Methodological Challenges and Approaches for Assessing the Mortality Impacts of Disasters

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Two Disasters

2004 Indian Ocean Earthquake and Tsunami

Contemporary American Drug Overdose Epidemic

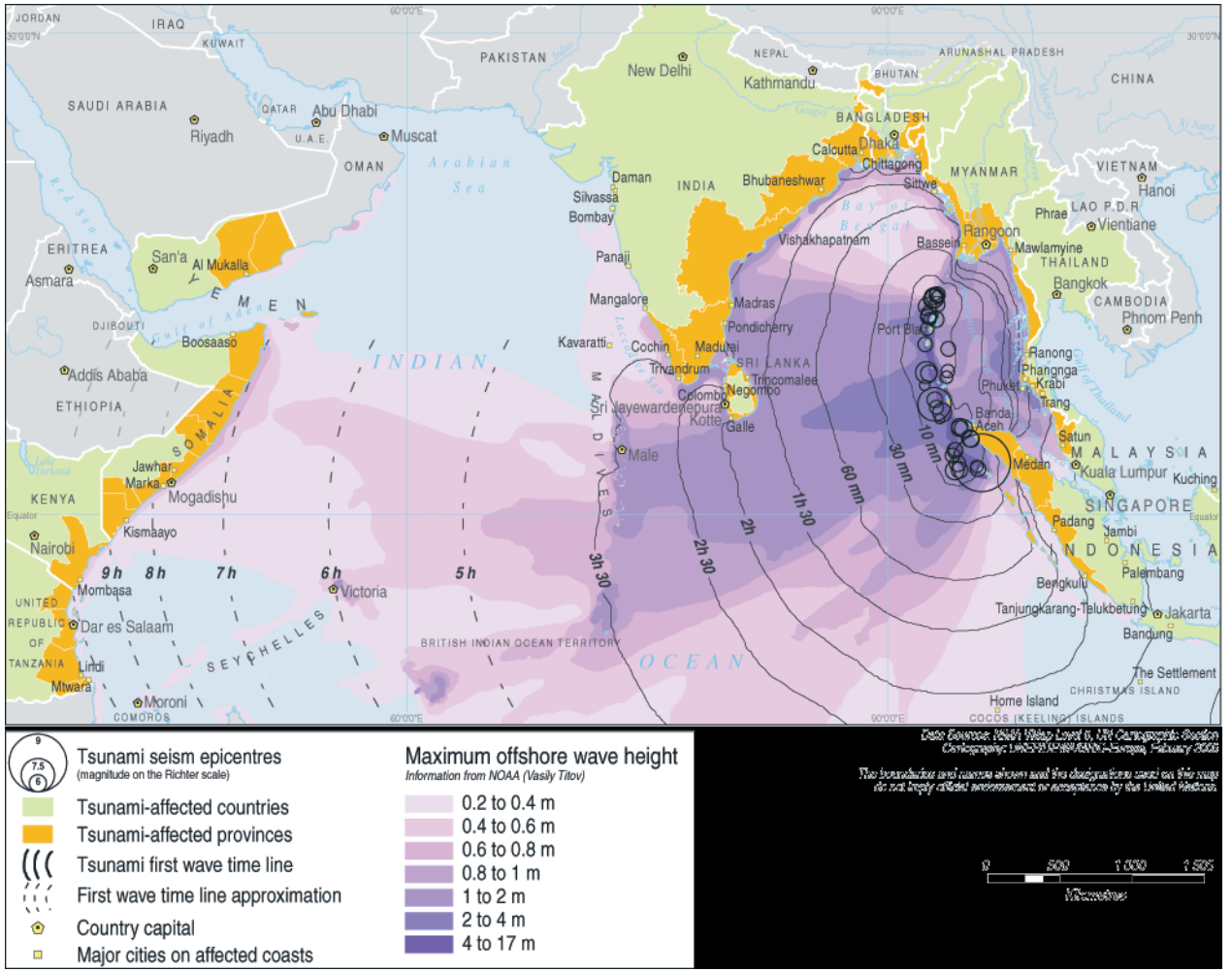
Examining the Evolution of Adult Mortality

After the 2004 Indian Ocean Earthquake & Tsunami

Ho, Jessica Y., Elizabeth Frankenberg, Cecep Sumantri, and Duncan Thomas. 2017. “Adult Mortality Five Years after a Natural Disaster: Evidence from the Indian Ocean Tsunami.” Population and Development Review 43(3): 467–490.

2004 Indian Ocean Earthquake and Tsunami

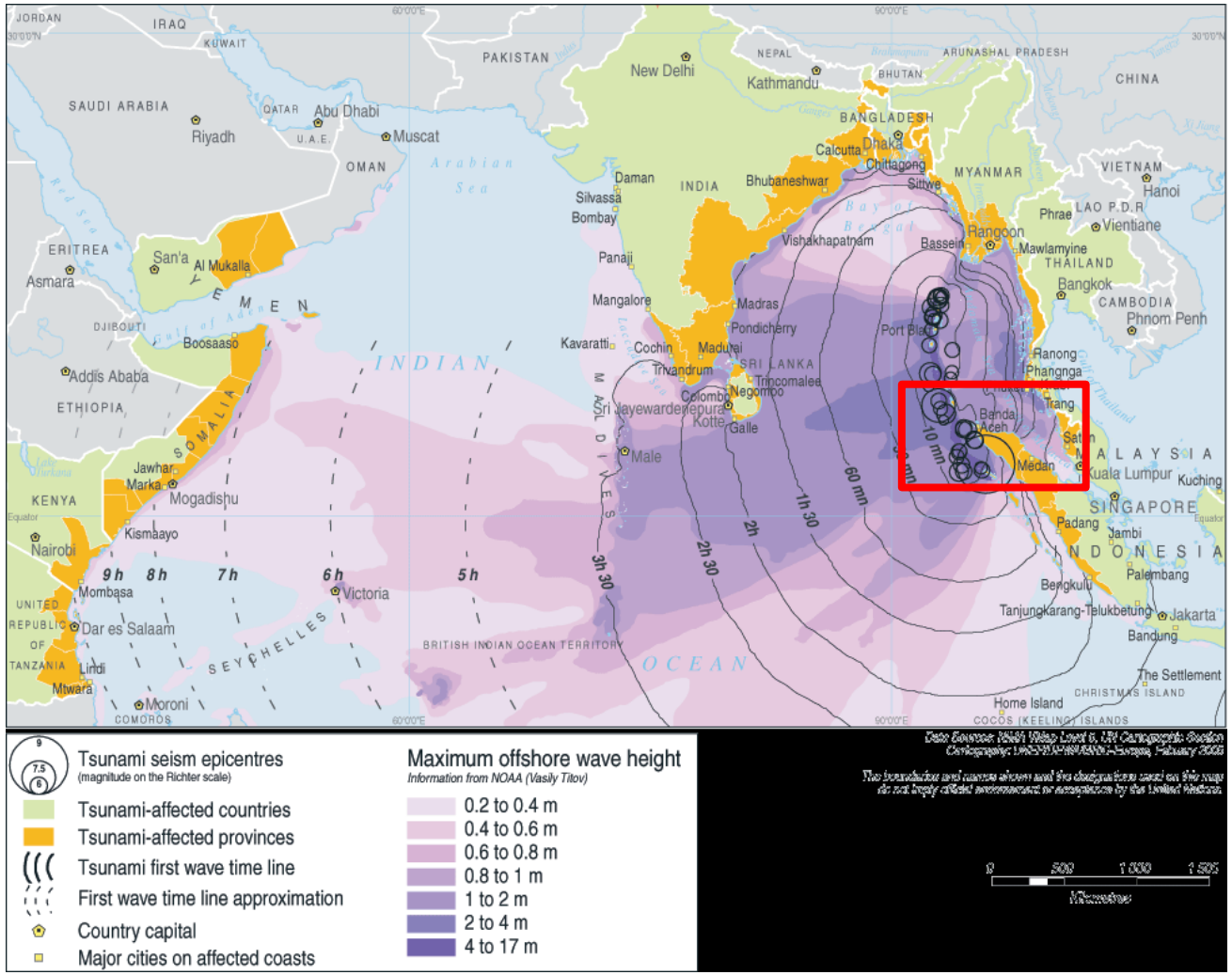
December 26, 2004



2004 Indian Ocean Earthquake and Tsunami

December 26, 2004

- 170,000 estimated deaths
- 750,000 people displaced
- Widespread destruction of property and infrastructure, $4.5 billion in property losses
- $7 billion reconstruction effort by 2007



Key Dimensions

1) Establishing a baseline
2) Measuring exposure to the disaster
3) Tracking respondents
4) Measuring the outcome

Study of the Tsunami Aftermath and Recovery (STAR)

- Directed by Elizabeth Frankenberg and Duncan Thomas with Cecep Sumantri

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STAR Baseline

- Created from a subsample of respondents in the 2004 round of the large, population-representative national socioeconomic survey (SUSENAS) conducted by Statistics Indonesia in February/March 2004 (10 months before the tsunami)
  - All enumeration areas in the SUSENAS in the 11 districts along the coast of Aceh province potentially vulnerable to inundation by the tsunami
  - All members of households enumerated in these districts in 2004
  - Detailed information on demographic and socioeconomic characteristics, widely regarded as a very high-quality survey, participation rates >99%

STAR Follow-Ups

- First STAR follow-up survey was conducted between May 2005 and July 2006
- 4 annual follow-ups (permanently in the field during the 5 years after the tsunami)
- Collected detailed information about exposure to and recovery from the tsunami

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Measuring Exposure

Community-Level

- Based on the location of each respondent's community at the time of the tsunami that combines information on that community's elevation above sea level, proximity to the coastline, and tsunami wave height at the closest coastal point to the community
- Allows for comparisons between communities

Measuring Exposure

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- Allows for comparisons between communities

Individual-Level

- Whether the respondent was caught up in or saw others struggling in the waves, lost family members, helped search for survivors, lost his/her home…
- Allows for comparisons between individuals from the same community (e.g., fixed effects models)

Key Dimensions

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Tracking

- Extensive tracking of respondents
- Highly culturally and linguistically diverse population, substantial displacement post-tsunami
- Incorporating local and long distance tracking and follow-up in STAR from the outset (see Thomas et al. 2012 for more detail)
- Survival status for 99% of the baseline sample established by combining multiple sources of information, including interviews with household and family members, community leaders, and neighbors

Key Dimensions

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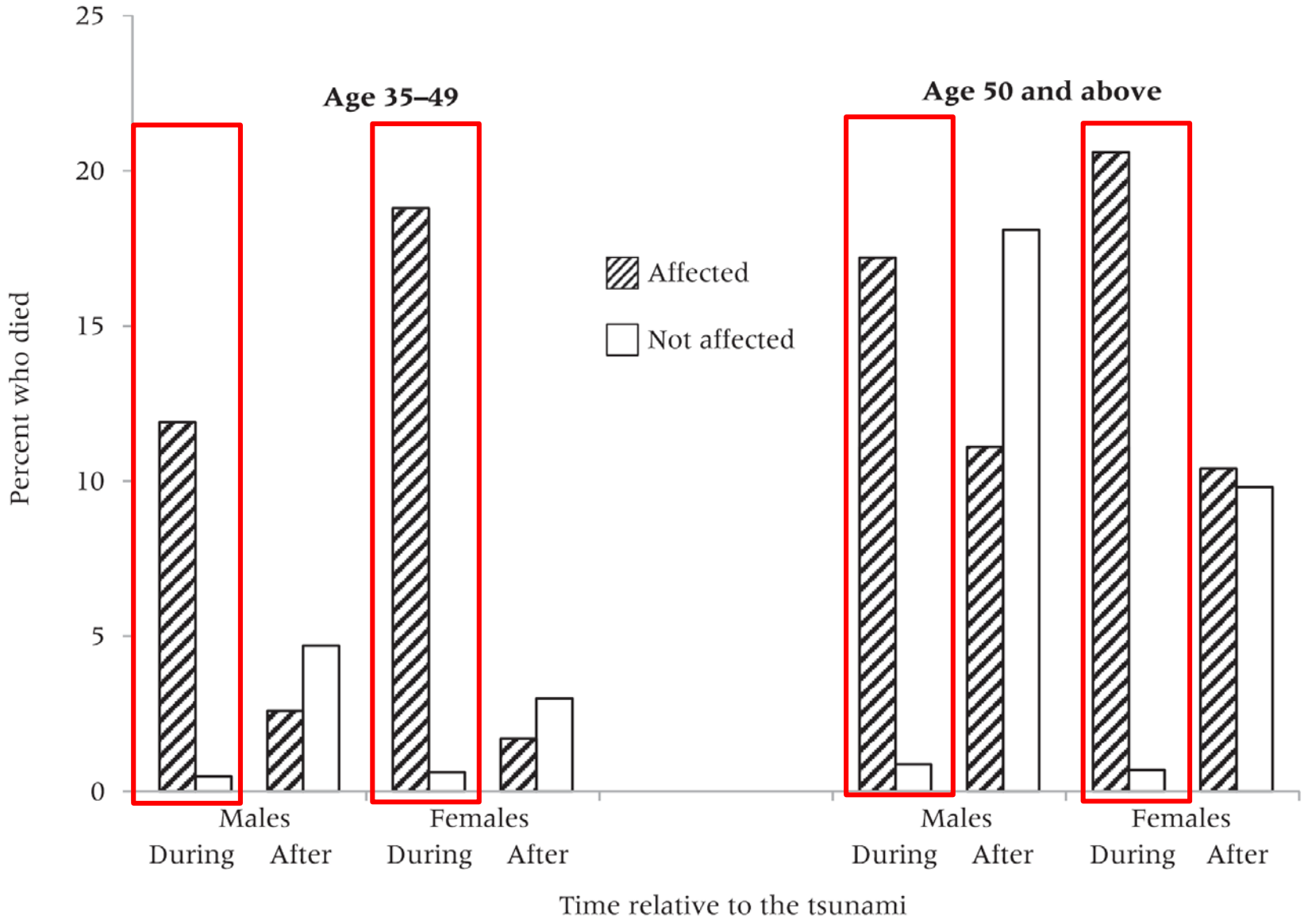
Mortality

- Whether the respondent was dead/alive and time of death based on network of informed contacts (family members, neighbors, local networks, etc.)
- Indonesia lacks a comprehensive vital registration system with complete coverage of the population
- Very limited information and high degree of uncertainty surrounding cause of death

Source: Ho, Frankenberg, Sumantri, and Thomas (2017)



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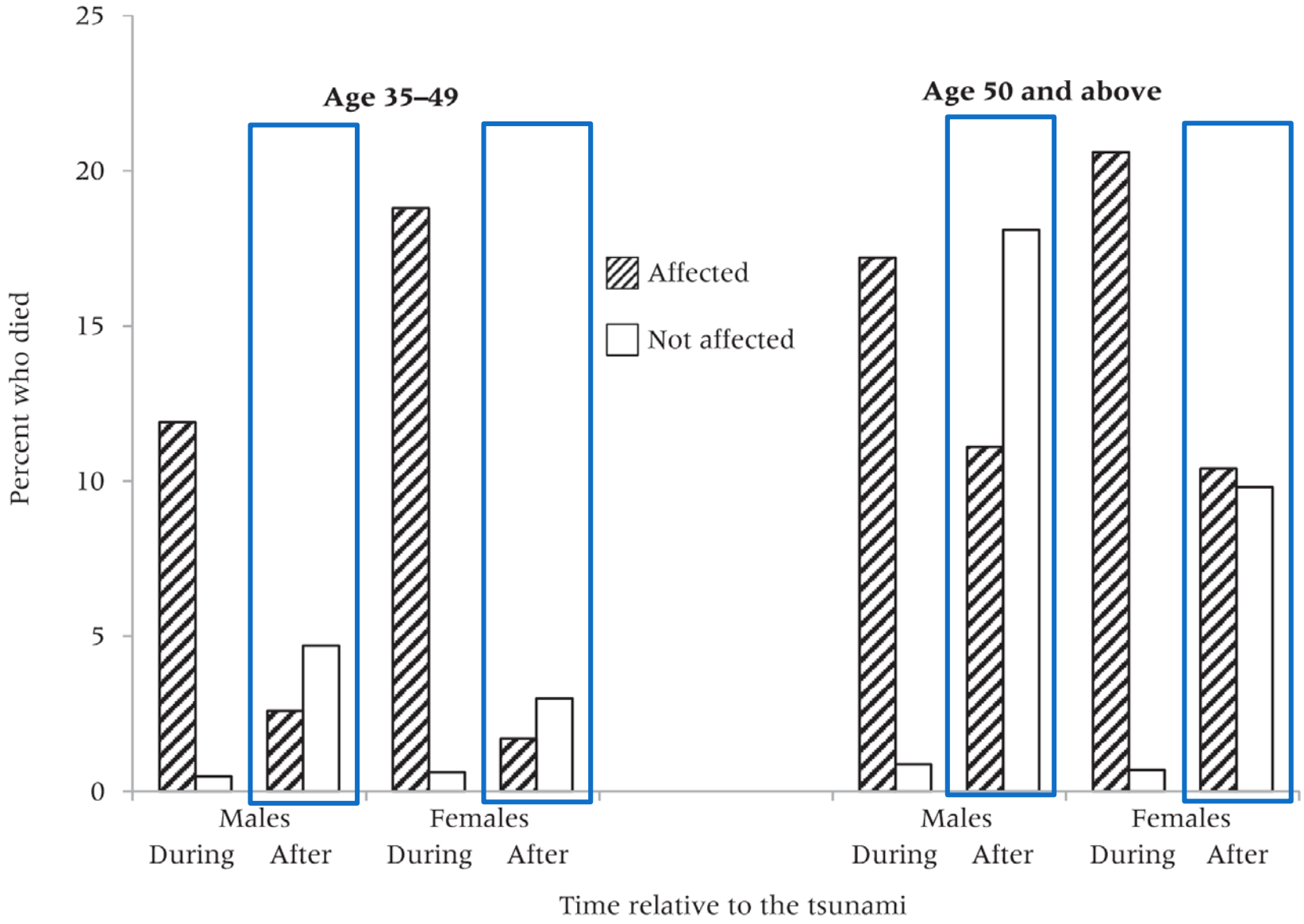


Source: Ho, Frankenberg, Sumantri, and Thomas (2017)

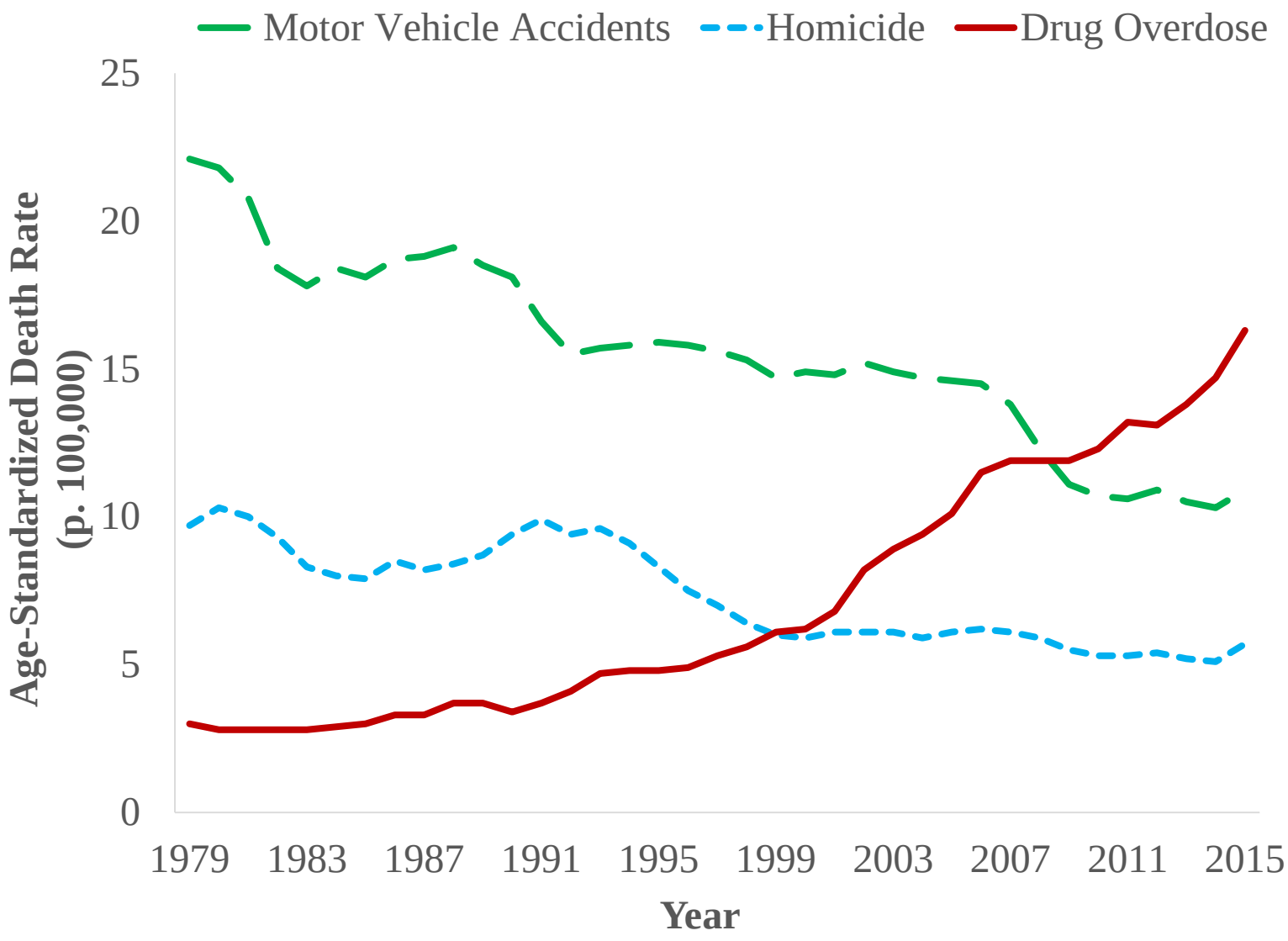
Main Finding

- Considerable evidence of mortality selection as a result of the disaster
  - Mortality rates among survivors in affected areas are lower than among those in unaffected areas, especially among men
  - Strong indicator that the composition of the post-disaster population differs in important ways from the pre-disaster population
- Also reflected differences in the height distributions between affected and unaffected areas (Frankenberg et al. 2011)

Best Practices Learned from STAR

- Leverage existing, high quality data to establish a baseline
- Use multiple measures of exposure appropriate to the disaster and context
- Minimize attrition by using tracking
- Survivors of disasters are likely to be a select group, which has important implications for selecting a comparison group and interpreting results

Insights from the Contemporary American Drug Overdose Epidemic



Data from CDC Wonder

Leveraging Multiple Data Sources

- Vital statistics (National Center for Health Statistics)
- Nationally representative population surveys with mortality follow up (e.g., NHIS, NLMS, HRS)
- Economic data
  - Bureau of Labor Statistics
  - County Business Patterns (U.S. Census Bureau)
  - Bureau of Economic Analysis
- Area-level sociodemographic characteristics: education, income, poverty, racial/ethnic composition (Census and American Community Survey)
- Prescribing data (IQVIA, Medicare)
- Health care system characteristics (Area Health Resources Files)

Combining Data Sources to Address Data Biases and Small Sample Size

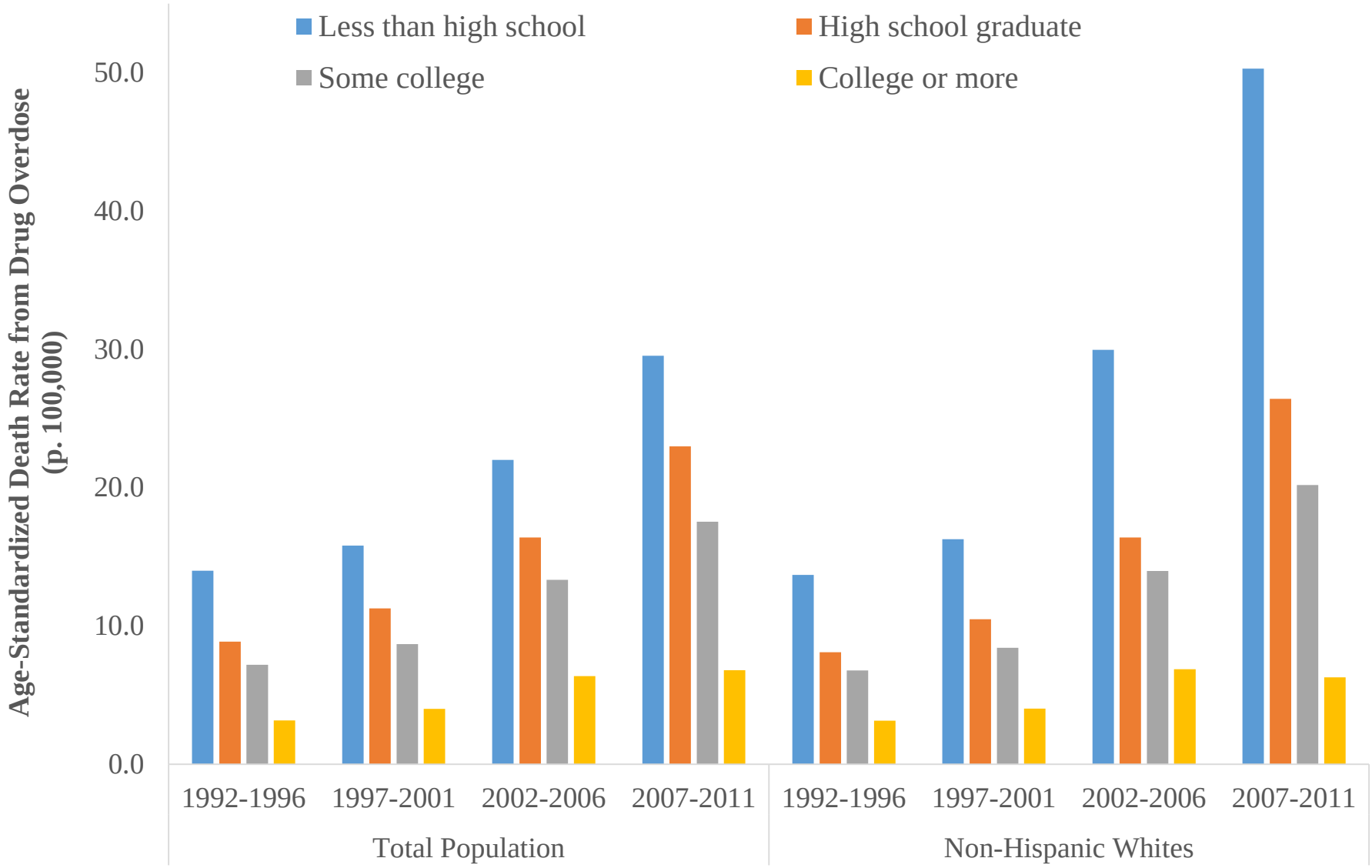
- Question: Does drug overdose mortality differ across education groups?
- Two problems:
  1. Well-known issues with using the education reported on death certificates coupled with population estimates (dual data source bias) (Hendi 2015)
  2. Even in the largest population-based surveys linked to mortality follow up, deaths from drug overdose are too few to arrive at reliable estimates by education

Dealing with Small Sample Size

- Solution:
  - Combine the two data sources, using the National Health Interview Survey (NHIS) to estimate all-cause death rates by education and vital statistics data to get the proportion of total deaths due to drug overdose

$$M_{ijsp}^{Drug\ Overdose} = M_{ijsp}^{All\ Causes} \times \frac{D_{ijsp}^{Drug\ Overdose}}{D_{ijsp}^{All\ Causes}},$$

Men



Source: Ho (2017)

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