HIV Incidence Surveillance

2007 HIV Incidence Estimates

Los Angeles County

Overview

- What is HIV Incidence Surveillance?
- Why is it important?
- How do we calculate an incidence estimate (methodology)?
- What is the 2007 incidence estimate?

Terminology

Type of Data	Definition
Reported HIV/AIDS Diagnoses	The number of individuals reported in a specific population during a specific time period
HIV Incidence	The number of new HIV infections in a specific time period.
HIV Incidence Rate	HIV incidence divided by the number of people at risk in a population during a specific time period.

What is HIV Incidence Surveillance (HIS)?

- HIS is a ***national effort*** developed and funded by the Centers for Disease Control and Prevention (**CDC**).
- HIS is a system that estimates the number and rate of ***new*** HIV infections in a population like Los Angeles County.
- HIS uses data from newly diagnosed HIV/AIDS cases in combination with a laboratory-based technology to estimate the rate of new HIV infections.

Why is HIS Different?

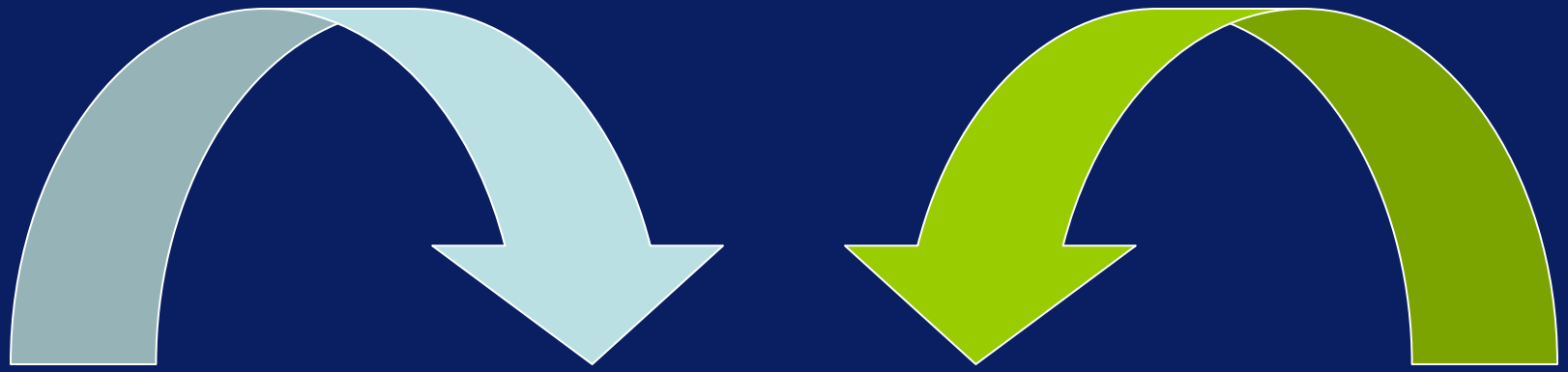
- HIS provides the first population-based estimate of HIV incidence that accounts for those who:
  - test early
  - test late
  - never test
- Previous incidence estimates in LAC are based on back-calculation methods using the number of reported AIDS cases.
- HIS supplies information on when individuals ***acquire*** HIV infection instead of when they received their first positive test.

Why is HIS important?

- Provides reliable and scientifically valid estimates of the number of newly acquired infections to better describe the HIV epidemic in “real time”
- Provides a window into the HIV epidemic at an earlier stage of the disease.
- Gives a more accurate description of the HIV epidemic for better allocation of prevention and care resources.

Methodology

What Information is Needed for HIV Incidence Estimation?



STARHS Test with BED assay

HIV Incidence Estimation

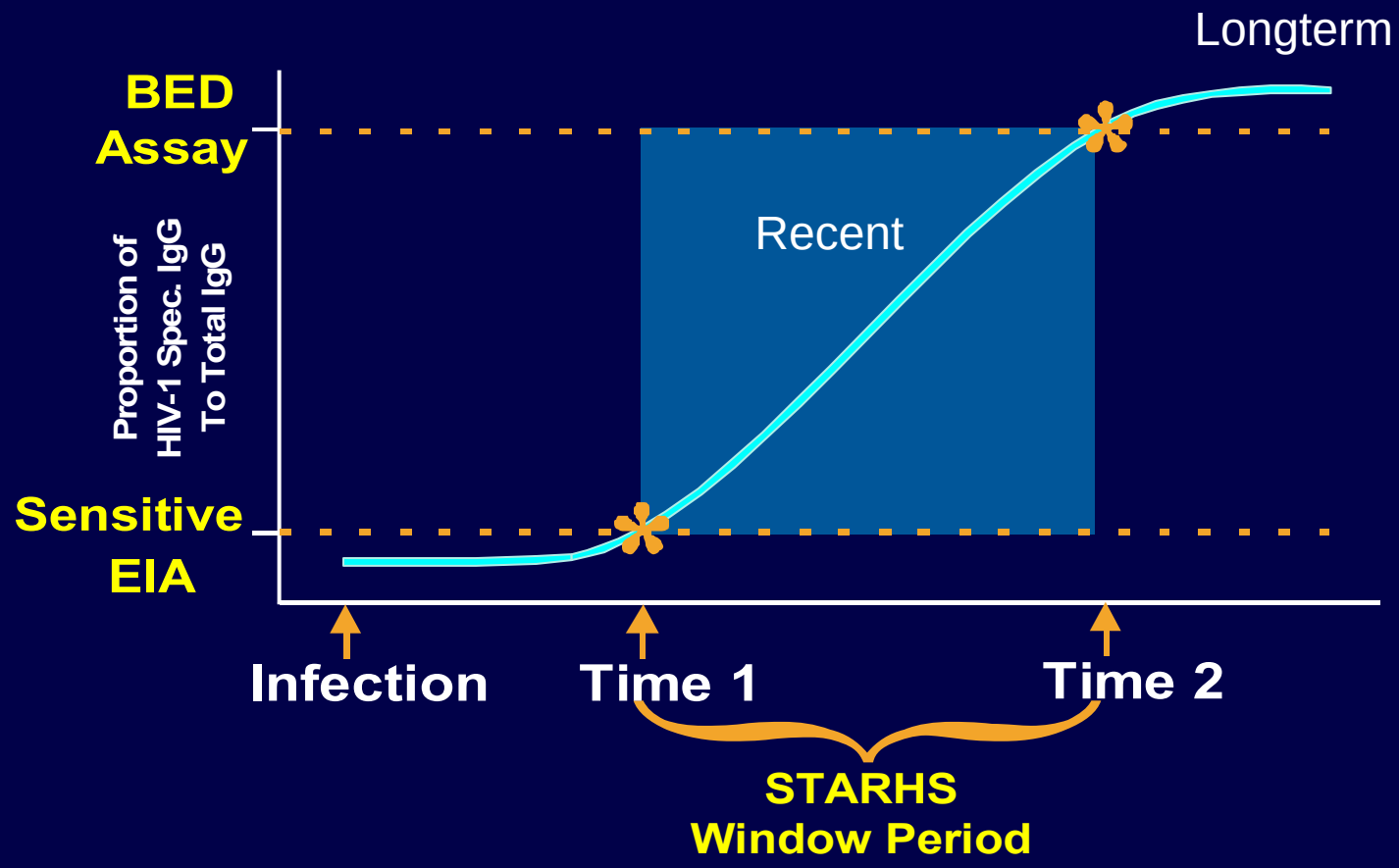
Demographic, clinical, and HIV testing and treatment history (TTH)

Using STARHS to calculate incidence

- STARHS stands for:
  - Serologic
  - Testing
  - Algorithm for
  - Recent
  - HIV
  - Seroconversion

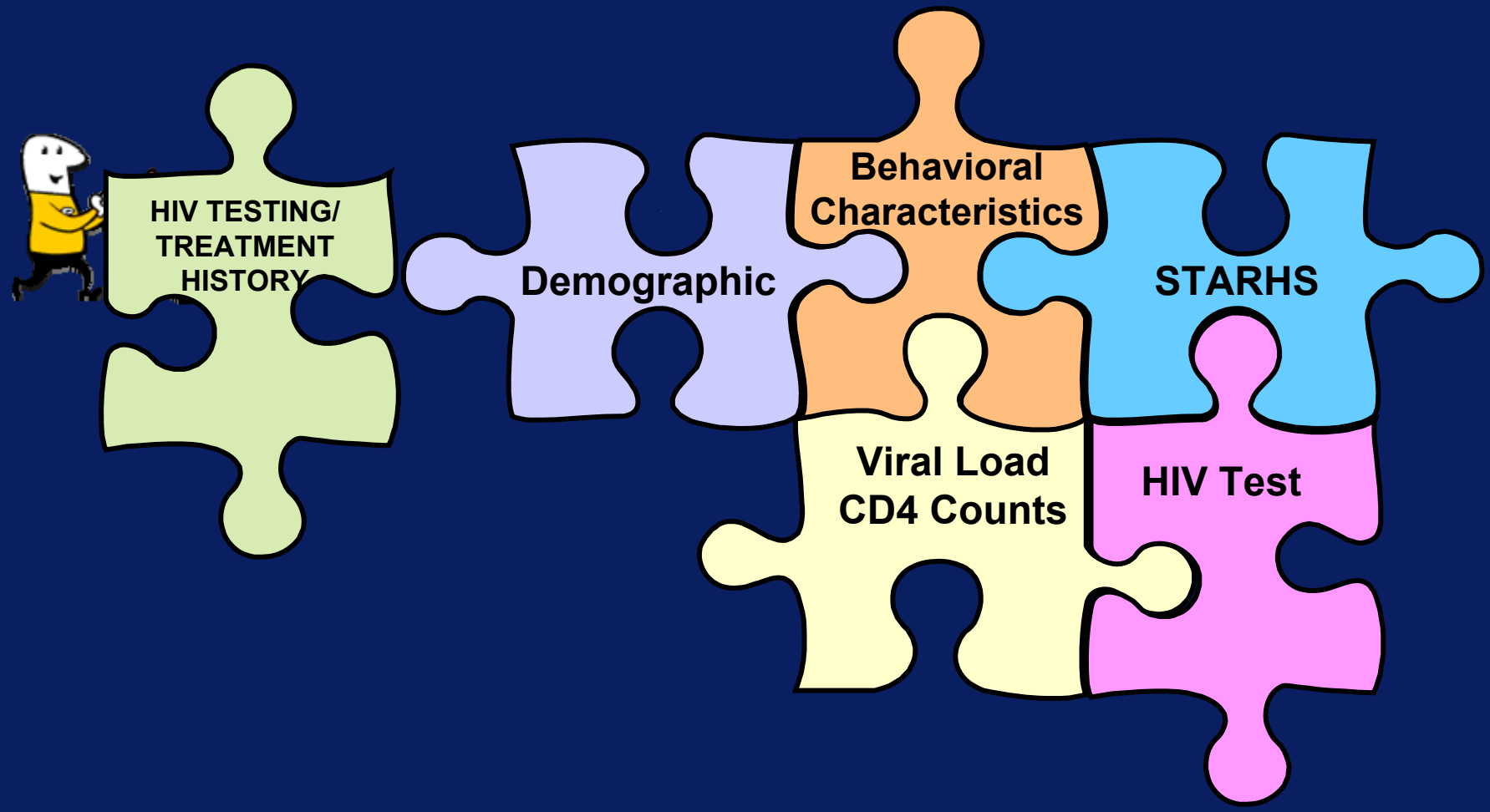
- STARHS is a laboratory method that is used to classify newly diagnosed HIV infection as recent (< 6 months) or long-term (> 6 months).

How Does STARHS Work?



Mean Window Period = 156 days (95% CI = 146, 168)

OH-1-9


HIV TESTING/
TREATMENT
HISTORY
Demographic
Behavioral
Characteristics
STARHS
Viral Load
CD4 Counts
HIV Test

Testing and Treatment History

Testing Treatment History Questions:

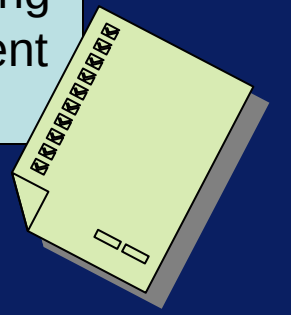
- Date of *first positive* HIV test result
- Date of *last negative* HIV test result
- Number of HIV tests in *2 years* before first positive
- Any history of ART use in the *6 months before* first positive

Calculating Incidence

Enter new HIV case report in HARS

Obtain and STARHS test remnant sera

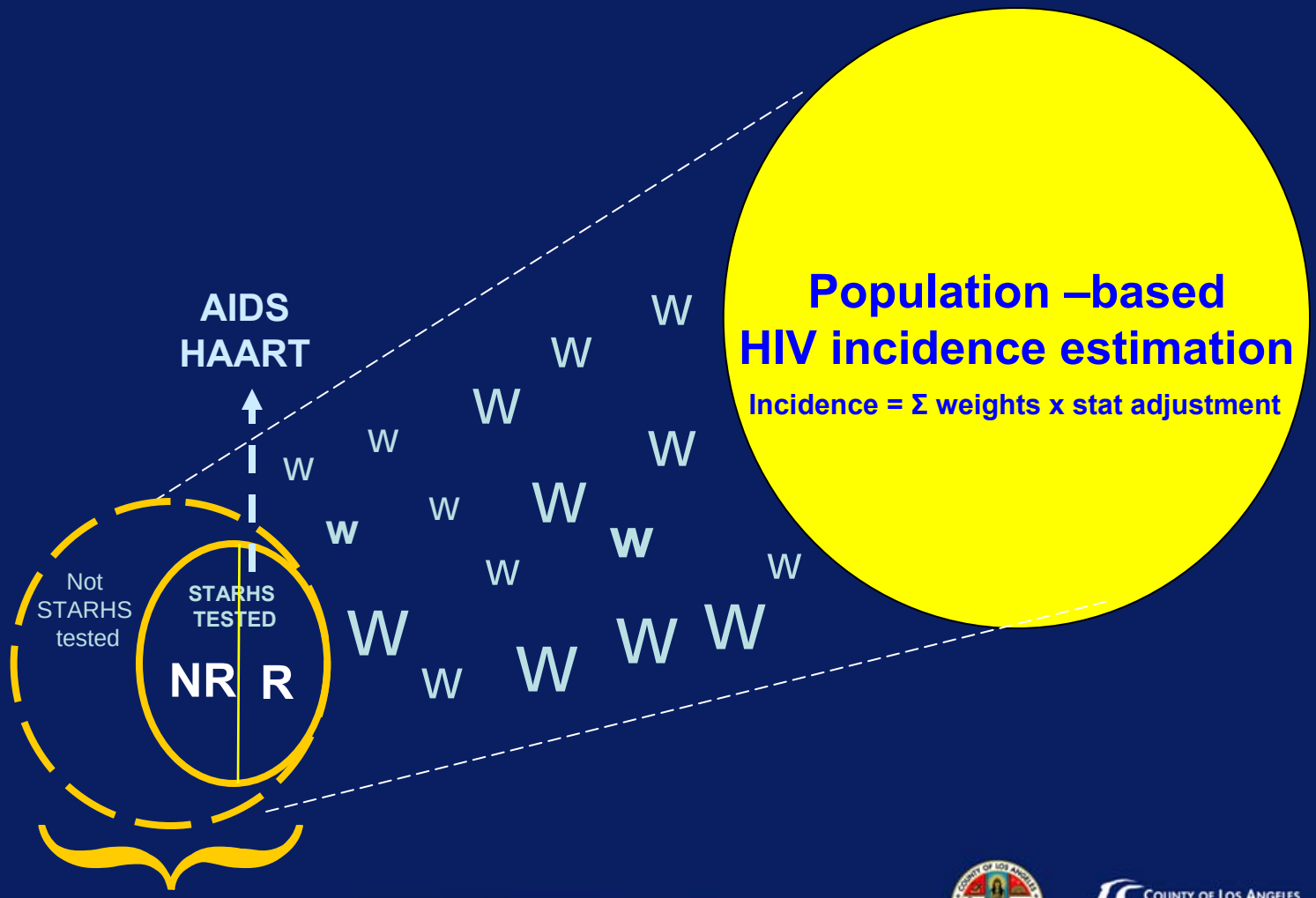
Collect Testing and Treatment History



Impute “fill in” missing info for testers based on available data

Extrapolate completed dataset to the entire population (testers and non testers), to calculate a population-level incidence estimate.

Population-based HIV Incidence Estimation



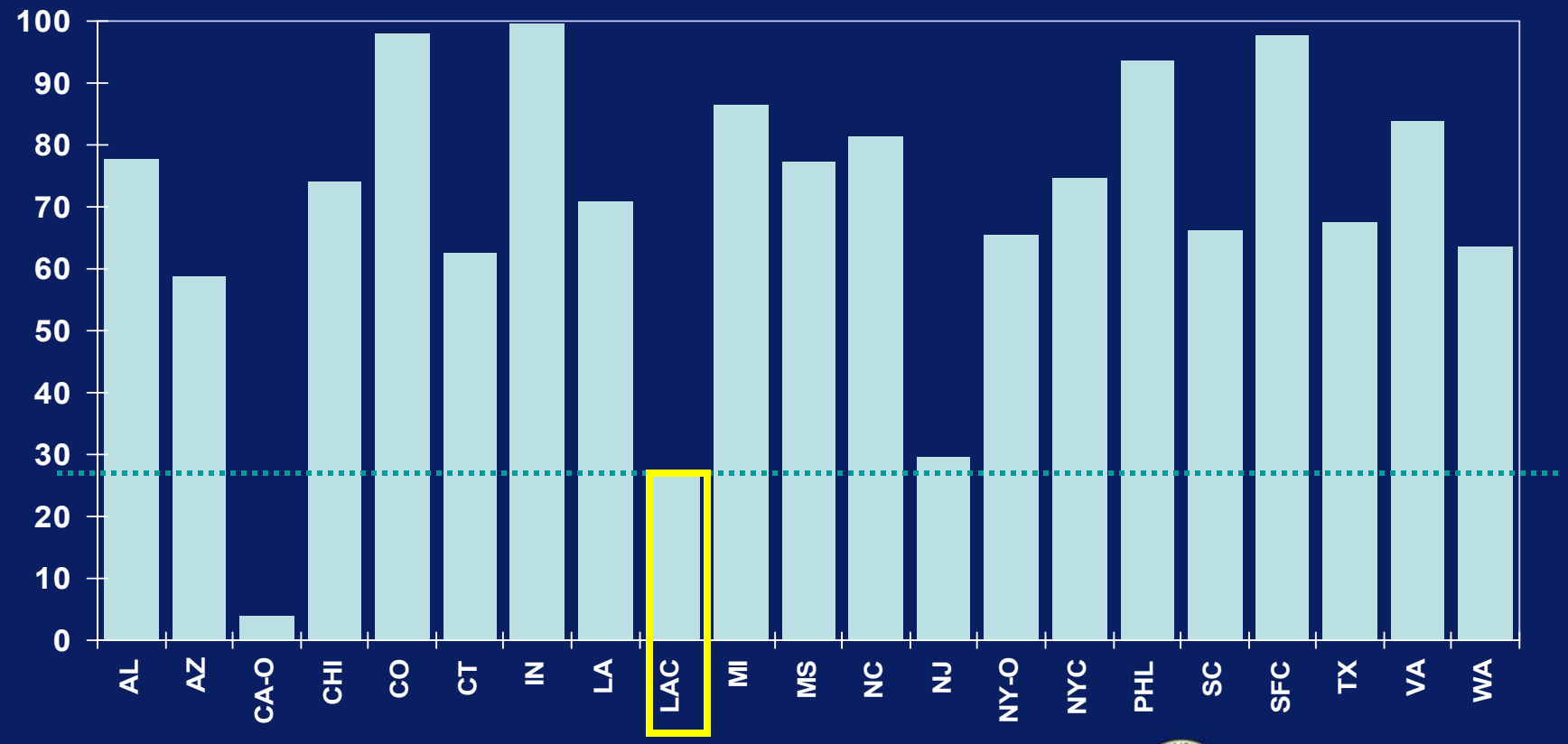
New HIV + detected by testing

Results

Data Completeness

	Los Angeles (2007)	National (2006)
Number of HIV/AIDS cases diagnosed per year	**2,550**	**39,400**
BED test available	**535 (21%)**	**6,864 (17%)**
Testing history	**746 (29%)**	**12,067 (31%)**
Incidence estimate	**3,138**	**56,300**
Incidence rate per 100,000	**38**	**24**
Population size (≥13 years)	**8,343,784**	**240,000,000**

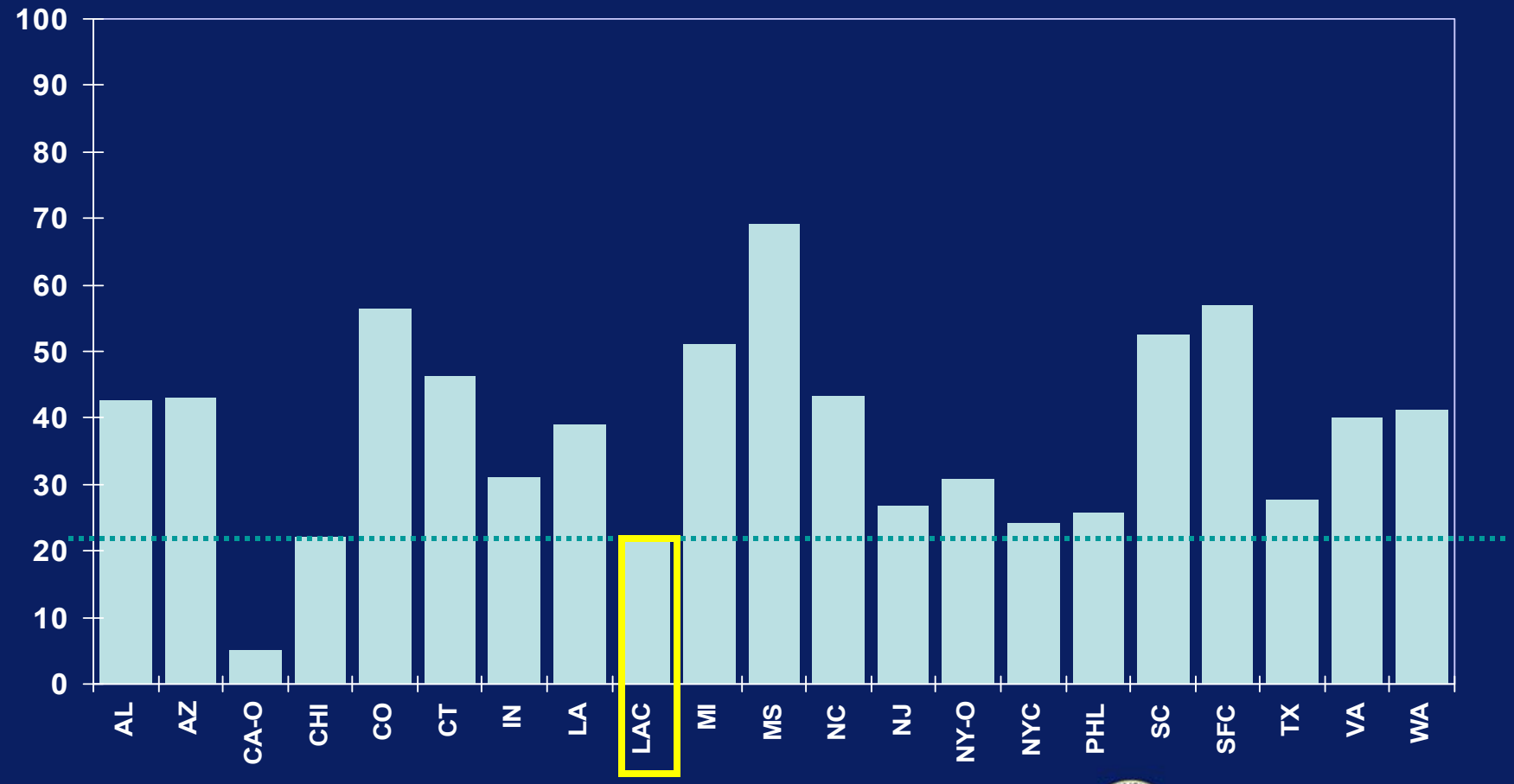
Proportion of Cases Newly Diagnosed with HIV with Testing and Treatment History + by Area, 2007



Source: 2007 – January 2009 HIS data (patched), does not include FL or MD
+ At least one data element in the TTH

County of Los Angeles Public Health

Proportion of Cases Newly Diagnosed with HIV with BED Result+ by Area, 2007



Source: 2007 – January 2009 HIS data (patched), does not include FL or MD
+ BED Result includes valid STARHS result of recent or long-term

County of Los Angeles Public Health

2007 HIV Incidence Estimate

- 3,138 new cases of HIV in LA County
  - 95% Confidence Interval (2,390-3,886)

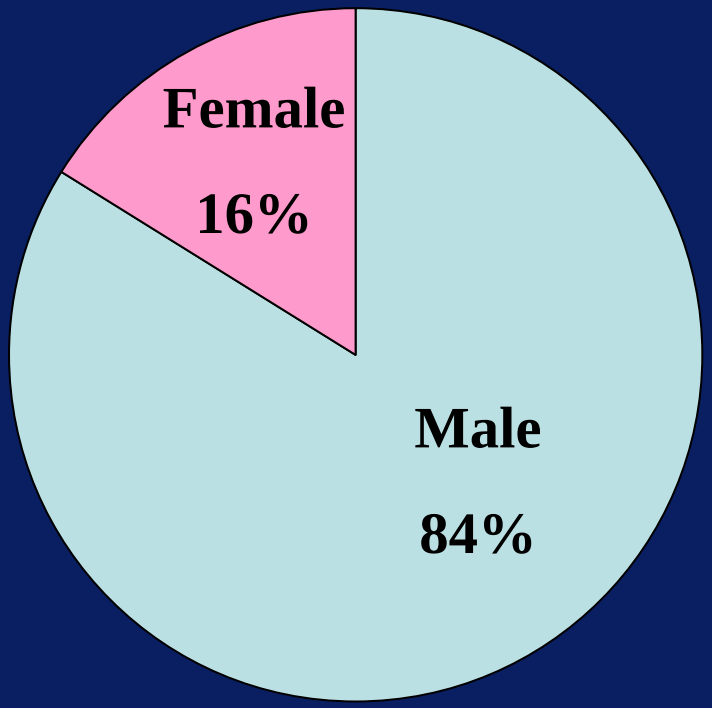
- Although our previous back-calculation estimates were lower (2,000-3,000 new cases per year), this new estimate does not represent an increase in HIV incidence, but rather is an estimate based on more precise methodology.

Data Requirements

200-40-10

- 200 newly diagnosed cases of HIV in each sub-group of interest
- 40 cases STARHS tested
- 10 STARHS recent

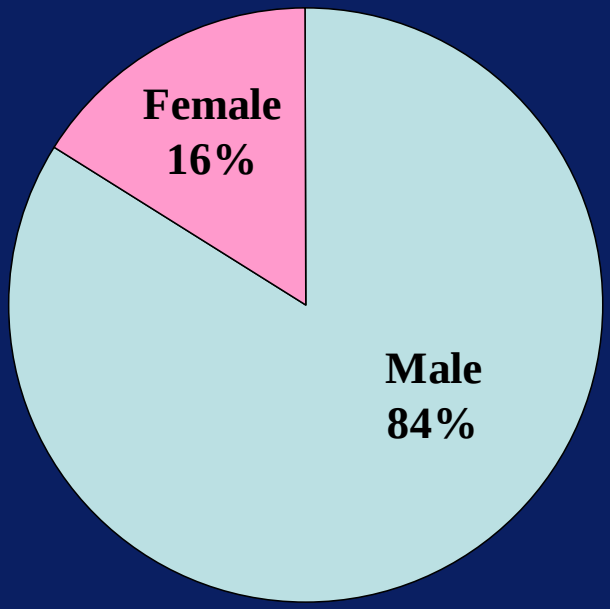
Estimated percentage of new HIV infections by sex*



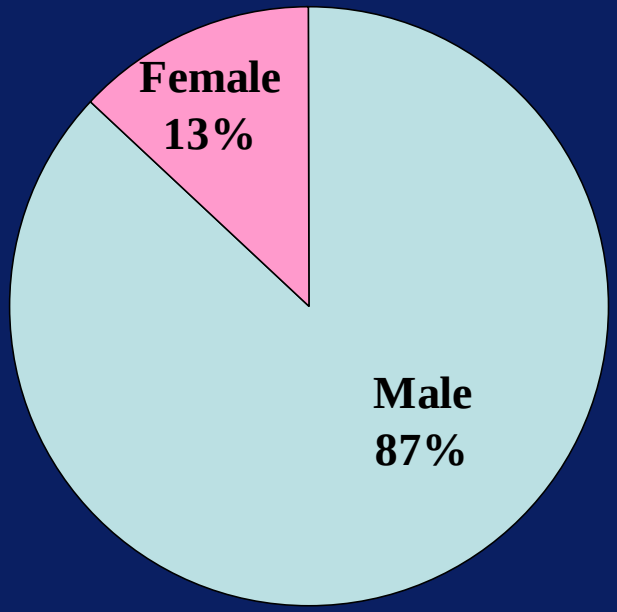
*The number of newly reported HIV+ cases among transgendered people was insufficient to calculate an individual HIV estimate

Estimated percentage of new HIV and AIDS infections by sex*

New HIV Infections

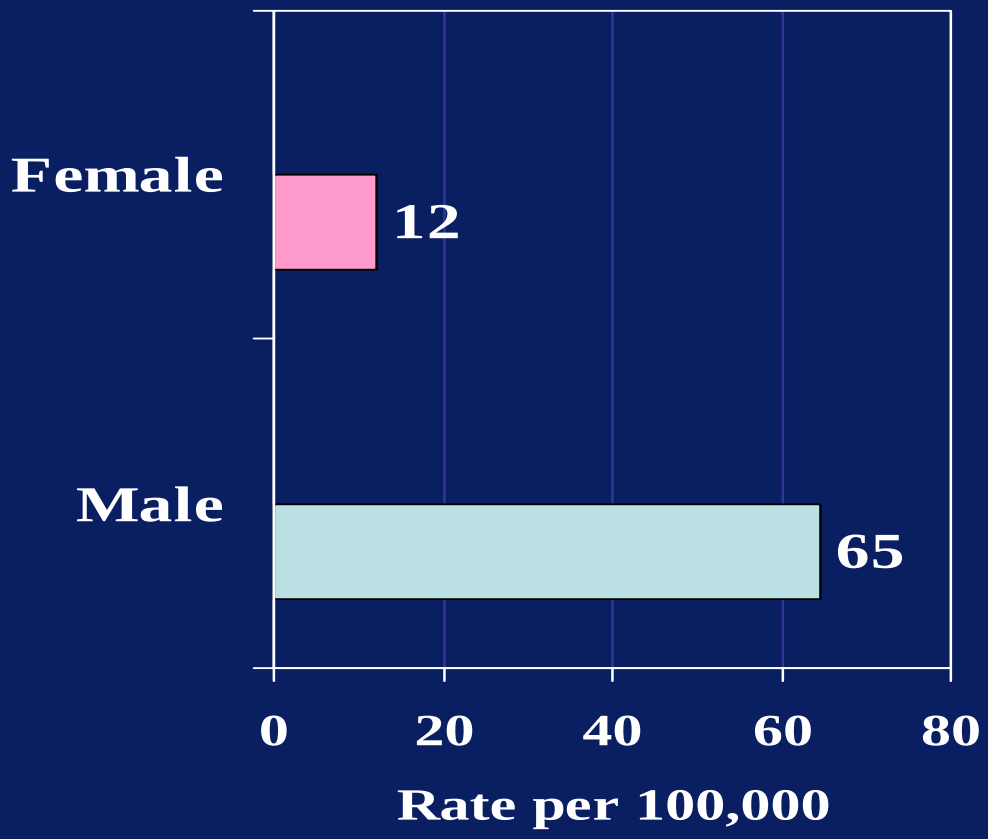


New AIDS Diagnoses



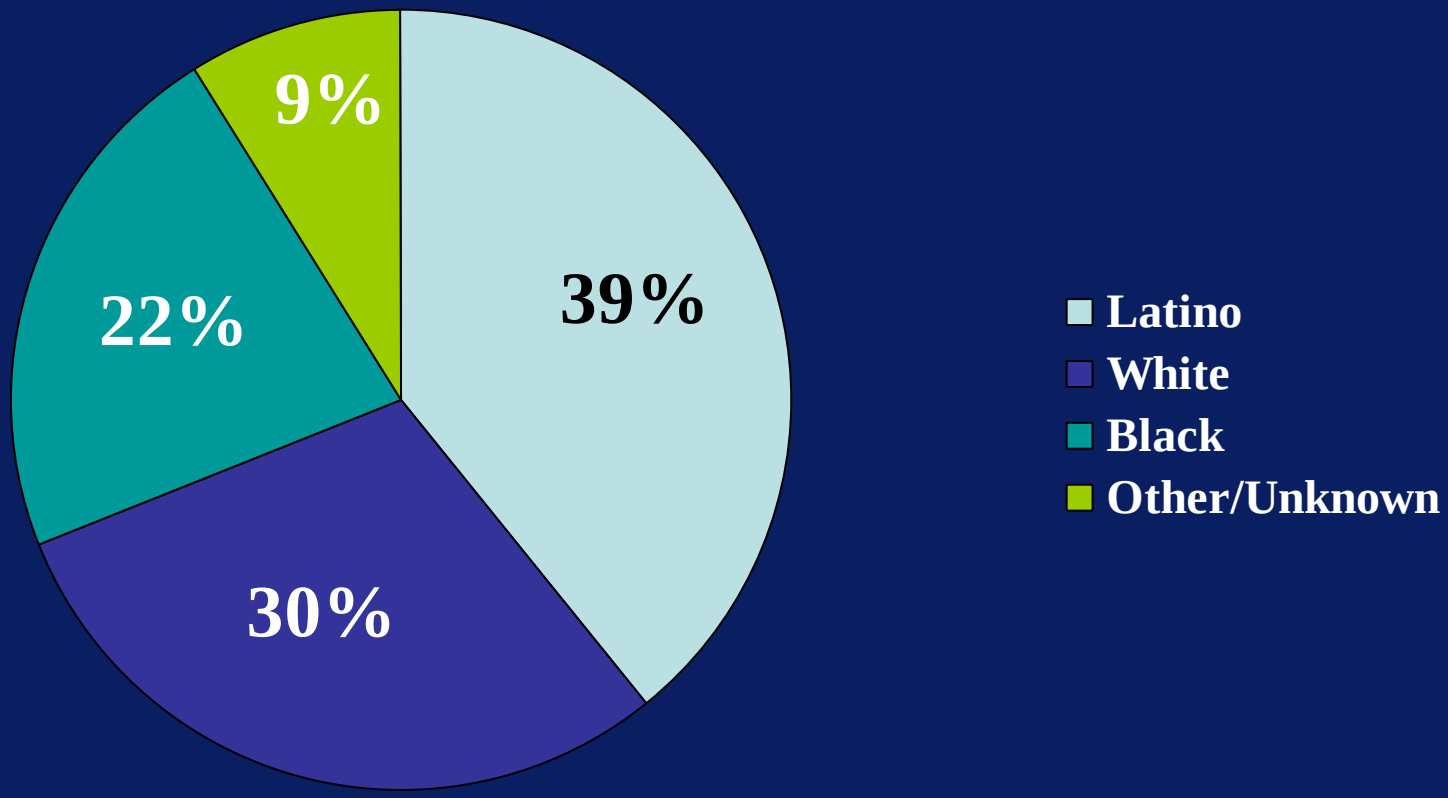
*The number of newly reported HIV+ cases among transgendered people was insufficient to calculate an individual HIV estimate

Estimated rate of new HIV infections by sex*



*The number of newly reported HIV+ cases among transgendered people was insufficient to calculate an individual HIV estimate

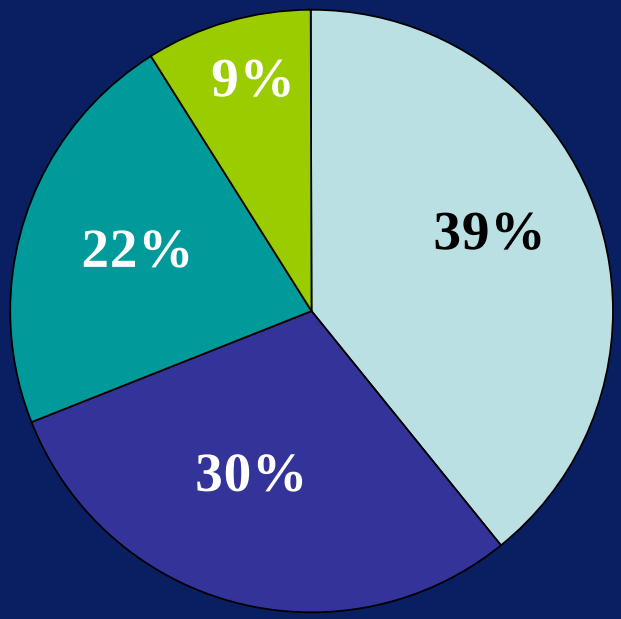
Estimated percentage of new HIV infections by race/ethnicity



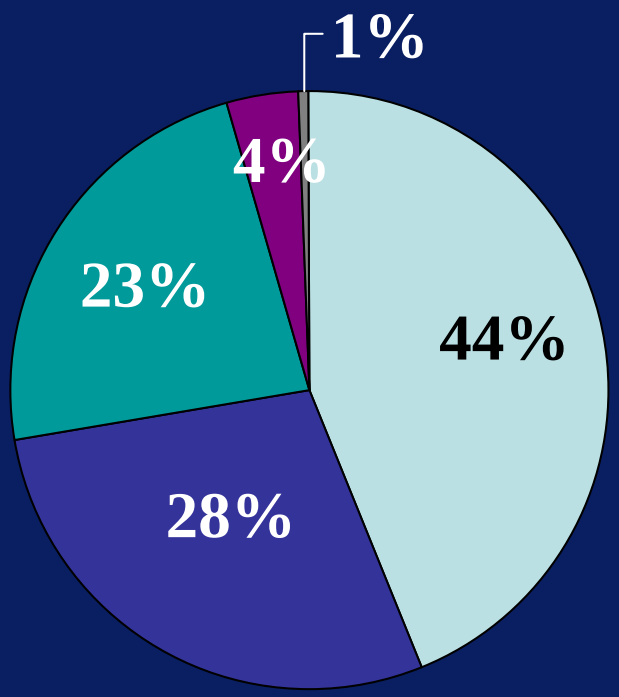
*The number of newly reported HIV+ cases among Asian/PI and Native Americans was insufficient to calculate individual HIV estimates

Estimated percentage of new HIV and AIDS infections by race/ethnicity

New HIV Infections



New AIDS Diagnoses



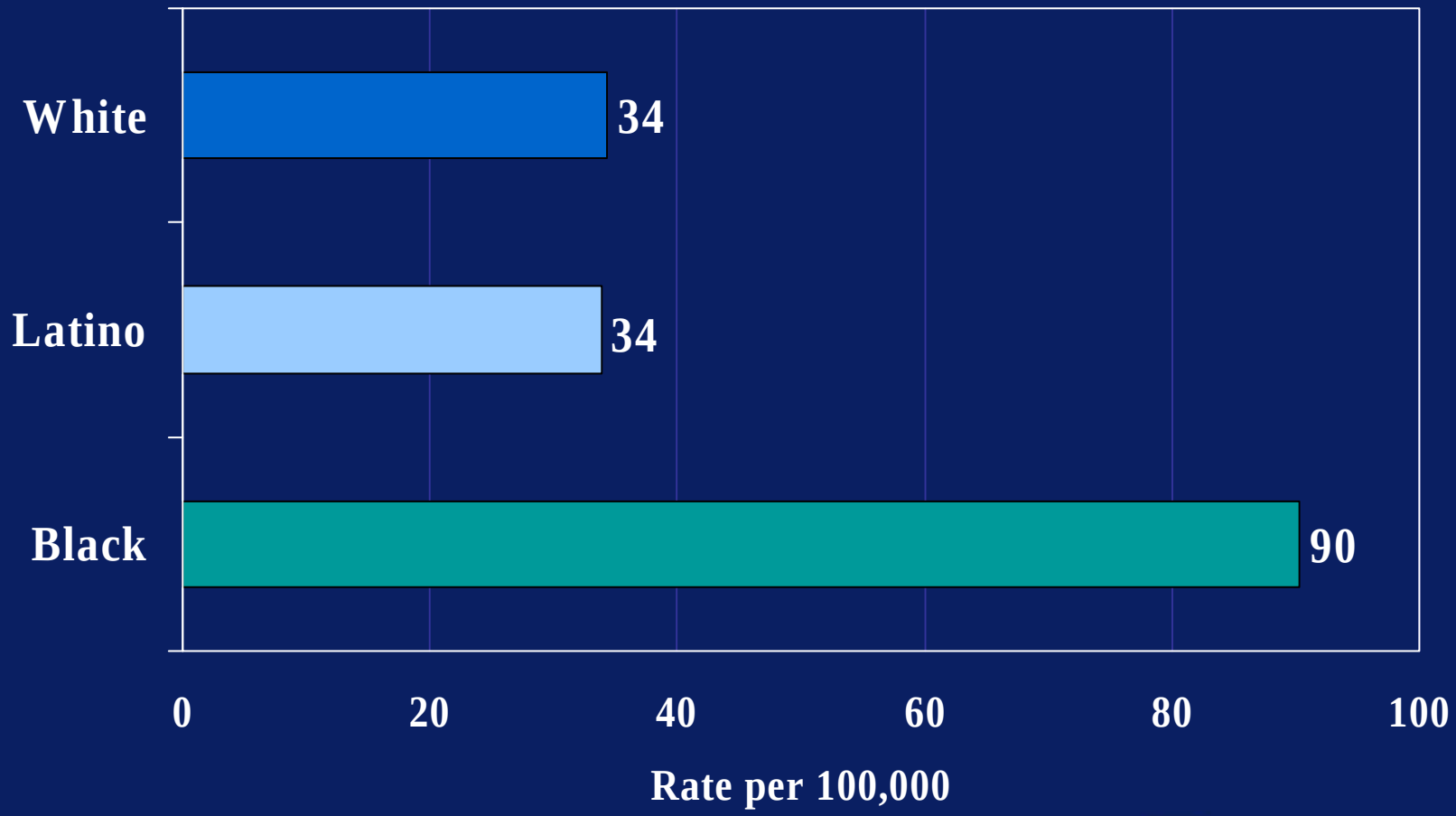
Black **White** **Latino** **Other**

Asian/Pacific Islander **Native American**

*The number of newly reported HIV+ cases among Asian/PI and Native Americans was insufficient to calculate individual HIV estimates

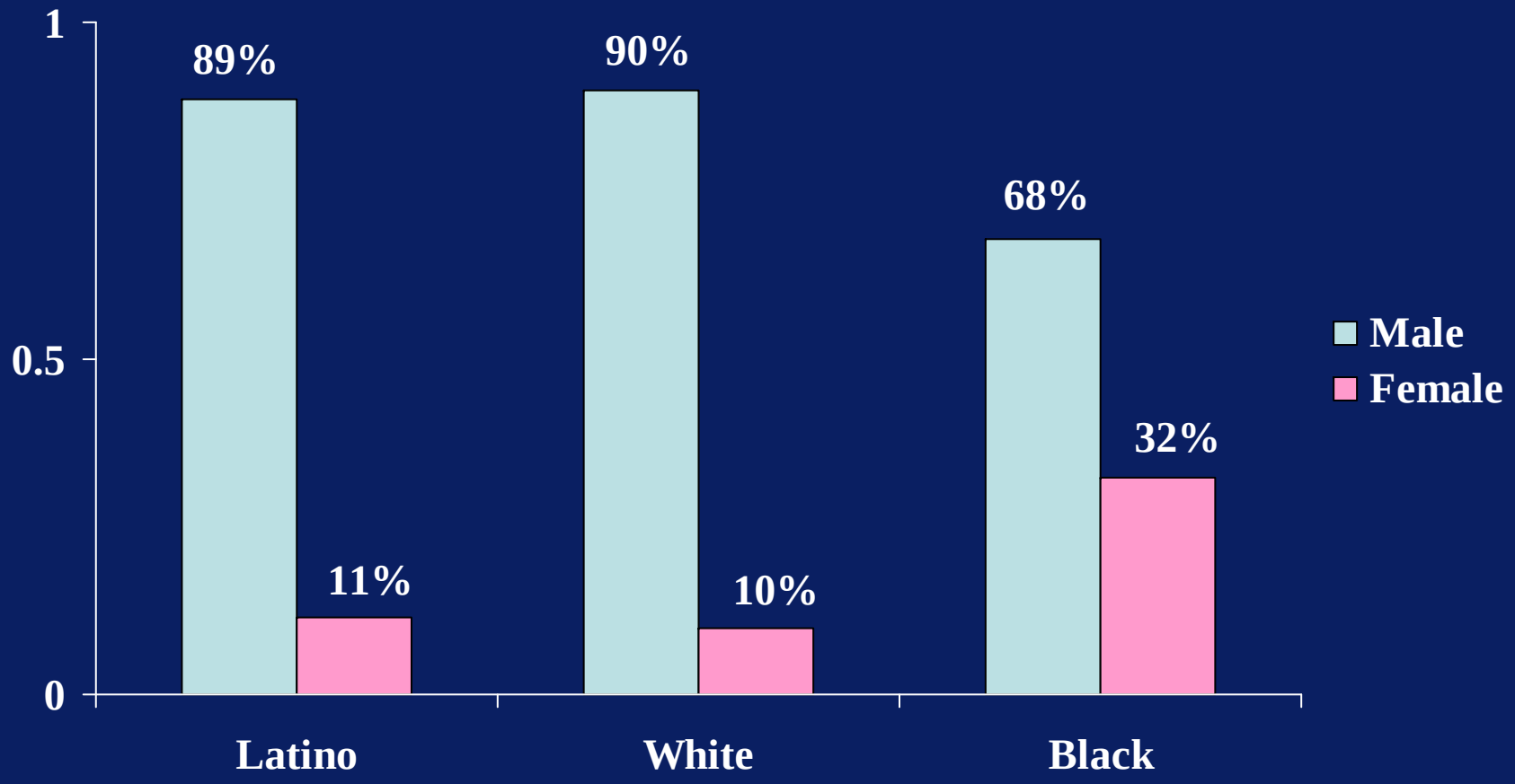
County of Los Angeles Public Health

Estimated rate of new HIV infections by race/ethnicity

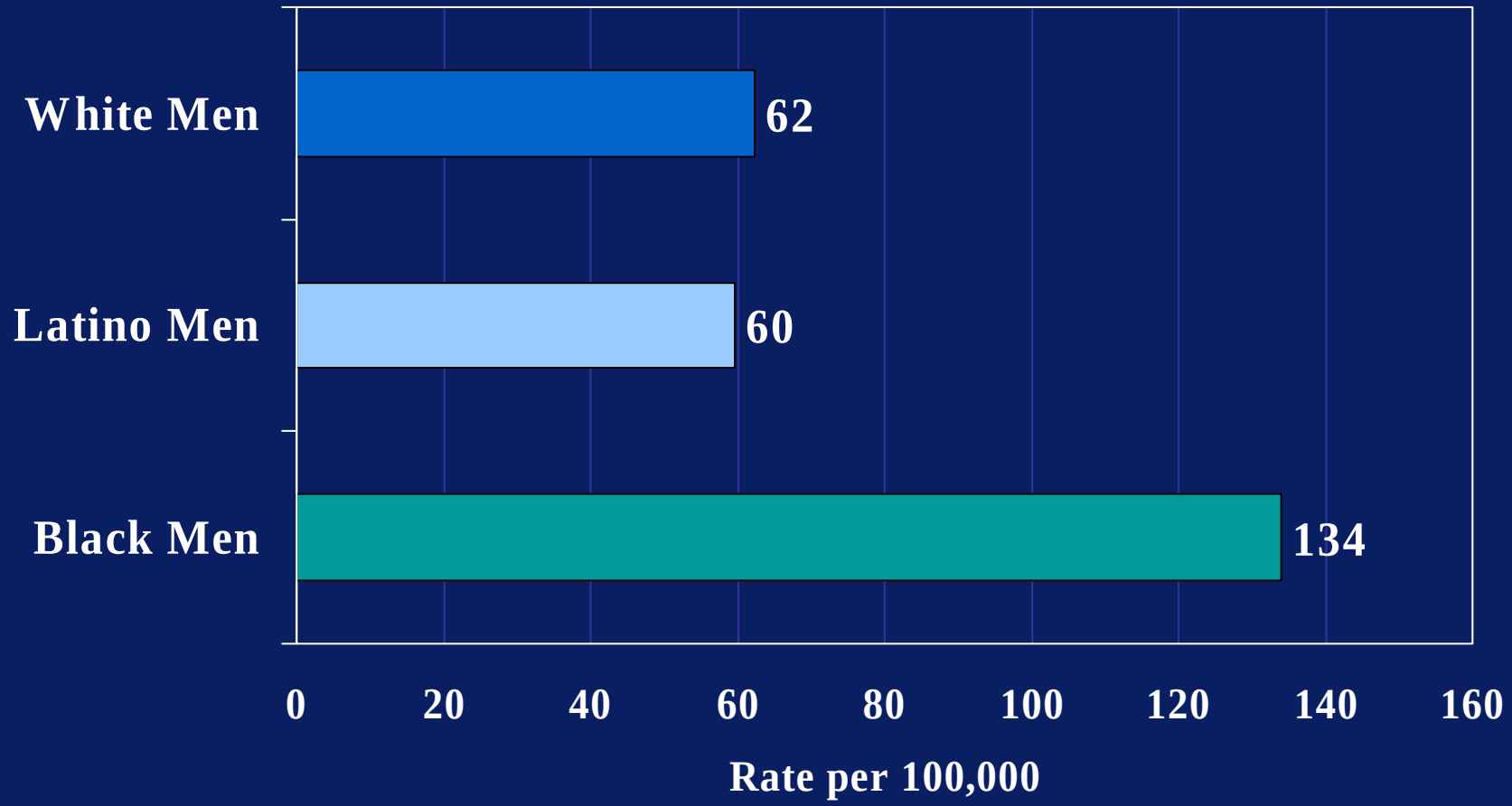


*The number of newly reported HIV+ cases among Asian/PI and Native Americans was insufficient to calculate individual HIV estimates

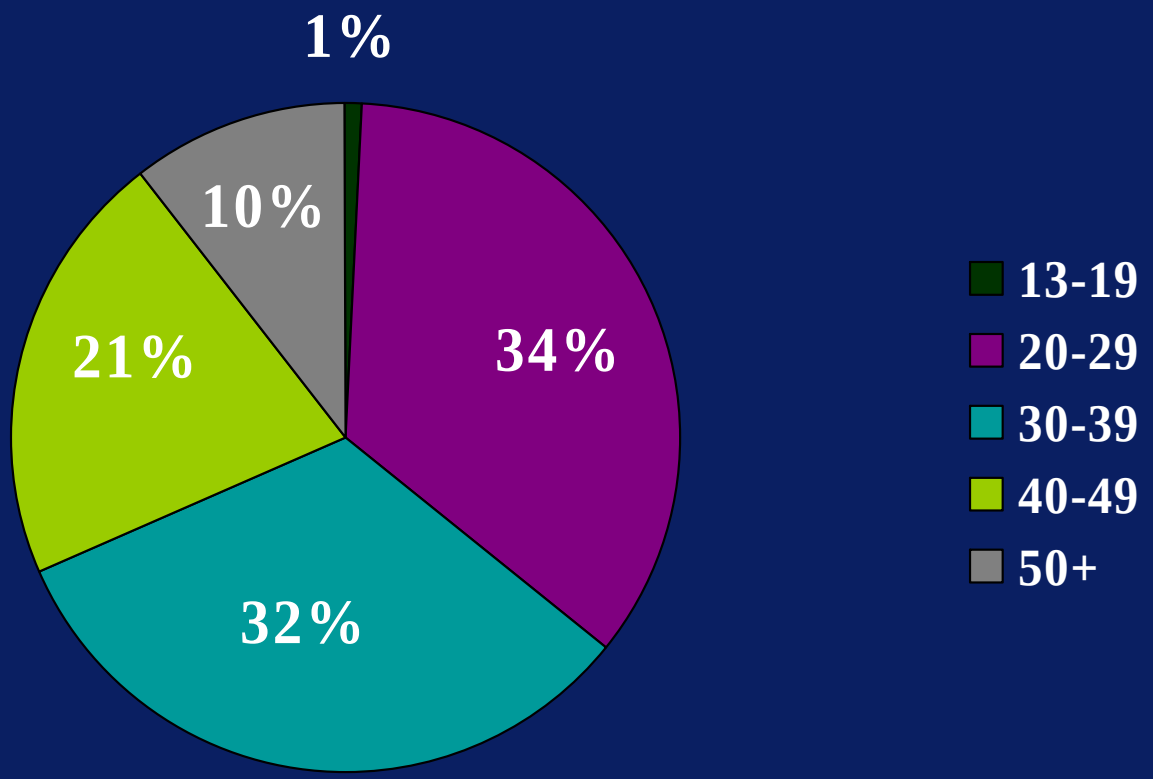
Estimated percentage of new HIV infections by race/ethnicity and sex



Estimated rate of new HIV infections by race/ethnicity for males



Estimated percentage of new HIV infections by age group



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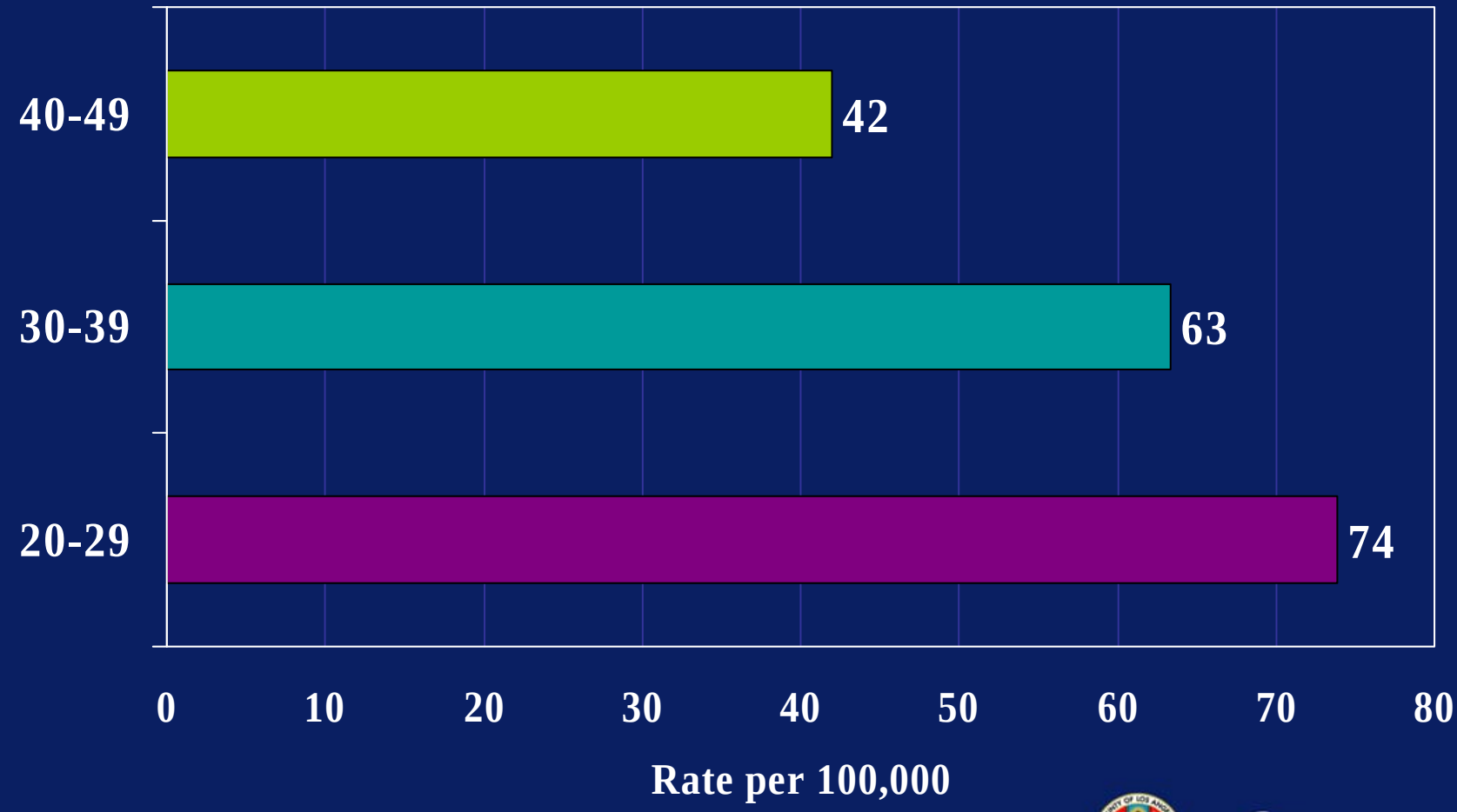
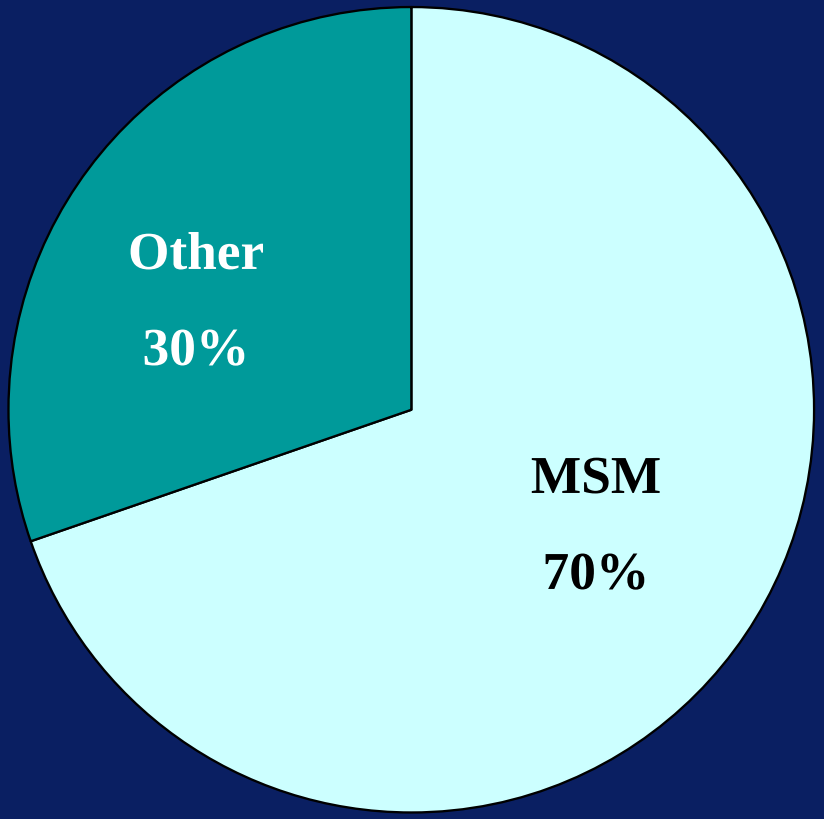
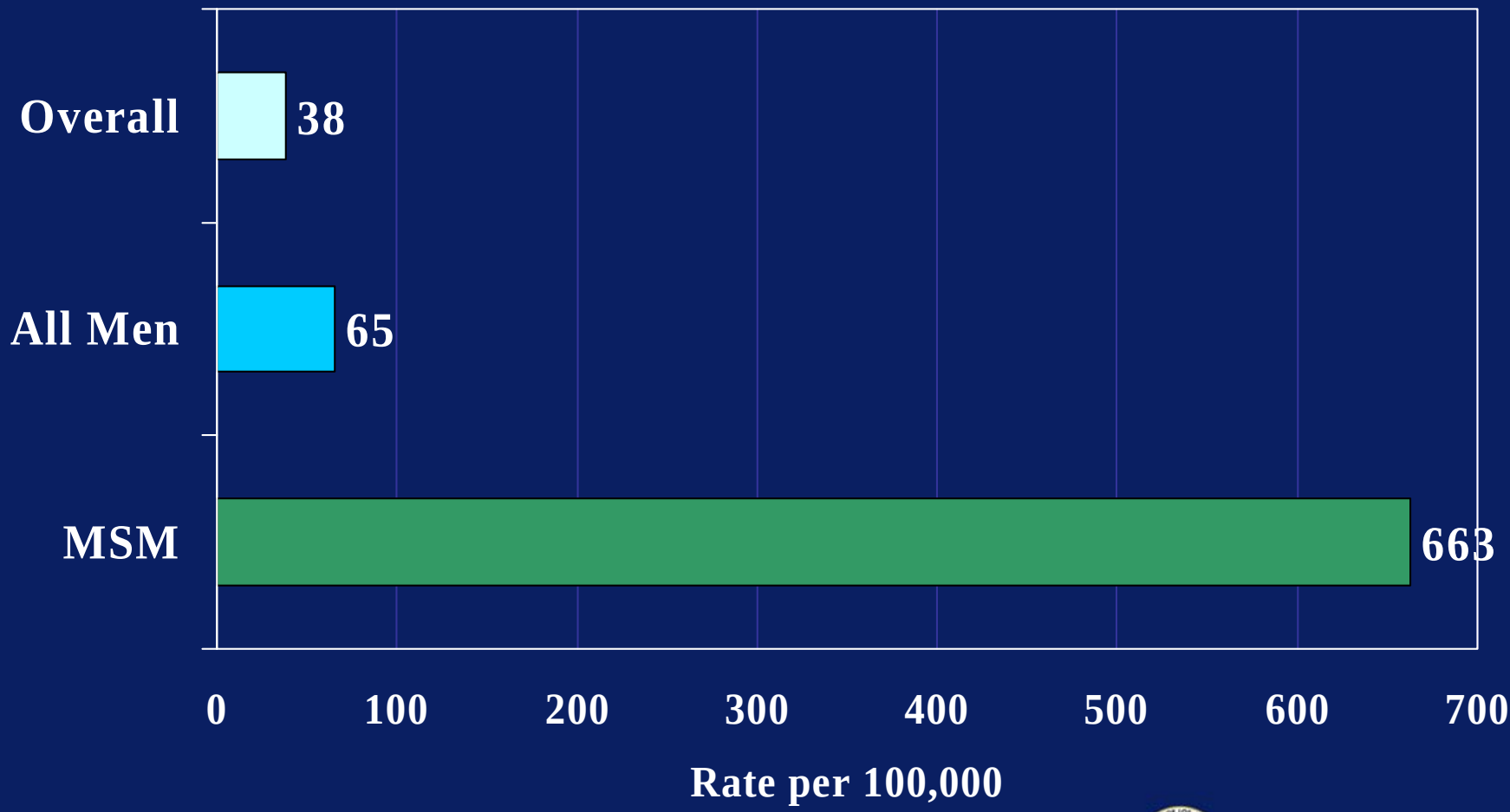


Estimated percentage of new HIV infections by mode of transmission

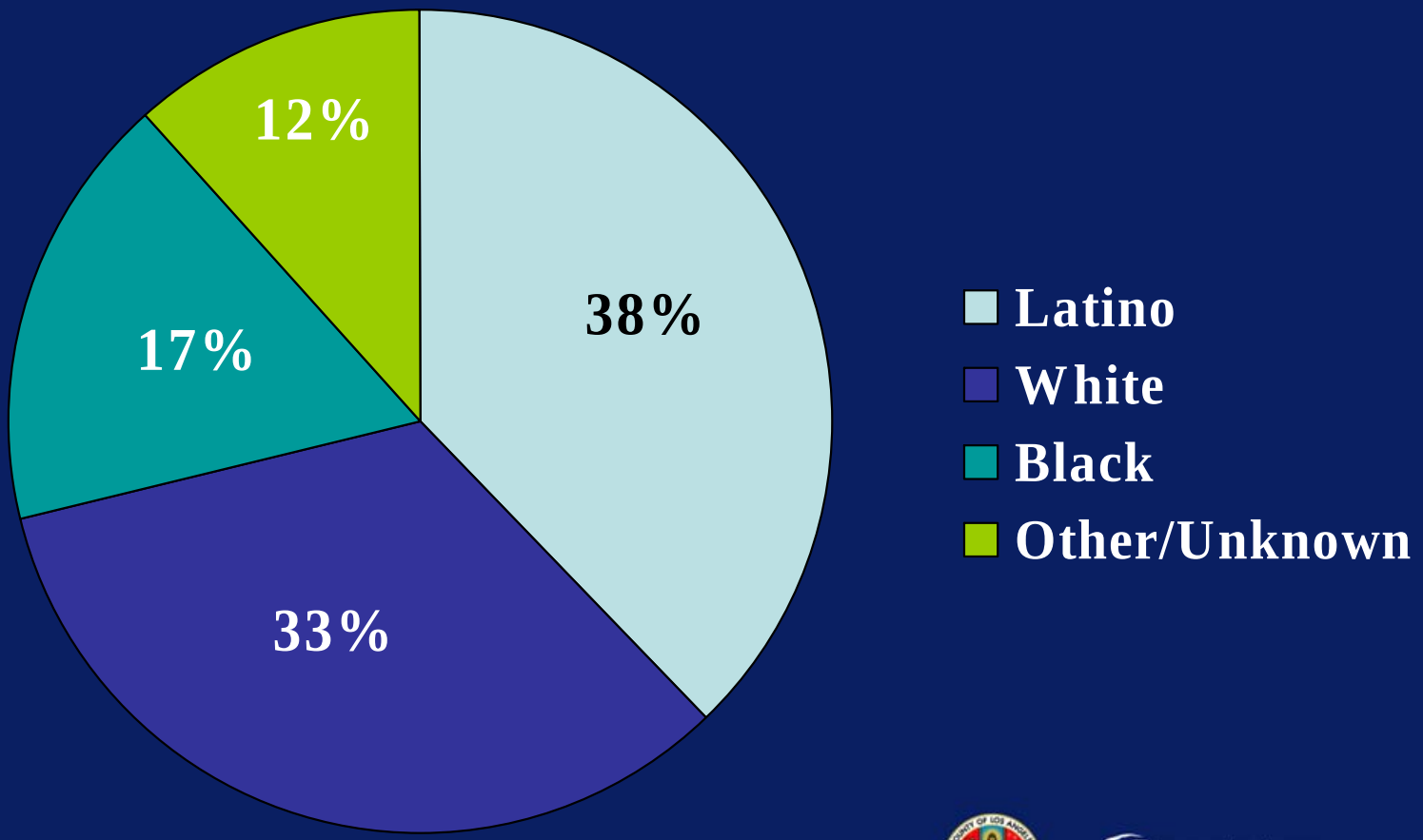


Numbers of newly diagnosed HIV infections are too small to calculate individual estimates for any group other than MSM

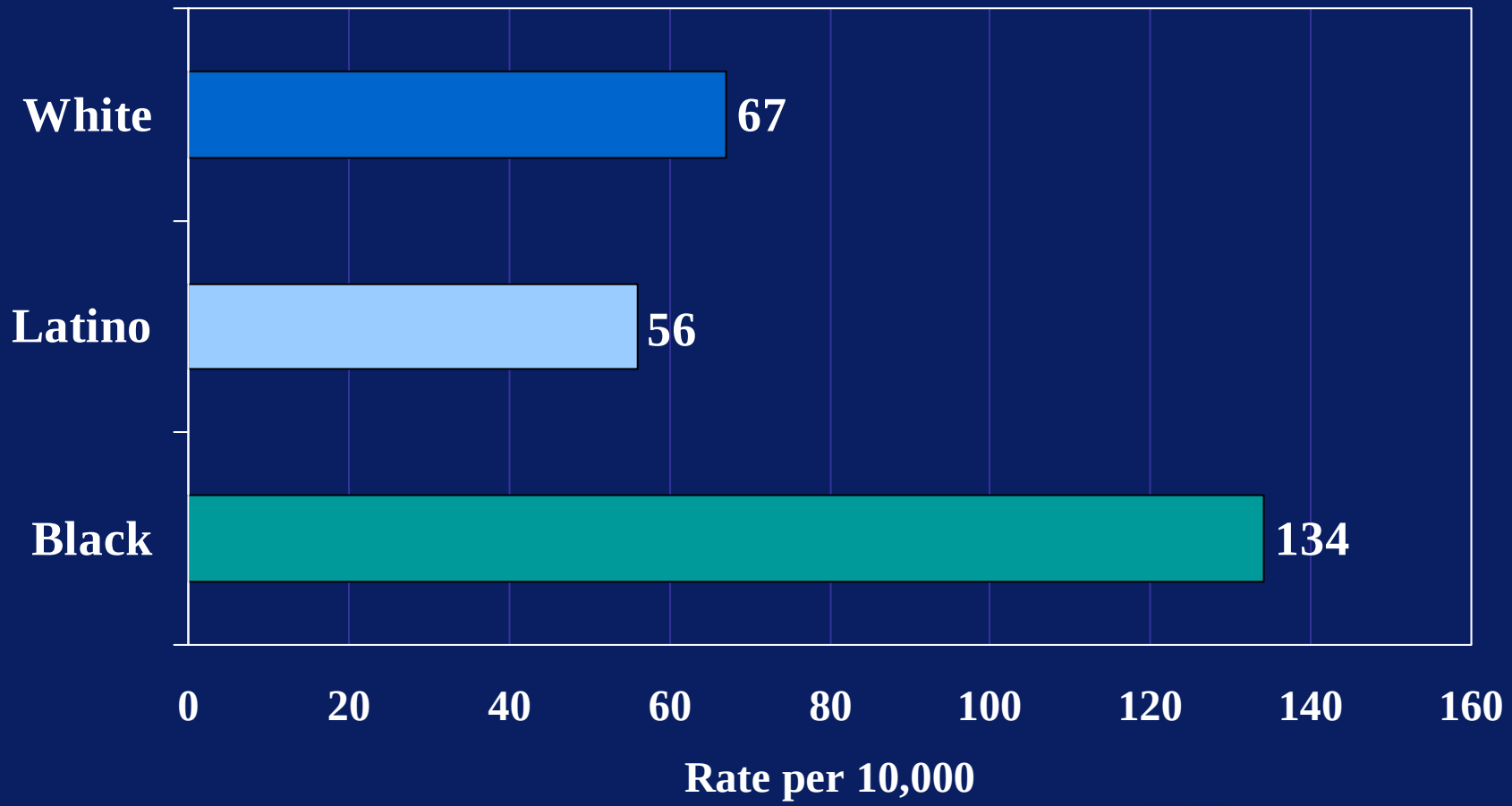
Estimated rate of new HIV infections by MSM



Estimated percentage of new HIV infections among MSM by race/ethnicity



Estimated rate of new HIV infections among MSM by race/ethnicity



Limitations

- The large proportion (71% of Testing and Treatment History and 79% of BED) of missing data may affect the validity of our results.
- Submission of Testing and Treatment History and sera for STARHS testing is not yet mandated.
  - While we were able to collect cases from both public and private providers, we achieved a higher % of complete data from publicly funded providers.
  - Most remnant sera for STARHS testing was provided by the LAC Public Health Lab. The lack of participation of many commercial labs may also bias our results.

The Future of HIS

- As we collect more complete data, our estimates will be more valid and precise.
- HIV incidence surveillance was first implemented in LAC in 2005. Each year our data collection from both providers and labs has improved.

Resources

- Estimation of HIV Incidence in the United States Hall HI, Song R, Rhodes P, Prejean J, An Q, Lee LM, Karon J, Brookmeyer R, Kaplan EH, McKenna MT, Janssen RS for the HIV Incidence Surveillance Group. Estimation of HIV Incidence in the United States. *JAMA*, August 6, 2008;300(5):520

- Estimating HIV incidence in the United States from HIV/AIDS surveillance data and biomarker HIV test results. Karon KM, Song R, Brookmeyer R, Kaplan E, Hall HI. *Stat Med*. doi:10.1002/sim.3144.

Thank You

- LA County Providers
- Public Health Lab
- LabCorp and Quest Lab
- OAPP
- SFDPH
- CA Office of AIDS
- HIS Team
  - Trista Bingham
  - Otilia Orozco
  - Alex Mok
  - Farimah Fiali
  - Emily Kahn
- Core Surveillance
  - Virginia Hu
  - Zhijuan Sheng
  - Ying Ou
  - LaTonya Taylor
  - Anita Williams
  - Cherie Holloway
  - Ernesto Magdaleno
  - Essam Botros
  - Keira Davis
  - Linda Ochoa
  - Victoria Cervantes
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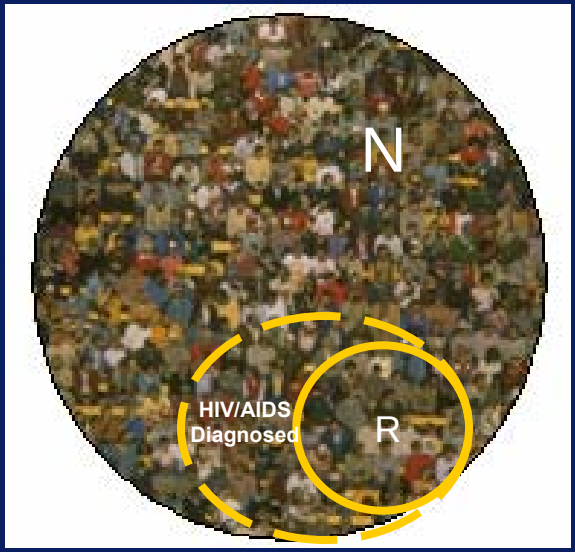
Estimation of HIV Incidence Using the Stratified Extrapolation Approach

Sampling Frame	Sample Selected	Estimated Probability	Sample Weight	Population Size
N	R	P	Wt = 1/P	N = R/P = R*Wt



Sampling Frame = N

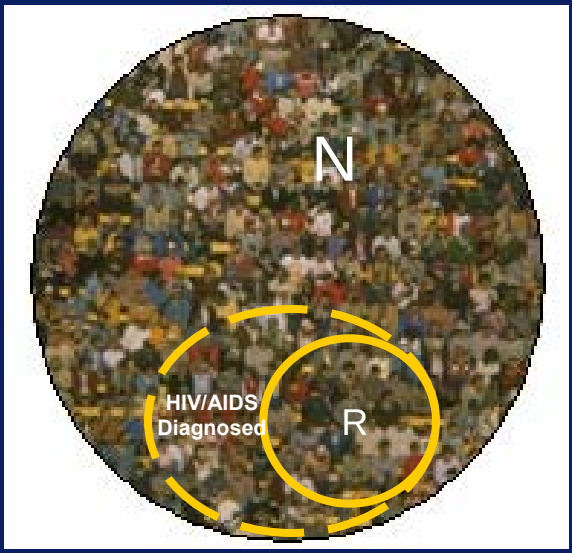
All persons who became infected with HIV in the selected period of time including those not diagnosed.

Sample Selected = R

All persons diagnosed in the selected period of time and classified as BED "recent"

Estimation of HIV Incidence Using the Stratified Extrapolation Approach

Sampling Frame	Sample Selected	Estimated Probability	Sample Weight	Population Size
N	R	P	Wt = 1/P	N = R/P = R*Wt



Estimated Probability = P

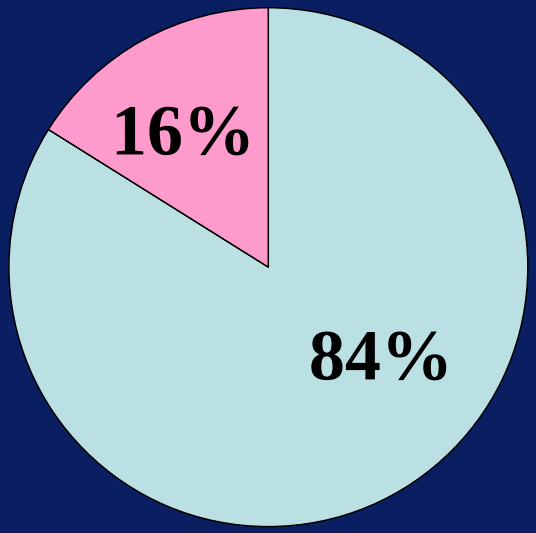
Probability of being in the sample:

- Infected person was tested within 1 year after infection
- Person diagnosed with HIV had a BED test result*
- BED result for a person tested within 1 year after infection was "recent"

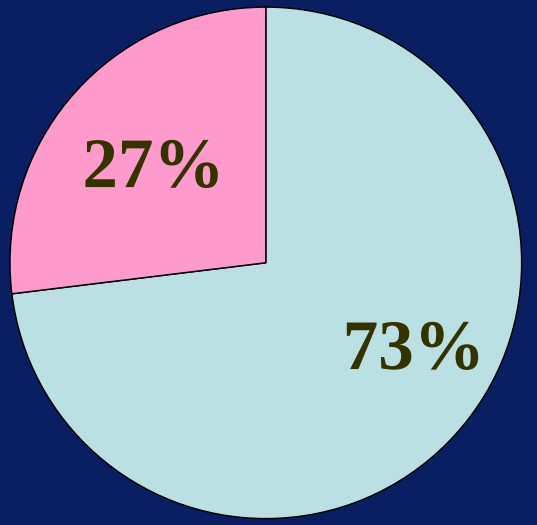
*All persons without AIDS within 6 months after their HIV diagnosis have a BED result in the estimation model (imputed data)

Estimated percentage of new HIV infections by sex

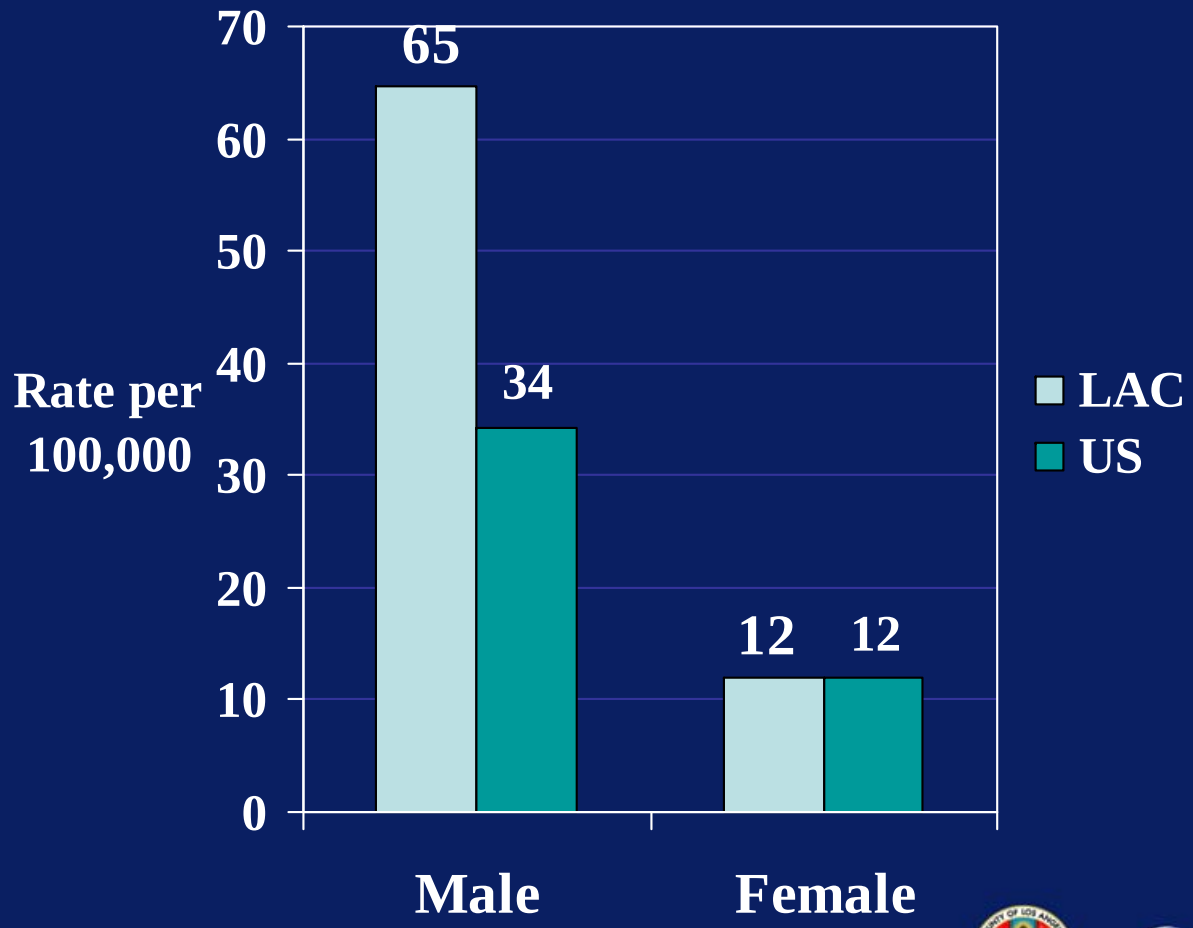
LAC, 2007



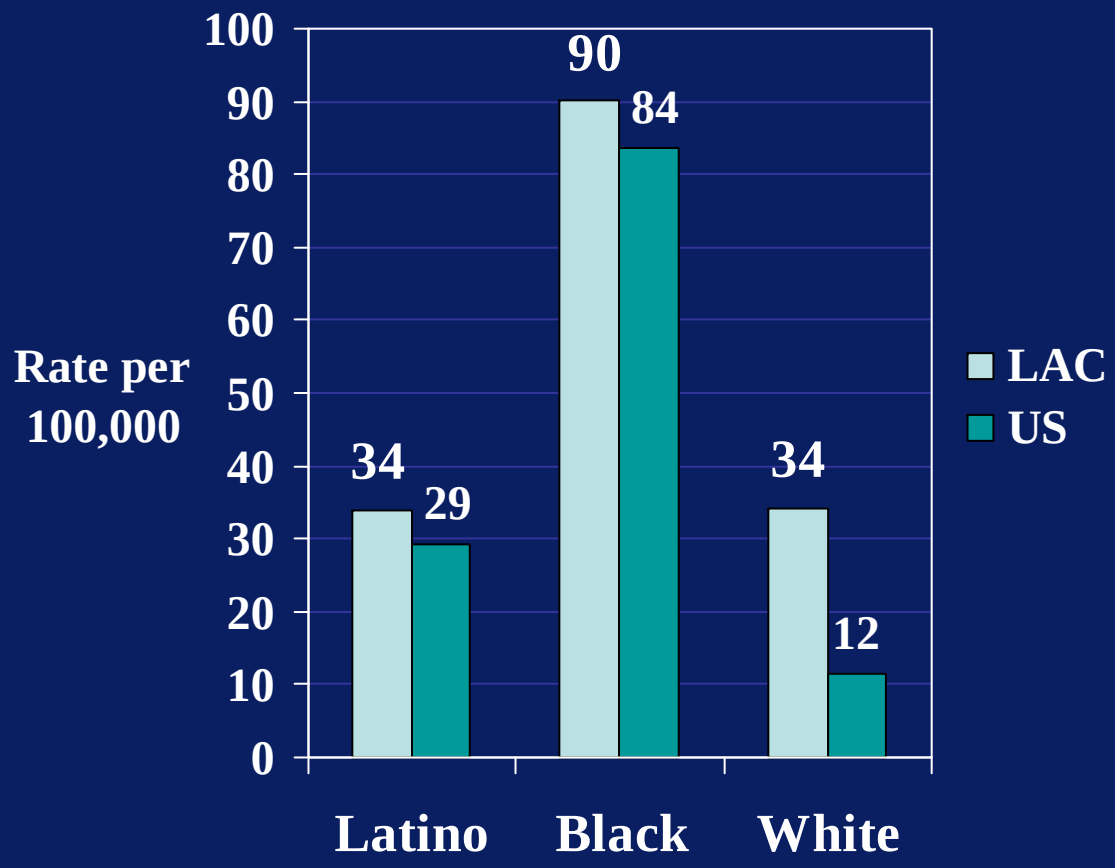
US, 2006



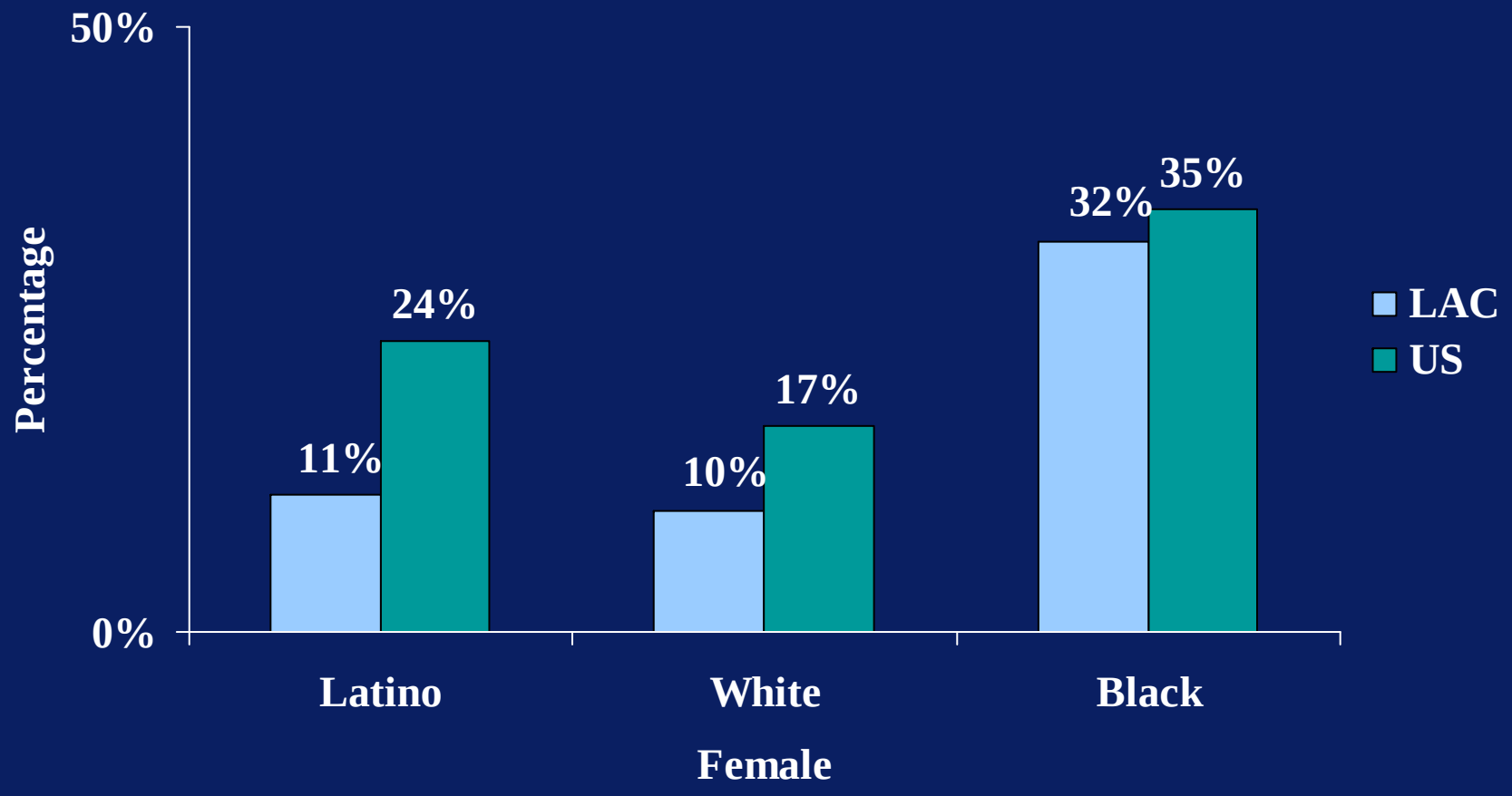
Comparison of HIV Incidence Rates by Sex, US 2006 and LAC 2007



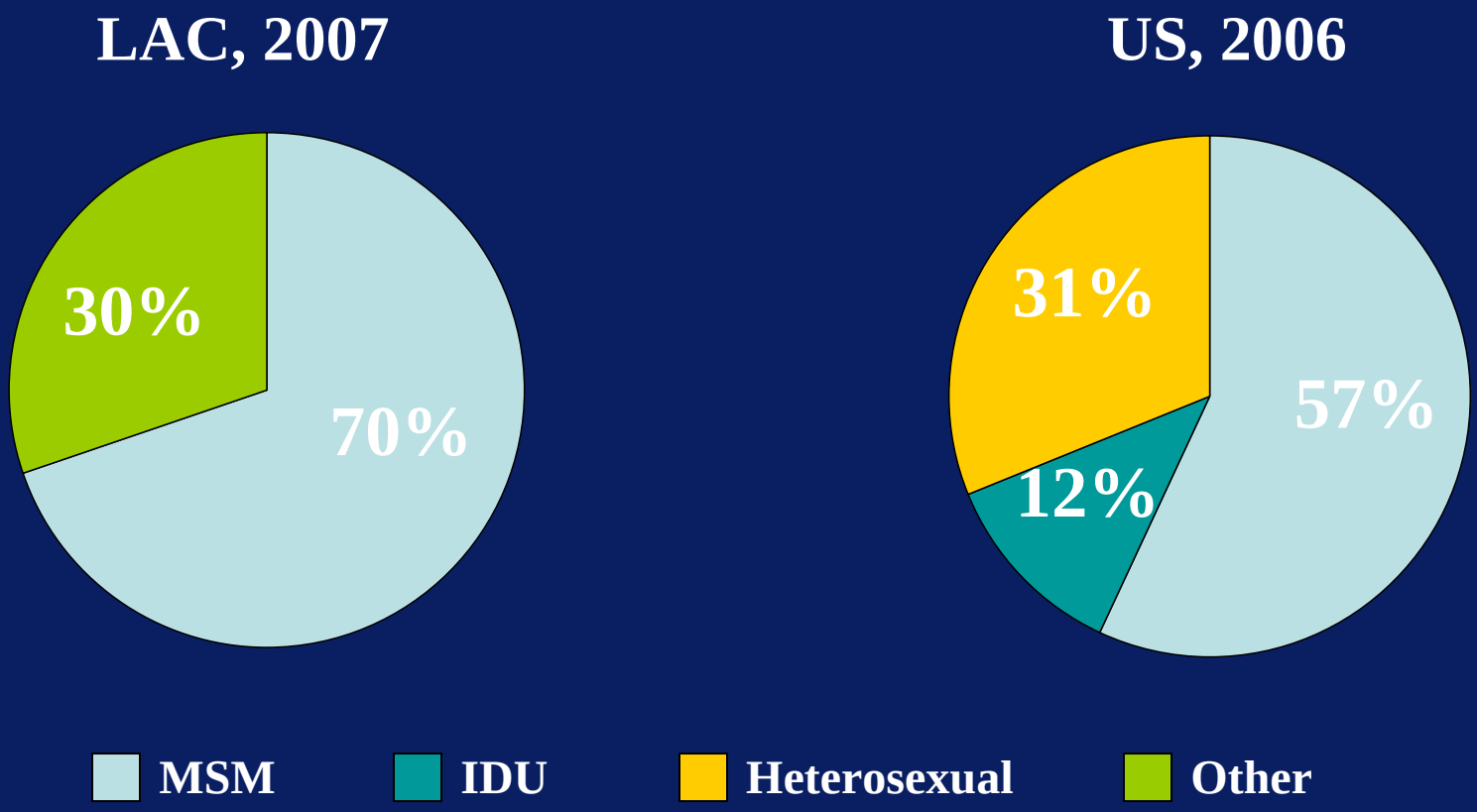
Comparison of HIV Incidence Rates by Race/Ethnicity, US 2006 and LAC 2007



Estimated percentage of new HIV infections by race/ethnicity among women, LAC 2007, US 2006



Estimated percentage of new HIV infections by mode of transmission



Numbers of newly diagnosed HIV infections are too small to calculate individual estimates for any group other than MSM for LAC

Percentage of new HIV diagnoses by mode of transmission