

INVASIVE MENINGOCOCCAL DISEASE IN MARICOPA COUNTY

January 1, 2000-June 30, 2006*



**Office of Epidemiology and Vital Statistics
Maricopa County Department of Public Health
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Overview of Invasive Meningococcal Disease

Neisseria meningitidis or meningococcus is a gram negative diplococcus. At least 13 serogroups are known. The most common of these, which cause the majority of clinical disease, are A, B, C, Y, and W-135.^{5,6} Humans are the only host of *N. meningitidis*.⁷ Transmission occurs via contact with large aerosol droplets or contact with respiratory tract secretions. Examples of contact include kissing, sharing drinks or cigarettes, mouth-to-mouth resuscitation, and intubation.⁶

A carrier state occurs in 10% or more of the population.⁸ This may increase to 60-80% in closed populations.⁹ Carriers are most frequently colonized in the nasopharynx with low or non-pathogenic strains of *N. meningitidis* or a related non-pathogenic bacteria, *N. lactamica*.^{5,8} By age 30, the majority of the population has had 10 different episodes of carriage.⁸ Carriage is an immune-inducing event. Cross-reactivity of antibodies occurs.¹⁰ By adulthood, the majority of people have formed antibodies to A, B, C, Y, and W-135.¹¹ Carriage is highest in adolescents and lowest in young children.⁸ Despite this relatively high carrier state, less than 1% of colonized organisms invade.¹²

Clinical syndromes caused by *N. meningitidis* include septicemia, meningitis, bacteremia, pneumonia, and other infections of normally sterile body fluid, such as septic arthritis, conjunctivitis, and pericarditis.⁵ In septicemia, patients often present with hypotension, diffuse petechiae, and may develop disseminated intravascular coagulation and purpura fulminans. In meningitis, the organism crosses the blood-brain barrier. This occurs in 50% of the cases and occurs 24-48 hours after the bacteria invades the bloodstream.^{9,12} Cases of bacteremia often present with non-specific symptoms and meningococcus may not be suspected.² Pneumonia occurs in up to 15% of the cases.¹² The incubation period of the organism is generally 2-4 days but ranges from 1-10 days. A patient remains infectious as long as *N. meningitidis* remains in the nasopharynx and until 24 hours after receiving appropriate antibiotics.¹³

High risk groups include:

- College freshmen living in dormitories
- Military recruits
- Microbiologists routinely exposed to *N. meningitidis*
- Those with terminal complement component deficiencies
- Those with functional/anatomic asplenia
- Travelers to hyperendemic or epidemic areas. Examples include Sub-Saharan Africa, "the meningitis belt" and Saudi Arabia during the pilgrimage to Mecca.^{1,10}

Risk factors for disease include antecedent viral infection, crowding, chronic disease, including hepatic disease, multiple myeloma, and systemic lupus erythematosus, and active and passive smoking. Black race and lower socioeconomic status are felt to be risk markers for IMD.^{1,10}

Epidemiology in the United States

Overall

Approximately 1,400-2,800 cases/year occur in the US. The rate of disease is 0.5-1.1/100,000 population.¹ This range reflects the cyclical incidence of the disease.¹⁴ 98% of cases are sporadic. Outbreaks are uncommon.¹¹ CFR is high, 10-14%, and may be as high as 20% in the adolescent population.^{1,15} Morbidity in survivors occurs in 11-19% and includes limb loss, neurologic disability, and hearing loss.¹ IMD follows a seasonal pattern with the majority of cases in the winter and early spring months.¹⁶

Distribution by Serogroup

In the US, serogroups B, C, and Y each cause about 1/3rd of cases. In the infant population, ≥50% of cases is caused by serogroup B. For ages ≥ 11, 75% is caused by C, Y, and W-135, vaccine-preventable serogroups.¹ A higher proportion of serogroup Y IMD occurs in the elderly.¹¹ Serogroup A rarely causes disease in the US.⁵

Internationally, serogroup A is significant in Africa and Asia. Serogroup B is significant in Europe, South America, New Zealand, and Australia.⁹

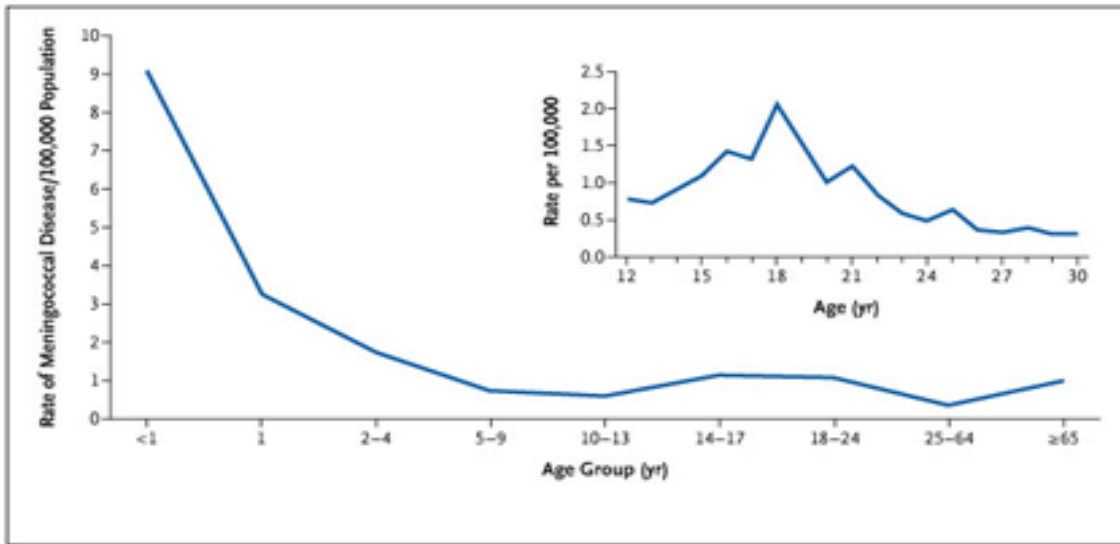
Antigenic shift provides a possible explanation for the change in serogroup distribution over time. Dramatic changes were noticed in the 1990's. Cases caused by serogroup Y increased from 2% in 1989-1991 to 37% in 1997-2002. Additionally, disease rate increased in the 15-24 year old population with approximately 50% caused by serogroup C. In antigenic shift, the bacteria genetically changes so that a new virulent strain of the serogroup forms and evades established host immunity.¹⁴

Distribution by Age

As can be seen in FIGURE 1, IMD has two main peaks by age. The greatest rate of IMD occurs in the <1 year old population. A second peak occurs in late adolescence.¹⁵ Some possible explanations for the <1 year old peak are the loss of maternal antibody protection at 3 months and the low carriage state. For the late adolescent population, crowding, smoking, and the high carriage state contribute to the peak in incidence. The carrier state provides exposure to *N.meningitidis* and antibody development, but also provides exposure to virulent strains and the risk of invasive disease.^{5,8}

FIGURE 1: Rate of Meningococcal Disease by age-US, 1991-2002

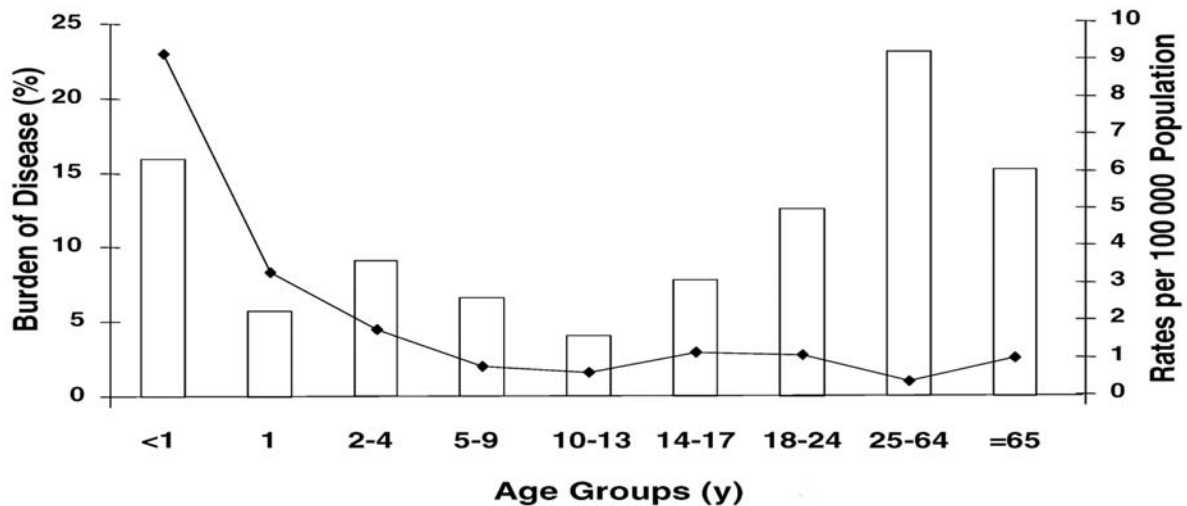
Centers for Disease Prevention and Control. Prevention and Control of Meningococcal Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2005;54(RR-7).



Although the greatest rate of disease is in the <1 year old population, the greatest burden of disease (% of cases) is in the 25-64 year old population as can be seen in FIGURE 2.¹⁵

FIGURE 2: Burden of disease (percentage of cases) and rates of invasive meningococcal disease (all serogroups) in the United States, 1991-2002, according to age (CDC, Active Bacterial Core surveillance)

Committee on Infectious Diseases, *Pediatrics* 2005;116:496-505



Distribution by Race/Ethnicity

Blacks are at a higher risk of IMD although this is felt to be a risk marker. (due to environmental factors rather than a genetic predisposition to developing the disease.)¹

Distribution by Gender

Males account for 51-55% of cases.^{9,17}

Distribution by Syndrome

Meningitis, defined as meningitis with or without meningococemia is more common than bacteremia alone. The death rate is higher with meningococemia.¹⁷⁻¹⁹

Surveillance in the United States

Surveillance on a national level is accomplished in two ways. States send information to the CDC once a week via the National Electronic Telecommunications System for Surveillance (NETSS) on nationally reportable diseases which includes IMD. Provisional data is published weekly in MMWR. At the end of the year, the compiled data is corrected and finalized. This report is published in MMWR as a Summary of Notifiable Diseases for that year. A limitation of this system is that reporting is voluntary.²⁰ Active Bacterial Core surveillance (ABCs) is an active surveillance system for 6 pathogens including *N. meningitidis*. There are 10 sites in the US representing a population of over 38 million persons. For ABCs cases, additional demographic information is obtained on cases, additional laboratory studies are performed on samples, isolates are sent to the CDC for additional testing, and laboratories are both contacted and audited regularly.²¹

Treatment

Intravenous (IV) Penicillin G is the treatment of choice.⁹ Alternatives are IV Ceftriaxone and Ampicillin. IV Chloramphenicol is a choice for penicillin allergic patients.¹³ Except for the third-generation cephalosporins, the IV treatment options do not eradicate nasopharyngeal carriage. Patients not receiving an IV third-generation cephalosporin for the acute disease need one of the chemoprophylactic antibiotics prior to hospital discharge to eradicate nasopharyngeal carriage.²⁴ Antibiotic resistance to Penicillin has not been a problem in the US with *N. meningitidis*.⁹

Prevention

A. Vaccination

Currently there are two meningococcal vaccines available in the US, the meningococcal polysaccharide vaccine (MPSV4 or Menomune) and the meningococcal conjugate vaccine (MCV4 or Menactra). Both of these vaccines are tetravalent and contain antigens to serogroups A,C,Y, and W-135. There is no serogroup B coverage in these vaccines.¹¹

The meningococcal polysaccharide vaccine was licensed in 1981 for use in those ≥ 2 years of age. This vaccine has been used in all military recruits since 1982. Limitations of this vaccine include a short duration of protection, booster may lead to a diminished antibody response, lack of interruption of the carrier state, and lack of herd immunity.^{1,11}

The meningococcal conjugate vaccine was licensed in January 2005 for use in those 11-55 years of age. The advantages of this vaccine include a longer duration of protection and booster leads to a rise in antibodies. Assumed advantages, based on experience with other conjugate vaccines such as that for *H.influenza* and *S.pneumoniae*, include a reduction in the carrier state and development of herd immunity.

In the US, the Advisory Committee on Immunization Practices of the CDC has recommended routine vaccination with the meningococcal conjugate vaccine for 11-12 year olds at their pre-adolescent physician visit; catch-up at age 15 if vaccine not yet received; and to those in high risks groups, which includes entering college students who plan to live in dormitories.¹ Groups that have endorsed these recommendations include the American Academy of Pediatrics and the American Academy of Family Physicians.^{15,32}

B. Chemoprophylaxis

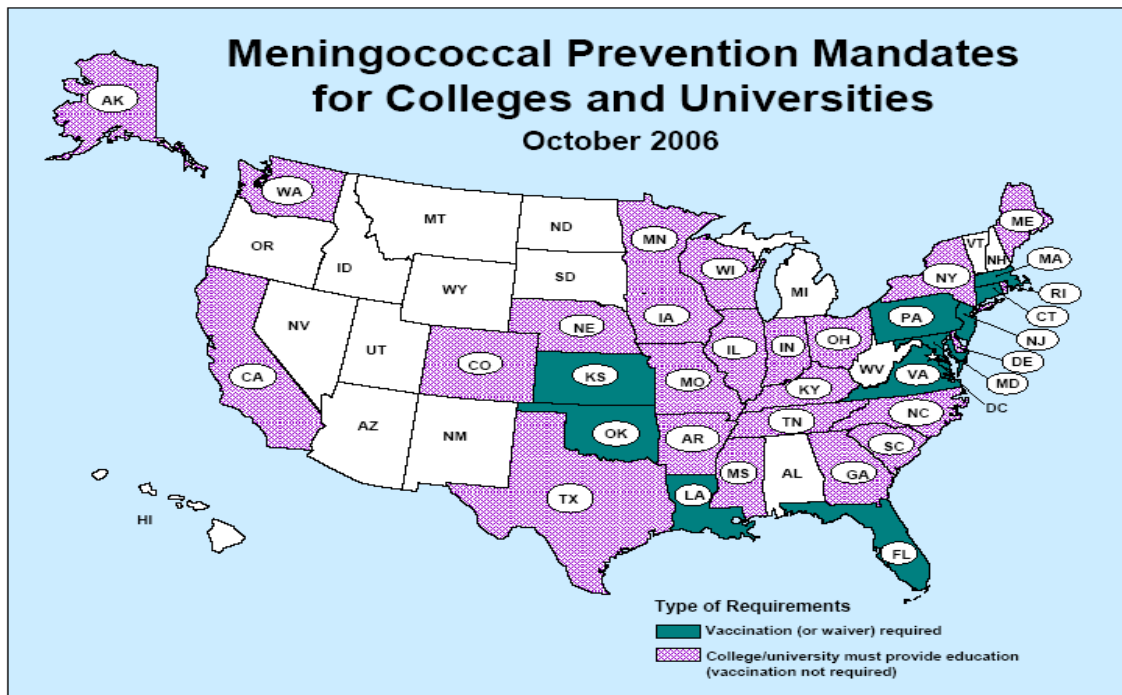
Chemoprophylaxis is an important component of prevention. Contacts of IMD cases who should receive prophylaxis include household contacts, child-care center contacts, and those who have had prolonged and/or intimate contact with the patient.¹ Generally, school and work contacts are not included unless the contact has been close. Administration of chemoprophylaxis is ideal within 24 hours. Benefit is still achieved up to 2 weeks, however, the benefit decreases as time elapses from the exposure. After 2 weeks, the benefit is not appreciable and hence is not recommended. The current choices for prophylaxis are

- Rifampin for adults and children, oral dose twice a day for 2 days
- Ciprofloxacin for adults, one time oral dose
- Ceftriaxone for adults and children, one time intramuscular dose ¹¹

Prevention Mandates for US Colleges and Universities

As shown in FIGURE 3, mandates for meningococcal prevention for college students differ from state to state. 11 states currently require proof of vaccination or waiver for their colleges and universities. 24 states require education. The remaining 15, which includes Arizona, do not have requirements.³³

FIGURE 3



Source=Immunization Action Coalition (2006). Available from <http://www.immunize.org/laws/meninmap.pdf>

Surveillance in Maricopa County

Reporting is required in Arizona under the Arizona Administrative Code. Reporting requirements differ by reporting group. For health care providers, a report must be submitted to the local health department within 24 hours for a case or suspect case. For laboratories, a report on a positive lab test must be submitted within 24 hours to the Arizona Department of Health Services and isolates must be submitted to the Arizona State Public Health Laboratory. Violation of this reporting is a Class III Misdemeanor.²²

The case definition of a confirmed case of IMD is a clinically compatible case with culture confirmation of *N. meningitidis* from a normally sterile site. A

probable case is a clinically compatible case with a positive PCR or positive *N. meningitidis* antigen. A suspect case is presence of purpura fulminans without a positive blood culture or clinical compatibility with gram negative diplococci on gram stain of a sample from a normally sterile site.²³

Data from the Communicable Disease Report form (CDR) submitted to MCDPH is maintained in an electronic CDR database. Case investigation is performed by a community health nurse investigator using the National Bacterial Meningitis and Bacteremia Case Report form (long form). The data from the long forms is transferred to an Excel spreadsheet and maintained electronically. This data is available from G:\EPI\New Surveillance\Communicable Diseases\Specific Diseases\Bacterial meningitis\Forms

Epidemiologic Trends in Maricopa County 2000-2006

Overall

During 1/1/2000-6/30/2006, 113 confirmed and probable in-county cases of IMD were reported to MCDPH. 12 deaths occurred in this group. (See TABLE 1)

TABLE 1, Invasive Meningococcal Disease in Maricopa County 2000-2006*

	2000	2001	2002	2003	2004	2005	2006	Total
# of Cases	28	13	20	17	11	19	5	113
Rate	0.90	0.41	0.61	0.50	0.31	0.52	0.22†	
# of Deaths	3	0	5	1	0	1	2	12
Case Fatality Rate	11%	0%	25%	6%	0%	5%	40%	11%

*Year 2006 through 6/30/2006
Rates per 100,000 population US Census estimates

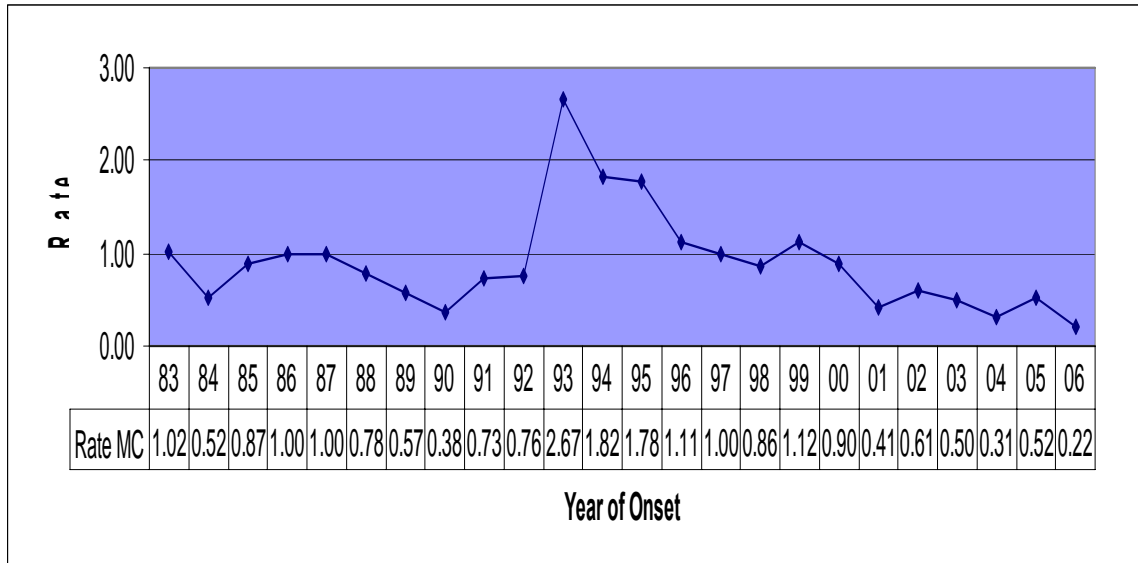
†Annualized as of 6/30/2006

Rate of disease was at a high of 0.90 in 2000 and slowly trended down over time to a low in 2006 of 0.22 (annualized). Median rate was 0.5. Annualized average rate was 0.47. At no time during the study period was the rate

≥ 1/100,000 population. The overall case-fatality rate was 11% which was similar to that previously discussed from the literature.

FIGURE 3 provides an overall look at the rate of IMD in MC from 1983-2006. An outbreak occurred in 1993.

FIGURE 3, Invasive Meningococcal Disease in Maricopa County, Rates by Year on Onset, 1983-2006*

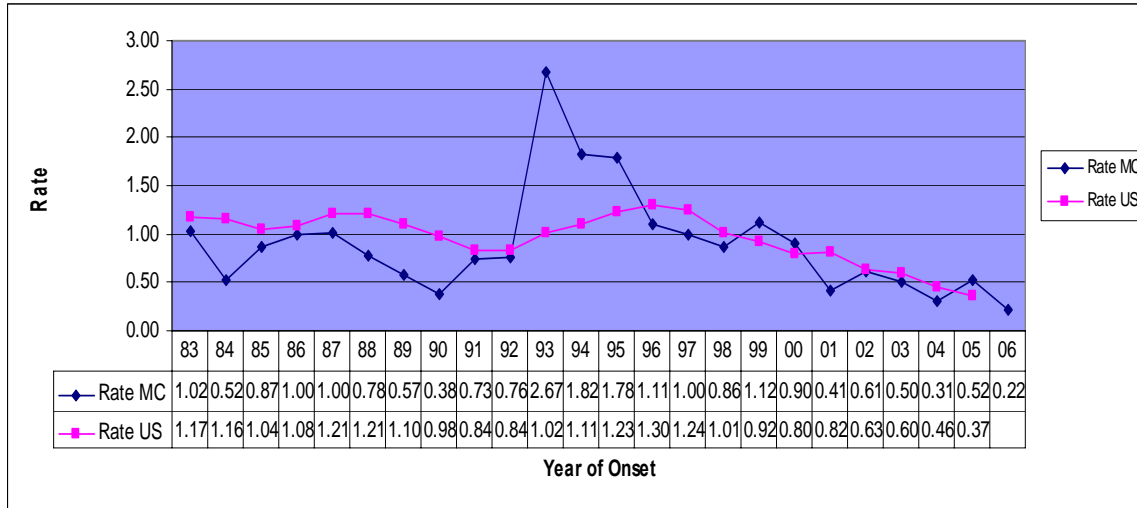


*Year 2006 annualized as of 6/30/2006
Rates per 100,000 population US Census estimates

All MC data from MCDPH, Office of
Epidemiology

FIGURE 4 shows the rates of IMD in the US and MC from 1983-2006. The rate in MC from 2000-2006 was similar to the US rate during this same time period. In both cases, the rate slowly trended down over time and was <1/100,000 population.

FIGURE 4, Invasive Meningococcal Disease in the US and Maricopa County, Rates by Year of Onset 2000-2006*



*Year 2006 annualized as of 6/30/2006

All MC data from MCDPH. Office of Epidemiology

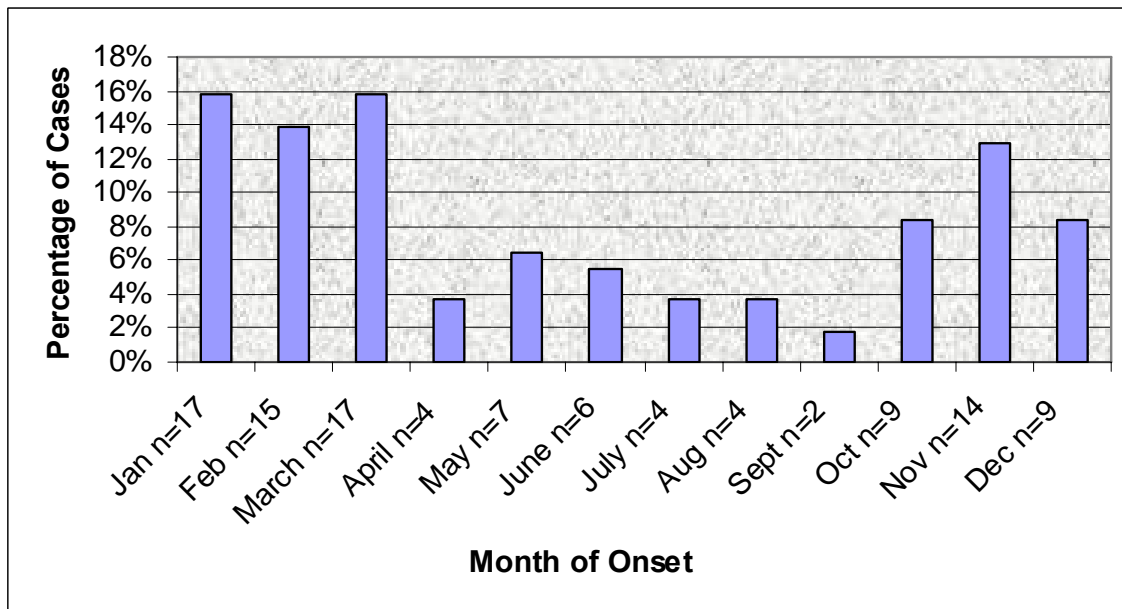
Rates per 100,000 population US Census estimates

Raw numbers for US rate calculation obtained from CDC. Summary of Notifiable Diseases, US, 2000-2004. *MMWR* 2000;49(53); *MMWR* 2001;50(53); *MMWR* 2002;51(53); *MMWR* 2003;52(54); *MMWR* 2004;53(53)2004 & CDC. Notifiable Diseases/Deaths in Selected Cities Weekly Information. *MMWR* 2006;54(52);1320-1330

Seasonality

The distribution of cases by month of onset in MC followed a seasonal pattern similar to what was discussed earlier from the literature. A higher percentage of cases were seen in the winter and early spring months.(See FIGURE 5)

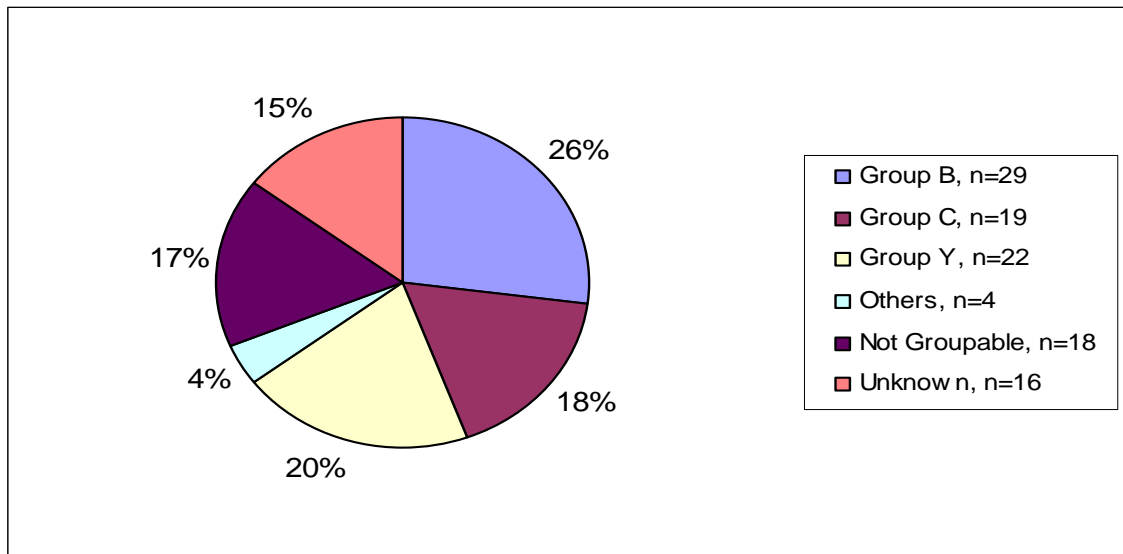
FIGURE 5, Invasive Meningococcal Disease in Maricopa County, Percentage Distribution by Month of Onset 2000-2005



Distribution by Serogroup

The proportions of IMD cases by serogroup in MC differed from that reported in the literature for the US. (See FIGURE 6) Unlike the US where serogroups B,C, and Y each cause 1/3rd of cases, in MC B caused 26%; C caused 18%; and Y caused 20%. 15% of MC cases were unknowns and 17% were Not Groupable. Unknowns were samples that were not sent to the AZ State Lab for serogrouping or cultures that did not grow because the patient received antibiotics prior to obtaining the cultures. Not Groupables are capsule-deficient samples that cannot be serogrouped due to their lack of capsule. Not Groupable samples that cause disease are either genetically B, C, or Y but capsule-deficient or another unidentifiable serogroup that is capsule-deficient.³⁴ The effect of these two groups on the MC data is unclear.

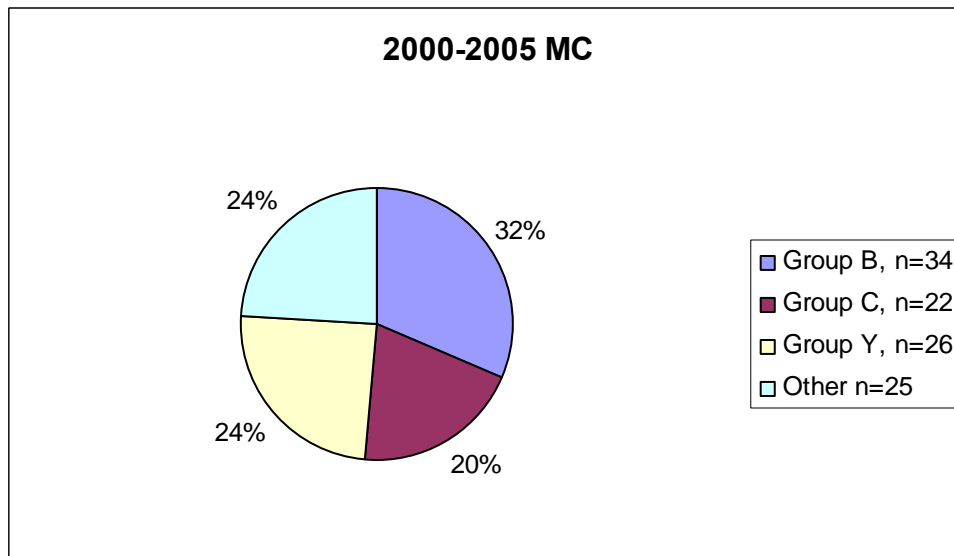
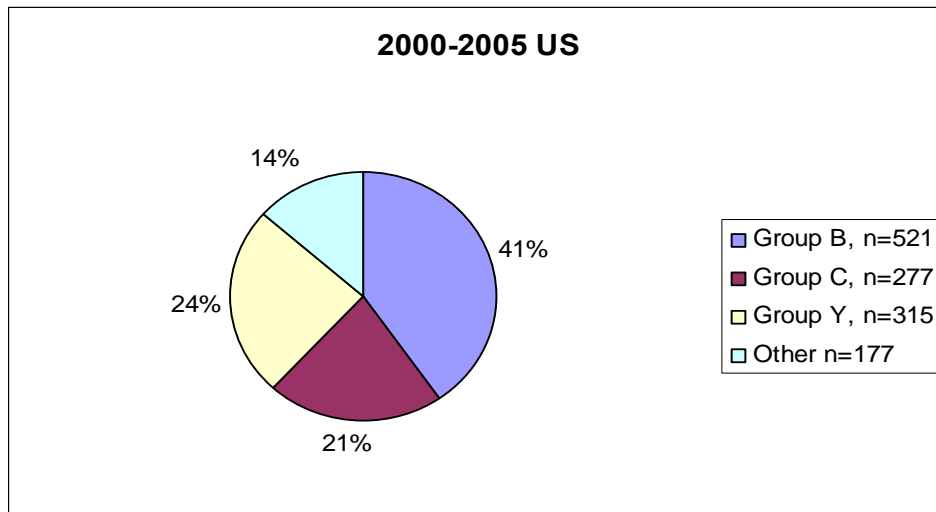
FIGURE 6, Invasive Meningococcal Disease in Maricopa County by Serogroup, 2000-2005



Others=Serogroups A & W-13

Comparison of the proportion of IMD cases by serogroup in MC to the US per ABCs data showed MC with a lower proportion of serogroup B cases and a higher proportion of Other cases, those due to W-135 or Not Groupables. (See FIGURES 7a & 7b) Only 3 cases of W-135 occurred in MC between 2000-2005, so the Other category in MC was mainly Not Groupables.

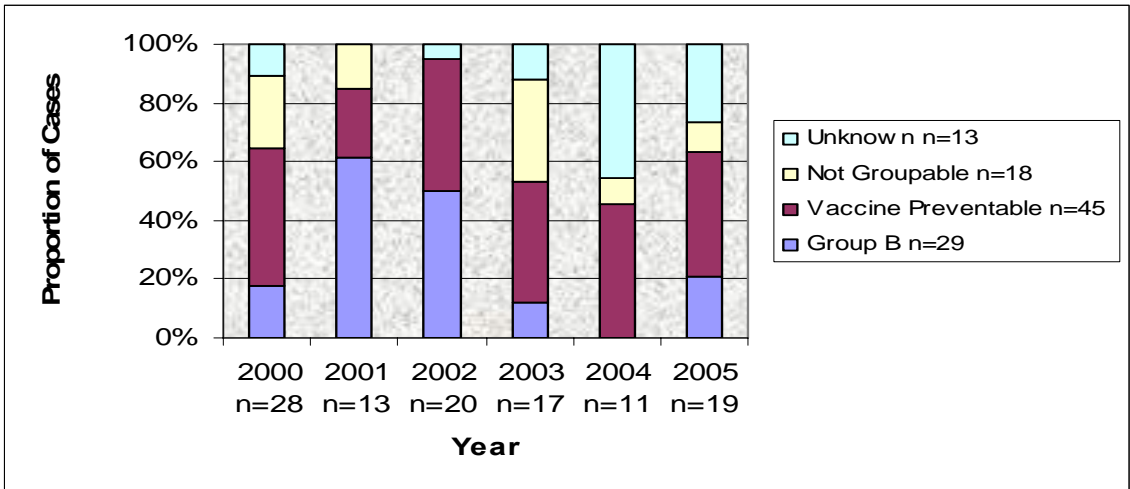
FIGURES 7a & 7b, Invasive Meningococcal Disease in the US and Maricopa County by Serogroup, 2000-2005



US data per Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network
Neisseria meningitidis, 2000-2005-provisional
 Unknowns distributed among knowns
 Other=Serogroup W-135 & Not Groupables

Most notable when looking at proportion of serogroup for IMD cases in MC was the consistency of the proportion of vaccine-preventable cases over time. Proportion of vaccine-preventable disease was approximately 40-45% each year except in 2001. Of note also is that the proportion of unknown cases seemed to be increasing. (See FIGURE 8)

FIGURE 8, Invasive Meningococcal Disease in Maricopa County by Serogroup, 2000-2005

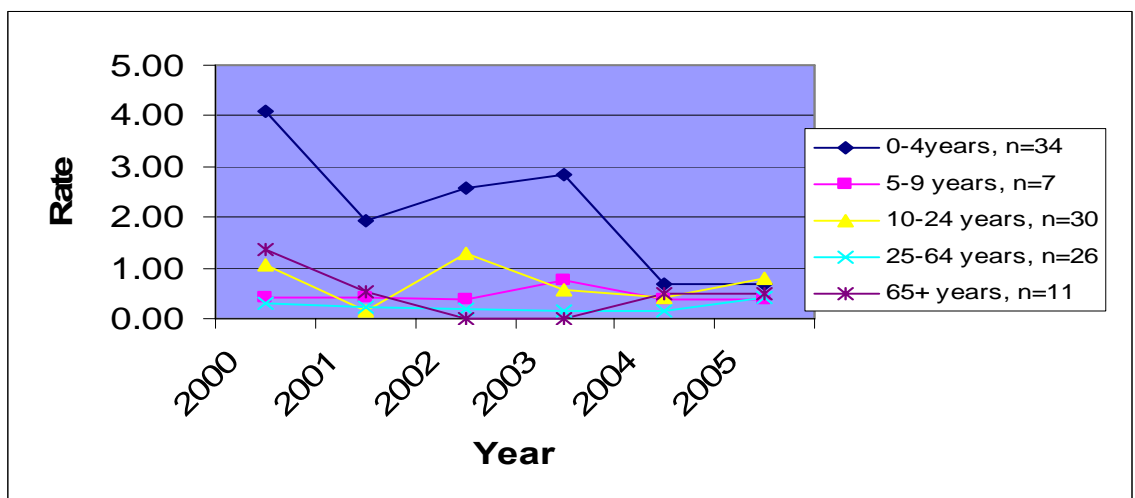


Vaccine Preventable=Groups A,C,Y,W-135

Distribution by Age

Most notable in the distribution of IMD by age in MC was the rate for the 0-4 year old population. This rate trended down over time. (See FIGURE 9). By 2004-2005, all age groups had fairly similar rates of disease.

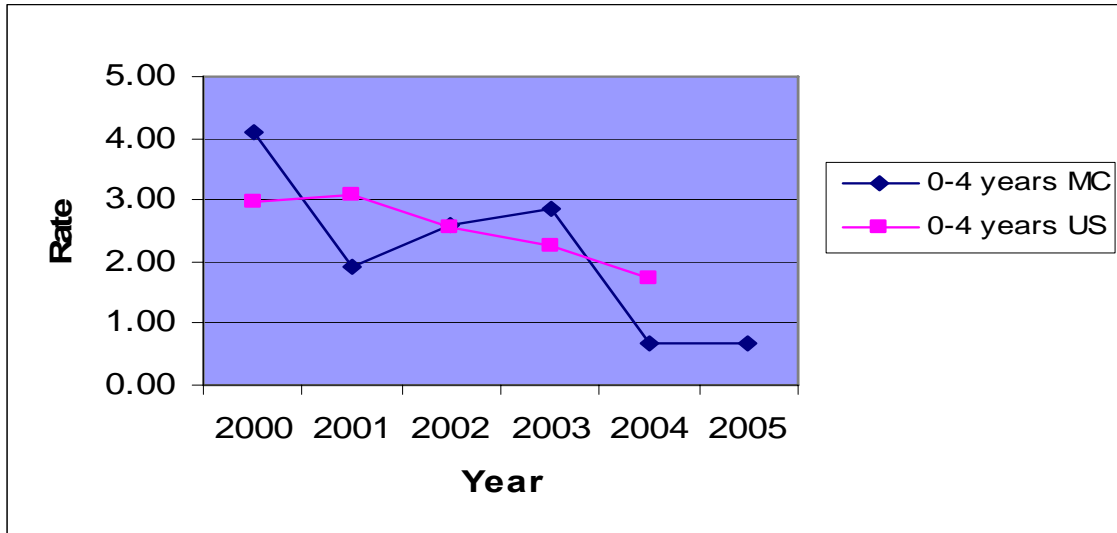
FIGURE 9, Invasive Meningococcal Disease in Maricopa County by Age, 2000-2005



Rates per 100,000 US Census population estimates

Comparison of the distribution of IMD for the 0-4 year old population between MC and the US, using ABCs data (FIGURE 10), showed that both were trending down over time. By 2004, however, the rate in the 0-4 year old population in MC seemed to be lower than that in the US.

Figure 10, Invasive Meningococcal Disease in US and Maricopa County, Age 0-4 Years, 2000-2005

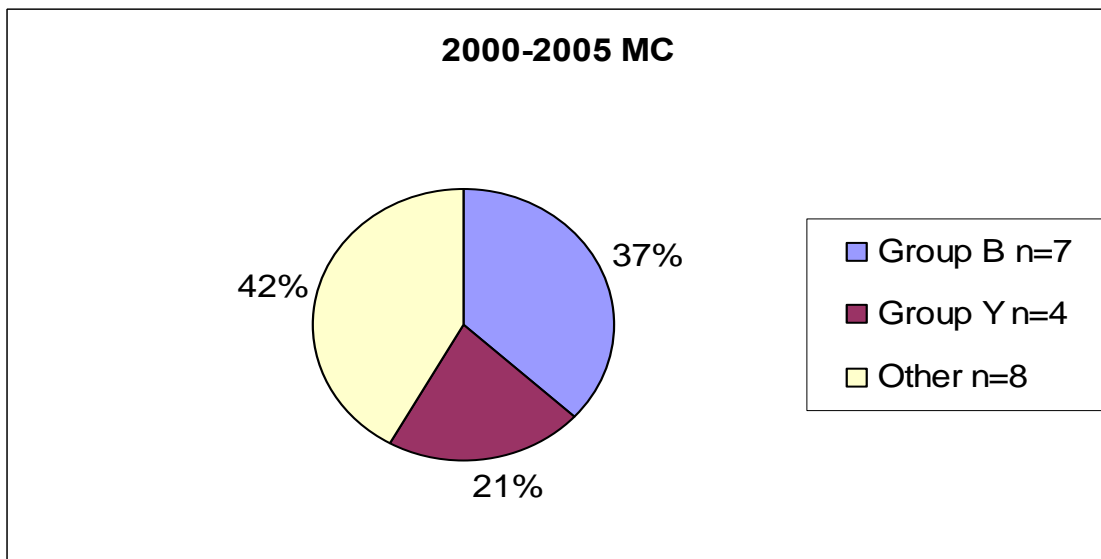
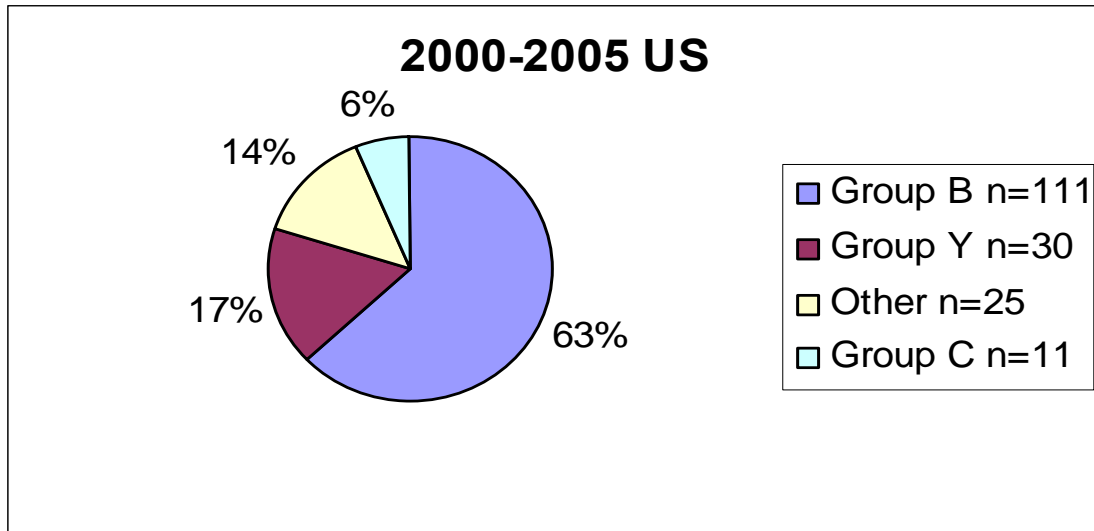


Rates per 100,000 US Census population estimates.
 Raw numbers for US rate calculation obtained from CDC. Summary of Notifiable Diseases, US, 2000-2004. MMWR 2000;49(53); MMWR 2001;50(53);MMWR 2002;51(53);MMWR 2003;52(54);MMWR 2004;53(53)2004

Distribution by Age and Serogroup

Comparison of the serogroup distribution in the <1 year old populations in MC to that in the US per ABCs data (See FIGURES 11a & 11b), showed a lower proportion of serogroup B disease and a higher proportion of Other disease in MC. No cases of W-135 occurred in the <1 year old population in MC during 2000-2005 so the Other category in MC was entirely Not Groupables. The proportion of serogroup B cases in the US data seemed consistent with that discussed in the literature, $\geq 50\%$. MC's proportion was lower than this at 37%. The highest proportion of cases in MC in the <1 year old population was Not Groupables.

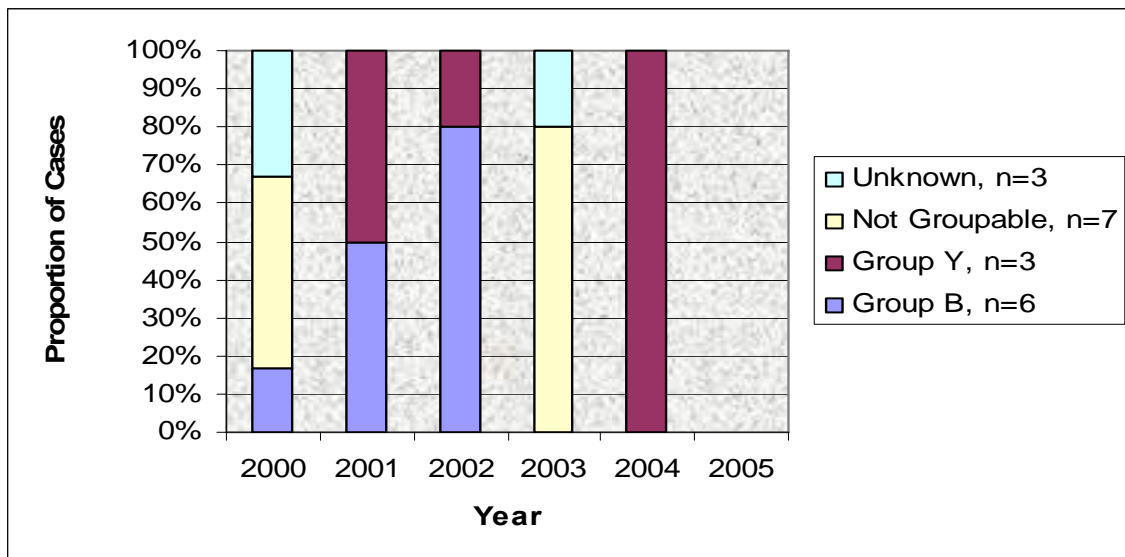
FIGURE 11a & 11b, Invasive Meningococcal Disease in the US & Maricopa County, Age < 1 year by Serogroup, 2000-2005



US data per Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network
Neisseria meningitidis, 2000-2005-provisional
 Unknowns distributed among knowns
 Other=W-135 & Not Groupables

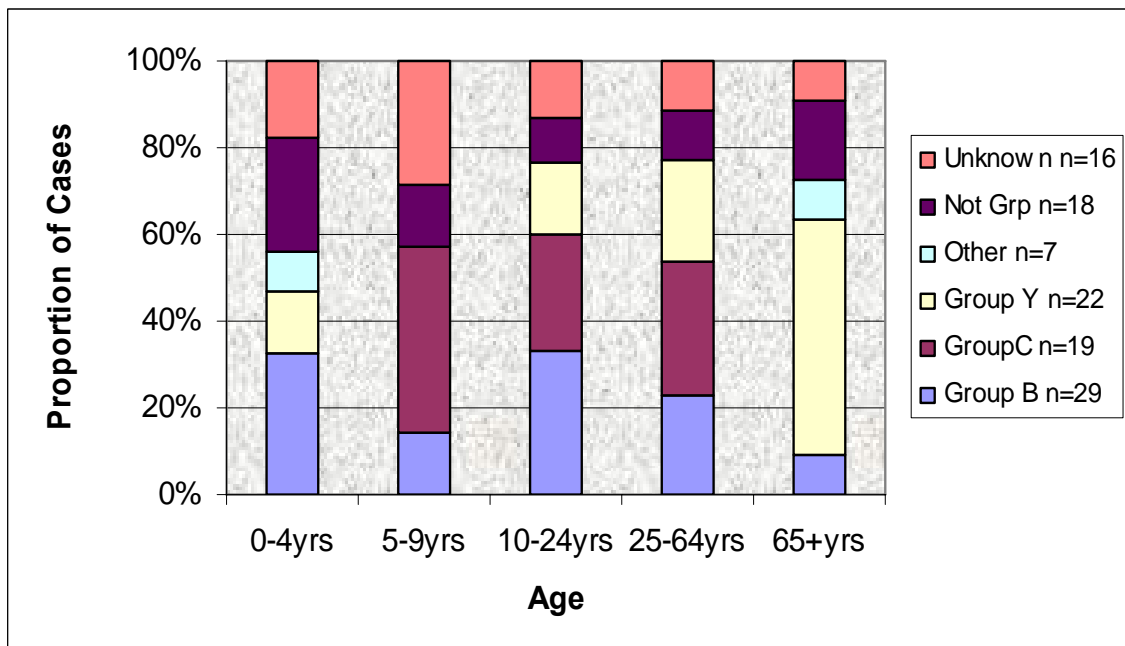
IMD in the <1 year old population in MC has decreased over time. (See FIGURE 12) As discussed earlier, per the literature the <1 year old population has the highest overall rate of IMD. In MC, there have no cases in this age group since 2004 and no cases of serogroup B disease since 2002.

FIGURE 12, Invasive Meningococcal Disease in Maricopa County, Age < 1 year by Serogroup, 2000-2005



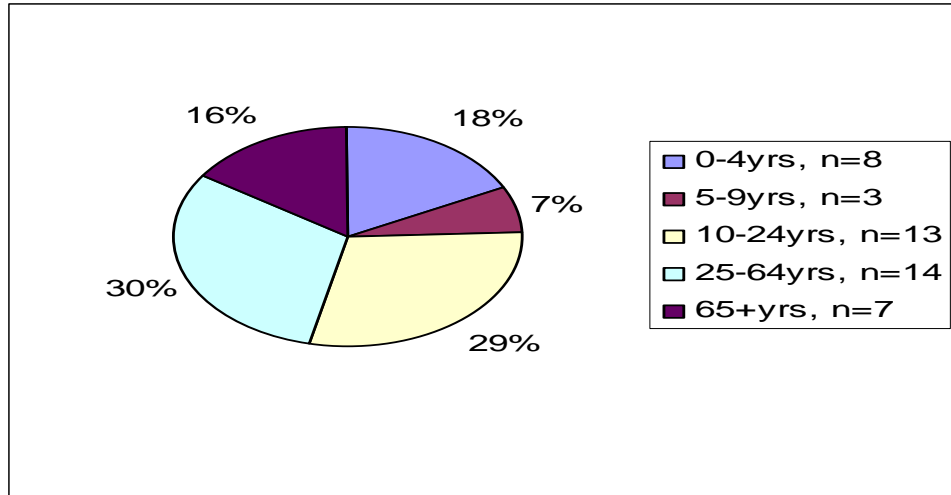
Evaluation of distribution of IMD by age and serogroup in MC showed that the proportion of C, Y, and W-135 was less than the 75% quoted in the literature for those ≥ 11 years. (See FIGURE 13) The effect the Unknown and Not Groupable categories have on this is unclear. In the elderly, Y caused the greatest proportion of cases which is consistent with that mentioned earlier from the literature.

FIGURE 13, Distribution of Invasive Meningococcal Disease in Maricopa County by Age & Serogroup, 2000-2005



The proportion of vaccine-preventable disease in MC was greatest in the 10-24 year old and 25-64 year old populations. (See FIGURE 14)

FIGURE 14, Vaccine-Preventable* Invasive Meningococcal Disease in Maricopa County by Age 2000-2005

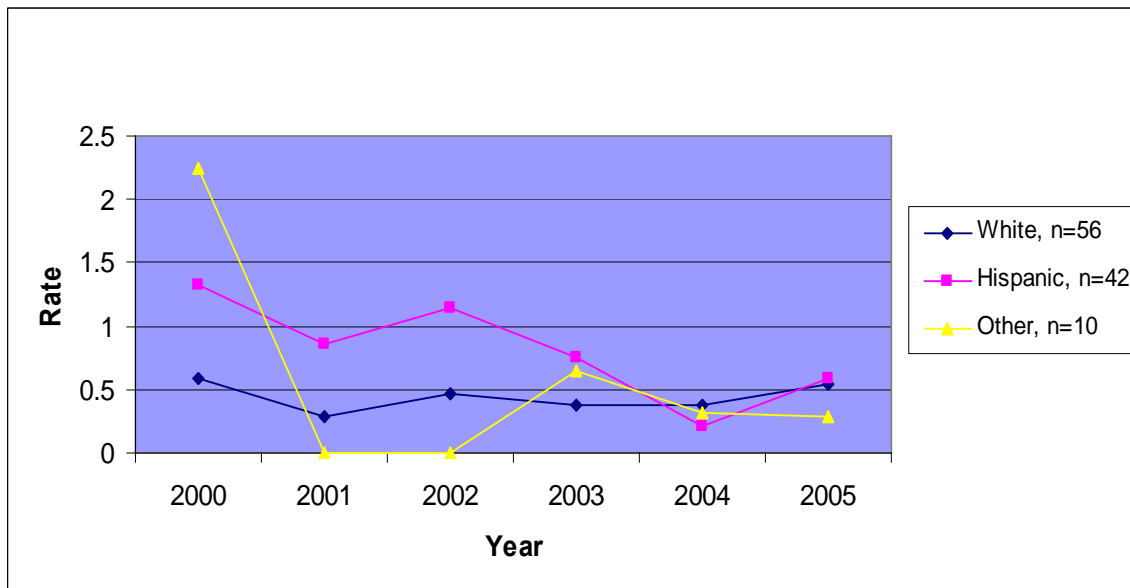


*Vaccine Preventable=A,C,Y,W-135

Distribution by Race/Ethnicity

The rate of IMD in the Hispanic population in MC trended down during the study period. (See FIGURE 15) By 2004-2005, the rates in all 3 race/ethnicity categories were very similar.

FIGURE 15, Invasive Meningococcal Disease in Maricopa County by Race/Ethnicity, 2000-2005

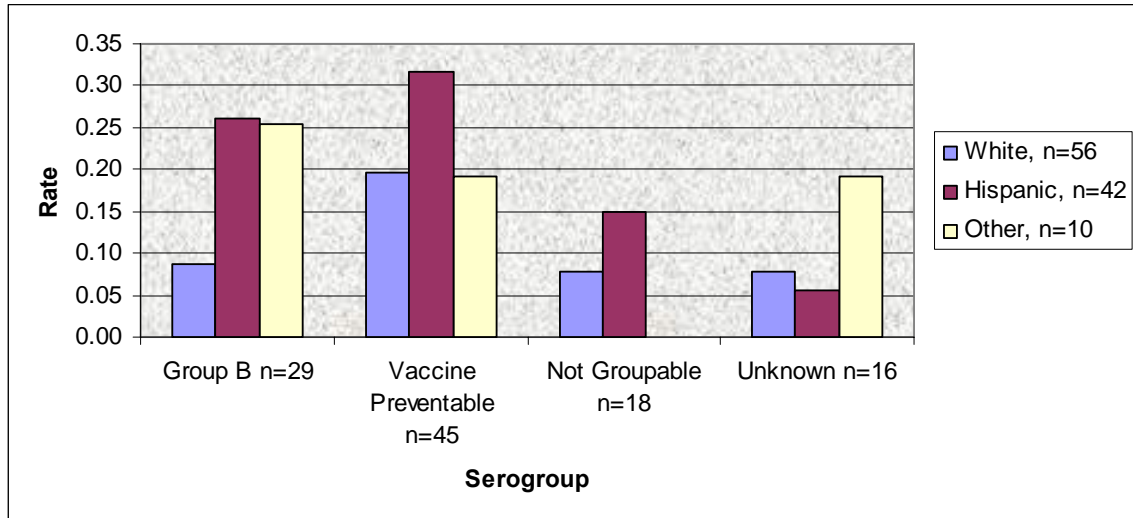


Rates per 100,000 US Census population estimates
Other includes Black, American Indian, Alaskan Native, Asian/Pacific Islander

Distribution by Race/Ethnicity and Serogroup

During the study period, the non-white populations had higher rates for serogroup B disease and the Hispanic population had the highest rate for vaccine-preventable disease. (See FIGURE 16)

FIGURE 16, Invasive Meningococcal Disease in Maricopa County by Race/Ethnicity and Serogroup, 2000-2005

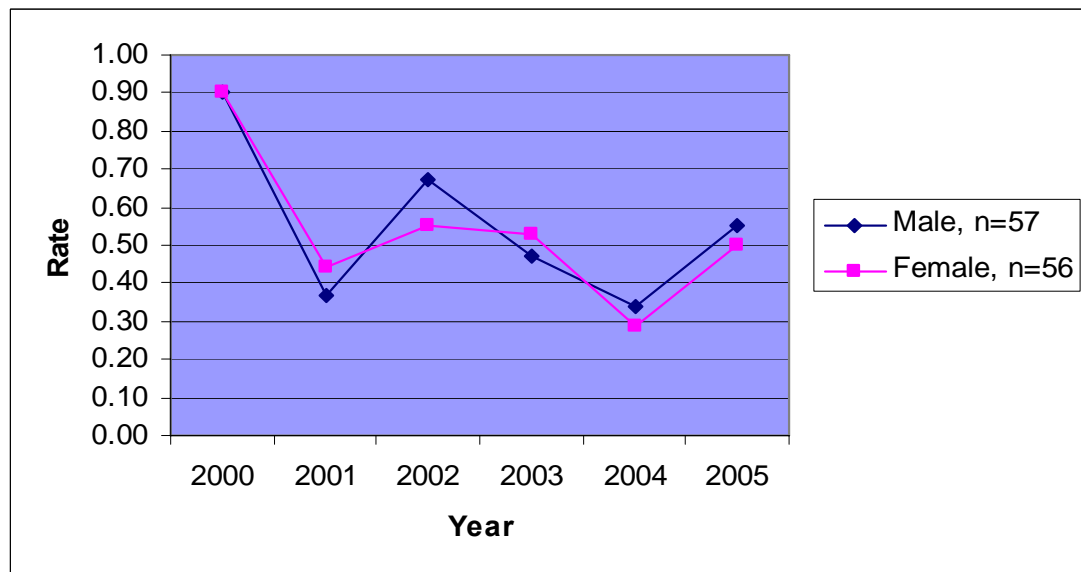


Rates per 100,000 US population estimates
Other includes Black, Native American/Alaskan Native, Asian/Pacific Islander

Distribution by Gender

Rates of IMD in MC for male and females during the study years were very similar. (See FIGURE 17)

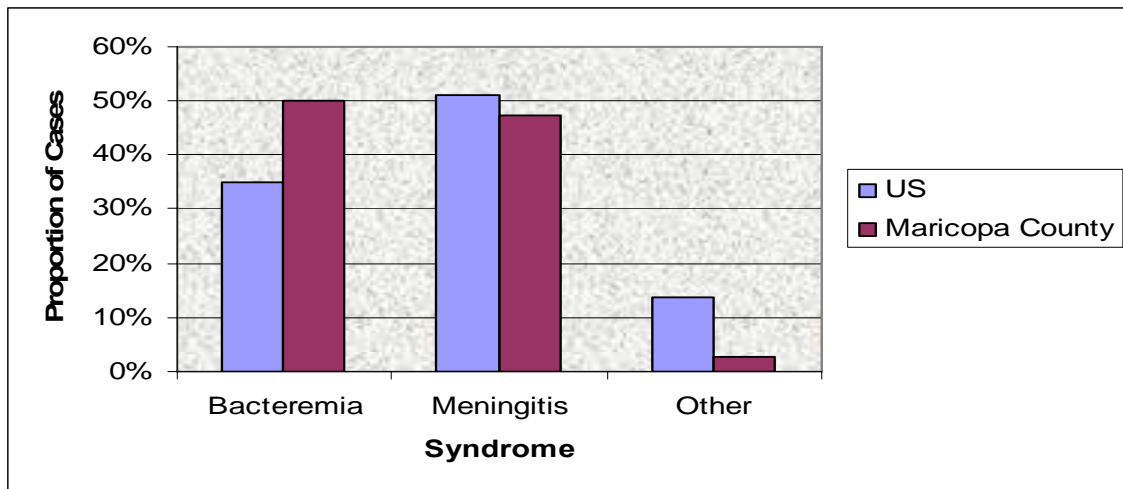
FIGURE 17, Invasive Meningococcal Disease in Maricopa County by Gender, 2000-2005



Distribution by Syndrome

In MC, the highest proportion of IMD by syndrome was due to cases of bacteremia alone, closely followed by meningitis. A very low proportion of cases was caused by other syndromes. (See FIGURE 18) In the US ABCs data and in the literature, the highest proportion of cases was due to meningitis.

FIGURE 18, Invasive Meningococcal Disease in Maricopa County by Syndrome, 2000-2005

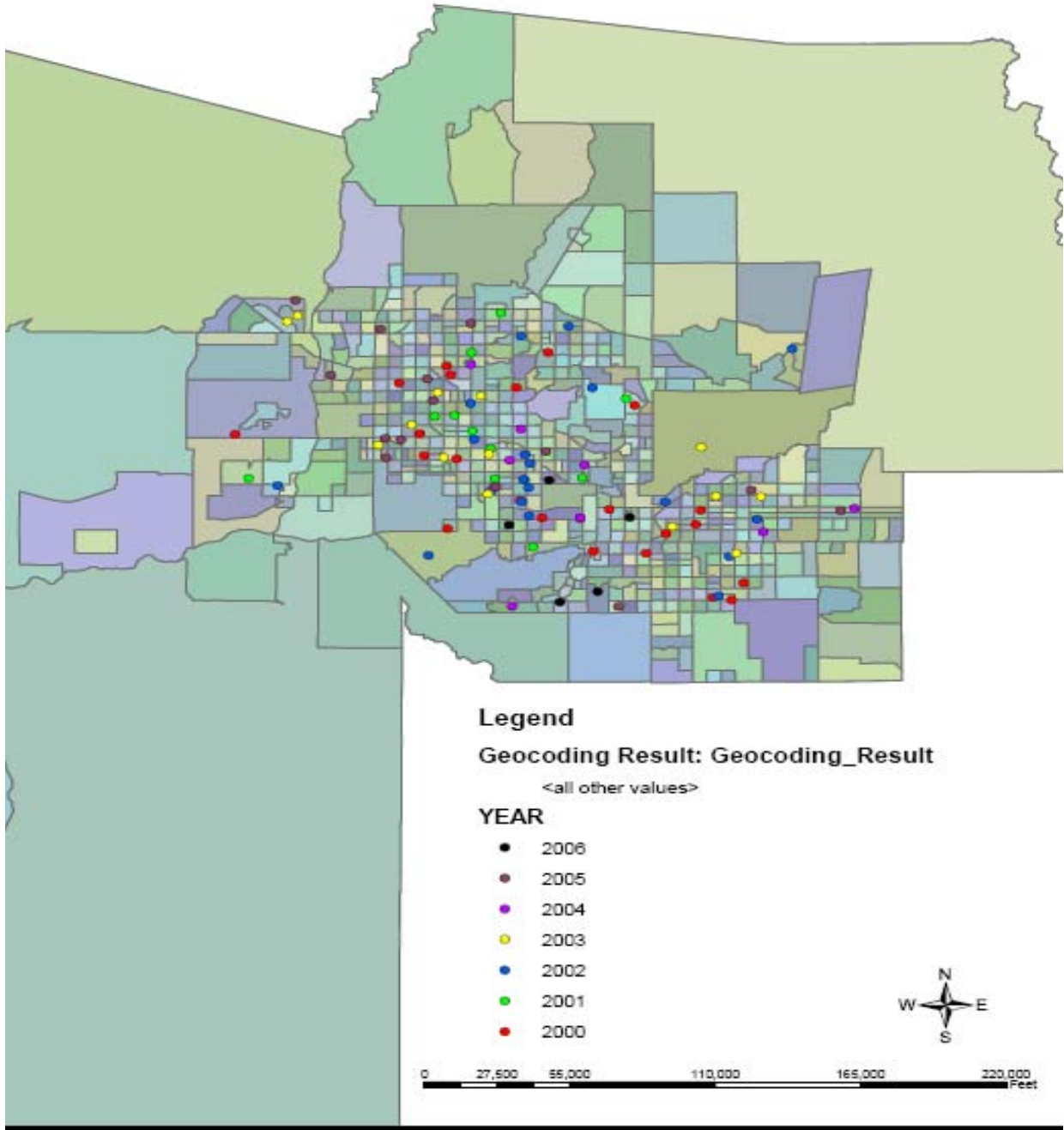


US data per Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network
Neisseria meningitidis, 2000-2005-provisional
Meningitis=meningitis +/-meningococcemia

Geographic Distribution

No apparent clusters were seen for IMD in MC during the study period. (See MAP 1) For 2002, 6 cases did occur in census tracts of relatively close proximity along a north to south corridor in Phoenix.

MAP 1: Invasive Meningococcal Disease in Maricopa County by Census Tracts 2000-2006



14/113 cases (12%) not geocoded.
Generated using ArcMap GIS software.

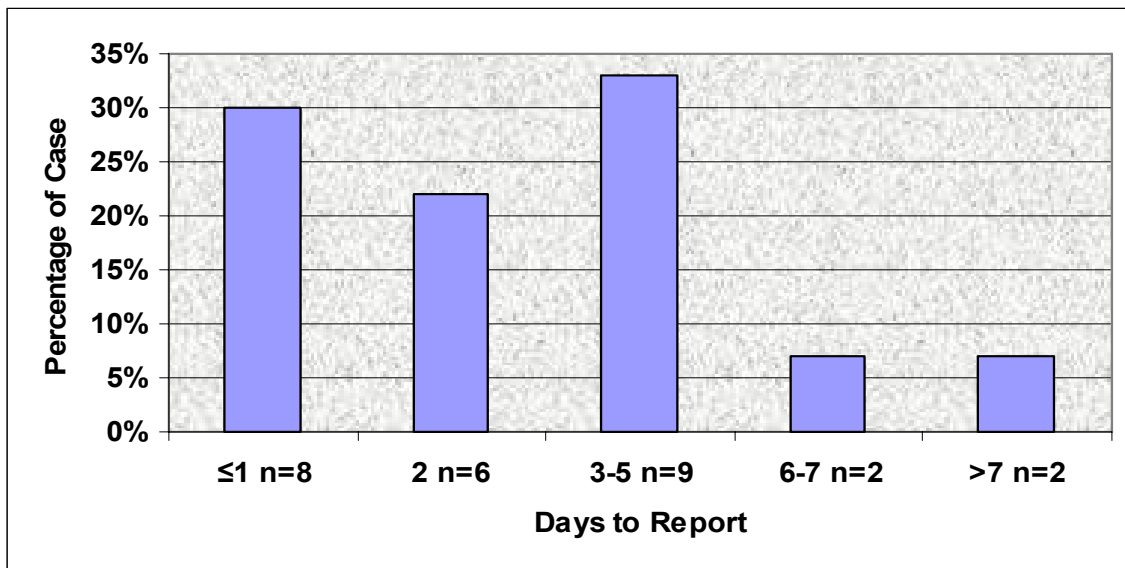
Statistical Analysis

Limited statistical analysis was performed on the data. Using SPSS, a logistic regression model was used to test for any statistically significant relationship between age, sex, serogroup, or syndrome and outcome; and between serogroup and age. No statistically significant associations were found.

Reporting and Investigation in Maricopa County 2005-2006

A subset of cases reported to MCDPH from 1/1/2005-6/30/2006 was analyzed. 27 cases occurred during this period. In approximately 50% of cases, IMD cases were reported to MCDPH 1-2 days after cultures were obtained. In the other 50% of cases, report was made ≥ 3 days after cultures were obtained. (See FIGURE 19) As discussed earlier, health care providers are required to report a suspect or confirmed case of IMD within 24 hours.

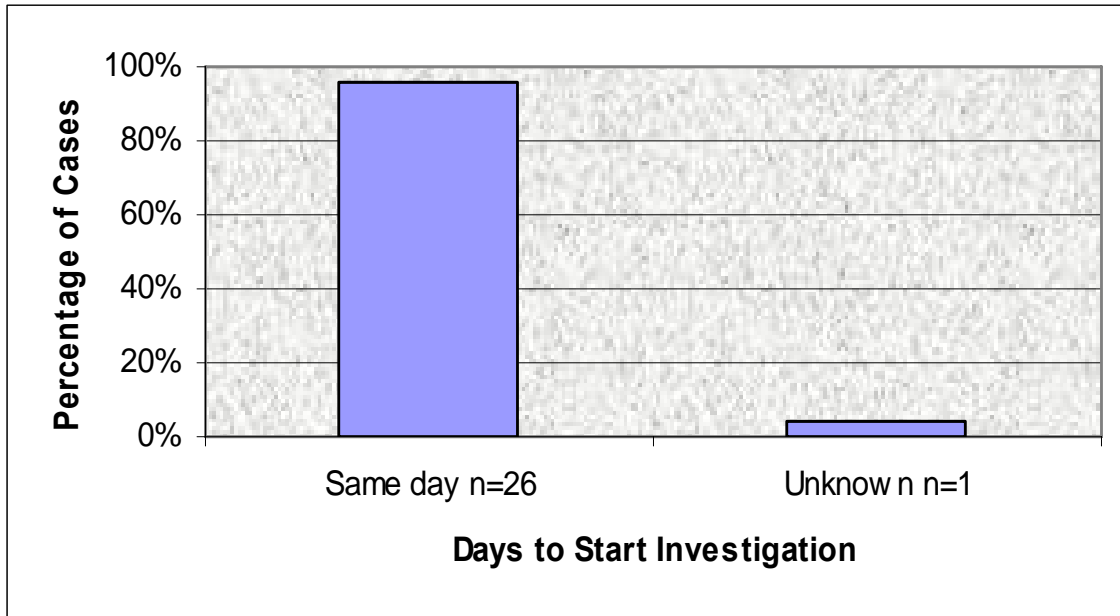
FIGURE 19, Time to Report Case* to Maricopa County Department of Public Health, 1/1/2005-6/30/2006



*Case=confirmed & probable, Maricopa County or out of state
Time to report case=time from date of 1st culture to date of report

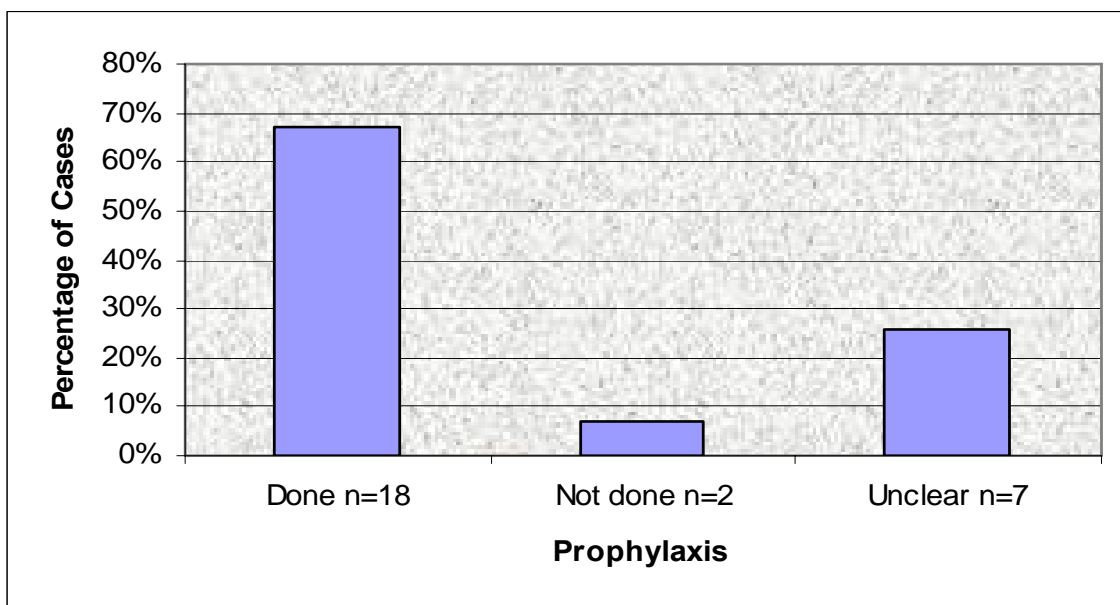
In 26 out of 27 cases in the subset of data analyzed, investigation at MCDPH was done on the same day as the report received. In one case, no information was provided in the record as to the date of investigation. (See FIGURE 20)

FIGURE 20, Time to Start Investigation at Maricopa County Department of Public Health after Report Received, 1/1/2005-6/30/2006



In the majority of cases, prophylaxis of contacts was done. (See FIGURE 21) In seven cases the record was unclear as to whether prophylaxis was done or not.

FIGURE 21, Prophylaxis of Cases, 1/1/2005-6/30/2006



Conclusions

This study provides baseline epidemiologic trends of IMD in MC. The trends of particular interest include

1. The lower proportion of serogroup B cases
2. The higher proportion of Not Groupable cases
3. The declining rate in the 0-4 year old population
4. The lack of any cases in the <1 year old population since 2004
5. The lack of any B cases in the <1 year old population since 2002
6. The higher proportion of Bacteremia alone cases
7. The sizeable proportion of vaccine-preventable disease
8. The highest rate of vaccine-preventable disease in the Hispanic population

This study also provides useful information for MCDPH, Office of Epidemiology on reporting, investigating, and data completeness. Reporting of cases of IMD to MCDPH occurred ≥ 3 days in about 50% of the cases, despite a 24 hour reporting mandate for cases or suspect cases.

Data on IMD in MC can be analyzed on a yearly basis using this study as a model. Future analyses can reassess the epidemiologic trends noted in this study and assess the effect of routine meningococcal vaccination in MC. Reassessment of the distribution of vaccine preventable disease by age will be important. If the conjugate vaccine interrupts the carrier state and if herd immunity is elicited, the proportion of vaccine preventable disease should decrease in both the immunized and not immunized populations. If immunity lasts long, over time older age groups should show a lower proportion of vaccine-preventable disease.

Areas of Future Study & Action

Areas of further investigation and action should include

1. The Not Groupable serogroup category.
 - Is there a lab cause for the higher proportion of Not Groupable cases in MC compared to the US ABCs data?
 - Is an unidentified serogroup causing disease in MC?
 - Could the AZ State Lab collaborate with the CDC to evaluate this?
2. The higher rate of vaccine preventable disease in the Hispanic population.
 - Would GIS mapping of vaccine preventable disease in MC by race/ethnicity and serogroup provide useful information?
 - Are the cases grouped in similar areas where vaccination could be targeted?
3. Late reporting of cases
 - Send a letter to health care providers in MC about the reporting requirements, the conjugate vaccine, and the importance of reporting to achieve early prophylaxis and thorough documentation of cases.

- Send a letter to laboratories in MC about the reporting requirements and reinforce the importance of sending isolates to the AZ State Lab for serogrouping so that the epidemiology of IMD in MC can be accurately understood.
 - A possible future internship project could be analysis of timeliness of reporting to MCDPH for various diseases, determination of barriers to timely reporting, and determination of methods for improvement.
4. Colleges and Universities in MC
 - Contact in reference to meningococcal vaccination policies for entering students
 5. Documentation of meningococcal vaccination status
 - Routinely obtain this information as part of the case investigation
 - Obtain updated CDC National Bacterial Meningitis and Bacteremia Case Report form with fields for vaccination information when available (currently in draft stage per CDC)
 6. CDC
 - Follow-up with the CDC to discuss this report

APPENDIX

A. Cases & Deaths of Invasive Meningococcal Disease(IMD) in Maricopa County(MC) by Syndrome, 2000-2006, per year

TABLE 1-Cases & Deaths of IMD in MC by Syndrome in 2000

Syndrome	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Meningitis	7	25%	0.23	0	0%	0.00	0%
Bacteremia	17	61%	0.55	3	100%	0.10	11%
Both	4	14%	0.13	0	0%	0.00	0%
Other	0	0%	0.00	0	0%	0.00	0%
Total	28	100%	0.90	3	100%	0.10	11%

*†per 100000 population, estimates per US Census

TABLE 1-Cases & Deaths of IMD in MC by Syndrome in 2001

Syndrome	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Meningitis	3	23%	0.09	0	0%	0.00	0%
Bacteremia	6	46%	0.19	0	0%	0.00	0%
Both	3	23%	0.09	0	0%	0.00	0%
Other	1	8%	0.03	0	0%	0.00	0%
Total	13	100%	0.41	0	0%	0.00	0%

*†per 100000 population, estimates per US Census

TABLE 1-Cases & Deaths of IMD in MC by Syndrome in 2002

Syndrome	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Meningitis	8	40%	0.24	2	40%	0.06	10%
Bacteremia	8	40%	0.24	1	20%	0.03	5%
Both	3	15%	0.09	2	40%	0.06	10%
Other	1	5%	0.03	0	0%	0.00	0%
Total	20	100%	0.61	5	100%	0.15	25%

*†per 100000 population, estimates per US Census

TABLE 1-Cases & Deaths of IMD in MC by Syndrome in 2003

Syndrome	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Meningitis	4	24%	0.12	0	0%	0.00	0%
Bacteremia	8	47%	0.24	1	100%	0.03	6%
Both	5	29%	0.15	0	0%	0.00	0%
Other	0	0%	0.00	0	0%	0.00	0%
Total	17	100%	0.50	1	100%	0.03	6%

*†per 100000 population, estimates per US Census

TABLE 1-Cases & Deaths of IMD in MC by Syndrome in 2004

Syndrome	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Meningitis	4	36%	0.11	0	0%	0.00	0%
Bacteremia	5	45%	0.14	0	0%	0.00	0%
Both	1	9%	0.03	0	0%	0.00	0%
Other	1	9%	0.03	0	0%	0.00	0%
Total	11	100%	0.31	0	0%	0.00	0%

*†per 100000 population, estimates per US Census

TABLE 1-Cases & Deaths of IMD in MC by Syndrome in 2005

Syndrome	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Meningitis	6	32%	0.17	0	0%	0.00	0%
Bacteremia	10	53%	0.28	1	100%	0.03	5%
Both	3	16%	0.08	0	0%	0.00	0%
Other	0	0%	0.00	0	0%	0.00	0%
Total	19	100%	0.52	1	100%	0.03	5%

*†per 100000 population, estimates per US Census

TABLE 1-Cases & Deaths of IMD in MC by Syndrome in 2006, 1/1-6/30

Syndrome	Cases			Deaths			CFR
	#	%	Rate	#	%	Rate	
Meningitis	2	40%		1	50%		20%
Bacteremia	3	60%		1	50%		20%
Both	0	0%		0	0%		0%
Other	0	0%		0	0%		0%
Total	5	100%		2	100%		40%

**TABLE 1-Cases & Deaths of IMD in MC by Syndrome
1/1/2000-6/30/2006**

Syndrome	Cases			Deaths			CFR
	#	%	Rate	#	%	Rate	
Meningitis	34	30%		3	25%		3%
Bacteremia	57	50%		7	58%		6%
Both	19	17%		2	17%		2%
Other	3	3%		0	0%		0%
Total	113	100%		12	100%		11%

B. Cases & Deaths of Invasive Meningococcal Disease(IMD) in Maricopa County(MC) by Race/Ethnicity, 2000-2006, per year

TABLE 2-Cases & Deaths of IMD in MC by Race/Ethnicity in 2000

Race/Ethnicity	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
White	12	43%	0.58	2	67%	0.10	7%
Hispanic	10	36%	1.32	1	33%	0.13	4%
Black	3	11%	2.71	0	0%	0.00	0%
Am Indian/Alaskan Native	2	7%	4.04	0	0%	0.00	0%
Asian/Pacific Islander	1	4%	1.41	0	0%	0.00	0%
Other	0	0%	0.00	0	0%	0.00	0%
Total	28	100%	0.90	3	100%	0.10	11%
§Combo B, A/A, A/PI, Other	6	21%	2.24	0	0%	0.00	0%

*†per 100000 population, estimates per US Census

§ Total of Black, Am Indian/Alaskan Native, Asian/Pacific Islander, and Other

TABLE 2-Cases & Deaths of IMD in MC by Race/Ethnicity in 2001

Race/Ethnicity	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
White	6	46%	0.29	0	0%	0.00	0%
Hispanic	7	54%	0.86	0	0%	0.00	0%
Black	0	0%	0.00	0	0%	0.00	0%
Am Indian/Alaskan Native	0	0%	0.00	0	0%	0.00	0%
Asian/Pacific Islander	0	0%	0.00	0	0%	0.00	0%
Other	0	0%	0.00	0	0%	0.00	0%
Total	13	100%	0.41	0	0%	0.00	0%
§Combo B, A/A, A/PI, Other	0	0%	0.00	0	0%	0.00	0%

*†per 100000 population, estimates per US Census

§ Total of Black, Am Indian/Alaskan Native, Asian/Pacific Islander, and Other

TABLE 2-Cases & Deaths of IMD in MC by Race/Ethnicity in 2002

Race/Ethnicity	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
White	10	50%	0.47	2	40%	0.09	10%
Hispanic	10	50%	1.15	3	60%	0.35	15%
Black	0	0%	0.00	0	0%	0.00	0%
Am Indian/Alaskan Native	0	0%	0.00	0	0%	0.00	0%
Asian/Pacific Islander	0	0%	0.00	0	0%	0.00	0%
Other	0	0%	0.00	0	0%	0.00	0%
Total	20	100%	0.61	5	100%	0.15	25%
§Combo B, A/A, A/PI, Other	0	0%	0.00	0	0%	0.00	0%

*†per 100000 population, estimates per US Census

§ Total of Black, Am Indian/Alaskan Native, Asian/Pacific Islander, and Other

TABLE 2-Cases & Deaths of IMD in MC by Race/Ethnicity in 2003

Race/Ethnicity	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
White	8	47%	0.37	0	0%	0.00	0%
Hispanic	7	41%	0.76	0	0%	0.00	0%
Black	0	0%	0.00	0	0%	0.00	0%
Am Indian/Alaskan Native	1	6%	1.81	1	100%	1.81	6%
Asian/Pacific Islander	0	0%	0.00	0	0%	0.00	0%
Other	1	6%	2.35	0	0%	0.00	0%
Total	17	100%	0.50	1	100%	0.03	6%
§Combo B, A/A, A/PI, Other	2	12%	0.65	1	100%	0.33	6%

*†per 100000 population, estimates per US Census

§ Total of Black, Am Indian/Alaskan Native, Asian/Pacific Islander, and Other

TABLE 2-Cases & Deaths of IMD in MC by Race/Ethnicity in 2004

Race/Ethnicity	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
White	8	73%	0.37	0	0%	0.00	0%
Hispanic	2	18%	0.21	0	0%	0.00	0%
Black	1	9%	0.76	0	0%	0.00	0%
Am Indian/Alaskan Native	0	0%	0.00	0	0%	0.00	0%
Asian/Pacific Islander	0	0%	0.00	0	0%	0.00	0%
Other	0	0%	0.00	0	0%	0.00	0%
Total	11	100%	0.31	0	0%	0.00	0%
§Combo B, A/A, A/PI, Other	1	9%	0.31	0	0%	0.00	0%

*†per 100000 population, estimates per US Census

§ Total of Black, Am Indian/Alaskan Native, Asian/Pacific Islander, and Other

TABLE 2-Cases & Deaths of IMD in MC by Race/Ethnicity in 2005

Race/Ethnicity	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
White	12	63%	0.54	0	0%	0.00	0%
Hispanic	6	32%	0.58	0	0%	0.00	0%
Black	1	5%	0.72	1	100%	0.72	5%
Am Indian/Alaskan Native	0	0%	0.00	0	0%	0.00	0%
Asian/Pacific Islander	0	0%	0.00	0	0%	0.00	0%
Other	0	0%	0.00	0	0%	0.00	0%
Total	19	100%	0.52	1	100%	0.03	5%
§Combo B, A/A, A/PI, Other	1	5%	0.29	1	100%	0.29	5%

*†per 100000 population, estimates per US Census

§ Total of Black, Am Indian/Alaskan Native, Asian/Pacific Islander, and Other

TABLE 2-Cases & Deaths of IMD in MC by Race/Ethnicity in 2006, 1/1-6/30

Race/Ethnicity	Cases			Deaths			CFR
	#	%	Rate	#	%	Rate	
White	2	40%		1	50%		20%
Hispanic	2	40%		0	0%		0%
Black	1	20%		1	50%		20%
Am Indian/Alaskan Native	0	0%		0	0%		0%
Asian/Pacific Islander	0	0%		0	0%		0%
Other	0	0%		0	0%		0%
Total	5	100%		2	100%		40%
§Combo B, A/A, A/PI, Other	1	20%		1	50%		20%

§ Total of Black, Am Indian/Alaskan Native, Asian/Pacific Islander, and Other

**TABLE 2-Cases & Deaths of IMD in MC by Race/Ethnicity
1/1/2000-6/30/2006**

Race/Ethnicity	Cases			Deaths			CFR
	#	%	Rate	#	%	Rate	
White	58	51%		5	42%		4%
Hispanic	44	39%		4	33%		4%
Black	6	5%		2	17%		2%
Am Indian/Alaskan Native	3	3%		1	8%		1%
Asian/Pacific Islander	1	1%		0	0%		0%
Other	1	1%		0	0%		0%
Total	113	100%		12	100%		11%
§Combo B, A/A, A/PI, Other	11	10%		3	25%		3%

§ Total of Black, Am Indian/Alaskan Native, Asian/Pacific Islander, and Other

C. Cases & Deaths of Invasive Meningococcal Disease(IMD) in Maricopa County(MC) by Gender, 2000-2006, per year

TABLE 3-Cases & Deaths of IMD in MC by Gender in 2000

Sex	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Male	14	50%	0.90	0	0%	0.00	0%
Female	14	50%	0.90	3	100%	0.19	11%
Total	28	100%	0.90	3	100%	0.10	11%

*†per 100000 population, estimates per US Census

TABLE 3-Cases & Deaths of IMD in MC by Gender in 2001

Sex	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Male	6	46%	0.37	0	0%	0.00	0%
Female	7	54%	0.44	0	0%	0.00	0%
Total	13	100%	0.41	0	0%	0.00	0%

*†per 100000 population, estimates per US Census

TABLE 3-Cases & Deaths of IMD in MC by Gender in 2002

Sex	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Male	11	55%	0.67	2	40%	0.12	10%
Female	9	45%	0.55	3	60%	0.18	15%
Total	20	100%	0.61	5	100%	0.15	25%

*†per 100000 population, estimates per US Census

TABLE 3-Cases & Deaths of IMD in MC by Gender in 2003

Sex	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Male	8	47%	0.47	0	0%	0.00	0%
Female	9	53%	0.53	1	33%	0.06	6%
Total	17	100%	0.50	1	100%	0.03	6%

*†per 100000 population, estimates per US Census

TABLE 3-Cases & Deaths of IMD in MC by Gender in 2004

Sex	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Male	6	55%	0.34	0	0%	0.00	0%
Female	5	45%	0.29	0	0%	0.00	0%
Total	11	100%	0.31	0	0%	0.00	0%

*†per 100000 population, estimates per US Census

TABLE 3-Cases & Deaths of IMD in MC by Gender in 2005

Sex	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Male	10	53%	0.55	1	100%	0.05	5%
Female	9	47%	0.50	0	0%	0.00	0%
Total	19	100%	0.52	1	100%	0.03	5%

*†per 100000 population, estimates per US Census

TABLE 3-Cases & Deaths of IMD in MC by Gender in 2006, 1/1-6/30

Sex	Cases			Deaths			CFR
	#	%	Rate	#	%	Rate	
Male	2	40%		1	50%		20%
Female	3	60%		1	50%		20%
Total	5	100%		2	100%		40%

**TABLE 3-Cases & Deaths of IMD in MC by Gender
1/1/2000-6/30/2006**

Sex	Cases			Deaths			CFR
	#	%	Rate	#	%	Rate	
Male	57	50%		4	33%		4%
Female	56	50%		8	67%		7%
Total	113	100%		12	100%		11%

D. Cases & Deaths of Invasive Meningococcal Disease(IMD) in Maricopa County(MC) by Age, 2000-2006, per year

TABLE 4-Cases & Deaths of IMD in MC by Age in 2000

Age	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
<1 year	6	21%		0	0%		0%
1 year	3	11%		0	0%		0%
2-4 years	1	4%		1	33%		4%
§0-4 years	10	36%	4.10	1	33%	0.41	4%
5-9 years	1	4%	0.42	0	0%	0.00	0%
10-13 years	3	11%		0	0%		0%
14-17 years	2	7%		0	0%		0%
18-24 years	2	7%		0	0%		0%
§10-24years	7	25%	1.05	0	0%	0.00	0%
25-64 years	5	18%	0.32	0	0%	0.00	0%
65+ years	5	18%	1.38	2	67%	0.55	7%
Total	28	100%	0.90	3	100%	0.10	11%

*†per 100000 population, estimates per US Census

§Combined age groups for rate calculation purposes

TABLE 4-Cases & Deaths of IMD in MC by Age in 2001

Age	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
<1 year	2	15%		0	0%		0%
1 year	1	8%		0	0%		0%
2-4 years	2	15%		0	0%		0%
§0-4 years	5	38%	1.92	0	0%	0.00	0%
5-9 years	1	8%	0.40	0	0%	0.00	0%
10-13 years	0	0%		0	0%		0%
14-17 years	1	8%		0	0%		0%
18-24 years	0	0%		0	0%		0%
§10-24years	1	8%	0.14	0	0%	0.00	0%
25-64 years	4	31%	0.24	0	0%	0.00	0%
65+ years	2	15%	0.54	0	0%	0.00	0%
Total	13	100%	0.41	0	0%	0.00	0%

*†per 100000 population, estimates per US Census

§Combined age groups for rate calculation purposes

TABLE 4-Cases & Deaths of IMD in MC by Age in 2002

Age	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
<1 year	5	25%		2	40%		10%
1 year	0	0%		0	0%		0%
2-4 years	2	10%		0	0%		0%
§0-4 years	7	35%	2.59	2	40%	0.74	10%
5-9 years	1	5%	0.39	0	0%	0.00	0%
10-13 years	0	0%		0	0%		0%
14-17 years	2	10%		1	20%		5%
18-24 years	7	35%		2	40%		10%
§10-24years	9	45%	1.27	3	60%	0.42	15%
25-64 years	3	15%	0.18	0	0%	0.00	0%
65+ years	0	0%	0.00	0	0%	0.00	0%
Total	20	100%	0.61	5	100%	0.15	25%

*†per 100000 population, estimates per US Census

§Combined age groups for rate calculation purposes

TABLE 4-Cases & Deaths of IMD in MC by Age in 2003

Age	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
<1 year	5	29%		1	100%		6%
1 year	0	0%		0	0%		0%
2-4 years	3	18%		0	0%		0%
§0-4 years	8	47%	2.85	1	100%	0.36	6%
5-9 years	2	12%	0.76	0	0%	0.00	0%
10-13 years	0	0%		0	0%		0%
14-17 years	1	6%		0	0%		0%
18-24 years	3	18%		0	0%		0%
§10-24years	4	24%	0.55	0	0%	0.00	0%
25-64 years	3	18%	0.17	0	0%	0.00	0%
65+ years	0	0%	0.00	0	0%	0.00	0%
Total	17	100%	0.50	1	100%	0.03	6%

*†per 100000 population, estimates per US Census

§Combined age groups for rate calculation purposes

TABLE 4-Cases & Deaths of IMD in MC by Age in 2004

Age	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
<1 year	1	9%		0	0%		0%
1 year	0	0%		0	0%		0%
2-4 years	1	9%		0	0%		0%
§0-4 years	2	18%	0.69	0	0%	0.00	0%
5-9 years	1	9%	0.37	0	0%	0.00	0%
10-13 years	2	18%		0	0%		0%
14-17 years	1	9%		0	0%		0%
18-24 years	0	0%		0	0%		0%
§10-24years	3	27%	0.40	0	0%	0.00	0%
25-64 years	3	27%	0.17	0	0%	0.00	0%
65+ years	2	18%	0.51	0	0%	0.00	0%
Total	11	100%	0.31	0	0%	0.00	0%

*†per 100000 population, estimates per US Census

§Combined age groups for rate calculation purposes

TABLE 4-Cases & Deaths of IMD in MC by Age in 2005

Age	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
<1 year	0	0%		0	0%		0%
1 year	1	5%		0	0%		0%
2-4 years	1	5%		1	100%		5%
§0-4 years	2	11%	0.67	1	100%	0.33	5%
5-9 years	1	5%	0.36	0	0%	0.00	0%
10-13 years	0	0%		0	0%		0%
14-17 years	3	16%		0	0%		0%
18-24 years	3	16%		0	0%		0%
§10-24years	6	32%	0.78	0	0%	0.00	0%
25-64 years	8	42%	0.42	0	0%	0.00	0%
65+ years	2	11%	0.50	0	0%	0.00	0%
Total	19	100%	0.52	1	100%	0.03	5%

*†per 100000 population, estimates per US Census

§Combined age groups for rate calculation purposes

TABLE 4-Cases & Deaths of IMD in MC by Age in 2006, 1/1-6/30

Age	Cases			Deaths			CFR
	#	%	Rate	#	%	Rate	
<1 year	0	0%		0	0%		0%
1 year	0	0%		0	0%		0%
2-4 years	2	40%		0	0%		0%
§0-4 years	2	40%		0	0%		0%
5-9 years	0	0%		0	0%		0%
10-13 years	0	0%		0	0%		0%
14-17 years	0	0%		0	0%		0%
18-24 years	2	40%		1	50%		20%
§10-24 years	2	40%		1	50%		20%
25-64 years	1	20%		1	50%		20%
65+ years	0	0%		0	0%		0%
Total	5	100%		2	100%		40%

§Combined age groups

**TABLE 4-Cases & Deaths of IMD in MC by Age
1/1/2000-6/30/2006**

Age	Cases			Deaths			CFR
	#	%	Rate	#	%	Rate	
<1 year	19	17%		3	25%		3%
1 year	5	4%		0	0%		0%
2-4 years	12	11%		2	17%		2%
§0-4 years	36	32%		5	42%		4%
5-9 years	7	6%		0	0%		0%
10-13 years	5	4%		0	0%		0%
14-17 years	10	9%		1	8%		1%
18-24 years	17	15%		3	25%		3%
§10-24years	32	28%		4	33%		4%
25-64 years	27	24%		1	8%		1%
65+ years	11	10%		2	17%		2%
Total	113	100%		12	100%		11%

§Combined age groups

E. Cases & Deaths of Invasive Meningococcal Disease(IMD) in Maricopa County(MC) by Serogroup, 2000-2006, per year

TABLE 5-Cases & Deaths of IMD in MC by Serogroup in 2000

Serogroup	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Group B	5	18%	0.16	0	0%	0.00	0%
Group C	1	4%	0.03	0	0%	0.00	0%
Group Y	10	36%	0.32	2	67%	0.06	7%
§Others	2	7%	0.06	1	33%	0.03	4%
Not Groupable	7	25%	0.23	0	0%	0.00	0%
Unknown	3	11%	0.10	0	0%	0.00	0%
Total	28	100%	0.90	3	100%	0.10	11%

*†per 100000 population, estimates per US Census
 §Others=A & W-135

TABLE 5-Cases & Deaths of IMD in MC by Serogroup in 2001

Serogroup	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Group B	8	62%	0.25	0	0%	0.00	0%
Group C	0	0%	0.00	0	0%	0.00	0%
Group Y	3	23%	0.09	0	0%	0.00	0%
§Others	0	0%	0.00	0	0%	0.00	0%
Not Groupable	2	15%	0.06	0	0%	0.00	0%
Unknown	0	0%	0.00	0	0%	0.00	0%
Total	13	100%	0.41	0	0%	0.00	0%

*†per 100000 population, estimates per US Census
 §Others=A & W-135

TABLE 5-Cases & Deaths of IMD in MC by Serogroup in 2002

Serogroup	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Group B	10	50%	0.30	4	80%	0.12	20%
Group C	6	30%	0.18	0	0%	0.00	0%
Group Y	2	10%	0.06	0	0%	0.00	0%
§Others	1	5%	0.03	0	0%	0.00	0%
Not Groupable	0	0%	0.00	0	0%	0.00	0%
Unknown	1	5%	0.03	1	20%	0.03	5%
Total	20	100%	0.61	5	100%	0.15	25%

*†per 100000 population, estimates per US Census
 §Others=A & W-135

TABLE 5-Cases & Deaths of IMD in MC by Serogroup in 2003

Serogroup	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Group B	2	12%	0.06	0	0%	0.00	0%
Group C	5	29%	0.15	0	0%	0.00	0%
Group Y	2	12%	0.06	0	0%	0.00	0%
§Others	0	0%	0.00	0	0%	0.00	0%
Not Groupable	6	35%	0.18	0	0%	0.00	0%
Unknown	2	12%	0.06	1	100%	0.03	6%
Total	17	100%	0.50	1	100%	0.03	6%

*†per 100000 population, estimates per US Census

§Others=A & W-135

TABLE 5-Cases & Deaths of IMD in MC by Serogroup in 2004

Serogroup	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Group B	0	0%	0.00	0	0%	0.00	0%
Group C	2	18%	0.06	0	0%	0.00	0%
Group Y	3	27%	0.09	0	0%	0.00	0%
§Others	0	0%	0.00	0	0%	0.00	0%
Not Groupable	1	9%	0.03	0	0%	0.00	0%
Unknown	5	45%	0.14	0	0%	0.00	0%
Total	11	100%	0.31	0	0%	0.00	0%

*†per 100000 population, estimates per US Census

§Others=A & W-135

TABLE 5-Cases & Deaths of IMD in MC by Serogroup in 2005

Serogroup	Cases			Deaths			CFR
	#	%	Rate*	#	%	Rate†	
Group B	4	21%	0.11	1	100%	0.03	5%
Group C	5	26%	0.14	0	0%	0.00	0%
Group Y	2	11%	0.06	0	0%	0.00	0%
§Others	1	5%	0.03	0	0%	0.00	0%
Not Groupable	2	11%	0.06	0	0%	0.00	0%
Unknown	5	26%	0.14	0	0%	0.00	0%
Total	19	100%	0.52	1	100%	0.03	5%

*†per 100000 population, estimates per US Census

§Others=A & W-135

TABLE 5-Cases & Deaths of IMD in MC by Serogroup in 2006,1/1-6/30

Serogroup	Cases			Deaths			CFR
	#	%	Rate	#	%	Rate	
Group B	0	0%		0	0%		0%
Group C	0	0%		0	0%		0%
Group Y	2	40%		1	33%		20%
§Others	0	0%		0	0%		0%
Not Groupable	0	0%		0	0%		0%
Unknown	3	60%		1	33%		20%
Total	5	100%		2	100%		40%

§Others=A & W-135

**TABLE 5-Cases & Deaths of IMD in MC by Serogroup
2000-2005**

Serogroup	Cases			Deaths			CFR
	#	%	Rate	#	%	Rate	
Group B	29	27%	0.14	5	42%		5%
Group C	19	18%	0.09	0	0%		0%
Group Y	22	20%	0.11	2	17%		2%
§Others	4	4%	0.02	1	8%		1%
Not Groupable	18	17%	0.09	0	0%		0%
Unknown	16	15%	0.08	2	17%		2%
Total	108	100%	0.54	10	83%		9%

*†per 100000 population, estimates per US Census

§Others=A & W-135

**TABLE 5-Cases & Death of IMD in MC by Serogroup
1/1/2000-6/302006**

Serogroup	Cases			Deaths			CFR
	#	%	Rate	#	%	Rate	
Group B	29	26%		5	42%		4%
Group C	19	17%		0	0%		0%
Group Y	24	21%		3	25%		3%
§Others	4	4%		1	8%		1%
Not Groupable	18	16%		0	0%		0%
Unknown	19	17%		3	25%		3%
Total	113	100%		12	100%		11%

§Others=A & W-135

F. Invasive Meningococcal Disease(IMD) in Maricopa County(MC) by Serogroup and Age, 2000-2006, per year

TABLE 9- IMD in MC by Serogroup and Age-2000

Age	Serogroup				Not		Total
	Group B	Group C	Group Y	§Others	Groupable	Unknown	
<1 year #	1	0	0	0	3	2	6
Serogroup by age %	17%	0%	0%	0%	50%	33%	100%
Age by serogroup %	20%	0%	0%	0%	43%	67%	21%
1 year #	0	0	2	1	0	0	3
Serogroup by age %	0%	0%	67%	33%	0%	0%	100%
Age by serogroup %	0%	0%	20%	50%	0%	0%	11%
2-4 years #	0	0	0	1	0	0	1
Serogroup by age %	0%	0%	0%	100%	0%	0%	100%
Age by serogroup %	0%	0%	0%	50%	0%	0%	4%
5-9 years #	0	1	0	0	0	0	1
Serogroup by age %	0%	100%	0%	0%	0%	0%	100%
Age by serogroup %	0%	100%	0%	0%	0%	0%	4%
10-13 years #	1	0	1	0	1	0	3
Serogroup by age %	33%	0%	33%	0%	33%	0%	100%
Age by serogroup %	20%	0%	10%	0%	14%	0%	11%
14-17 years #	1	0	1	0	0	0	2
Serogroup by age %	50%	0%	50%	0%	0%	0%	100%
Age by serogroup %	20%	0%	10%	0%	0%	0%	7%
18-24 years #	1	0	0	0	1	0	2
Serogroup by age %	50%	0%	0%	0%	50%	0%	100%
Age by serogroup %	20%	0%	0%	0%	14%	0%	7%
25-64 years #	1	0	2	0	1	1	5
Serogroup by age %	20%	0%	40%	0%	20%	20%	100%
Age by serogroup %	20%	0%	20%	0%	14%	33%	18%
65+ years #	0	0	4	0	1	0	5
Serogroup by age %	0%	0%	80%	0%	20%	0%	100%
Age by serogroup %	0%	0%	40%	0%	14%	0%	18%
Total #	5	1	10	2	7	3	28
%	18%	4%	36%	7%	25%	11%	100%
Age by serogroup %	100%	100%	100%	100%	100%	100%	

§Others=A & W-135

TABLE 9- IMD in MC by Serogroup and Age-2001

Serogroup

Age		Serogroup				Not		Total
		Group B	Group C	Group Y	§Others	Groupable	Unknown	
<1 year	#	1	0	1	0	0	0	2
Serogroup by age	%	50%	0%	50%	0%	0%	0%	100%
Age by serogroup	%	13%	0%	33%	0%	0%	0%	15%
1 year	#	0	0	0	0	1	0	1
Serogroup by age	%	0%	0%	0%	0%	100%	0%	100%
Age by serogroup	%	0%	0%	0%	0%	50%	0%	8%
2-4 years	#	2	0	0	0	0	0	2
Serogroup by age	%	100%	0%	0%	0%	0%	0%	100%
Age by serogroup	%	25%	0%	0%	0%	0%	0%	15%
5-9 years	#	1	0	0	0	0	0	1
Serogroup by age	%	100%	0%	0%	0%	0%	0%	100%
Age by serogroup	%	13%	0%	0%	0%	0%	0%	8%
10-13 years	#	0	0	0	0	0	0	0
Serogroup by age	%	0%	0%	0%	0%	0%	0%	0%
Age by serogroup	%	0%	0%	0%	0%	0%	0%	0%
14-17 years	#	0	0	1	0	0	0	1
Serogroup by age	%	0%	0%	100%	0%	0%	0%	100%
Age by serogroup	%	0%	0%	33%	0%	0%	0%	8%
18-24 years	#	0	0	0	0	0	0	0
Serogroup by age	%	0%	0%	0%	0%	0%	0%	0%
Age by serogroup	%	0%	0%	0%	0%	0%	0%	0%
25-64 years	#	3	0	0	0	1	0	4
Serogroup by age	%	75%	0%	0%	0%	25%	0%	100%
Age by serogroup	%	38%	0%	0%	0%	50%	0%	31%
65+ years	#	1	0	1	0	0	0	2
Serogroup by age	%	50%	0%	50%	0%	0%	0%	100%
Age by serogroup	%	13%	0%	33%	0%	0%	0%	15%
Total	#	8	0	3	0	2	0	13
Serogroup by age	%	62%	0%	23%	0%	15%	0%	100%
Age by serogroup	%	100%	0%	100%	0%	100%	0%	

§Others=A & W-135

TABLE 9- IMD in MC by Serogroup and Age-2002

Serogroup

Age		Serogroup				Not		Total
		Group B	Group C	Group Y	§Others	Groupable	Unknown	
<1 year	#	4	0	1	0	0	0	5
	Serogroup by age %	80%	0%	20%	0%	0%	0%	100%
	Age by serogroup %	40%	0%	50%	0%	0%	0%	25%
1 year	#	0	0	0	0	0	0	0
	Serogroup by age %	0%	0%	0%	0%	0%	0%	0%
	Age by serogroup %	0%	0%	0%	0%	0%	0%	0%
2-4 years	#	1	0	0	1	0	0	2
	Serogroup by age %	50%	0%	0%	50%	0%	0%	100%
	Age by serogroup %	10%	0%	0%	100%	0%	0%	10%
5-9 years	#	0	1	0	0	0	0	1
	Serogroup by age %	0%	100%	0%	0%	0%	0%	0%
	Age by serogroup %	0%	14%	0%	0%	0%	0%	5%
10-13 years	#	0	0	0	0	0	0	0
	Serogroup by age %	0%	0%	0%	0%	0%	0%	0%
	Age by serogroup %	0%	0%	0%	0%	0%	0%	0%
14-17 years	#	0	0	1	0	0	1	2
	Serogroup by age %	0%	0%	50%	0%	0%	50%	100%
	Age by serogroup %	0%	0%	50%	0%	0%	100%	10%
18-24 years	#	5	2	0	0	0	0	7
	Serogroup by age %	71%	29%	0%	0%	0%	0%	100%
	Age by serogroup %	50%	29%	0%	0%	0%	0%	35%
25-64 years	#	0	3	0	0	0	0	3
	Serogroup by age %	0%	100%	0%	0%	0%	0%	100%
	Age by serogroup %	0%	43%	0%	0%	0%	0%	15%
65+ years	#	0	0	0	0	0	0	0
	Serogroup by age %	0%	0%	0%	0%	0%	0%	0%
	Age by serogroup %	0%	0%	0%	0%	0%	0%	0%
Total	#	10	6	2	1	0	1	20
	Serogroup by age %	50%	30%	10%	5%	0%	5%	100%
	Age by serogroup %	100%	86%	100%	100%	0%	100%	

§Others=A & W-135

TABLE 9- IMD in MC by Serogroup and Age-2003

Serogroup

Age		Serogroup				Not		Total
		Group B	Group C	Group Y	§Others	Groupable	Unknown	
<1 year	#	0	0	0	0	4	1	5
Serogroup by age	%	0%	0%	0%	0%	80%	20%	100%
Age by serogroup	%	0%	0%	0%	0%	67%	50%	29%
1 year	#	0	0	0	0	0	0	0
Serogroup by age	%	0%	0%	0%	0%	0%	0%	0%
Age by serogroup	%	0%	0%	0%	0%	0%	0%	0%
2-4 years	#	1	0	0	0	1	1	3
Serogroup by age	%	33%	0%	0%	0%	33%	33%	100%
Age by serogroup	%	50%	0%	0%	0%	17%	50%	18%
5-9 years	#	0	1	0	0	1	0	2
Serogroup by age	%	0%	50%	0%	0%	50%	0%	100%
Age by serogroup	%	0%	20%	0%	0%	17%	0%	12%
10-13 years	#	0	0	0	0	0	0	0
Serogroup by age	%	0%	0%	0%	0%	0%	0%	1%
Age by serogroup	%	0%	0%	0%	0%	0%	0%	0%
14-17 years	#	0	1	0	0	0	0	1
Serogroup by age	%	0%	100%	0%	0%	0%	0%	100%
Age by serogroup	%	0%	20%	0%	0%	0%	0%	6%
18-24 years	#	0	2	1	0	0	0	3
Serogroup by age	%	0%	67%	33%	0%	0%	0%	100%
Age by serogroup	%	0%	40%	50%	0%	0%	0%	18%
25-64 years	#	1	1	1	0	0	0	3
Serogroup by age	%	33%	33%	33%	0%	0%	0%	100%
Age by serogroup	%	50%	20%	50%	0%	0%	0%	18%
65+ years	#	0	0	0	0	0	0	0
Serogroup by age	%	0%	0%	0%	0%	0%	0%	0%
Age by serogroup	%	0%	0%	0%	0%	0%	0%	0%
Total	#	2	5	2	0	6	2	17
Serogroup by age	%	0%	0%	12%	0%	35%	12%	100%
Age by serogroup	%	100%	100%	100%	0%	100%	100%	

§Others=A & W-135

TABLE 9- IMD in MC by Serogroup and Age-2004

Serogroup

Age		Group B	Group C	Group Y	§Others	Not		Total
						Groupable	Unknown	
<1 year	#	0	0	1	0	0	0	1
Serogroup by age	%	0%	0%	100%	0%	0%	0%	100%
Age by serogroup	%	0%	0%	33%	0%	0%	0%	9%
1 year	#	0	0	0	0	0	0	0
Serogroup by age	%	0%	0%	0%	0%	0%	0%	0%
Age by serogroup	%	0%	0%	0%	0%	0%	0%	0%
2-4 years	#	0	0	0	0	0	1	1
Serogroup by age	%	0%	0%	0%	0%	0%	100%	100%
Age by serogroup	%	0%	0%	0%	0%	0%	20%	9%
5-9 years	#	0	0	0	0	0	1	1
Serogroup by age	%	0%	0%	0%	0%	0%	100%	100%
Age by serogroup	%	0%	0%	0%	0%	0%	20%	9%
10-13 years	#	0	1	0	0	1	0	2
Serogroup by age	%	0%	50%	0%	0%	50%	0%	100%
Age by serogroup	%	0%	50%	0%	0%	100%	0%	18%
14-17 years	#	0	0	0	0	0	1	1
Serogroup by age	%	0%	0%	0%	0%	0%	100%	100%
Age by serogroup	%	0%	0%	0%	0%	0%	20%	9%
18-24 years	#	0	0	0	0	0	0	0
Serogroup by age	%	0%	0%	0%	0%	0%	0%	0%
Age by serogroup	%	0%	0%	0%	0%	0%	0%	0%
25-64 years	#	0	1	1	0	0	1	3
Serogroup by age	%	0%	33%	33%	0%	0%	33%	100%
Age by serogroup	%	0%	50%	33%	0%	0%	20%	27%
65+ years	#	0	0	1	0	0	1	2
Serogroup by age	%	0%	0%	50%	0%	0%	50%	100%
Age by serogroup	%	0%	0%	33%	0%	0%	20%	18%
Total	#	0	2	3	0	1	5	11
Serogroup by age	%	0%	18%	27%	0%	9%	45%	100%
Age by serogroup	%	0%	100%	100%	0%	100%	100%	

§Others=A & W-135

TABLE 9- IMD in MC by Serogroup and Age-2005

Age		Serogroup				Not		Total
		Group B	Group C	Group Y	§Others	Groupable	Unknown	
<1 year	#	0	0	0	0	0	0	0
Serogroup by age	%	0%	0%	0%	0%	0%	0%	0%
Age by serogroup	%	0%	0%	0%	0%	0%	0%	0%
1 year	#	0	0	0	0	0	1	1
Serogroup by age	%	0%	0%	0%	0%	0%	100%	100%
Age by serogroup	%	0%	0%	0%	0%	0%	50%	5%
2-4 years	#	1	0	0	0	0	0	1
Serogroup by age	%	100%	0%	0%	0%	0%	0%	100%
Age by serogroup	%	25%	0%	0%	0%	0%	0%	5%
5-9 years	#	0	0	0	0	0	1	1
Serogroup by age	%	0%	0%	0%	0%	0%	100%	100%
Age by serogroup	%	0%	0%	0%	0%	0%	20%	5%
10-13 years	#	0	0	0	0	0	0	0
Serogroup by age	%	0%	0%	0%	0%	0%	0%	0%
Age by serogroup	%	0%	0%	0%	0%	0%	0%	0%
14-17 years	#	1	1	0	0	0	1	3
Serogroup by age	%	33%	33%	0%	0%	0%	33%	0%
Age by serogroup	%	25%	20%	0%	0%	0%	20%	16%
18-24 years	#	1	1	0	0	0	1	3
Serogroup by age	%	33%	33%	0%	0%	0%	33%	100%
Age by serogroup	%	25%	20%	0%	0%	0%	20%	16%
25-64 years	#	1	3	2	0	1	1	8
Serogroup by age	%	13%	38%	25%	0%	13%	13%	100%
Age by serogroup	%	25%	60%	100%	0%	50%	20%	42%
65+ years	#	0	0	0	1	1		2
Serogroup by age	%	0%	0%	0%	50%	50%	0%	100%
Age by serogroup	%	0%	0%	0%	100%	50%	0%	11%
Total	#	4	5	2	1	2	5	19
Serogroup by age	%	21%	26%	11%	5%	11%	26%	100%
Age by serogroup	%	100%	100%	100%	100%	100%	100%	

§Others=A & W-135

TABLE 9- IMD in MC by Serogroup and Age-2006, 1/1-6/30
Serogroup

Age		Group B	Group C	Group Y	§Others	Not		Total
						Groupable	Unknown	
<1 year	#	0	0	0	0	0	0	0
	Serogroup by age %	0%	0%	0%	0%	0%	0%	0%
	Age by serogroup %	0%	0%	0%	0%	0%	0%	0%
1 year	#	0	0	0	0	0	0	0
	Serogroup by age %	0%	0%	0%	0%	0%	0%	0%
	Age by serogroup %	0%	0%	0%	0%	0%	0%	0%
2-4 years	#	0	0	1	0	0	1	2
	Serogroup by age %	0%	0%	50%	0%	0%	50%	100%
	Age by serogroup %	0%	0%	50%	0%	0%	33%	40%
5-9 years	#	0	0	0	0	0	0	0
	Serogroup by age %	0%	0%	0%	0%	0%	0%	0%
	Age by serogroup %	0%	0%	0%	0%	0%	0%	0%
10-13 years	#	0	0	0	0	0	0	0
	Serogroup by age %	0%	0%	0%	0%	0%	0%	0%
	Age by serogroup %	0%	0%	0%	0%	0%	0%	0%
14-17 years	#	0	0	0	0	0	0	0
	Serogroup by age %	0%	0%	0%	0%	0%	0%	0%
	Age by serogroup %	0%	0%	0%	0%	0%	0%	0%
18-24 years	#	0	0	0	0	0	2	2
	Serogroup by age %	0%	0%	0%	0%	0%	100%	100%
	Age by serogroup %	0%	0%	0%	0%	0%	67%	40%
25-64 years	#	0	0	1	0	0	0	1
	Serogroup by age %	0%	0%	100%	0%	0%	0%	100%
	Age by serogroup %	0%	0%	50%	0%	0%	0%	20%
65+ years	#	0	0	0	0	0	0	0
	Serogroup by age %	0%	0%	0%	0%	0%	0%	0%
	Age by serogroup %	0%	0%	0%	0%	0%	0%	0%
Total	#	0	0	2	0	0	3	5
	%	0%	0%	40%	0%	0%	60%	100%
	Age by serogroup %	0%	0%	100%	0%	0%	100%	

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TABLE 9-IMD in MC by Serogroup and Age 2000-2005

Age	Serogroup				Not		Total
	Group B	Group C	Group Y	§Others	Groupable	Unknown	
<1 year #	6	0	3	0	7	3	19
Serogroup by age %	32%	0%	16%	0%	37%	16%	100%
Age by serogroup %	21%	0%	14%	0%	39%	19%	18%
1 year #	0	0	2	1	1	1	5
Serogroup by age %	0%	0%	40%	20%	20%	20%	100%
Age by serogroup %	0%	0%	9%	25%	6%	6%	5%
2-4 years #	5	0	0	2	1	2	10
Serogroup by age %	50%	0%	0%	20%	10%	20%	100%
Age by serogroup %	17%	0%	0%	50%	6%	13%	9%
5-9 years #	1	3	0	0	1	2	7
Serogroup by age %	14%	43%	0%	0%	14%	29%	100%
Age by serogroup %	3%	16%	0%	0%	6%	13%	6%
10-13 years #	1	1	1	0	2	0	5
Serogroup by age %	20%	20%	20%	0%	40%	0%	100%
Age by serogroup %	3%	5%	5%	0%	11%	0%	5%
14-17 years #	2	2	3	0	0	3	10
Serogroup by age %	20%	20%	30%	0%	0%	30%	100%
Age by serogroup %	7%	11%	14%	0%	0%	19%	9%
18-24 years #	7	5	1	0	1	1	15
Serogroup by age %	47%	33%	7%	0%	7%	7%	100%
Age by serogroup %	24%	26%	5%	0%	6%	6%	14%
25-64 years #	6	8	6	0	3	3	26
Serogroup by age %	23%	31%	23%	0%	12%	12%	100%
Age by serogroup %	21%	42%	27%	0%	17%	19%	24%
65+ years #	1	0	6	1	2	1	11
Serogroup by age %	8%	0%	50%	8%	17%	8%	92%
Age by serogroup %	3%	0%	27%	25%	11%	6%	10%
Total #	29	19	22	4	18	16	108
%	27%	18%	20%	4%	17%	15%	100%
Age by serogroup %	100%	100%	100%	100%	100%	100%	

§Others=A & W-135

TABLE 9- IMD in MC by Serogroup and Age
1/1/2000-6/30/2006

Age		Serogroup				Not		Total
		Group B	Group C	Group Y	§Others	Groupable	Unknown	
<1 year	#	6	0	3	0	7	3	19
Serogroup by age	%	32%	0%	16%	0%	37%	16%	100%
Age by serogroup	%	21%	0%	13%	0%	39%	16%	17%
1 year	#	0	0	2	1	1	1	5
Serogroup by age	%	0%	0%	40%	20%	20%	20%	100%
Age by serogroup	%	0%	0%	8%	25%	6%	5%	4%
2-4 years	#	5	0	1	2	1	3	12
Serogroup by age	%	42%	0%	8%	17%	8%	25%	100%
Age by serogroup	%	17%	0%	4%	50%	6%	16%	11%
5-9 years	#	1	3	0	0	1	2	7
Serogroup by age	%	14%	43%	0%	0%	14%	29%	100%
Age by serogroup	%	3%	16%	0%	0%	6%	11%	6%
10-13 years	#	1	1	1	0	2	0	5
Serogroup by age	%	20%	20%	20%	0%	40%	0%	100%
Age by serogroup	%	3%	5%	4%	0%	11%	0%	4%
14-17 years	#	2	2	3	0	0	3	10
Serogroup by age	%	20%	20%	30%	0%	0%	30%	100%
Age by serogroup	%	7%	11%	13%	0%	0%	16%	9%
18-24 years	#	7	5	1	0	1	3	17
Serogroup by age	%	41%	29%	6%	0%	6%	18%	100%
Age by serogroup	%	24%	26%	4%	0%	6%	16%	15%
25-64 years	#	6	8	7	0	3	3	27
Serogroup by age	%	22%	30%	26%	0%	11%	11%	100%
Age by serogroup	%	21%	42%	29%	0%	17%	16%	24%
65+ years	#	1	0	6	1	2	1	11
Serogroup by age	%	8%	0%	50%	8%	17%	8%	92%
Age by serogroup	%	3%	0%	25%	25%	11%	5%	10%
Total	#	29	19	24	4	18	19	113
	%	26%	17%	21%	4%	16%	17%	100%
Age by serogroup	%	100%	100%	100%	100%	100%	100%	

§Others=A & W-135

G. Invasive Meningococcal Disease(IMD) in Maricopa County(MC) by Serogroup and Race/Ethnicity, 2000-2006, per year

TABLE 7- IMD in MC by Serogroup and Race/Ethnicity-2000

Race/Ethnicity	Serogroup					Not		Total
	Group B	Group C	Group Y	§Others	Groupable	Unknown		
White #	2	1	5	0	4	0	12	
Serogroup by race %	17%	8%	42%	0%	33%	0%	100%	
Race by serogroup %	40%	100%	50%	0%	57%	0%	43%	
Hispanic #	1	0	3	2	3	1	10	
Serogroup by race %	10%	0%	30%	20%	30%	10%	100%	
Race by serogroup %	20%	0%	30%	100%	43%	33%	36%	
Black #	0	0	2	0	0	1	3	
Serogroup by race %	0%	0%	67%	0%	0%	33%	100%	
Race by serogroup %	0%	0%	20%	0%	0%	33%	11%	
Am Indian/Al Native #	2	0	0	0	0	0	2	
Serogroup by race %	100%	0%	0%	0%	0%	11%	100%	
Race by serogroup %	40%	0%	0%	0%	0%	0%	7%	
Asian/Pacific Islander#	0	0	0	0	0	1	1	
Serogroup by race %	0%	0%	0%	0%	0%	100%	100%	
Race by serogroup %	0%	0%	0%	0%	0%	33%	4%	
Unknown #	0	0	0	0	0	0	0	
Serogroup by race %	0%	0%	0%	0%	0%	0%	100%	
Race by serogroup %	0%	0%	0%	0%	0%	0%	0%	
Total #	5	1	10	2	7	3	28	
%	18%	4%	36%	7%	25%	11%	100%	
Race by serogroup %	100%	100%	100%	100%	100%	100%		

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TABLE 7- IMD in MC by Serogroup and Race/Ethnicity-2001
Serogroup

Race/Ethnicity		Group B	Group C	Group Y	§Others	Not		Total
						Groupable	Unknown	
White	#	3	2	0	0	1	0	6
	Serogroup by race %	50%	33%	0%	0%	17%	0%	100%
	Race by serogroup %	38%	67%	0%	0%	50%	0%	46%
Hispanic	#	5	1	0	0	1	0	7
	Serogroup by race %	71%	14%	0%	0%	14%	0%	100%
	Race by serogroup %	63%	33%	0%	0%	50%	0%	54%
Black	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Am Indian/Al Native	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Asian/Pacific Islander	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Unknown	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Total	#	8	3	0	0	2	0	13
	%	62%	23%	0%	0%	15%	0%	100%
	Race by serogroup %	100%	100%	0%	0%	100%	0%	

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TABLE 7- IMD in MC by Serogroup and Race/Ethnicity-2002
Serogroup

Race/Ethnicity		Group B	Group C	Group Y	§Others	Not		Total
						Groupable	Unknown	
White	#	5	4	0	0	0	1	10
	Serogroup by race %	50%	40%	0%	0%	0%	10%	100%
	Race by serogroup %	50%	67%	0%	0%	0%	100%	50%
Hispanic	#	5	2	2	1	0	0	10
	Serogroup by race %	50%	20%	20%	10%	0%	0%	100%
	Race by serogroup %	50%	33%	100%	100%	0%	0%	50%
Black	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Am Indian/Al Native	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Asian/Pacific Islander	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Unknown	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Total	#	10	6	2	1	0	1	20
	%	36%	21%	7%	4%	0%	4%	100%
	Race by serogroup %	100%	100%	100%	100%	0%	100%	

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TABLE 7- IMD in MC by Serogroup and Race/Ethnicity-2003
Serogroup

Race/Ethnicity		Group B	Group C	Group Y	§Others	Not		Total
						Groupable	Unknown	
White	#	0	4	1	0	3	0	8
	Serogroup by race %	0%	50%	13%	0%	38%	0%	100%
	Race by serogroup %	0%	80%	50%	0%	50%	0%	47%
Hispanic	#	1	1	1	0	3	1	7
	Serogroup by race %	14%	14%	14%	0%	43%	14%	100%
	Race by serogroup %	50%	20%	50%	0%	50%	50%	41%
Black	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Am Indian/Al Native	#	0	0	0	0	0	1	1
	Serogroup by race %	0%	0%	0%	0%	0%	100%	100%
	Race by serogroup %	0%	0%	0%	0%	0%	50%	6%
Asian/Pacific Islander	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Unknown	#	1	0	0	0	0	0	1
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	50%	0%	0%	0%	0%	0%	6%
Total	#	2	5	2	0	6	2	17
	%	12%	29%	12%	0%	35%	12%	100%
	Race by serogroup %	40%	100%	100%	0%	100%	100%	

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TABLE 7- IMD in MC by Serogroup and Race/Ethnicity-2004
Serogroup

Race/Ethnicity		Not						
		Group B	Group C	Group Y	§Others	Groupable	Unknown	Total
White	#	0	1	3	0	0	4	8
	Serogroup by race %	0%	13%	38%	0%	0%	50%	100%
	Race by serogroup %	0%	50%	100%	0%	0%	80%	73%
Hispanic	#	0	0	0	0	1	1	2
	Serogroup by race %	0%	0%	0%	0%	50%	50%	100%
	Race by serogroup %	0%	0%	0%	0%	100%	20%	18%
Black	#	0	1	0	0	0	0	1
	Serogroup by race %	0%	100%	0%	0%	0%	0%	100%
	Race by serogroup %	0%	50%	0%	0%	0%	0%	9%
Am Indian/Al Native	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	25%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Asian/Pacific Islander	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Unknown	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Total	#	0	2	3	0	1	5	11
	%	0%	7%	11%	0%	4%	18%	100%
	Race by serogroup %	0%	100%	100%	0%	100%	100%	

§Others=A & W-135

TABLE 7- IMD in MC by Serogroup and Race/Ethnicity-2005
Serogroup

Race/Ethnicity		Group B	Group C	Group Y	§Others	Not		Total
						Groupable	Unknown	
White	#	1	2	1	1	2	5	12
	Serogroup by race %	8%	17%	8%	8%	17%	42%	100%
	Race by serogroup %	25%	40%	50%	100%	100%	100%	63%
Hispanic	#	2	3	1	0	0	0	6
	Serogroup by race %	33%	50%	17%	0%	0%	0%	100%
	Race by serogroup %	50%	60%	50%	0%	0%	0%	32%
Black	#	1	0	0	0	0	0	1
	Serogroup by race %	100%	0%	0%	0%	0%	0%	100%
	Race by serogroup %	25%	0%	0%	0%	0%	0%	5%
Am Indian/Al Native	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Asian/Pacific Islander	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Unknown	#	0	0	0	0	0	0	0
	Serogroup by race %	0%	0%	0%	0%	0%	0%	0%
	Race by serogroup %	0%	0%	0%	0%	0%	0%	0%
Total	#	4	5	2	1	2	5	19
	%	14%	18%	7%	4%	7%	18%	100%
	Race by serogroup %	100%	100%	100%	100%	100%	100%	

§Others=A & W-135

TABLE 7- IMD in MC by Serogroup and Race/Ethnicity-2006, 1/1-6/30
Serogroup

Race/Ethnicity		Group B	Group C	Group Y	§Others	Not		Total
						Groupable	Unknown	
White	#	0	0	1	0	0	1	2
Serogroup by race	%	0%	0%	50%	0%	0%	50%	100%
Race by serogroup	%	0%	0%	50%	0%	0%	33%	40%
Hispanic	#	0	0	1	0	0	1	2
Serogroup by race	%	0%	0%	50%	0%	0%	50%	100%
Race by serogroup	%	0%	0%	50%	0%	0%	33%	40%
Black	#	0	0	0	0	0	1	1
Serogroup by race	%	0%	0%	0%	0%	0%	100%	100%
Race by serogroup	%	0%	0%	0%	0%	0%	33%	20%
Am Indian/Al Native	#	0	0	0	0	0	0	0
Serogroup by race	%	0%	0%	0%	0%	0%	0%	0%
Race by serogroup	%	0%	0%	0%	0%	0%	0%	0%
Asian/Pacific Islander	#	0	0	0	0	0	0	0
Serogroup by race	%	0%	0%	0%	0%	0%	0%	0%
Race by serogroup	%	0%	0%	0%	0%	0%	0%	0%
Unknown	#	0	0	0	0	0	0	0
Serogroup by race	%	0%	0%	0%	0%	0%	0%	0%
Race by serogroup	%	0%	0%	0%	0%	0%	0%	0%
Total	#	0	0	2	0	0	3	5
	%	0%	0%	40%	0%	0%	60%	100%
Race by serogroup	%	0%	0%	40%	0%	0%	100%	

§Others=A & W-135

**TABLE 7-IMD in MC by Serogroup and Race/Ethnicity
2000-2005
Serogroup**

Race/Ethnicity		Group B	Group C	Group Y	Not		Total	
					§Others	Groupable		Unknown
White	#	11	14	10	1	10	10	56
Serogroup by race	%	20%	25%	18%	2%	18%	18%	100%
Race by serogroup	%	38%	64%	53%	25%	56%	63%	52%
Hispanic	#	14	7	7	3	8	3	42
Serogroup by race	%	33%	17%	17%	7%	19%	7%	100%
Race by serogroup	%	48%	32%	37%	75%	44%	19%	39%
Black	#	1	1	2	0	0	1	5
Serogroup by race	%	20%	20%	40%	0%	0%	20%	100%
Race by serogroup	%	3%	5%	11%	0%	0%	6%	5%
Am Indian/Al Native	#	2	0	0	0	0	1	3
Serogroup by race	%	67%	0%	0%	0%	0%	33%	100%
Race by serogroup	%	7%	0%	0%	0%	0%	6%	3%
Asian/Pacific Islander	#	0	0	0	0	0	1	1
Serogroup by race	%	0%	0%	0%	0%	0%	100%	100%
Race by serogroup	%	0%	0%	0%	0%	0%	6%	1%
Unknown	#	1	0	0	0	0	0	1
Serogroup by race	%	100%	0%	0%	0%	0%	0%	100%
Race by serogroup	%	3%	0%	0%	0%	0%	0%	1%
Total	#	29	22	19	4	18	16	108
	%	27%	20%	18%	4%	17%	15%	100%
Race by serogroup	%	100%	100%	100%	100%	100%	100%	

§Others=A & W-135

H. Invasive Meningococcal Disease (IMD) in Maricopa County(MC) by Month of Onset, 2000-2006

TABLE 10- IMD in MC by Month of Onset, 1/1/2000-6/30/2006

Month of Onset	Year							Total
	2000	2001	2002	2003	2004	2005	2006	
January	6	1	4	4	1	1	2	19
% of month total	32%	5%	21%	21%	5%	5%	11%	100%
% of year total	21%	8%	20%	24%	9%	5%	40%	17%
February	4	1	4	1	1	4	2	17
% of month total	24%	6%	24%	6%	6%	24%	12%	100%
% of year total	14%	8%	20%	6%	9%	21%	40%	15%
March	3	4	4	2	0	4	1	18
% of month total	17%	22%	22%	11%	0%	22%	6%	100%
% of year total	11%	31%	20%	12%	0%	21%	20%	16%
April	1	0	0	0	2	1	0	4
% of month total	25%	0%	0%	0%	50%	25%	0%	100%
% of year total	4%	0%	0%	0%	18%	5%	0%	4%
May	0	0	0	3	1	3	0	7
% of month total	0%	0%	0%	43%	14%	43%	0%	100%
% of year total	0%	0%	0%	18%	9%	16%	0%	6%
June	1	0	2	0	2	1	0	6
% of month total	17%	0%	33%	0%	33%	17%	0%	100%
% of year total	4%	0%	10%	0%	18%	5%	0%	5%
July	1	0	1	0	1	1		4
% of month total	25%	0%	25%	0%	25%	25%		100%
% of year total	4%	0%	5%	0%	9%	5%		4%
August	1	1	0	0	2	0		4
% of month total	25%	25%	0%	0%	50%	0%		100%
% of year total	4%	8%	0%	0%	18%	0%		4%
September	2	0	0	0	0	0		2
% of month total	100%	0%	0%	0%	0%	0%		100%
% of year total	7%	0%	0%	0%	0%	0%		2%
October	4	0	4	1	0	0		9
% of month total	44%	0%	44%	11%	0%	0%		100%
% of year total	14%	0%	20%	6%	0%	0%		8%
November	2	4	1	4	1	2		14
% of month total	14%	29%	7%	29%	7%	14%		100%
% of year total	7%	31%	5%	24%	9%	11%		12%
December	3	2	0	2	0	2		9
% of month total	33%	22%	0%	22%	0%	22%		100%
% of year total	11%	15%	0%	12%	0%	11%		8%
Total	28	13	20	17	11	19	*8	113
% of total cases	25%	12%	18%	15%	10%	17%		100%
% of year total	100%	100%	100%	100%	100%	100%		100%
Rate	0.90	0.41	0.61	0.50	0.31	0.52	*0.22	

*Annualized

I. Invasive Meningococcal Disease(IMD) in Maricopa County(MC) by Serogroup, 2000-2006

TABLE 11-IMD in MC by Serogroup 1/1/2000-6/30/2006
Serogroup

Year	Group B	Group C	Group Y	§Others	Not		Total
					Groupable	Unknown	
2000	5	1	10	2	7	3	28
% of year	18%	4%	36%	7%	25%	11%	100%
% of total	17%	5%	42%	50%	39%	16%	25%
2001	8	0	3	0	2	0	13
% of year	62%	0%	23%	0%	15%	0%	100%
% of total	28%	0%	13%	0%	11%	0%	12%
2002	10	6	2	1	0	1	20
% of year	48%	29%	10%	5%	0%	5%	0%
% of total	34%	32%	8%	25%	0%	5%	18%
2003	2	5	2	0	6	2	17
% of year	12%	29%	12%	0%	35%	12%	100%
% of total	7%	26%	8%	0%	33%	11%	15%
2004	0	2	3	0	1	5	11
% of year	0%	18%	27%	0%	9%	45%	100%
% of total	0%	11%	13%	0%	6%	26%	10%
2005	4	5	2	1	2	5	19
% of year	21%	26%	11%	5%	11%	26%	100%
% of total	14%	26%	8%	25%	11%	26%	17%
2006	0	0	2	0	0	3	5
% of year	0%	0%	40%	0%	0%	60%	100%
% of total	0%	0%	8%	0%	0%	16%	4%
Total	29	19	24	4	18	19	113
% of total	26%	17%	21%	4%	16%	17%	100%
	100%	100%	100%	100%	100%	100%	

§Others=A & W-135

J. Invasive Meningococcal Disease(IMD) in Maricopa County(MC) Case Fatality Rates by Syndrome, Race/Ethnicity, Gender, Age, and Serogroup, 2000-2006

**TABLE 12- IMD in MC Case Fatality Rate by Syndrome
1/1/2000-6/30/2006**

Syndrome	Year							Total
	2000	2001	2002	2003	2004	2005	2006	
Meningitis	0%	0%	10%	0%	0%	0%	20%	3%
Bacteremia	11%	0%	5%	6%	0%	5%	20%	6%
Both	0%	0%	10%	0%	0%	0%	0%	2%
Other	0%	0%	0%	0%	0%	0%	0%	0%
Total	11%	0%	24%	6%	0%	5%	40%	11%

**TABLE 13- IMD in MC Case Fatality Rate by Race/Ethnicity
1/1/2000-6/30/2006**

Race/Ethnicity	Year							Total
	2000	2001	2002	2003	2004	2005	2006	
White	7%	0%	10%	0%	0%	0%	20%	4%
Hispanic	4%	0%	14%	0%	0%	0%	0%	4%
Black	0%	0%	0%	0%	0%	5%	20%	2%
Am Indian/Alaskan Native	0%	0%	0%	6%	0%	0%	0%	1%
Asian/Pacific Islander	0%	0%	0%	0%	0%	0%	0%	0%
Other	0%	0%	0%	0%	0%	0%	0%	0%
Total	11%	0%	24%	6%	0%	5%	40%	11%

**TABLE 14- IMD in MC Case Fatality Rate by Gender
1/1/2000-6/30/2006**

Sex	Year							Total
	2000	2001	2002	2003	2004	2005	2006	
Male	0%	0%	10%	0%	0%	5%	20%	4%
Female	11%	0%	14%	6%	0%	0%	20%	7%
Total	11%	0%	24%	6%	0%	5%	40%	11%

TABLE 15- IMD in MC Case Fatality Rate by Age
1/1/2000-6/30/2006

Age	Year							Total
	2000	2001	2002	2003	2004	2005	2006	
<1 year	0%	0%	10%	6%	0%	0%	0%	3%
1 year	0%	0%	0%	0%	0%	0%	0%	0%
2-4 years	4%	0%	0%	0%	0%	5%	0%	2%
0-4 years	4%	0%	10%	6%	0%	5%	0%	4%
5-9 years	0%	0%	0%	0%	0%	0%	0%	0%
10-13 years	0%	0%	0%	0%	0%	0%	0%	0%
14-17 years	0%	0%	5%	0%	0%	0%	0%	1%
18-24 years	0%	0%	10%	0%	0%	0%	20%	3%
10-24years	0%	0%	14%	0%	0%	0%	20%	4%
25-64 years	0%	0%	0%	0%	0%	0%	20%	1%
65+ years	7%	0%	0%	0%	0%	0%	0%	2%
Total	11%	0%	24%	6%	0%	5%	40%	11%

TABLE 16- IMD in MC Case Fatality Rate by Serogroup
1/1/2000-6/30/2006

Serogroup	Year							Total
	2000	2001	2002	2003	2004	2005	2006	
Group B	0%	0%	19%	0%	0%	5%	0%	4%
Group C	0%	0%	0%	0%	0%	0%	0%	0%
Group Y	7%	0%	0%	0%	0%	0%	20%	3%
§Others	4%	0%	0%	0%	0%	0%	0%	1%
Not Groupable	0%	0%	0%	0%	0%	0%	0%	0%
Unknown	0%	0%	5%	6%	0%	0%	0%	3%
Total	11%	0%	24%	6%	0%	5%	40%	11%

§Others=A & W-135

K. Rate of Invasive Meningococcal Disease(IMD) in the US and Maricopa County(MC), 1983-2006

TABLE 17-Rate of IMD in the US and MC, 1983-2006

Year	Cases MC		Cases US	
	#	Rate†	#	Rate†
1983	17	1.02	2736	1.17
1984	9	0.52	2746	1.16
1985	16	0.87	2479	1.04
1986	19	1.00	2594	1.08
1987	20	1.00	2930	1.21
1988	16	0.78	2964	1.21
1989	12	0.57	2727	1.10
1990	8	0.38	2451	0.98
1991	16	0.73	2130	0.84
1992	17	0.76	2134	0.84
1993	62	2.67	2637	1.02
1994	44	1.82	2886	1.11
1995	45	1.78	3243	1.23
1996	29	1.11	3437	1.30
1997	27	1.00	3308	1.24
1998	24	0.86	2725	1.01
1999	32	1.12	2501	0.92
2000	28	0.90	2256	0.80
2001	13	0.41	2333	0.82
2002	20	0.61	1814	0.63
2003	17	0.50	1756	0.60
2004	11	0.31	1361	0.46
2005	19	0.52	1111	0.37
2006	*8	*0.22	N/A	

*Annualized

†Population per 100,000, US Census estimates

L. Population Estimates-Maricopa County(MC)

MC Population Estimates, 2000-2005, by Race/Ethnicity*

Year	Total	White	Hispanic	Black	Am Indian/ AI Native	Asian/ Pac Islander	Other	Combined Group§
2000	3,096,692	2,053,712	759,498	110,717	49,461	71,067	36,611	267,856
2001	3,195,893	2,083,248	814,998	115,412	52,141	75,360	38,657	281,570
2002	3,293,441	2,113,578	868,911	120,413	53,672	79,791	40,617	294,493
2003	3,388,711	2,144,584	920,225	125,014	55,386	84,109	42,536	307,045
2004	3,498,587	2,183,362	974,637	131,052	57,756	89,519	44,885	323,212
2005	3,635,528	2,235,502	1,037,514	139,304	60,333	97,085	47,731	344,453
2000-2005	20,108,852	12,813,986	5,375,783	741,912	328,749	496,931	251,037	1,818,629
†2006	3,778,704							

*Source=<http://www.census.gov/popest/estimates.php>

†Source=MCDPH, Office of Epidemiology

§Combined Group=Black, Am Indian/AI Native, Asian/Pac Islander, and Other

MC Population Estimates, 2000-2005, by Gender*

Year	Total	Male	Female
2000	3,096,692	1,549,174	1,547,518
2001	3,195,893	1,600,713	1,595,180
2002	3,293,441	1,651,660	1,641,781
2003	3,388,711	1,701,239	1,687,472
2004	3,498,587	1,758,613	1,739,974
2005	3,635,528	1,829,380	1,806,148
†2006	3,778,704		

*Source=<http://www.census.gov/popest/estimates.php>

†Source=MCDPH, Office of Epidemiology

MC Population Estimates, 2000-2005, by Age*

Year	Total	0-4yrs	5-9 yrs	10-24yrs	25-64yrs	65+yrs
2000	3,096,692	244,198	239,817	667,692	1,583,864	361,121
2001	3,195,893	260,208	250,280	690,906	1,672,191	367,308
2002	3,293,441	270,677	257,466	710,012	1,681,776	373,510
2003	3,388,711	280,592	262,102	726,888	1,737,305	381,824
2004	3,498,587	290,416	268,677	745,424	1,802,134	391,936
2005	3,635,528	298,509	275,582	767,403	1,890,981	403,053
2000-2005	20,108,852	1,644,600	1,553,924	4,308,325	10,368,251	2,278,752
†2006	3,778,704					

*Source=<http://www.census.gov/popest/estimates.php>

†Source=MCDPH, Office of Epidemiology

MC Population Estimates, 1983-1999*

Year	Total
1983	1,663,973
1984	1,736,952
1985	1,828,748
1986	1,905,504
1987	1,991,400
1988	2,048,441
1989	2,101,787
1990	2,129,352
1991	2,183,182
1992	2,244,827
1993	2,318,774
1994	2,419,394
1995	2,526,113
1996	2,614,093
1997	2,698,459
1998	2,783,779
1999	2,861,395

*Source=<http://www.census.gov/popest/estimates.php>

M. US Population Estimates, 1983-2005

US Population Estimates, 1983-2005*

Year	Total
1983	233,791,994
1984	235,824,902
1985	237,923,795
1986	240,132,887
1987	242,288,918
1988	244,498,982
1989	246,819,230
1990	249,464,396
1991	252,153,092
1992	255,029,699
1993	257,782,608
1994	260,327,021
1995	262,803,276
1996	265,228,572
1997	267,783,607
1998	270,248,003
1999	272,690,813
2000	282,193,477
2001	285,107,923
2002	287,984,799
2003	290,850,005
2004	293,656,842
2005	296,410,404

*Source=<http://www.census.gov/popest/estimates.php>

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