



Trends in Opiate-Related Overdose Admissions in a Nationally Representative Sample of US Hospitals: 1993-2007

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History of Opiate Use

- Long history of opiate use among humans dating back to Mesopotamia in 2400 B.C.
- Historically, different forms of opiates have been associated with different distributions of use among populations.



Recent Trends in Opiate Use

- 1960's saw the emergence of an urban core heroin epidemic, disproportionately occurring in African American communities
- The late 1990's to early 2000's saw a resurgence in heroin overdoses
 - Increase occurred in traditional urban core groups
- More recently an increase in non-heroin (prescription) opiate overdoses has been documented.
 - Has been argued that this surge has shifted opiate use to groups outside of the urban core populations



Surge in Prescription Opiate Overdose

- DAWN data shows significant increases in ER overdose admissions related to oxytocin and hydrocodone.¹
- Rates of increase in overdose deaths higher in rural counties (371% increase) compared to urban counties (52% increase)²
 - Suggesting a change in the population at risk.

1. Centers for Disease Control and Prevention CDC. Emergency department visits involving nonmedical use of selected prescription drugs - United States, 2004-2008. *MMWR Morb Mortal Wkly Rep.* 2010;59(23):705-709.

2. Paulozzi L. Recent changes in drug poisoning mortality in the United States by urban-rural status and by drug type. *Pharmacoepidemiol Drug Saf.* 2008.



Research Questions

- Characterize demographic (individual-level) trends in heroin and prescription opiate overdoses between 1993 and 2007
- Examine community-level correlates of heroin and prescription opiates between 1993 and 2007



Data Sources

- Nationwide Inpatient Survey (NIS)
 - Stratified sample of approximately 20% of US community hospitals representing 5 to 8 million hospital admissions annually?
 - States included in the NIS represent about 95% of the US population
 - All payer data (Medicaid, Medicare, Private Insurance and uninsured)
 - Years 1993 to 2007



Data Sources(2)

- Used primary ICD-9 diagnosis codes
 - Heroin Overdose : 965.01 or an E code of E850.0
 - Prescription Opiate Overdose: 965.00, 965.02 or 965.09, or an E code of E850.1 or E8502
- Hospital location (urban/rural) data from NIS
- Used Census and SEER data to construct county level variables

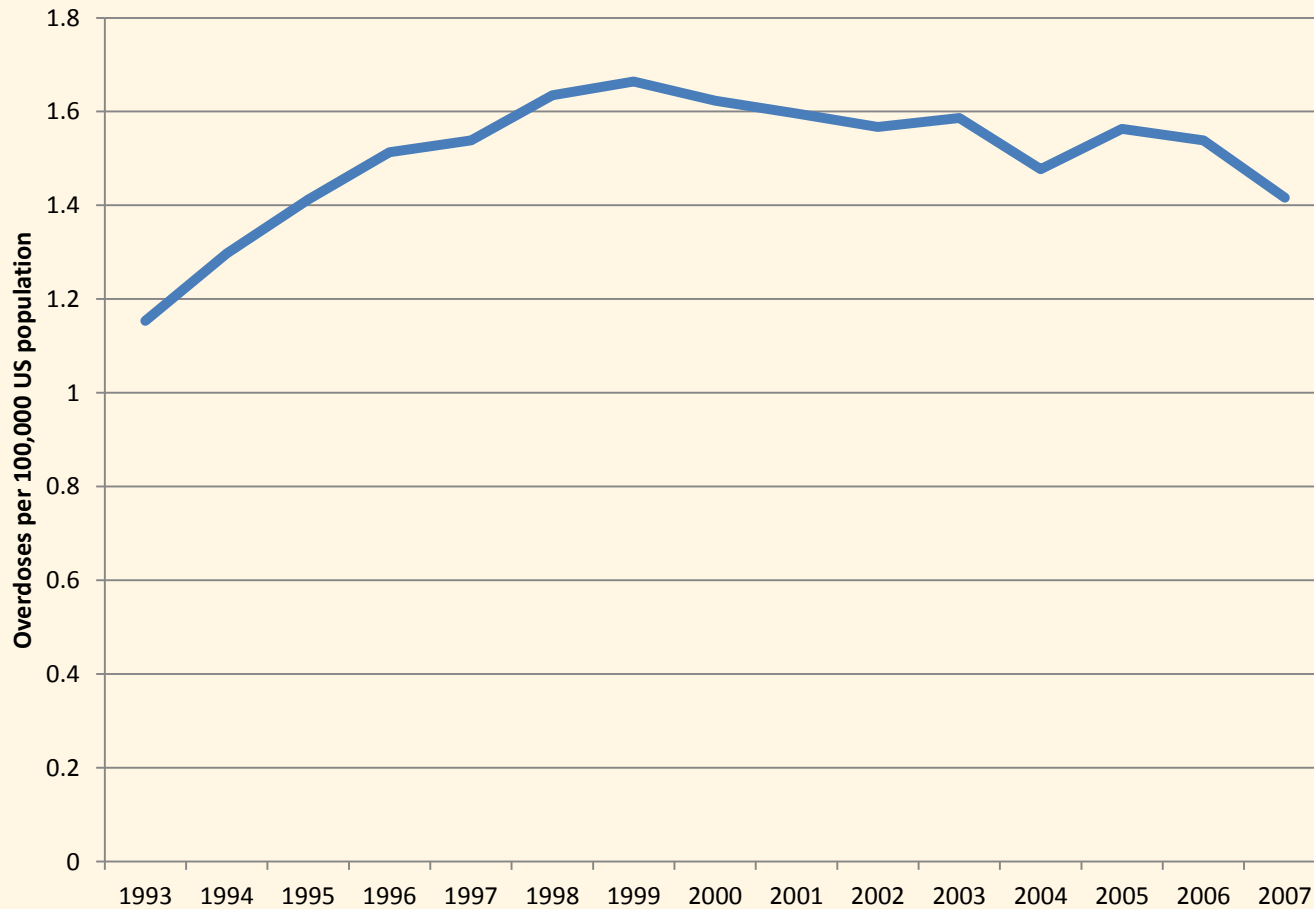


Methods

- SAS Proc Surveyfreq was used to estimate counts of heroin and prescription overdoses in hospitals by year using the NIS supplied weights, PSUs and Strata
 - National estimates of overdoses and overdose deaths
 - Rates per 100,000 US population
 - National rates by ethnicity, gender, age
- Stata XTMixed was used to estimate multilevel regression models of logged counts of ODs adjusting for differences between hospitals, counties and demographic differences.

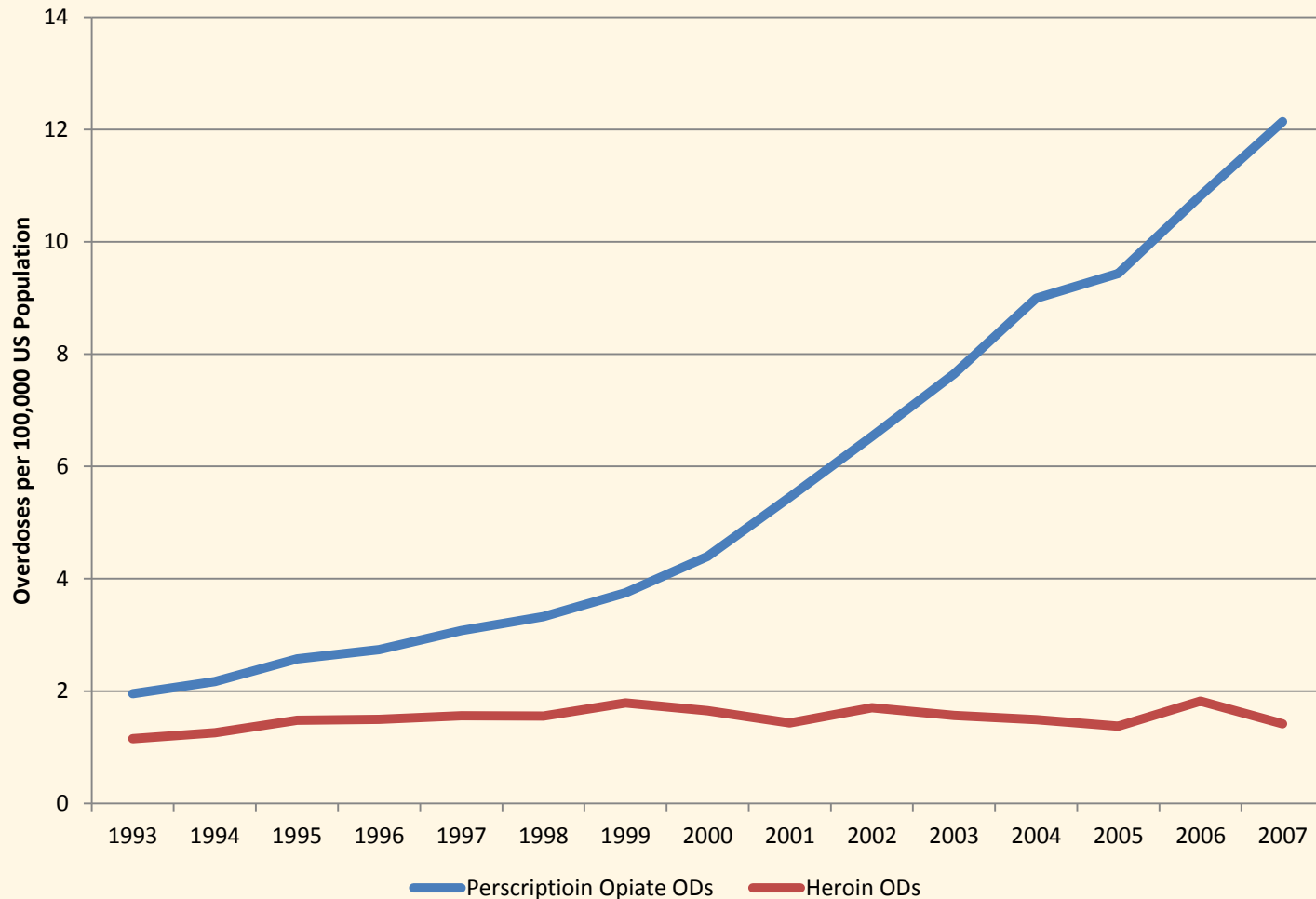


Heroin Overdose Hospital Admissions



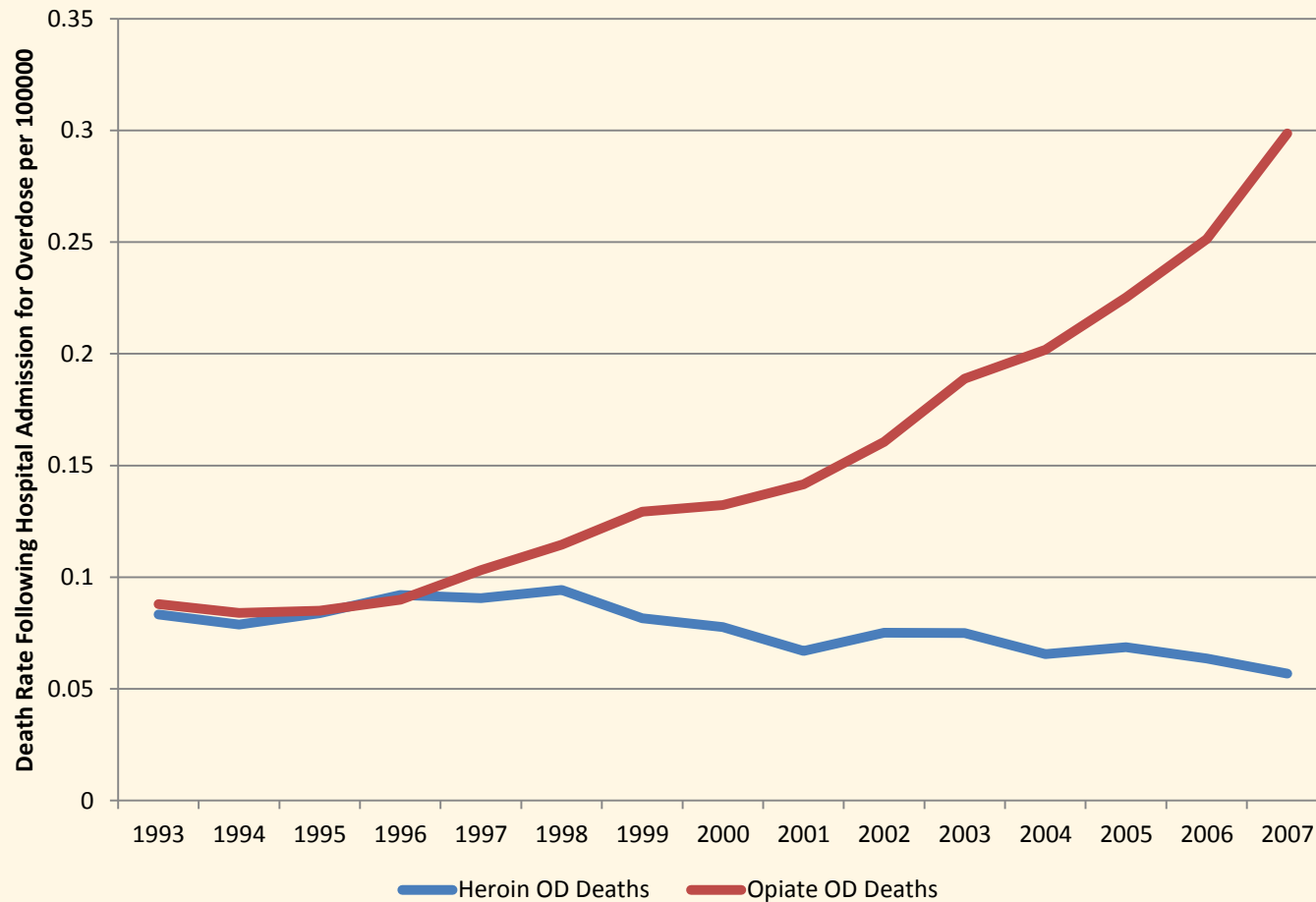


Opiate Overdose Admissions



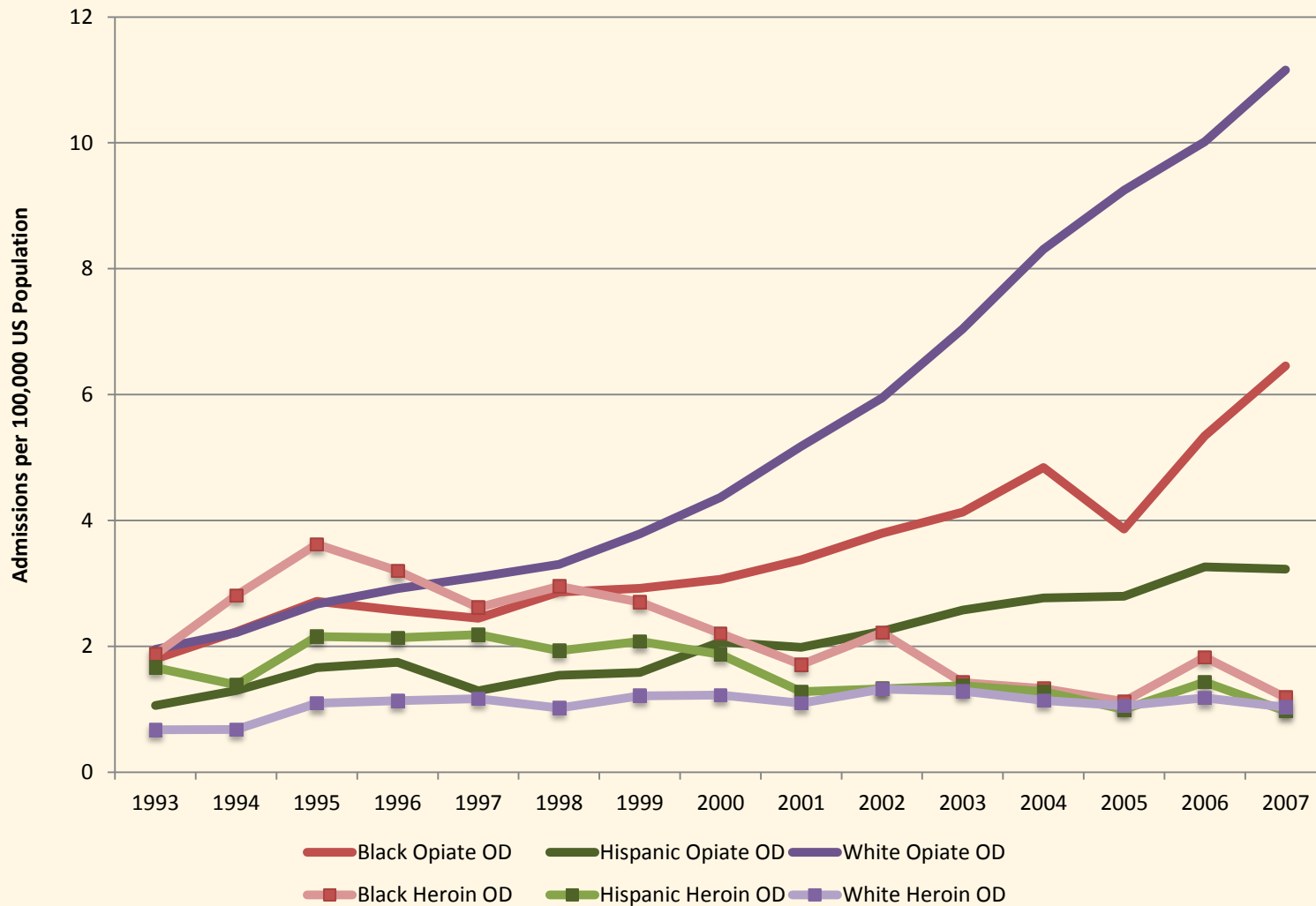


Opiate Overdose Deaths



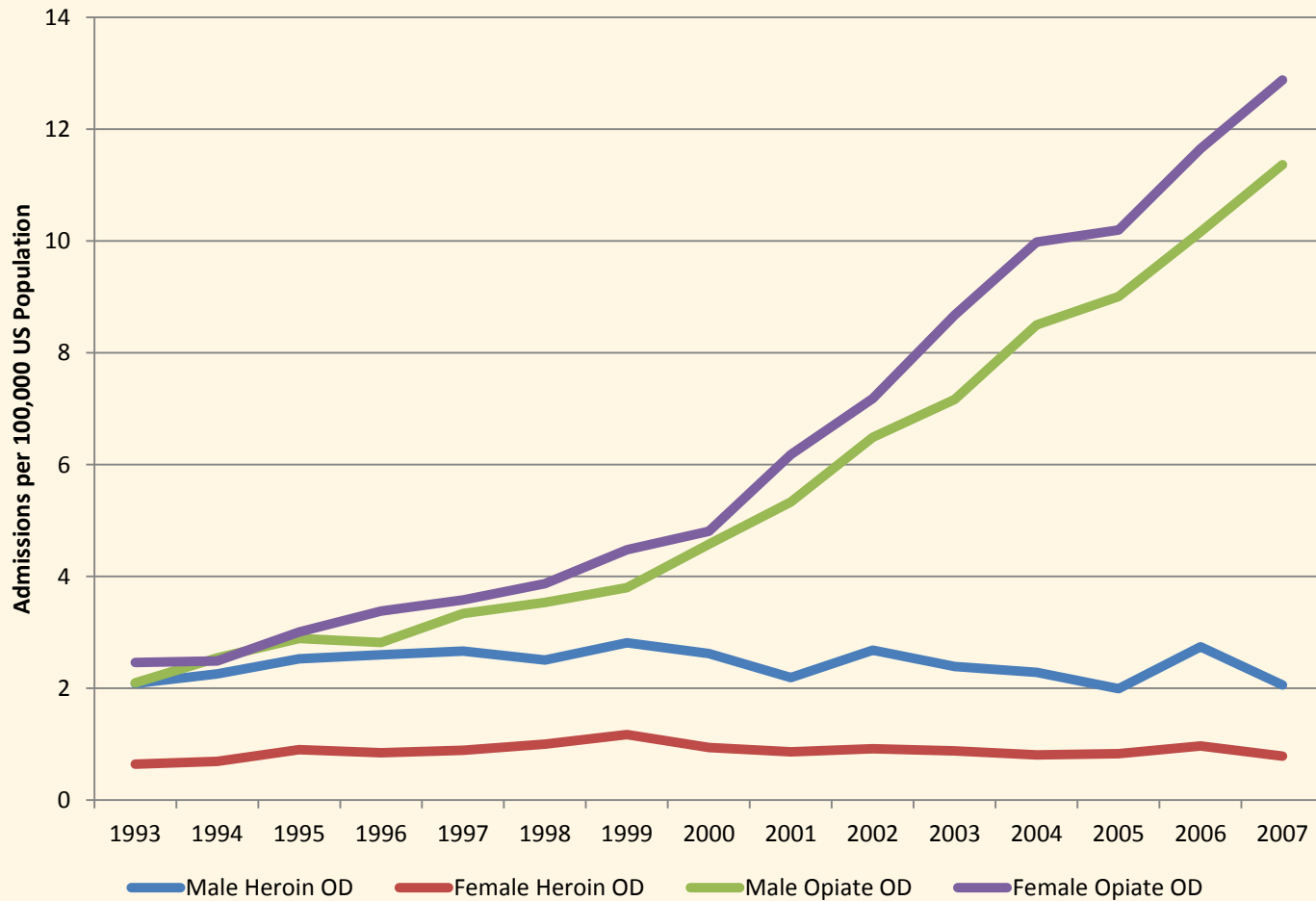


Race and OD Hospital Admissions



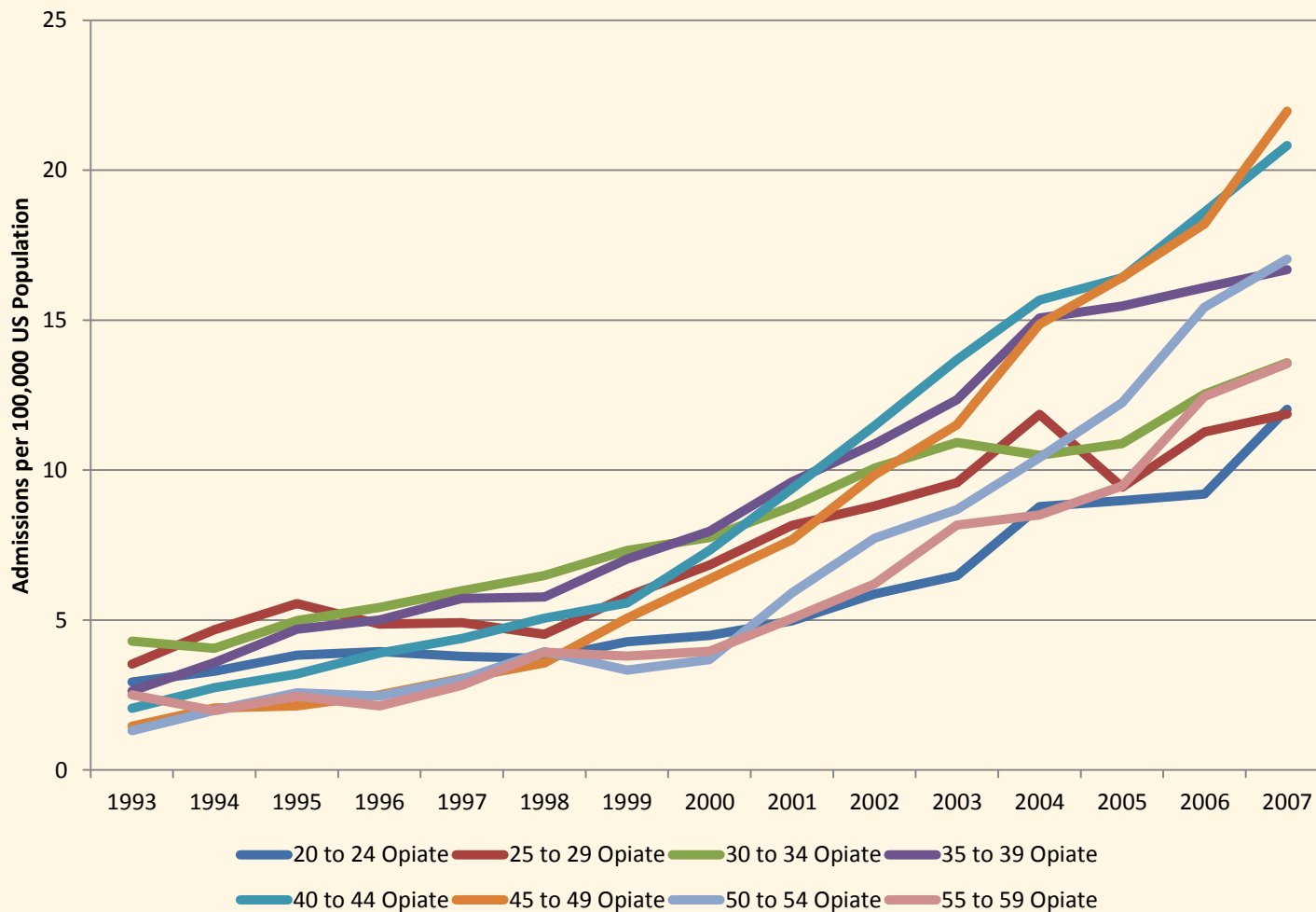


Gender



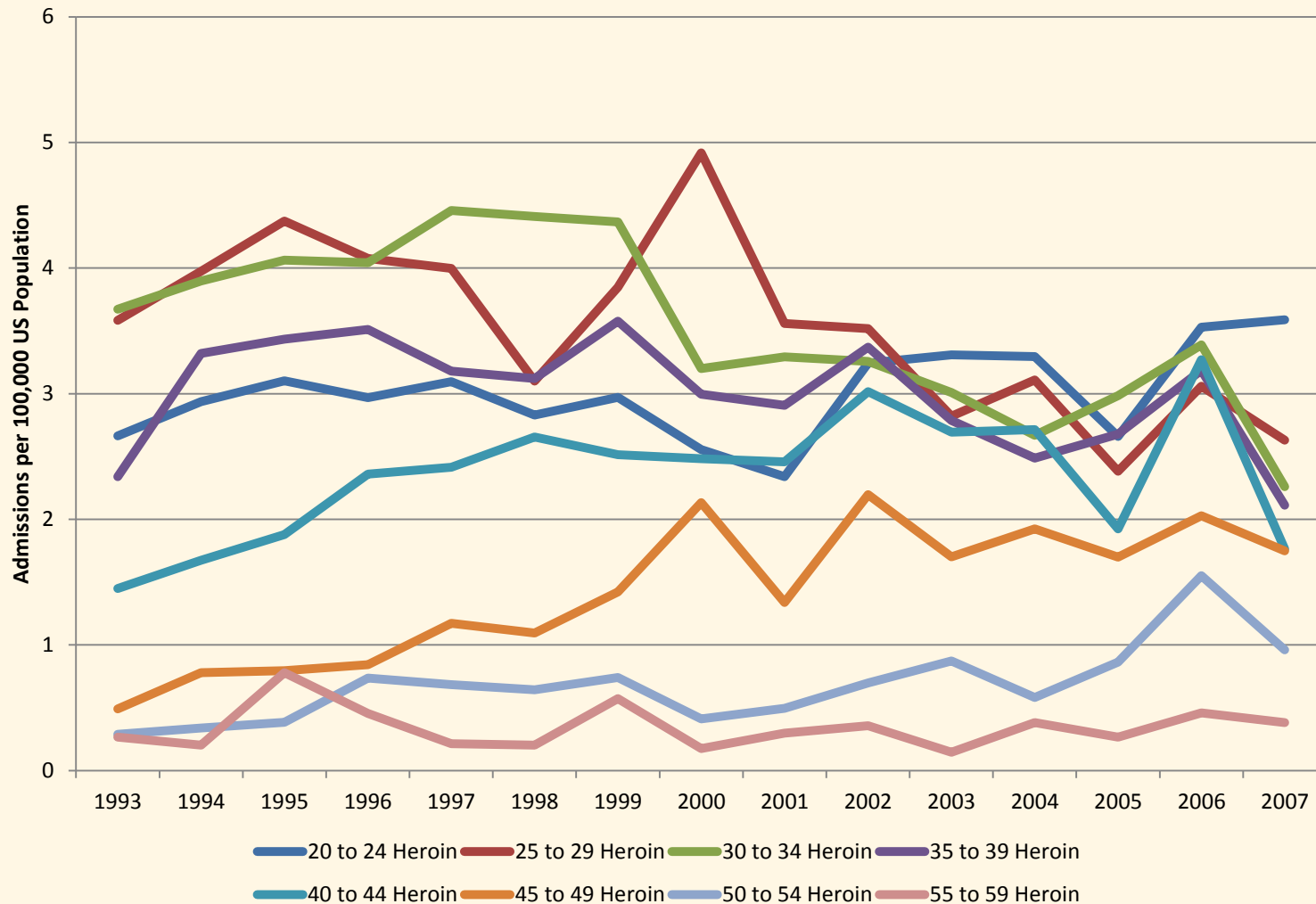


Age and Prescription Opiates





Age and Heroin



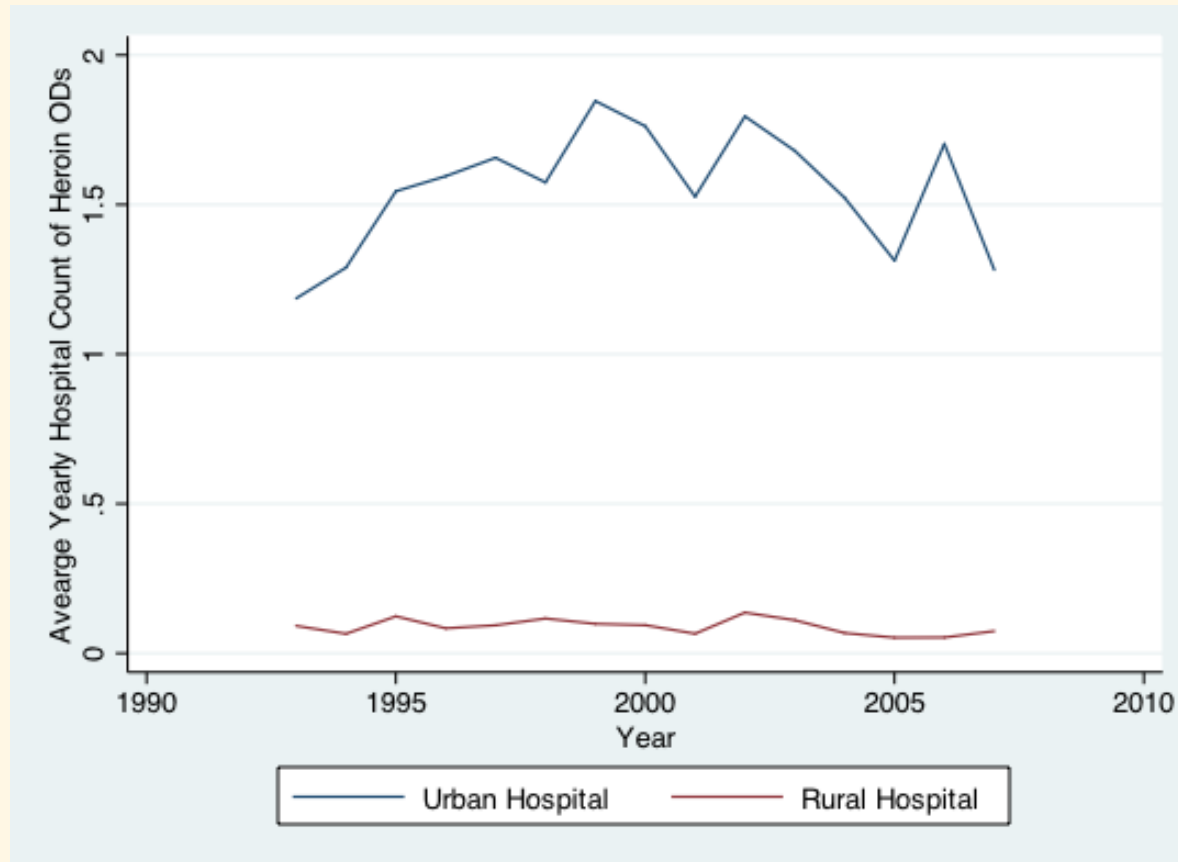


Community Model Results: Heroin Overdoses

- Models adjusted for differences in hospital and county population, county size, race and ethnicity, poverty and median income.
- Statistically significant difference between urban and rural hospitals and statistically significant interaction.
 - Urban hospitals had on average 16.5% more prescription opiate OD cases ($P > .001$) adjusting for demographics
 - Yearly percent increase in heroin ODs 0.7% higher in urban hospitals compared to rural hospitals ($P = .012$) adjusting for demographics



Urban-Rural Heroin ODs





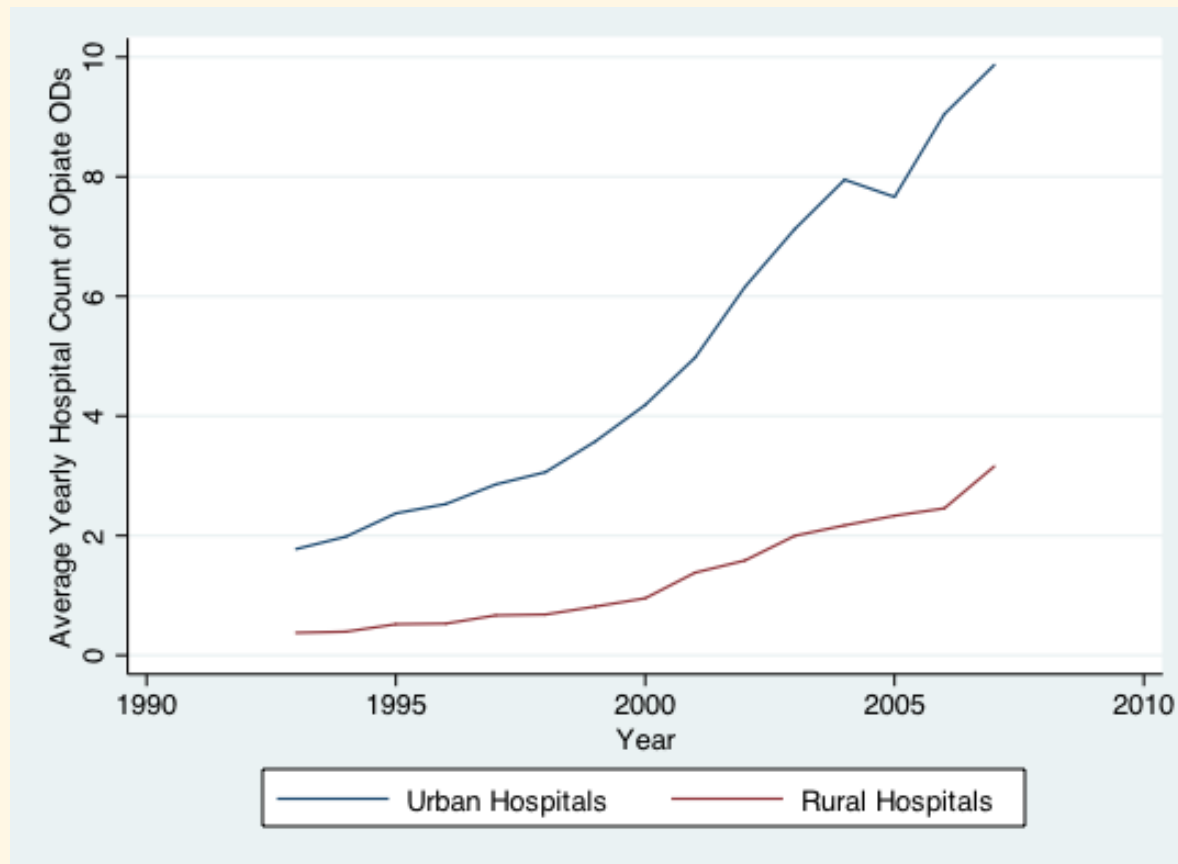
Community Model Results:

Prescription Opiates

- Models adjusted for differences in hospital and county means, county size, race and ethnicity, poverty and median income.
- Statistically significant difference between urban and rural hospitals and statistically significant interaction.
 - Urban hospitals had on average 26% more prescription opiate OD cases ($P > .001$) adjusting for demographics
 - Yearly percent increase in ODs 2.3% higher in urban hospitals compared to rural hospitals ($P = .04$) adjusting for demographics



Urban-Rural Opiate Prescription ODs





Discussion (1)

- Dramatic increase in Prescription Opiate ODs in hospitals
- The dynamics of both heroin ODs and Opiate ODs have changed
 - Increasingly white, female and middle aged
- While rural ODs have increased dramatically the rate of increase is faster in urban settings



Discussion (2)

- The early rise in Heroin OD (43% increase from 93-99) may be related to changes in heroin supplies
- It is unknown what factors are influencing the prescription opiate OD epidemic: increased availability? changes in social acceptability?
- Evidence for dynamics between prescription opiates and heroin.
 - If enforcement efforts are effective some proportion of the opiate dependent population may seek heroin; we may see a resurgence in heroin use and OD.
 - We might see evidence of this in the rise on heroin OD among whites females and 40 year olds.



Limitations

- Hospital admissions do not account for changes in rate of per person admissions
- ICD-9 codes are error prone
- Community level data has well know potential for distorted interpretation (Ecological Fallacy)
- Can't distinguish between opiate prescription misuse and diversion of opiate prescriptions for illicit use.
- Lots of individual level factors not accounted for such as poverty/income



Conclusions

- Consistent with historical experience, changes in the form of opiate use co-occurs with changes in the demographic patterns of use
- More resources need to be invested in addressing the dramatically increasing epidemic of opiate prescription overdoses



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Presenter Disclosures

George J Unick

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No relationships to disclose