



## Summary of Vaccine Preventable Diseases Reported to the Michigan Department of Community Health, 2006

This is a summary of reported cases of selected vaccine-preventable diseases in Michigan in 2006. Totals for 2005 are provided for comparison in Table 1 (see last page).

**Congenital Rubella** - No cases of congenital rubella were reported in 2006.

**Diphtheria** - No cases of diphtheria were reported in 2006.

***Haemophilus influenzae* invasive disease** – Thirty-six cases of invasive *H. influenzae* disease were reported to the Michigan Department of Community Health (MDCH) in 2006. Six were in persons under 5 years of age; none of these were identified as being serotype b (5 were tested but not typeable, 1 was serotype f).

**Measles** – One case of measles was reported in the state in 2006, a 14 month-old infant who had spent several months in China with her parents. Eight days after returning she received her first MMR vaccine dose; 3 days after vaccination she developed a rash and fever. The differential diagnosis included measles versus a reaction to MMR vaccination; measles IgM was positive but would be expected in either instance. By sequencing the viral DNA obtained from a throat swab specimen, CDC Measles Laboratory was able to determine this case was due to a wild strain of measles virus and thus established measles disease as the diagnosis. The strain was further characterized as genotype H1, a variant known to be circulating in China.

In addition, MDCH received reports of 19 suspect cases which were ruled following collaborative investigation by local health department and MDCH personnel.

**Mumps** – In 2006 a total 85 mumps cases were reported to MDCH, an increase of more than 250% over the 24 cases reported in 2005. One of the 85 cases was considered an Iowa case on the basis of attending college there and having connection to a campus outbreak. The US experienced a nationwide resurgence of mumps in 2006, with over 6,000 cases reported (in 2005 there were 314 cases). In Michigan cases began to be reported in the mid-winter and occurred throughout the year; onsets of illness peaked in mid-April to early May (see Mumps Figure 1). Cases were widely dispersed geographically and no focal outbreaks were identified.

### **Case classification**

Twenty-five cases were classified as Confirmed (defined as having serologic or virologic lab confirmation, or an epidemiologic link to another confirmed case) - 18 were positive by mumps IgM serology, and 2 were confirmed by epi-link.

Sixty were classified as Probable, meeting the CDC/CSTE clinical case definition (an illness with acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary gland, lasting greater than or equal to 2 days, and without other apparent cause).

**Age and sex distribution**

Females accounted for 48 (57%) of the 85 cases, the female-to-male ratio was 1.3:1.

The median age of cases was 18 years with a range of 1 to 72 years. Cases were distributed across the age spectrum (see Mumps Figure 2). While many states observed peak incidence in the 18-24 year-old age group, Michigan actually had relatively few cases in this age group; the largest number of cases were in the 10-17 year-old age group. The majority (70%) of cases were white.

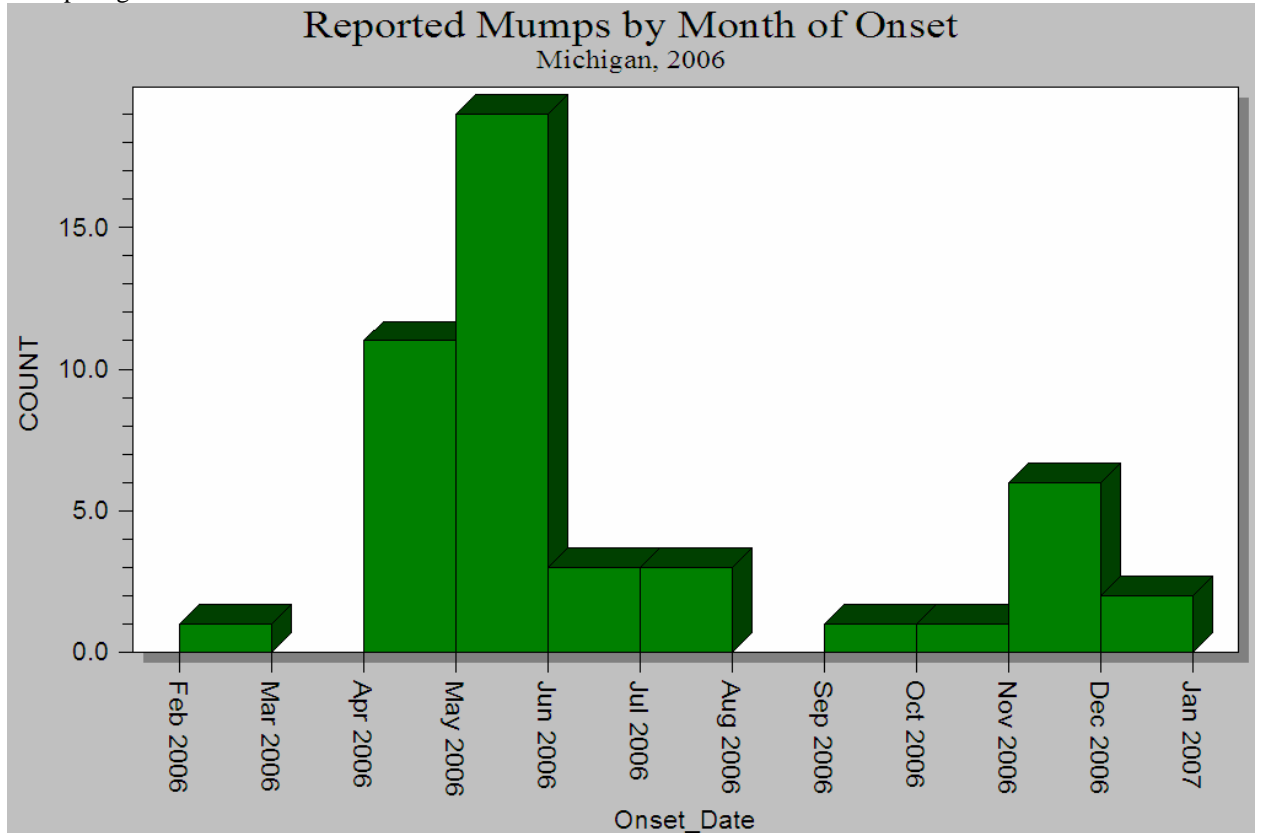
**Vaccine history**

Overall, 49 (58%) cases indicated a history of receipt of at least one dose of mumps-containing vaccine; 40 (82%) were able to provide one or more dates of mumps vaccination.

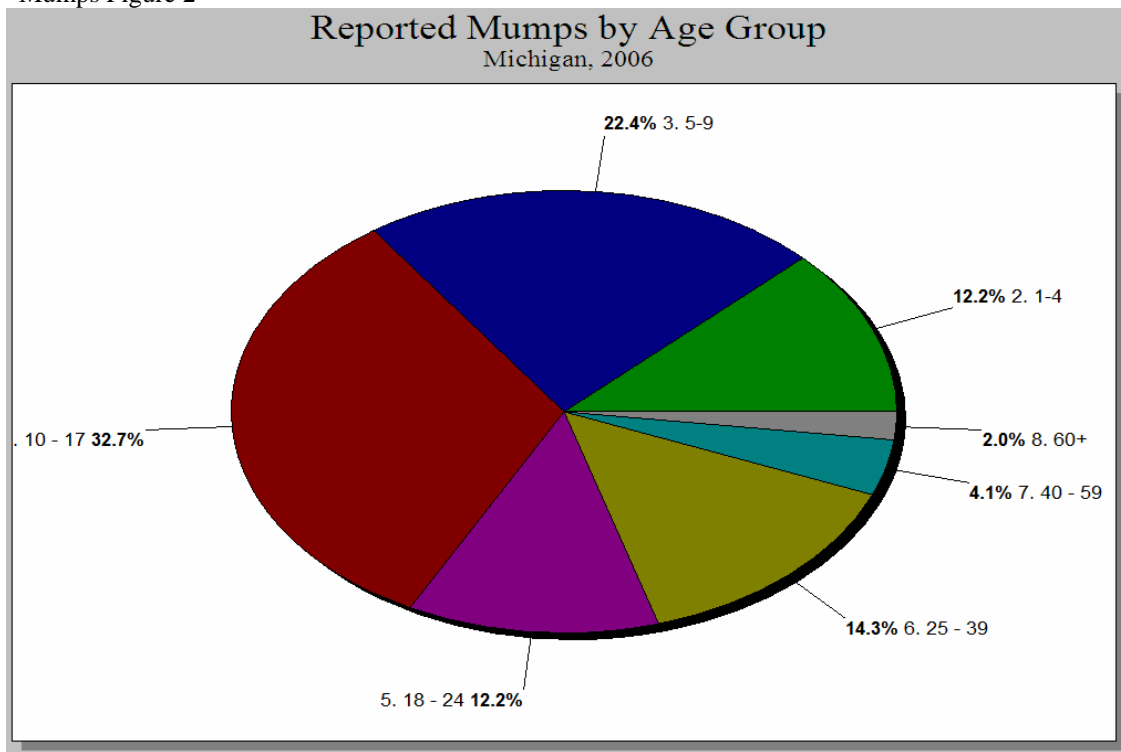
**Comment:**

As was true in many states, Michigan saw a substantial increase in mumps cases in 2006. The increase continued a trend first noted in Michigan in 2005 when 24 cases were reported, considerably more than the annual average of 6 cases reported in the years from 2000 to 2004 (see Mumps Figure 3). Large outbreaks of mumps have been reported in recent years in other western countries, notably England, Wales, Scotland and Ireland. The current resurgence in the US may reflect some connection to the situation in those areas.

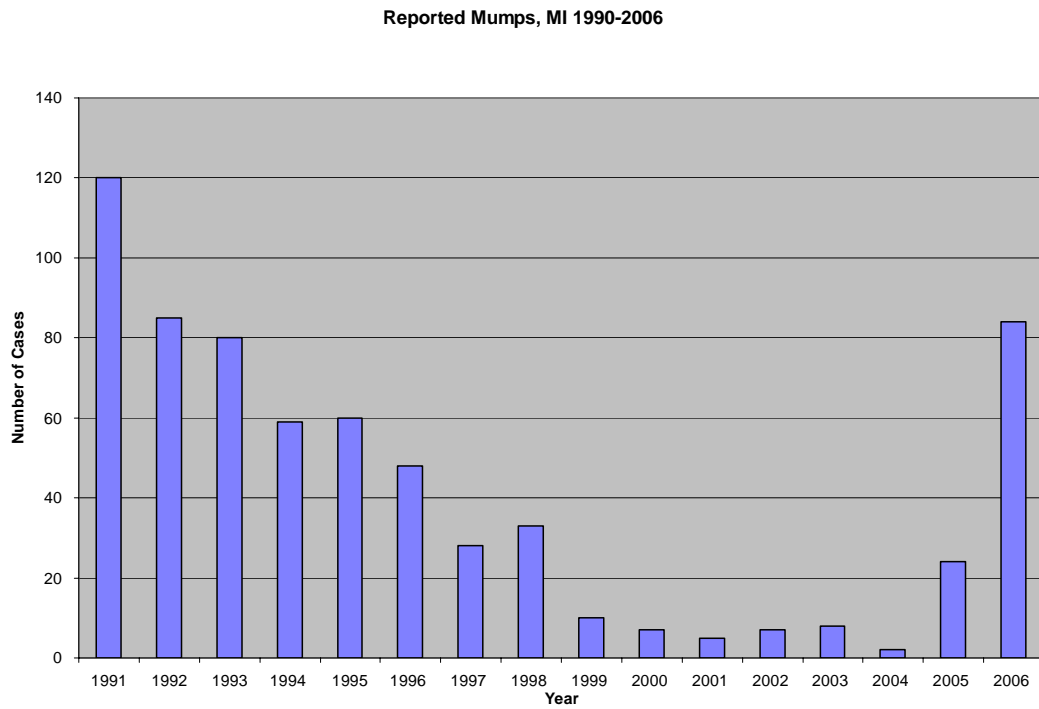
Mumps Figure 1.



Mumps Figure 2



Mumps Figure 3.



**Pertussis** - In 2006 there were 632 confirmed or probable pertussis cases reported to MDCH, representing an increase of 97% over the 321 cases reported in 2005. This continues a trend of substantial increases in the reported incidence of pertussis cases in recent years (Pertussis Figure 1). One county accounted for 44% of reported cases. Onset date was available for 532 (84.2%). Cases occurred throughout the year with a prominent peak in September (Pertussis Figure 2.)

**Case classification**

Of the 632 cases, 307 (49%) were reported as confirmed and 325 (51%) as probable. Forty-four (7%) were reported as having a culture-positive lab result, and 216 (34%) were reported with a PCR-positive lab test; three were reported with both a positive culture and PCR result.

**Age, sex, and race distribution**

Females accounted for 352 or 55% of cases. Age was reported for 631 (99.8%) cases, ranging from 9 days to 92 years, with a median age of 14 years and a mean age of 19.8 years. Adults (over 20 years of age) accounted for the largest proportion of cases (33%, see Pertussis Figure 3). Race data were indicated for 477 (75%) cases; of these, 398 (83%) were white, 52 (11%) were black, 26 (6%) were other.

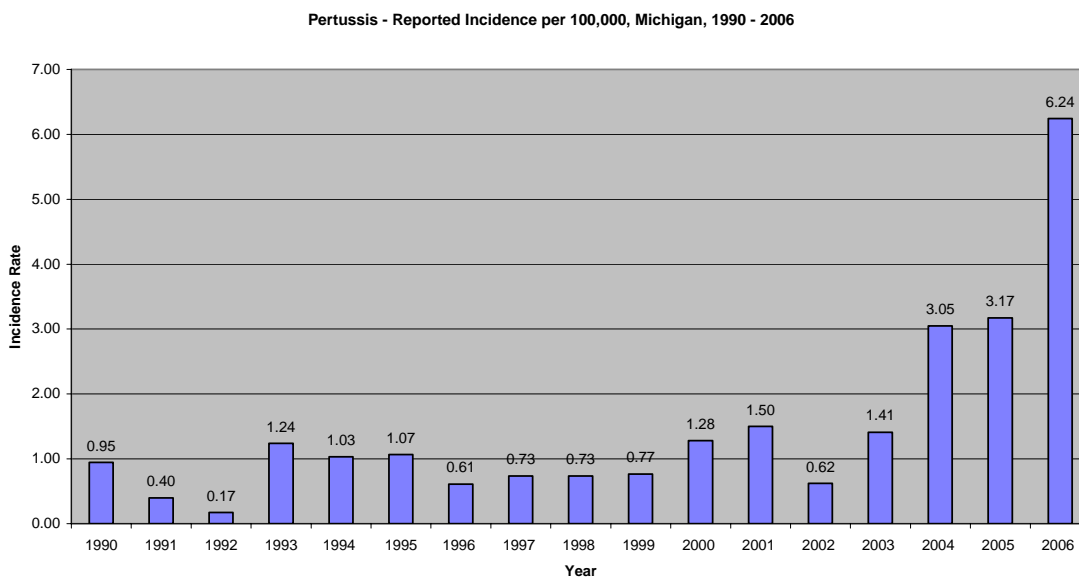
**Vaccination history**

Information on vaccination history was available for 468 (74%) case records. Of these, 390 (83%) indicated receipt of at least one dose of pertussis-containing vaccine. A date of vaccination for one or more doses was provided for 282 (72%) of the 390 cases that indicated prior receipt of pertussis-containing vaccine. Among 312 cases under age 20 who indicated they had a history of being vaccinated against pertussis, 272 (87%) had a vaccine date in the case report for one or more doses.

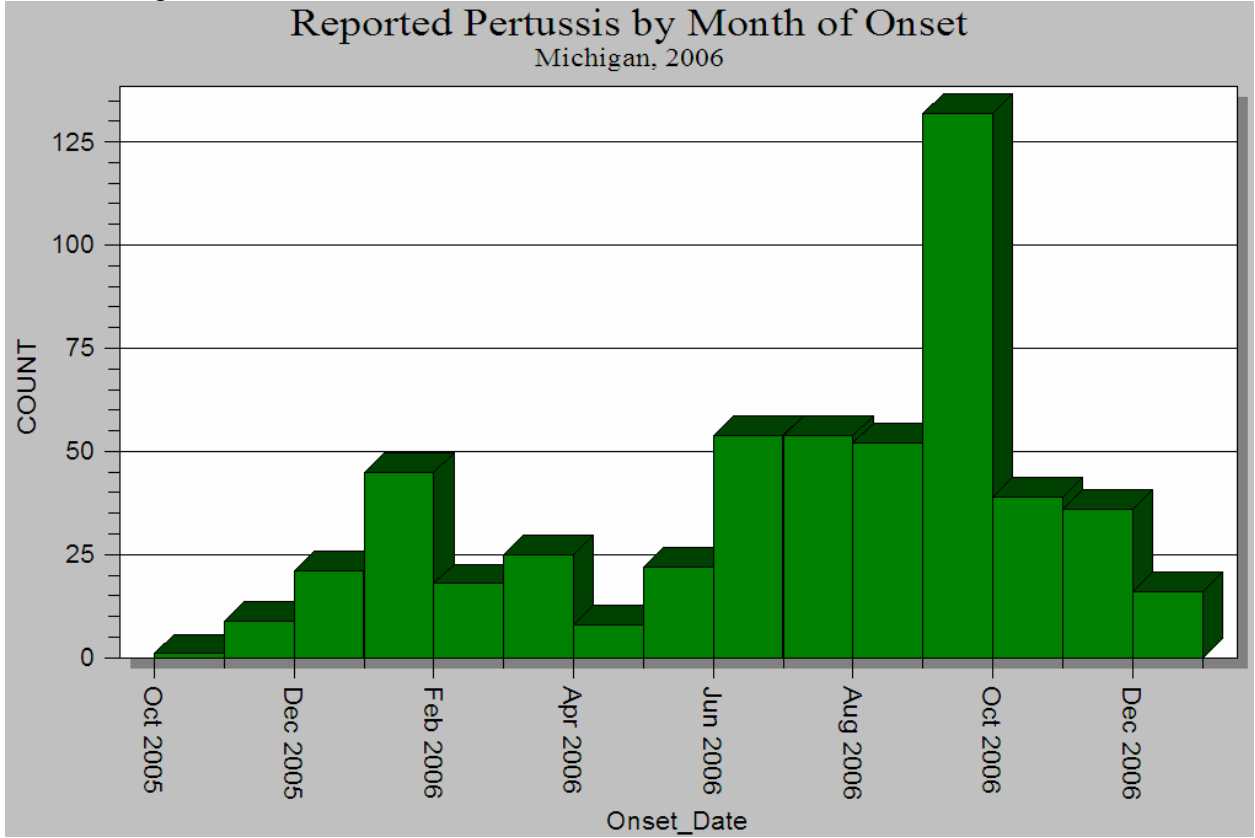
**Clinical characteristics and course**

Paroxysm of cough was reported in 542 cases (86%), post-tussive vomiting in 314 (50%), and whoop in 195 (31%). Pneumonia based on chest X-ray was reported in 28 (4.4%). Sixty-four (10%) cases were reported as hospitalized, with a median stay of 2.5 days (range 1 day – 17 days). There were 2 pertussis-related deaths reported, both cases were infants less than 1 month of age, too young to have started immunizations. In both instances the source of infection was likely another member of the household with an undiagnosed prolonged cough illness.

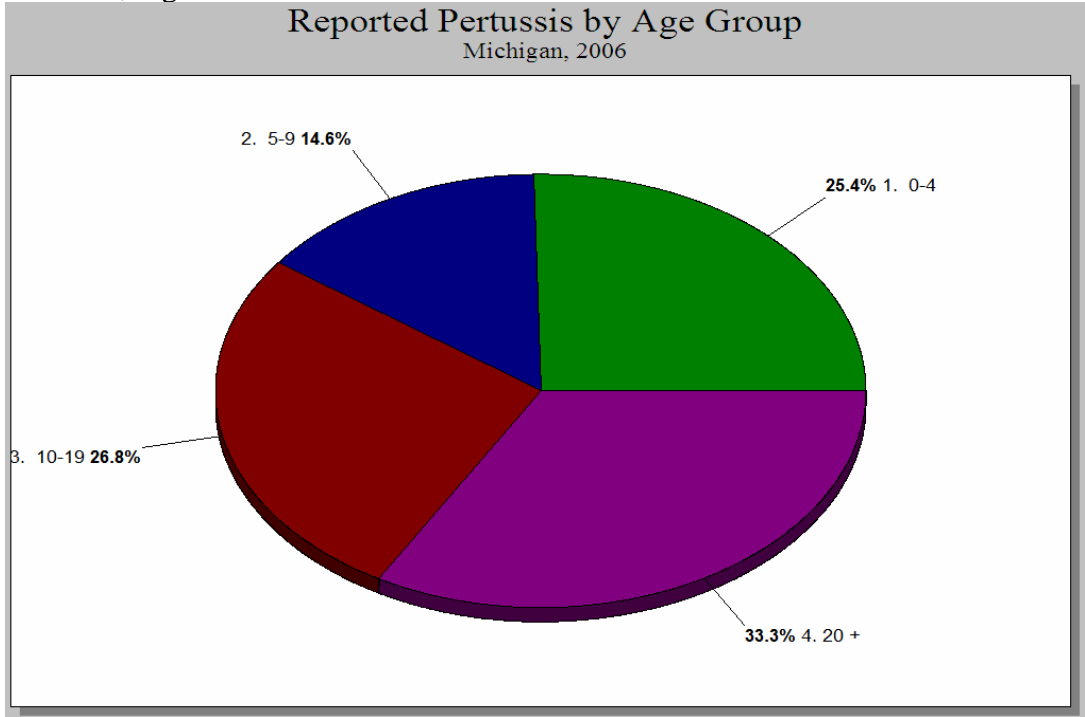
Pertussis Figure 1.



Pertussis Figure 2.



Pertussis, Figure 3.



**Rubella** – One case of rubella was reported in 2006. In March a 33 year-old male who had spent the previous 7 weeks in Bangladesh experienced a rash illness, having onset one day after his return to Michigan. The case was serologically confirmed; virologic and molecular epidemiology studies were not successful. Given the travel history, the case is presumed to have acquired the infection while abroad. Case finding efforts among family and other close contacts in Michigan, as well as among persons potentially exposed on the case’s return international flight, did not identify any secondary cases. The immunization history was uncertain.

***Streptococcus pneumoniae* invasive disease, under age 5 years** – Invasive disease due to *S. pneumoniae* became reportable in Michigan in September 2005. National surveillance efforts focus on monitoring infections of non-sterile sites in children under the of age 5 years, which corresponds to the age group at highest risk and for whom vaccination recommendations have been made. In 2006, 70 cases of invasive *S. pneumoniae* disease were reported in children under 5 years of age, 38 (54%) were male. Data on PCV7 immunization history and serotyping were not available.

**Tetanus** – Three cases of tetanus were reported in 2006, one in an adult and 2 involving unvaccinated children. Summaries of child cases are provided here.

In September a tetanus case was reported in a 7 year-old previously health, unvaccinated female. She presented to a local emergency department with complaints of multiple episodes of seizure over the previous 2 days. In the six days prior to admission she developed back and chest pain, and complained of sore throat, mild dysphagia and back spasms. The parents related at least one episode of trismus. She was admitted to the pediatric ICU with respiratory distress and a high fever. Multiple consultations were obtained, including neurology and infectious disease. A diagnosis of generalized tetanus was established on the basis of signs and symptoms. The mother related the patient had suffered a wound of uncertain cause on the left great toe. A 0.4 cm scab was noted in the area.

The case was intubated and placed on a ventilator. Over the course of a 25-day hospitalization tonic-clonic seizures, locked jaw, and spasms with arching provoked by sensory stimulation were observed. A tracheostomy was performed on day 8 of hospitalization. A tetanus antitoxoid antibody titer (tetanus Ab IgG) obtained on the second day of hospitalization was 0.09 IU/mL, below the level considered protective (> 0.10 IU/mL). Immunization status was reviewed through the primary care provider office records, the state of Michigan immunization registry, and school records; all showed a lack of any immunizations for the child. The school record included a waiver of all immunizations due to “parent decision” signed by a parent and dated August 24, 2004.

In October another childhood case was reported in a 6 year-old previously healthy, unvaccinated Amish female. The case had initially presented to a local emergency department with complaints of a 1 day history of pain in the mid-back and neck, muscle spasms, occasional spastic extremity movement, and worsening back pain. She was transferred to the emergency department of a large medical center where significant muscle spasms of all extremities and her back were observed. The case resided on a farm with numerous animals. Initially her history was negative for recent injuries, accidents, or other trauma but later a history of stepping on a

nail two weeks prior to onset was reported. The patient was admitted to the pediatric ICU; body spasms and trismus were noted and she developed progressive laryngeal spasms. She was intubated the following day for airway protection. In the course of her hospitalization her treatment included 17 days of mechanical ventilation and tracheostomy placement.

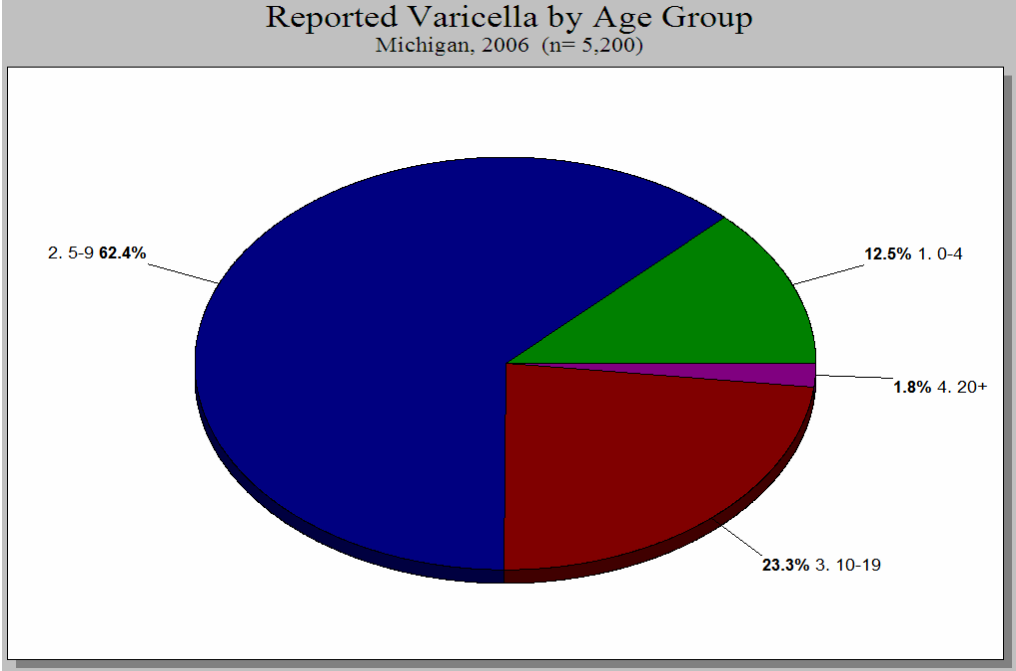
**Varicella** – In September of 2005 Michigan implemented individual case reporting for varicella. Previously, surveillance was based on aggregate weekly case counts from schools, day-care centers, and providers. Thus 2006 provided the first complete year of individual case-based varicella data. Although overall the reported incidence of varicella in Michigan has declined by approximately 85% since the introduction of varicella vaccine in 1995, the level of reported disease continues to be on the order of several thousand cases each year. In an effort to minimize the burden on public health resources, data collection efforts are focused on the collection of basic demographic variables and three additional key data elements: age, varicella vaccination history, and severity of illness.

In 2006, a total of 5,200 cases of varicella (confirmed or probable) were reported; this represents a 30% increase over the 4,004 cases reported in 2005. It is unclear if this reflects a true increase in occurrence or an improvement in the reporting of cases. Of the 5,200 cases, age was reported for 5,172 (99.5%) and gender was reported for 5,133 (98.7%). The largest number of cases was reported in the 5-9 year-old age group (3,229, 62% of cases), followed by the 10-19 year-old age group (1,206, 23% of cases) – see Varicella Figure 1. The median age was 7 years (mean age 8.1), with a range of 1 month to 86 years.

Severity of illness was approximated by estimates of the number of lesions as reported in one of four categories: less than 50, 50 – 249, 250 – 500, and more than 500. Such categorical estimates of number of lesions were reported for 4,052 (77.9%) cases. For purposes of additional analysis, cases with fewer than 50 lesions were considered mild, and cases with 50 or more were considered moderate-to-severe.

Vaccination history was reported for 4,517 (86.9%) cases. Overall, 3,490 (67%) reported a history of having received varicella vaccine. Among 3,892 cases with data on varicella vaccination history and illness severity, vaccinated individuals were more likely to experience mild illness (72%) than unvaccinated persons (30%,  $p < 0.0005$ ) – see Varicella Table. Among 1,764 cases reporting a discrete number of lesions (as opposed to a categorical range), vaccinated persons reported significantly fewer lesions (median of 20 lesions) than non-vaccinated persons (median of 35 lesions,  $p < 0.0005$ ).

Varicella Figure 1.



Varicella Table – Severity of chickenpox disease by vaccination status.

Vaccination status	Disease severity	
	Mild illness, i.e. <50 lesions (%)	Moderate-to-Severe illness, i.e. ≥50 lesions (%)
<b>Vaccinated</b>	2148 (71.6%)	852 (28.4%)
<b>Unvaccinated</b>	267 (29.9%)	625 (70.1%)



Table 1 - Number of reported cases of selected vaccine preventable diseases, Michigan, 2006 and 2005.

Disease	Total Cases 2006	Total Cases 2005
Congenital Rubella	0	0
Diphtheria	0	0
<i>H. influenzae</i> invasive <5 years (serotype b)	6(0)	4 (1)
Measles	1	1
Mumps	85	24
Pertussis	632	321
Poliomyelitis	0	0
Rubella	1	0
<i>S. pneumoniae</i> invasive disease < 5 years	70	--
Tetanus	3	1
Varicella	5,200	4,004