County-level Discrepancies between SF-1 and DHC across the Rural-Urban Continuum

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Background

- Rural America is in the midst of a long pattern of population aging, chronic outmigration, and economic difficulties
- The decade from 2010 to 2020 was the first decade where there was net depopulation of rural counties
- Rural America is also prone to significant rates of poverty, hardship, and poor health outcomes

Background

- Although these trends are well-known, it has always been hard to document them
  - Data suppression has been an issue for rural demography for a long time
  - Many data sets are simply unusable for rural areas
    - Rural census tracts in the American Community Survey have massive margins of error
  - Other data sets simply don't have enough rural respondents to allow for rural insights
- The decennial census, particularly at the county level, has long-been the gold standard for rural demography

Background

- Rural demography generally happens at the county level
- Rural areas can be though of as being defined by low population density *and* a lack of connectivity to urban areas
  - The county is a valuable scale for determining connectivity
- Data is often only reliable at the county level
- Counties are political units, so policy implications can more easily be assessed
- Thus, we often treat nonmetropolitan counties as synonymous with rural
  - As defined by OMB where a metro county is any county with an urban population of greater than 50,000 or is connected to a core metro county by at least 25% of commuting

Goal and Methods

- My goal here is to display discrepancies between the traditional method of disclosure avoidance via the 2010 SF-1…
  - Data swapping, suppression, and top and bottom coding
- And the new differential privacy approach via TopDown
- I will be using the person-level DHC files from the March 16th release of demonstration data, retrieved via IPUMS-NHGIS
  - Privacy loss budget of 20.82

Goal and Methods

- I will be making comparisons along the rural-urban continuum via the nine-category Rural Urban Continuum Codes
  - 2013 vintage determined via the 2010 census
- Metro
  - 1 – 1 million or more
  - 2 – 250,000 to 1 million
  - 3 – Less than 250,000
- Nonmetro
  - 4 – Adjacent to metro, 20,000 or more
  - 5 – Not adjacent, 20,000 or more
  - 6 – Adjacent, 2,500 to 19,999
  - 7 – Not adjacent, 2,500 to 19,999
  - 8 – Adjacent, less than 2,500
  - 9 – Not Adjacent, less than 2500

Goal and Methods

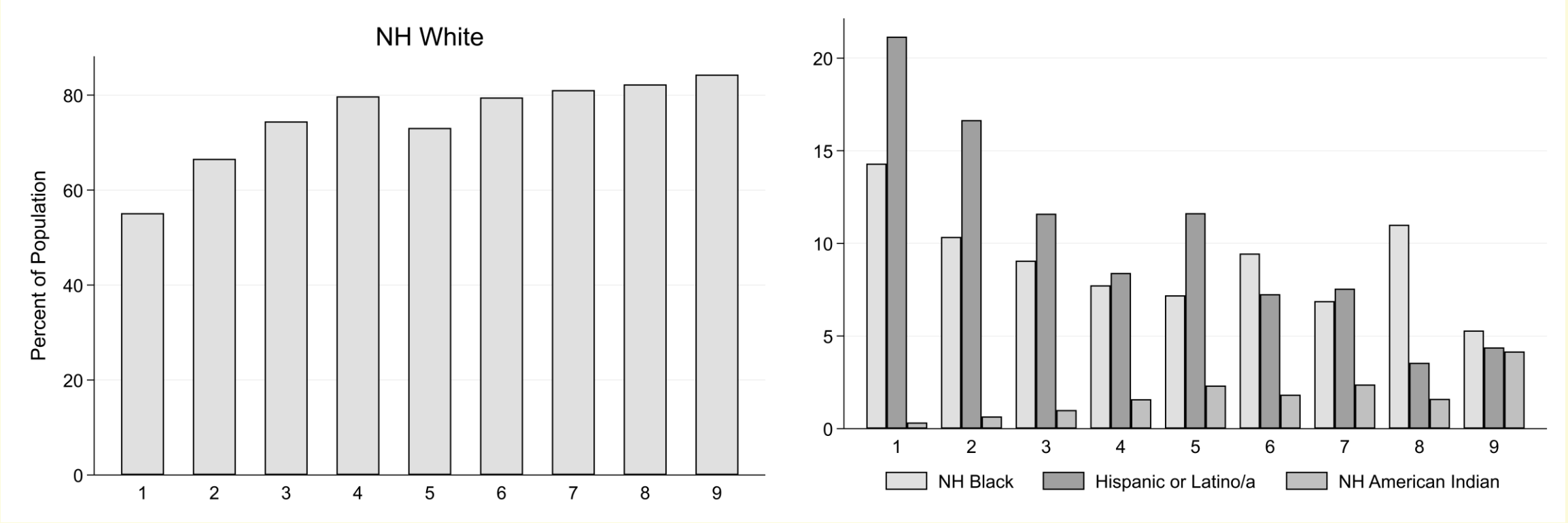
- I will first compare total population statistics, then median age statistics

- In all cases I will make comparisons across race and ethnicity
  - Non-Hispanic white
  - Non-Hispanic Black
  - Hispanic or Latino/a
  - Non-Hispanic American Indian

A Note on Race and Ethnicity

- Rural America is not monolithic
- Although many imagine it as being entirely white, this isn't true, hasn't ever been true, and is becoming less so every year
- Most importantly, rural non-white residents of the U.S. live in some of the most difficult and unequal conditions
  - High mortality rates, limited mobility, long-term neglect from local governments

A Note on Race and Ethnicity



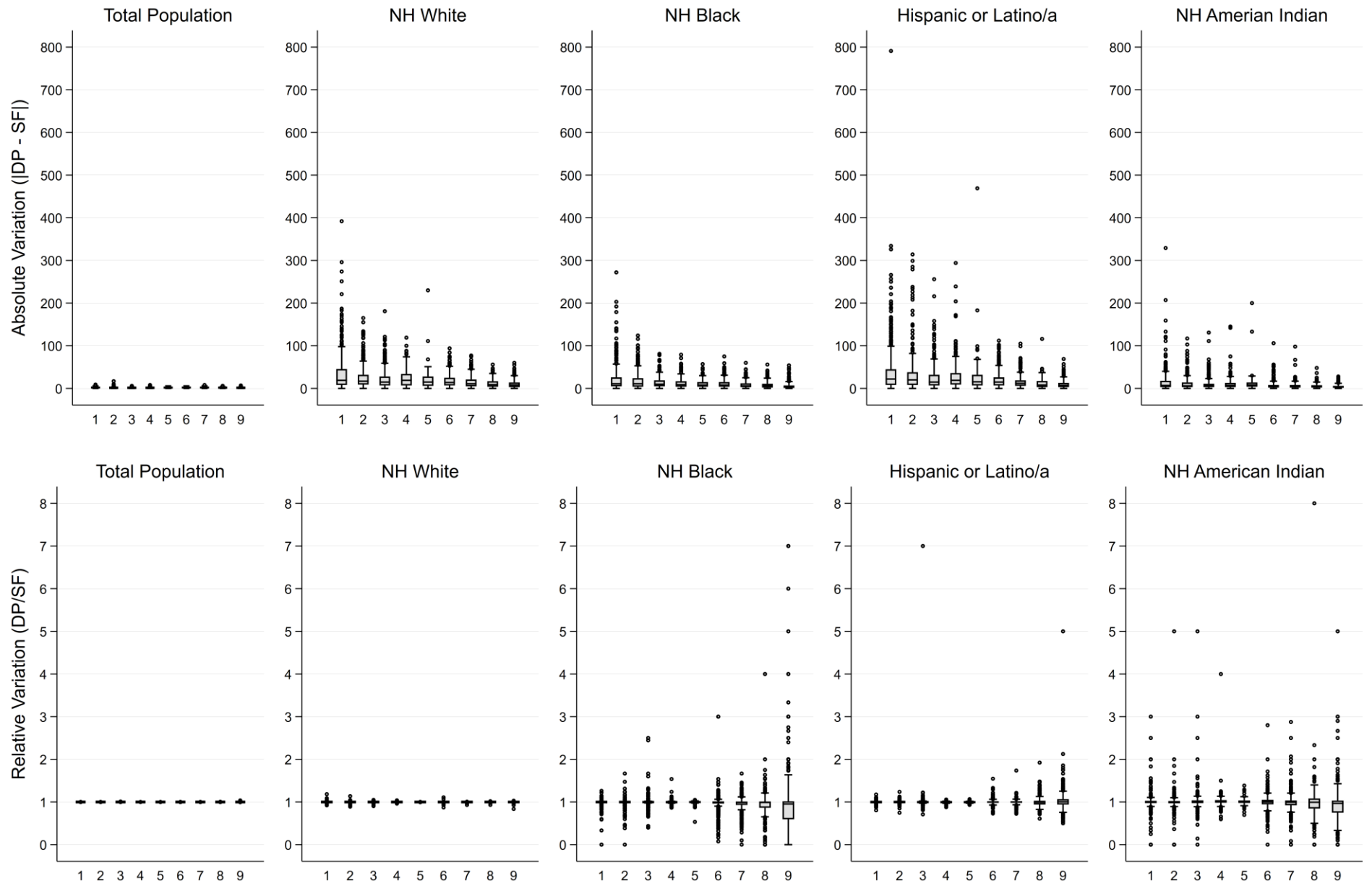
Percent of population in each group across 2013 RUCC Categories as reported by the 2010 SF-1.

A Note on Race and Ethnicity

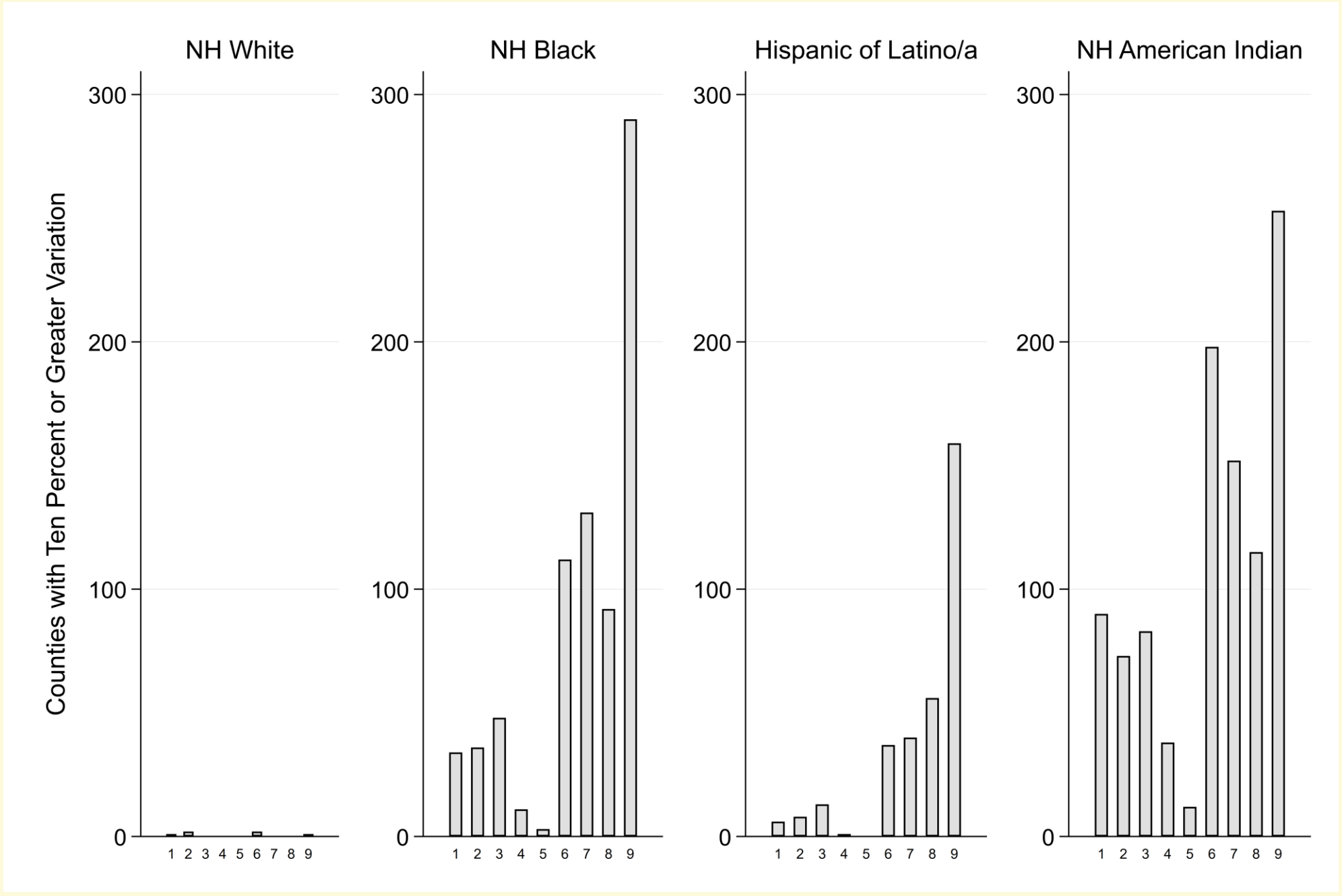
- Non-white populations are highly concentrated in specific areas throughout the United States

- Even in the most rural counties (RUCC=9), there are still counties with…
  - 72% NH Black
  - 92% Hispanic or Latino/a
  - 94% NH American Indian

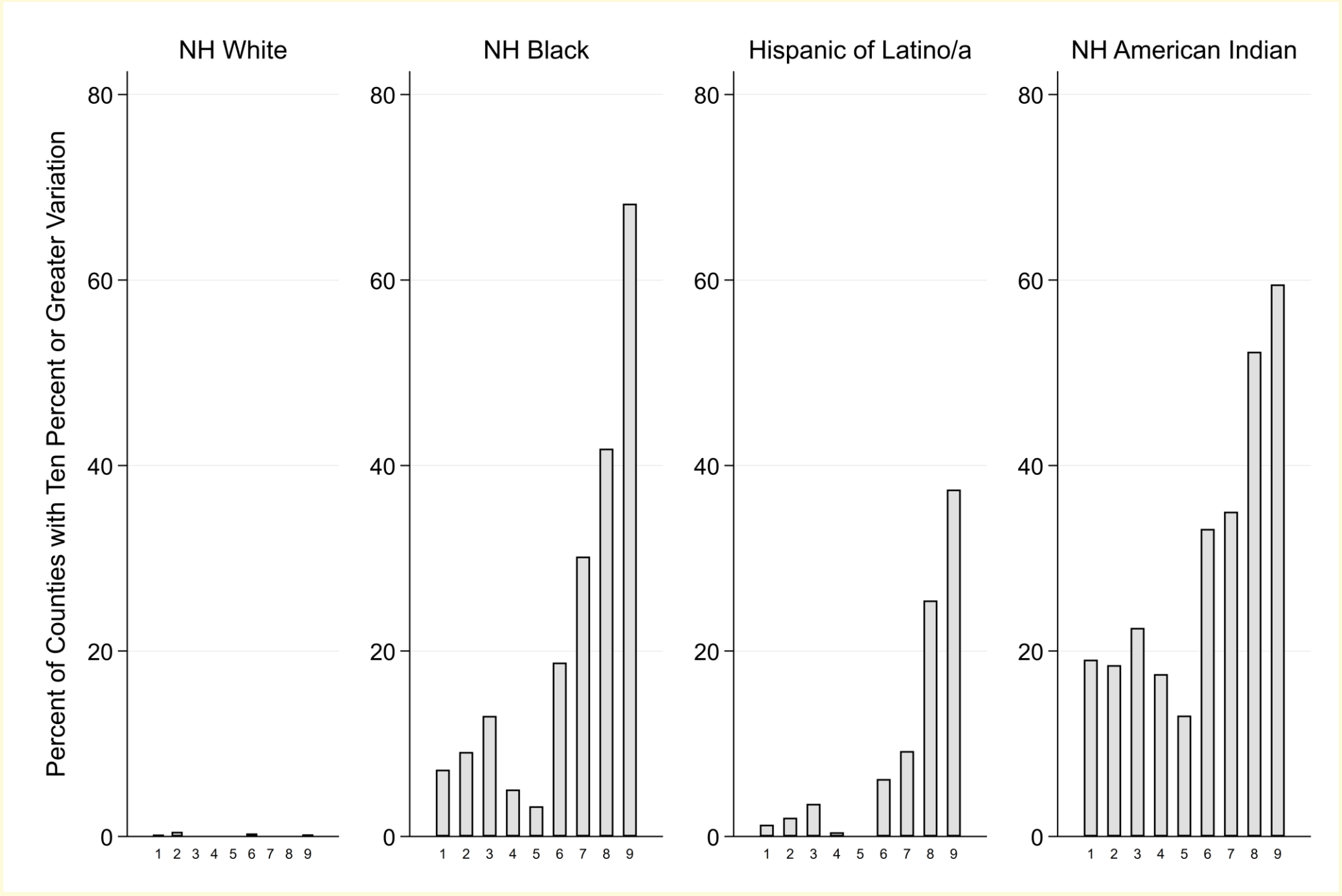
- Thus, the discrepancies I am about to show would impact many people and communities across rural America, many of whom are in difficult situations already



Absolute and relative differences in county-level population counts between 2010 DHC demonstration and SF-1 data across 2013 RUCC Categories



Number of counties in each 2013 RUCC group with a discrepancy between population counts in 2010 DHC and SF-1 greater than 10%



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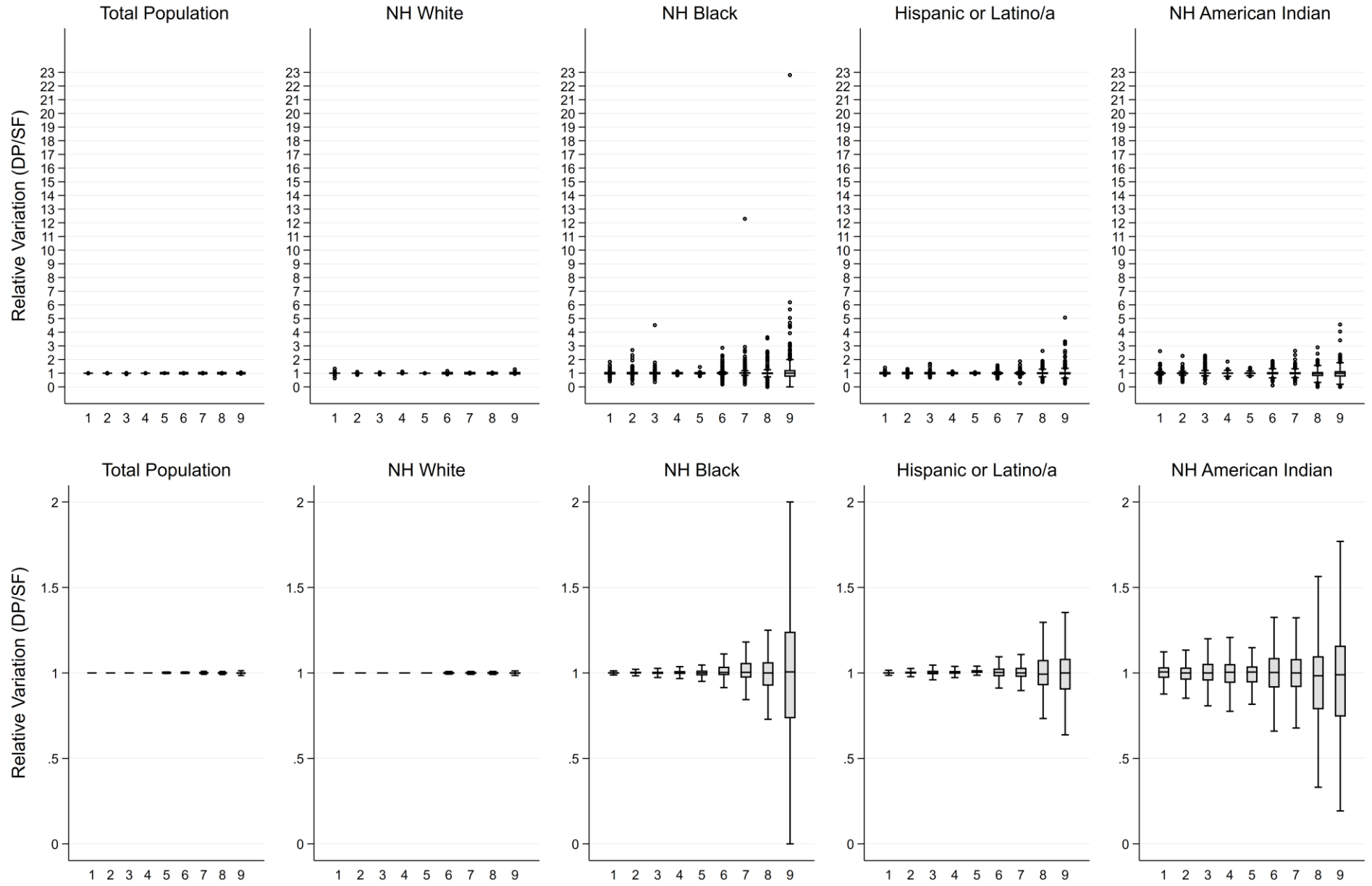
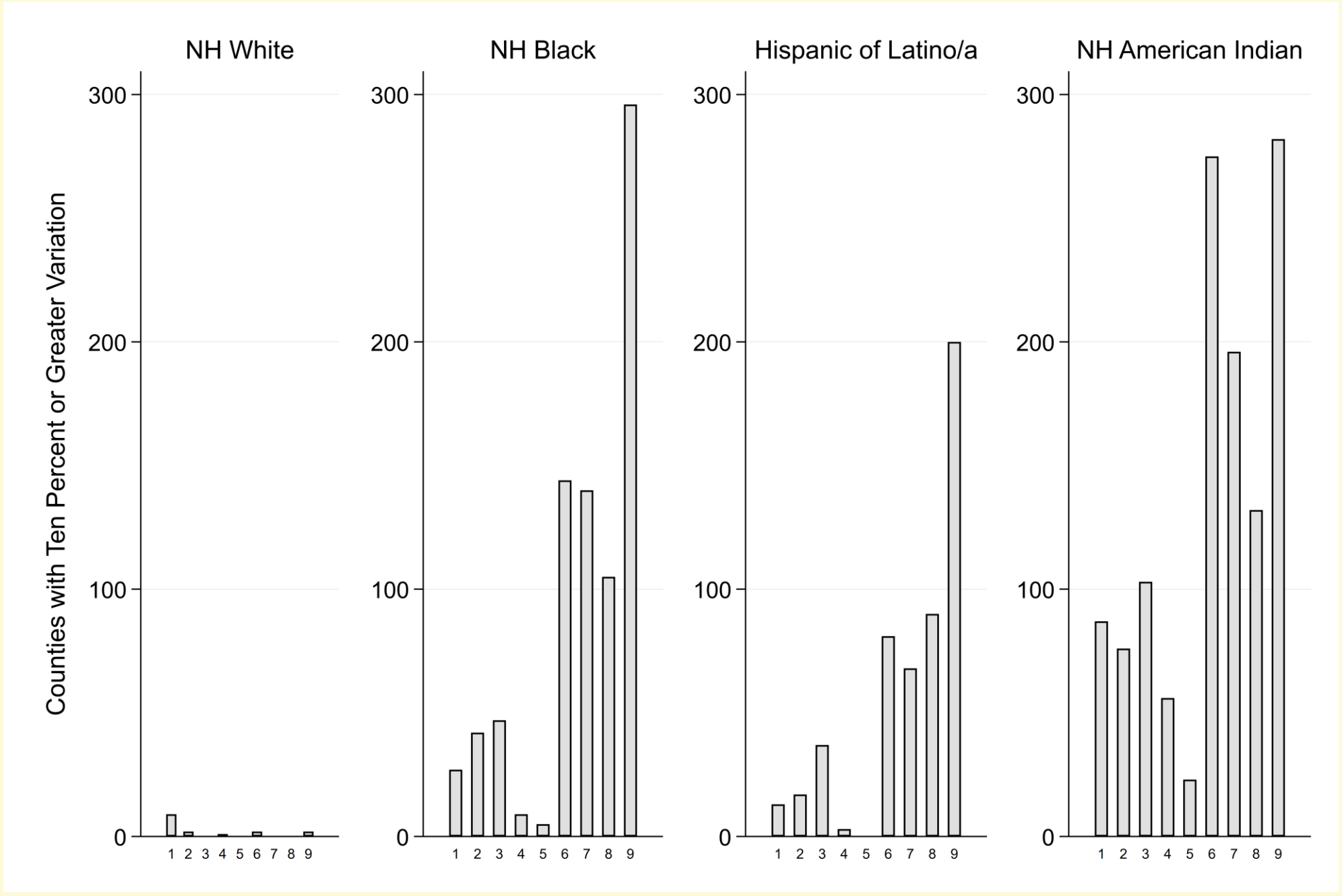


Absolute and relative differences in county-level median age between 2010 DHC demonstration and SF-1 data across 2013 RUCC Categories



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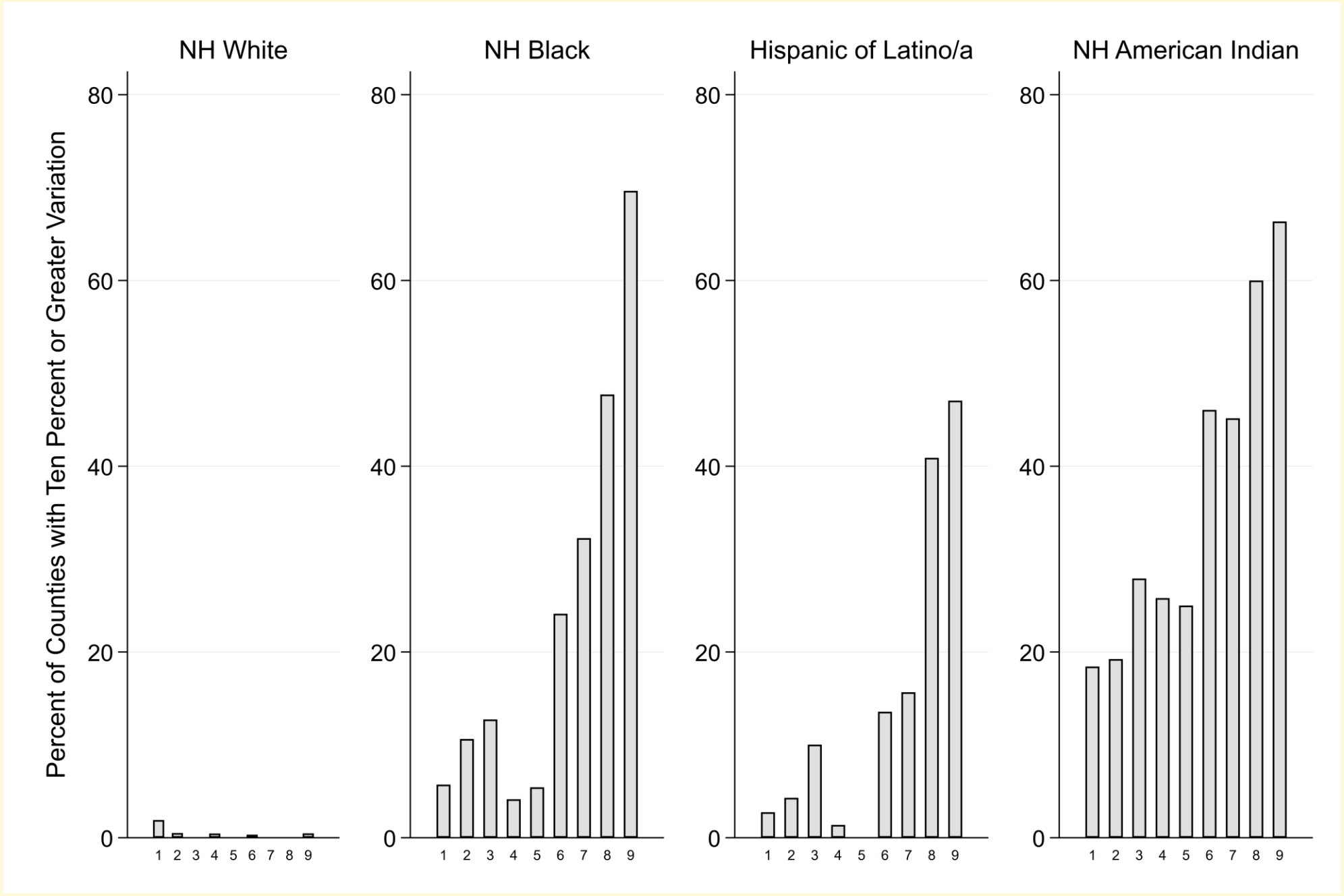

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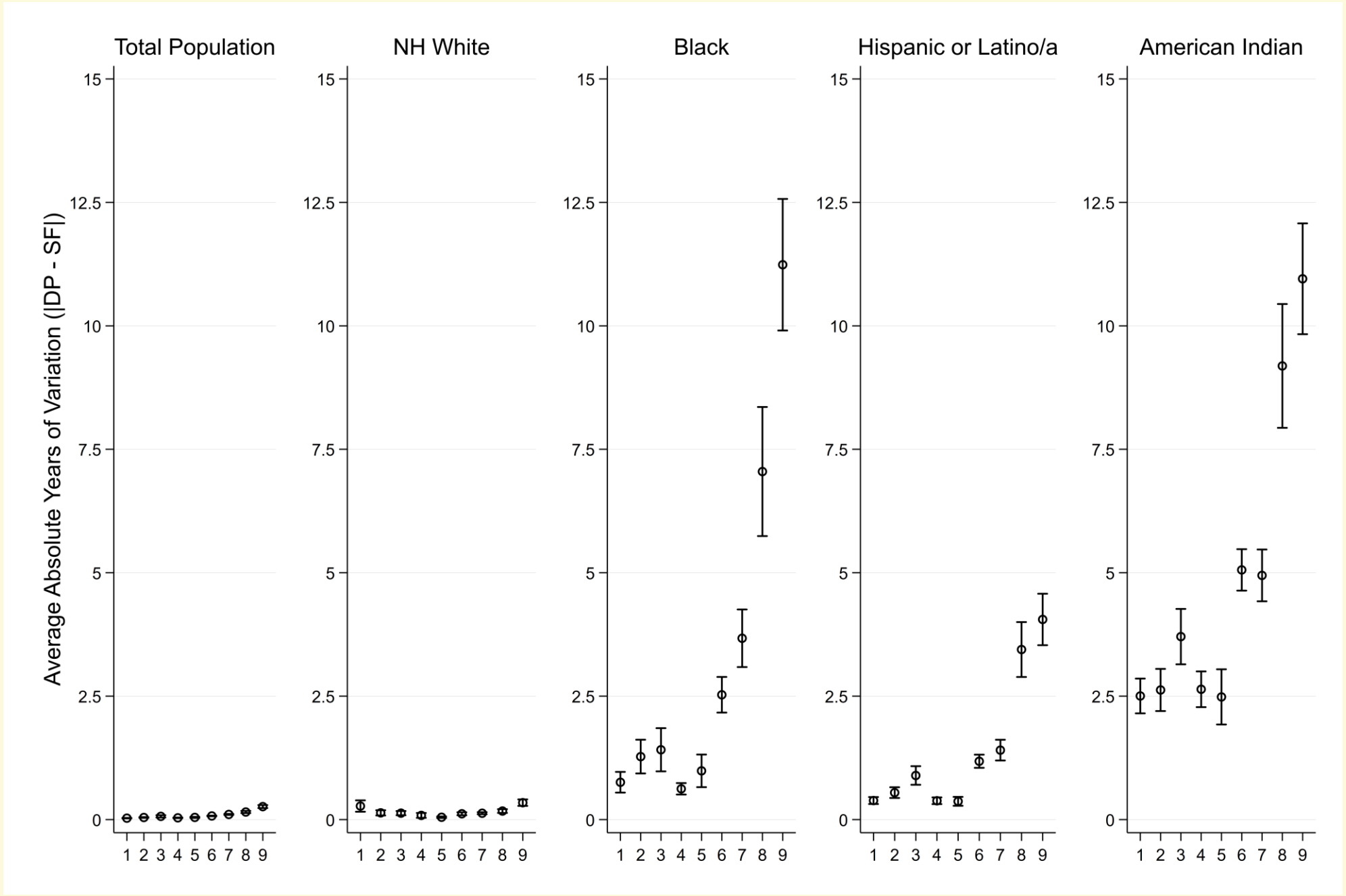

Average county-level discrepancy between median age between 2010 DHC and SF-1 in years by 2013 RUCC

Conclusion

- To be clear, most of the ratio averages remain quite close to 1.0
  - But this isn't really how demographers and other users use this data.
- State demographers rely on these estimates to know specific things about specific rural counties
- Further, population counts are used by agencies and policies to determine aid and other resources
  - These discrepancies will *certainly* impact our upcoming poverty rates
- The discrepancies I illustrate will cause rate estimates to become very inaccurate for many counties

Conclusion

- The issues I have shown will exist for all small-n population groups
  - However, in the US that basically assures that white and urban populations get to have accurate data and non-white and rural populations do not
- The picture is likely even worse for any intersectional subgroups
- I am concerned about the ability of the academic and practitioner communities to do their jobs if this method is used for 2020 data

Conclusion

- It is not clear to the rural demography community how differential privacy makes sense when accuracy for small groups is important
  - This is the difference between big data and large-n data
  - Prior methods seemingly did a much better job of preserving headcount totals
- Small groups and places have just as much of a right to accuracy and representation as the large groups and places
- I know many have concerns about reidentification, but if our 2020 data is released with these discrepancies, I am not sure I will be able to use it or recommend others use it.
  - Sadly, we don't have an alternative source of data for rural areas in the United States

Thank you

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