Congenital Syphilis Outbreak – Southern Nevada

Investigation and Recommendations

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Introduction

In 2003 Southern Nevada experienced an outbreak of syphilis. In spite of vigorous public health efforts, the outbreak has continued. Initially, the outbreak occurred in adults, but in 2006 congenital syphilis cases began to occur. Nevada now has the highest rate of congenital syphilis in the United States. Controlling this outbreak will continue to be a challenge for the medical and public health community.

Background

Adult Syphilis – Primary and Secondary cases

In 2003, Nevada reported 12 cases and ranked 41 among the 50 states. The rate of syphilis in Nevada was 0.5 cases/100,000 population, below the US rate of 2.5 cases/ 100,000 population. In 2004, Nevada reported 40 cases and jumped in the ranking to 31; the rate increased to 1.8/1000,000. (Figure 1) In 2005, Nevada reported 109 cases and jumped in the ranking to 6; the rate increased to 4.7/100,000. In 2006, Nevada reported 137 cases, increased in the ranking to 5; the rate increased to 5.7/100,000. During this period, there also was an increase in the rate of syphilis nationally, with the rate rising from 2.5 cases/100,000 in 2003 to 3.3 cases/100,000. In 2004, there was a large increase in the number of syphilis cases in Clark County, reaching a peak in 2006 with 131 cases. (Figure 2)

There was a striking disparity in the sex, and race/ethnicity of Nevada cases, with the rate among blacks 6.1 times that of whites in 2006 (23.6/100,000 blacks vs 3.9/100,000 whites). These differences existed in prior years as well.

In 2005-2007, an epidemiologic investigation was conducted by the SNHD and the Centers for Disease Control and Prevention. Important characteristics of the outbreak were discovered, including

- A male:female ratio rising from 1:1 to as high as 8.4:1 (Figures 3-6)
- A large increase in the number of cases among both white and black men, and among Hispanics (Figures 7-9)
- A much larger male:female ratio among whites (7.5—8.4:1) than blacks (1.1—2.2:1)

- A sharp increase in the number of cases among men who have sex with men (MSM) (Figure 10)
- An increase in cases among persons 20 – 49 years of age (Figures 11,12)

Congenital Syphilis

In 2003 and 2004, there were no reported cases of congenital syphilis in Nevada. In 2005, Nevada reported 1 case and ranked 21 among the 28 states that reported at least one case. In 2006, Nevada reported 15 cases of congenital syphilis for a rate of 42.6/100,000 live births compared to the total US rate of 8.7/100,000 live births. Nevada ranked 1 among the 26 states that reported at least 1 case of congenital syphilis in 2006. From 2001 to 2006, there was a decline in the number of congenital syphilis cases in the United States from 503 to 349. (Figure 13) However, in 2006, Nevada had the highest rate of congenital syphilis in the United States, 42.6/100,000 live births. (Figure 14)

Public Health Response

As a result of the epidemiologic investigation in 2005-2006, the SNHD and CDC developed specific interventions to control the outbreak . These included nationally recommended Syphilis Elimination Strategies:

- Enhanced surveillance
- Strengthened Community Involvement and Partnerships
- Rapid Outbreak Response
- Expanded Clinical and Laboratory Services
- Enhanced Health Promotion

The public health professionals substantially increased their efforts for active case finding and delivery of confidential, client-centered partner services to patients, partners, and identified high-risk patients. These enhanced activities are on-going.

Methods

Congenital Syphilis Case Definition

Investigation and control of congenital syphilis presents especially complex challenges to the medical and public health community. This is because the diagnostic tests for syphilis are themselves complex, and identified cases must be also be categorized by the stage of infection. A mother who has been infected with syphilis will have certain antibodies that will be present for life, and others that will fall over time or after successful treatment. The mother's antibodies can be transferred to the developing fetus and will persist for a period of time after the birth of the baby, even if the baby is not infected with syphilis. A mother can become infected with syphilis at any time during her pregnancy, and the stage of pregnancy during which she becomes infected is important in the severity of disease if the fetus becomes infected in the womb.

Because of these issues, there exists both a surveillance case definition and a set of clinical criteria to determine if an infant or child has congenital syphilis. The surveillance case definition is more sensitive than the clinical case definition—therefore, the surveillance case definition will classify some infants as

cases of congenital syphilis that are not infected. Knowledge of these differences is important to interpret epidemiologic and clinical information.

For public health purposes, using a very sensitive case definition is important, as the goal is not to miss possible cases. It is more important to identify possible cases to enable their early treatment than to make highly accurate counts of infected infants.

The medical treatment of infants born with suspected or confirmed congenital syphilis is also very complex and requires specialized expertise. Once screening tests detect a possible case, the health care provider should always obtain expert consultation on the diagnosis and treatment of the mother, the newborn, and all other siblings who are off-springs of the infected mother should be screened and evaluated.

As part of the enhanced public health response to the outbreak of syphilis and congenital syphilis, public health professionals have increased active case finding activities. One important component of this expanded effort has been to cross-match records of reported cases of syphilis among women of child-bearing age with birth certificate data to identify all children who have been born to a woman who has given birth since 2003. All such identified births have been followed up by public health staff to determine if any of the children might have been infected with syphilis but not been detected to have the disease. This retrospective review is still underway and expected to continue into 2009.

Results

From 2006 through Nov 2008, a total of 101 cases of congenital syphilis were reported to the SNHD who meet the surveillance case definition. Of these 101 reported cases, 33 cases were confirmed to have clinical infection with syphilis, including 2 stillborn infants, an average of 11 cases per year out of approximately 26,000 live births; and 68 cases were determined not to have been infected. (Figure 15)

Because some mothers delivered more than one baby during this period and some of the reported cases in infants included children delivered prior to 2005, there were more infants reported (N=101) than mothers (N= 89). There were 81 mothers who delivered 1 child, 2 mothers delivered 1 case and 1 non-cases, 3 mothers delivered 2 cases, 1 mother delivered 2 non-cases, and 2 mothers delivered 2 cases and 2 non-cases. (Figure 15)

Of the 33 cases of congenital syphilis, 17 (52%) were black, and 8 (24%) were white. Of the 68 non-cases, 33 (49%) were black, and 23 (34%) were white. (Figure 16) Of the cases, 7 (21%) were Hispanic; of the non-cases, 18 (27%) were Hispanic. (Figure 17)

The odds of premature delivery were 3.3 times higher among cases than non-cases (95% CI: 1.32, 8.21). Of the cases, 16 (49%) delivered at less than 37 weeks gestation, while 46 (24%) of the non-cases delivered prematurely. (Figure 18)

Many of the mothers were single, never married—24 (75%) of the cases, and 44 (65%) of the non-cases. The proportion of cases was lower for married mothers than for non-cases (19% vs 31%). (Figure 19)

Mothers of cases were slightly younger at the time of delivery than mothers of non-cases, but there was a broad age range of the mothers of both cases and non-cases. This broad age range existed for both married and single, never married mothers of both cases and non-cases. (Figure 20)

Mothers of cases (69%) were less likely to have received prenatal care than mothers of non-cases (88%). Unfortunately, we do not have detailed information on the timing of the prenatal visits for those mothers who received prenatal care. We do know that of mothers who delivered infants with congenital syphilis, 6 had at least one first trimester visit, 3 at least one second trimester visit, and 2 had at least one third trimester visit. (Figure 21)

For a large proportion of cases and non-cases, we do not know when the mothers had their first nontreponemal test for syphilis. Of the 33 cases, 4 were tested within the first trimester, 6 were tested in the second trimester, and 6 were tested in the third trimester. (Figure 22)

The likelihood of being a congenital syphilis case decreased significantly with earlier treatment of the mother. (Chi-square = 441.5, $p < 0.0001$). Of the 33 cases, 19 (58%) received no treatment during pregnancy compared to 3 (4%) of the 68 non-cases. (Figure 23)

Of the 33 cases, 11 cases were staged as having been infected for greater than one year, and 15 cases were staged as infected for less than one year. Of the 15 cases, 6 were linked through partner investigation to infected partners.

Although the case reviews are still underway and quantitative data are not yet available, several preliminary associations are being intensively investigated. Many of the mothers who gave birth to an infant with congenital syphilis had a prior history of syphilis previous to their most recent pregnancy. In some cases, their previous infection had occurred as many as 7-8 years ago, and some had records of having been appropriately treated in the past. Most of the mothers had not had any prenatal visits for their most recent pregnancy, and the first syphilis test occurred at the time of delivery. Some had a record of at least one prenatal visit, but they were not tested for syphilis at that visit – a clear missed opportunity for a preventive/curative intervention. These potential risk factors continue to be investigated.

Discussion

Nevada continues to experience the tragic consequences from a major outbreak of syphilis that began in 2004. The outbreak began among adult MSM and then spread to bisexual males and subsequently to their female partners. The outbreak has disproportionately impacted minority populations, especially blacks and Hispanics.

The current outbreak of congenital syphilis is tragic and frightening, because it is a symptom of a failed public health and medical care system. Only a few years ago, CDC publicized widely its plan for the eradication of syphilis in the United States. Instead of achieving that goal, the United States has experienced a resurgence of syphilis, and Nevada leads the nation in its rate of syphilis and congenital syphilis.

The science of syphilis is well known, and public health interventions that work have been well-studied and successfully applied in the past. Inadequate resources and lack of access to health care, and

especially lack of access to prenatal care, are the cause of the current outbreak. Inadequate medical care is also a contributing factor, as many of the cases occurred among women who had received at least one prenatal visit but were not adequately screened, diagnosed, and treated.

Epidemiologic investigation has provided several clues that can be used to try to target intervention activities. First, elimination of congenital syphilis cannot be expected only through focusing on prenatal screening. Elimination of the outbreak will require increased efforts at both prenatal screening and adequate care and increased efforts to eliminate syphilis in the male population.

The outbreak of syphilis has disproportionately impacted minorities, and single, unmarried mothers. Increased access to care, improved quality of care, and rapid case investigation will be required to control this outbreak. The outbreak is not randomly distributed among the population. There is an apparent association with women who have been diagnosed with syphilis and other STDs in the past, and also with women who have not had adequate prenatal care or none at all.

Nevada has experienced an unprecedented growth in population in the past 10 years. There has also been a progressive rise in the number of live births. For example, in Clark County, the number of live births increased from 16,848 in 1995 to 26,152 in 2004. This growth in population has exacerbated problems with access to medical care. It also underscores the difficulty of controlling the outbreak of congenital syphilis. The current outbreak of congenital syphilis has resulted in an average of 11 cases per year, and 34 cases that meet the surveillance case definition per year. Only a well-funded, fully supported intervention campaign that involves the whole community and targets intervention efforts at those at high risk can be expected to eradicate syphilis.

Nevada law requires screening of pregnant women during the third trimester for syphilis (NRS 442.010). Given the extent and seriousness of the current outbreak, we recommend expanding screening of pregnant women, adding additional screening at the first prenatal visit and at the time of delivery. Special efforts are needed to screen minority, single, never-married women at every prenatal visit so that the diagnosis of syphilis can be made and treatment initiated.

Recommendations

The medical and public health communities must make control of syphilis a priority. The Elimination Strategies developed by CDC will work if they are funded and implemented. Only an intensified effort will be effective.

- Enhanced surveillance
- Enhanced confidential, comprehensive client-centered partner services
- Enhanced collaboration with the primary health care community
- Enhanced access to prenatal care and screening
- All pregnant women should have a serologic test for syphilis during the 1st and 3rd trimester and at the time of delivery. Women who deliver should not be discharged from care until results of

the syphilis screening test are known and, if positive, adequate investigation and treatment of the mother and infant have occurred.

- Pregnant, single, never-married minority women should be screened and evaluated as a sub-group who may be at higher risk for syphilis. If found to have had a medical history of an STD in the past or if positive for syphilis when screened during their first prenatal visit, these women should be enrolled in case-management supportive care throughout their pregnancy.

- All pregnant women with a positive syphilis test result should be immediately reported to the SNHD and receive expert consultation on clinical management and treatment, and receive partner services by SNHD expert public health professionals.

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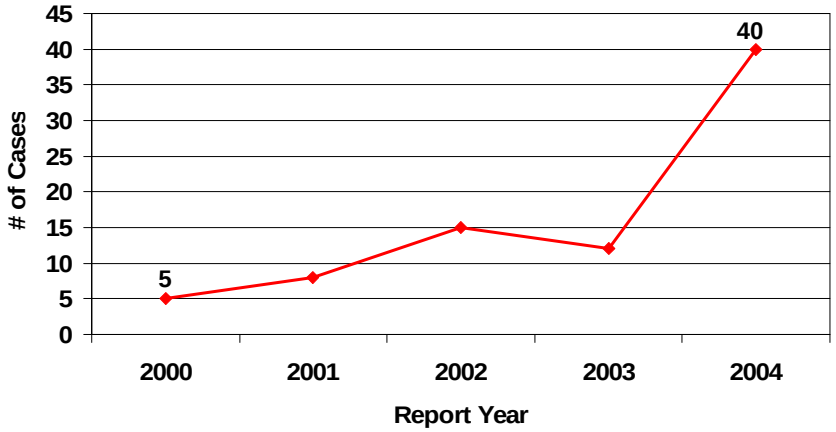
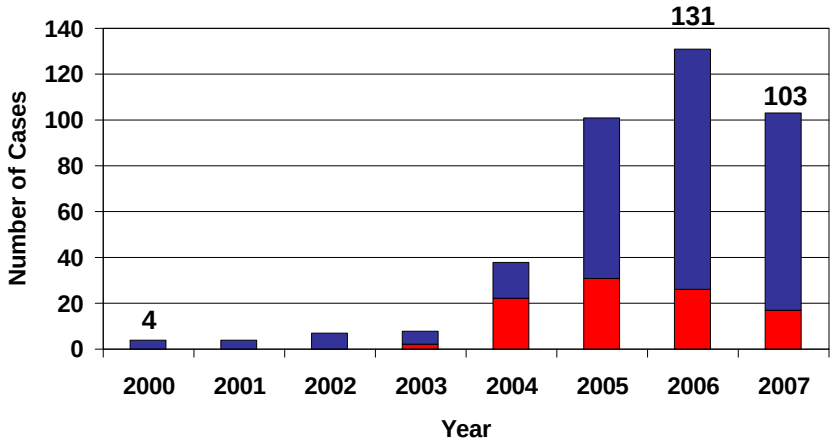
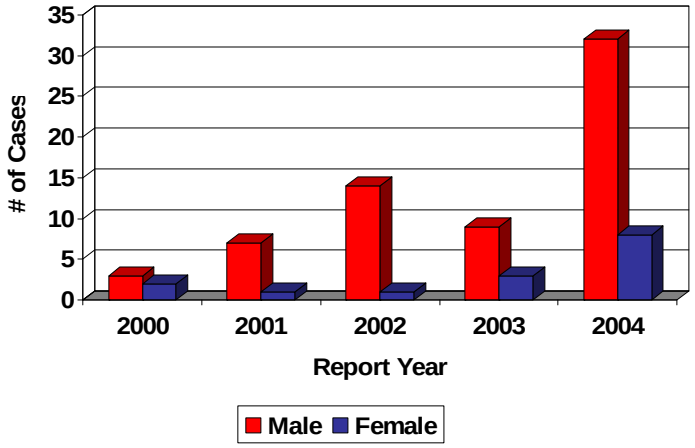
Infectious Syphilis, Nevada, 2000–2004



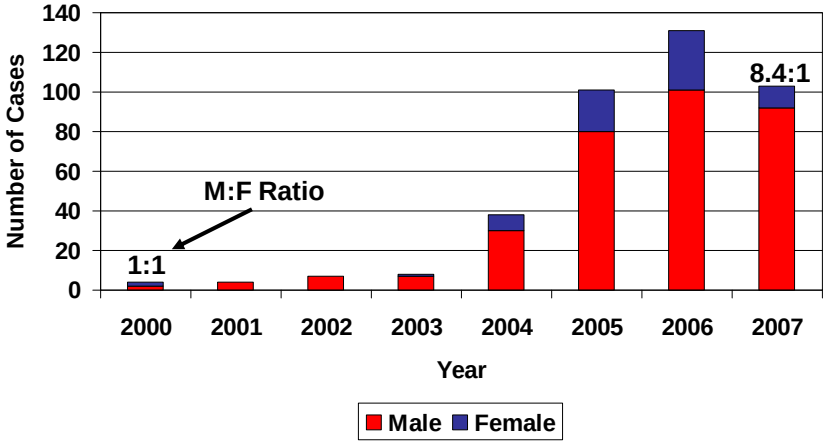
Infectious Syphilis, Clark County, NV, 2000-2007



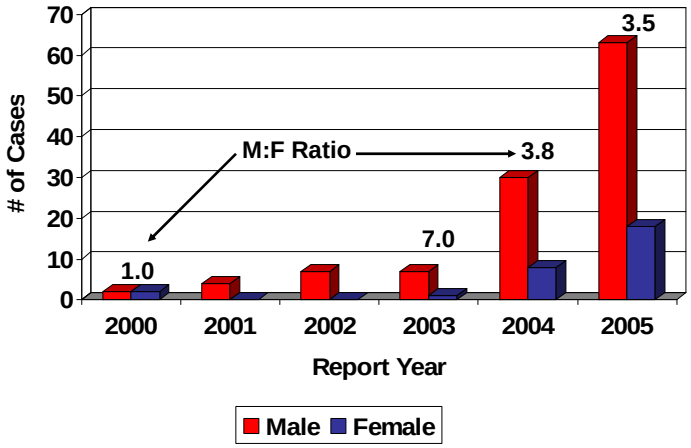
Infectious Syphilis by Sex, Nevada, 2000-2004



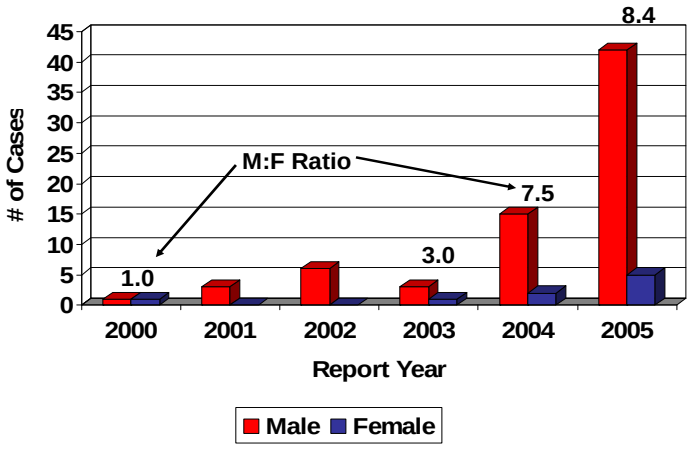
Infectious Syphilis by Sex, Clark County, NV, 2000-2007



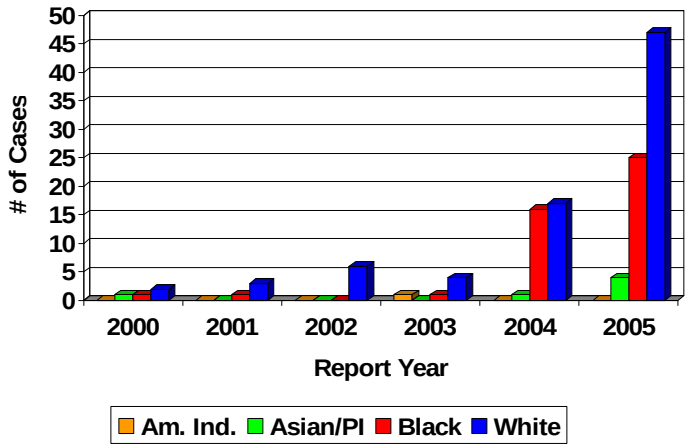
Infectious Syphilis by Sex, Clark County, NV, 2000-2005*



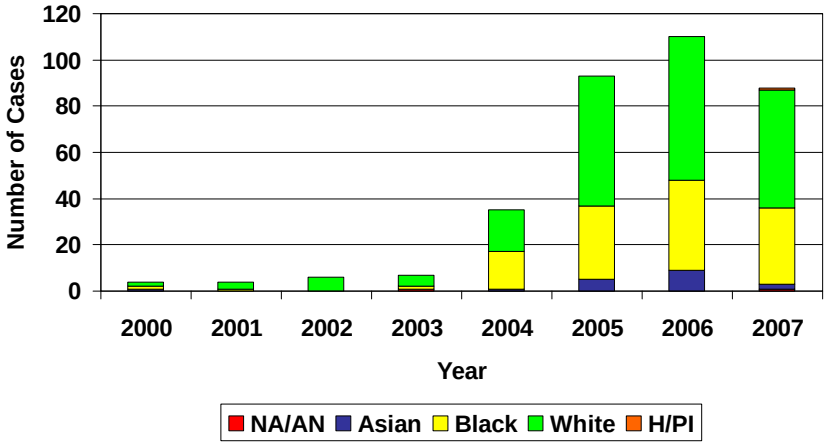
Infectious Syphilis by Sex Among Whites, Clark County, NV, 2000-2005*



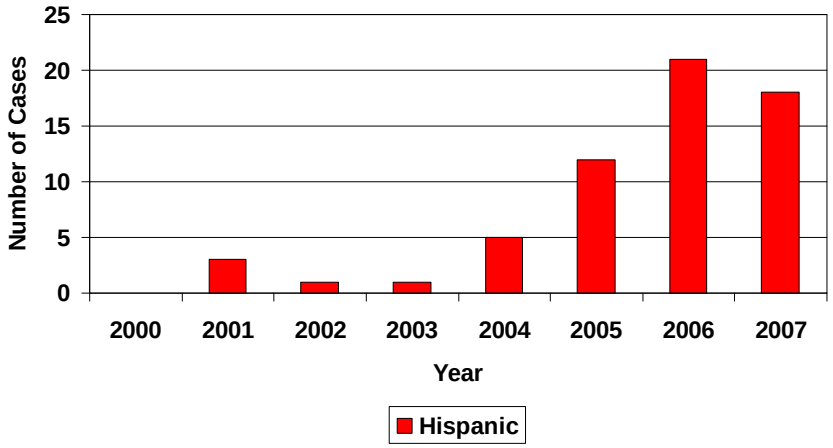
Infectious Syphilis by Race, Clark County, NV, 2000-2005*



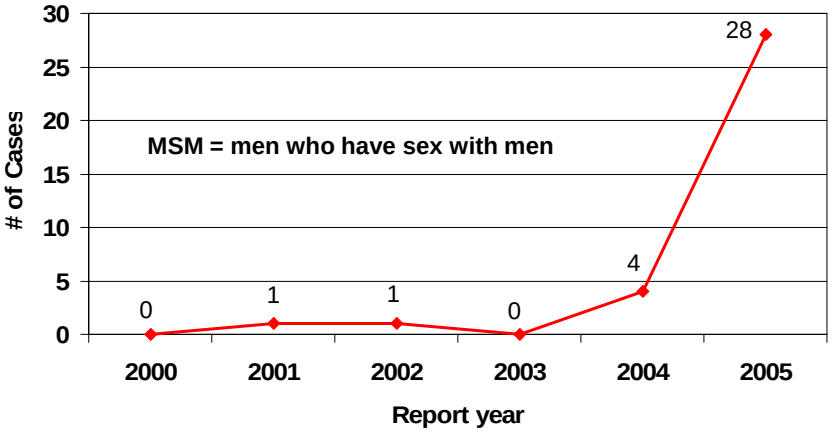
Infectious Syphilis by Race, Clark County, NV, 2000-2007



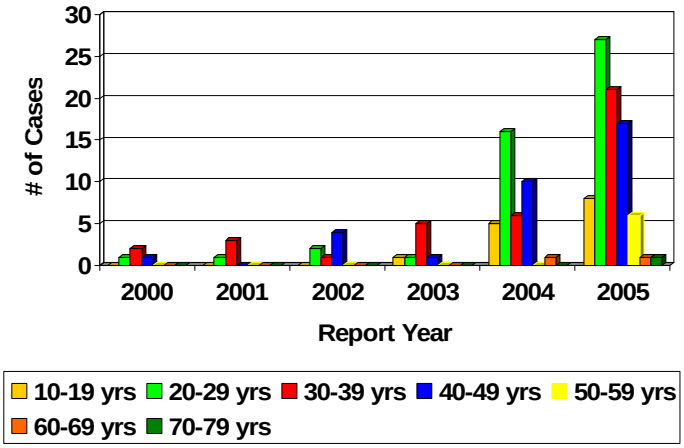
Infectious Syphilis by Ethnicity, Clark County, NV, 2000-2007



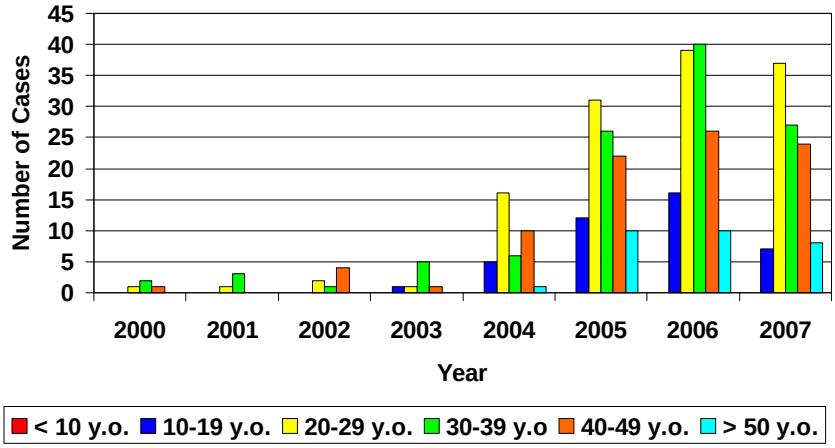
Infectious Syphilis Among MSM, Clark County, NV, 2000-2005*



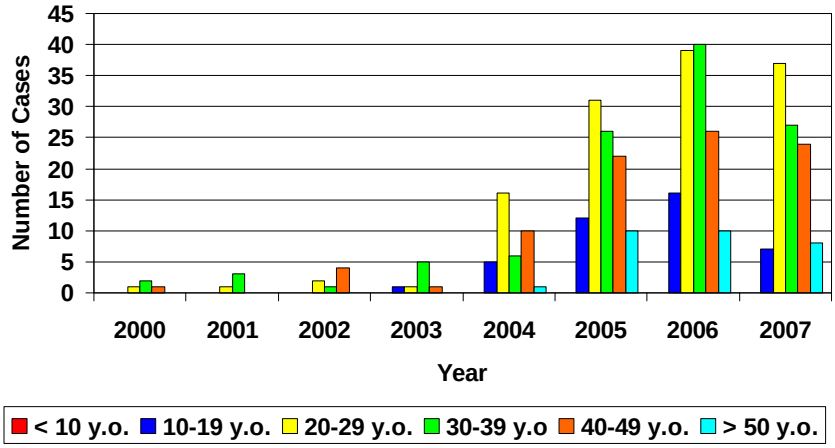
Infectious Syphilis by Age Category, Clark County, NV, 2000-2005*



Infectious Syphilis by Age Category, Clark County, NV, 2000-2007



Infectious Syphilis by Age Category, Clark County, NV, 2000-2007



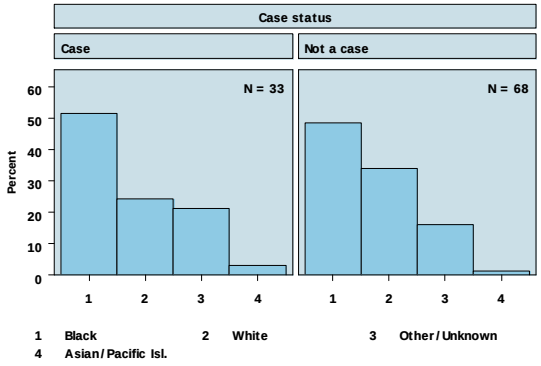
Congenital Syphilis, Selected States, 2006

Rank	State	Cases	Rate**
1	Nevada	15	42.6
2	Maryland	19	25.5
3	N. Mexico	7	24.7
4	Texas	79	20.7
---	U.S. Total	349	8.5

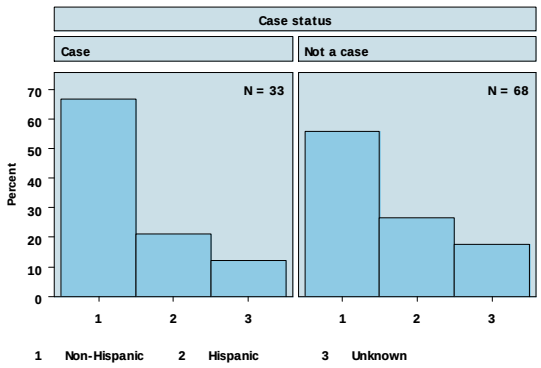
*** Ranked by rate**
**** Cases and rates in infants < 1 year of age (per 100,000)**

Case classification		Case	Not a case	All
Not a case	N	0	68	68
	%	0	100.0%	67.3%
Syphilitic stillbirth	N	2	0	2
	%	6.1%	0	2.0%
Presumptive case	N	31	0	31
	%	93.9%	0	30.7%

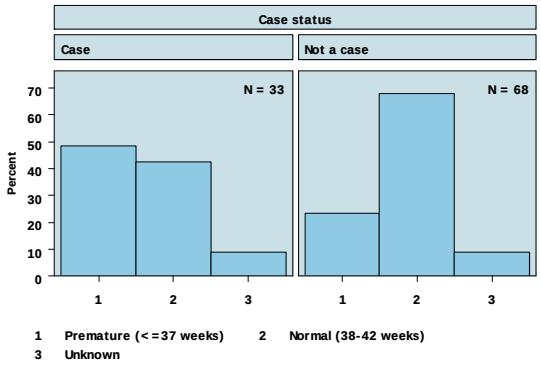
Baby status of the same mother	N	% of unique mothers
1 case(s)	21	23.6%
1 non-case(s)	60	67.4%
1 non-case(s) and 1 case(s)	2	2.2%
2 case(s)	3	3.4%
2 non-case(s)	1	1.1%
2 non-case(s) and 2 case(s)	2	2.2%



Infant's race		Case	Not a case	All
Asian/Pacific Isl.	N	1	1	2
	%	3.0%	1.5%	2.0%
Black	N	17	33	50
	%	51.5%	48.5%	49.5%
White	N	8	23	31
	%	24.2%	33.8%	30.7%
Other/Unknown	N	7	11	18
	%	21.2%	16.2%	17.8%



Infant's ethnicity		Case	Not a case	All
Hispanic	N	7	18	25
	%	21.2%	26.5%	24.8%
Non-Hispanic	N	22	38	60
	%	66.7%	55.9%	59.4%
Unknown	N	4	12	16
	%	12.1%	17.6%	15.8%



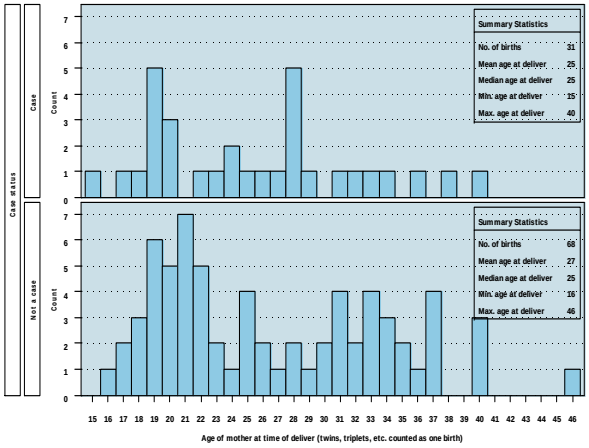
Gestational age		Case	Not a case	All
Normal (38-42 weeks)	N	14	46	60
	%	42.4%	67.6%	59.4%
Premature (<=37 weeks)	N	16	16	32
	%	48.5%	23.5%	31.7%
Unknown	N	3	6	9
	%	9.1%	8.8%	8.9%

*****The odds of premature deliver is 3.3 times higher among cases than non-cases (95% confidence interval for odds ratio: [1.32, 8.21]).

		Case status		
		Case	Not a case	All
Mother's marital status				
Single, never married	N	24	44	68
	%	75.0%	64.7%	68.0%
Married	N	6	21	27
	%	18.8%	30.9%	27.0%
Separated, divorced	N	1	2	3
	%	3.1%	2.9%	3.0%
Other/Unknown	N	1	1	2
	%	3.1%	1.5%	2.0%

*****At time when records were written to STD-MIS congenital syphilis module.

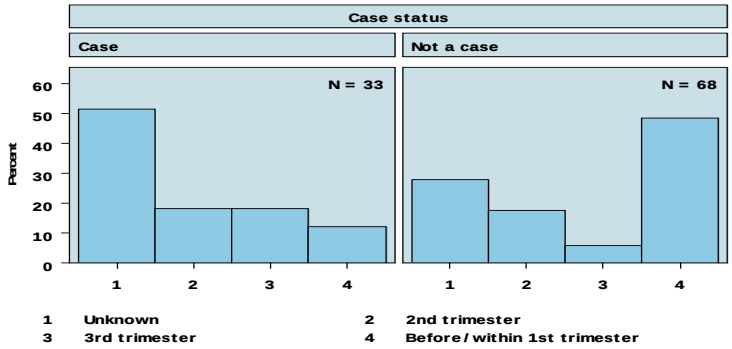
******One twin birth.



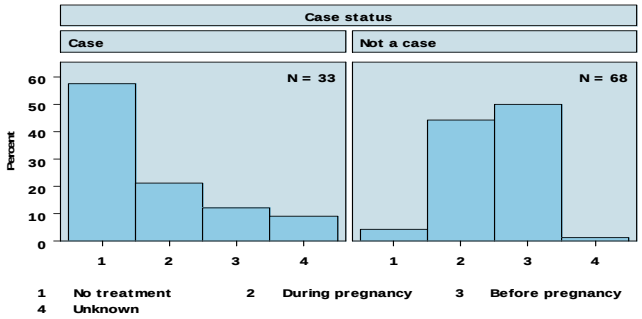
		Case status		
		Case	Not a case	All
Age of mother at time of deliver				
<=15 years	N	1	0	1
	%	3.2%	0	1.0%
16-20 years	N	10	17	27
	%	32.3%	25.0%	27.3%
21-25 years	N	5	19	24
	%	16.1%	27.9%	24.2%
26-30 years	N	8	8	16
	%	25.8%	11.8%	16.2%
31-35 years	N	4	15	19
	%	12.9%	22.1%	19.2%
36-40 years	N	3	8	11
	%	9.7%	11.8%	11.1%
46-50 years	N	0	1	1
	%	0	1.5%	1.0%

*****Of the 89 unique mothers, 88 have DOB recorded in STD-MIS, amounting to a total of 99 births where age at delivery is known.

		Case status		
		Case	Not a case	All
Prenatal care?				
Yes	N	22	60	*82*
	%	68.8%	88.2%	*82.0%*
No	N	7	4	*11*
	%	21.9%	5.9%	*11.0%*
Unknown	N	3	4	*7*
	%	9.4%	5.9%	*7.0%*
Trimester when had 1st prenatal care visit				
Unknown	N	20	26	*46*
	%	62.5%	38.2%	*46.0%*
1st (weeks 1-14)	N	6	25	*31*
	%	18.8%	36.8%	*31.0%*
2nd (weeks 15-28)	N	4	15	*19*
	%	12.5%	22.1%	*19.0%*
3rd (weeks 29 through labor/deliver)	N	2	2	*4*
	%	6.3%	2.9%	*4.0%*
Prenatal care visits				
Unknown	N	16	28	*44*
	%	50.0%	41.2%	*44.0%*
0-5 times	N	9	6	*15*
	%	28.1%	8.8%	*15.0%*
6-10 times	N	3	20	*23*
	%	9.4%	29.4%	*23.0%*
>10 times	N	4	14	*18*
	%	12.5%	20.6%	*18.0%*



When had 1st nontreponemal test		Case	Not a case	All
Before/within 1st trimester	N	4	33	37
	%	12.1%	48.5%	36.6%
2nd trimester	N	6	12	18
	%	18.2%	17.6%	17.8%
3rd trimester	N	6	4	10
	%	18.2%	5.9%	9.9%
Unknown	N	17	19	36
	%	51.5%	27.9%	35.6%



Mother's last treatment for syphilis		Case	Not a case	All
Before pregnancy	N	4	34	38
	%	12.1%	50.0%	37.6%
During pregnancy	N	7	30	37
	%	21.2%	44.1%	36.6%
No treatment	N	19	3	22
	%	57.6%	4.4%	21.8%
Unknown	N	3	1	4
	%	9.1%	1.5%	4.0%

*The likelihood of being a congenital syphilis case decreased significantly with earlier treatment for mothers (Chi-square=41.5, P value<0.0001)