

Estimation of New York State Hepatitis C Prevalence, 2013 - 2016

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Outline

- Background
- Overview of methodology
- Tailoring methods for New York State
- Results
- Limitations and strengths

Background on HCV Prevalence Estimation

- State-level burden of HCV infection informs policies, resource allocation, advocacy, and elimination efforts
- Prevalence of current infection nationally traditionally measured in representative residential survey
 - National Health and Nutrition Examination Survey (NHANES)
- Statistical models allow combining national NHANES HCV prevalence with local information to yield state-level results
 - National Vital Statistics System (NVSS) mortality
 - American Community Survey (ACS) population sizes

Method builds on previous approaches

Clinical Infectious Diseases

MAJOR ARTICLE



Estimation of State-Level Prevalence of Hepatitis C Virus Infection, US States and District of Columbia, 2010

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Hall et al. *BMC Infectious Diseases* (2018) 18:224
<https://doi.org/10.1186/s12879-018-3133-6>

BMC Infectious Diseases

RESEARCH ARTICLE

Open Access

Estimates of state-level chronic hepatitis C virus infection, stratified by race and sex, United States, 2010



Eric W. Hall^{1*}, Eli S. Rosenberg² and Patrick S. Sullivan¹

HEPATOLOGY

HEPATOLOGY, VOL. 0, NO. 0, 2018



Estimating Prevalence of Hepatitis C Virus Infection in the United States, 2013-2016

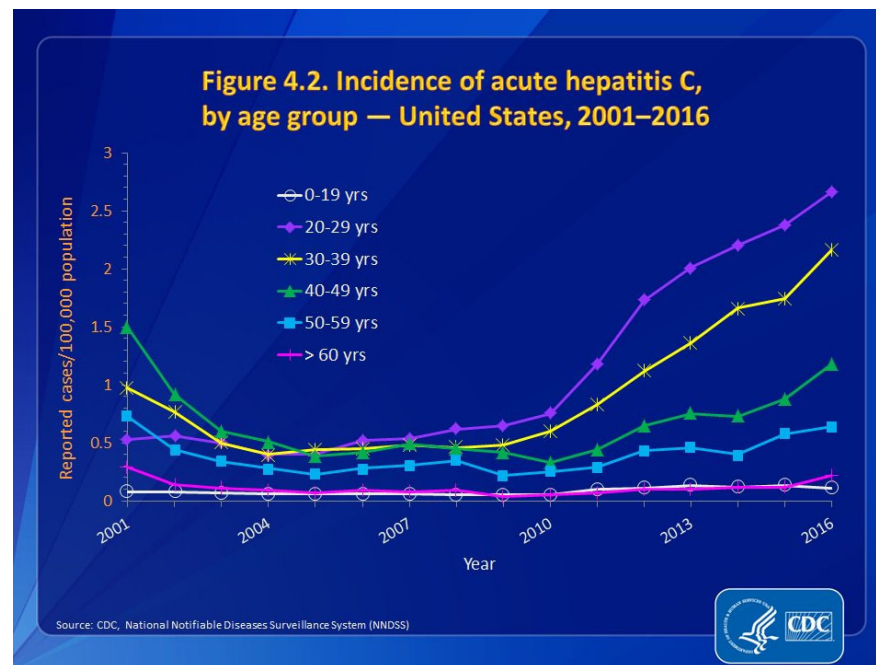
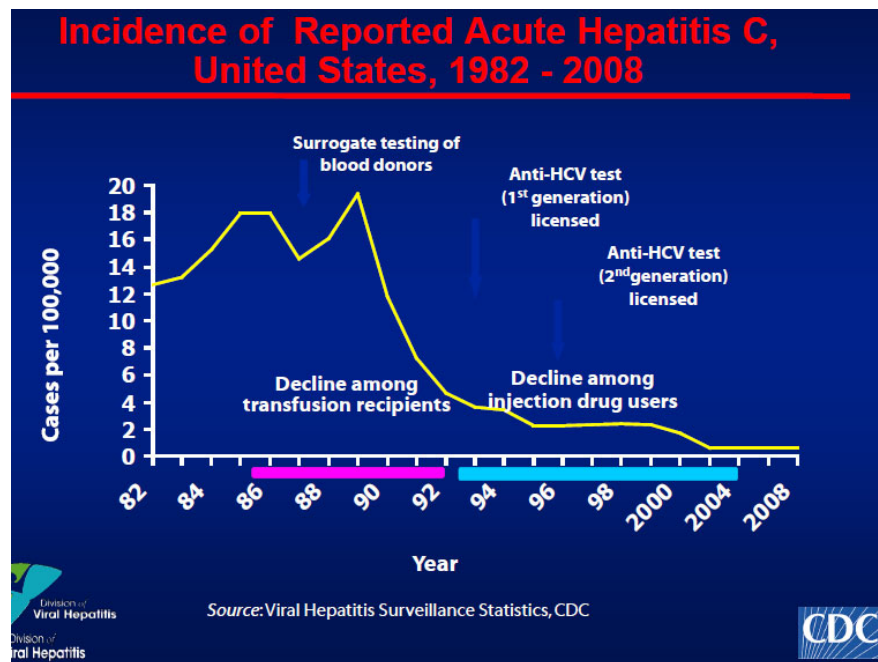
Megan G. Hofmeister,^{1,2} Elizabeth M. Rosenthal,³ Laurie K. Barker,¹ Eli S. Rosenberg,³ Meredith A. Barranco,³ Eric W. Hall,⁴ Brian R. Edlin,⁵ Jonathan Mermin,⁵ John W. Ward,^{1,6} and A. Blythe Ryerson¹

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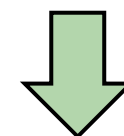
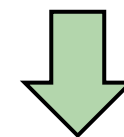
Shifting epidemiology of HCV to account for

Effect on HCV prevalence

- Rapid rise in incidence in younger PWID due to opioid epidemic



- Mortality in high prevalence group: 1945-1965 birth cohort
- Scale-up of cure via DAAs

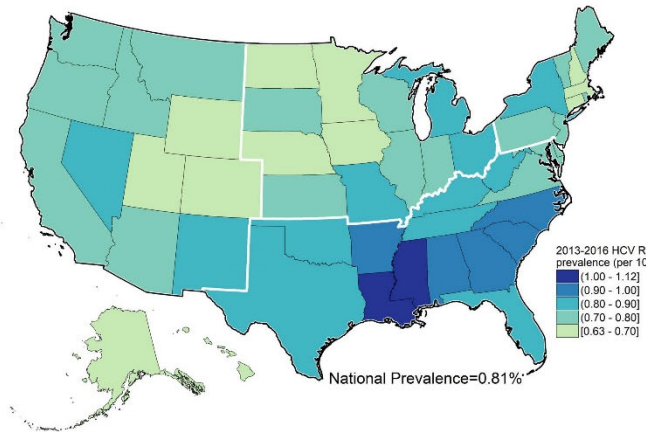


Overview of analytic approach

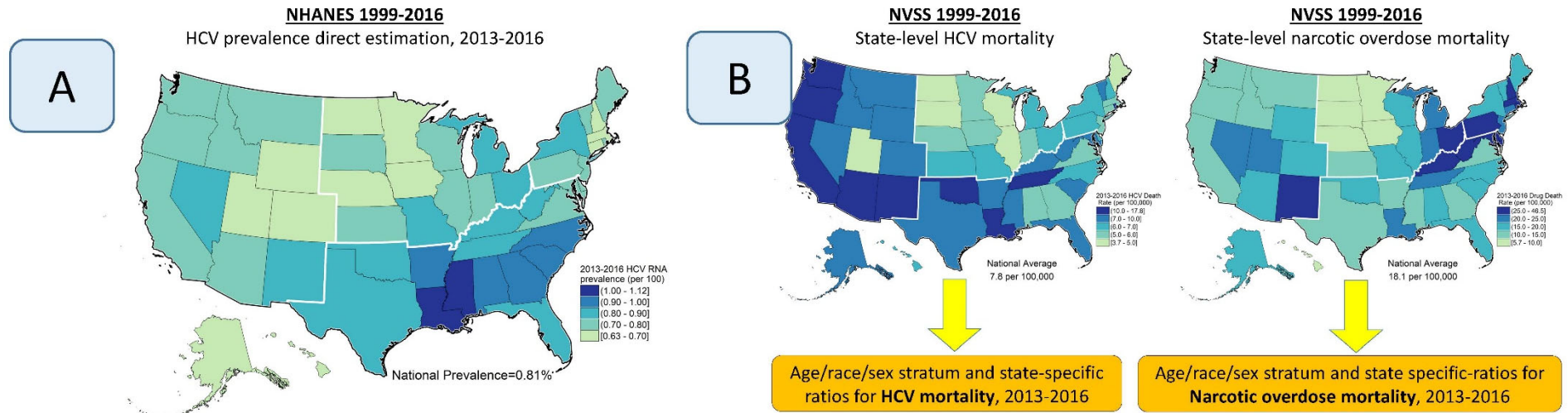
NHANES 1999-2016

HCV prevalence direct estimation, 2013-2016

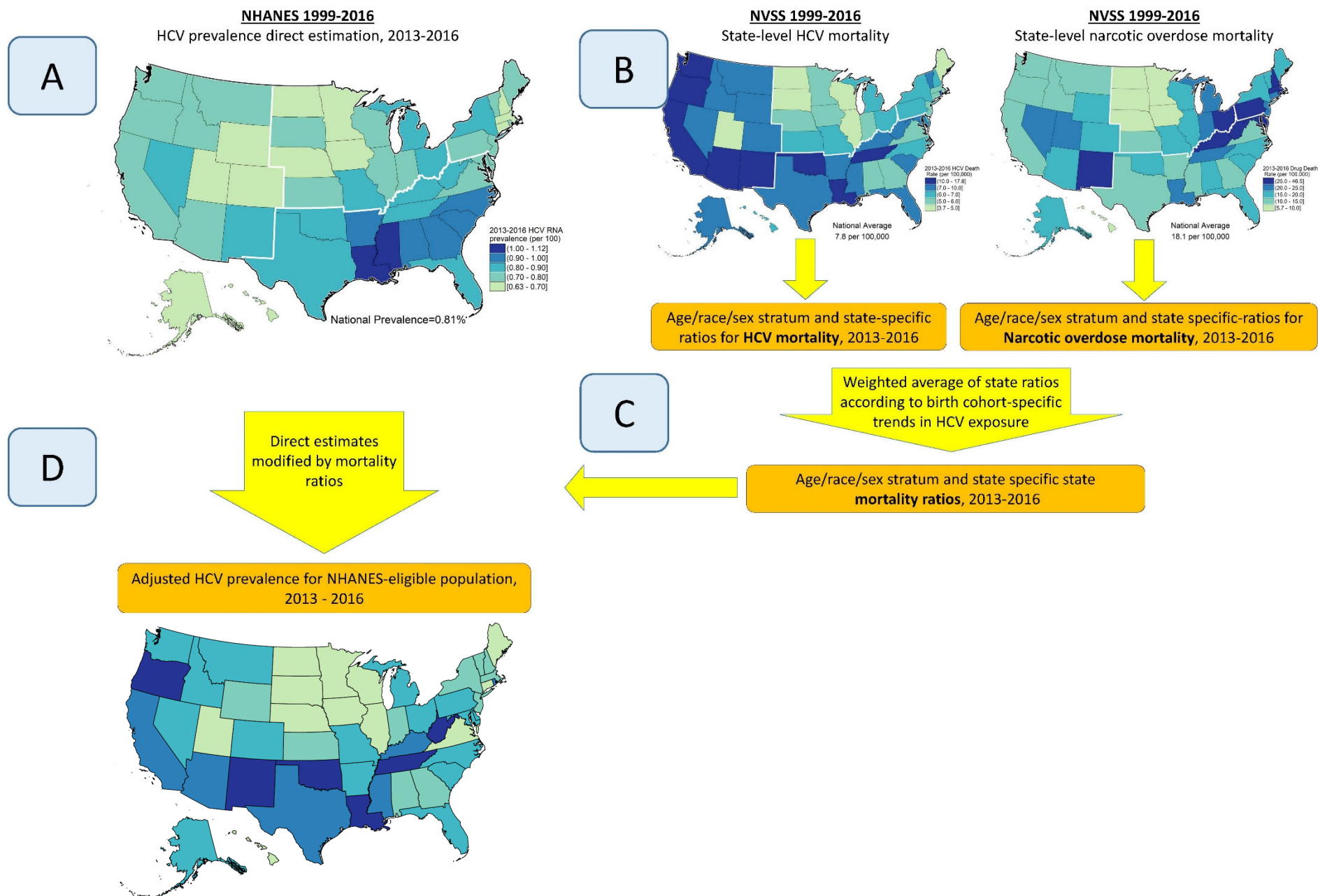
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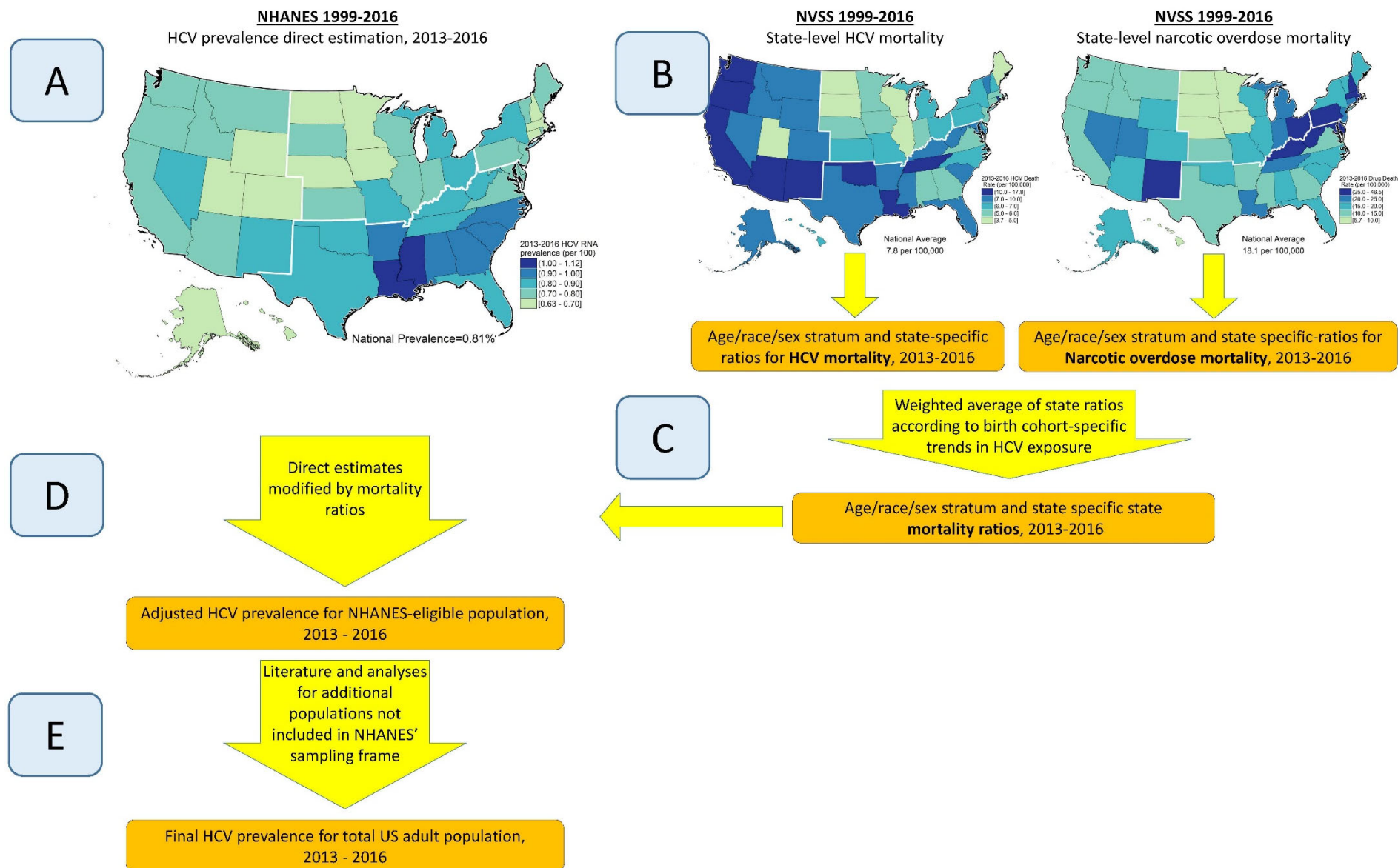
Overview of analytic approach



Overview of analytic approach



Overview of analytic approach



Populations not Included in NHANES

- Residents of nursing homes
- Unsheltered homeless
- Incarcerated

Approach

- State-level population size estimates for each population
- Estimate HCV prevalence in each population
 - Residents of nursing homes
 - Used on NHANES sex/age-specific prevalences
 - Unsheltered homeless
 - Review of articles published 1/1/2013 to 12/31/2017
 - Incarcerated
 - Analyses of specific data sources

Tailoring national work to New York

- Used HCV prevalence model for all states, 2013-2016
- Synthesized NYS and NYC HCV diagnosis data
 - Generate state-specific weights by sex
 - Better reflects HCV epidemiology in New York
- Used New York-specific testing and population size sources for incarcerated populations

Tailoring to NYS: Incarcerated Population

DOH
Seroprevalence
Study

DOCCS Under
Custody
Report

AI
Rapid
Testing
(Upstate)

Lit
Review
(NYC)

Prison Ab+ Prevalence
Estimate

Jail Ab+ Prevalence
Estimate

Combined Ab+ Count (previous/current infection)

RNA Adjustment
Method #1

RNA Adjustment
Method #2

Combined RNA+ Count (current infection)

HCV Prevalence in Prisons

Illustration of approach

Intake Date	Intake Prevalence	×	# Incarcerated in 2016	=	HCV Count
2014	9.8% (Male)		5,210 (Male)		512
2015	10.1% (Male)		8,459 (Male)		852
2014	17.8% (Female)		230 (Female)		41
2015	21.0% (Female)		475 (Female)		100

= 5,746 Ab+ persons (5,227 male, 519 female) as of Jan 2016

HCV Prevalence in Jails

- 20.6% Ab+ in NYC (Akiyama et al., 2016)
 - x 9,599 inmates (NYS Division of Criminal Justice Services)
 - 12.8% Ab+ in NYS (AIDS Institute HCV Rapid Testing Program)
 - x 15,534 inmates (NYS Division of Criminal Justice Services)
- = 3,966 Ab+ inmates in jails

Incarcerated HCV Prevalence: Current Infection

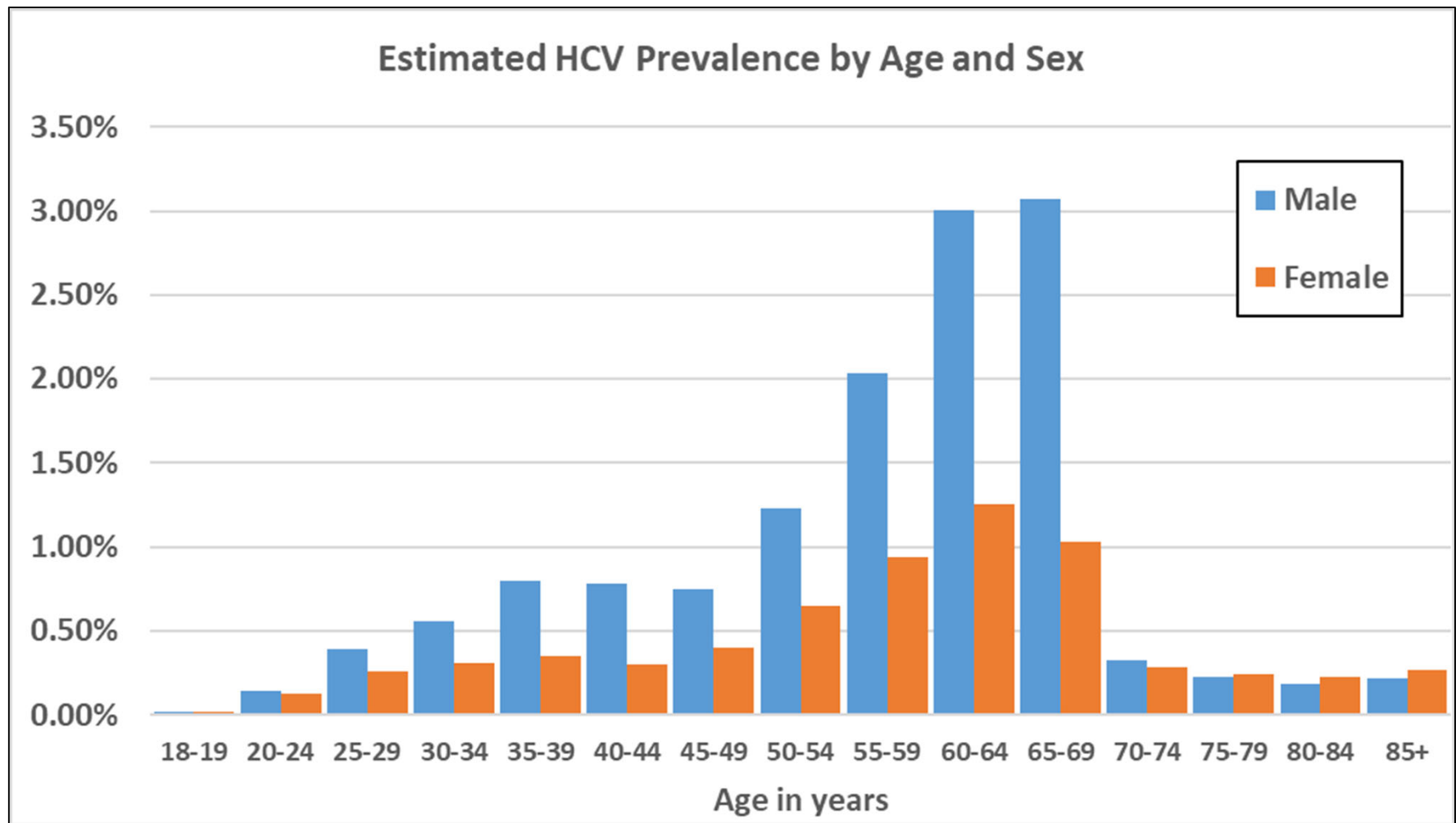
- Above estimates are Ab+, representing previous or current infection
 - Prisons: 5,746
 - Jails: 3,966
 - Total: 9,712
- How many currently infected (RNA positive)?
 - Reflects spontaneous clearance (~25%) and treatment
 - Based on analysis of DOCCS testing data from AI:
67.93% of Ab+ individuals RNA+

$$= 9,712 \times 67.93\% = 6,597 \text{ RNA positive}$$

Primary Results: Adult HCV prevalence, 2013-2016

	Population size	Persons with HCV	(%)
NHANES civilian, residential population	15,260,067	106,996	(0.70)
Incarcerated	80,063	6,597	(8.24)
Unsheltered homeless	3,528	318	(9.01)
Nursing home residents	110,448	446	(0.40)
Total Population	15,448,845	114,356	(0.74)

Detailed age and sex distribution



Final model-based estimate of 114,356 adults with current HCV infection, with finer age breakdown based on distribution of diagnoses in NYS and NYC

Estimation by poverty level

- Estimates by Federal Poverty Level (FPL) may aid HCV planning efforts
- Crude approach to allocate to FPL based on simpler stage of model
 - 42% of infections in 14% of population < FPL

NHANES-based Poverty Level	% of Number infected	Total Number Infected	Total NYS Population
Below FPL	42%	48,003	2,128,092
1.0-1.9 times the FPL	18%	20,723	2,425,375
>= 2.0 times the FPL	40%	45,239	10,895,378

Limitations & Strengths

- Limitations to consider
 - NHANES representation of HCV increases among PWID
 - HCV- & opioid- mortality incomplete proxies for underlying HCV infection
 - Estimates represent average during 2013-2016
 - Period of rising incidence
 - Incidence continues to rise
 - Use of NY probable/confirmed case surveillance
 - May not reflect current infections
 - Emphasizes screened populations
- Strengths of approach
 - Synthesis of large national datasets, with local information
 - Few model assumptions
 - Allows apples-apples comparisons between states

Thank you!

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