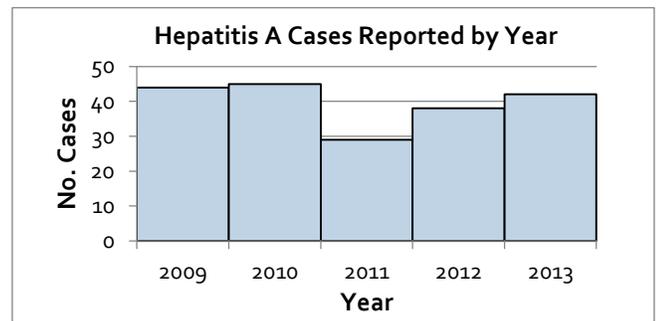
Cases By Month



Hepatitis A, 2013

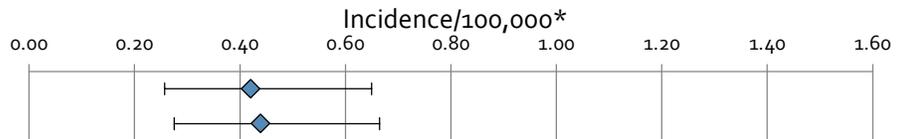
Annual Summary

Year	2009	2010	2011	2012	2013
Incidence / 100,000	0.47	0.47	0.30	0.39	0.43
No. cases	44	45	29	38	42

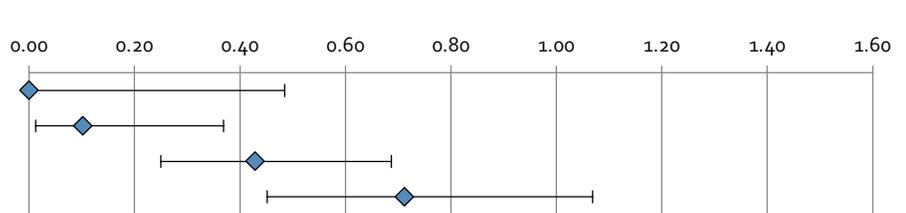


Case Demographics, 2013

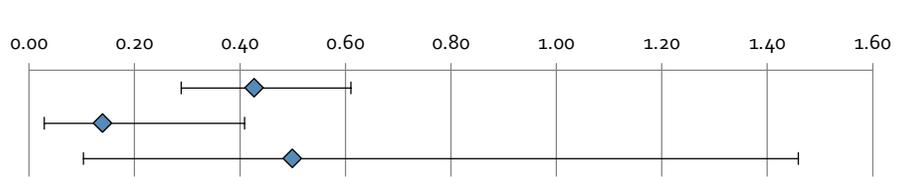
Sex	No. cases	% of total	Incidence/100,000
Male	20	48%	0.42
Female	22	52%	0.44
Unknown	0	0%	--



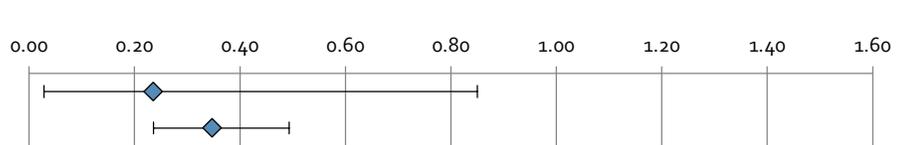
Age Group	No. cases	% of total	Incidence/100,000
Under 5 yrs.	0	0%	0.00
5-19 yrs.	2	5%	0.10
20-49 yrs.	17	40%	0.43
50+ yrs.	23	55%	0.71
Unknown	0	0%	--



Race	No. cases	% of total	Incidence/100,000
White	30	71%	0.43
Black	3	7%	0.14
Other or multiple	3	7%	0.50
Unknown	6	14%	--



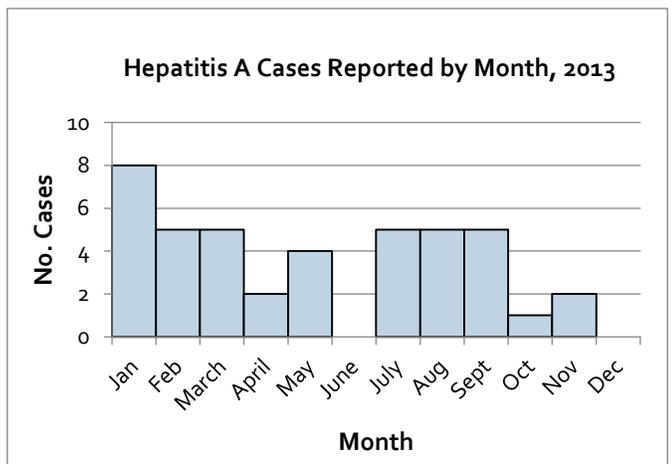
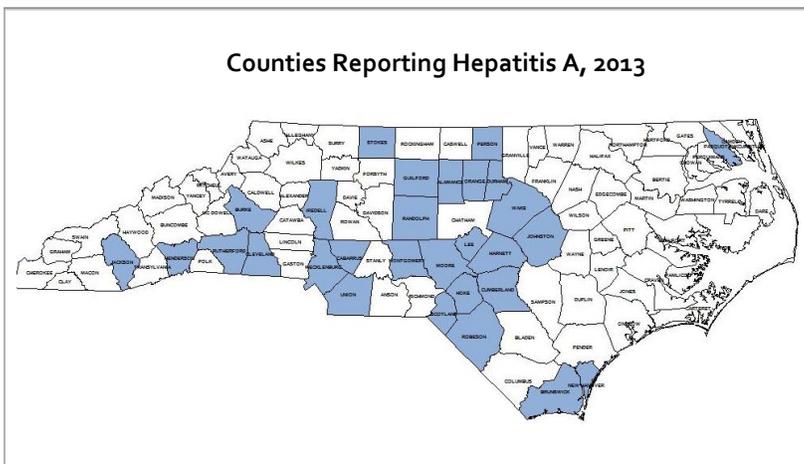
Hispanic Ethnicity	No. cases	% of total	Incidence/100,000
Yes	2	5%	0.24
No	31	74%	0.35
Unknown	9	21%	--



*Point estimates and 95% confidence intervals are shown

Geographic Distribution

Cases By Month

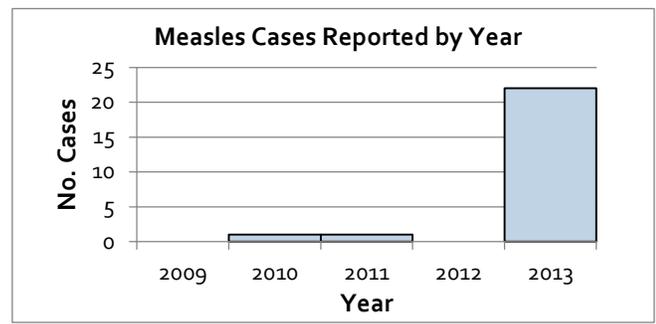


Measles, 2013

Annual Summary

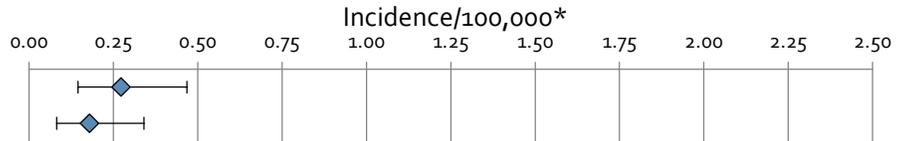
Year	2009	2010	2011	2012	2013
Incidence / 100,000	0.00	0.01	0.01	0.00	0.23
No. cases	0	1	1	0	22
Import or import-associated		100%	100%		100%
Lab-confirmed		100%	100%		73%
Unvaccinated		100%	100%		85%*

*Of cases with known status (17/20)

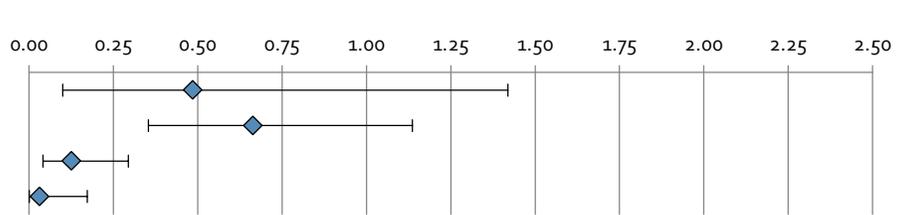


Case Demographics, 2013

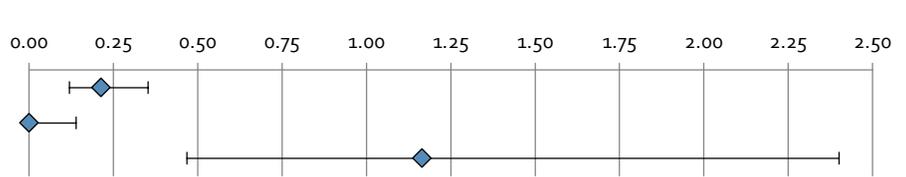
Sex	No. cases	% of total	Incidence/100,000
Male	13	59%	0.27
Female	9	41%	0.18
Unknown	0	0%	--



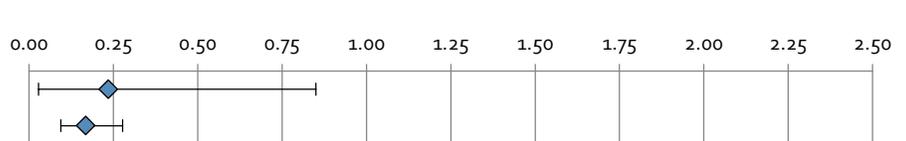
Age Group	No. cases	% of total	Incidence/100,000
Under 5 yrs.	3	14%	0.49
5-19 yrs.	13	59%	0.66
20-49 yrs.	5	23%	0.13
50+ yrs.	1	5%	0.03
Unknown	0	0%	--



Race	No. cases	% of total	Incidence/100,000
White	15	68%	0.21
Black	0	0%	0.00
Other or multiple	7	32%	1.17
Unknown	0	0%	--



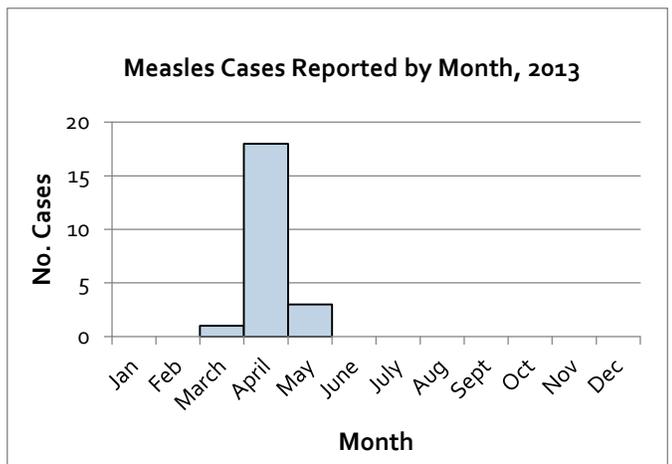
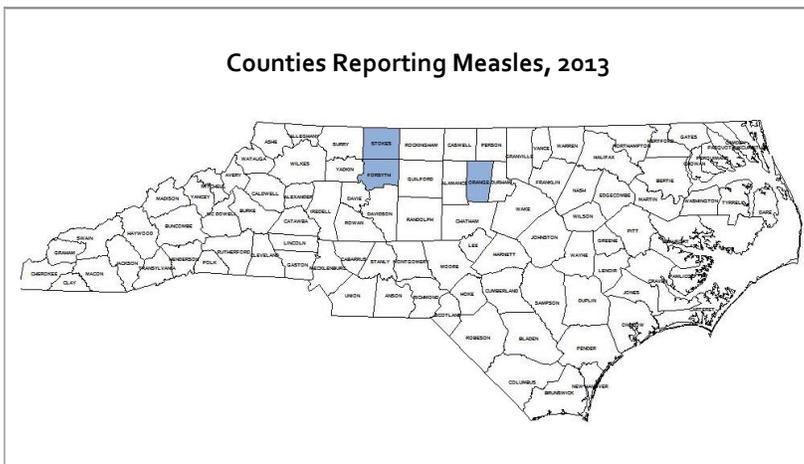
Hispanic Ethnicity	No. cases	% of total	Incidence/100,000
Yes	2	9%	0.24
No	15	68%	0.17
Unknown	5	23%	--



*Point estimates and 95% confidence intervals are shown

Geographic Distribution

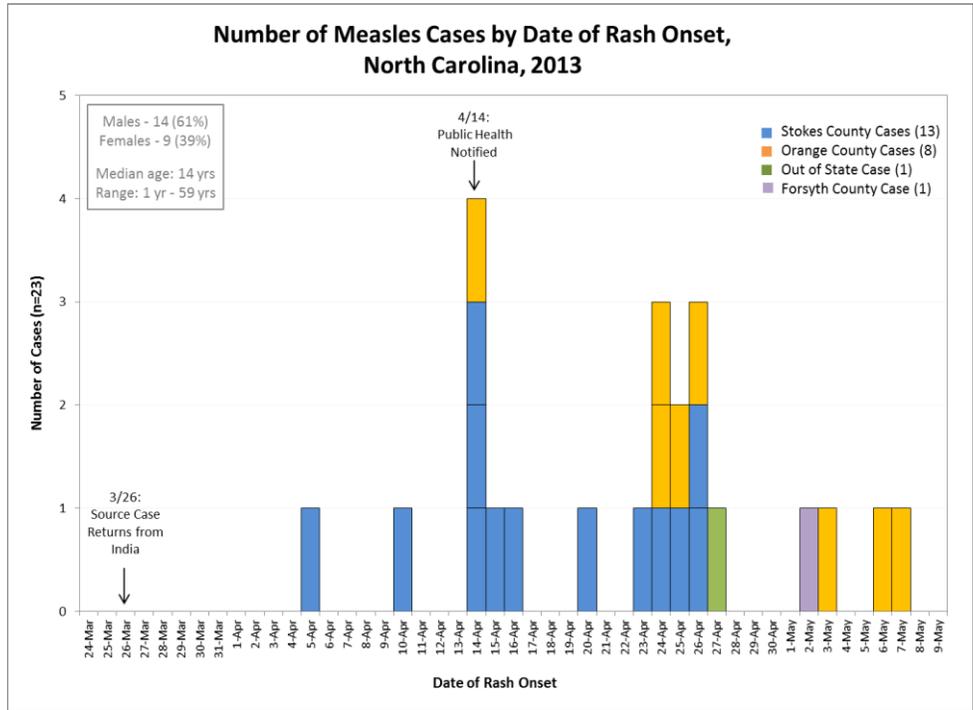
Cases By Month



Measles, 2013 (continued)

2013 Measles Outbreak

A measles outbreak began in April of 2013 when an unvaccinated traveler became symptomatic after returning from India to North Carolina. Transmission from this patient resulted in an additional 22 cases of measles identified with onsets ranging over a five-week period. Cases were identified among residents of three North Carolina counties and in a visiting out-of-state resident. Control of the outbreak required extensive resources from state and local public health and resulted in the identification and investigation of over 1,000 contacts, including over 450 healthcare workers. The outbreak was first identified on April 14 and declared over on June 19. The epi curve is shown below.

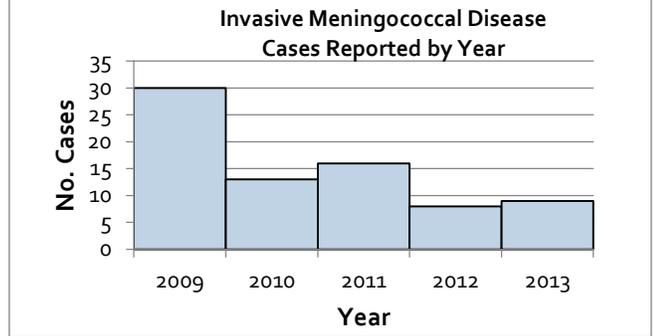


Additional details about the outbreak can be found in the outbreak report (http://epi.publichealth.nc.gov/cd/rubeola/provider_memo_rubeola_o8062013.pdf) and in the *Notes from the Field* portion of the September 13, 2013 MMWR (<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6236a5.htm>).

Meningococcal Invasive Disease, 2013

Annual Summary

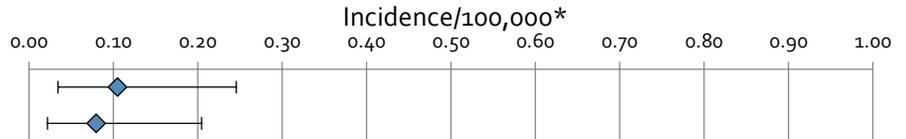
Year	2009	2010	2011	2012	2013	
Incidence / 100,000	0.32	0.14	0.17	0.08	0.09	
No. of cases	30	13	16	8	9	
Serogroups	A	0%	6%	0%	0%	
	C	17%	15%	13%	13%	11%
	Y	37%	62%	50%	50%	33%
	W-135	3%	0%	0%	0%	0%
	B	10%	15%	25%	25%	33%
	Unknown	33%	8%	6%	13%	22%*



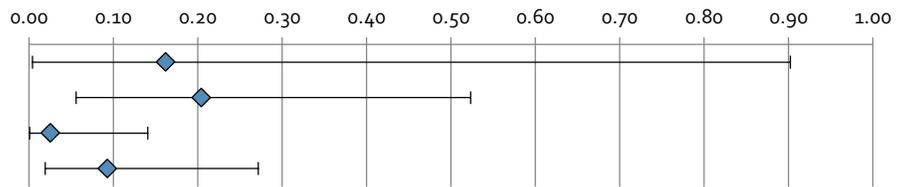
*1 unknown, 1 could not distinguish between C & W-135

Case Demographics, 2013

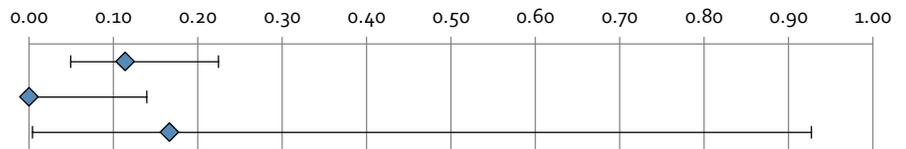
Sex	No. cases	% of total	Incidence/100,000
Male	5	56%	0.11
Female	4	44%	0.08
Unknown	0	0%	--



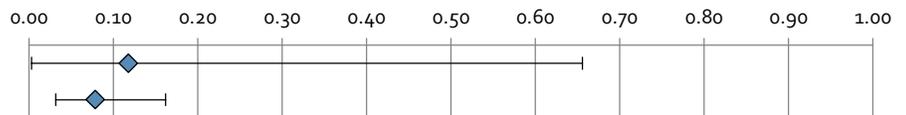
Age Group	No. cases	% of total	Incidence/100,000
Under 5 yrs.	1	11%	0.16
5-19 yrs.	4	44%	0.20
20-49 yrs.	1	11%	0.03
50+ yrs.	3	33%	0.09
Unknown	0	0%	--



Race	No. cases	% of total	Incidence/100,000
White	8	89%	0.11
Black	0	0%	0.00
Other or multiple	1	11%	0.17
Unknown	0	0%	--



Hispanic Ethnicity	No. cases	% of total	Incidence/100,000
Yes	1	11%	0.12
No	7	78%	0.08
Unknown	1	11%	--



*Point estimates and 95% confidence intervals are shown

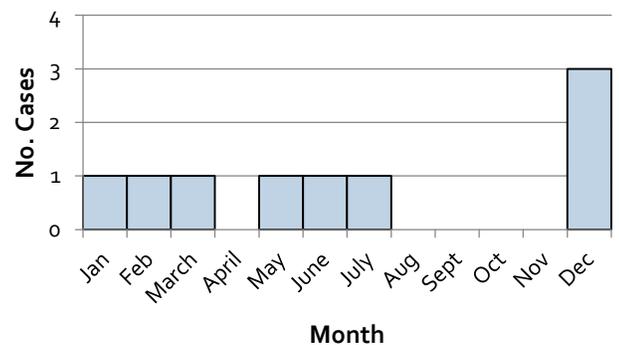
Geographic Distribution

Cases By Month

Counties Reporting Invasive Meningococcal Disease, 2013

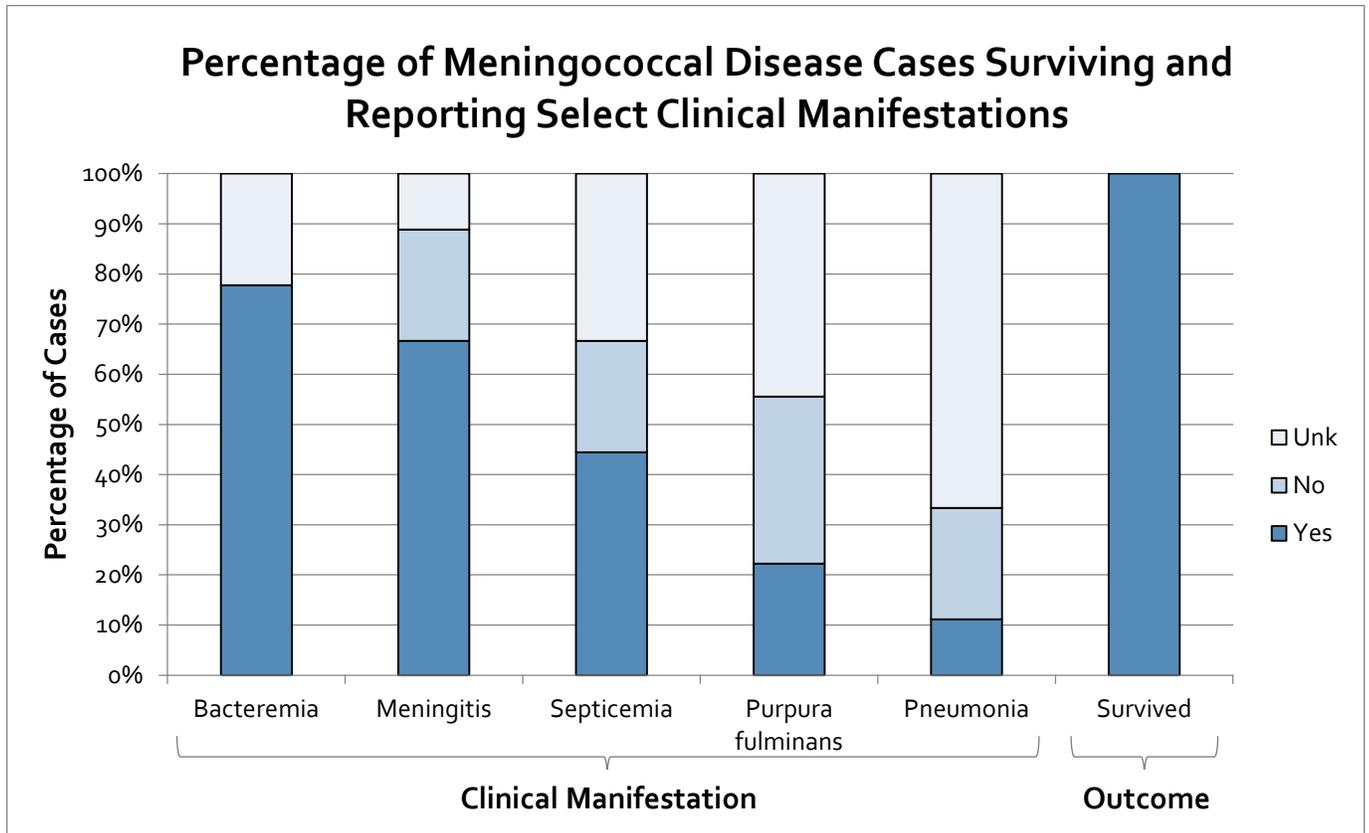


Invasive Meningococcal Disease Cases Reported by Month, 2013



Meningococcal Invasive Disease, 2013 (continued)

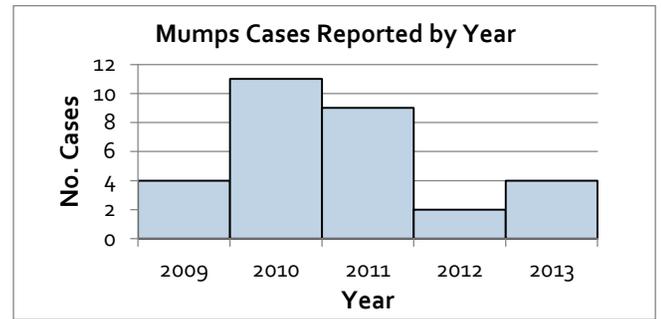
Clinical Manifestations and Outcome



Mumps, 2013

Annual Summary

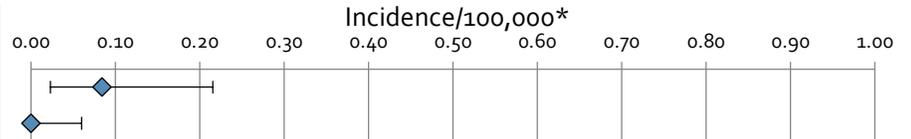
Year	2009	2010	2011	2012	2013
Incidence / 100,000	0.04	0.11	0.09	0.02	0.04
No. cases	4	11	9	2	4
Confirmed	75%	91%	100%	50%	0%
Probable	25%	9%	0%	50%	100%
Unvaccinated or unknown immune status*	25%	45%	56%	50%	25%



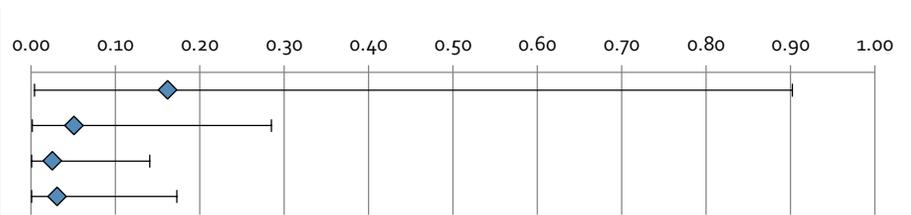
*Cases born before 1957 are considered immune

Case Demographics, 2013

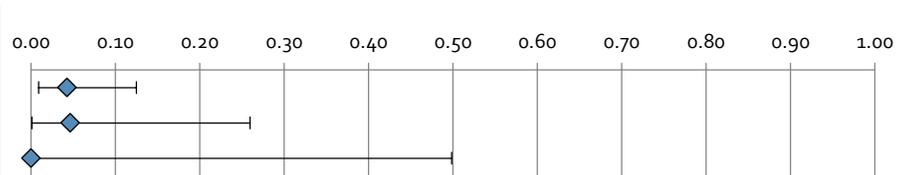
Sex	No. cases	% of total	Incidence/100,000
Male	4	100%	0.08
Female	0	0%	0.00
Unknown	0	0%	--



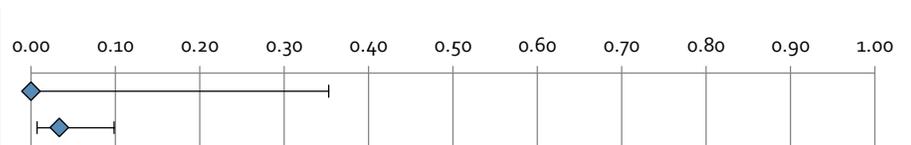
Age Group	No. cases	% of total	Incidence/100,000
Under 5 yrs.	1	25%	0.16
5-19 yrs.	1	25%	0.05
20-49 yrs.	1	25%	0.03
50+ yrs.	1	25%	0.03
Unknown	0	0%	--



Race	No. cases	% of total	Incidence/100,000
White	3	75%	0.04
Black	1	25%	0.05
Other or multiple	0	0%	0.00
Unknown	0	0%	--



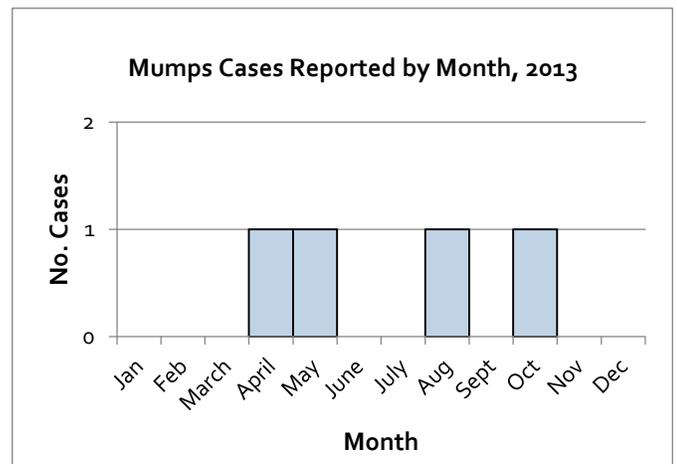
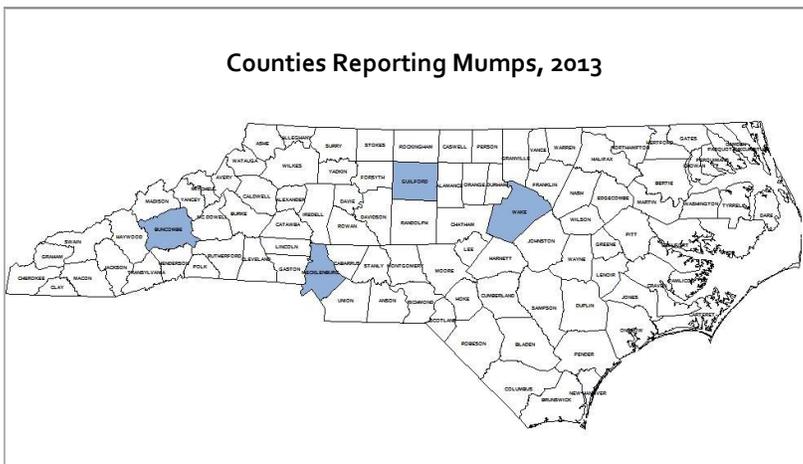
Hispanic Ethnicity	No. cases	% of total	Incidence/100,000
Yes	0	0%	0.00
No	3	75%	0.03
Unknown	1	25%	--



*Point estimates and 95% confidence intervals are shown

Geographic Distribution

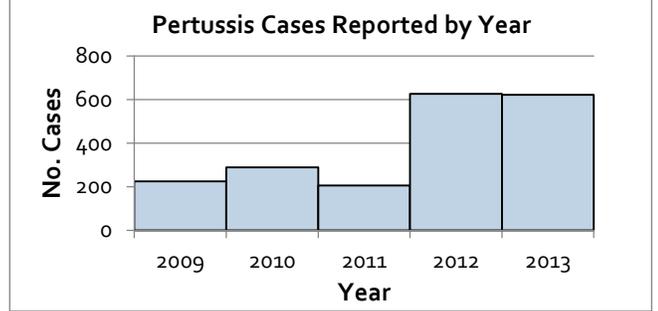
Cases By Month



Pertussis, 2013

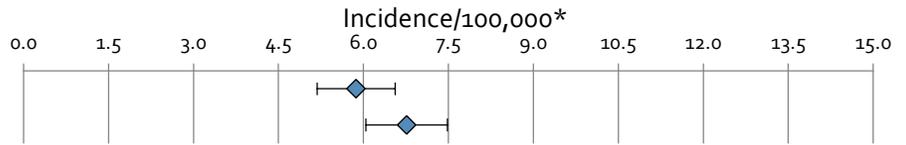
Annual Summary

Year	2009	2010	2011	2012	2013
Incidence / 100,000	2.4	3.0	2.1	6.4	6.4
No. cases	224	289	206	626	622
Culture confirmed	19%	17%	8%	11%	8%
PCR confirmed	33%	33%	27%	42%	54%
Epi-link confirmed	8%	11%	18%	11%	10%
Probable	41%	40%	47%	37%	28%

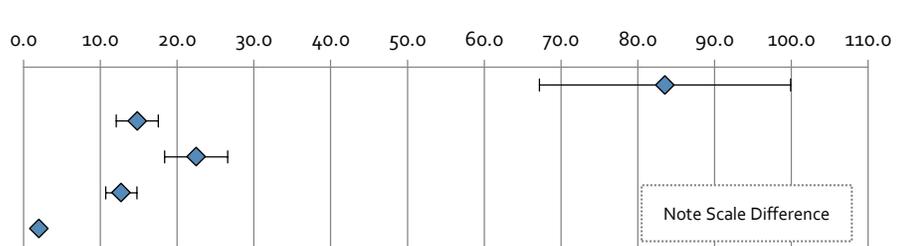


Case Demographics, 2013

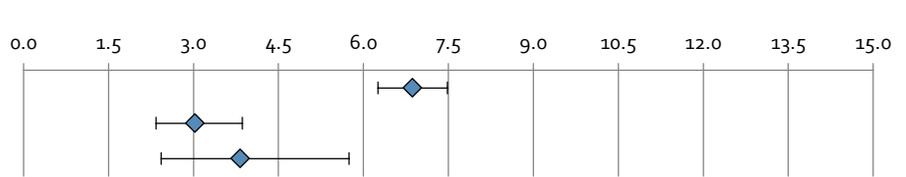
Sex	No. cases	% of total	Incidence/100,000
Male	279	45%	5.9
Female	339	55%	6.8
Unknown	4	1%	--



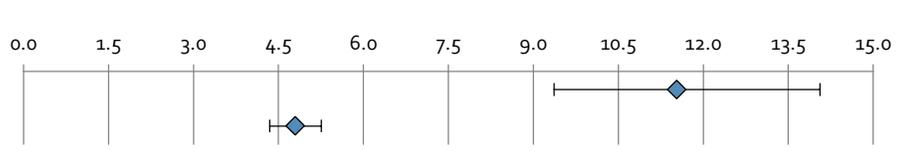
Age Group	No. cases	% of total	Incidence/100,000
Infants (<1 yr.)	100	16%	83.5
1-6 yrs.	112	18%	14.8
7-10 yrs.	115	18%	22.5
11-19 yrs.	151	24%	12.7
20+ yrs.	143	23%	2.0
Unknown	1	0%	--



Race	No. cases	% of total	Incidence/100,000
White	482	77%	6.9
Black	65	10%	3.0
Other or multiple	23	4%	3.8
Unknown	52	8%	--



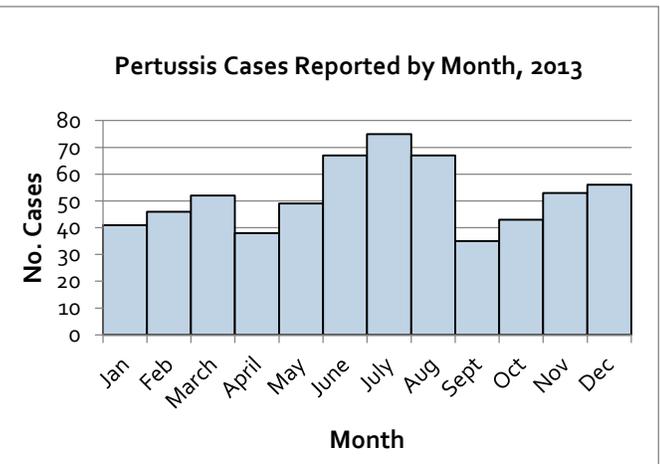
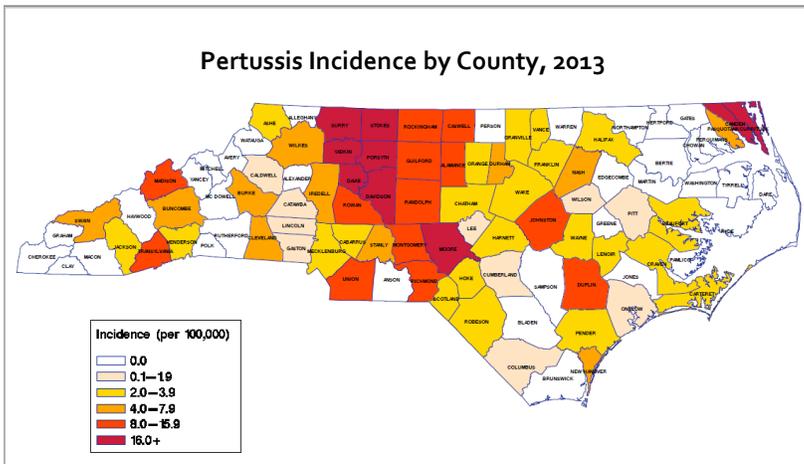
Hispanic Ethnicity	No. cases	% of total	Incidence/100,000
Yes	98	16%	11.5
No	428	69%	4.8
Unknown	96	15%	--



*Point estimates and 95% confidence intervals are shown

Geographic Distribution

Cases By Month

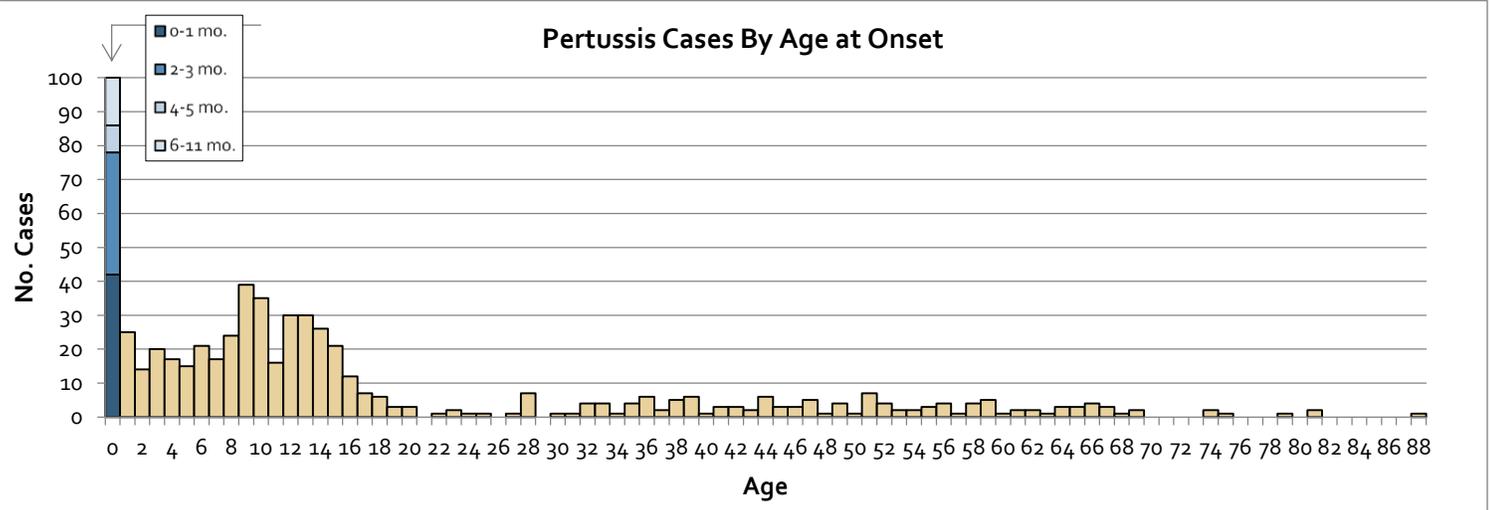


Pertussis, 2013 (continued)

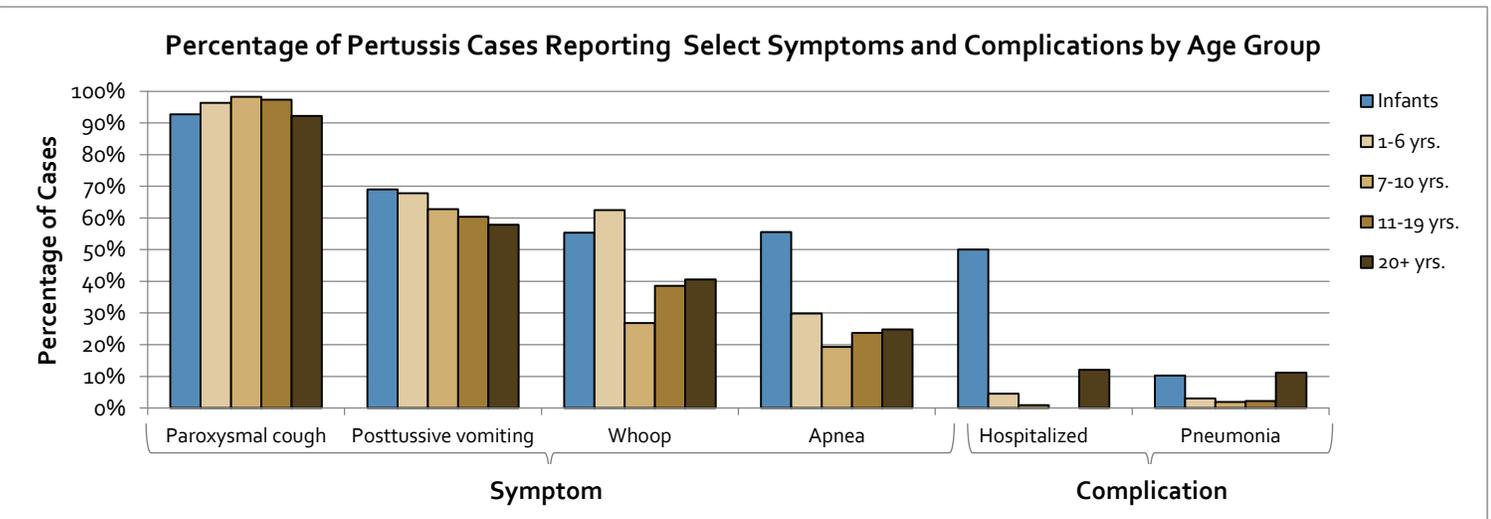
Pertussis Cases by County and Month													Incidence	
County	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	/100,000
Currituck County				7	3	1			1				12	49.7
Yadkin County	2	3	5	1	3		1	1					16	41.9
Forsyth County	4	20	11	8	10	15	20	13	5	10	15	13	144	40.3
Moore County	1		4	5	4	3	2	1	2	2	6	1	31	34.3
Davidson County	2	4	5		3	7	12	8	2		4	1	48	29.3
Camden County	1	1											2	19.8
Davie County				1		5	2						8	19.3
Stokes County	1		4		1	2							8	17.0
Surry County	1						2	5		4			12	16.3
Transylvania County		1					3	1					5	15.1
Alamance County	2			1		2	2	3	2	2	2	2	18	11.8
Montgomery County	1			1							1		3	10.8
Richmond County		1	1					2	1				5	10.8
Union County			1	4		2	2	1	1	3	1	7	22	10.6
Johnston County				1	1	4		5	3		1	3	18	10.3
Rockingham County	3	2					2	1	1				9	9.7
Madison County	1					1							2	9.5
Caswell County			2										2	8.5
Randolph County	2		1		2		5				1	1	12	8.4
Duplin County										1	3	1	5	8.3
Guilford County	1		3	1	7	9	3	4	3	5	2	2	40	8.0
Rowan County		2	1				2	2	1	2	1		11	8.0
Buncombe County	1		2	1		2		4			3	6	19	7.7
Swain County									1				1	6.9
New Hanover County	3	1	2		2					2	2		12	5.7
Iredell County				1	1	1	2	1	1			2	9	5.5
Pasquotank County	1	1											2	5.0
Stanly County								1	1			1	3	4.9
Durham County	2	1	1				2	2	1	3		1	13	4.6
Burke County					1	2						1	4	4.4
Wilkes County								2				1	3	4.3
Nash County		1			1		1	1					4	4.2
Cleveland County		1	1			1						1	4	4.1
Ashe County										1			1	3.7
Halifax County		1			1								2	3.7
Pender County	1					1							2	3.7
Robeson County	3	1			1								5	3.7
Granville County				1	1								2	3.4
Lenoir County							1					1	2	3.4
Harnett County					1			1	1	1			4	3.3
Franklin County							1				1		2	3.2
Wayne County					1		1		1		1		4	3.2
Chatham County	1		1										2	3.0
Carteret County	1									1			2	2.9
Craven County						1			1	1			3	2.9
Mecklenburg County	3	2	1	2	4	1	1	5	2		2	5	28	2.9
Orange County			2				1				1		4	2.9
Henderson County		1					1		1				3	2.8
Scotland County						1							1	2.7
Wake County	1			1	1	4	5	3		3	4	3	25	2.6
Jackson County									1				1	2.4
Cabarrus County		1		1					1		1		4	2.2
Vance County			1										1	2.2
Beaufort County						1							1	2.1
Hoke County												1	1	2.0
Gaston County	2					1			1				4	1.9
Columbus County		1											1	1.7
Lee County												1	1	1.7
Catawba County			2										2	1.3
Lincoln County				1									1	1.3
Caldwell County							1						1	1.2
Wilson County			1										1	1.2
Onslow County										2			2	1.1
Pitt County												1	1	0.6
Cumberland County											1		1	0.3

Pertussis, 2013 (continued)

Age Distribution



Clinical Information																				
	Infant Age Groups				Age Groups					All Ages										
	0-1 mo.	2-3 mo.	4-5 mo.	6-11 mo.	Infants	1-6 yrs.	7-10 yrs.	11-19 yrs.	20+ yrs.											
No. cases	42	36	8	14	100	112	115	151	143	622										
Symptoms (No. cases, % of known responses)																				
Paroxysmal cough	38	93%	32	94%	8	100%	12	86%	90	93%	106	96%	112	98%	146	97%	131	92%	586	95%
Posttussive vomiting	25	60%	27	75%	7	88%	10	71%	69	69%	76	68%	71	63%	90	60%	81	58%	388	63%
Whoop	23	61%	21	60%	5	63%	3	23%	52	55%	65	63%	29	27%	54	39%	54	41%	255	44%
Apnea	27	68%	16	52%	3	50%	4	31%	50	56%	31	30%	21	19%	33	24%	31	25%	166	29%
Complications (No. cases, % of known responses)																				
Hospitalized	30	75%	17	47%	0	0%	2	14%	49	50%	5	5%	1	1%	0	0%	17	12%	72	12%
Pneumonia	6	16%	3	10%	0	0%	0	0%	9	10%	3	3%	2	2%	3	2%	13	11%	30	5%
Seizures	0	0%	1	3%	0	0%	0	0%	1	1%	0	0%	0	0%	0	0%	1	1%	2	0%
Encephalopathy	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	1%	0	0%	1	0%
Died	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%



Pertussis, 2013 (continued)

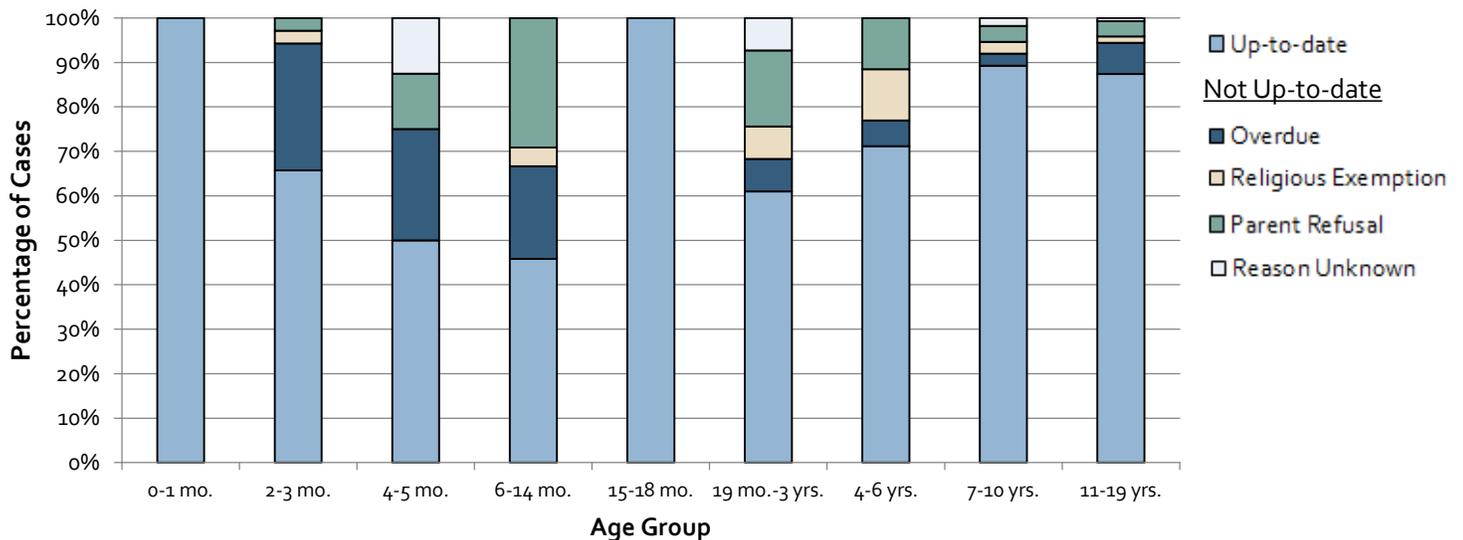
Vaccination Status of Children and Adolescents by Age Group*

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	42		35		8		24		8		41		52		113		148	
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	42	100%	12	34%	1	13%	9	38%	0	0%	10	24%	13	25%	8	7%	18	12%
1			23	66%	3	38%	3	13%	0	0%	2	5%	0	0%	1	1%	125	84%
2					4	50%	1	4%	0	0%	0	0%	1	2%	0	0%		
3							11	46%	6	75%	4	10%	1	2%	1	1%		
4									2	25%	25	61%	13	25%	3	3%		
5+													24	46%	99	88%		
Unknown	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	1%	5	3%
<i>Up-to-date (of known status)</i>																		
Yes	42	100%	23	66%	4	50%	11	46%	8	100%	25	61%	37	71%	100	89%	125	87%
No	--	--	12	34%	4	50%	13	54%	0	0%	16	39%	15	29%	12	11%	18	13%
Overdue			10	83%	2	50%	5	38%	0	0%	3	19%	3	20%	3	25%	10	56%
Religious Exemption			1	8%	0	0%	1	8%	0	0%	3	19%	6	40%	3	25%	2	11%
Parent Refusal			1	8%	1	25%	7	54%	0	0%	7	44%	6	40%	4	33%	5	28%
Unknown			0	0%	1	25%	0	0%	0	0%	3	19%	0	0%	2	17%	1	6%

*Vaccination data were provided by the NC Immunization Branch. Vaccination history was obtained using documentation provided in NC EDSS or in the NC Immunization Registry. Figures shown represent 471/478 cases in children <20 years old reported in 2013.

†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 4th DTaP/DTP dose was given on or after the 4th birthday. Three children aged 7 through 10 years received Tdap (recommended if not fully vaccinated at this age).

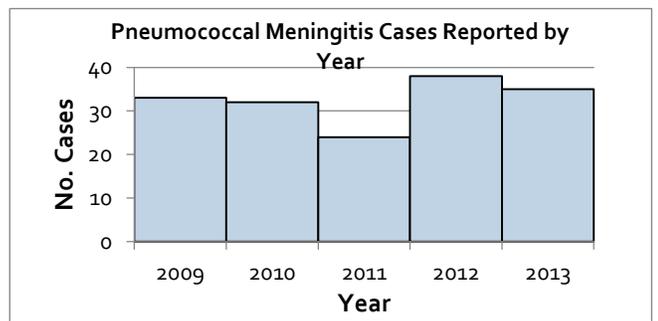
Percentage of Pertussis Cases by Up-to-date Status and Reason Not Up-to-date by Age Group, North Carolina, 2013



Pneumococcal Meningitis, 2013

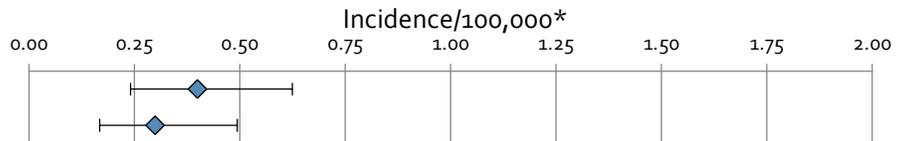
Annual Summary

Year	2009	2010	2011	2012	2013
Incidence / 100,000	0.35	0.33	0.25	0.39	0.36
No. cases	33	32	24	38	35
<5 yrs.	9%	16%	4%	13%	6%
≥ 5 yrs.	91%	84%	96%	87%	94%
Unvaccinated or unknown vaccination status (<5 yrs. only)	33%	20%	100%	20%	0%

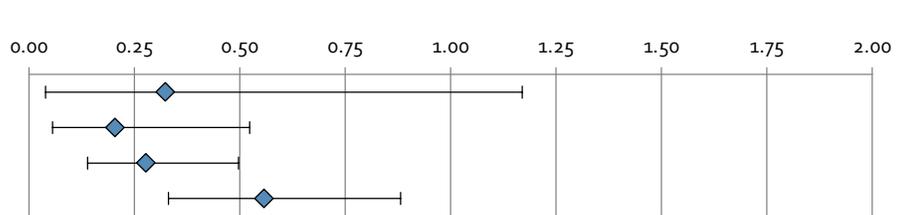


Case Demographics, 2013

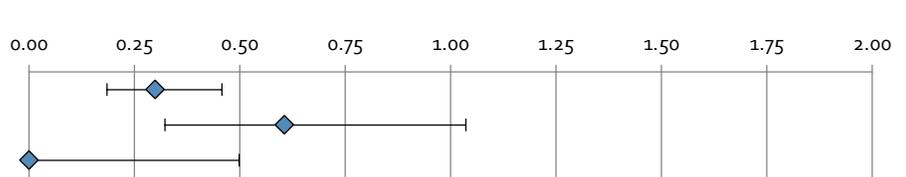
Sex	No. cases	% of total	Incidence/100,000
Male	19	54%	0.40
Female	15	43%	0.30
Unknown	1	3%	--



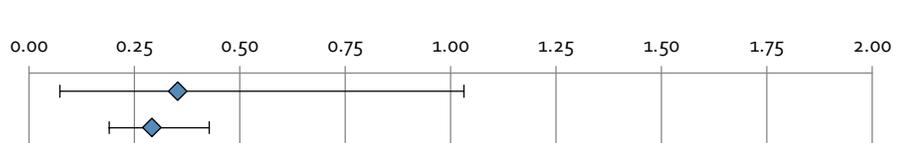
Age Group	No. cases	% of total	Incidence/100,000
Under 5 yrs.	2	6%	0.32
5-19 yrs.	4	11%	0.20
20-49 yrs.	11	31%	0.28
50+ yrs.	18	51%	0.56
Unknown	0	0%	--



Race	No. cases	% of total	Incidence/100,000
White	21	60%	0.30
Black	13	37%	0.61
Other or multiple	0	0%	0.00
Unknown	1	3%	--



Hispanic Ethnicity	No. cases	% of total	Incidence/100,000
Yes	3	9%	0.35
No	26	74%	0.29
Unknown	6	17%	--



*Point estimates and 95% confidence intervals are shown

Geographic Distribution

Cases By Month

