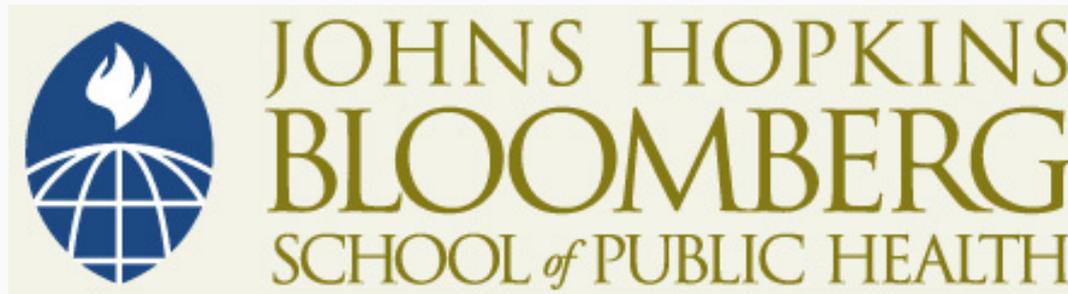


This work is licensed under a [Creative Commons Attribution-NonCommercial-ShareAlike License](https://creativecommons.org/licenses/by-nc-sa/4.0/). Your use of this material constitutes acceptance of that license and the conditions of use of materials on this site.



Copyright 2007, The Johns Hopkins University and David Celentano. All rights reserved. Use of these materials permitted only in accordance with license rights granted. Materials provided "AS IS"; no representations or warranties provided. User assumes all responsibility for use, and all liability related thereto, and must independently review all materials for accuracy and efficacy. May contain materials owned by others. User is responsible for obtaining permissions for use from third parties as needed.



JOHNS HOPKINS
BLOOMBERG
SCHOOL *of* PUBLIC HEALTH

Behavioral Intervention

David D. Celentano, SHPH

- To discuss contemporary perspectives on sexual behavior and STI/HIV risks
- To describe sexual mixing patterns as a causal factor in STI/HIV transmission
- To summarize prevention strategies that offer promise

Importance of Preventing and Controlling STIs

- International health objective
- High rates of complications and adverse health outcomes
- High human and economic costs
- STIs facilitate the transmission of HIV
- Substance use may influence both HIV and STI acquisition



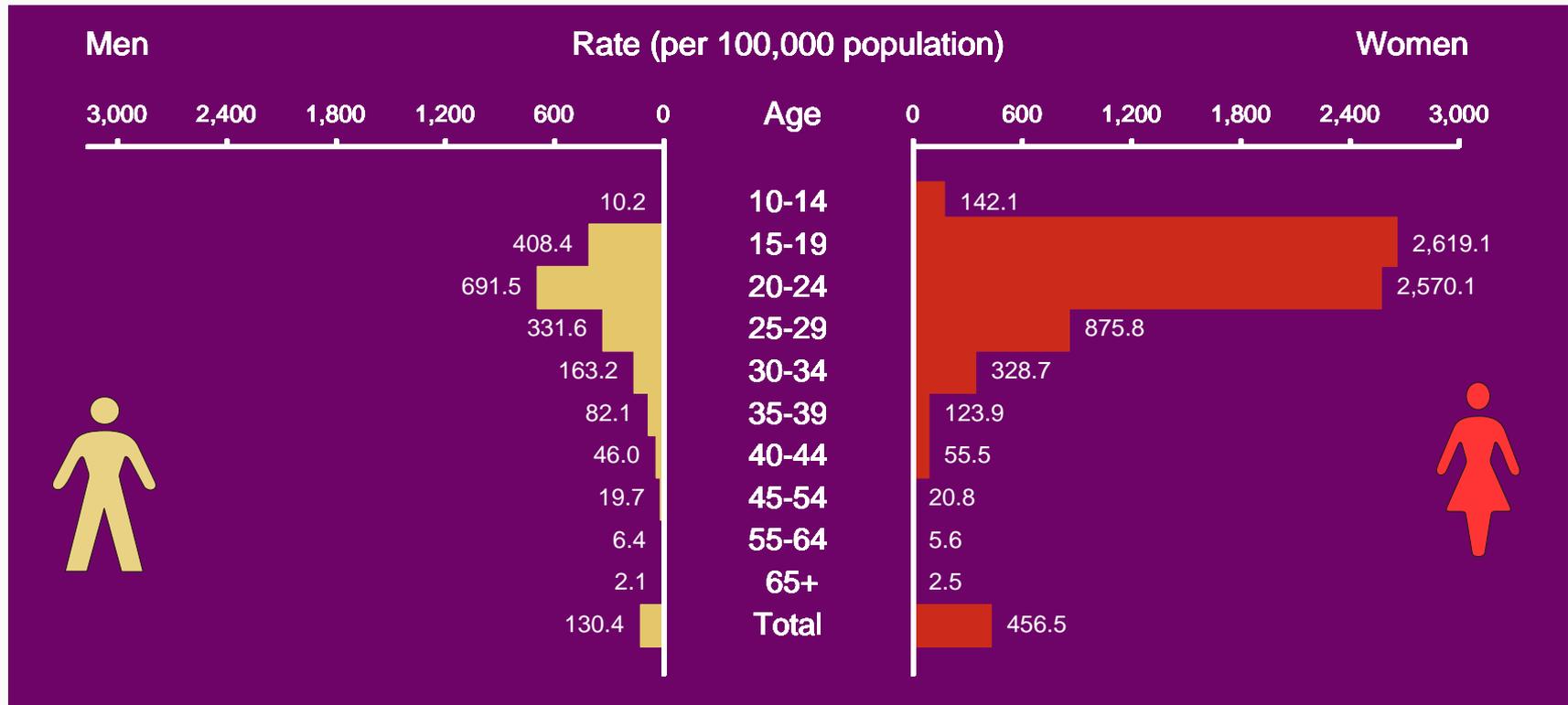
JOHNS HOPKINS
BLOOMBERG
SCHOOL *of* PUBLIC HEALTH

Section A

Epidemiology by Age and Race

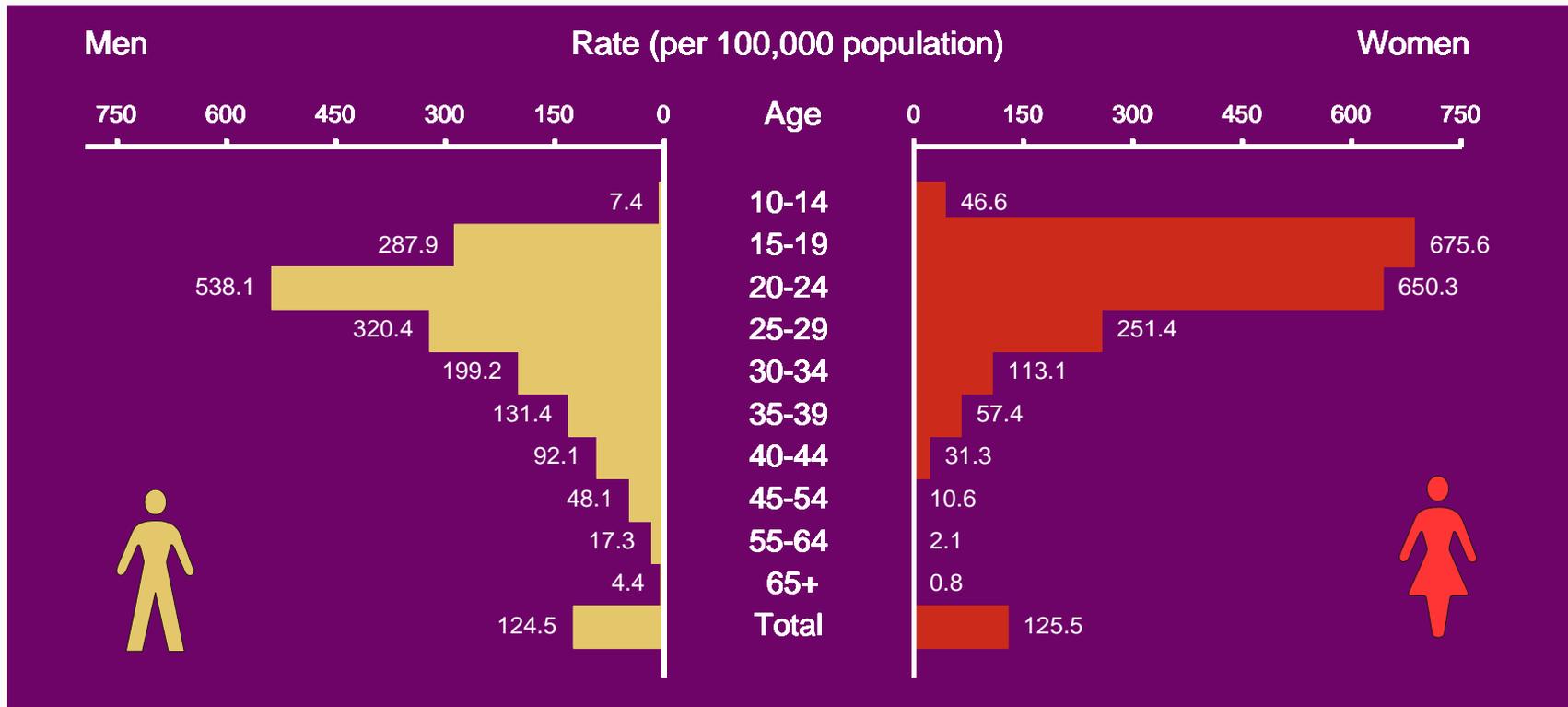
Chlamydia—Age- and Sex-Specific Rates

- Chlamydia—age- and sex-specific rates: United States, 2002



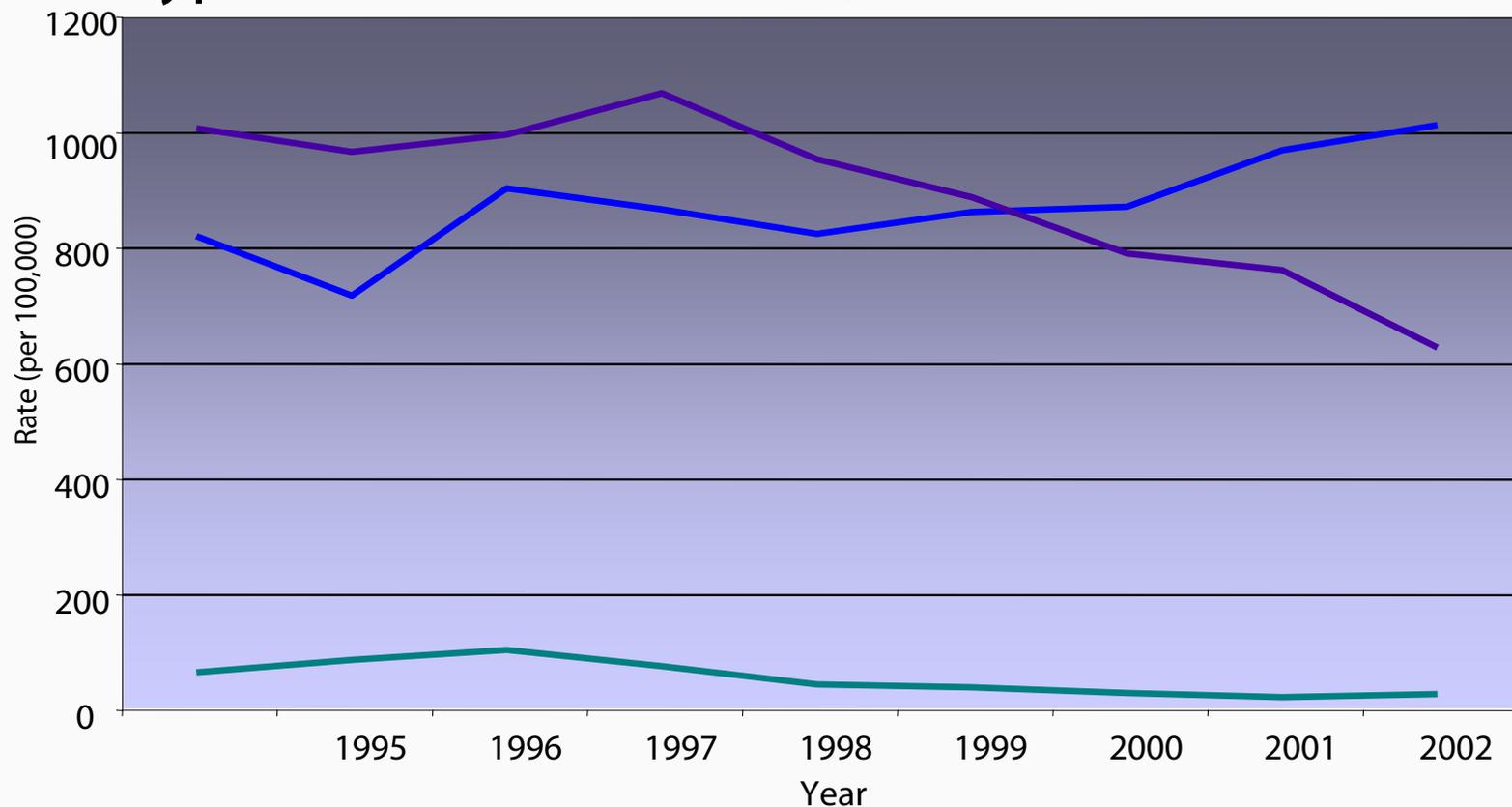
Gonorrhea—Age- and Sex-Specific Rates

- Gonorrhea—age- and sex-specific rates: United States, 2002



Chlamydia, Gonorrhea, and Syphilis Rates in Baltimore

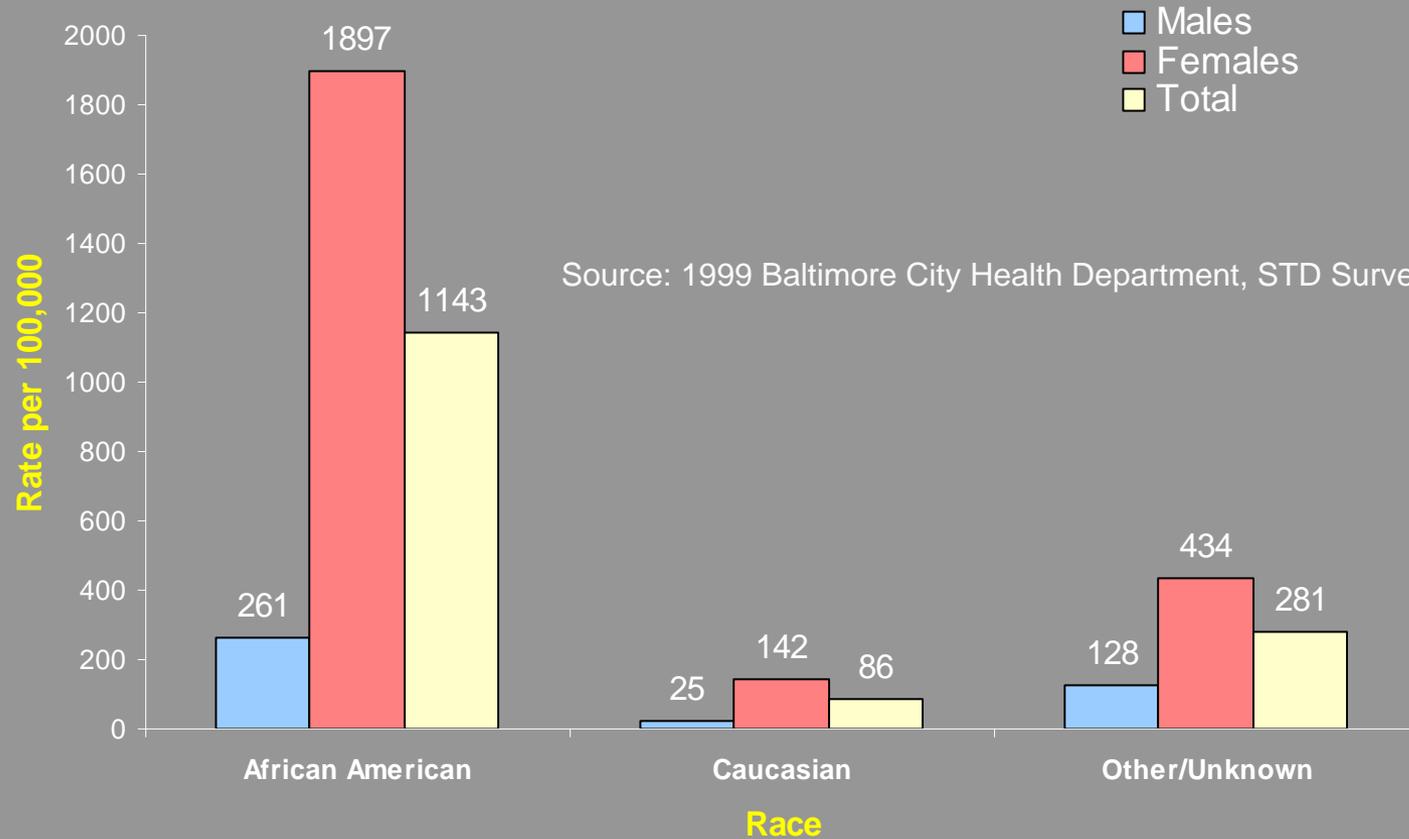
■ Chlamydia, gonorrhea, and primary and secondary syphilis rates in Baltimore, 1994–2002



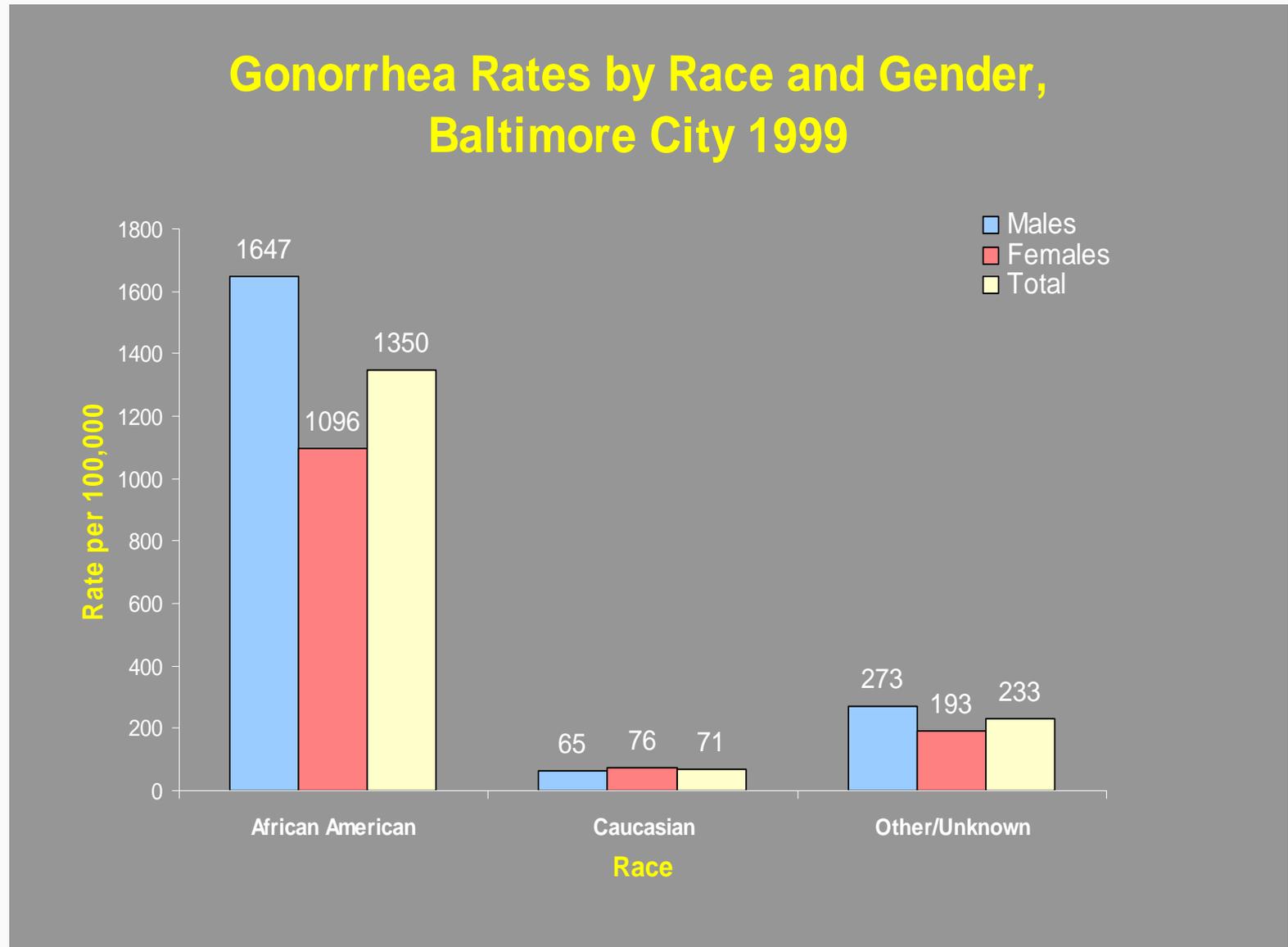
— CT
— GC
— Primary and secondary syphilis

Chlamydia Rates by Race and Gender

Chlamydia Rates by Race and Gender, Baltimore City 1999



Gonorrhea Rates by Race and Gender





JOHNS HOPKINS
BLOOMBERG
SCHOOL *of* PUBLIC HEALTH

Section B

Role of Social Factors

Social Factors Affecting the Spread of STIs

- Lack of gender equity
- Poverty and transactional sex
- Disruptions to traditional family life
- Inadequate health services
- Legal, cultural, and religious barriers to condom promotion and use

Other STIs increase risk of HIV infection

- Presence of other STIs increases the risk of HIV acquisition
 - Ulcerative STIs
 - ▶ 10–300 times per exposure
 - Non-ulcerative STIs
 - ▶ 3–10 times per exposure

Risks for STIs in Adolescents and Young Adults

- Biologic factors may increase susceptibility for female adolescents
 - Cervical ectopy
 - Greater risk of infection at 1st exposure
 - Hormonal changes
- Social factors
 - Limited access to services
 - Nonconsensual sex

Risks for STIs in Adolescents and Young Adults

- STI sexual risk behaviors among 15–24 year olds may be more prevalent (vs. adults)
 - High number of sex partners
 - Alcohol and drug use
 - Inconsistent and incorrect condom use
 - Lack of knowledge or negotiation skills
 - Invulnerability and willingness to take risks

Limitations of Known Epidemiologic Risk Factors

- Lack of explanatory power of identified individual sexual behaviors to explain STI acquisition
 - Most OR/RR on the order of < 3.0
 - Most risky people do not acquire disease
 - All known risks account for $< 1/3$ of disease

- Simple but useful equation

$$R_o = \beta c D$$

Reproductive rate

Probability of transmission

Number of sexual contacts

Duration of infectiousness

The diagram illustrates the equation $R_o = \beta c D$. Below the equation, four orange arrows point upwards to the variables: R_o , β , c , and D . To the left of each arrow is a descriptive label: 'Reproductive rate' for R_o , 'Probability of transmission' for β , 'Number of sexual contacts' for c , and 'Duration of infectiousness' for D .

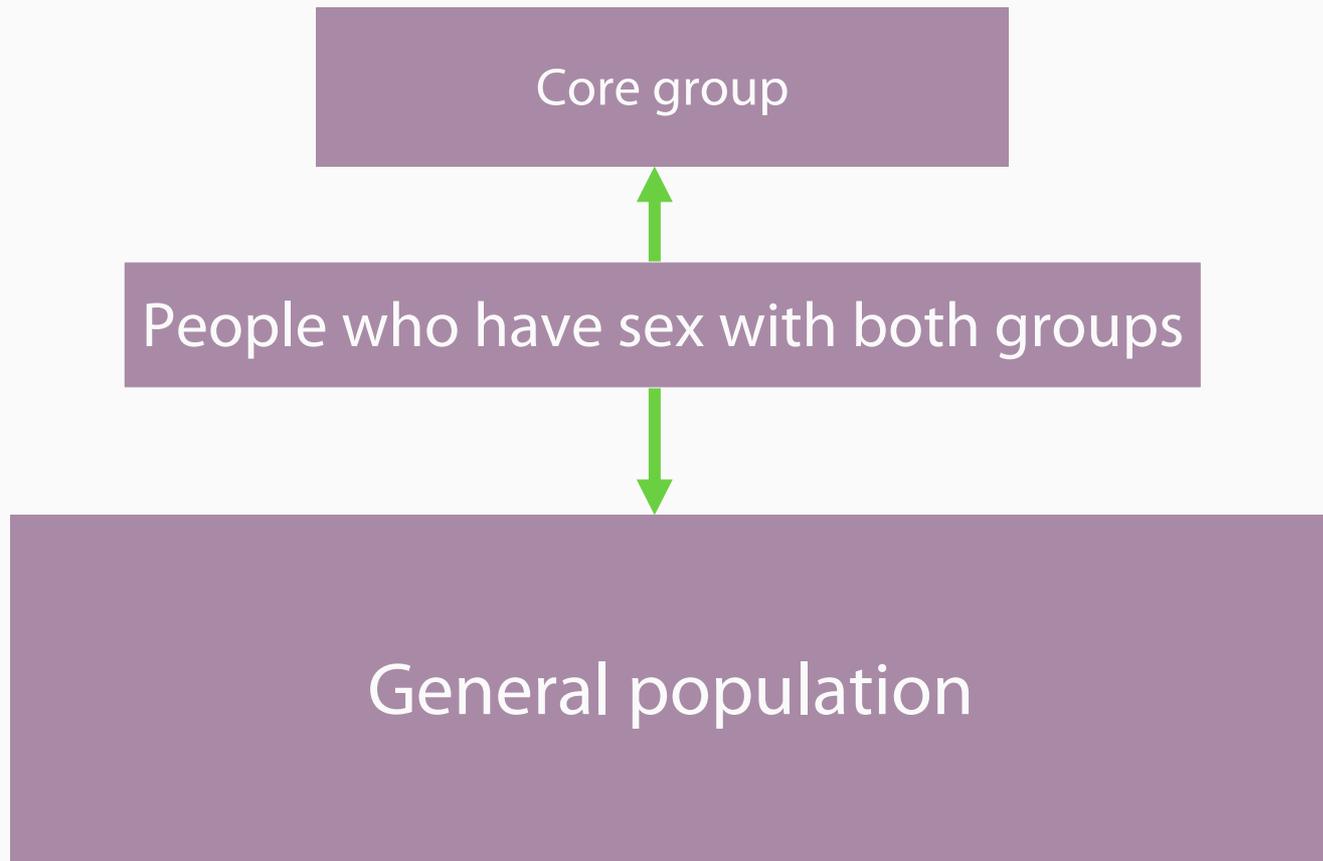
- Relationships between social and sexual networks

- Relationships between social and sexual networks
- Structure of sexual networks
 - Concurrency
 - Serial sexual partners
 - Mixing patterns

- Relationships between social and sexual networks
- Structure of sexual networks
 - Concurrency
 - Serial sexual partners
 - Mixing patterns
- Core group and core transmitters
- Frequency and type of substance use/abuse

- Targeting core transmitters for prevention and treatment services
- Changing social norms
 - Safer sexual behaviors
 - Condom use
 - Altering substance use/sex equation

Public Health Strategies: Core Transmitters



Public Health Strategies: Containing the Epidemic

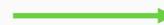
- Targeting core transmitters—most effective STI prevention
 - Target population (Kenya)

500 sex workers (80% HIV +)
with four clients per day



10,200 HIV infections
prevented

500 low-income men (10% HIV+)
with four partners per year

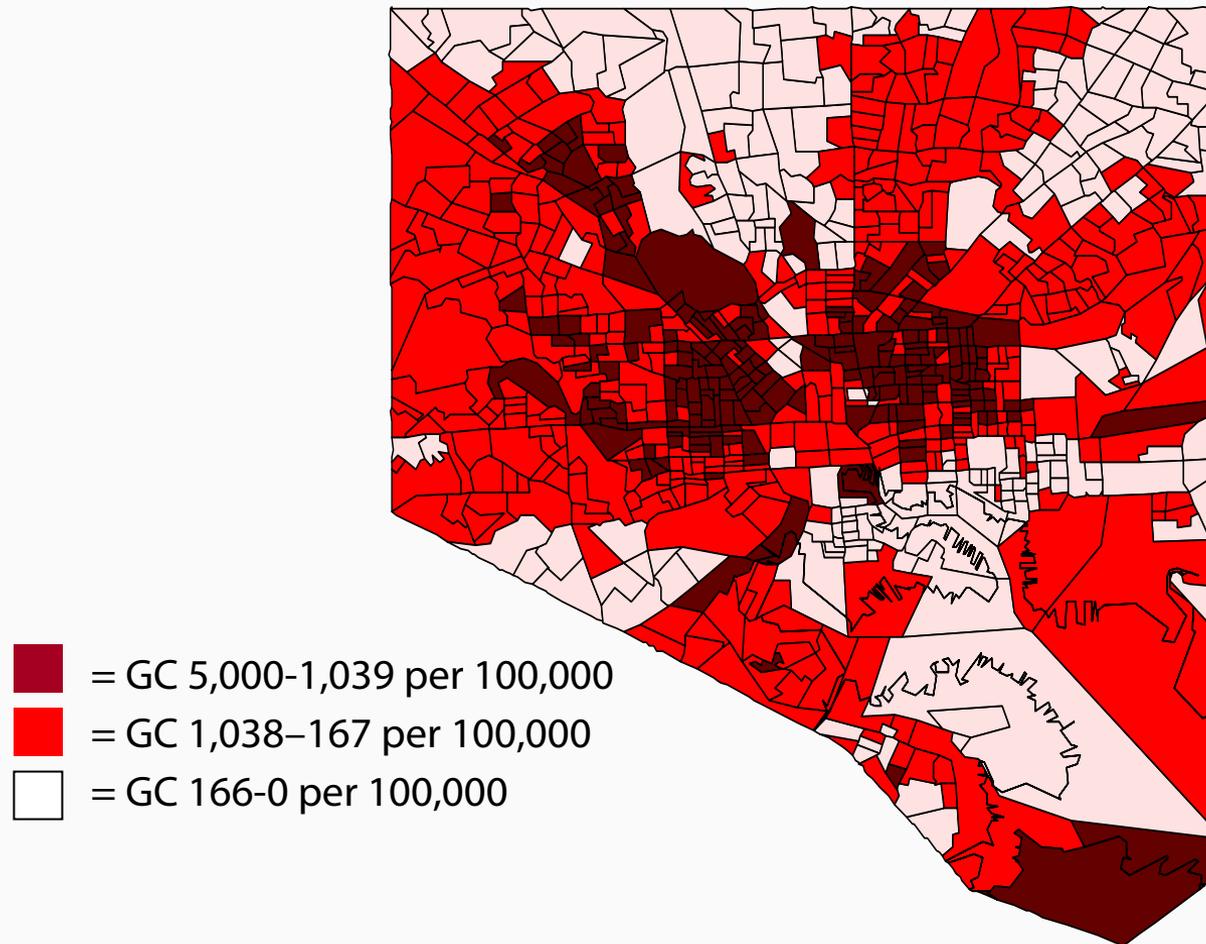


88 averted infections

- STIs are not equally distributed across neighborhoods
- Studies in Colorado Springs, Dade County, North Carolina, Miami, San Francisco, and Baltimore show similar findings

Gonorrhea Rate Categories by Census Block Group

- Gonorrhea rate categories by census block group in Baltimore, Maryland, 1995–1998



Association Between Core Neighborhood and Core Transmitter

- Association between core neighborhood and core transmitter
 - **Core neighborhoods**—geographic units with high prevalence of STIs
 - **Core transmitters**—individuals in core neighborhoods who engage in “risky” social behaviors and experience a large proportion of diagnosed STDs

- Core groups are critical to maintaining high rates of gonorrhea in community-based models of STI transmission
 - Cores are characterized by high transmission density

Links Between Neighborhood Characteristics and STIs

- Studies have consistently found higher rates of STIs in neighborhoods with the following characteristics:
 - Poverty
 - Social disadvantage
 - Segregation
 - Drug abuse
- Few studies have linked community-level characteristics to individuals

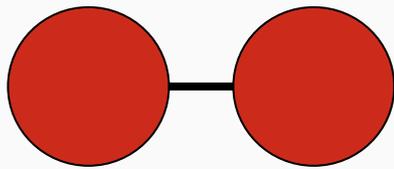


JOHNS HOPKINS
BLOOMBERG
SCHOOL *of* PUBLIC HEALTH

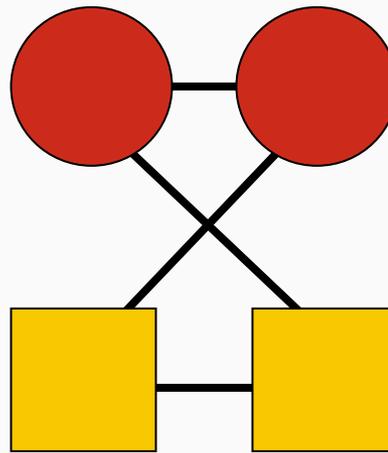
Section C

Sexual Mixing (Partner Selection)

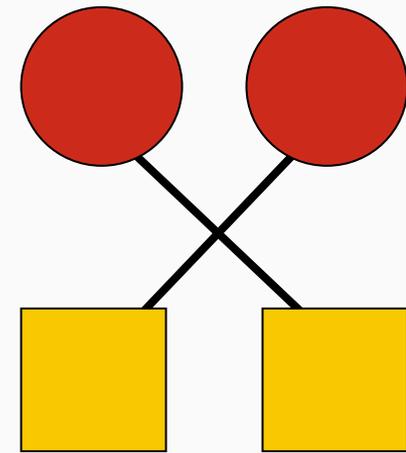
- The extent of sexual contact within and among definable segments of the population
- Segments of the population can be defined by factors such as
 - Age
 - Race/ethnicity
 - Sex
 - Geography
 - Drug use patterns



Assortative



Random



Disassortative

Sex Partner Selection and Mixing Patterns

- Laumann (1998)
 - Higher STI rates in African Americans is partly due to patterns of sexual networks
 - STIs remain endemic because partner selections are more assortative by race/ethnicity
 - Partner selection is more disassortative by demographic characteristics among African-Americans than other groups

Sex Partner Selection and Mixing Patterns

- Aral (1996)
 - STI morbidity concentrations create potential partner pools with high-risk behaviors and high rates of sexually transmitted infections
 - These geographic and social contexts create a higher probability of exposure to infection for each sex act

Evidence for Sex Partner Selection and Mixing Patterns

- Ellen (1998)
 - African American adolescents are more likely to practice assortative mixing on race/ethnicity vs. other adolescents
- Zenilman & Glass (1999)
 - In adult STD patients, core neighborhood residents are more likely to have sex partners from core neighborhoods

Evidence for Sex Partner Selection and Mixing Patterns

- Celentano et al. (2005)
 - Young African American MSM have sex partners from core neighborhoods who are exclusively African American
 - ▶ HIV prevalence is ~25%, as compared to 1% among whites (holds for both Baltimore and New York City)

Sexual Behavior Intervention Targets

- Individual
- Group
- Community

- Behavior change
- Treatment
- Vaccine
- Structural change
- Microbicide
- Surgical change

- Acquisition
- Transmission
- Complications



JOHNS HOPKINS
BLOOMBERG
SCHOOL *of* PUBLIC HEALTH

Section D

Sexual Behavior Interventions: What Works?

- What do we know about behavior change for STI prevention?
 - We know the targets
 - ▶ Abstinence (drugs/sex)
 - ▶ Motivating risk reduction
 - ▶ Establishing safer behavior

What works?

- STI services and case ascertainment
- Partner referral and outreach
- Primary medical care
- Timely prenatal care
- Counseling and testing

What Works: Counseling and Educational Strategies

- Individual risk reduction counseling
- Small group interventions
- Couples counseling

What Works: Institution-Based Strategies

- Schools
- Prisons
- Bars
- Military

What Works: Media-Based Strategies

- Condom social marketing
- Behavior change communications
- Promoting popular culture

What Works: Community-Level Strategies

- Social norm change
- Promotion of monogamy
- Needle disinfection and needle exchange

- STD diagnosis and management
- Drug treatment
- ART to prevent perinatal transmission
- ART to prevent sexual transmission

Challenges in HIV and STI Prevention

- Maintenance of behavior change
- Targeting hard to reach populations
- Prevention in the era of HAART, PEP, PREP, and “waiting for a vaccine”

Challenges in HIV and STI Prevention

- Maintenance of behavior change
- Targeting hard to reach populations
- Prevention in the era of HAART, PEP, PREP, and “waiting for a vaccine”
- Young people, especially adolescent girls
- Alcohol use and HIV transmission
- STD clinic attendees differ from other risky adolescents/young adults
- Advocacy for changing health policy



JOHNS HOPKINS
BLOOMBERG
SCHOOL *of* PUBLIC HEALTH

Section E

The International Voluntary Counseling and Testing Study

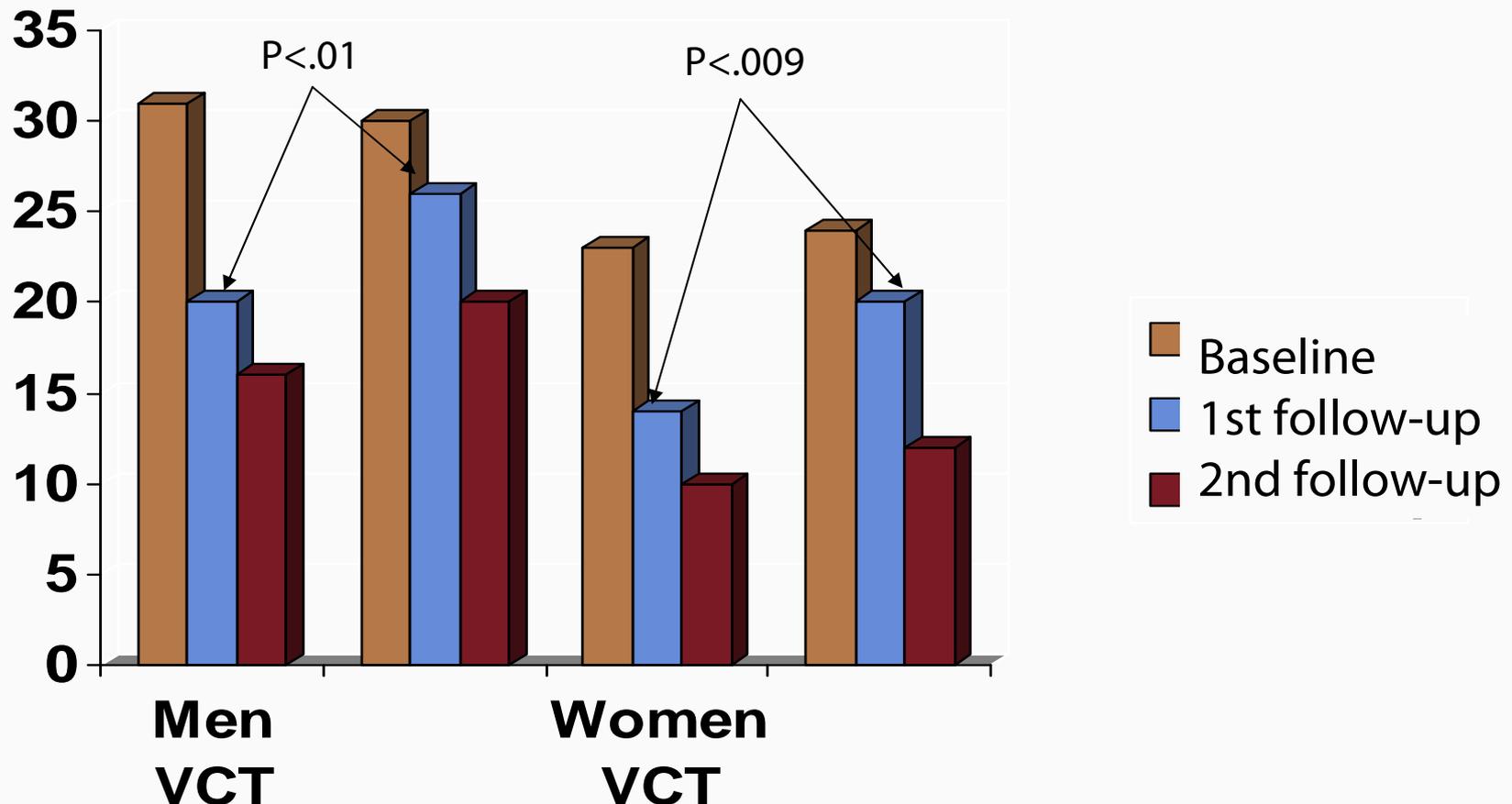
Design of the VCT Efficacy Study

- Multicenter randomized trial: 1995–1997
- Three sites: Kenya, Tanzania, and Trinidad
- Randomized to receive (VCT) or health information(HI)
- Traced and interviewed at six and twelve months
- Cross-over at six months so that the original HI group now had access to VCT

- 3,120 individuals
 - 1,563 to VCT; 1,557 to HI
 - 1,534 men; 1,586 women
 - 82% retained at first follow-up
 - 70% retained at second follow-up
- 586 couples
 - 85% retained at first follow-up
 - 76% retained at second follow-up

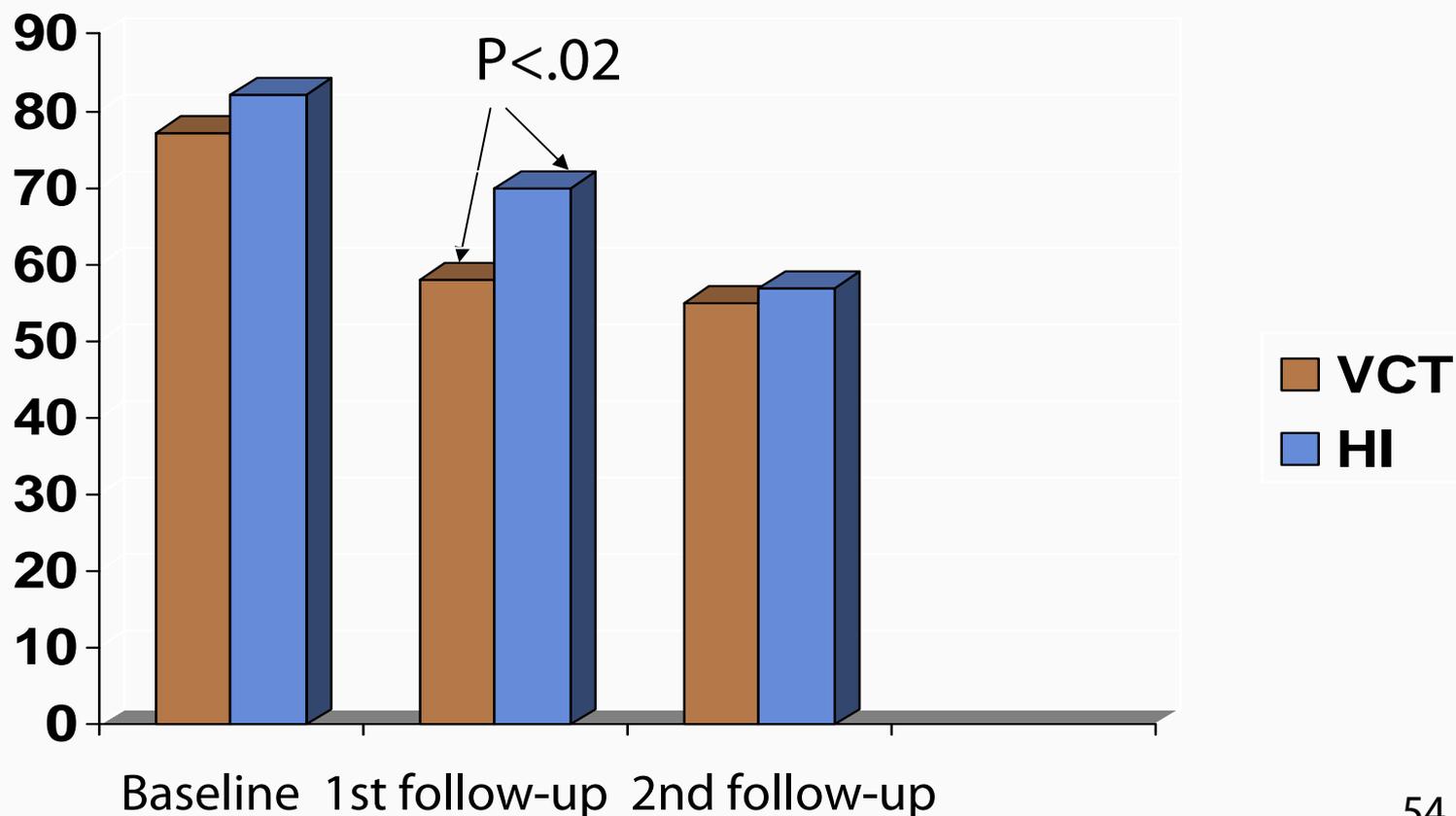
Men and Women Assigned to VCT

- Men and women assigned to VCT reduced unprotected intercourse with non-primary partners, but HI reduced after they received VCT



Couples Assigned to VCT at Baseline

- Couples assigned to VCT at baseline reduced unprotected intercourse with enrolment partners, but HI reduced as much after they received VCT



- Delivery
 - \$26.65 in Kenya
 - \$28.93 in Tanzania
- Averted HIV infections:
 - 1100 in Kenya
 - >800 in Tanzania
- \$250,000 to \$300,000 for 10,000 clients

- DALY
 - \$12.77 in Kenya
 - \$17.78 in Tanzania
- Childhood immunization
 - \$12 to \$17 per DALY
- Increased prevalence to 45%
 - \$8 to \$12 per DALY

- People wanted VCT, did not have access to it
- We have a lot of effective tools in our kit
- We know how to apply these tools
- Currently learning from the field how to target and tailor our interventions
- Political will may be more important than “science” in this century
- We need to overcome negativism!