

Sexually Transmitted Disease Surveillance 2000 Supplement

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**Gonococcal Isolate Surveillance Project (GISP)
Annual Report - 2000**

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This report is available from the Internet via the CDC home page address at <http://www.cdc.gov/std/GISP2000/> and at <http://www.cdc.gov/ncidod/dastlr/gcdir/Resist/gisp.html>. The 2000 STD Surveillance Report may be found at <http://www.cdc.gov/std/stats/>.

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GONOCOCCAL ISOLATE SURVEILLANCE PROJECT (GISP) ANNUAL REPORT - 2000

Introduction

Gonorrhea is the second most frequently reported communicable disease in the United States. Gonorrhea rates in the United States declined 73.9% during 1975-1997. However, in 1998, the reported rate of gonococcal infections in the United States (131.6 cases per 100,000 persons) increased by 7.9% compared with the 1997 rate (122.0 cases per 100,000 persons). The gonorrhea rates in 1999 (132.0 cases per 100,000 persons) and 2000 (131.6 cases per 100,000 persons) were essentially unchanged from 1998 (**Figure 1**).¹ Gonorrhea rates remain high in the southeastern states, among minorities, and among adolescents of all racial and ethnic groups (**Figures 2, 3, and 4**).^{2,3} The health impact of gonorrhea is largely related to its role as a major cause of pelvic inflammatory disease, which frequently leads to infertility or ectopic pregnancy.⁴ In addition, recent data suggest that gonorrhea facilitates HIV transmission.^{5,6}

Control of gonorrhea has been complicated by the development of resistance to antimicrobial agents. The appearance of penicillinase-producing *Neisseria gonorrhoeae* (PPNG) and chromosomally mediated penicillin- and tetracycline-resistant *N. gonorrhoeae* (CMRNG) in the 1970s eventually led to the abandonment of these drugs as therapies for gonorrhea. The current CDC recommended primary therapies for gonorrhea are two broad-spectrum cephalosporins, ceftriaxone and cefixime, and two fluoroquinolones, ciprofloxacin and ofloxacin.⁷ However, fluoroquinolone-resistant *N. gonorrhoeae* have been reported from many parts of the world, including the United States.⁸⁻¹²

GISP Overview

The Gonococcal Isolate Surveillance Project (GISP) was established in 1986 to monitor trends in antimicrobial susceptibilities of strains of *N. gonorrhoeae* in the United States in order to establish a rational basis for the selection of gonococcal therapies.¹³ GISP is a collaborative project among selected sexually transmitted diseases (STD) clinics, five regional laboratories, and the Centers for Disease Control and Prevention (CDC) (Division of STD Prevention, National Center for HIV, STD, and TB Prevention, and the Division of AIDS, STD, and TB Laboratory Research, National Center for Infectious Diseases).

In GISP, *N. gonorrhoeae* isolates are collected from the first 25 men with urethral gonorrhea attending STD clinics each month in 25 cities in the United States. At regional laboratories, the susceptibilities of these isolates to penicillin, tetracycline, spectinomycin, ciprofloxacin, ceftriaxone, cefixime, and azithromycin are determined by agar dilution. Minimum inhibitory concentrations (MICs) are measured, and values are interpreted according to criteria recommended by the National Committee for Clinical Laboratory Standards (NCCLS).^{14,15}

Important GISP findings have included:

- the ongoing high prevalence of resistance to penicillin and tetracycline;
- the appearance, with low prevalence, of decreased susceptibility and resistance to the fluoroquinolones;⁹⁻¹²
- the absence of resistance to the broad-spectrum cephalosporins;
- the increasing proportion of gonorrhea cases identified in men who have sex with men;^{16, 17} and
- the appearance, with low level prevalence, of decreased susceptibility to the macrolides.¹²

GISP findings contributed to the development of CDC's STD treatment recommendations in 1993, 1998, and 2001,^{7, 18,19} and stimulated further investigation of the increase in gonorrhea among men who have sex with men (MSM).^{16, 17}

2000 GISP Sites

A total of 25 STD clinics contributed 5,461 gonococcal isolates to GISP in 2000 (**Figure 5**). Seventeen sites have participated continuously since 1988: Albuquerque, Anchorage, Atlanta, Baltimore, Birmingham, Cincinnati, Denver, Honolulu, Long Beach, New Orleans, Philadelphia, Phoenix, Portland, San Antonio, San Diego, San Francisco, and Seattle. Eight sites joined GISP after 1988: Cleveland, Kansas City, Nassau County, and Orange County in 1991; Minneapolis in 1992; Chicago in 1996; Miami in 1998; and Dallas in 2000. Two sites have had intermittent participation in GISP: Fort Bragg 1987-1990 and 1997-2000, and St. Louis 1987-1993 and 1995-2000. The GISP Regional Laboratories are located in Atlanta, Birmingham, Cleveland, Denver, and Seattle.

DESCRIPTION OF GISP DATA

Aggregate data from all GISP sites are described and illustrated in the first part of this report. The clinic-specific data illustrate substantial geographic variation in patient characteristics and antimicrobial susceptibility of gonococcal strains; clinic-specific figures are provided in the second part of this report.

Demographic and Clinical Characteristics

Age The age distribution of GISP participants compared with nationally reported male gonorrhea patients in 2000 is shown in **Figure 6**. In 2000, GISP had proportionally fewer <20 year olds than were reported nationally for male gonorrhea cases; otherwise the two groups had similar age distributions. GISP participants in 2000 ranged in age from 13 to 85 years.

Race/Ethnicity The race/ethnicity distribution of GISP participants compared with nationally reported male gonorrhea patients in 2000 is shown in **Figure 7**. White and Hispanic males were slightly over represented in GISP while black males were slightly under represented compared with the race/ethnicity distribution of nationally reported male gonorrhea patients in 2000.

Sexual Orientation Overall, the proportion of GISP isolates coming from MSM increased from 4.0% in 1988 to 13.9% in 2000. The proportion of GISP participants who were MSM has increased every year since 1993 (**Figure 8**).¹⁷ The number of clinics having >5% of GISP isolates from MSM rose from seven clinics in 1990 to fourteen clinics in 2000. These fourteen clinics reported 91.7% (633/690) of the MSM in GISP in 2000. For each of the fourteen clinics, the percentage of patients who were MSM in 2000 ranged from 6.5% to 70.0%, with a median of 19.1% (**Figure 9**). A 1996 study of eight of these clinics showed that in five of the eight (Honolulu, Portland, San Diego, San Francisco, and Seattle) the proportional increases corresponded to absolute increases in numbers of MSM with gonorrhea.^{16, 17}

Reason for Clinic Attendance Most GISP participants in 2000 presented to the clinic as volunteers; others were gonorrhea contacts or presented for test-of-cure cultures (**Figure 10**). There has been little change in this distribution over time. Dysuria and/or urethral discharge was present in 96.9% of GISP participants in 2000 and 3.1% had no symptoms; these proportions have been stable over time.

History of Gonorrhea The percentage of GISP participants who reported a history of gonorrhea (ever) peaked at 49.9% in 1996, declined to 45.0% in 1999, and increased to 47.6% in 2000. The percentage of GISP participants with a documented previous episode of gonorrhea in the last 12 months decreased from 21.5% in 1992, the first year this information was collected, to 17.2% in 1999, but then increased to 23.6% in 2000 (**Figure 11**).

Antimicrobial Treatment The antimicrobial agents given to GISP participants for gonorrhea therapy are shown in **Figure 12**. The proportion of GISP patients treated with cephalosporins decreased from a high of 84.7% in 1990 to 58.0% in 2000, while the proportion treated with fluoroquinolones (ciprofloxacin or ofloxacin) increased from none in 1988 to 38.7% in 2000. The antimicrobial agents given to GISP participants for treatment of *Chlamydia trachomatis* infection are shown in **Figure 13**. The proportion of GISP patients treated with doxycycline or tetracycline decreased from a high of 99.4% in 1990 to 67.2% in 2000, while the proportion treated with azithromycin increased from 0.2% in 1992 (the first year of GISP that azithromycin was identified as being used for *C. trachomatis* therapy) to 27.6% in 2000.

Susceptibility to Antimicrobial Agents

Antimicrobial Resistance Criteria

Antimicrobial resistance in *N. gonorrhoeae* is defined by the criteria recommended by the National Committee on Clinical Laboratory Standards (NCCLS):¹⁵

- Penicillin, MIC ≥ 2.0 $\mu\text{g/ml}$
- Tetracycline, MIC ≥ 2.0 $\mu\text{g/ml}$
- Spectinomycin, MIC ≥ 128.0 $\mu\text{g/ml}$
- Ciprofloxacin, MIC 0.125 - 0.5 $\mu\text{g/ml}$ (intermediate resistance)
- Ciprofloxacin, MIC ≥ 1.0 $\mu\text{g/ml}$ (resistance)
- Ceftriaxone, MIC ≥ 0.5 $\mu\text{g/ml}$ (decreased susceptibility)
- Cefixime, MIC ≥ 0.5 $\mu\text{g/ml}$ (decreased susceptibility)

NCCLS criteria for resistance to ceftriaxone, cefixime, erythromycin, and azithromycin and for decreased susceptibility to erythromycin and azithromycin have not been established for *N. gonorrhoeae*.

Susceptibility to Penicillin and Tetracycline

Overall, 24.8% (1352/5461) of isolates collected in 2000 were resistant to penicillin, tetracycline, or both (**Figure 14**); this proportion has been relatively constant since 1988. The percentage of penicillinase-producing *N. gonorrhoeae* (PPNG) declined from a peak of 11.0% in 1991 to 1.6% in 2000 (**Figure 15**). In contrast, the percentage of isolates with chromosomally mediated resistance to penicillin (PenR) increased annually from 0.5% in 1988 to 5.7% in 1999 and then decreased to 3.8% in 2000 (**Figure 16**). The prevalence of plasmid-mediated resistance to tetracycline (TRNG), 5.9% in 2000, has varied little since 1988 (**Figure 15**). Similarly, the prevalence of chromosomally mediated resistance to tetracycline only (TetR), 5.2% in 2000, has been relatively stable since 1989, except for a transient increase in 1995 (**Figure 16**). However, the prevalence of isolates with chromosomally mediated resistance to both penicillin and tetracycline (CMRNG) increased from 3.0% in 1989 to 7.7% in 2000. The prevalence of isolates with plasmid-mediated

resistance to both penicillin and tetracycline (PPNG-TRNG), 0.6% in 2000, continues to be very low.

Susceptibility to Spectinomycin

All isolates were susceptible to spectinomycin in 2000. There have been five spectinomycin-resistant isolates in GISP; their locations and years were: St. Louis-1988, Honolulu-1989, San Francisco-1989, Long Beach-1990, and West Palm Beach-1994.

Susceptibility to Ceftriaxone

The distributions of MICs to ceftriaxone in 1988 and 2000 are shown in **Figure 17**. Over this time period, there has been a subtle shift towards higher ceftriaxone MICs. In 2000, all isolates were susceptible to ceftriaxone. There have been four isolates with decreased susceptibility to ceftriaxone in GISP; all four had MICs of 0.5 $\mu\text{g}/\text{ml}$. Their locations and years were: San Diego-1987, Cincinnati-1992 and 1993, and Philadelphia-1997.

Susceptibility to Cefixime

The distributions of MICs to cefixime in 1992 (the first year of cefixime susceptibility testing) and 2000 are shown in **Figure 18**. In 2000, all isolates were susceptible to cefixime. There have been 41 isolates with decreased susceptibility to cefixime in GISP; their MICs have ranged from 0.5-2.0 $\mu\text{g}/\text{ml}$.

Susceptibility to Ciprofloxacin

The correlation of ciprofloxacin MICs of 0.125-0.5 $\mu\text{g}/\text{ml}$ with treatment failure when a fluoroquinolone is used to treat a gonococcal infection is not well established. However, one study of infections with resistant strains treated with ciprofloxacin 500 mg orally showed a treatment failure rate of 45% for strains with MICs of $\geq 4.0 \mu\text{g}/\text{ml}$.²⁰ Gonococcal isolates with intermediate resistance and resistance to ciprofloxacin also have intermediate resistance and resistance to other fluoroquinolones. Criteria recommended for interpreting ofloxacin MICs are: intermediate resistance, MICs 0.5-1.0 $\mu\text{g}/\text{ml}$; resistance, MICs $\geq 2.0 \mu\text{g}/\text{ml}$.¹⁵

The distributions of MICs to ciprofloxacin in 1990 (the first year of ciprofloxacin susceptibility testing) and 2000 are shown in **Figure 19**. A total of 1.9% (104/5461) of isolates exhibited intermediate resistance or resistance to ciprofloxacin (MICs $\geq 0.125 \mu\text{g}/\text{ml}$) in 2000 compared with 1.4% (74/5180) of isolates tested in 1999 (**Figure 20**).

Intermediate resistance In 2000, 1.6% (85/5461) of all GISP isolates exhibited intermediate resistance to ciprofloxacin (MICs 0.125-0.5 $\mu\text{g}/\text{ml}$). Of these isolates, 34.1% (29/85) came from San Francisco where they accounted for 9.9% (29/294) of isolates; 29.4% (25/85) came from Cincinnati where they accounted for 9.5% (25/262) of isolates tested; and 11.8% (10/85) came from Phoenix where they accounted for 3.4% (10/292) of isolates tested in 2000. In 2000, isolates of *N. gonorrhoeae* exhibiting intermediate resistance to ciprofloxacin were also found in Atlanta (4), Chicago (1), Cleveland (2), Dallas (1), Honolulu (2), Miami (1), Minneapolis (1), Philadelphia (1), Portland (3), San Diego (1), and Seattle (5).

Resistance Nineteen isolates (0.4%; 19/5461) were resistant to ciprofloxacin (MICs $\geq 1.0 \mu\text{g}/\text{ml}$) in 2000, which was similar to 1999 (0.4%; 19/5180) and consistently higher than the number identified in previous years. Of note, 31.6% (6/19) of these ciprofloxacin-resistant isolates came from Honolulu where they accounted for 14.3% (6/42) of GISP isolates (range of MICs, 2.0-16.0 $\mu\text{g}/\text{ml}$) which was the same as in 1999 (14.3% or 7/49). Additionally, 31.6% (6/19) of the ciprofloxacin-resistant isolates were from Orange County where they accounted for 5.6% (6/107) of GISP isolates (range of MICs 2.0-8.0 $\mu\text{g}/\text{ml}$). The locations, numbers, and MICs of the other seven ciprofloxacin-resistant 2000 GISP isolates

were: Anchorage (2), 1 $\mu\text{g}/\text{ml}$ and 8 $\mu\text{g}/\text{ml}$; New Orleans (1), 1.0 $\mu\text{g}/\text{ml}$; San Diego (1), 4.0 $\mu\text{g}/\text{ml}$; Seattle (2), 1.0 $\mu\text{g}/\text{ml}$ and 2.0 $\mu\text{g}/\text{ml}$; and San Francisco (1), 8.0 $\mu\text{g}/\text{ml}$.

Susceptibility to Azithromycin

The correlation of azithromycin MICs ≥ 0.5 $\mu\text{g}/\text{ml}$ with clinical treatment failure when the 2.0 gm azithromycin dose is used to treat a gonococcal infection is not known. However, clinical treatment failures have been reported with the 1.0 gm azithromycin dose for strains with MICs of 0.125-0.5 $\mu\text{g}/\text{ml}$.²¹⁻²⁴

The distributions of MICs to azithromycin in 1992 (the first year of azithromycin susceptibility testing) and in 2000 are shown in **Figure 21**. Over this time period, there has been a shift towards higher azithromycin MICs. In 1992, 0.9% (34/3928) of isolates had azithromycin MIC ≥ 0.5 $\mu\text{g}/\text{ml}$ compared with 2.4% (132/5460) of such isolates in 2000. In 1992, there were no isolates with azithromycin MIC ≥ 1.0 $\mu\text{g}/\text{ml}$. In 2000, there were 19 isolates with azithromycin MIC ≥ 1.0 $\mu\text{g}/\text{ml}$; these isolates by location, number, and MIC are: Atlanta (2), 1.0 $\mu\text{g}/\text{ml}$ and 2.0 $\mu\text{g}/\text{ml}$; Birmingham (1), 1.0 $\mu\text{g}/\text{ml}$; Chicago (1), 1.0 $\mu\text{g}/\text{ml}$; Cleveland (1), 1.0 $\mu\text{g}/\text{ml}$; Dallas (1), 1.0 $\mu\text{g}/\text{ml}$; Fort Bragg (1), 2.0 $\mu\text{g}/\text{ml}$; Kansas City (4), two 1.0 $\mu\text{g}/\text{ml}$, one 2.0 $\mu\text{g}/\text{ml}$, and one 4.0 $\mu\text{g}/\text{ml}$; Long Beach (1), 2.0 $\mu\text{g}/\text{ml}$; Orange County (2), 1.0 $\mu\text{g}/\text{ml}$ and 2.0 $\mu\text{g}/\text{ml}$; San Diego (1), 2.0 $\mu\text{g}/\text{ml}$; San Francisco (3), two 1.0 $\mu\text{g}/\text{ml}$ and one 2.0 $\mu\text{g}/\text{ml}$; and Seattle (1), 2.0 $\mu\text{g}/\text{ml}$.

NON-GISP REPORTING OF RESISTANCE

The Association of Public Health Laboratories and STD project areas were informally surveyed in 2000-2001 to identify cities or states that routinely performed antimicrobial susceptibility testing of *N. gonorrhoeae* in 2000. Information was not available on 16 of the 65 STD project areas. In 2000, no testing outside GISP occurred in Alabama, Arkansas, Arizona, Baltimore, Chicago, Colorado, Connecticut, Delaware, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Missouri, Nevada, New Mexico, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Rhode Island, San Francisco, South Carolina, Tennessee, Vermont, Washington, D.C., Washington, or Wyoming. Information on testing in 2000 was available for 17 areas (**Table 1**).

Table 1. Non-GISP antimicrobial susceptibility testing of *N. gonorrhoeae* in 17 STD project areas in 2000.

Project Area	Total # Isolates	Cip S	Cip I	Cip R	Spc S	Spc R	Cfx S	Cfx DS	Cro S	Cro DS	Azi S	Azi DS ^a
CA												
San Diego	11	11 ^b	0	0	-	-	-	-	11	0	-	-
Santa Ana	11	11	0	0	11	0	11	0	11	0	10	1
FL	46	46	0	0	-	-	-	-	46	0	-	-
GA	534	534 ^b	0	0	534	0	-	-	534	0	-	-
HI	159	140	2	17	83	0	70	0	83	0	70	0
Los Angeles	1	1	0	0	-	-	-	-	1	0	-	-
MA	323	322	0	1	5	0	-	-	322	1	-	-
MI	225	224 ^b	0	0	-	-	224	0	225	0	-	-
MN	255	253	2	0	255	0	255	0	255	0	-	-
MS	1282	1282	0	0	-	-	-	-	61	0	-	-
MT	4	-	-	-	4	0	-	-	4	0	-	-
NH	17	17	0	0	17	0	-	-	17	0	-	-
NJ	253	253	0	0	253	0	253	0	253	0	-	-
NY												
Buffalo	77	75	1	1	77	0	74	3	75	2	-	-
NYC	2092	2086 ^b	2	4	1251	0	-	-	2092	0	-	-
TX	84	84	0	0	-	-	-	-	84	0	-	-
UT	93	93 ^b	0	0	-	-	-	-	93	0	-	-
VA	15	15	0	0	15	0	-	-	15	0	-	-
WI												
Milwaukee	203	198	4	1	-	-	-	-	203	0	-	-
Total	5685	5645	11	24	2505	0	887	3	4385	3	80	1

Cip=ciprofloxacin; Spc=spectinomycin; Cfx=cefixime; Cro=ceftriaxone; Azi=azithromycin; S=susceptible; DS=decreased susceptibility; I=intermediate resistant; R=resistant.

The testing methodology for all sites except Texas and Florida was by disk diffusion; Texas and Florida used the E-test method.

^aFor this table, AziDS is defined as an isolate with azithromycin disk inhibition zone size ≤ 35 mm.

^bGeorgia, Michigan, Utah, and San Diego, California tested all isolates against ofloxacin, rather than against ciprofloxacin. New York City tested isolates against ciprofloxacin from January until July 2000 and against ofloxacin from August until December 2000.

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ADDITIONAL RESOURCES

Recent publications using GISP data include MMWR articles in March 1998¹¹ and September 2000,¹² and a June 2001 article in the American Journal of Public Health.¹⁷ Presentations of GISP data were made at the International Conference on Emerging Infectious Diseases in July 2000,^{25,26} the Annual Meeting of the Infectious Diseases Society of America in September 2000,²⁷ and the International Pathogenic *Neisseria* Conference in November 2000.²⁸

Additional surveillance data on *N. gonorrhoeae* and other STDs may be found in the 2000 STD Surveillance Report (<http://www.cdc.gov/std/stats/>). Additional information on resistant *N. gonorrhoeae* may also be obtained through CDC's website (<http://www.cdc.gov/ncidod/dastlr/gcdir/gono.html>).

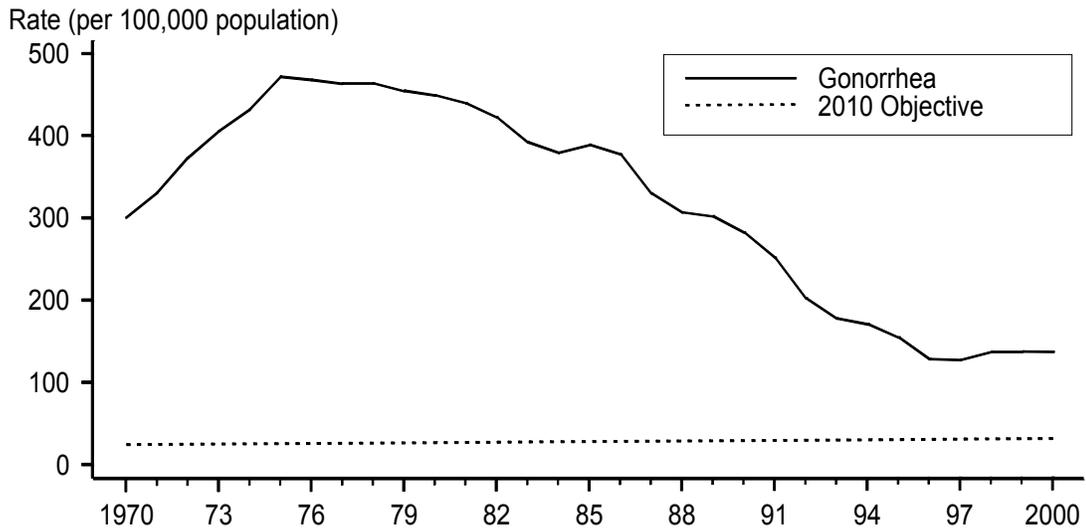
Information on the Public Health Action Plan to Combat Antimicrobial Resistance may be found on the CDC webpage (<http://www.cdc.gov/drugresistance/actionplan/>). The World Health Organization (WHO) webpage contains information on the WHO Global Strategy for Containment of Antimicrobial Resistance (<http://www.who.int/emc/amr.html>) and on the UNAIDS/WHO Guidelines for Sexually Transmitted Infections Surveillance (<http://www.who.int/emc-documents/STId/docs/whocdscsredc993.pdf>).

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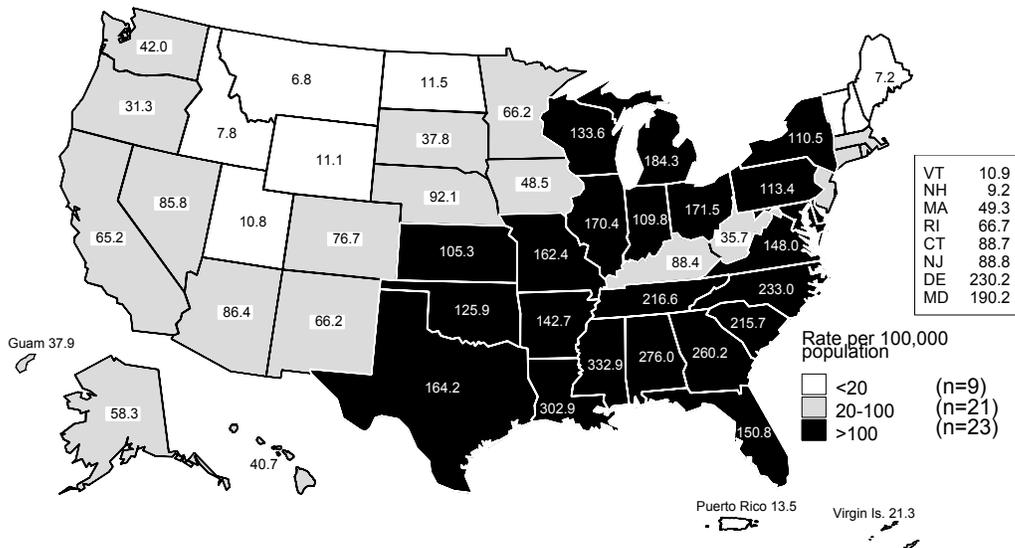
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Figure 1. Gonorrhea - Reported rates: United States, 1970-2000 and the Healthy People year 2010 objective



Note: Healthy People 2010 (HP2010) objective for gonorrhea is 19 cases per 100,000 population.

Figure 2. Gonorrhea — Rates by state: United States and outlying areas, 2000



Note: The total rate of gonorrhea for the United States and outlying areas (including Guam, Puerto Rico and Virgin Islands) was 129.9 per 100,000 population. The Healthy People year 2010 objective is 19 per 100,000 population.

Figure 3. Gonorrhea — Rates by race and ethnicity: United States, 1981-2000 and the Healthy People year 2010 objective

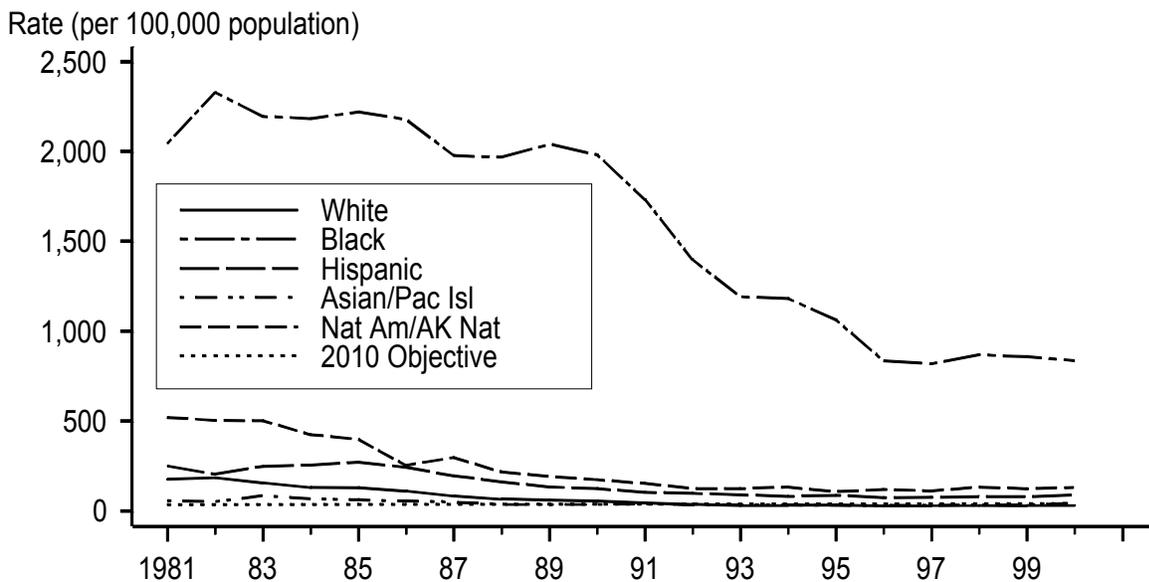


Figure 4. Gonorrhea — Age- and gender-specific rates: United States, 2000

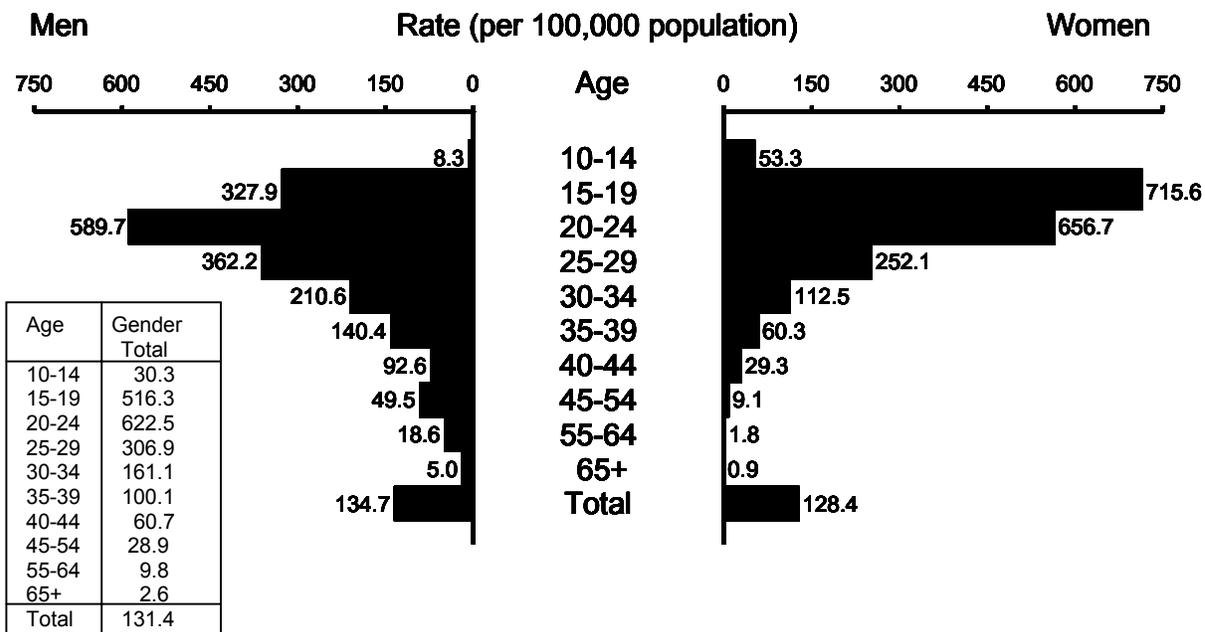


Figure 5. Gonococcal Isolate Surveillance Project (GISP) — Location of participating clinics and regional laboratories: United States, 2000

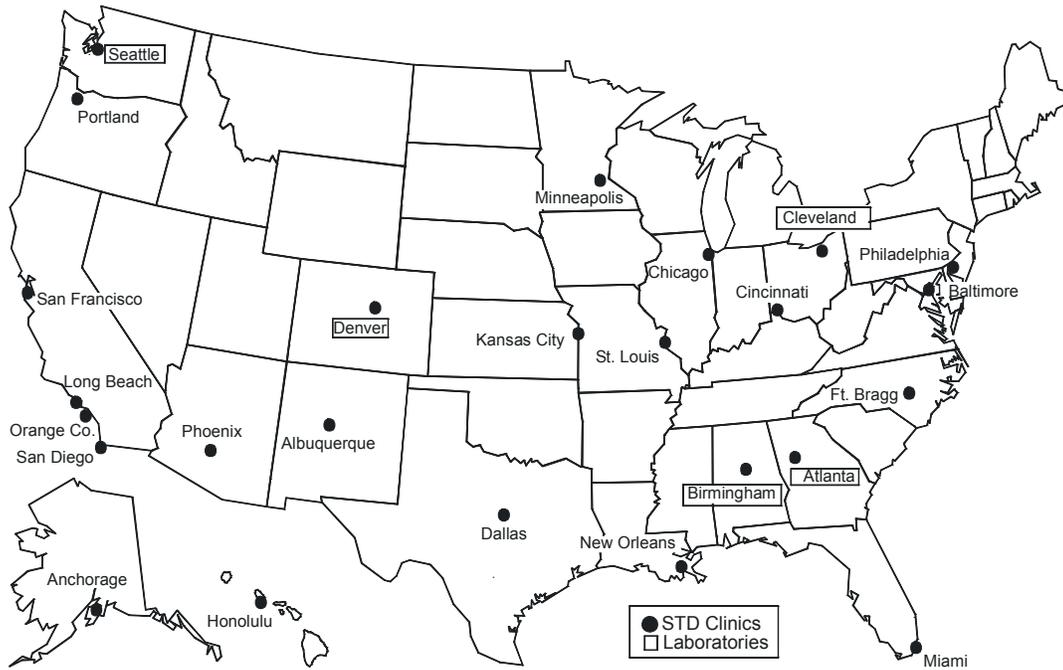
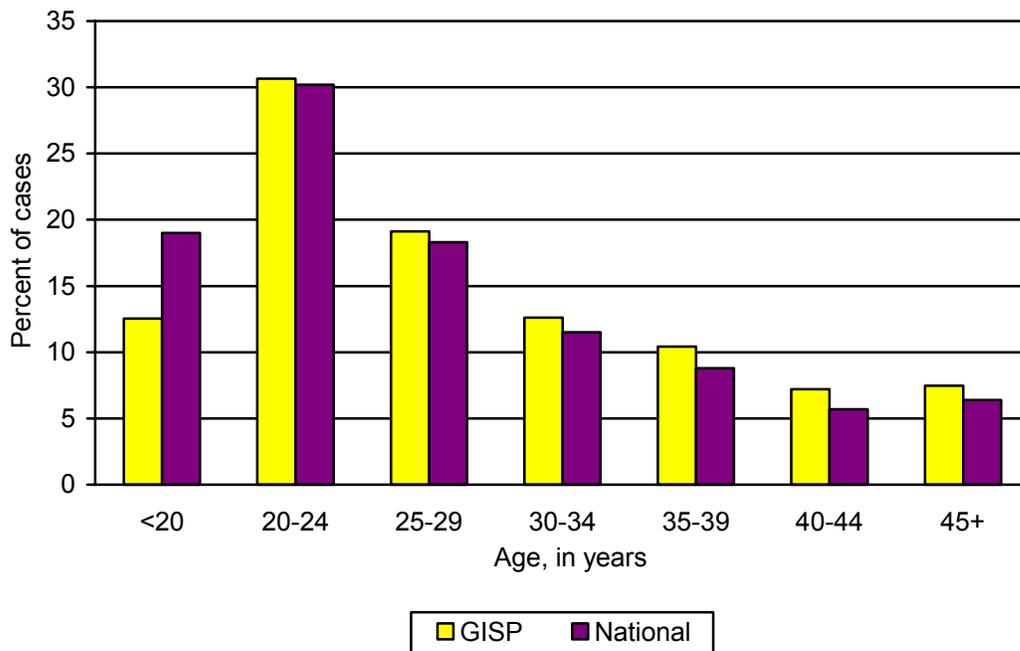
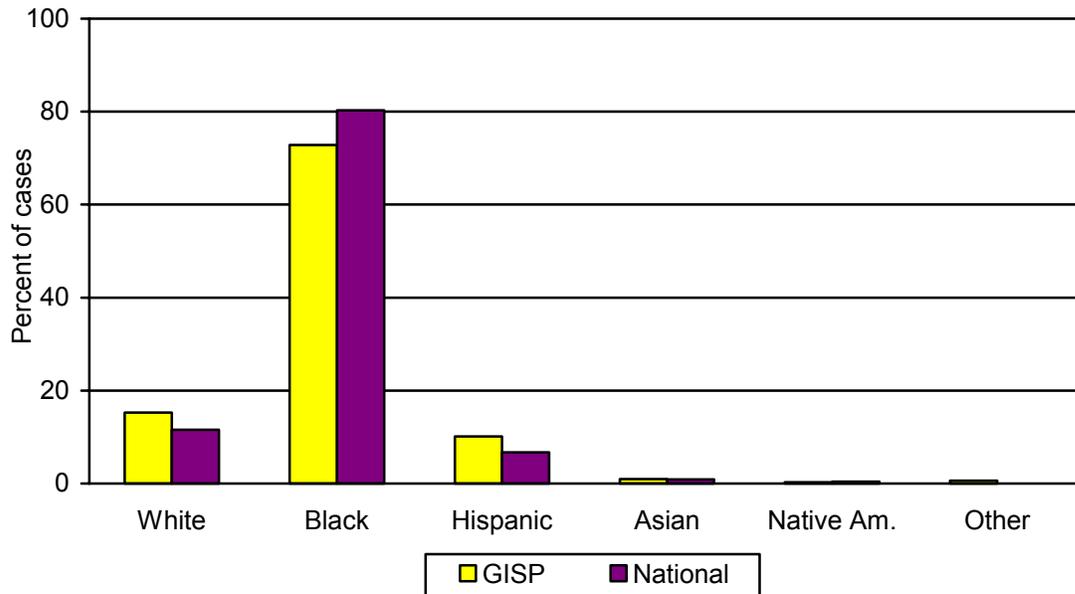


Figure 6. Age distribution of GISP participants and nationally reported gonorrhea cases in men, 2000



Note: The age <20 category includes ages 10-19 for national cases, and ages 13-19 for GISP; over 98% of the GISP cases in the <20 category are ages 15-19. National cases with unknown ages were excluded.

Figure 7. Race distribution of GISP participants and nationally reported cases of gonorrhea in men, 2000



Note: The “Other” category is not used in national gonorrhea reporting. National cases with unknown race were excluded.

Figure 8. Percentage of GISP cases that occurred among men who have sex with men (MSM), 1988-2000

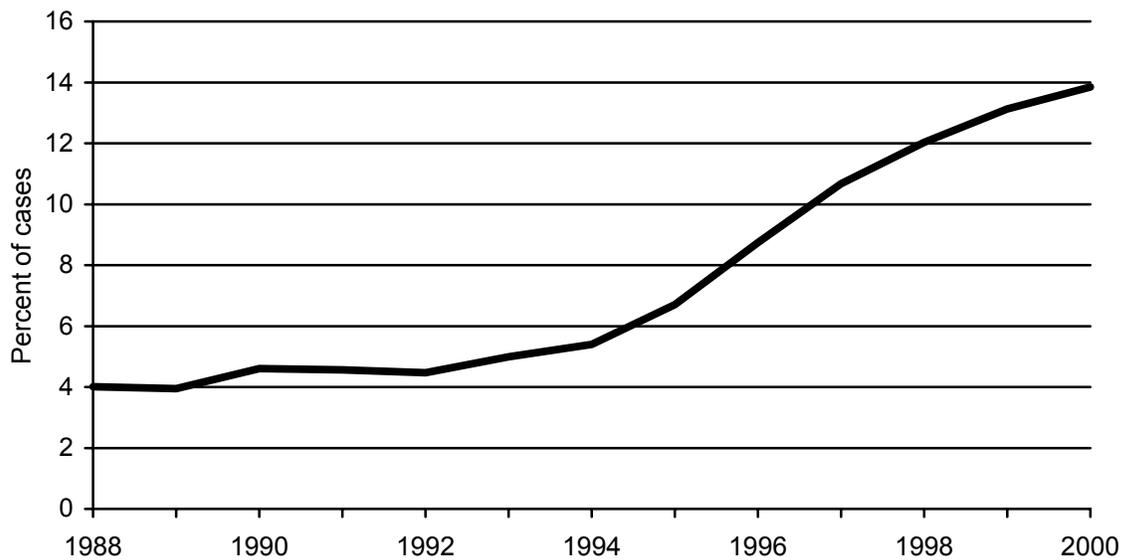
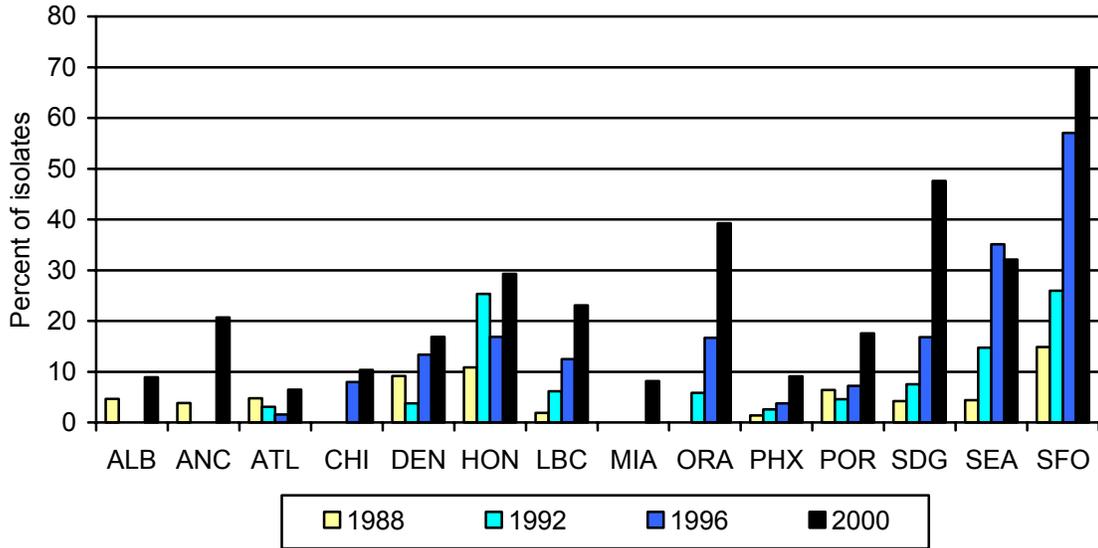
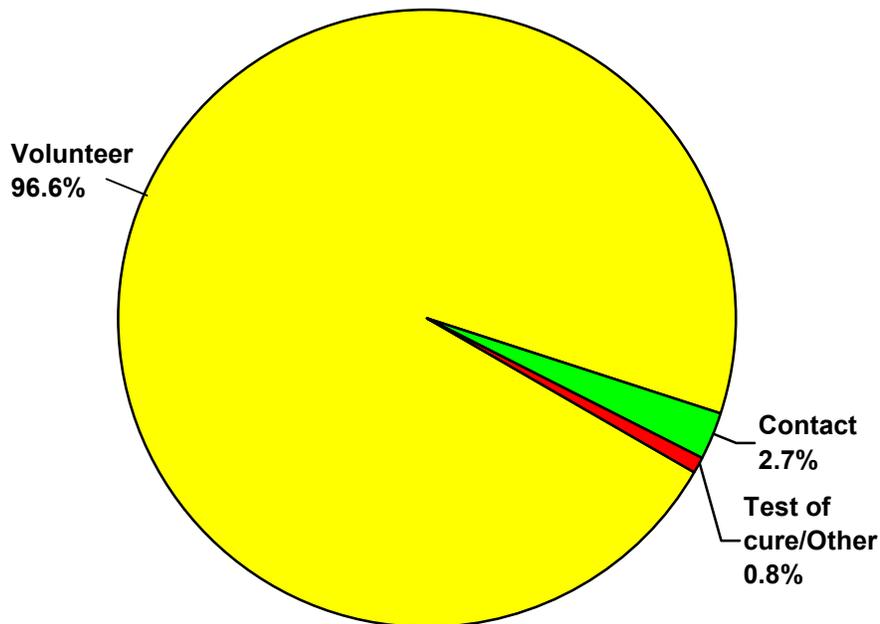


Figure 9. Percentage of GISP isolates from men who have sex with men in fourteen clinics, 1988, 1992, 1996, and 2000



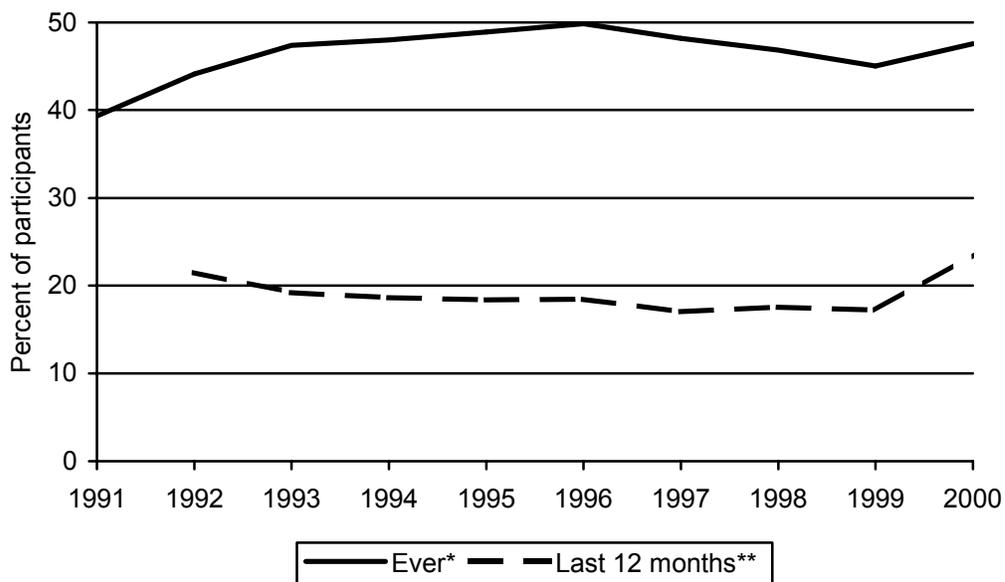
Note: In 2000, these fourteen clinics reported 91.7% (633/690) of GISP gonorrhea cases in men who have sex with men (MSM). Clinics include: ALB=Albuquerque, NM; ANC=Anchorage, AK; ATL=Atlanta, GA; CHI=Chicago, IL; DEN=Denver, CO; HON=Honolulu, HI; LBC=Long Beach, CA; MIA=Miami, FL; ORA=Orange County, CA; PHX=Phoenix, AZ; POR=Portland, OR; SDG=San Diego, CA; SEA=Seattle, WA; and SFO=San Francisco, CA.

Figure 10. Reason for clinic attendance among GISP participants, 2000



Contact=has sexual partner with gonorrhea

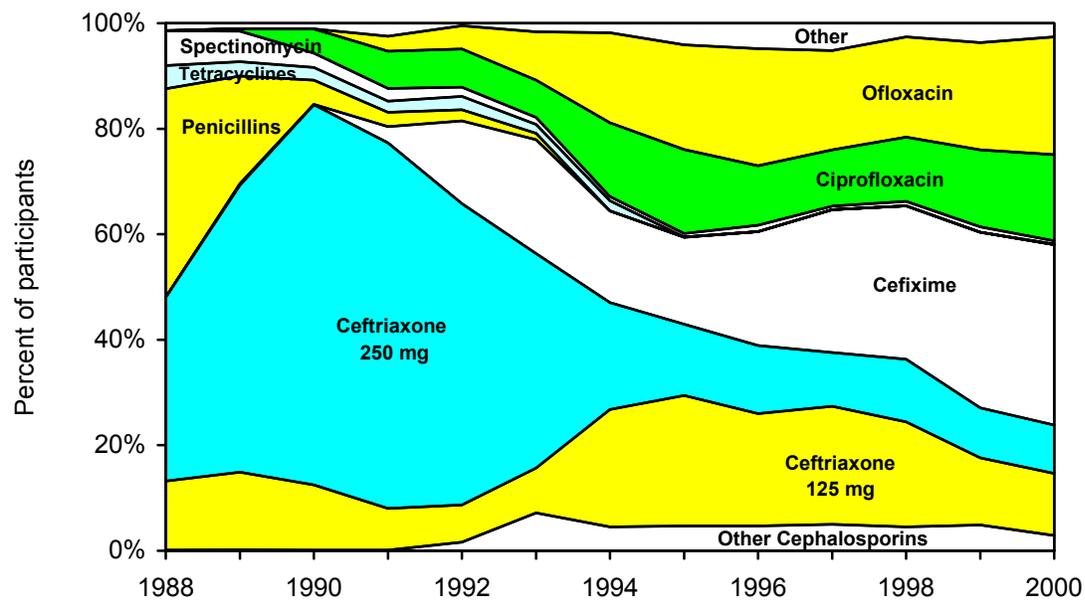
Figure 11. History of gonorrhea in GISP participants, 1991-2000



*Data first collected in 1991.

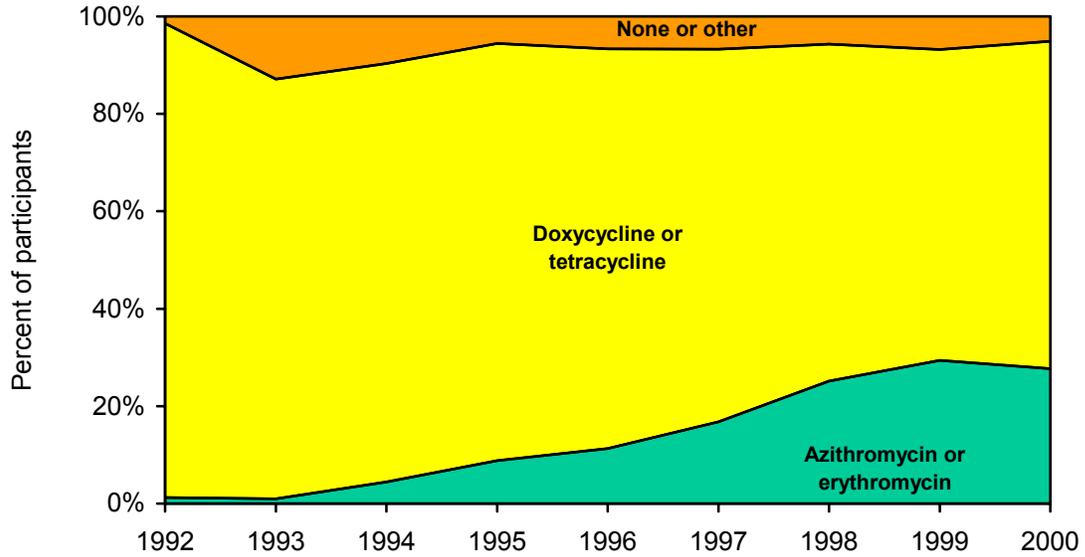
**Data first collected in 1992.

Figure 12. Drugs used to treat gonorrhea in GISP participants, 1988-2000



Note: "Other" includes macrolide or no drug therapy.

Figure 13. Drugs used to treat *Chlamydia trachomatis* infection in GISP participants, 1992-2000



For each year, "Other" accounted for only 0 - 0.9% of *C. trachomatis* treatment and erythromycin accounted for only 0.1 - 1.0% of *C. trachomatis* treatment.

Figure 14. Penicillin and tetracycline resistance among GISP isolates, 2000

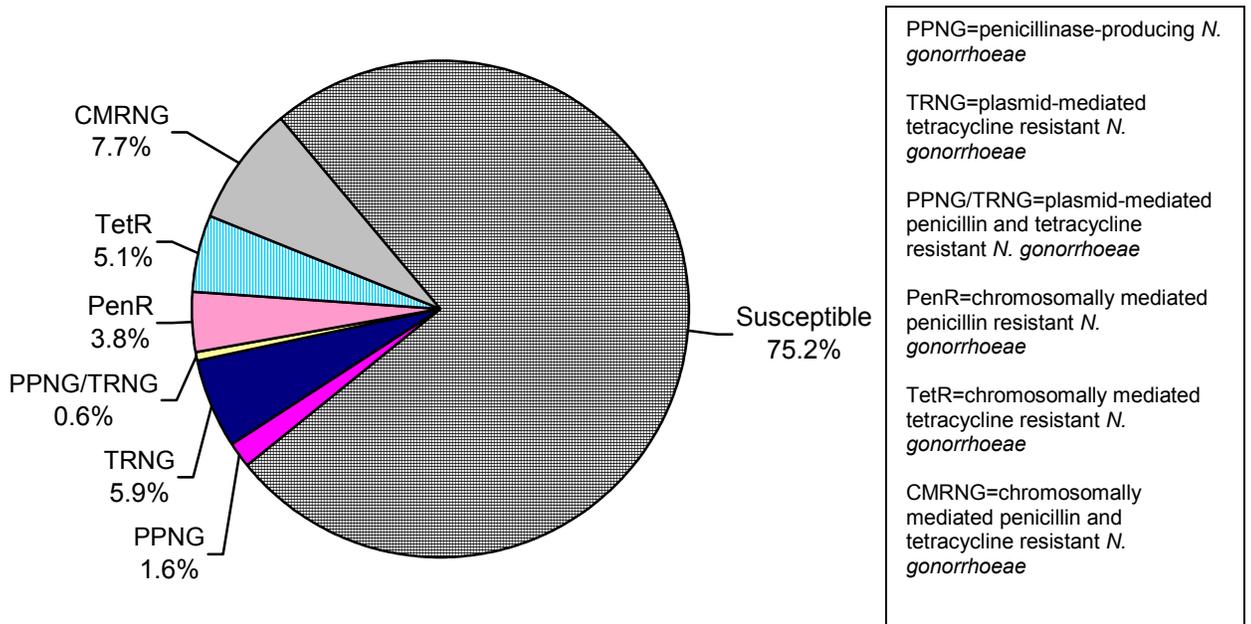


Figure 15. Plasmid-mediated resistance to penicillin and tetracycline among GISP isolates, 1988-2000

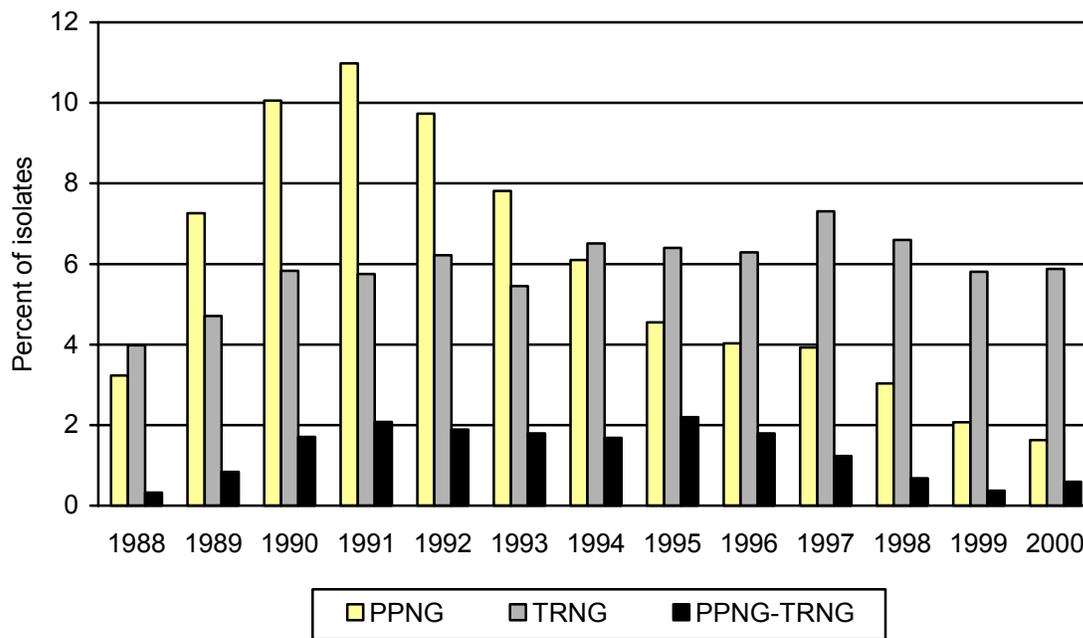


Figure 16. Chromosomally mediated resistance to penicillin and tetracycline among GISP isolates, 1988-2000

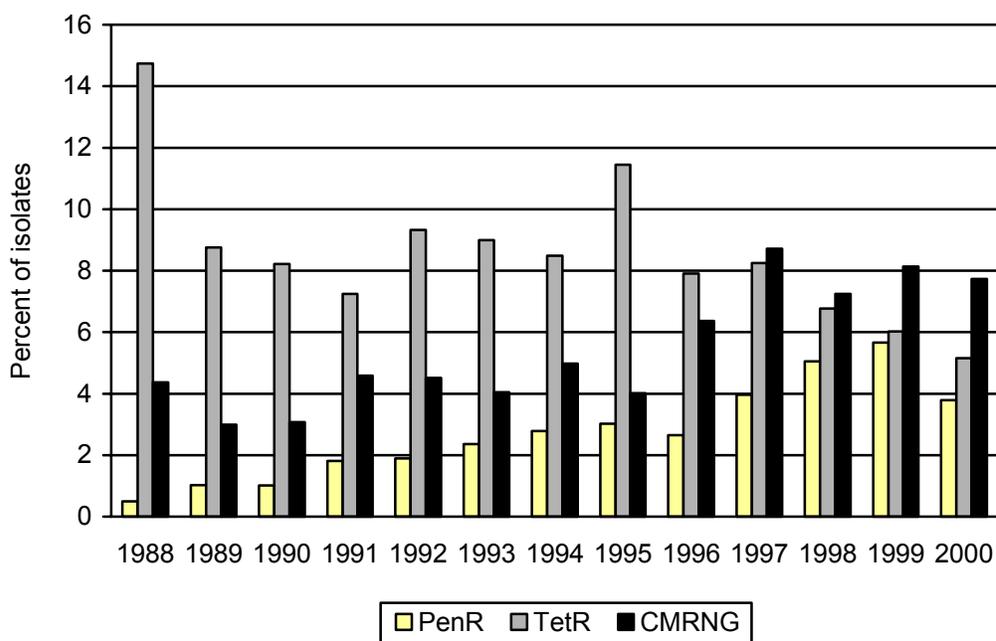
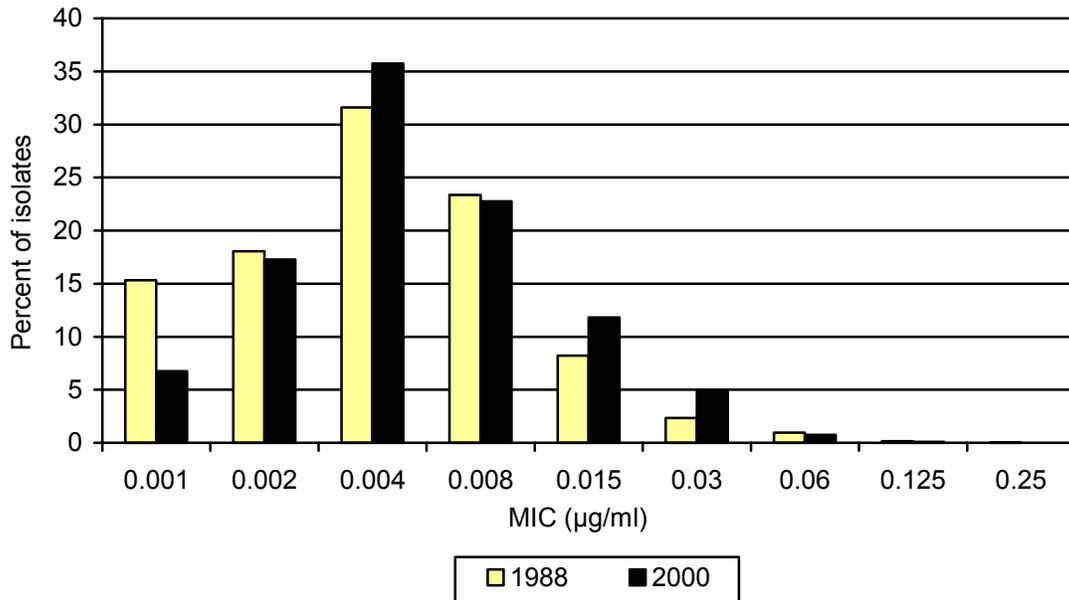
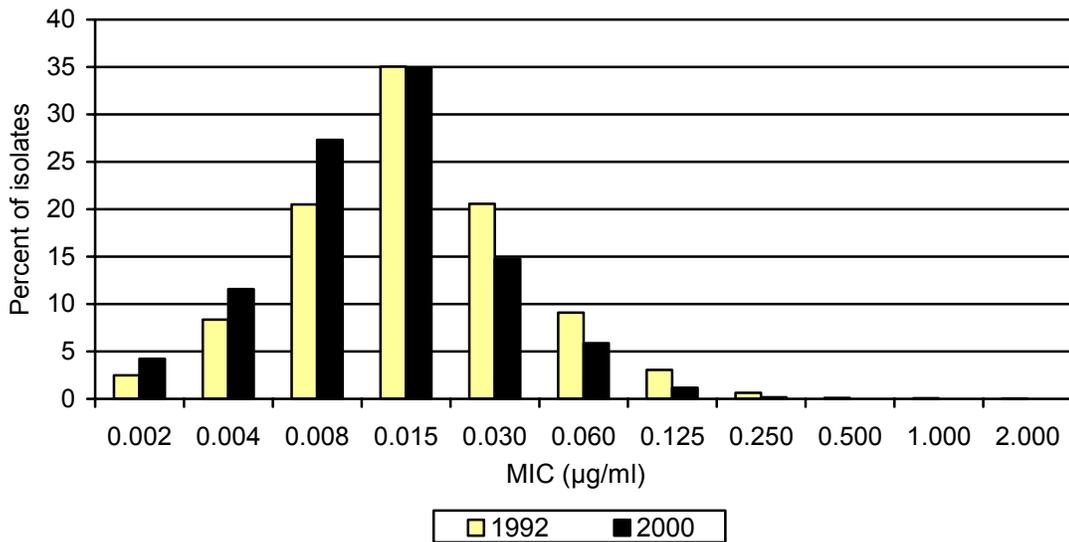


Figure 17. Distribution of MICs to ceftriaxone among GISP isolates, 1988 and 2000



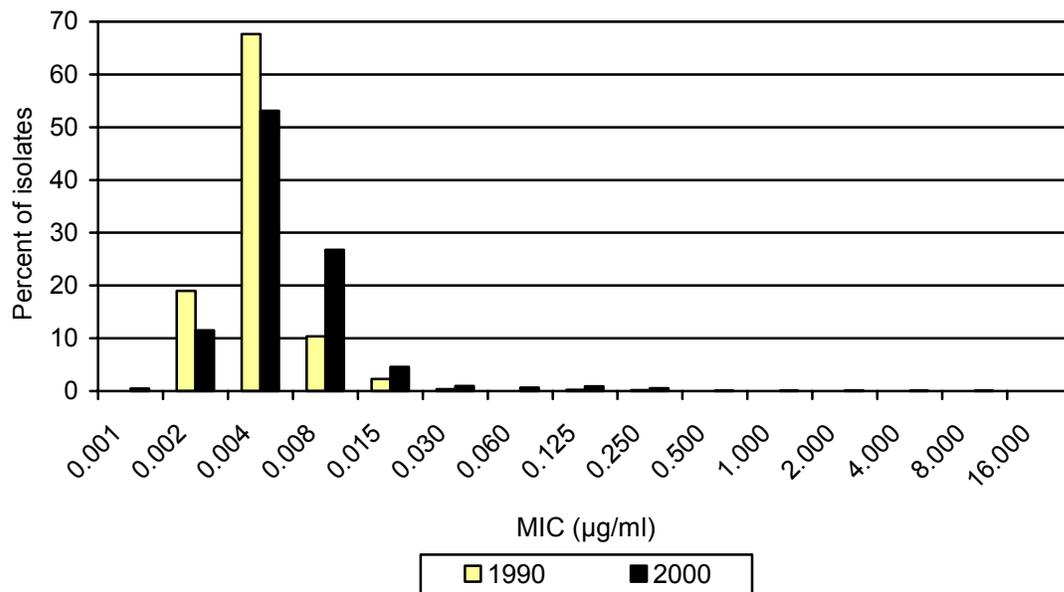
In 1988, there was one isolate with MIC 0.25 µg/ml. In 2000, there were no isolates with MIC > 0.125 µg/ml.

Figure 18. Distribution of MICs to cefixime among GISP isolates, 1992 and 2000



In 1992, there were six isolates with MIC 0.5 µg/ml, three isolates with MIC 1.0 µg/ml, and two isolates with MIC 2.0 µg/ml. In 2000, there were no isolates with MIC > 0.25 µg/ml.

Figure 19. Distribution of MICs to ciprofloxacin among GISP isolates, 1990 and 2000



In 1990, there were no isolates with MIC > 0.25 µg/ml. In 2000, there were five isolates with MIC 0.5, µg/ml, three isolates with MIC 1.0 µg/ml, six isolates with MIC 2.0 µg/ml, four isolates with MIC 4.0 µg/ml, five isolates with MIC 8.0 µg/ml, and one isolate with MIC 16.0 µg/ml.

Figure 20. Percentage of GISP isolates with intermediate resistance or resistance to ciprofloxacin, 1990-2000

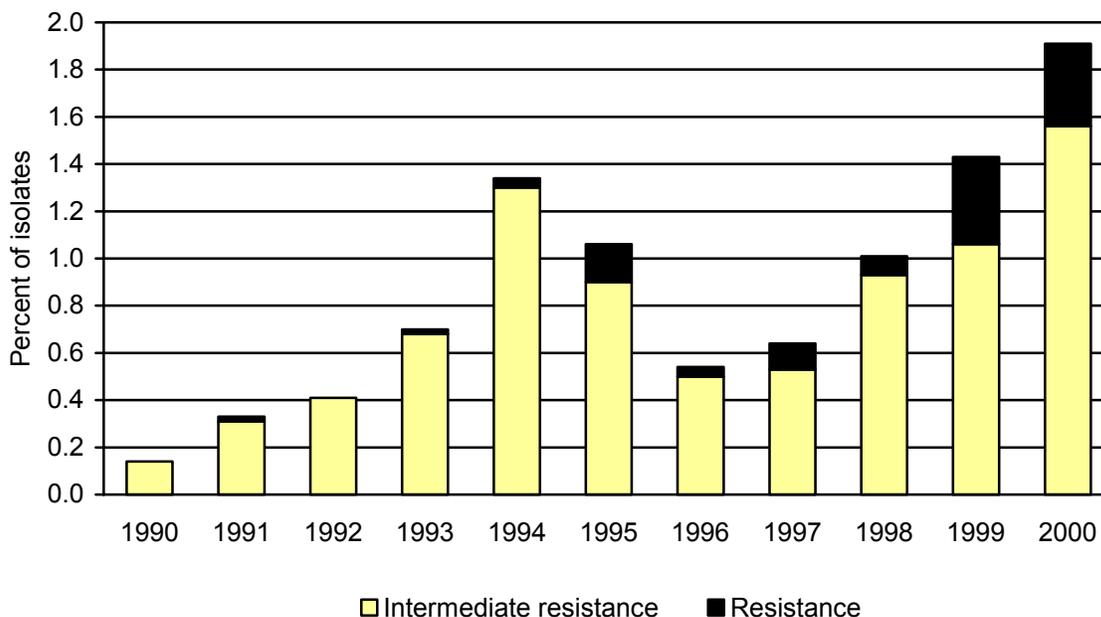
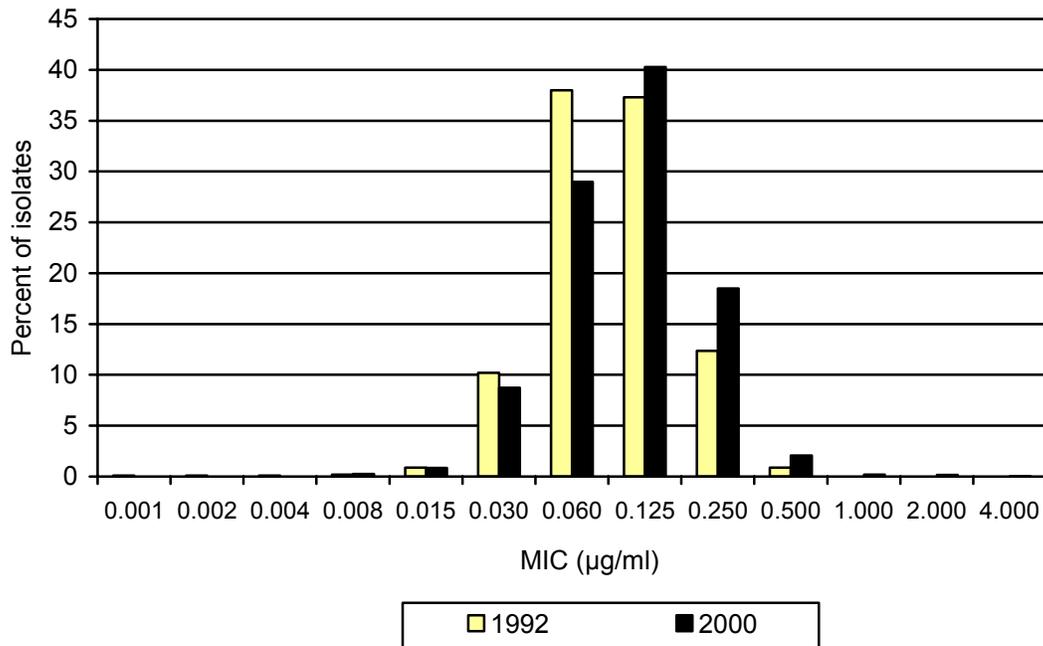


Figure 21. Distribution of MICs to azithromycin among GISP isolates, 1992 and 2000



In 1992, there were no isolates with MIC > 0.5 µg/ml. In 2000, there was one isolate with MIC 4.0 µg/ml.

CLINIC-SPECIFIC DEMOGRAPHIC, CLINICAL, AND LABORATORY DATA

The remainder of this report provides clinic-specific figures for each of the 25 currently participating clinics. Individual figures for each clinic show demographic and clinical characteristics of the men with gonorrhea enrolled in GISP, as well as antimicrobial susceptibilities for the *N. gonorrhoeae* isolates. The number of isolates submitted by each clinic is 300 when the full sample of 25 isolates per month is obtained. However, the number of isolates submitted is lower for many clinics located in areas with low gonorrhea rates. Each page of figures is labeled with the city of the participating clinic and the actual number of isolates on which the clinic's 2000 data are based.

Definitions of terms and abbreviations used in the clinic-specific figures are given below.

Figure D: contact=has sexual partner with gonorrhea

Figure F: ceftriaxone 250=ceftriaxone 250 mg
ceftriaxone 125=ceftriaxone 125 mg
other cephalo=other cephalosporins

Figure G: azi/ery=azithromycin/erythromycin
doxy/tet=doxycycline/tetracycline

Figure H: PPNG=penicillinase-producing *N. gonorrhoeae*
TRNG=plasmid-mediated tetracycline resistant *N. gonorrhoeae*
PPNG-TRNG=plasmid-mediated penicillin and tetracycline resistant *N. gonorrhoeae*
PenR=chromosomally mediated penicillin resistant *N. gonorrhoeae*
TetR=chromosomally mediated tetracycline resistant *N. gonorrhoeae*
CMRNG=chromosomally mediated penicillin and tetracycline resistant *N. gonorrhoeae*

Figure K: intermediate res=intermediate resistance