PUBLIC HEALTH GRAND ROUNDS

Office of the Director

DECEMBER 16, 2010

TARGETED PATHS TO HIV PREVENTION WHY AGAIN AND WHY NOW?

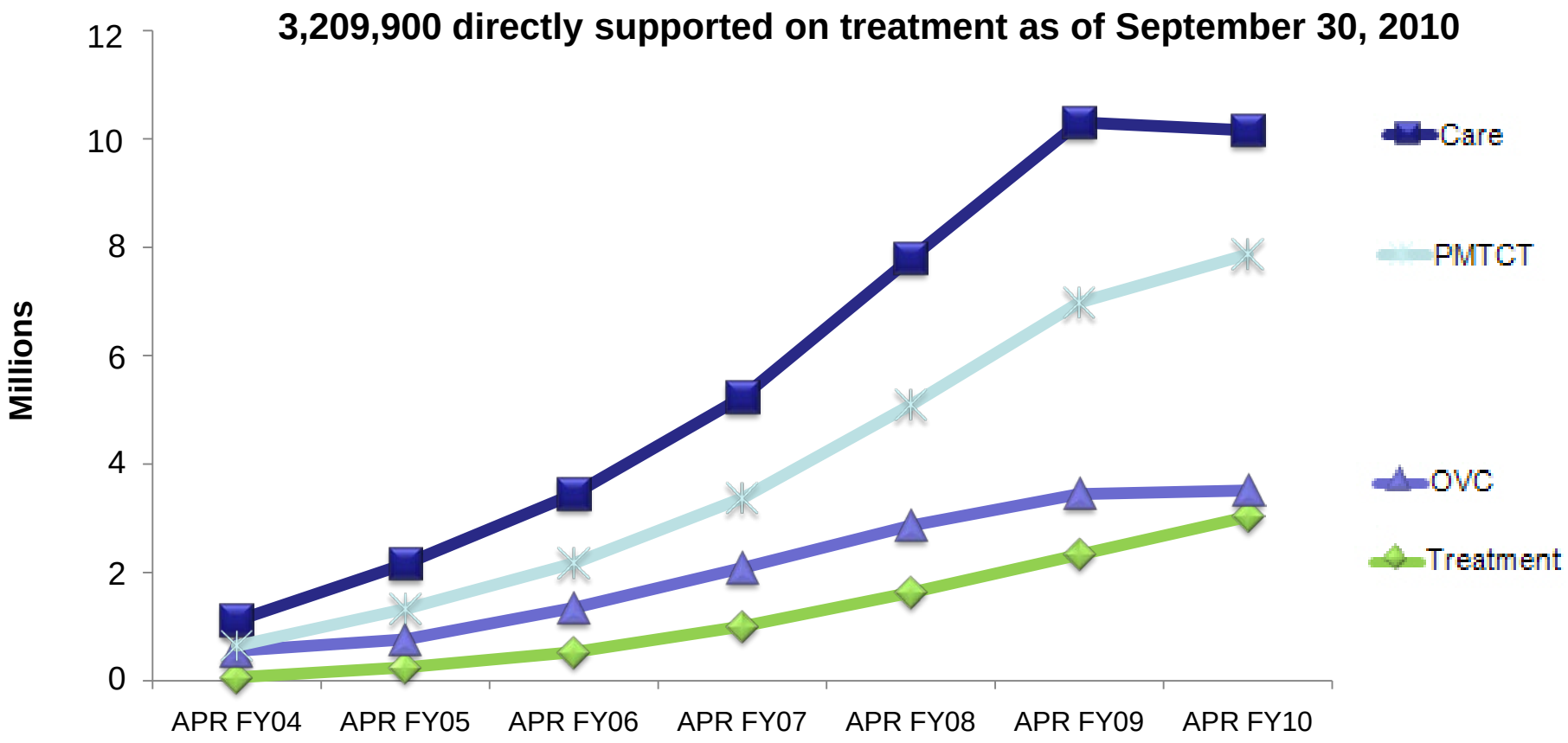
Debbi Birx, MD
Director, Division of Global HIV/AIDS
Center for Global Health
Centers for Disease Control and Prevention

Number of New HIV Infections Has Declined

- **In past 8 years, number of new HIV infections has decreased**
  - 17% overall
  - 18% in sub-Saharan Africa
  - 29% in South and South East Asia
- **HIV prevalence among young pregnant women (15–24 years old) has decreased significantly in Botswana, Ivory Coast, Kenya, Malawi, and Zimbabwe**

UNAIDS: Report on the Global AIDS Epidemic 2010
http://www.unaids.org/globalreport/Global_report.htm

Direct Numbers for PEPFAR-Supported Treatment, Care, PMTCT, and OVC, 2004–2010



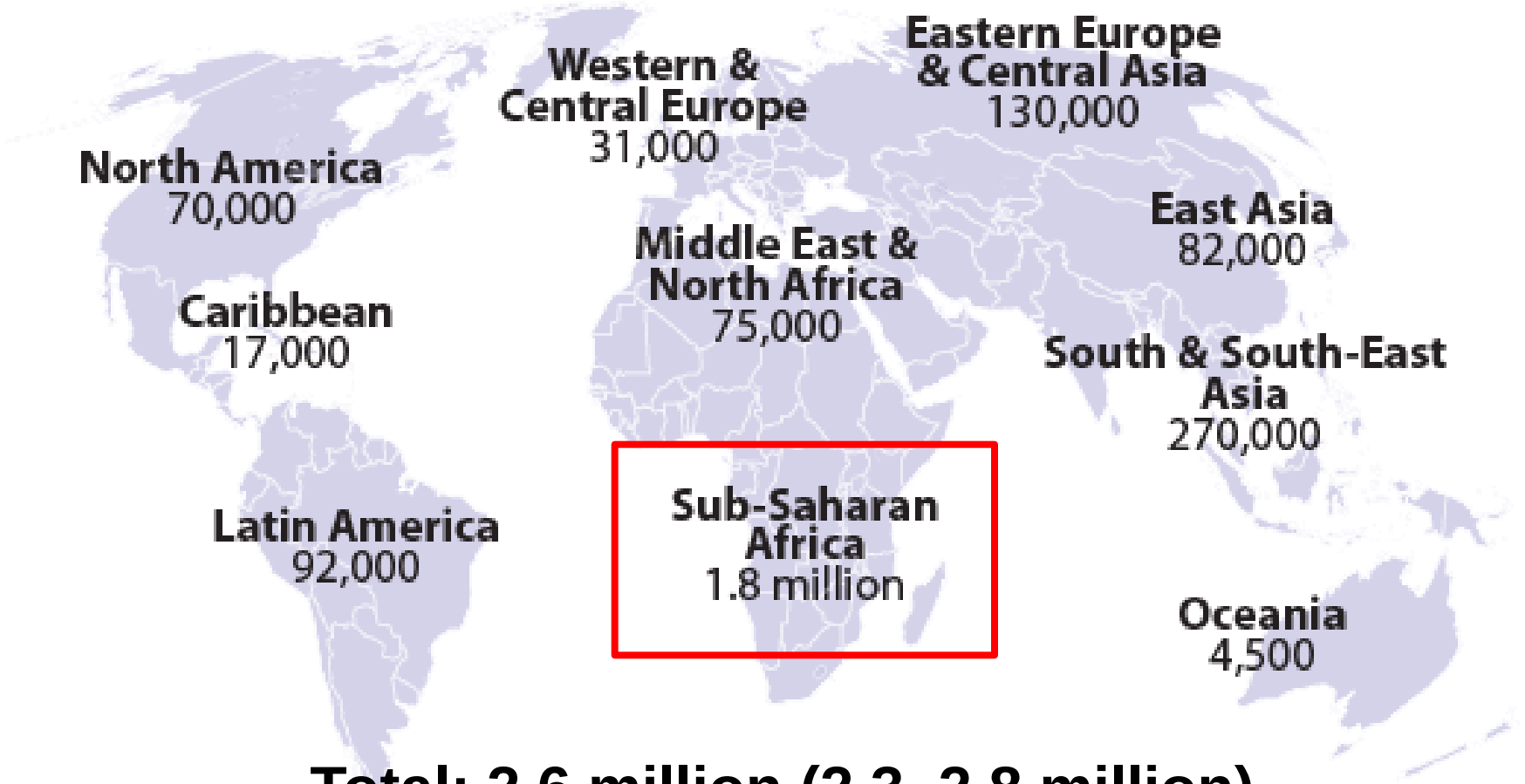
PEPFAR, President's Emergency Plan for AIDS Relief
PMTCT, Prevention of mother-to-child transmission
OVC, Orphans and vulnerable children

Summary of Global HIV Epidemic in Numbers in 2009

- **People living with HIV**
  - Total: 33.3 million
  - Women: 15.9 million
  - Children aged <15 years: 2.5 million
- **People newly infected with HIV**
  - Total: 2.6 million
  - More than 7,000 new HIV infections a day
    - 97% are in low- and middle-income countries
    - 1,000 are in children aged >15 years
    - 6,000 are in adults aged 15 years and older
      - ~51% are women
      - ~41% young people aged 15–24 years

UNAIDS: Report on the Global AIDS Epidemic 2010
http://www.unaids.org/globalreport/Global_report.htm

People Newly Infected with HIV Globally in 2009



Total: 2.6 million (2.3–2.8 million)

UNAIDS: Report on the Global AIDS Epidemic 2010, all numbers are estimates
http://www.unaids.org/globalreport/Global_report.htm

Why the Current Focus on HIV Prevention?

- **New interventions have proven efficacious for preventing HIV infection**
- **CDC and PEPFAR have built major global infrastructures in the health sector**
  - Allows for provision of care, treatment, and services for prevention of mother-to-child transmission, HIV testing and counseling, and medical male circumcision
  - Provides a platform for integrating prevention into existing services

Need for More Coverage with Efficacious-Interventions

Male circumcision	50-60% efficacy
Improved interventions for PMTCT	With effective PMTCT programs, HIV transmission can be reduced to 2–4%
Antiretroviral treatment as prevention	Observational data of sero-discordant couples suggest up to 92% reduction in HIV transmission
HIV vaccine	31% efficacy
Vaginal microbicide	39% efficacy; 54% among high adherers
Pre-exposure prophylaxis	44% efficacy; 74% among high adherers

PMTCT, Prevention of mother-to-child transmission

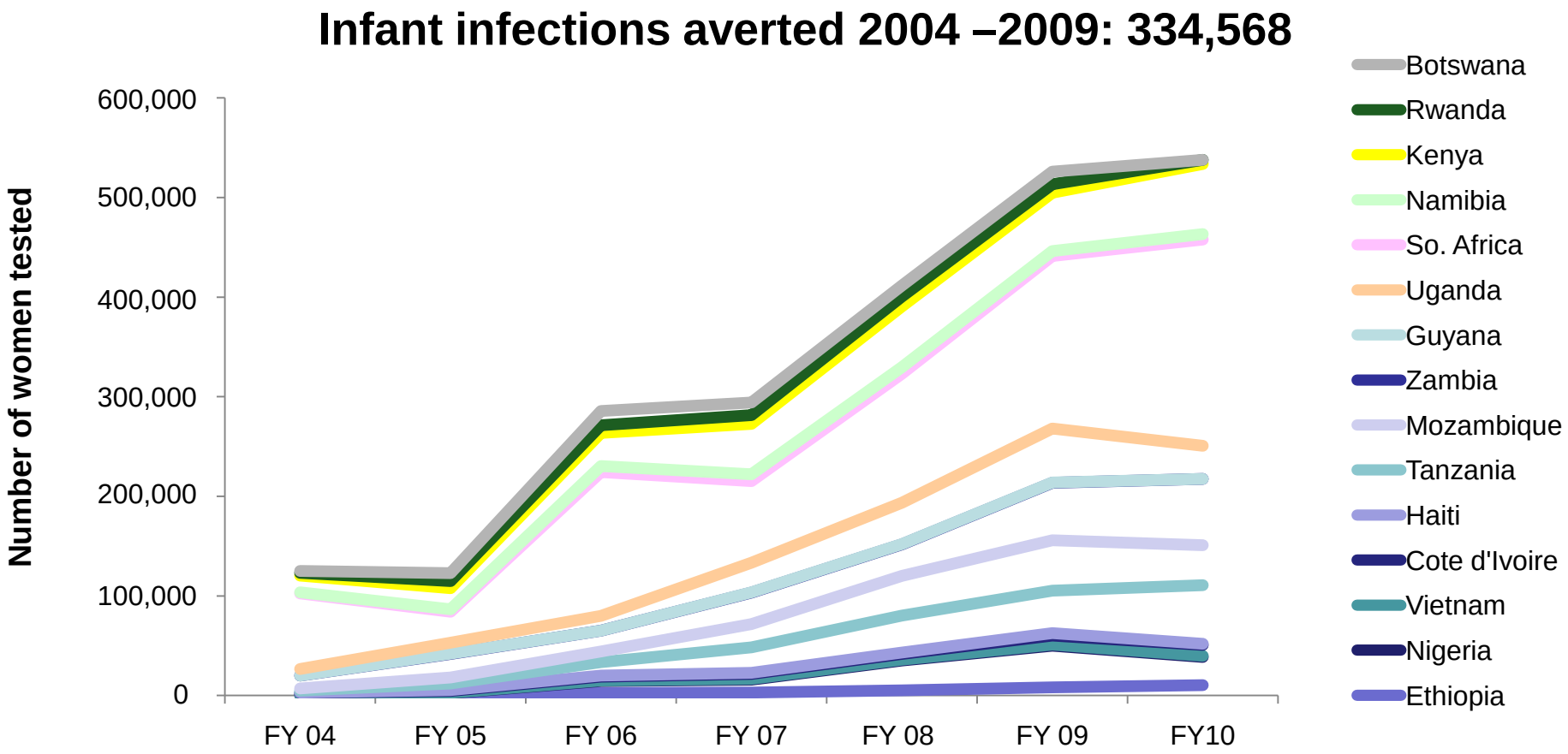
Prevention Interventions: Potential Impact vs. Quality of Data

Public Health Impact	Quality of Data		
	Poor	Fair	Good
Large		Treatment as prevention	Male circumcision PMTCT, PwP
Some		Commercial sex workers (all behavioral)	
Potential*	Counseling and testing	Injection and non-injection drug use	Peer education STI Management
No Evidence of Impact	Mass media		Abstinence and fidelity Other behavioral

*Right direction, not statistically significant

PMTCT, Prevention of mother-to-child transmission
PwP, Prevention with positives

Pregnant Women Treated FY2004–FY2010

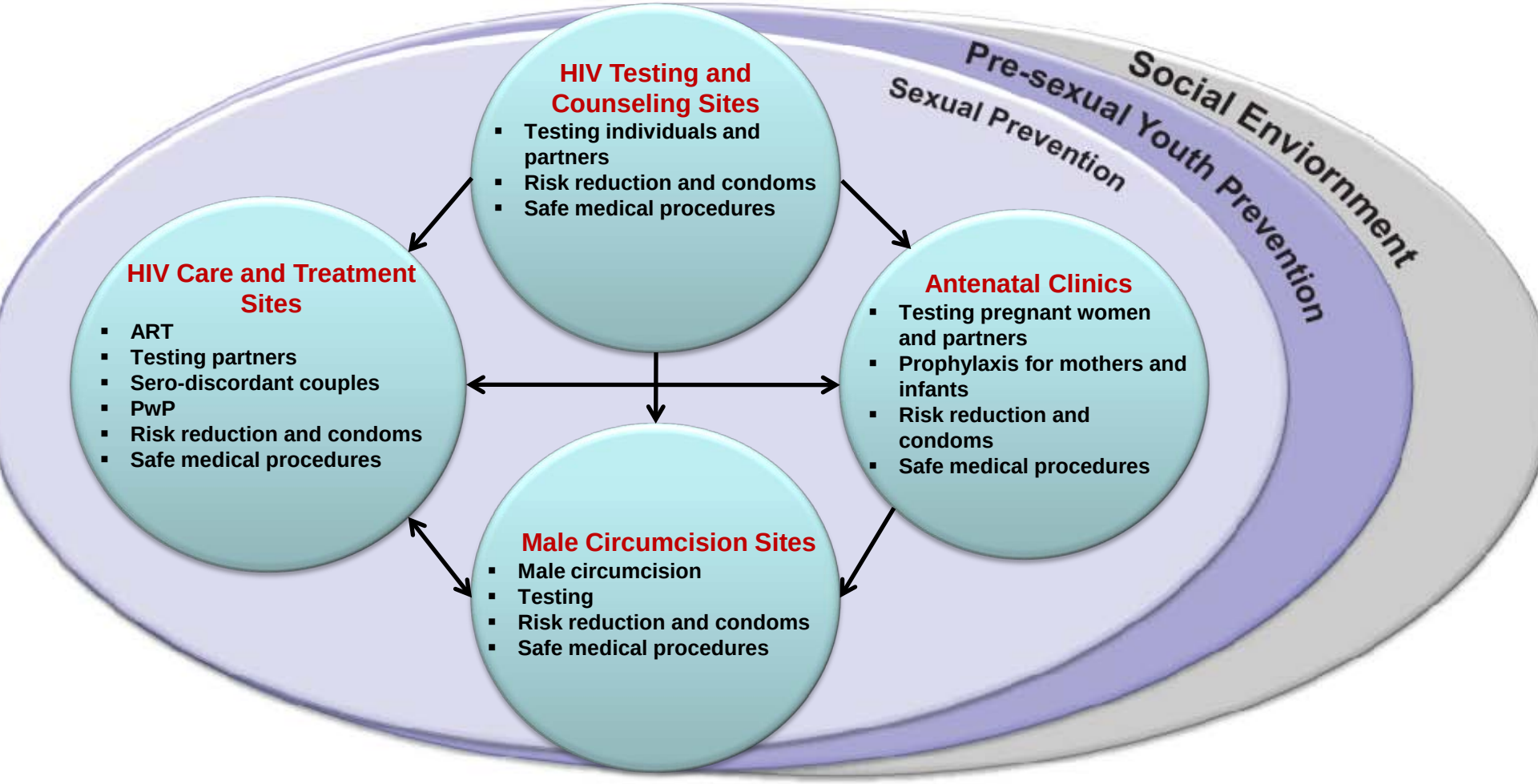


Need for More Coverage with Efficacious Interventions

Intervention	Coverage in Sub-Saharan Africa
HIV counseling and testing	40% have been tested; 40% of HIV infected know their status
Antiretroviral treatment*	37% of people eligible for treatment received life-saving medicines; 50% (21%–95%) in PEPFAR-supported former “focus” countries
Prevention of mother-to-child transmission	54% (40%–84%) PMTCT coverage

UNAIDS: Report on the Global Epidemic 2010
*Eligible at CD4 count of 200
PMTCT, Prevention of mother-to-child transmission

Using Health-Sector Platforms for Integrated HIV Prevention



ART, Antiretroviral treatment
PwP, Prevention with positives

HIV PREVENTION IN THE UNITED STATES NEW APPROACHES IN HEALTH CARE

Jonathan Mermin, MD, MPH

Director, Division of HIV/AIDS Prevention

National Center for HIV//AIDS, Hepatitis, STD, and TB Prevention

Centers for Disease Control and Prevention

Overview

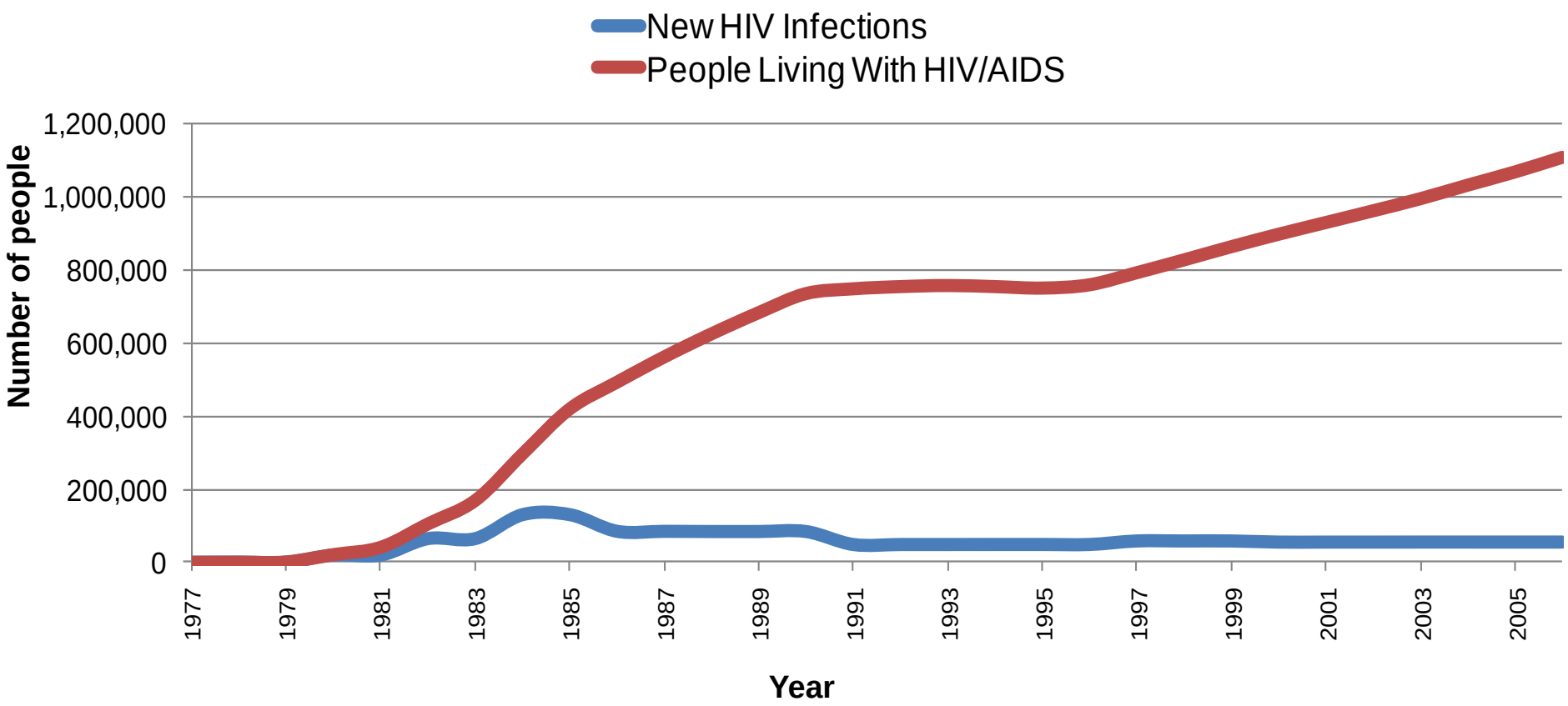
- **HIV in the United States**
- **National HIV/AIDS strategy**
- **Prevention in health care settings**
  - Persons with HIV
  - Persons with high risk for acquiring HIV

HIV in the United States
Magnitude of the Problem

- 1.1 million people living with HIV
- 56,000 new infections (2006)
- 16,000 deaths (2006)
- Net increase of 40,000 people each year
- People who start ART are now expected to live at least additional 35 years

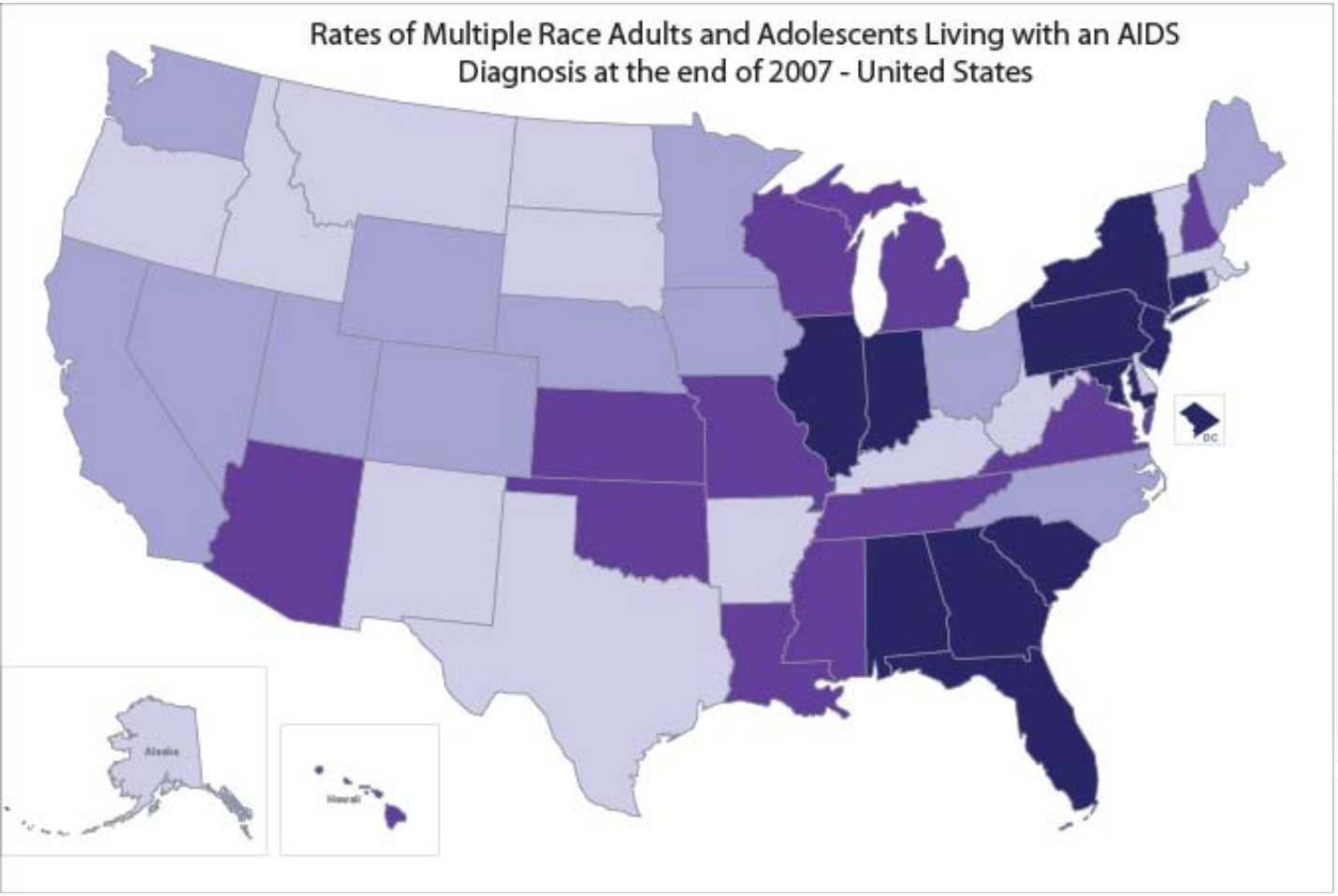
CDC, HIV Surveillance Report, 2008; vol. 20. Published June 2010; available at http://www.cdc.gov/hiv/surveillance/resources/reports/2008report/cover.htm
Hall H et al. JAMA 2008;300(5):20-529;
ART Cohort *Collaboration Lancet 2008:372*: 293-299
ART, Antiretroviral treatment 0

HIV Incidence and Prevalence Estimates United States, 1977–2006



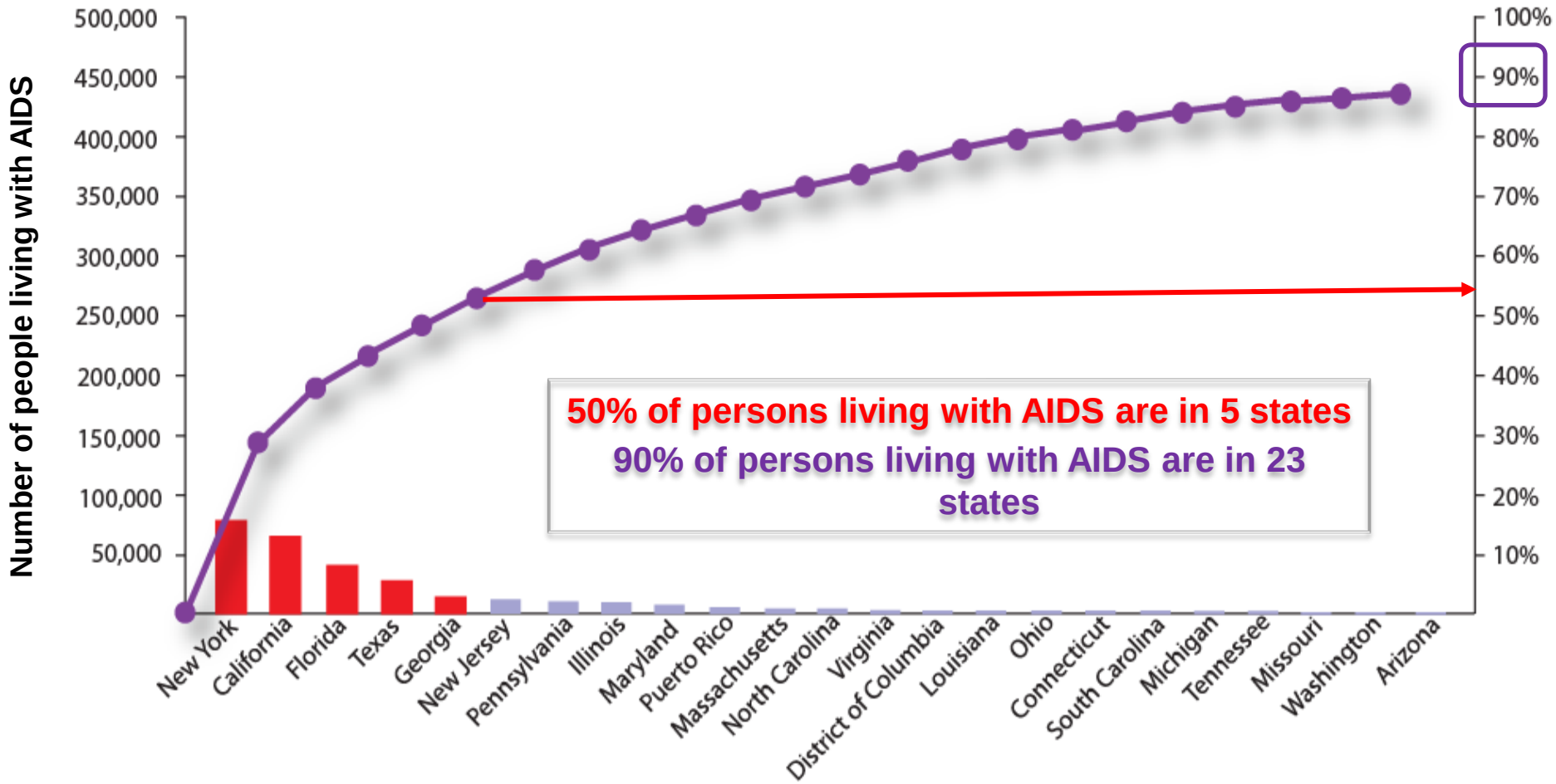
Hall HI, et al. JAMA 2008;300(5):520-529
Campsmith M, et al. Conference on Retroviruses and Opportunistic Infections, 2009

AIDS Prevalence in the United States By State, 2007



CDC, HIV Surveillance Report, 2008; vol. 20. Published June 2010; available at http://www.cdc.gov/hiv/surveillance/resources/reports/2008report/cover.htm

AIDS Prevalence in the United States By State, 2007



CDC, HIV Surveillance Report, 2008; vol. 20. Published June 2010; available at http://www.cdc.gov/hiv/surveillance/resources/reports/2008report/cover.htm

HIV/AIDS in the United States
Health Inequity

- **95% of people with AIDS are MSM, African American, Latino, or IDU**
  - 53% of all cases are among MSM
- **African Americans are 8 times more likely to have HIV than whites**
- **Latinos are 3 times more likely to have HIV than whites**
- **MSM are >40 times more likely to have HIV than other men**

CDC, HIV Surveillance Report, 2008; vol. 20. Published June 2010; available at http://www.cdc.gov/hiv/surveillance/resources/reports/2008report/cover.htm
MSM, Men having sex with men
IDU, Intravenous drug users

Overview

- **HIV in the United States**
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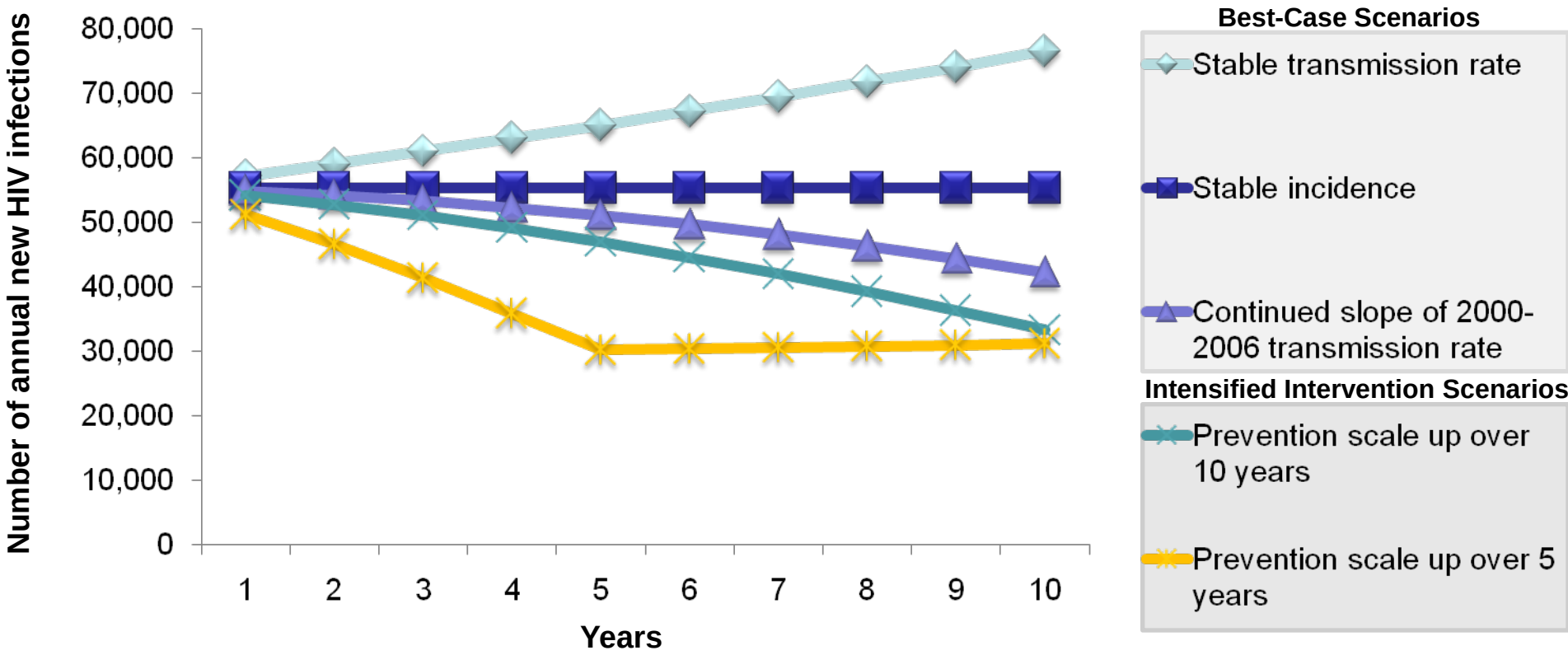
- **Prevention in health care settings**
  - Persons with HIV
  - Persons with high risk for acquiring HIV

National HIV/AIDS Strategy: Major Goals and Associated Targets for 2015

- **Reduce HIV incidence**
  - Lower the annual number of new infections by 25%
  - Reduce the HIV transmission rate by 30%
- **Increase access and quality of care for people with HIV**
  - Increase to 85% the proportion of newly diagnosed patients linked to care within 3 months of diagnosis
- **Reduce HIV-related disparities**
  - Increase by 20% the proportion of HIV-diagnosed persons with undetectable viral load in each of 3 target populations: African Americans, Hispanics/Latinos, and MSM

http://aids.gov/federal-resources/policies/national-hiv-aids-strategy
MSM, Men having sex with men

Smart Investments Now Yield Savings Later
Comparison of 5 scenarios: Projected HIV Incidence



Reducing transmission rate by 50% in 5 years would save $44–104 billion

Hall HI, et al. JAMA 2008;300(5):520-529

Overview

- **HIV in the United States**
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- **Prevention in health care settings**
  - Persons with HIV
  - Persons with high risk for acquiring HIV

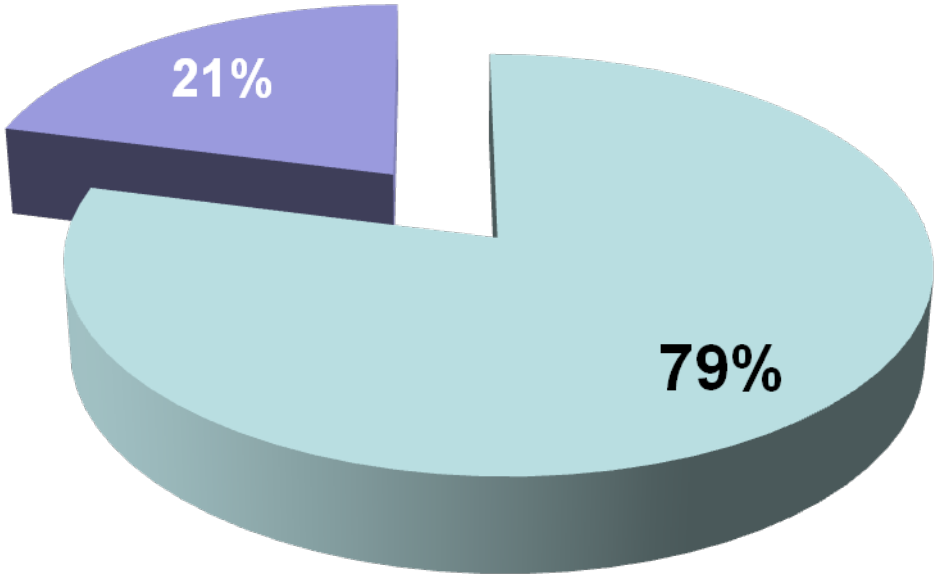
HIV Prevention in Healthcare Settings Targeting People with HIV

- HIV testing and linkage to care and prevention services
- Antiretroviral therapy
- Retention in care and adherence to interventions
- Partner services
- Risk-reduction interventions and condoms
- STD screening and treatment
- Perinatal transmission interventions
- Substance use, mental health, and social support

Testing and Diagnosis is Prevention

- **21% (230,000) with undiagnosed HIV**
  Associated with >50% of sexual transmission

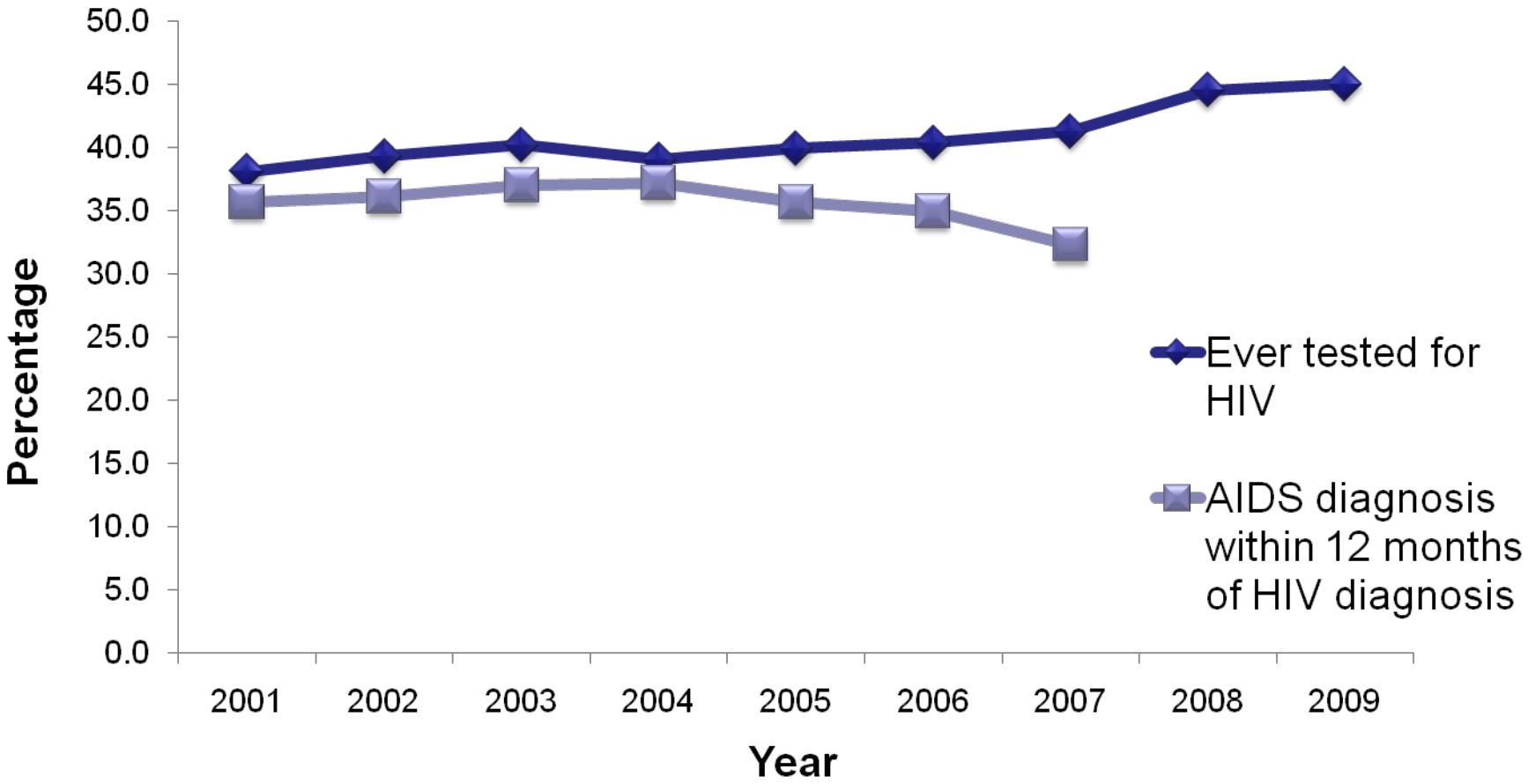
- **79% (870,000) diagnosed**
  More likely to access prevention and treatment



Routine, opt-out screening in clinical settings costs $2,000–6,000 per person with HIV diagnosed

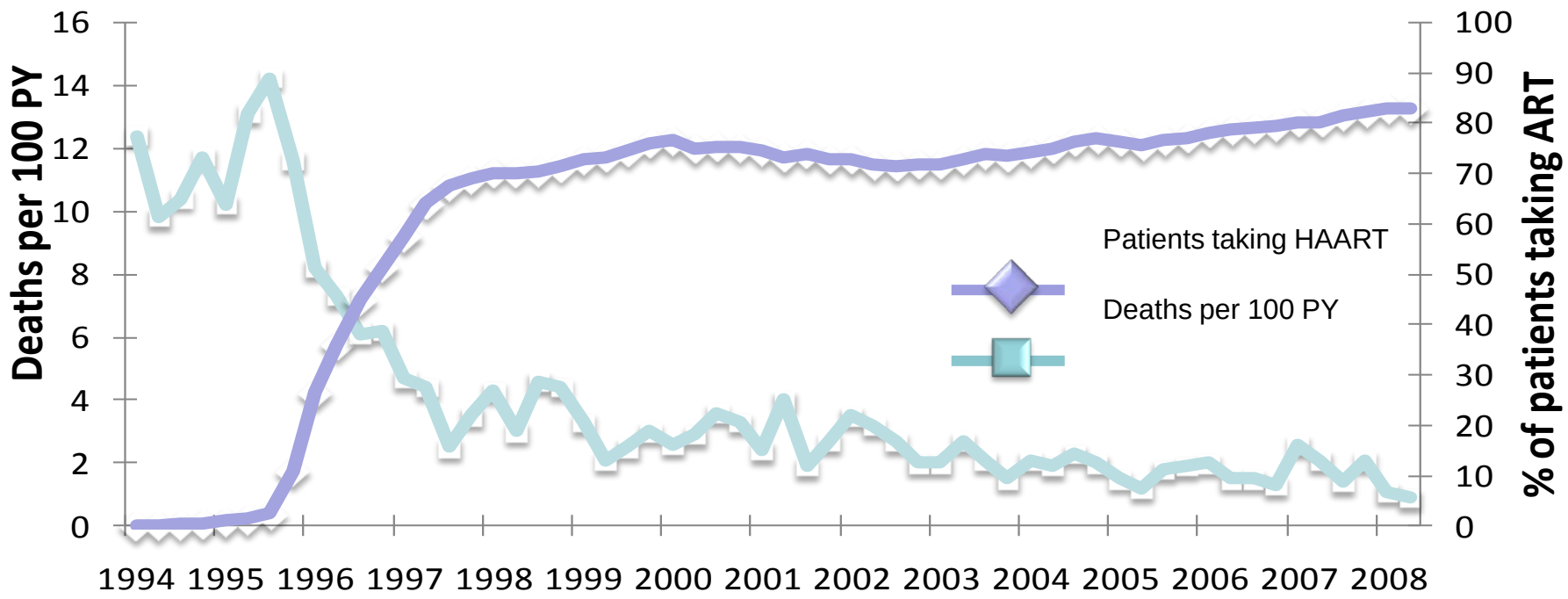
Marks G, et al. AIDS 2005;20(10);1447-1450
Campsmith M, et al. JAIDS 2010;53(5);619-24

2006 HIV Testing Recommendations Evidence of Impact



CDC. MMWR 2010;59(47);1550-1555

Antiretroviral Treatment (ART) Is Effective Care and Prevention

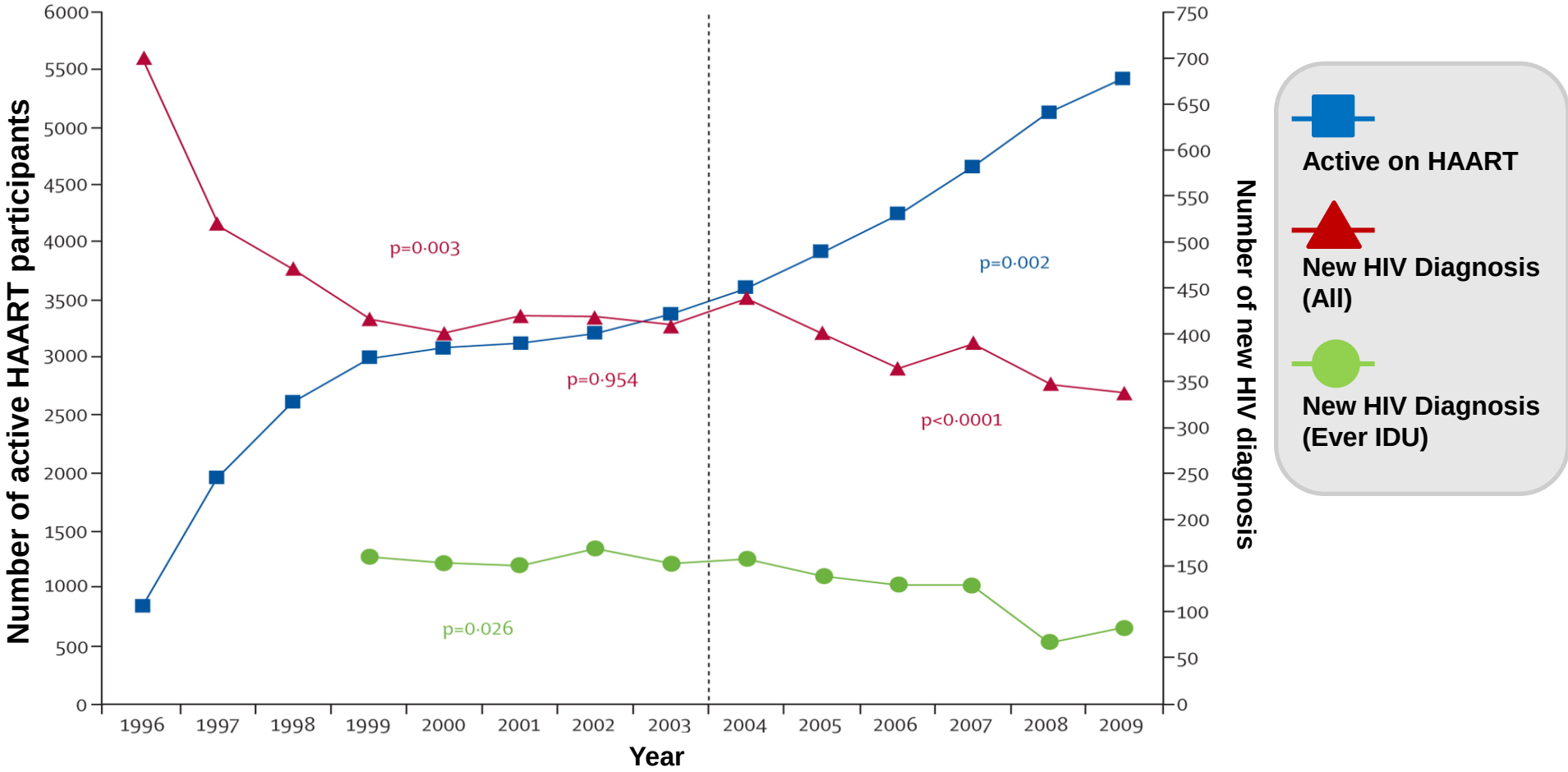


ART associated with

- **>90% reduction in excess mortality**
- **92% reduction in HIV transmission in cohort of HIV-discordant couples**

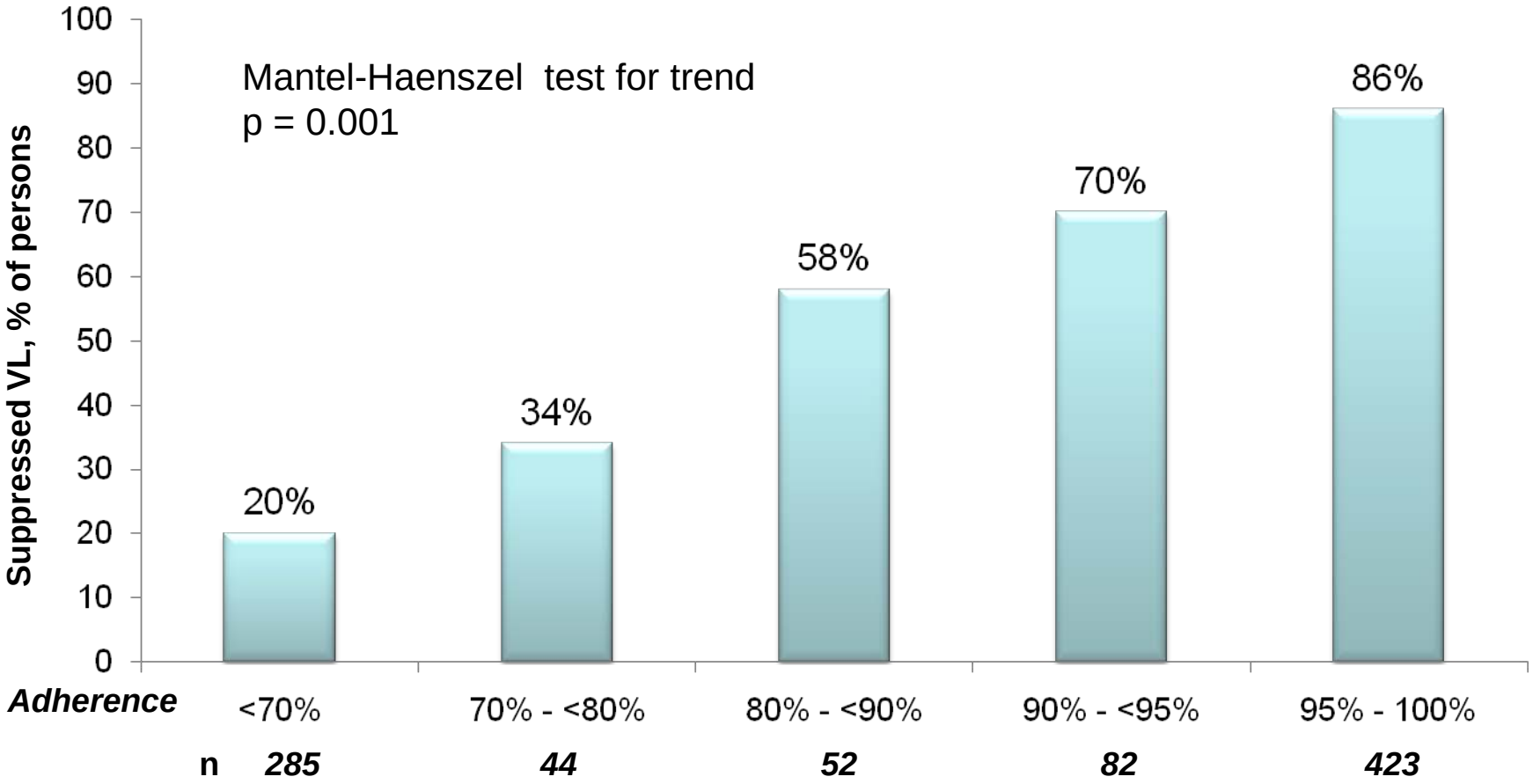
HIV Outpatient Study, CDC, 1994-2008
Donnell D. Lancet 2010; 375: 2092-2098
Bhaskaran K, et al. JAMA 2008;300(1):51-9
ART, Antiretroviral treatment .

Population Impact of Antiretroviral Therapy British Columbia, Canada, 1996–2009



Montaner JS, et al. Lancet, 2010;376(9740);532-539
HAART, Highly active antiretroviral therapy
IDU, Intravenous drug use

Medication Adherence and Viral Load Suppression



Low-Beer S, et al. JAIDS. 2000;23(4):360-361

Linkage and Retention in Care and Prevention Services

- **Linkage to care and preventive services**
  - Only 69% persons with HIV attend clinic within 12 months of diagnosis
- **Cost and effectiveness of services**
  - Case management improves linkage by 32% at a cost of $1,200/person
  - Interventions focused on adherence reduce viral load at ~$35,000/QALY
  - Sexual behavior change interventions reduce unprotected sex by 43% and acquisition of sexually transmitted diseases by 80%
- **Effectiveness depends on coverage during the entire cascade from testing to care**
  - Transmission reductions can vary from 15% to 44%

Walensky RP, et al. Clln Infect Dis 2010;51(4):392-400
Marks G, et al. AIDS 2010;24(17):2665–2678
Crepaz N, et al. AIDS 2006; 20(2):143-157
QUALY, Quality-adjusted life year

Partner Services

- **Partner testing and linkage services**
  - Reduce future transmission through earlier identification of undiagnosed infections
  - 20% of partners tested through provider notification had undiagnosed HIV
- **Median cost per new diagnosis is $7,800**

Hogben M, et al. Am J Prev Med 2007;33(2S):S89–S100.

HIV Prevention in Health Care Settings Targeting People at High Risk for Acquiring HIV

- Behavioral risk-reduction interventions and condoms
- Pre-exposure prophylaxis (PrEP)
- Microbicides
- STD Screening and treatment
- Substance use, mental health, and social support services
- Male circumcision

Behavioral Risk Reduction Interventions

- **Goal: Reduce risk behaviors and increase condom use**
  - More than 50 interventions showed effect in controlled trials
  - Many implemented in clinical settings
- **Impact**
  - Reduce incident STDs by 17%
  - Cost-effective: $15,000 per HIV infection averted
- **Delivery: Provider or computer-delivered interventions feasible to implement on large scale**
  - Need for linkage of patients requiring more intensive services to allied health or community-based provider
  - Social, economic, mental health, and substance use issues often paramount

CDC. 2009 Compendium of Evidence-Based HIV Prevention Interventions. Available at www.cdc.gov/hiv/topics/research/prs
Scott-Sheldon LA, et al. Ann Behav Med 2010;40:191-204
STDs, Sexually transmitted diseases

Pre-exposure Prophylaxis: Potential Users and Cost-effectiveness

- **44% reduction in acquisition**
- **Potential users are HIV-uninfected persons at very high risk of infection and unable to consistently use other prevention modalities**
- **Cost-effectiveness depends on**
  - Incidence in target groups using pre-exposure prophylaxis
  - Cost of medication and services
  - Ability to maintain or increase existing risk reduction behavior
  - Adherence to medication
  - $34,000-$320,000/QALY saved

Paltiel AD, et al. CID 2009:48(6):806-815
QUALY, Quality-adjusted life year

Policy, Systems, and Environmental Change: Integrating Prevention and Health Care

- **Policy development and support**
  - Guidelines and recommendations: testing, prevention with positives, ART, male circumcision
  - Quality measures
  - Reimbursement guidance
- **New programs and models**
  - Expanded Testing Initiative: 30 jurisdictions with >90% of epidemic
  - Enhanced HIV Prevention Planning: 12 urban areas with 44% of epidemic
    - Integrating HIV prevention, care, and treatment

ART, Antiretroviral treatment

“The United States will become a place where new HIV infections are rare and when they do occur, every person, regardless of age, gender, race/ethnicity, sexual orientation, gender identity or socioeconomic circumstance, will have unfettered access to high quality, life-extending care, free from stigma and discrimination.”

——*Vision, National HIV/AIDS Strategy*

CHILDHOOD SEXUAL VIOLENCE AND HIV: DATA TO GUIDE PREVENTION

Jim Mercy, PhD
Division of Violence Prevention
National Center for Injury Prevention and Control
Centers for Disease Control and Prevention

Overview

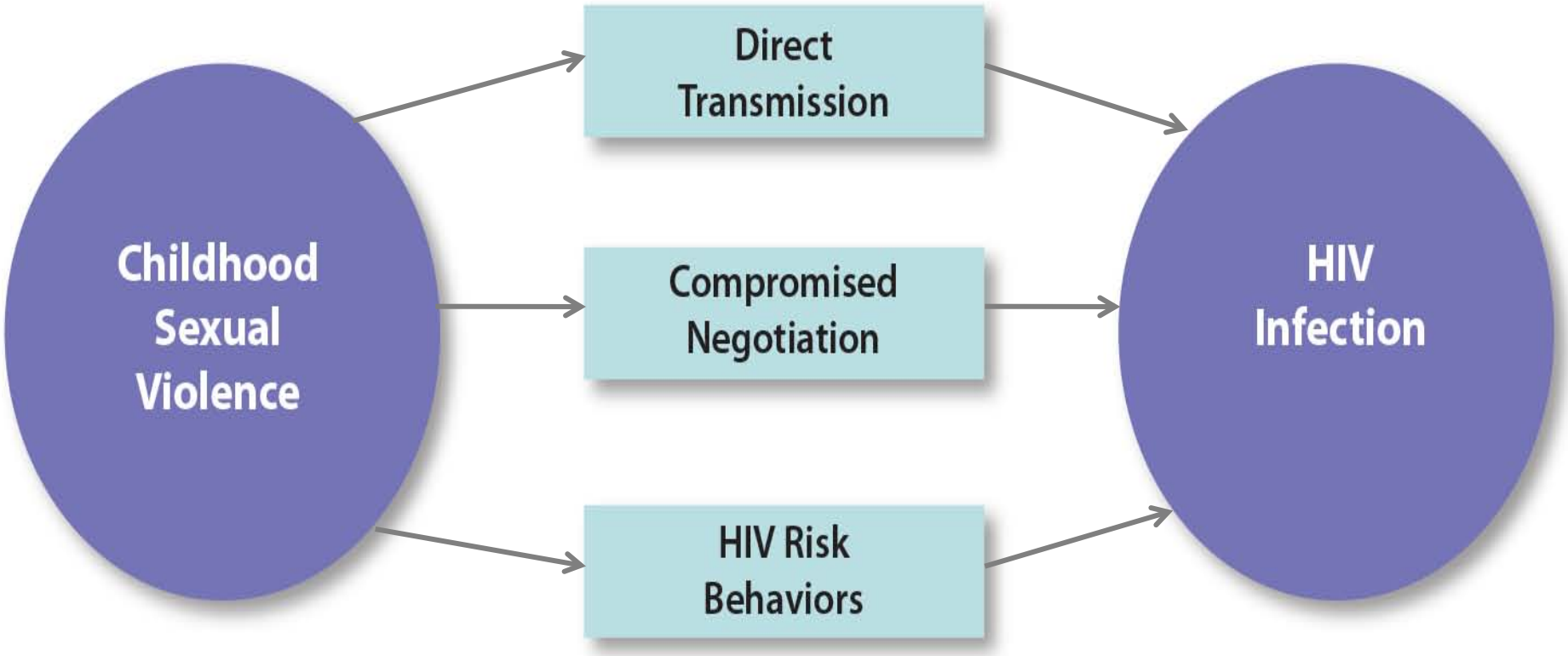
- **Childhood sexual violence and HIV/AIDS**
- **Importance of public health surveillance of childhood sexual violence globally**
  - National survey in Swaziland
  - Promising approaches to preventing childhood sexual violence and mitigating its health consequences

Childhood sexual violence is any sexual act perpetrated against the will of or by coercion of a person <18 years old by anyone regardless of their relationship to the victim

The Magnitude of the Problem

- 150 million girls and 73 million boys experienced sexual violence with physical contact in 2002
- Adolescents make up the fastest growing group of HIV-infected persons worldwide
- Sexual violence increases risk for HIV infection, as well as other mental and physical health problems

Paths Leading From Childhood Sexual Violence to HIV



Swaziland

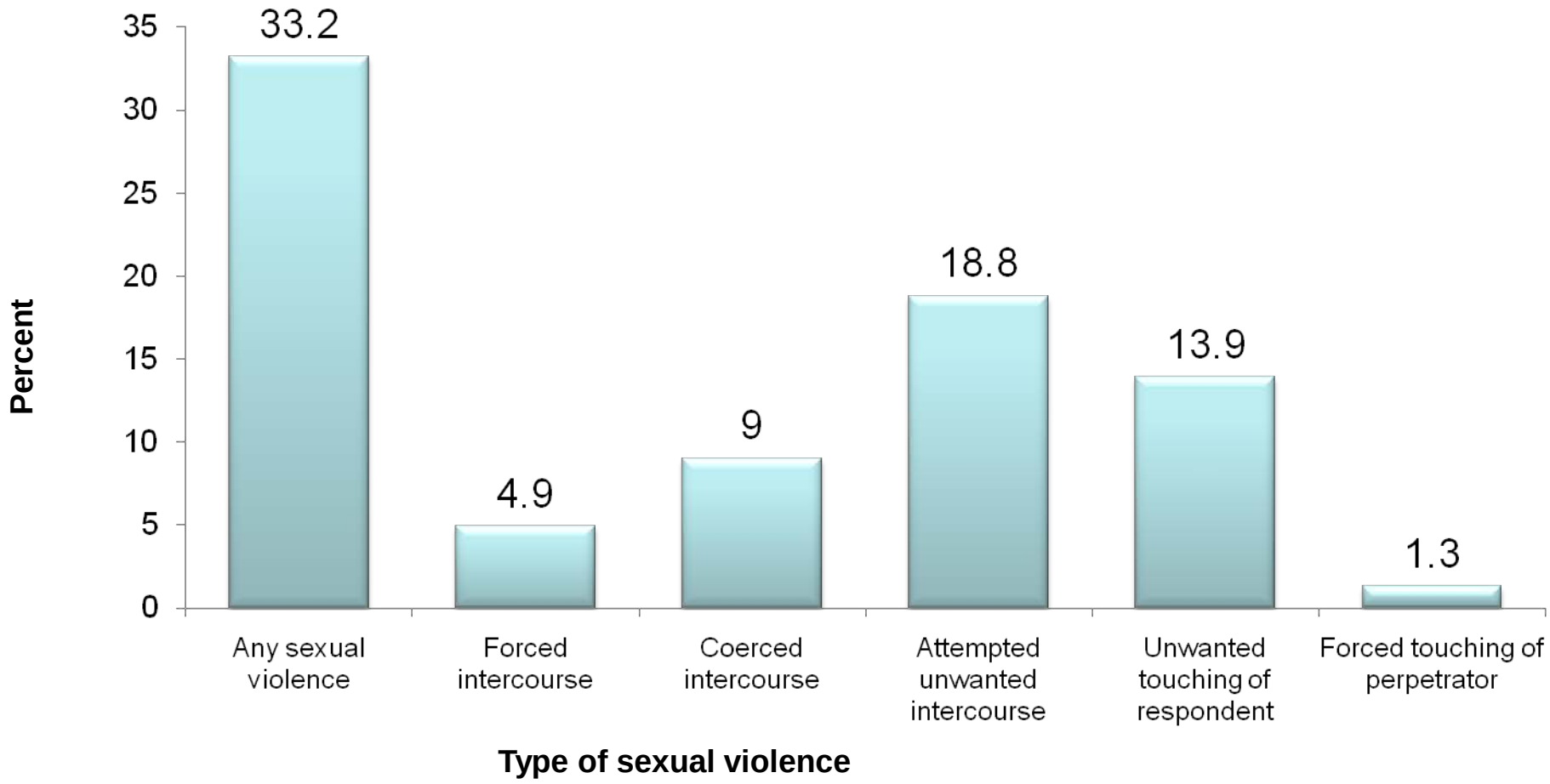
- Landlocked—bordering Mozambique and South Africa (population 1,133,066)
- Among countries with highest adult HIV prevalence: 34.5%
- 2006: CDC/UNICEF/Swaziland formed partnership to conduct a national survey

Purpose of the National Survey Swaziland, 2007

- Describe magnitude and nature of the problem
- Assess health consequences
- Identify potential risk and protective factors
- Assess utilization of services
- Help guide prevention programs and policies

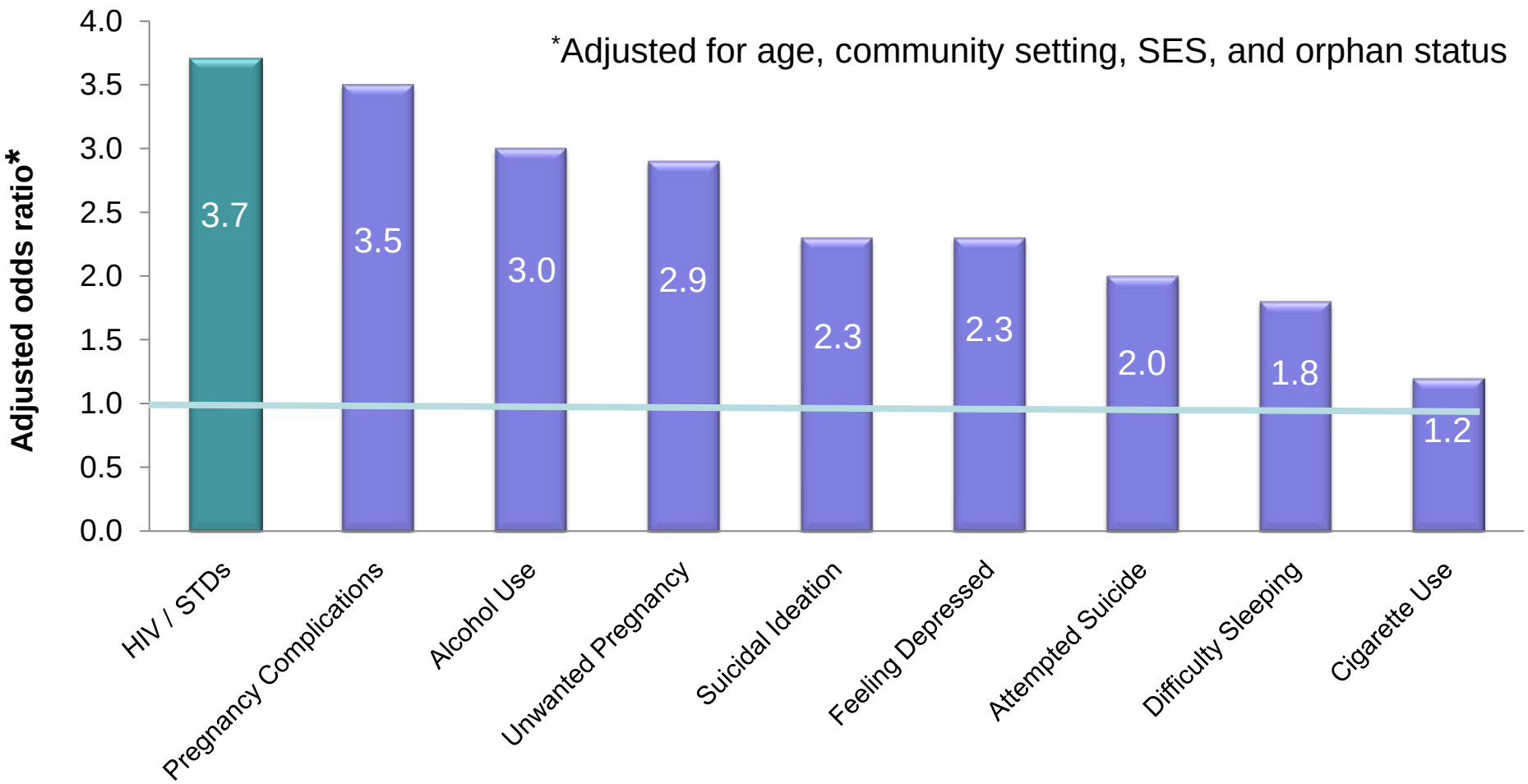
Females aged 13–24 years participated and reported on their experience with sexual violence as children

Sexual Violence Prior to Age 18 Among Females 13–24 Years of Age, Swaziland, 2007



Reza A, et al. Sexual violence and its health consequences for female children in Swaziland: a cluster survey study. Lancet 2009; 373(9679):1966-72

Association Between Childhood Sexual Violence and Selected Health Conditions, Females 13–24 Years Old, Swaziland, 2007



Reza A, et al. Sexual violence and its health consequences for female children in Swaziland: a cluster survey study. Lancet 2009;373(9679):1966-72
SES, Socioeconomic status
STDs, Sexually transmitted diseases

Key Characteristics of Perpetrators of Childhood Sexual Violence, Swaziland, 2007

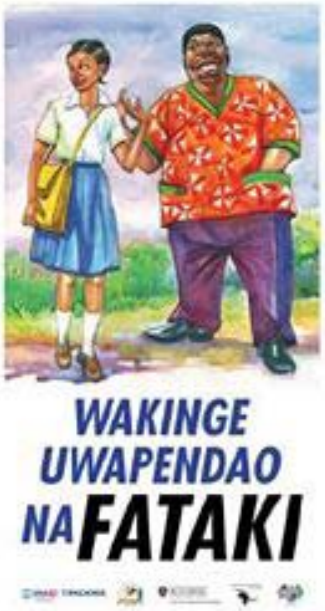
- **Three most common perpetrators**
  - Men/boys from the neighborhood: 32.3%
  - Boyfriends: 26.2%
  - Male relatives (excluding fathers): 14.0%
- **Perpetrators tend to be substantially older than their victims (60% 5 or more years older)**

Reza A, et al. Sexual violence and its health consequences for female children in Swaziland: a cluster survey study. Lancet 2009; 373(9679):1966-72.

The Fataki Campaign

- Reduce acceptance of cross-generational relationships that contribute to unsafe sex
- Morogoro, Tanzania

  Percent of people who said they could do something increased from 64% to 88%



The Fataki Campaign is working to change Tanzania's acceptance of cross-generational sex. As part of its efforts to encourage behavioral change, vignettes featuring the fictional Fataki can be seen throughout Tanzania.

Heath C. Switch: How to change things when change is hard. Broadway Books: New York, pp. 234-239

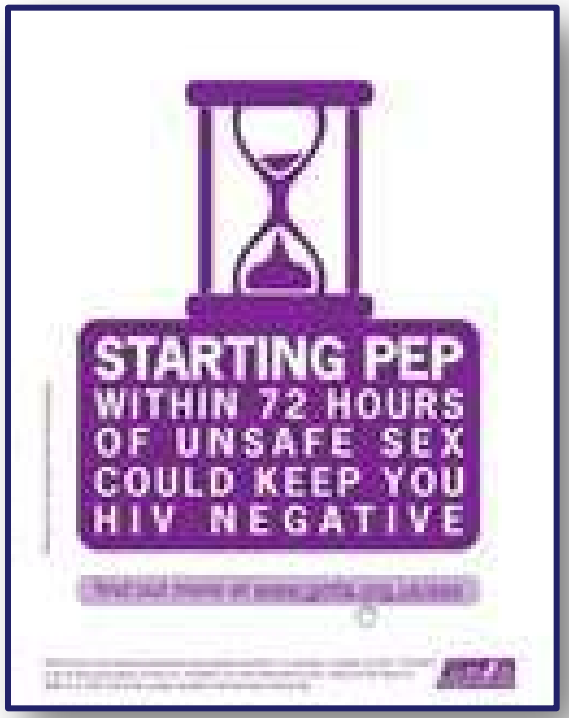
Use and Awareness of Services for Childhood Sexual Violence and HIV, Swaziland, 2007

- **Low use and awareness of services**
  - Only 14% of victims of childhood sexual violence received any kind of health, social, or criminal justice service
  - Only 16% of respondents were aware of post-exposure prophylaxis (PEP) services

Reza A, et al. Sexual violence and its health consequences for female children in Swaziland: a cluster survey study. Lancet 2009;373(9679):1966-72

Post-exposure Prophylaxis (PEP)

- **PEP for rape victims**
  - Reduces likelihood of HIV seroconversion
  - 28-day course of antiretroviral medications started within 72 hours of rape
    - 80% effective under optimal conditions
- **Cost effective in South Africa**
  - Net cost of $2,000 per life year gained



Christofides N, et al. Including post-exposure prophylaxis to prevent HIV/AIDS into post-sexual health services in South Africa: Costs and cost effectiveness of user -referred approaches to prevention. Pretoria, South Africa. Medical Research Council, 2006

Role of Parents in Providing Protection and Information Females Aged 13–24 Years, Swaziland, 2007

- **Parents protect children**
  - Having a close relationship with one's mother cuts the risk of childhood sexual violence by more than 50%
- **Parents are not a primary source of health information**
  - 16% learned of HIV/AIDS from their parents
  - 34% learned about safe sex from their parents

Breiding MJ, et al. Risk factors associated with the experience of childhood sexual violence among females in Swaziland. Bulletin of the World Health organization (forthcoming)

Families Matter

- **Promote positive parenting skills about sexuality and sexual risk reduction**
  - Targets parents/caretakers children 9–12 years old
  - Educational intervention in 5 sessions
- **Rural, Western Kenya**
  - Enhanced communication:
  - Proportion of children asking parents about a sexual topic increased from 14% to 50%

Vandenhoudt H, et al. Evaluation of a U.S. evidence-based intervention in rural Western Kenya: From Parents Matter to Families Matter! AIDS Education and Prevention 2010;22(4):328-343

Together for Girls: A Global Partnership

- Centers for Disease Control and Prevention
- United Nations Children's Fund
- President's Emergency Plan for AIDS Relief
- The Joint United Nations Programme on HIV/AIDS
- United Nations Development Fund for Women
- United Nations Population Fund
- Becton, Dickinson and Company
- CDC Foundation
- Nduna Foundation
- Grupo ABC

Together for girls
We can end sexual violence

Generate data to guide action
Support governments in evidence-based prevention and response
Mobilize action through communication strategies

HIV PREVENTION IN NEW YORK CITY

Thomas A. Farley, MD, MPH

Commissioner

New York City Department of Health and Mental Hygiene

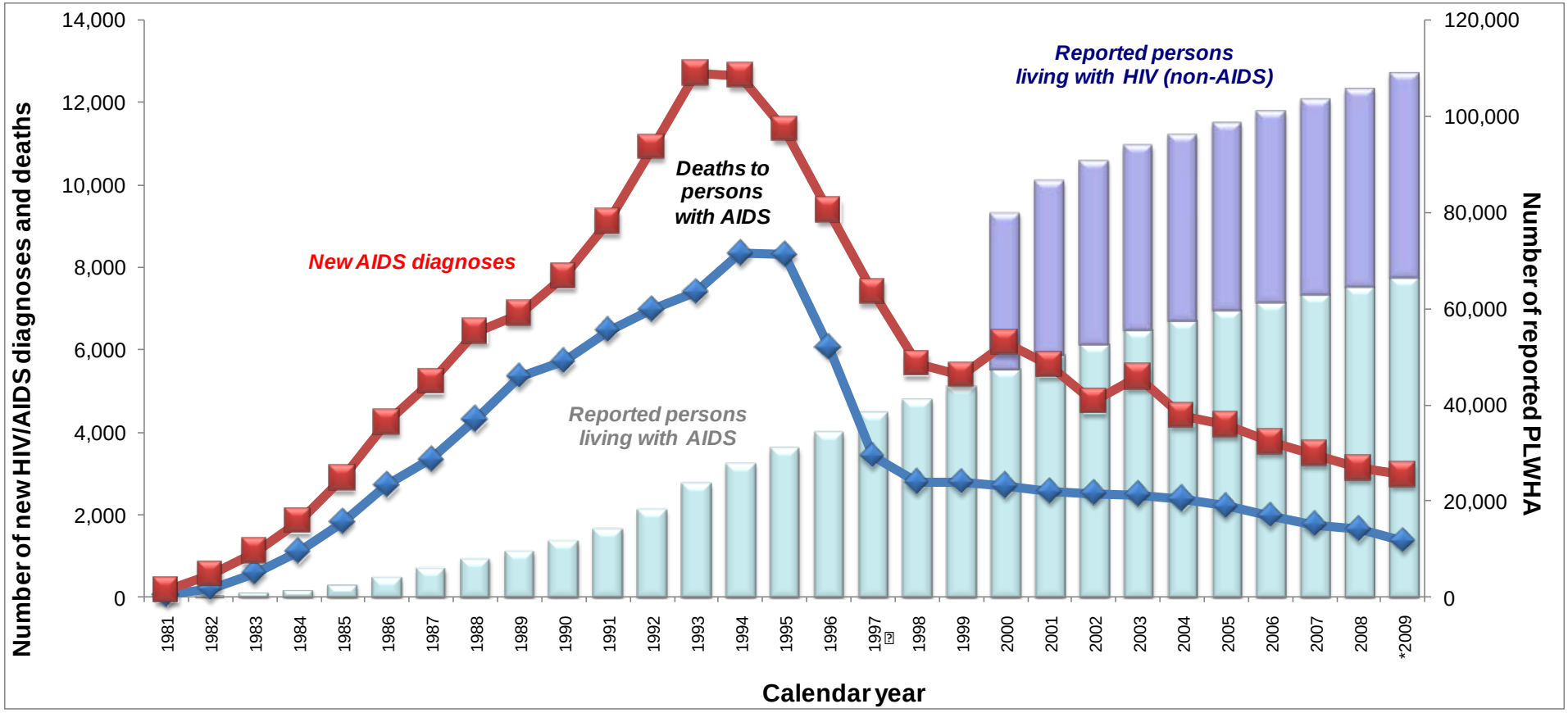
http://www.nyc.gov/html/doh/html/home/home.shtml

Overview

- **HIV epidemic in New York City**
  - Resurgence of transmission in MSM
- **Prevention initiatives**
  - Expanded HIV testing and linkage to care
  - Prevention with positives
  - Condom distribution
  - Risk-reduction messages in mass media
  - Reducing alcohol use

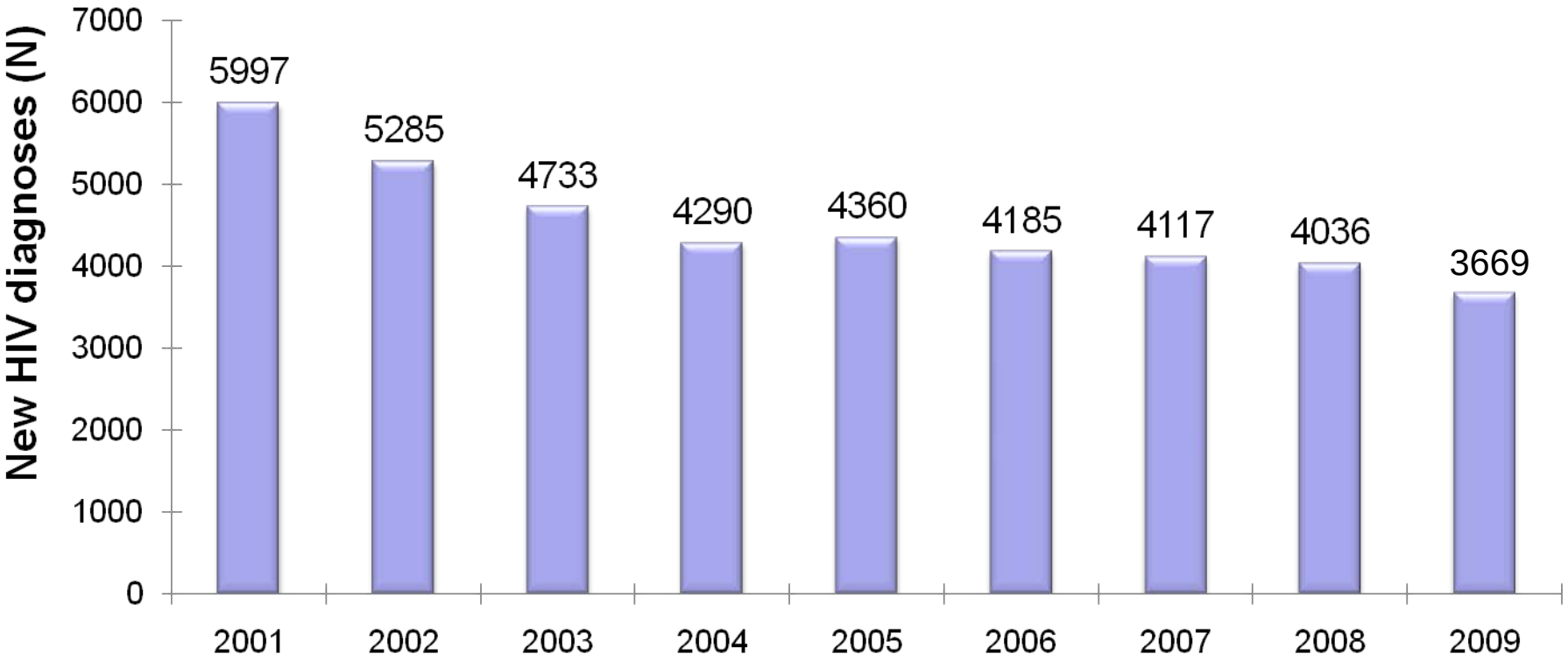
MSM, Men having sex with men

Trends in HIV/AIDS New York City, 1981–2009



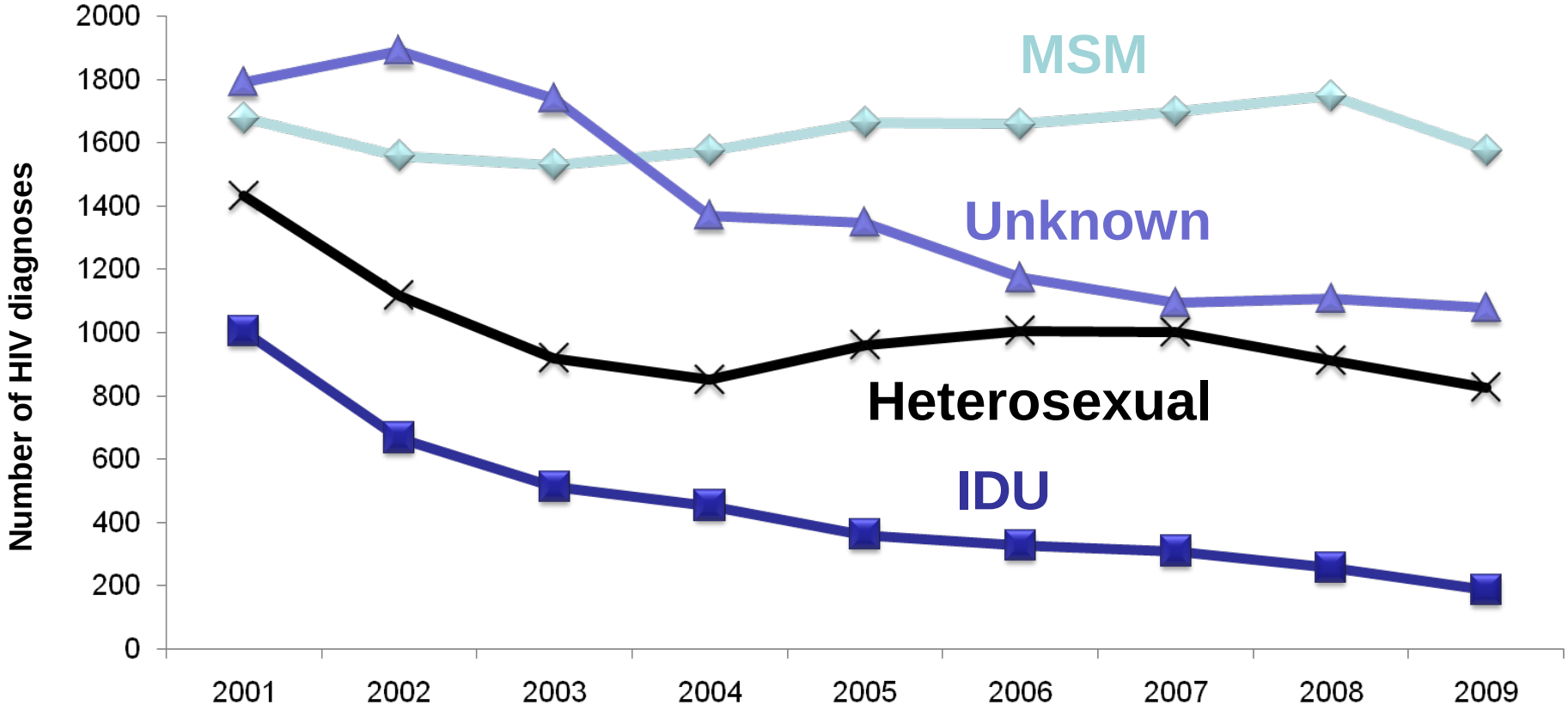
PLWHA, Persons living with HIV/AIDS
Data on deaths outside New York City are incomplete

New HIV Diagnoses
New York City, 2001–2009



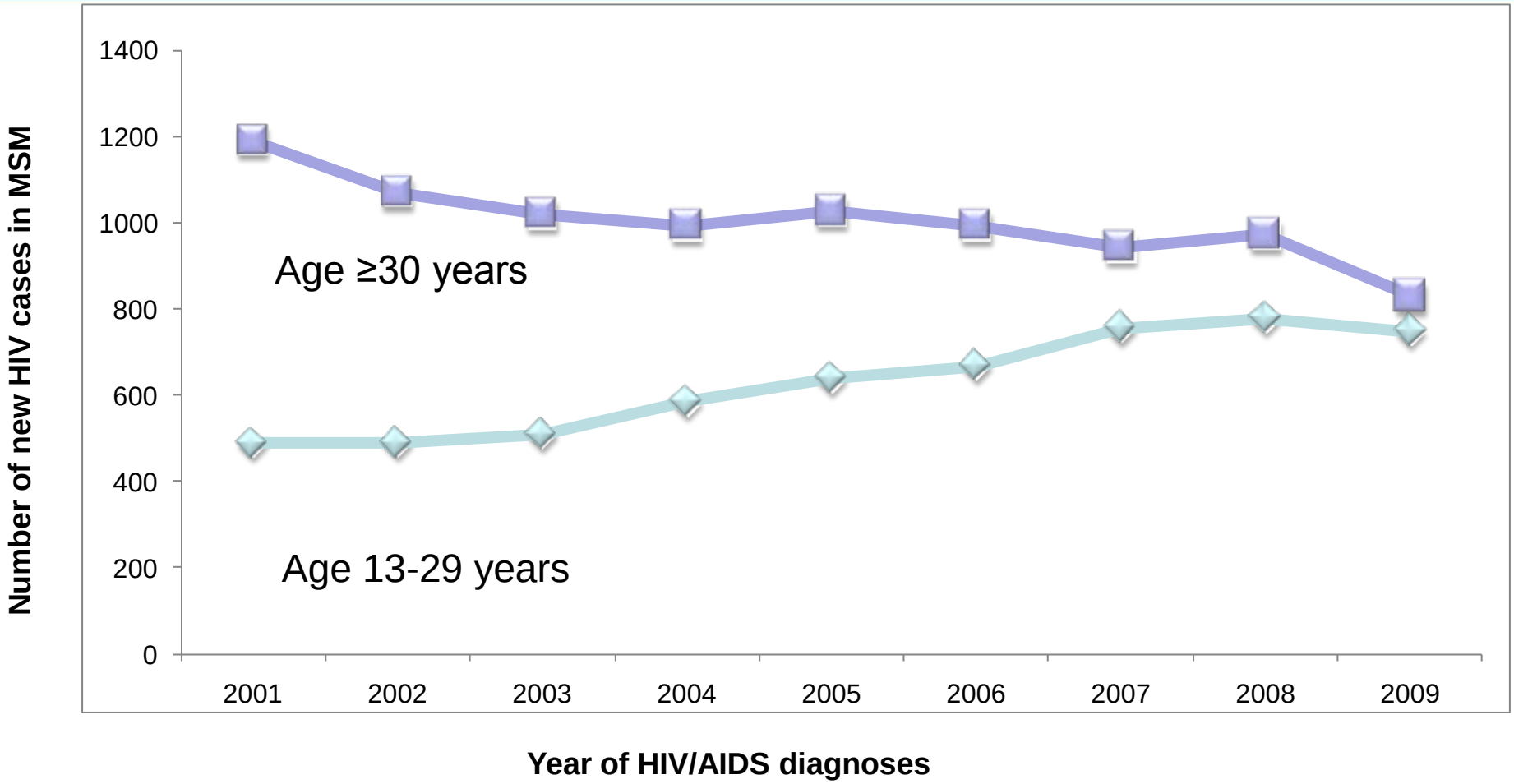
As reported to the New York City Department of Health and Mental Hygiene by September 30, 2010

Trends in HIV Diagnoses by Risk Group New York City, 2001–2009



For events reported to the NYC DOHMH by September 30, 2010. Heterosexual risk category expanded to include HEFSP-defined probable heterosexual risk. Perinatal and other risk not included. Source: HIV Epidemiology and Field Services Program, NYC DOHMH.
MSM, Men having sex with men IDU, Intravenous drug use

HIV/AIDS Diagnoses Among MSM by Age New York City, 2001–2009



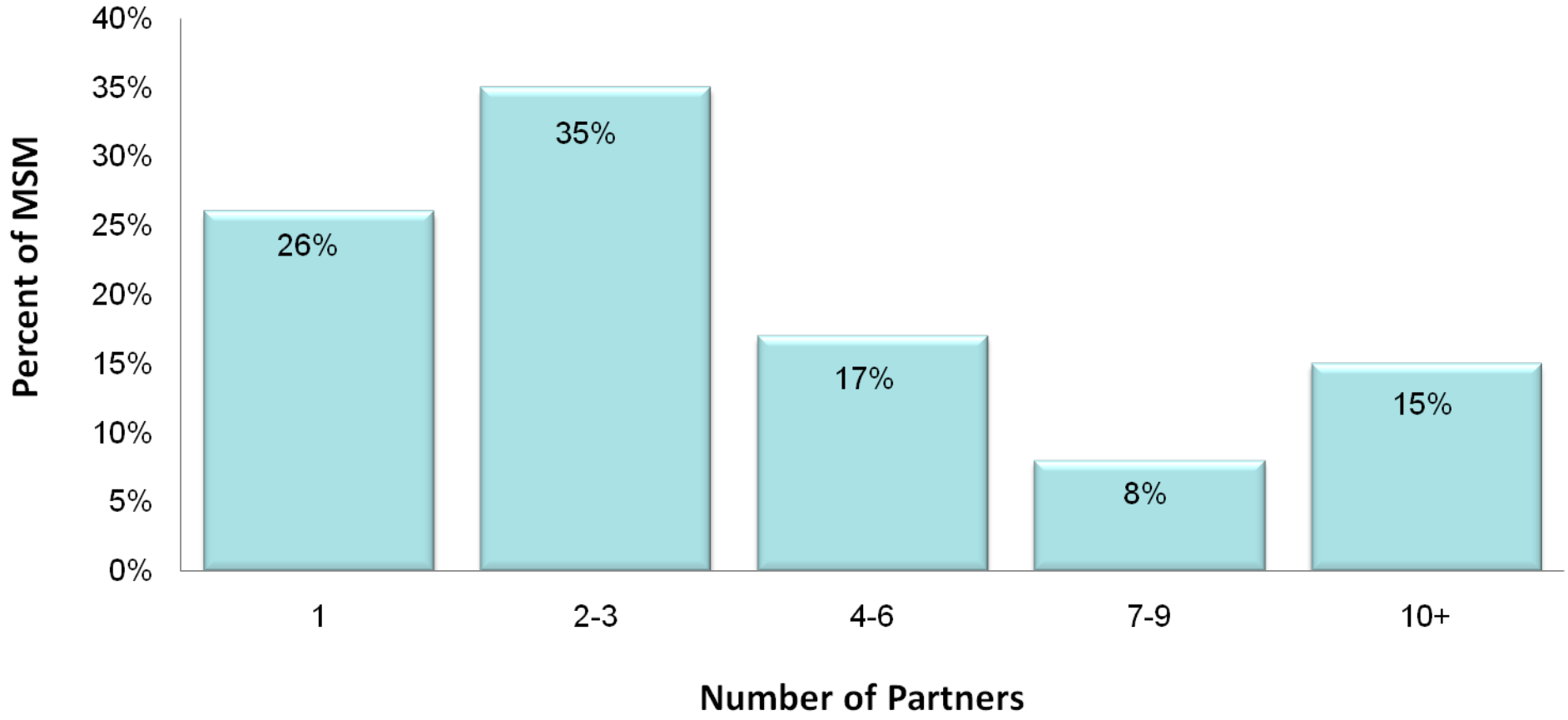
Reported to NYC DOHMH HIV Epidemiology and Field Services Program as of September 30, 2010.
Generated on December 2, 2010

Transmission Risks of Reported Acute HIV Cases New York City, 2008–2009

Transmission Risk	Cases	Percent	Percent with Known Risk Factor
MSM only	**143**	**74%**	**86%**
MSM and IDU	6	3%	4%
IDU	6	3%	4%
Heterosexual	11	6%	7%
Unknown/under investigation	27	14%	–
Total	**193**		

Based on data reported to NYC DOHMH HIV Epidemiology and Field Services Program by September 30, 2010

Number of Male Sex Partners in Past Year Among MSM MSM Venues, New York City, 2008



New York City Department of Health and Mental Hygiene HIV Epidemiology Program. HIV Risk and Prevalence among NYC Men Who Have Sex with Men: Results from the 2008 National HIV Behavioral Surveillance Study. Accessed at: http://www.nyc.gov/html/doh/downloads/pdf/dires/nhbsmsm_nov_2009.pdf

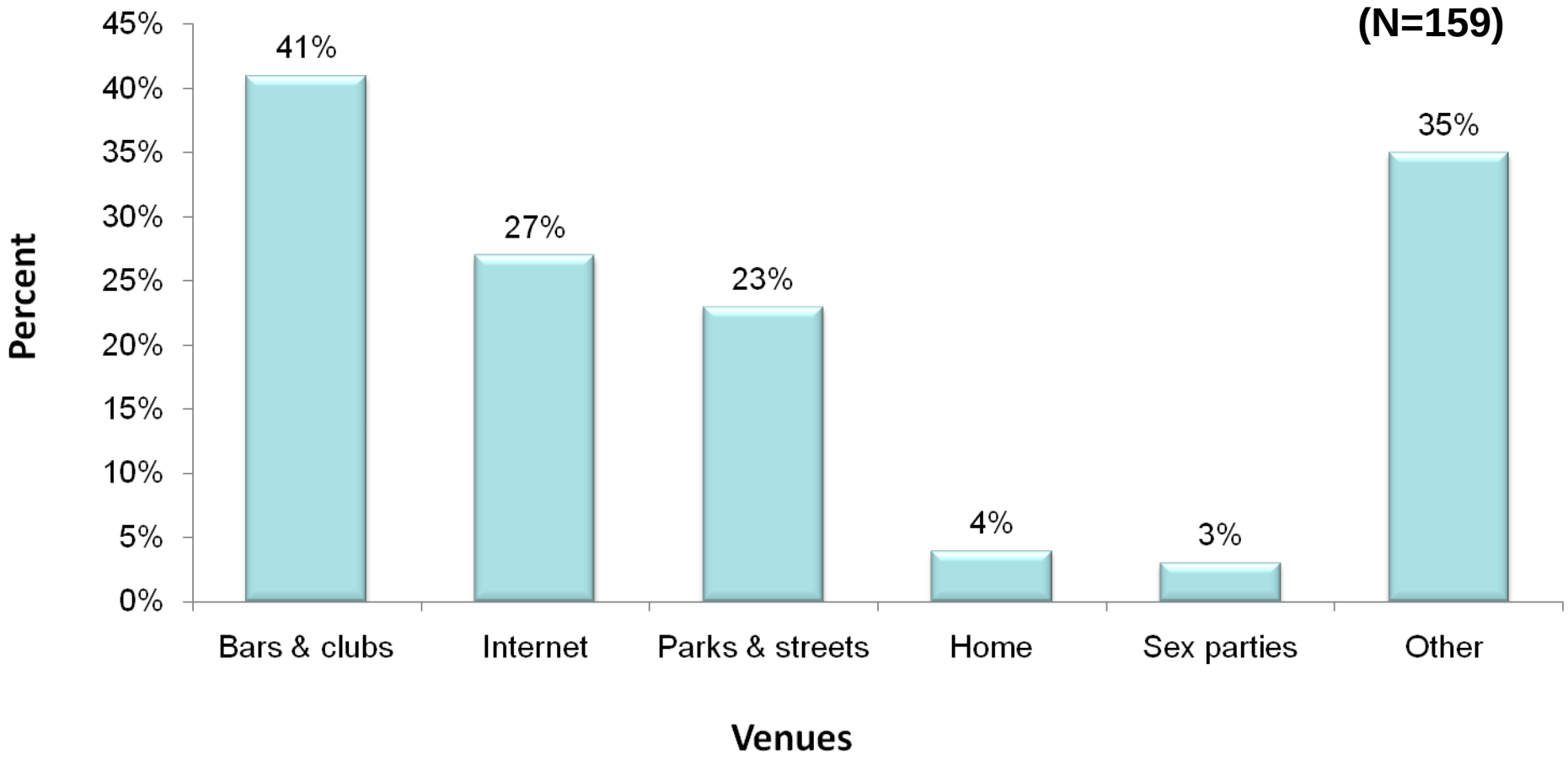
MSM, Men having sex with man

HIV/AIDS Risks Among MSM New York City

- **Condom use inconsistent**
  - Last anal sex unprotected: 35%*
  - Last anal sex with HIV+ or unknown status partner unprotected: 15%*
  - Last anal sex among HIV+ unprotected: 35%*
- **Disclosure of status inconsistent**
  - Knew HIV status of last partner: 62%
  - Discussed HIV before sex with all past-year partners: 41%

*Among MSM who had anal sex at last sex
National HIV Behavioral Surveillance Study of MSM, New York City, 2008

Where Newly Diagnosed MSM Go to Meet Partners New York City, 2007–2008



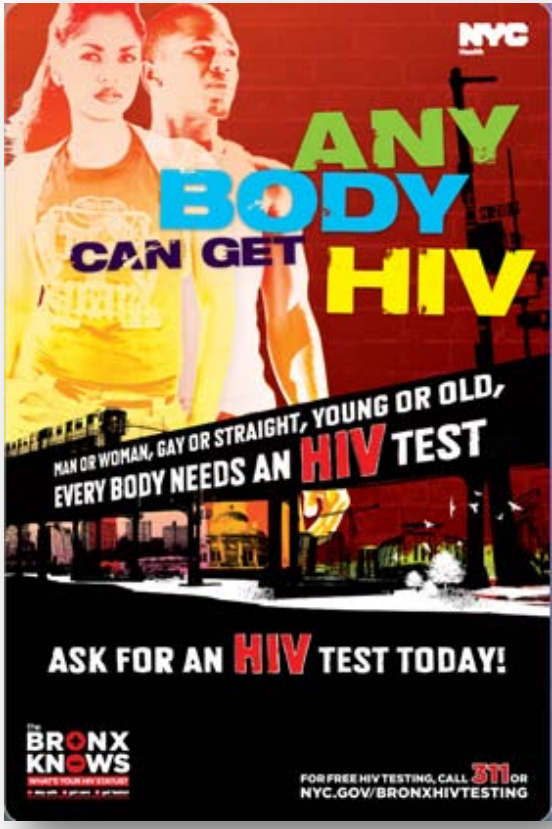
Among MSM naming venues
NYC DOHMH, Bureau of HIV/AIDS Prevention and Control, Field Services Unit Interview Data, MSM, NYC 2007-2008

Overview

- **HIV epidemic in New York City**
  - Resurgence in MSM
- **Prevention initiatives**
  - Expanded HIV testing and linkage to care
  - Prevention with positives
  - Condom distribution
  - Risk-reduction messages in mass media
  - Reducing alcohol use

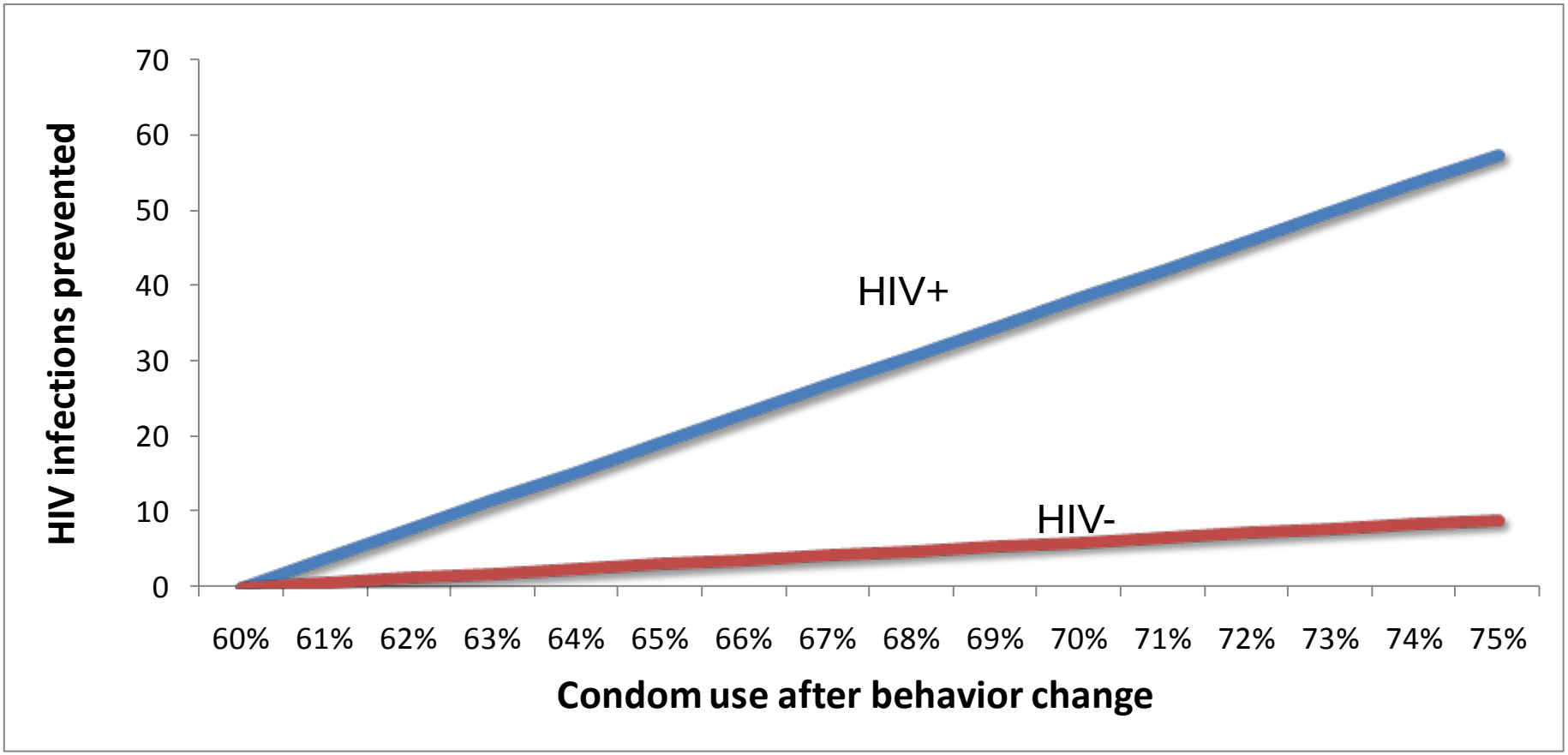
"The Bronx Knows" Testing Campaign July 2008–June 2010

- **Total reported tests: 395,061**
- **Data reporting partners:**
  - 7 hospitals:
    1,547 / 179,025, 0.86%
  - 16 community health centers:
    1,095 / 177,272, 0.62%
  - 9 community-based organizations:
    607 / 38,764, 1.57%
- **Total confirmed positive: 3,249 (0.82%)**
- **Total new diagnoses: 1,237 (0.31%)**
  - 67% linked to care



Reporting of new diagnoses is incomplete. Presented numbers are underestimated.

Small Changes in Behavior in HIV+ Prevent More Infections Than Large Changes in HIV-



Mathematical model of 1,000 MSM. Model assumes: 10 partners per year, 50 anal sex encounters per year, per-act transmission probability 0.01, baseline condom use 60%, condom effectiveness 90%

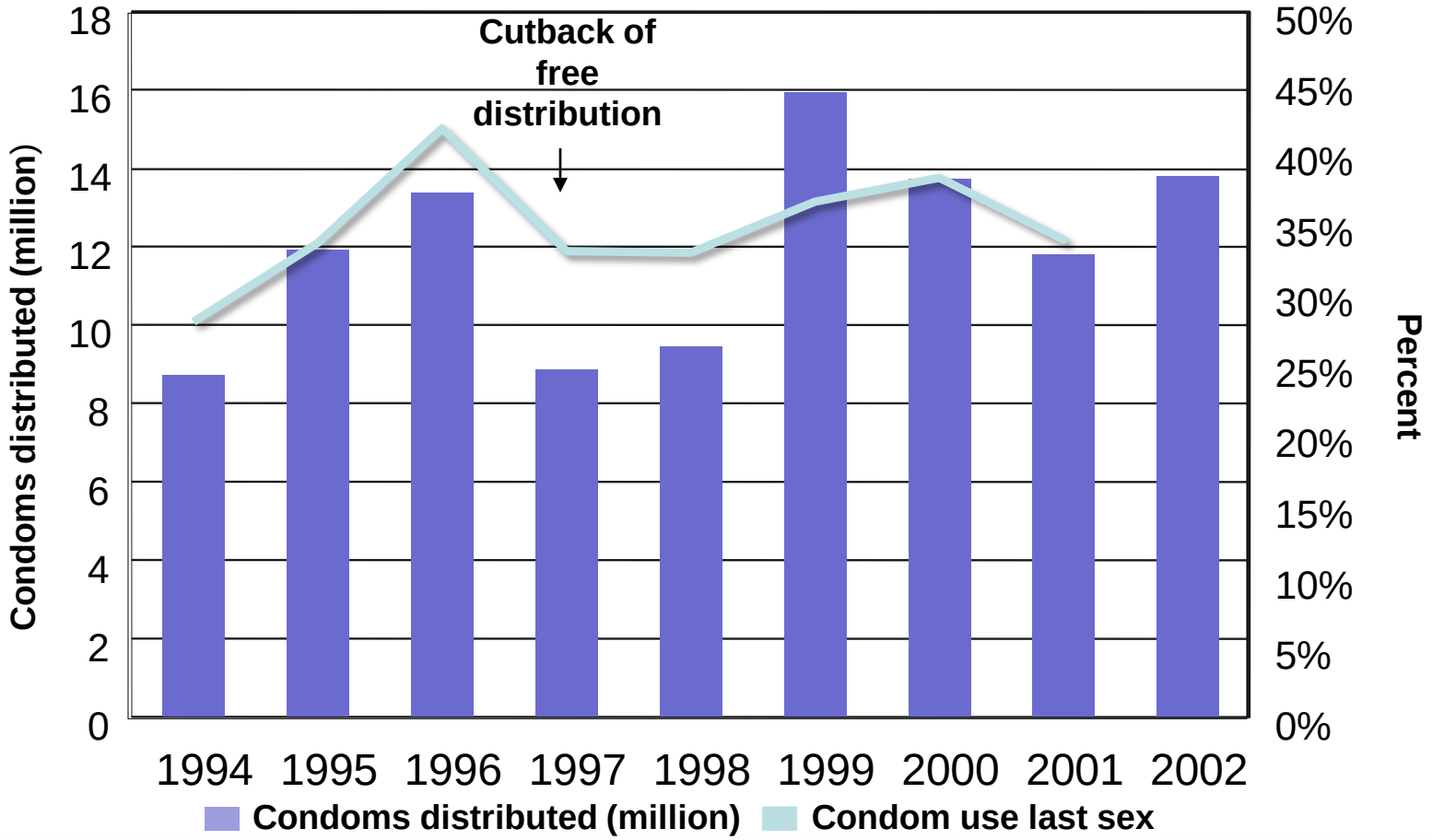
Prevention With Positives

- 77% of HIV+ men and 57% of HIV+ women in care in NYC remain sexually active*
- ~Half of sexually-active HIV+ MSM engage in unprotected anal sex*
- Only 14% of physicians provide HIV risk-reduction counseling to established HIV+ patients**
- Only 39% of sexually-active HIV+ adults in care received one-on-one risk reduction counseling in the last year*

Regular risk-reduction counseling of HIV+ by providers is essential

*Medical Monitoring Project, 1/1/2007-4/30/2007, Bureau of HIV Prevention and Control, NYC DOHMH
**Metsch L, et al. Am J Public Health. 2004;94:1186-1192

Condoms Distributed vs. Condom Use Louisiana, 1994–2002

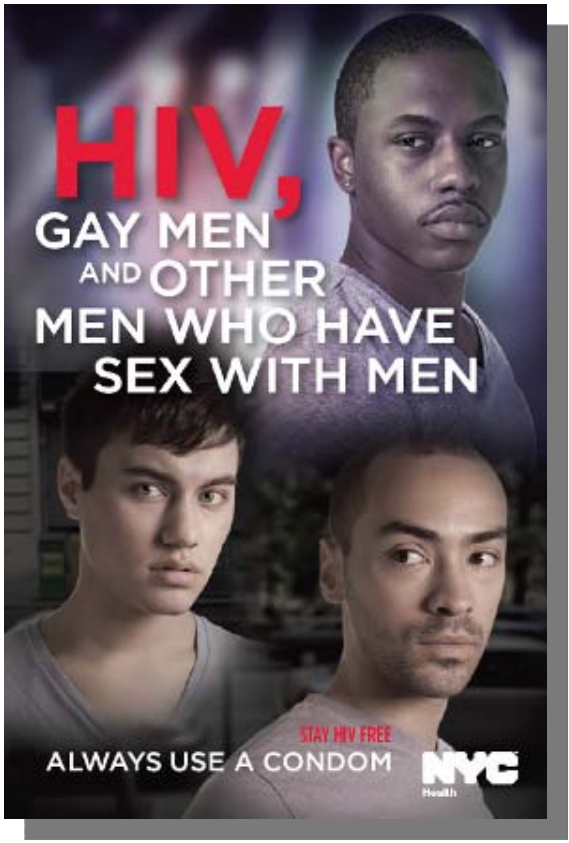


NYC Condom Availability Highlights

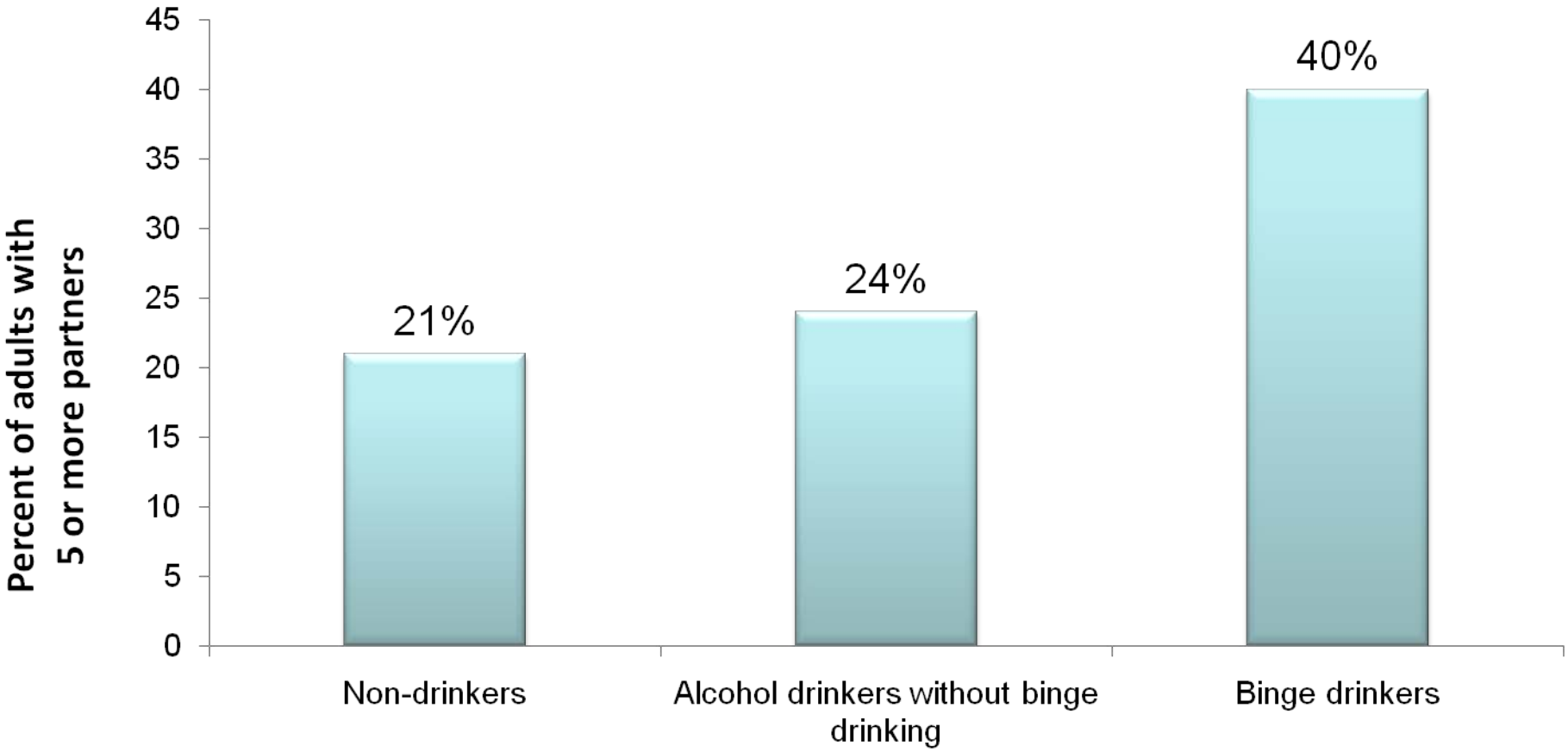
- **41 million free male condoms per year**
  - 5 per capita
- **>3,000 venues**
- **Of 200 MSM venues identified, 93% are condom distribution partners**

Reaching MSM in NYC with Prevention Messages

- **>100,000 MSM in NYC**
  - Need to use mass media
- **Focus groups of young minority MSM**
  - Unconcerned about HIV
  - Have not seen prevention messages
- **Developed media message to emphasize continued risk of HIV**

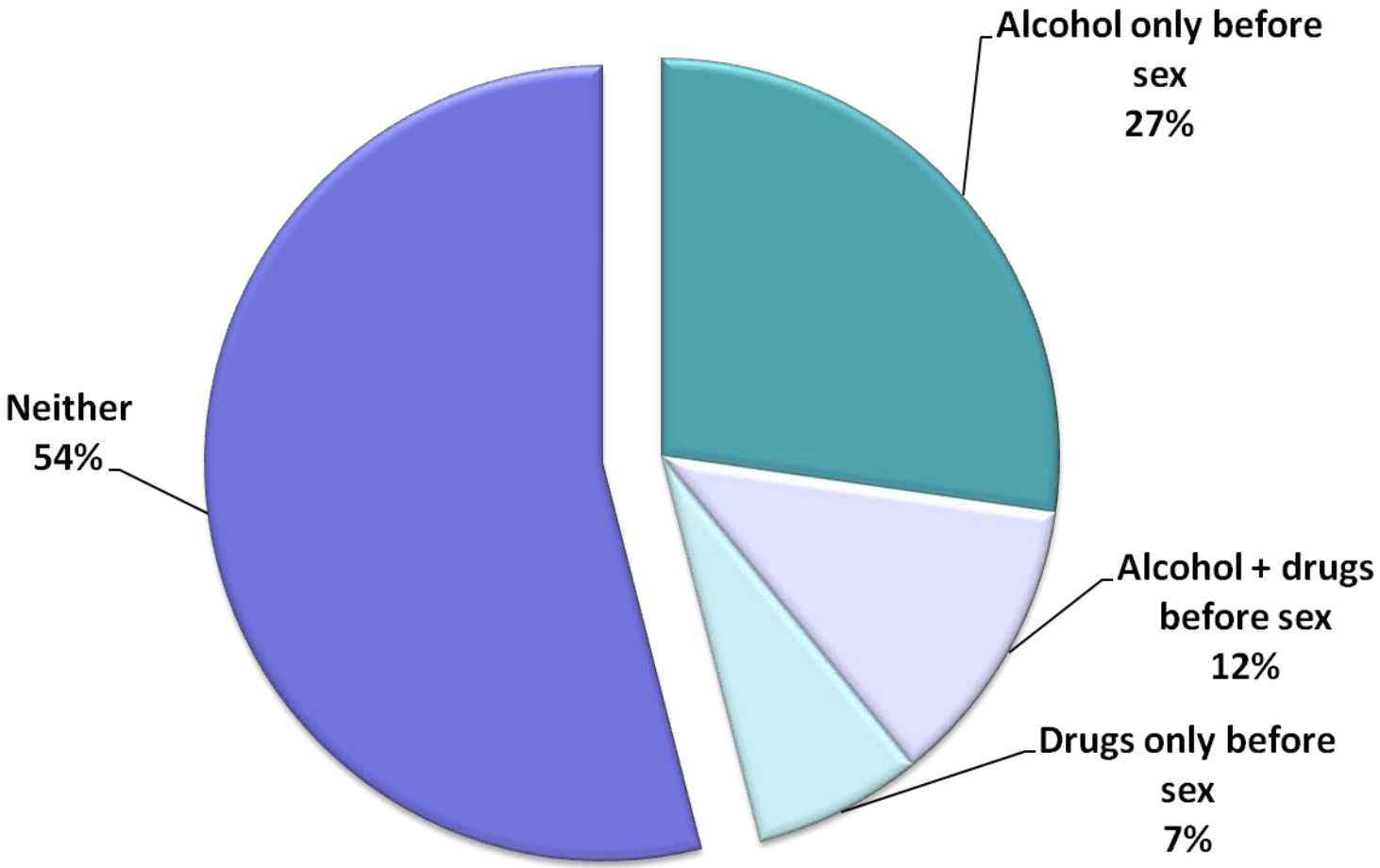


Five or More Sex Partners by Alcohol Use Among Men Who Have Sex with Men



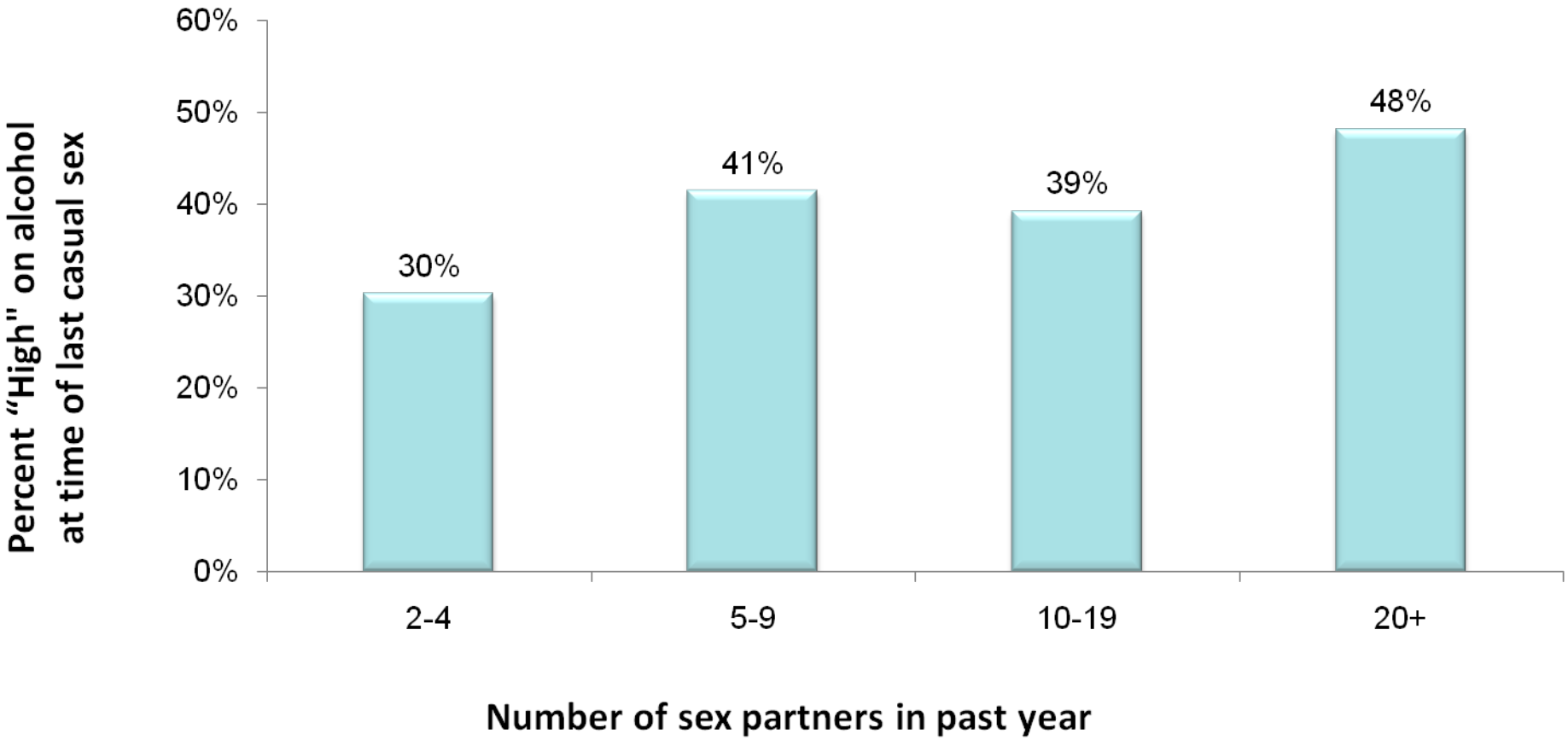
Farley T, et al. NYC Vital Signs 2008, 7(6); 1–4

Alcohol and/or Drugs Before Sex Among High-risk MSM with Two or More Sex Partners



Farley T, et al. NYC Vital Signs 2008, 7(6); 1–4

“High” on Alcohol at Last Sex by Number of Sex Partners among High-risk MSM



Farley T, et al. NYC Vital Signs 2008, 7(6); 1–4

Alcohol Availability and Sexual Risk

- **Increases in alcohol taxes are followed by reductions in alcohol consumption and reductions in STDs**
- **A 20 cents per pack increase in beer tax associated with 9% reduction in gonorrhea among teens and young adults**

Chesson H, et al. Journal of Law and Economics 2000;43 :215-238
STDs, Sexually transmitted diseases

"The harsh mathematics of this epidemic prove that prevention is essential to expanding treatment. Stressing treatment without paying adequate attention to prevention is simply unsustainable."

—Bill Gates
Co-chair, Bill & Melinda Gates Foundation

Bill Gates testimony before the Senate Committee on Foreign Relations, March 10, 2010.
Accessible at http://www.gatesfoundation.org/speeches-commentary/Pages/bill-gates-2010-senate-testimony.aspx

PUBLIC HEALTH GRAND ROUNDS

Office of the Director

DECEMBER 16, 2010