Mortality Among Persons Who Self-Identify as American Indian or Alaska Native

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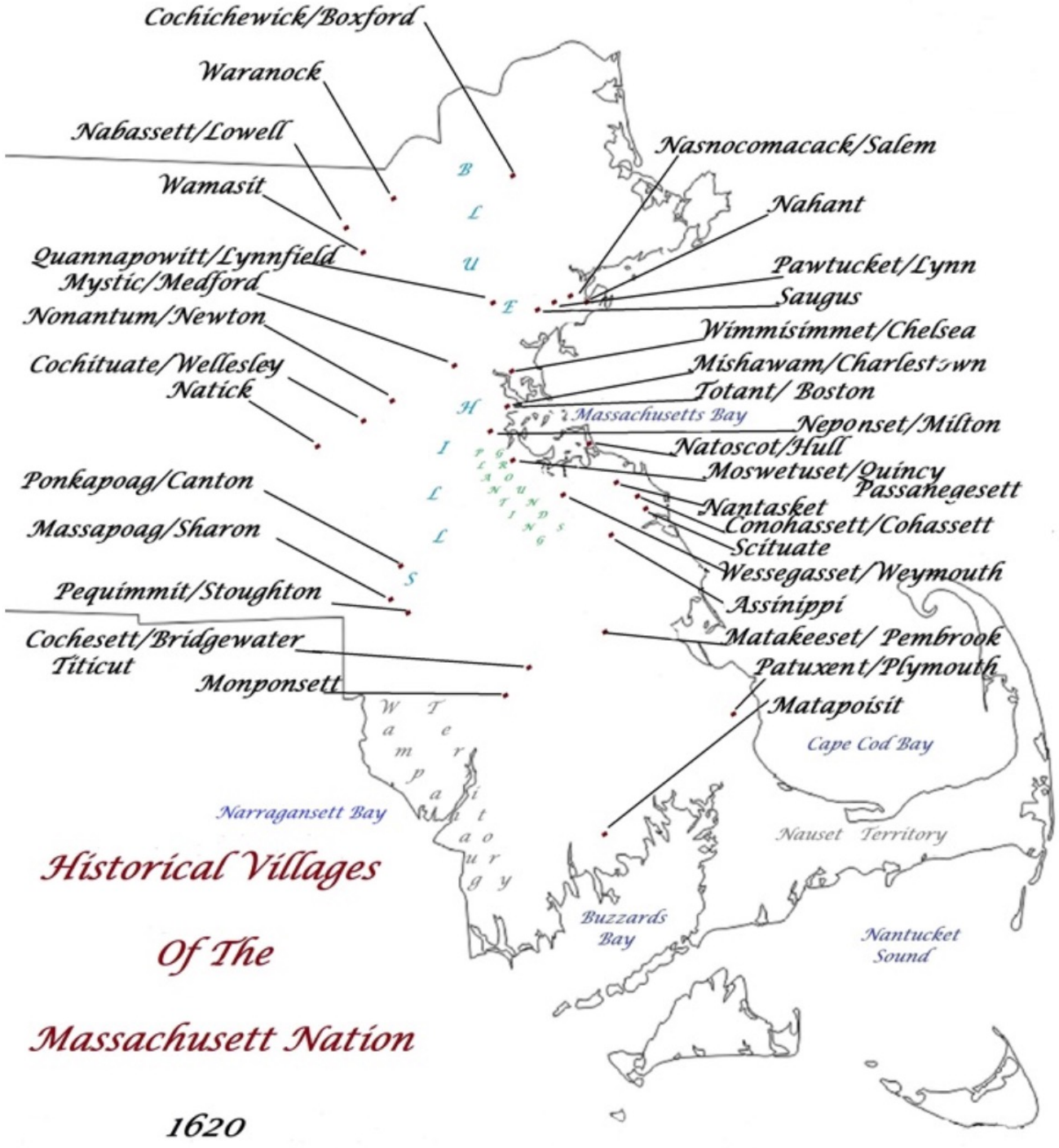
NBER Racial and Ethnic Health Disparities Workshop

April 28, 2023

We acknowledge support from the Commonwealth Fund.



Land acknowledgement

The Massachusett Tribe at Ponkapoag

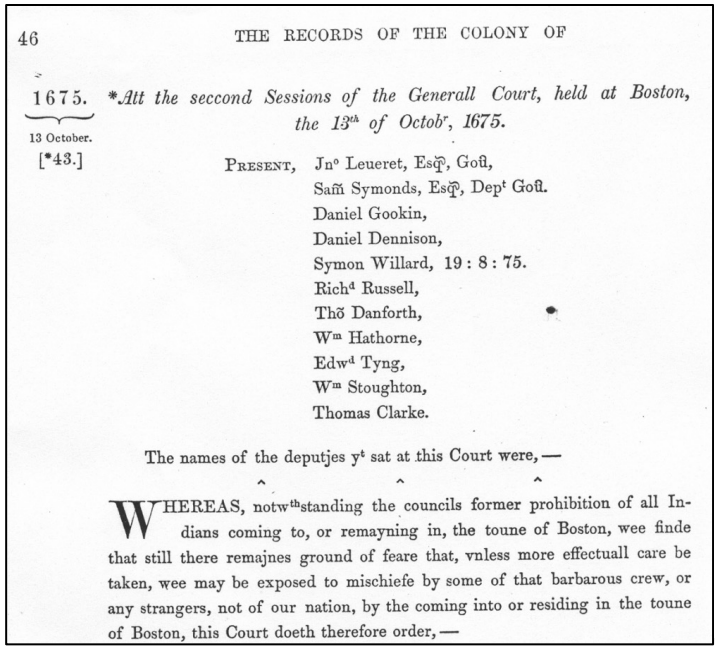
Welcome To Our Tribal Website

http://massachusetttribe.org/our-history

Policy of “erasure” from first contact

Genocide,
displacement,
and forced assimilation.

King Philips War, 1675



46 THE RECORDS OF THE COLONY OF

1675. 13 October. [*43.] *Att the seccond Sessions of the Generall Court, held at Boston, the 13th of Octobr, 1675.*

PRESENT, Jnº Leueret, Esq, Gou, Samˢ Symonds, Esq, Dep^t Gou. Daniel Gookin, Daniel Dennison, Symon Willard, 19 : 8 : 75. Rich^d Russell, Thõ Danforth, W^m Hathorne, Edw^d Tyng, W^m Stoughton, Thomas Clarke.

The names of the deputjes y^t sat at this Court were, —

WHEREAS, notw^thstanding the councils former prohibition of all Indians coming to, or remayning in, the toune of Boston, wee finde that still there remajnes ground of feare that, vnless more effectuall care be taken, wee may be exposed to mischiefe by some of that barbarous crew, or any strangers, not of our nation, by the coming into or residing in the toune of Boston, this Court doeth therefore order, —

“Indian Imprisonment Act of 1675”

https://www.mass.gov/doc/1675-law-barring-indians-from-boston/download

Banned in Boston: American Indians, but Only for 329 Years

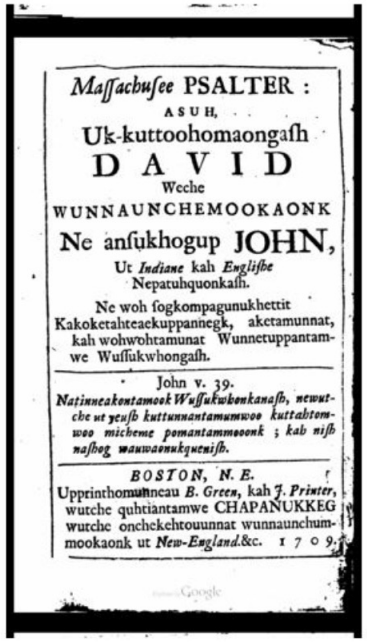
By Katie Zezima
Nov. 25, 2004

The New York Times

BOSTON, Nov. 24 - It is a prejudicial, archaic concept that prohibited Native Americans from entering a city for fear members of their "barbarous crew" would cause residents to be "exposed to mischief."

But it is more than notions and phrases in Boston. A ban on Indians entering Boston has been the law since 1675.

Mayor Thomas M. Menino took a step toward repealing the ban on Wednesday, filing a home rule petition. Mr. Menino said a repeal would remove the last vestiges of discrimination from a vibrant, diverse city that is looking past old racial conflicts.

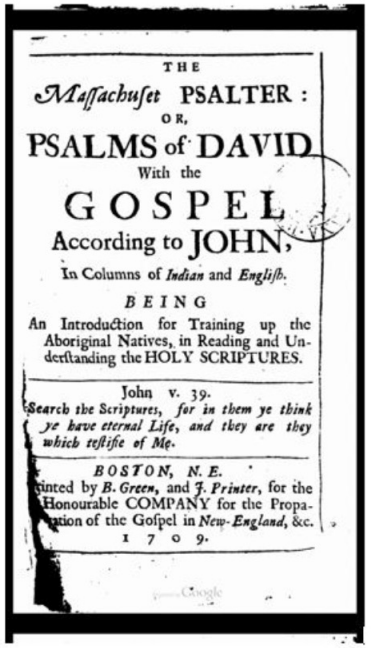


Massachusee PSALTER :
ASUH,
Uk-kuttoohomaongash
DAVID
Weche
WUNNAUNCHEMOOKAONK
Ne anſukhogup JOHN,
Ut *Indiane* kah *Engliſhe*
Nepatuhquonkaſh.

Ne woh ſogkompagunukhettit Kakoketahteackuppannegk, aketamunnat, kah wohwohtamunat Wunnetuppantamwe Wuſſukwhongaſh.

John v. 39.
Natinneakentamook Wuſſukwhonkanaſh, newutche ut yeuſh kuttunnantamumwoo kuttahtomwoo micheme pomantammoonk ; kah niſh naſhog wauwaonukqueniſh.

BOSTON, N. E.
Upprinthomuhneau *B. Green*, kah *J. Printer*, wutche quhtiantamwe CHAPANUKKEG wutche onchekehtouunnat wunnaunchummookaonk ut *New-England*.&c. 1709.



THE
Massachuſet PSALTER :
OR,
PSALMS of DAVID
With the
GOSPEL
According to JOHN,
In Columns of *Indian* and *Engliſh*.

BEING
An Introduction for Training up the Aboriginal Natives, in Reading and Underſtanding the HOLY SCRIPTURES.

John v. 39.
Search the Scriptures, for in them ye think ye have eternal Life, and they are they which teſtifie of Me.

BOSTON, N. E.
Printed by *B. Green*, and *J. Printer*, for the Honourable COMPANY for the Propagation of the Goſpel in *New-England*, &c.
1709.

Rev. John Elliot’s Massachusett Bible, 1709

http://massachusetttribe.org/our-history

Native American health suffers “invisibility paradox”

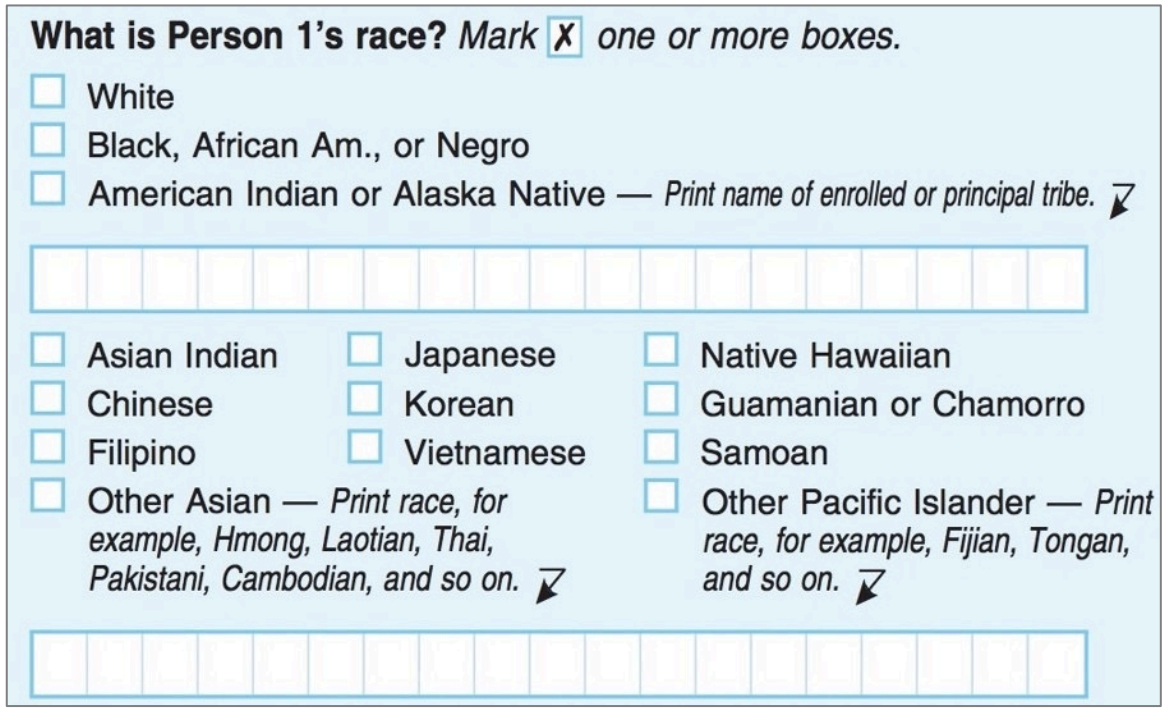
U.S. Policy of “Erasure” has had profound negative implications on:

- Population health past and present
- But also: data needed to assess patterns in population health
  - Often omitted from reports on health disparities due to small #s
  - Systematic underreporting of “American Indian/Alaska Native” in both Census population counts (denominators) and on death certificates (numerators)

Agenda

1) What is known: underreporting in life and in death
2) What we do: longitudinal analysis of survival in Mortality Disparities in American Communities (MDAC) study, by self-reported race/ethnicity
3) What we find: ratio of AIAN to total U.S. mortality is under-estimated by about 50%

U.S. Census has counted American Indians since 1890



What is Person 1's race? *Mark ✗ one or more boxes.*

- ☐ White
- ☐ Black, African Am., or Negro
- ☐ American Indian or Alaska Native — *Print name of enrolled or principal tribe.*

- ☐ Asian Indian
- ☐ Chinese
- ☐ Filipino
- ☐ Japanese
- ☐ Korean
- ☐ Vietnamese
- ☐ Other Asian — *Print race, for example, Hmong, Laotian, Thai, Pakistani, Cambodian, and so on.*
- ☐ Native Hawaiian
- ☐ Guamanian or Chamorro
- ☐ Samoan
- ☐ Other Pacific Islander — *Print race, for example, Fijian, Tongan, and so on.*

2010 Census Form

What does it mean to be "American Indian or Alaska Native"?

- "Not a racial identity but a political one"
- "despite tremendous diversity across nations, shared experiences of genocide, dispossession, removal, forced assimilation, structural racism"

-Yellow Horse et al. 2022

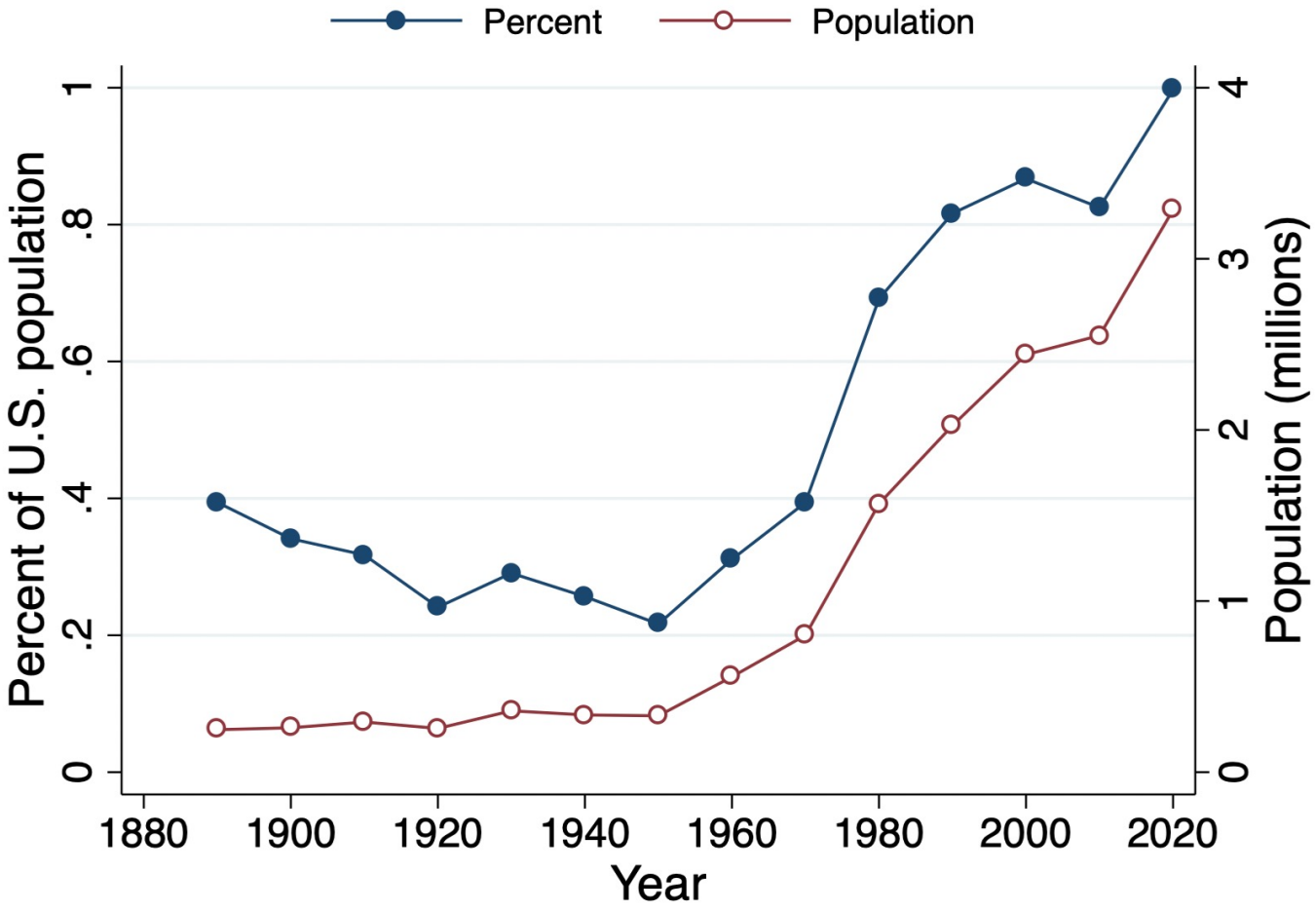
Structural Inequalities Established the Architecture for COVID-19 Pandemic Among Native Americans in Arizona: a Geographically Weighted Regression Perspective

Aggie J. Yellow Horse[1] · Tse-Chuan Yang[2] · Kimberly R. Huyser[3]

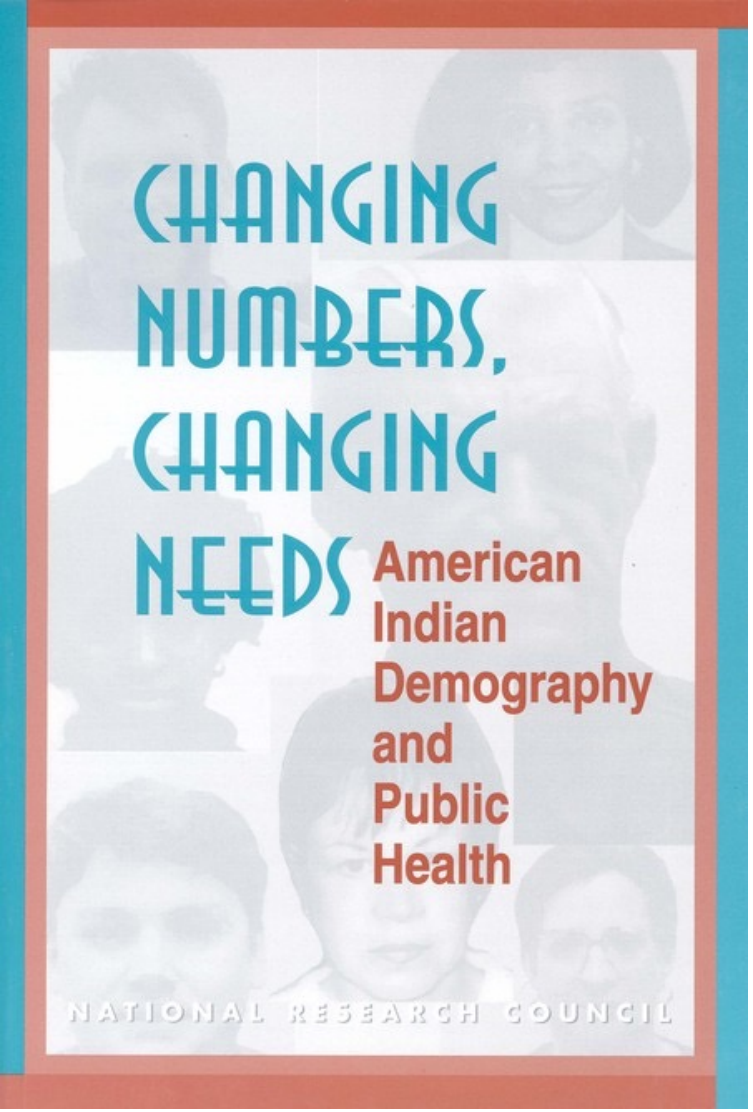
Journal of Racial and Ethnic Health Disparities

AIAN are a fast-growing share of the U.S. population

- 1890: first Census in which American Indians were enumerated including those residing in Indian reservations or “Indian territory”
- 1890-1950: In decennial Census, AIAN are declining share of U.S. population, consistent with national policy that reduced or forcibly assimilated native populations
- 1960-1990: Large increase in share of U.S. residents identifying as AIAN, coincides with the end of forced assimilation as policy
- 2020: AIAN make up the highest % of the U.S. population at any time in the last century.
- Today, the AIAN population is 10x what it was in 1950. Not just “still here” but “growing”.

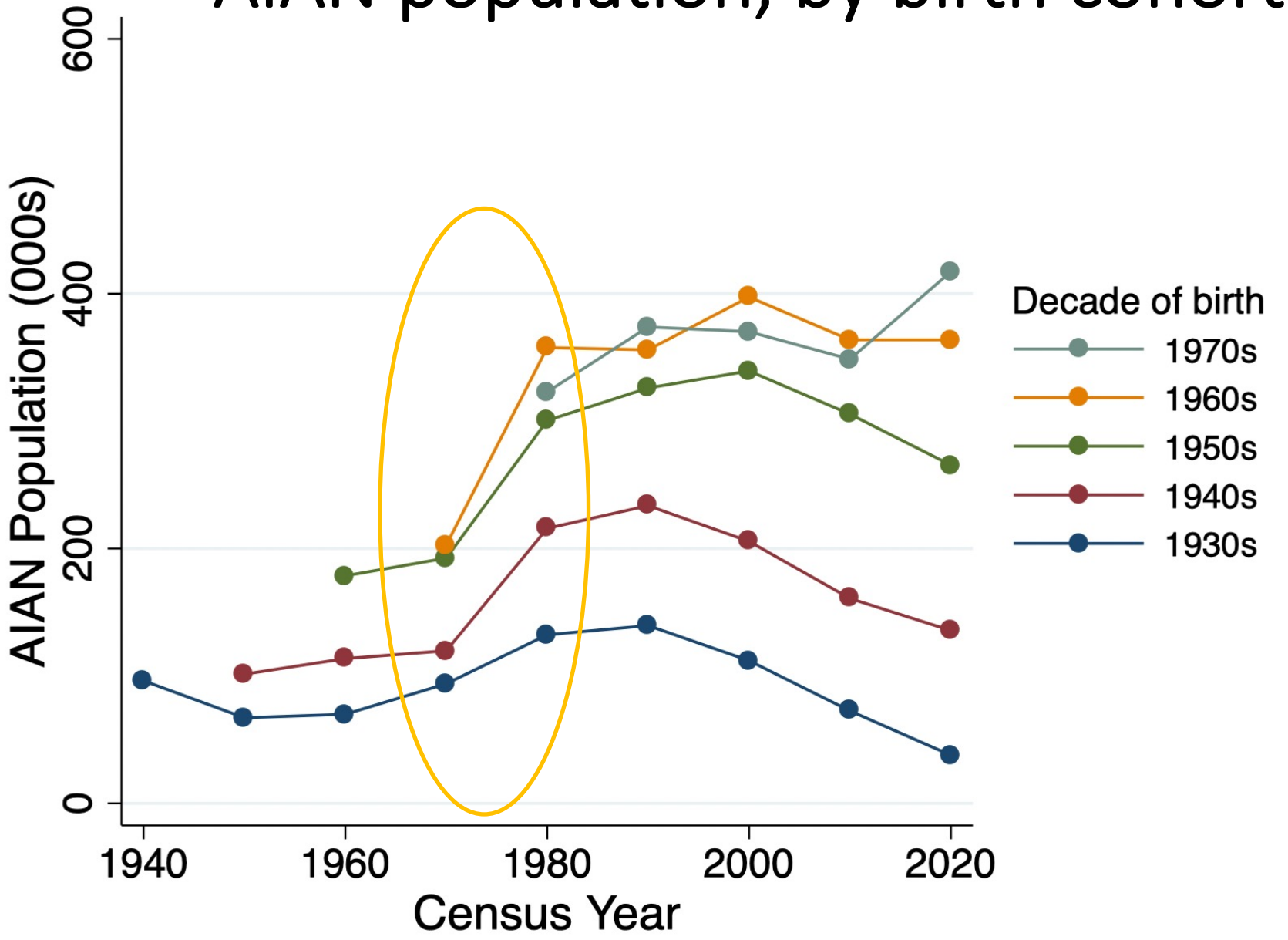


Source: decennial Census data from IPUMS USA



1996 Report,
see Ch. 2 by C. Matthew Snipp

AIAN population, by birth cohort



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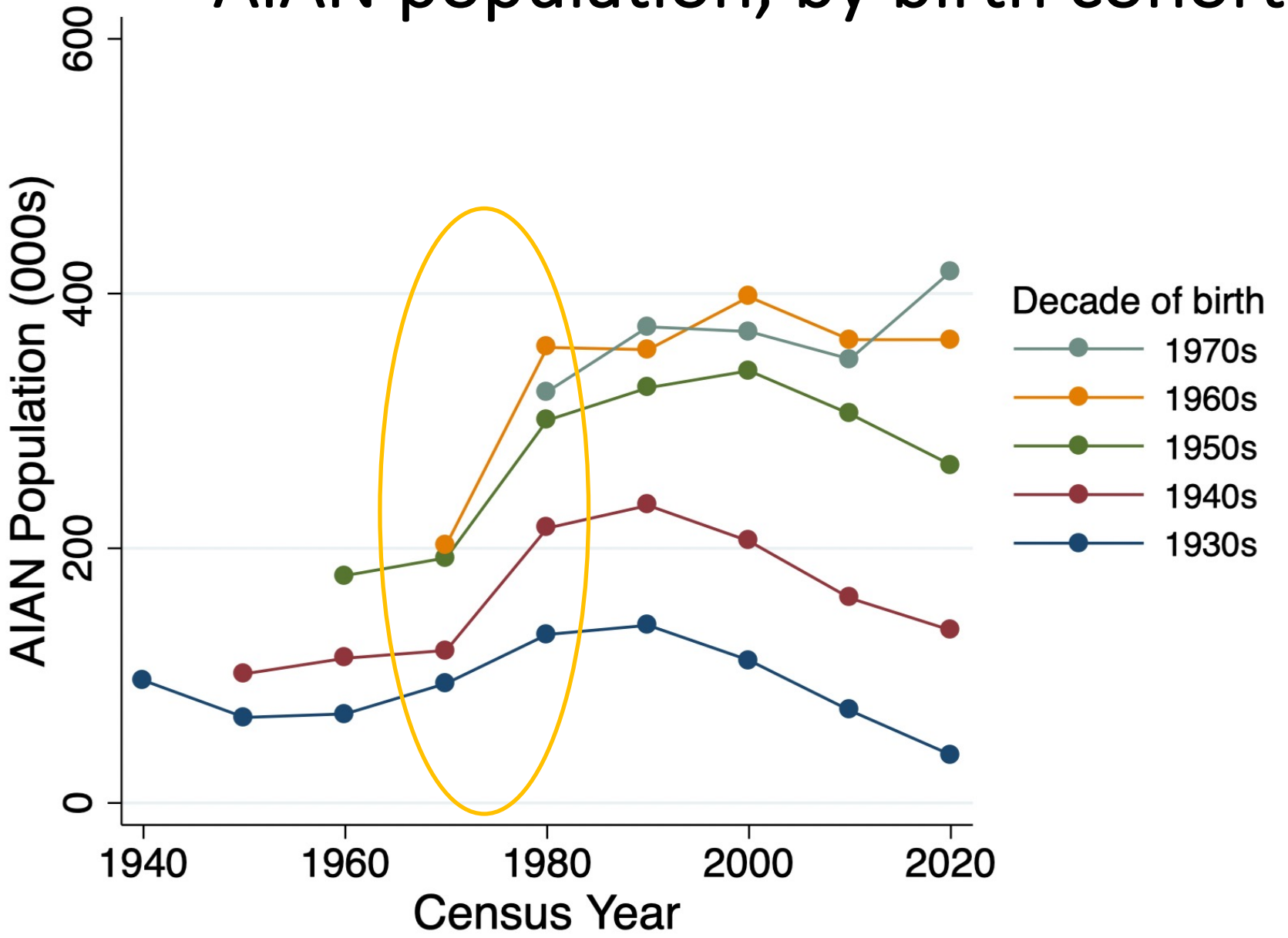
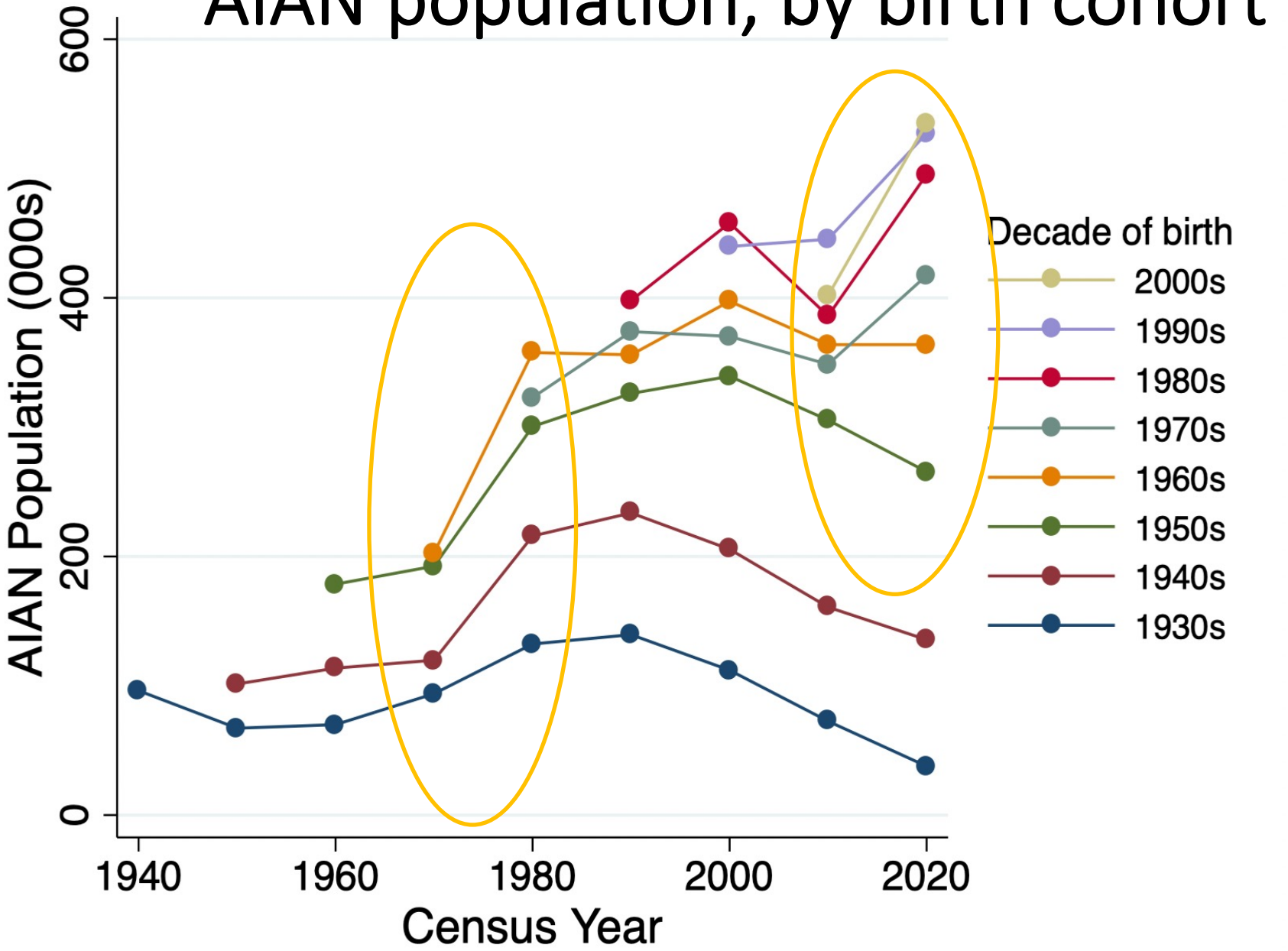
AIAN population, by birth cohort



Source: decennial Census data from IPUMS USA

AIAN population, by birth cohort

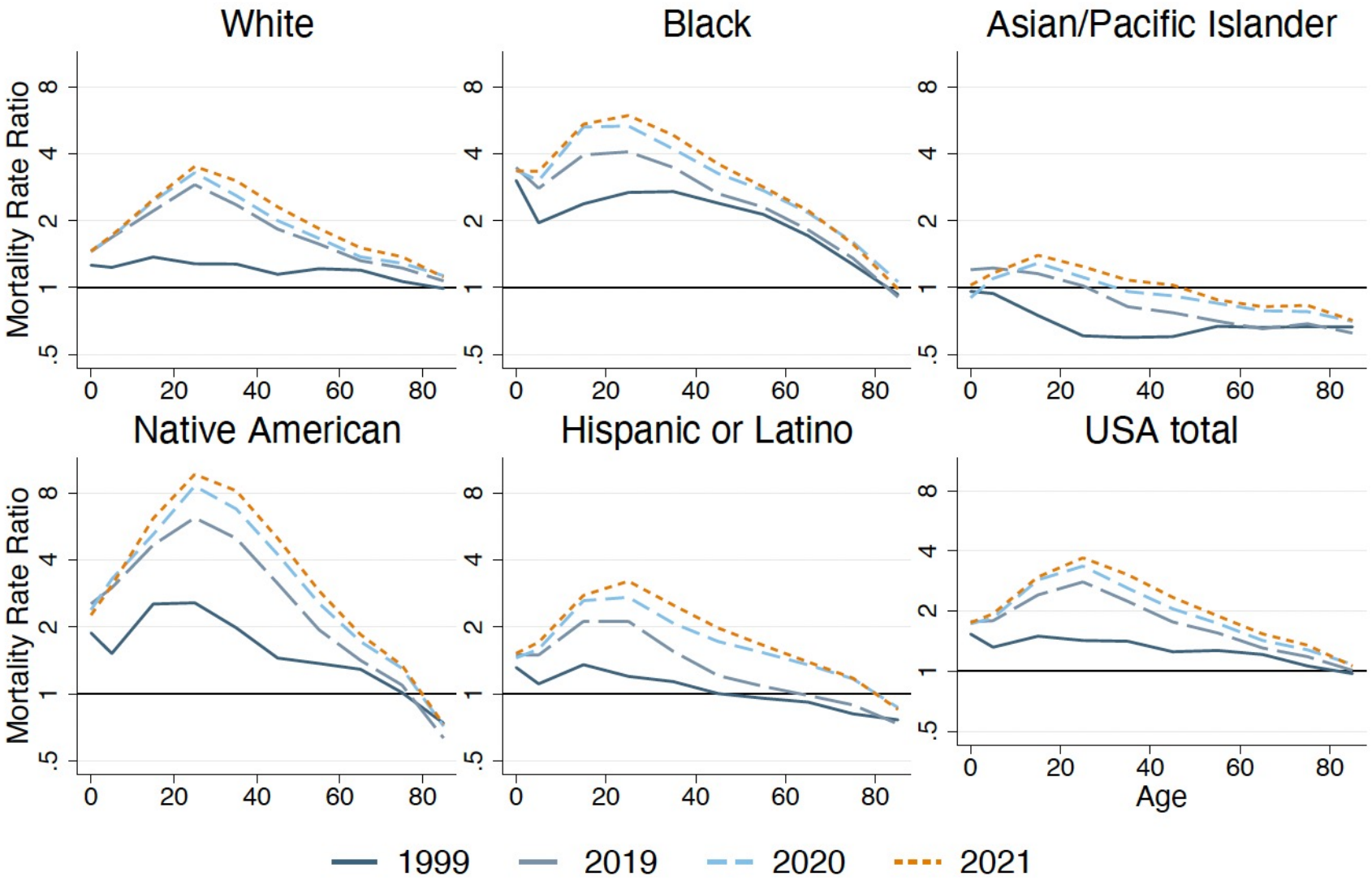
STANDING ROCK SIOUX TRIBE



Source: decennial Census data from IPUMS USA

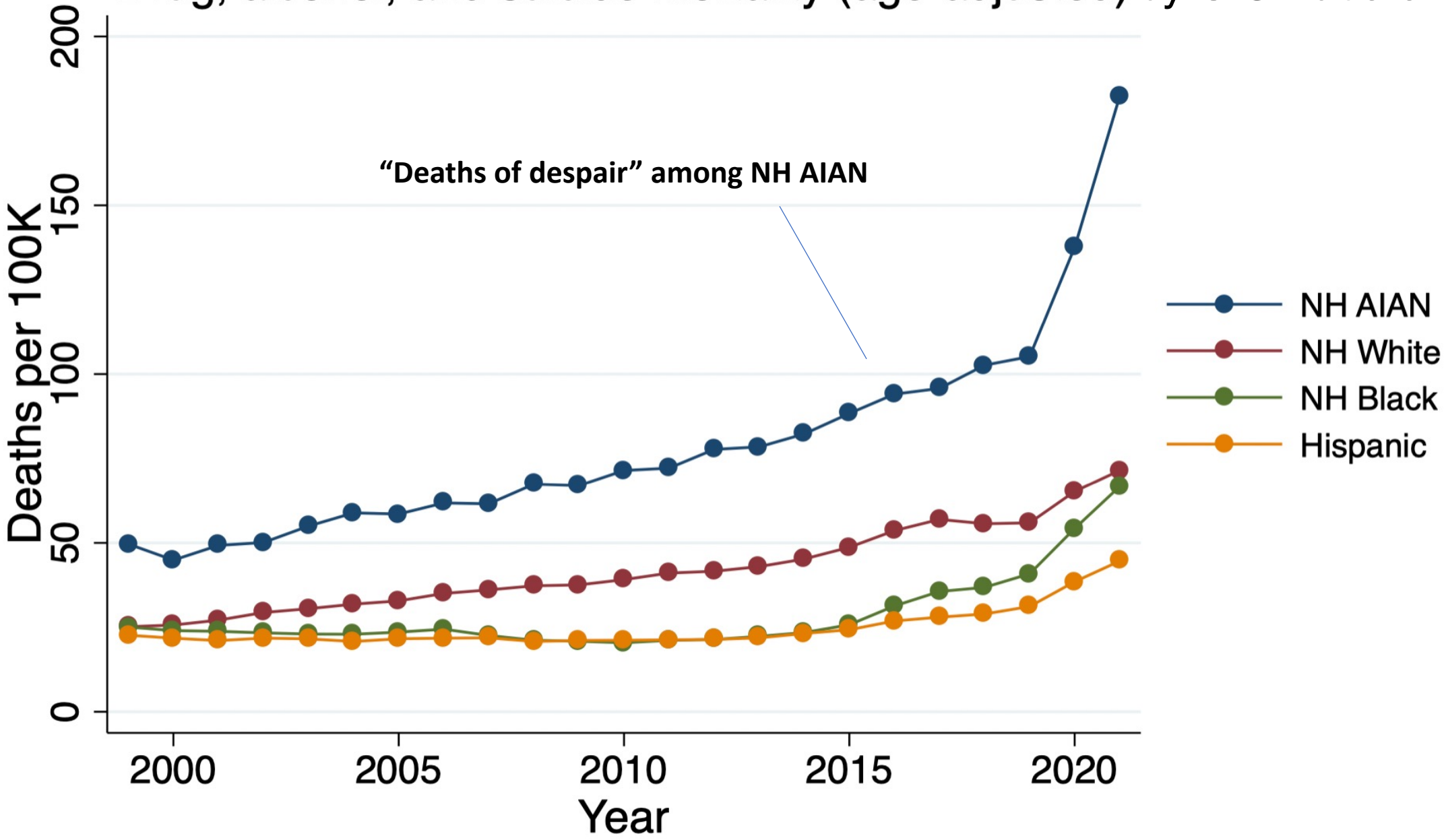
Mortality among non-Hispanic American Indian / Alaska Native U.S. residents

Highest mortality among U.S. racial/ethnic groups

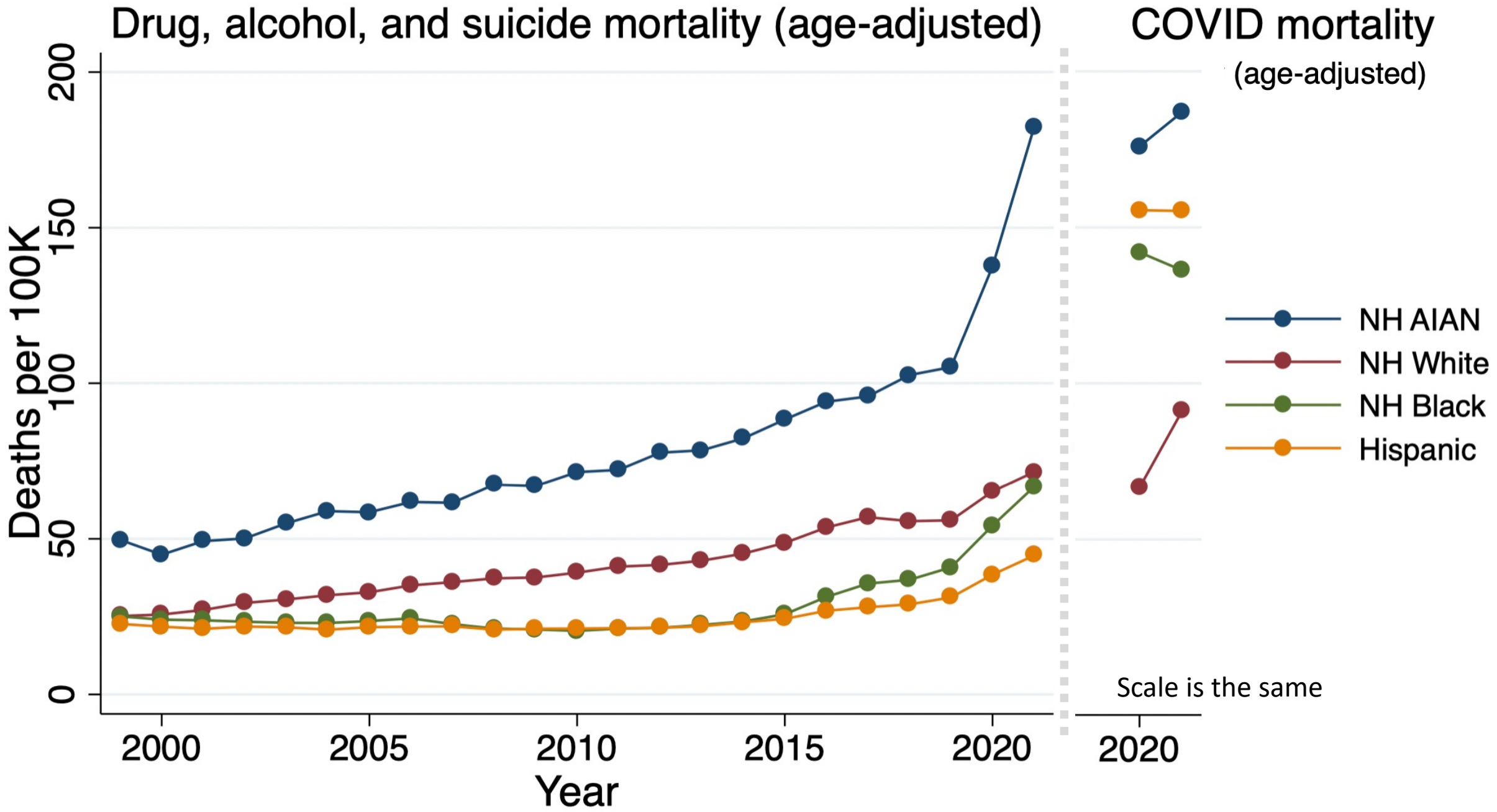


Source: Missing Americans, Bor et al. 2022. Figure compares age-specific mortality rates with those of 18 other wealthy nations.

Drug, alcohol, and suicide mortality (age-adjusted) by U.S. race/ethnicity



Source: Bor et al. analysis of CDC Wonder



Source: Bor et al. analysis of CDC Wonder

Confronting Legacies of Structural Racism and Settler Colonialism to Understand COVID-19 Impacts on the Navajo Nation

Marc A. Emerson, PhD, MPH, and Teresa Montoya, PhD, MA

By Teshia G. Arambula Solomon, Rachel Rose Bobelu Starks, Agnes Attakai, Fatima Molina, Felina Cordova-Marks, Michelle Kahn-John, Chester L. Antone, Miguel Flores Jr., and Francisco Garcia

DOI: 10.1377/hlthaff.2021.01419
HEALTH AFFAIRS 41,
NO. 2 (2022): 281–288

ANALYSIS

The Generational Impact Of Racism On Health: Voices From American Indian Communities

American Indian Reservations and COVID-19: Correlates of Early Infection Rates in the Pandemic

Desi Rodriguez-Lonebear, PhD; Nicolás E. Barceló, MD; Randall Akee, PhD; Stephanie Russo Carroll, DrPH, MPH

Structural Inequalities Established the Architecture for COVID-19 Pandemic Among Native Americans in Arizona: a Geographically Weighted Regression Perspective

Aggie J. Yellow Horse[1] · Tse-Chuan Yang[2] · Kimberly R. Huyser[3]

The “Uncounted”: these mortality disparities are significantly underestimated due to misclassification of AIAN “race” on death certificates

Counted in life, but not in death

Study	Share of AIAN deaths with race misclassified
1960 Census-Death Certificate Matched Study	21%
Natl Longitudinal Mortality Study (1979-2011, CPS-NVSS)	30-45%
AIAN Mortality Database (AMD) (IHS-NVSS, 1990–2009)	20%-82%
2010 Census – 2010/2011 NVSS link	25%

Misclassification on death certificates

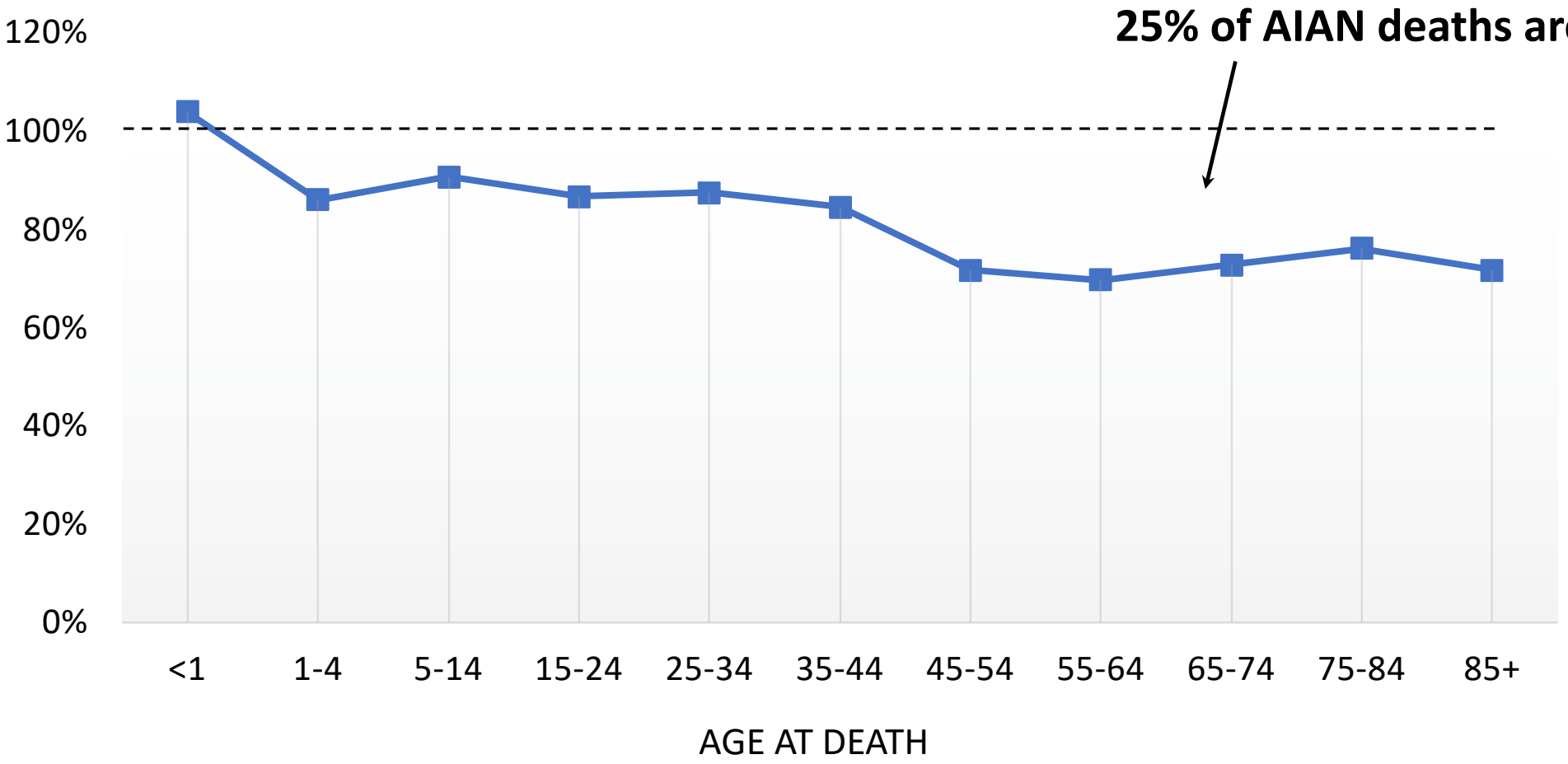
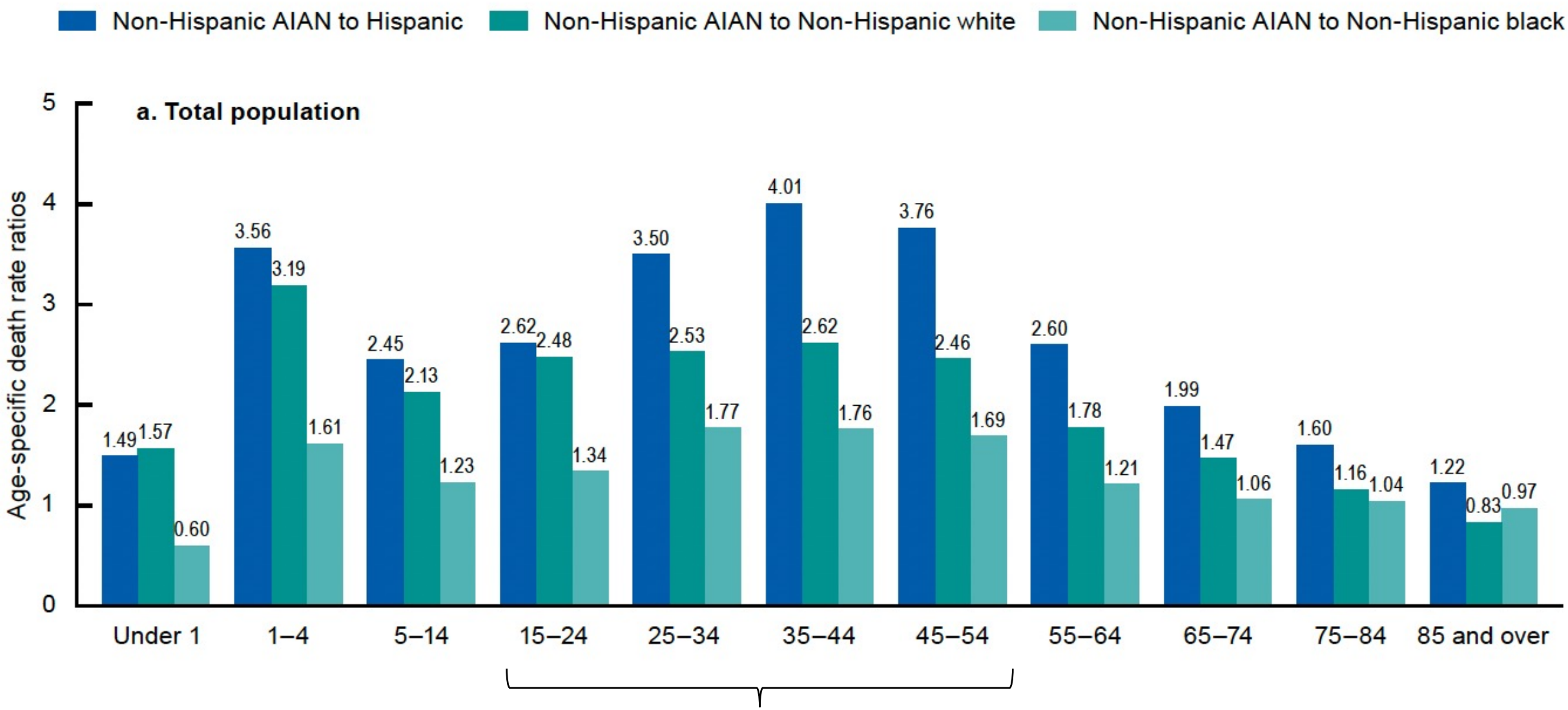


Figure shows the ratio of deaths with AIAN reported on death certificates to deaths with AIAN self-reported in the U.S. Census.

Data are from 34,366 death records matched between 2010 Census and 2010/2011 NVSS. Source: Arias et al. 2021

Age-specific mortality rate ratios

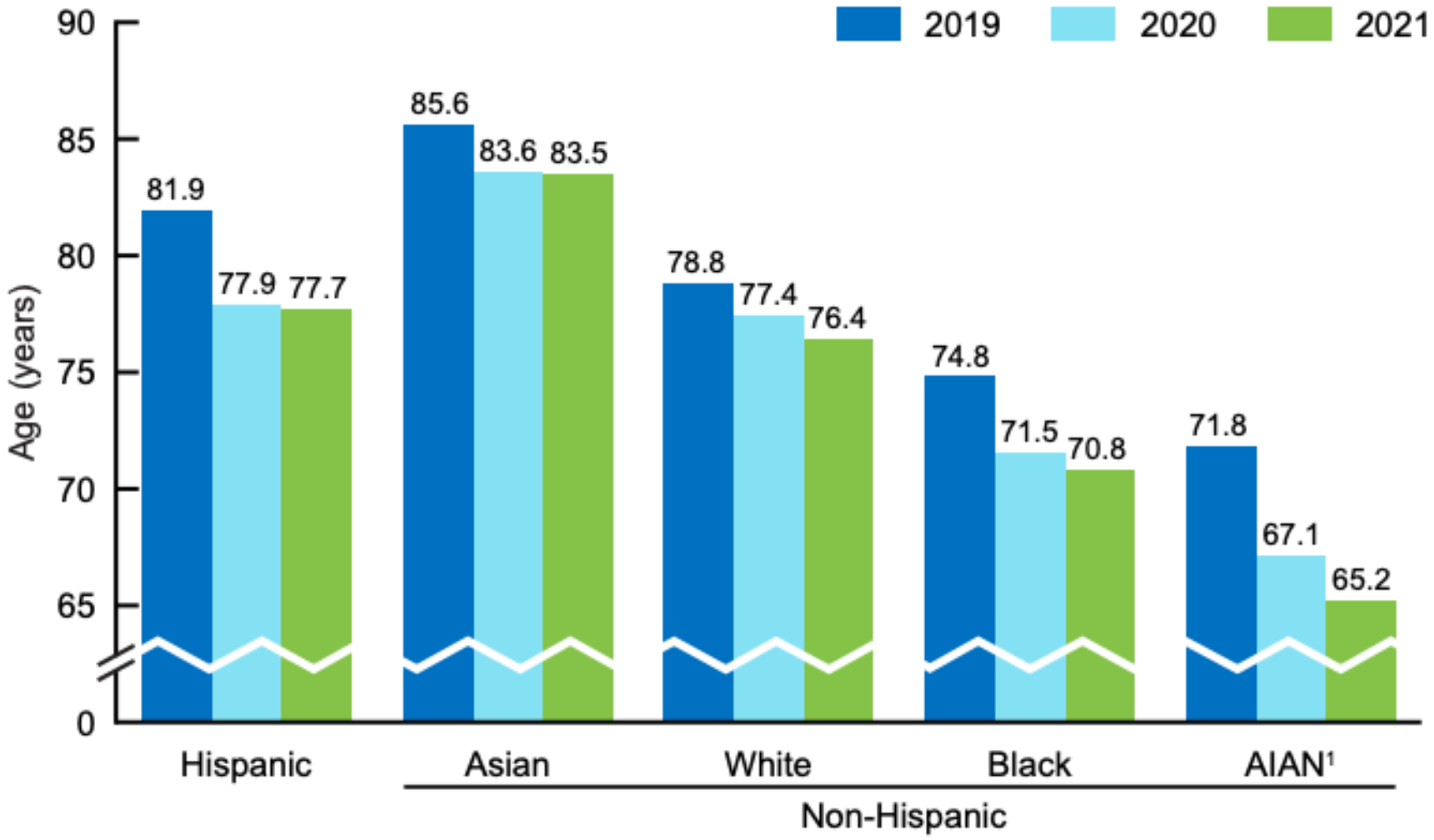
Non-Hispanic AIAN vs. Hispanic, non-Hispanic white, and non-Hispanic black, United States, 2019



MRR (AIAN:White) = 2.5 for ages 15-54

Source: Arias et al. 2021

Life expectancy changes during COVID pandemic



NH AIAN had a **6.6 year decline** in life expectancy, 2019 to 2021

Life expectancy at birth, Arias et al. 2022. https://www.cdc.gov/nchs/data/vsrr/vsrr023.pdf

2. What do we do in this study?

Mortality Disparities in American Communities (MDAC)

- 2008 American Community Survey (nationally-representative 2.5% sample)
- Linked by SSN to vital statistics for 2008 – 2015 (through 2019 coming)
- Self-reported race/ethnicity vs. death certificate race/ethnicity
- Restricted-access data, analyzed in collaboration with Census statistician through “Research Output Direct Access System” (RODAS)
- Results are past through Census Data Review Board (DRB) and exact counts are rounded, small cells suppressed, to protect confidentiality

Mortality Disparities in American Communities (MDAC)

- Enables longitudinal analysis of mortality by self-reported race/ethnicity
- Corrected estimates of life expectancy and other survival parameters
- Role of socioeconomic and geographic characteristics as mediators
- Comparison with conventional estimates from CDC Wonder, combining numerators from death certificates and denominators from Census

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- **Our approach**: deaths / person-time | self-reported AIAN in ACS
- **Conventional**: deaths with AIAN on death certificates / person-time of self-reported AIAN in Census

Data quality: completeness of record linkage

Table S1. Supporting Data for Defining the Study Sample, 2008-2015 follow-up

Parameter	Respondents (N)	Deaths (N)	% died
Non-Hispanic AIAN			
2008 ACS respondents	66,000	4000	6.1%
Not sent to NDI for linkage (failedit ==1)	500	N/A	N/A
Sent to NDI for linkage (failedit ==0), NO Social Security Number	7600	100	1.4%
Sent to NDI for linkage (failedit ==0) with Social Security Number	58,000	3900	6.8%
Immigrated to the U.S. in the prior 5 years	150	- S -	0.0%
All racial and ethnic groups			
2008 ACS respondents	4,510,000	308,000	6.8%
Not sent to NDI for linkage (failedit ==1)	33,000	N/A	N/A
Sent to NDI for linkage (failedit ==0), NO Social Security Number	344,000	4100	1.2%
Sent to NDI for linkage (failedit ==0) with Social Security Number	4,140,000	304,000	7.4%
Immigrated to the U.S. in the prior 5 years	66,500	750	1.1%

We exclude people with no SSN.

We retain immigrants.

Data quality: healthy respondent effect?

Table S2. Age-specific mortality, by year of follow-up (all racial and ethnic groups, 2008-2015)

Parameter	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Deaths per 100K person years							
Under 1 year	111	.	.	.	.	.	.
1-4 years	24	20	.	.	.	.	.
5-14	14	14	13	15	13	13	.
15-24	66	67	62	66	72	62	66
25-34	93	99	102	101	105	97	114
35-44	151	167	167	155	167	158	176
45-54	358	372	377	362	355	361	363
55-64	777	785	790	781	802	776	765
65-74	1857	1846	1853	1785	1778	1756	1738
75-84	4790	4780	4864	4697	4664	4659	4682
85+	14110	13600	13880	13370	13960	13340	13940

Comparing Y1 with later years, little evidence of “healthy respondent” effect.

We do not exclude first year of follow-up.

Data quality: healthy respondent effect?

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35-44	151	167	167	155	167	158	176
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Data quality: does mortality match CDC Wonder data?

Table S3. Age-specific mortality 2008-2015 in MDAC sample vs. CDC WONDER

Deaths per 100K Age group	MDAC (full sample)	MDAC (after exclusions)	CDC WONDER (pooled, 2008-2015)
Under 1 year	99	111	617
1-4 years	18	19	26
5-14	13	14	13
15-24	61	66	68
25-34	94	102	107
35-44	152	163	175
45-54	343	363	409
55-64	742	781	861
65-74	1702	1790	1839
75-84	4469	4714	4726
85+	12,540	13,710	13,750

All races/ethnicities.

Big differences for infants and children.

Meaningful differences for 45-64 year olds.

Otherwise, very similar.

Study sample

Table 1. Description of the Study Sample, by Self-Reported Race and Ethnicity

Parameter	NH AIAN	NH White	NH Black	NH API	Hispanic	US Total
Sample Size (unweighted counts)						
People	58,000	3,072,000	396,000	187,000	424,000	4,136,000
Person-years (based on ACS race)	423,000	22,200,000	2,880,000	1,380,000	3,140,000	30,000,000
Deaths (based on ACS race)	3900	253,000	26,500	7100	13,500	304,000
Deaths/100,000 PY (ACS race)	926	1141	916	519	425	1013

Study sample

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Deaths (based on ACS race)	3900	253,000	26,500	7100	13,500	304,000
Deaths/100,000 PY (ACS race)	926	1141	916	519	425	1013
Respondent Characteristics						
% female	51.2%	50.9%	52.6%	51.4%	49.6%	51.0%
Mean age (years)	33.6	40.2	33.2	34.8	29.3	37.5
% <FPL	20.4%	8.6%	22.3%	8.9%	18.5%	11.8%
% rural	36.3%	29.2%	12.3%	8.2%	9.8%	23.6%
% college	10.8%	22.9%	11.3%	34.2%	8.4%	19.9%
% in “AIAN area”	24.3%	1.6%	1.8%	0.7%	0.8%	1.8%

3. What do we find?

Differences in racial classification

Table 2. Classification of race and ethnicity in death certificates, by self-reported race and ethnicity

	% of deaths assigned to each racial / ethnic group on death certificate					Total # of deaths
ACS Race/ethnicity	**NH AIAN**	**NH White**	**NH Black**	**NH API**	**Hispanic**	**Total**
ACS NH AIAN	*40.5%*	*51.3%*	*6.7%*	*0.3%*	*1.1%*	*3,900*
ACS NH White	0.1%	99.5%	0.2%	0.0%	0.3%	*253,000*
ACS NH Black	0.1%	2.1%	97.3%	0.1%	0.3%	26,500
ACS NH API	0.1%	5.9%	0.6%	92.7%	0.7%	7,100
ACS Hispanic	0.3%	11.6%	1.0%	0.3%	86.8%	13,500

Note: Table shows data on 304,000 deaths observed in the MDAC study sample. This includes all linked deaths for all 2008 ACS respondents with sufficient information to be sent to NDI for linkage (failedit==0) and who had a social security number.

A majority of AIAN deaths are misclassified on the death certificate.

Using death certificate AIAN results in a 48.5% undercount of AIAN mortality.

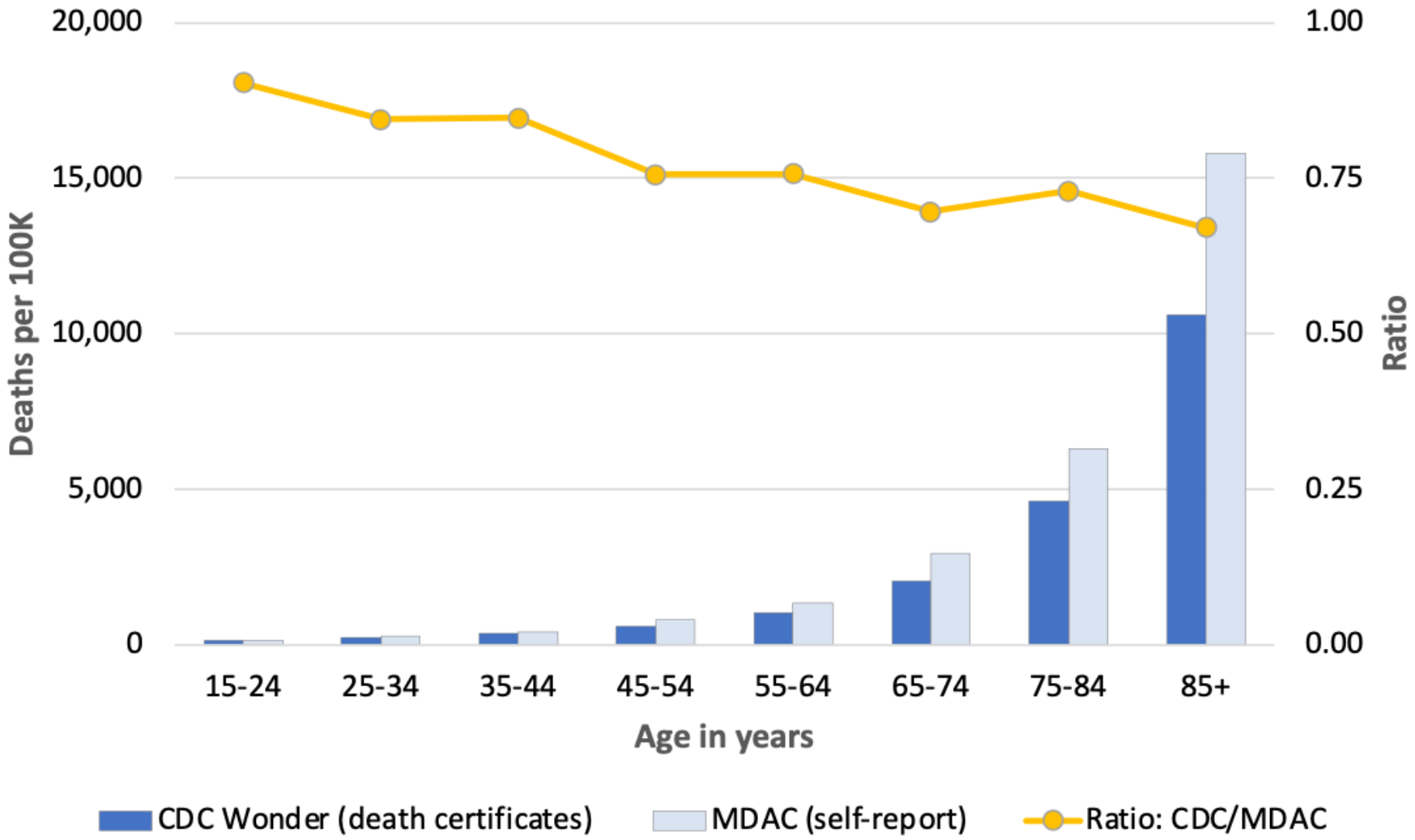
Impact of racial misclassification on mortality

Table 3. Age-specific mortality rates for non-Hispanic AIAN (alone or in combination) during 8-year follow-up

		Race/ethnicity from death certificates		Race/ethnicity from ACS self-report		Bias due to misclassification of race/ethnicity in death certificates	
Age	(A) Person-Years	(B) Deaths	(C) Rate	(D) Deaths	(E) Rate	Ratio (C / E)	Difference (C – E)
Under 1y	400	- S -	- S -	- S -	- S -	- S -	- S -
1-4 years	10000	- S -	- S -	- S -	- S -	- S -	- S -
5-14	62500	- S -	- S -	- S -	- S -	- S -	- S -
15-24	72500	70	89.5	90	125	0.714	(-35.8)
25-34	53500	90	161	150	236	0.683	(-74.8)
35-44	52500	100	208	200	367	0.568	(-159)
45-54	63500	200	329	450	675	0.488	(-345)
55-64	56500	300	548	650	1150	0.478	(-599)
65-74	32500	400	1180	900	2720	0.433	(-1540)
75-84	14500	400	2910	850	5970	0.487	(-3060)
85+	4700	300	6580	650	14400	0.458	(-7780)

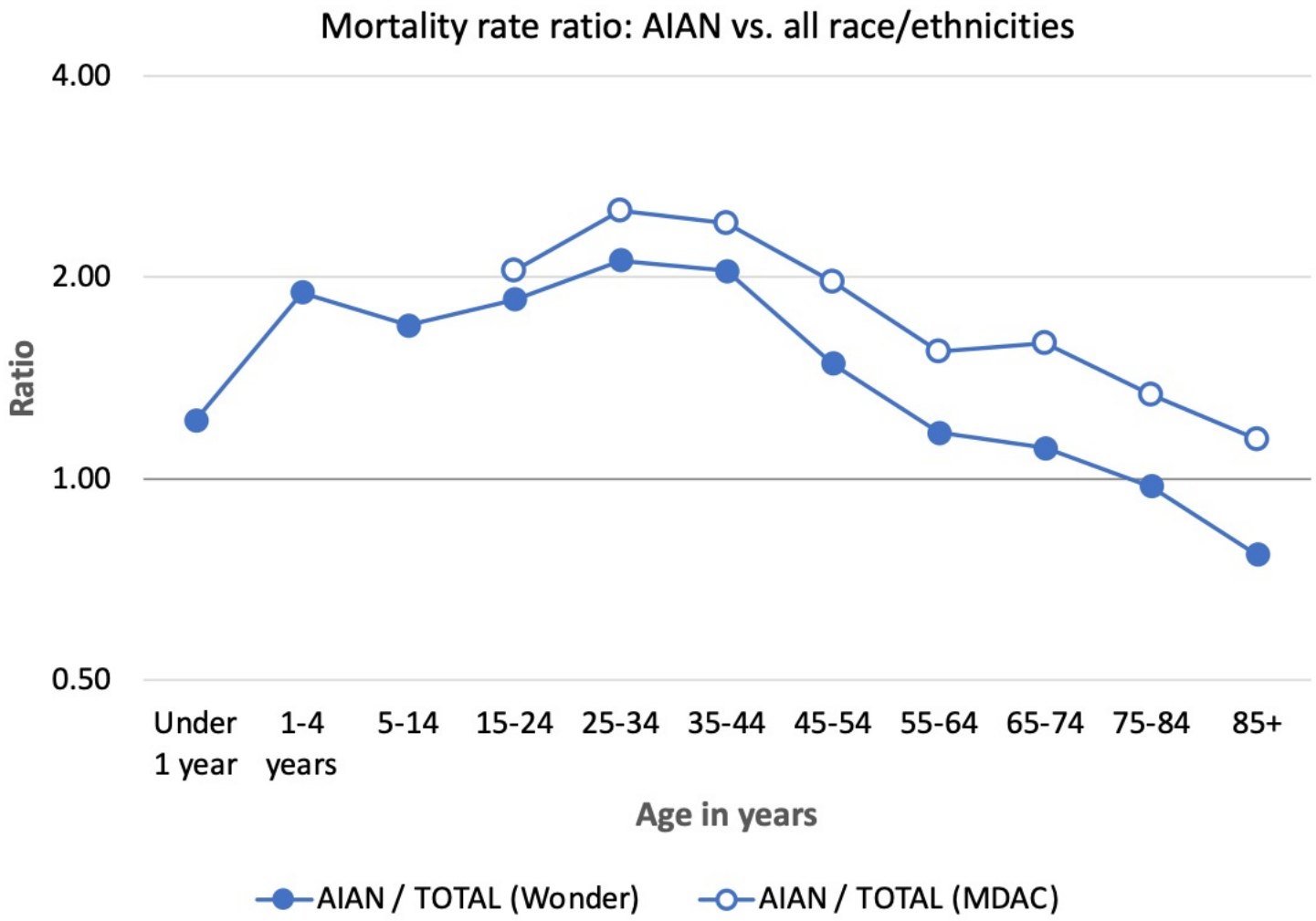
Impact of in racial misclassification on mortality

Figure 1. Age-specific mortality rates for AIAN: CDC Wonder, MDAC, ratio

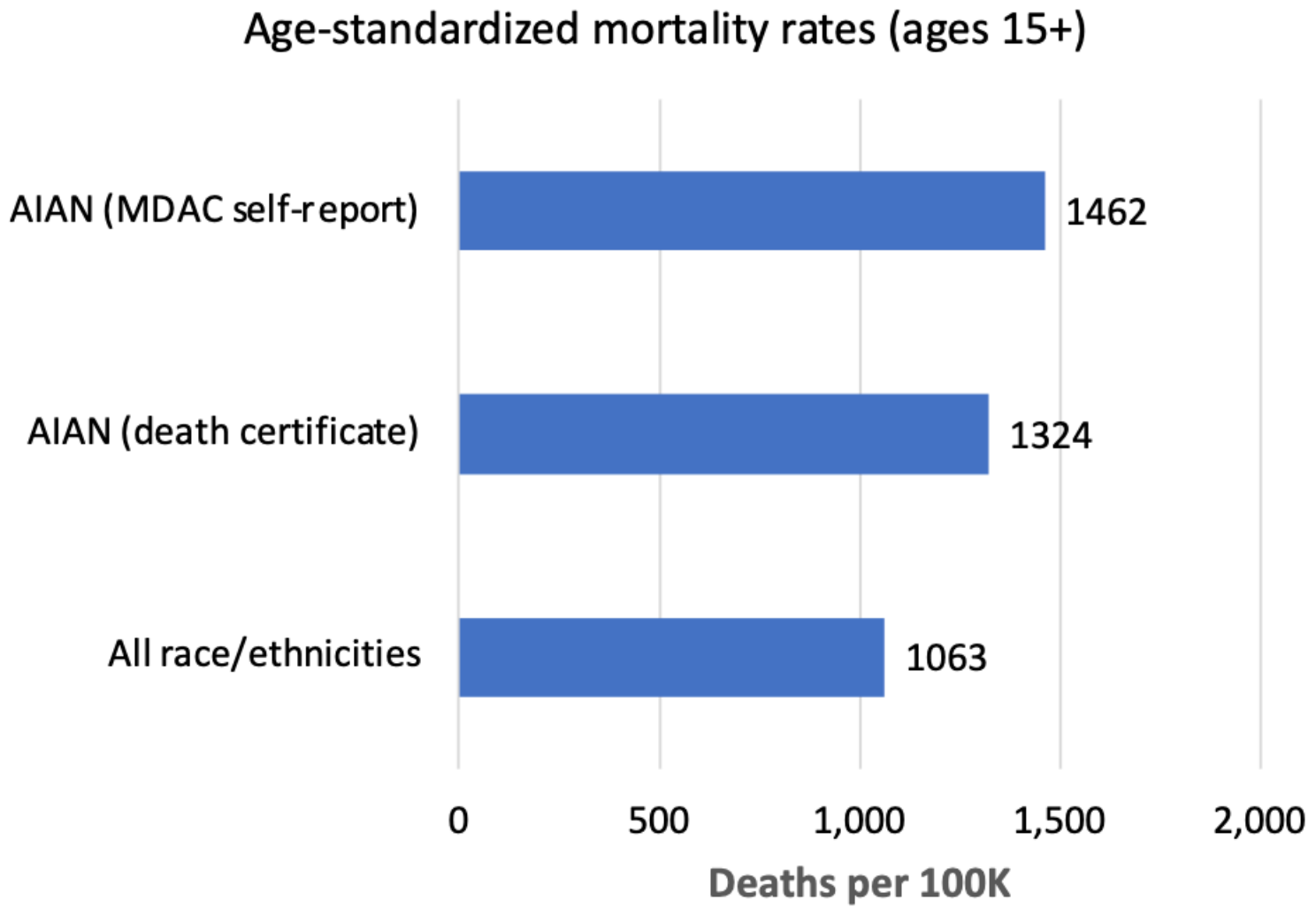


Impact of in racial misclassification on mortality rate ratios

Figure 2. AIAN mortality relative to total U.S. mortality by age: CDC Wonder vs. MDAC

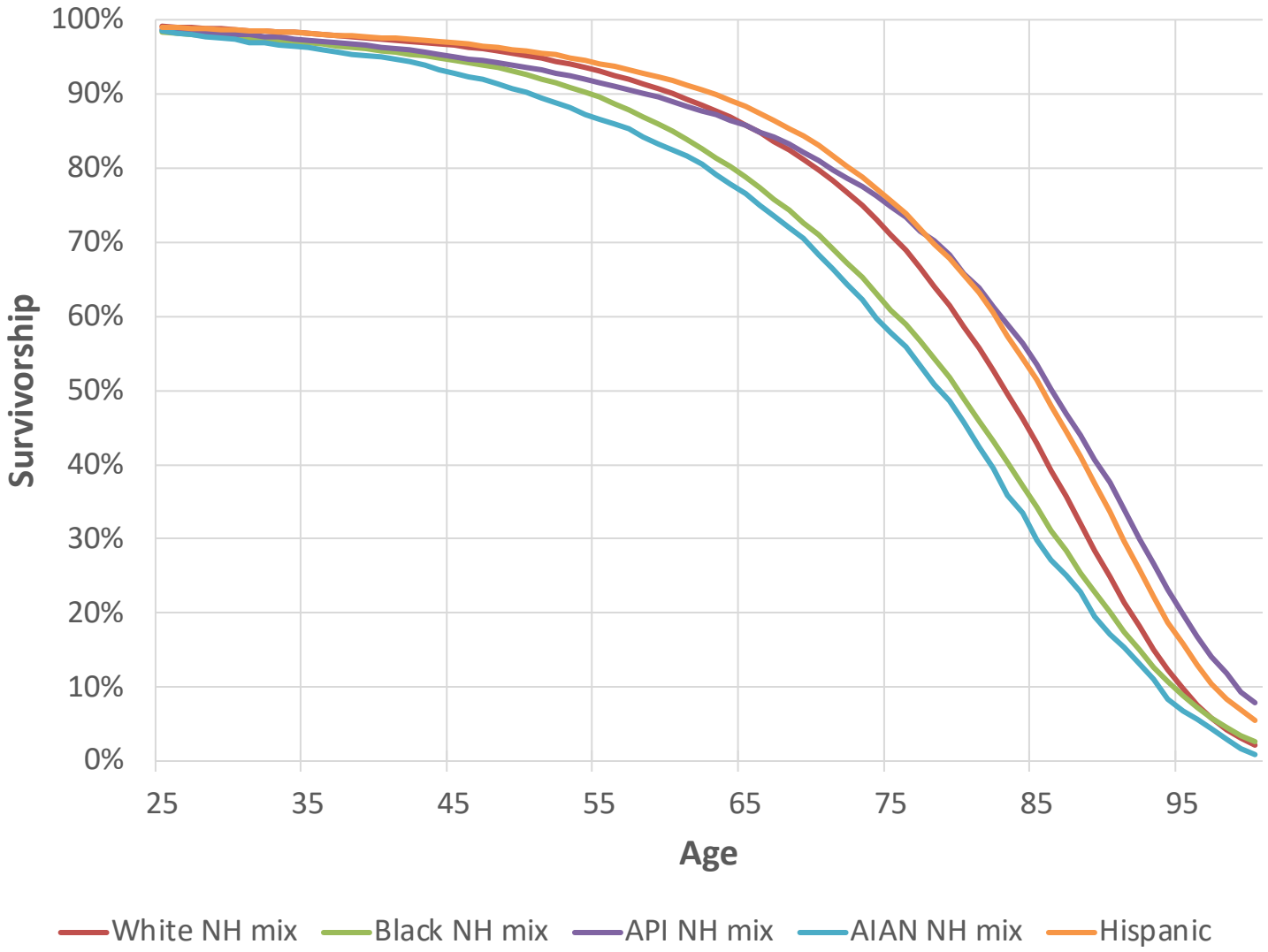


Impact of in racial misclassification on mortality rate ratios

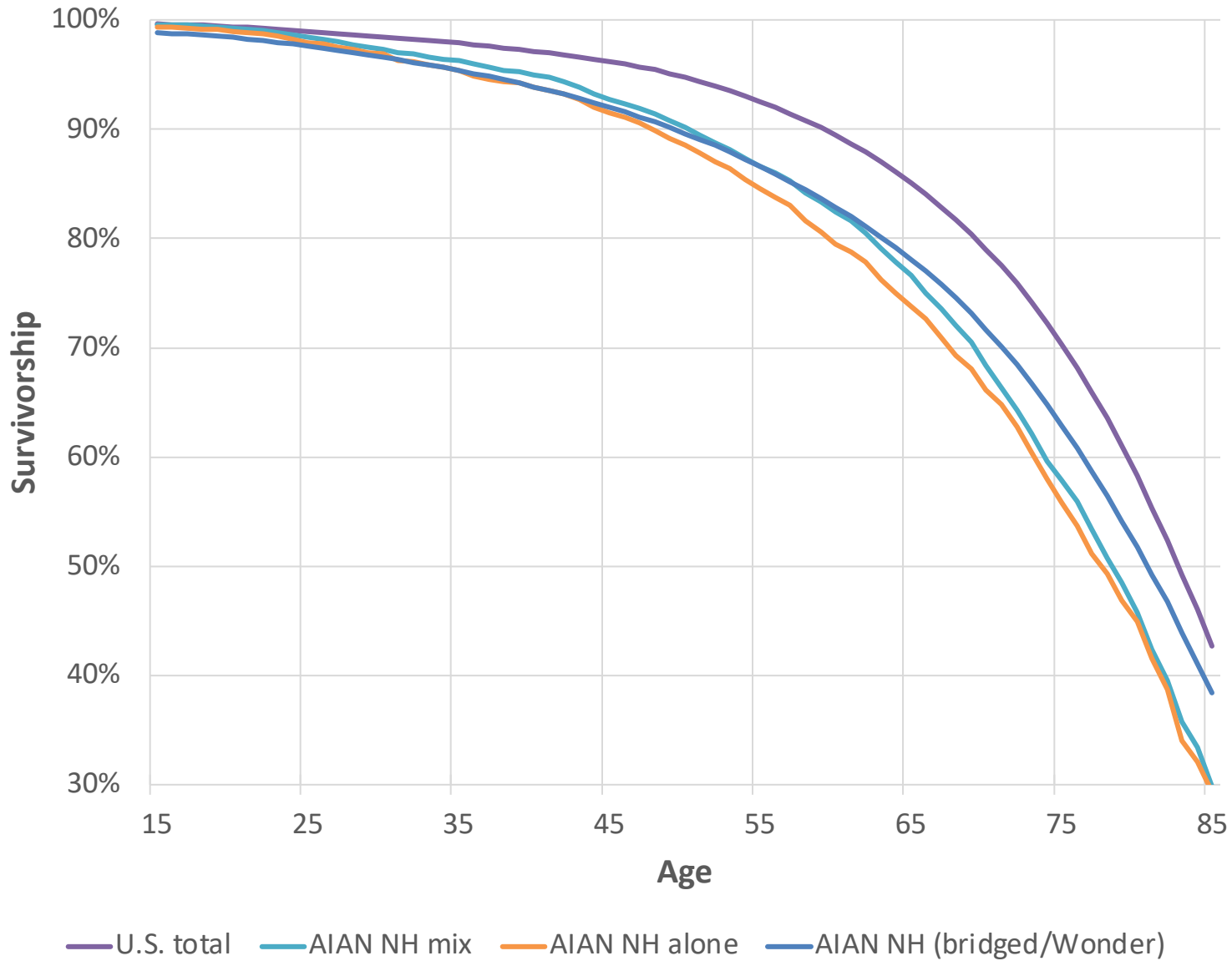


Difference between AIAN and US total increases by 53%.

Survivorship by self-reported race in the MDAC



Impact of in racial misclassification on survivorship



Survivorship disparities in the MDAC

		MDAC				CDC Wonder	
	U.S. Total	NH AIAN alone	Δ	NH AIAN alone or i.c.	Δ	AIAN NH bridged	Δ
Probability of death by							
45 years	3.8%	8.5%	4.7%	7.3%	3.5%	8.0%	4.2%
55 years	14.9%	26.2%	11.3%	23.4%	8.5%	21.9%	7.0%
65 years	16.0%	27.4%	11.4%	25.0%	9.0%	23.0%	7.0%
75 years	17.1%	29.1%	12.0%	26.4%	9.3%	24.2%	7.1%
Life expectancy (years)							
Average age at death	79.3	73.6	-5.7	74.6	-4.7		
Years lived 15 to 85	61.5	56.7	-4.8	57.6	-3.9	58.4	-3.1

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Mortality disparity is 54% larger (23% larger) than when using CDC Wonder bridged race.

How much of excess mortality risk can be "statistically explained" by sociodemographics?

Table 4. Cox proportional hazards models: Estimates hazard ratios for risk of death during 8-year follow-up

Hazard ratio (95% CI)	(1)	(2)	(3)	(4)
Race/ethnicity				
NH AIAN	1.425	1.422	1.260	1.223
NH White	Ref	Ref	Ref	Ref
NH Black	Ref	1.237	Ref	1.068
NH API	Ref	0.795	Ref	0.779
Hispanic	Ref	0.792	Ref	0.664

Adjusted for income, education, employment status, urban/rural residence., residence in AIAN area

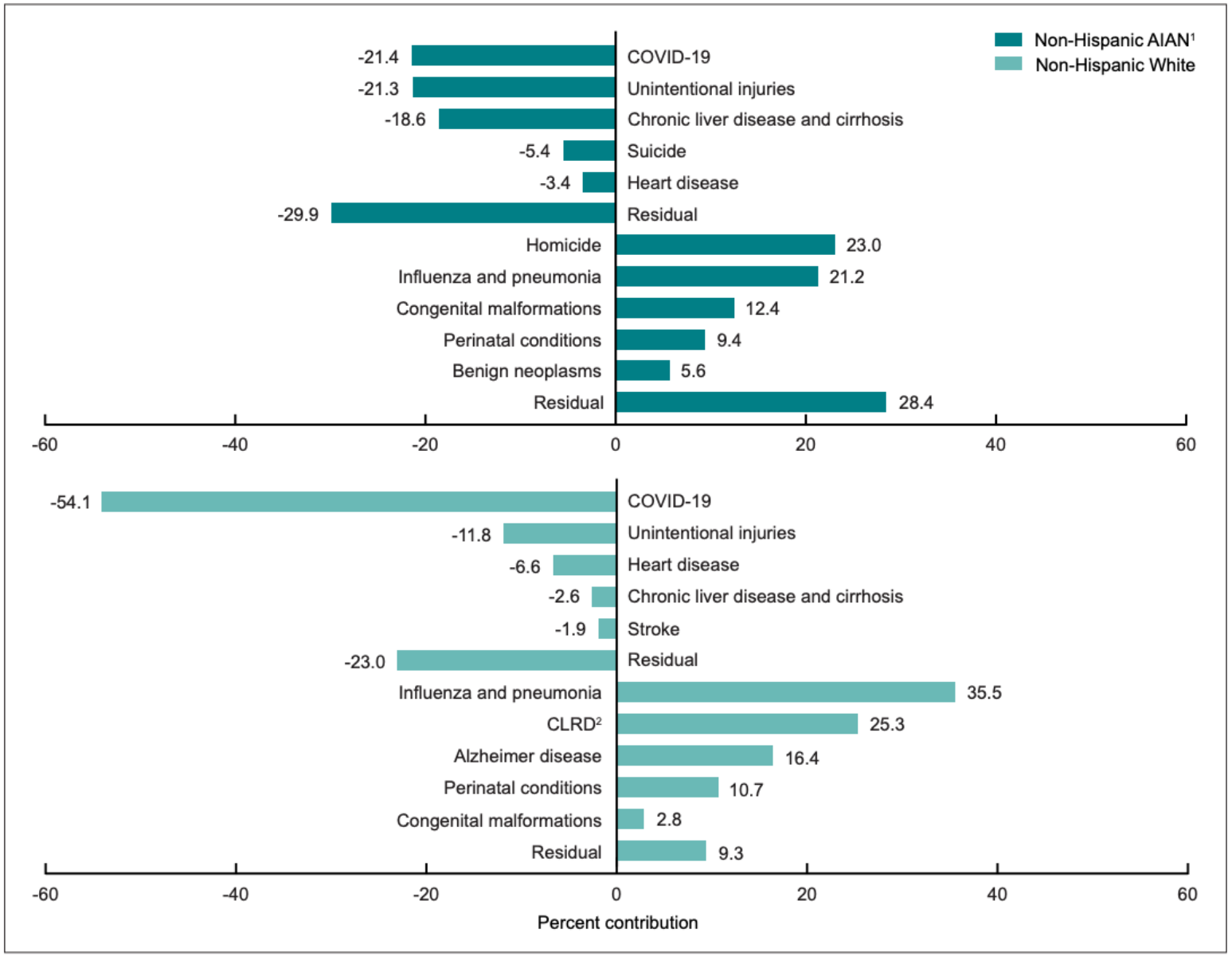
Due to misclassification, conventional estimates substantially underestimate the true mortality burden among American Indian & Alaska Native people.

Thank you. Feedback welcome! jbor@bu.edu

Thank you to: Michael Bird, Steffie Woolhandler, David Himmelstein, Jahn Hakes, Elizabeth Arias, Norm Johnson, Andre Strongbearheart, Mar Parrilla, Michelle Cook, Commonwealth Fund.

Appendix

Figure 5. Contribution of leading causes of death to change in life expectancy, by Hispanic origin and race: Non-Hispanic American Indian or Alaska Native and non-Hispanic White populations, 2020–2021

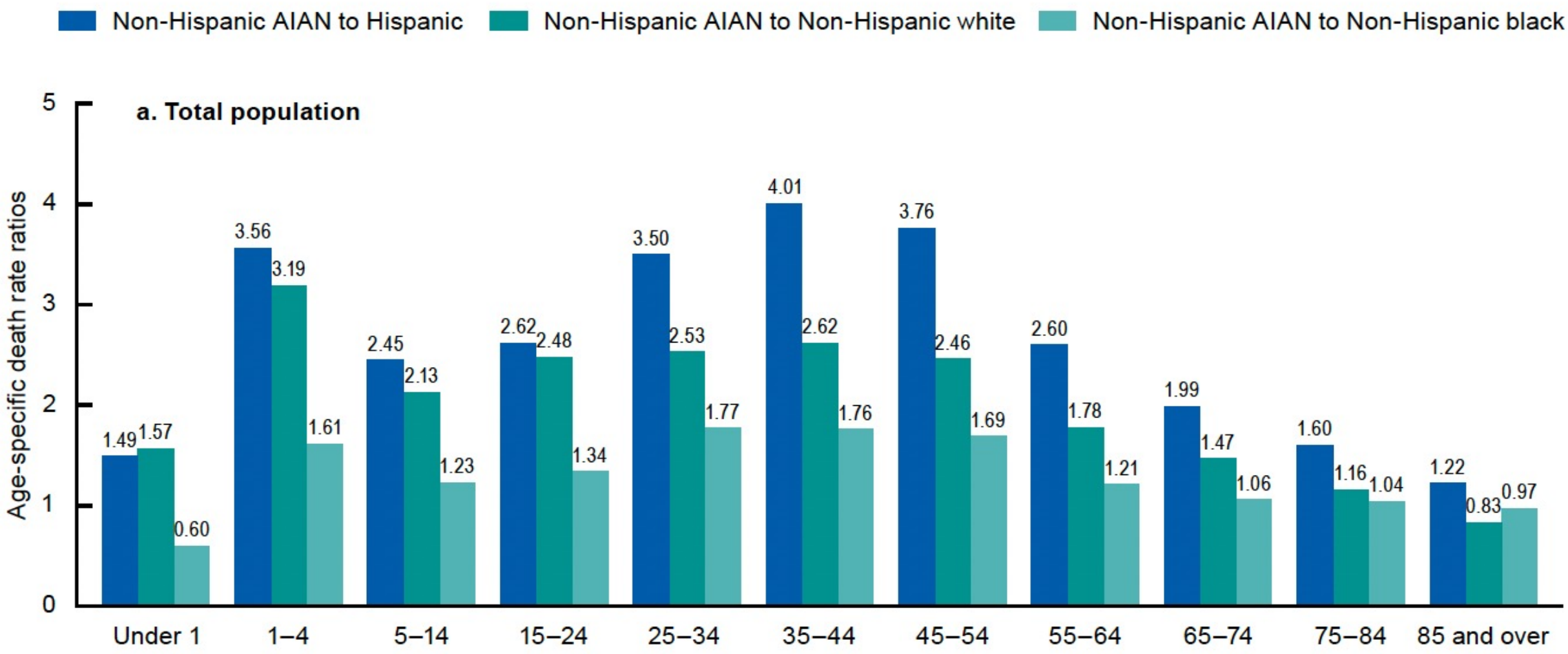


Changes during the pandemic were not just due to COVID-19.

Arias et al. 2022. https://www.cdc.gov/nchs/data/vsrr/vsrr023.pdf

Age-specific mortality rate ratios

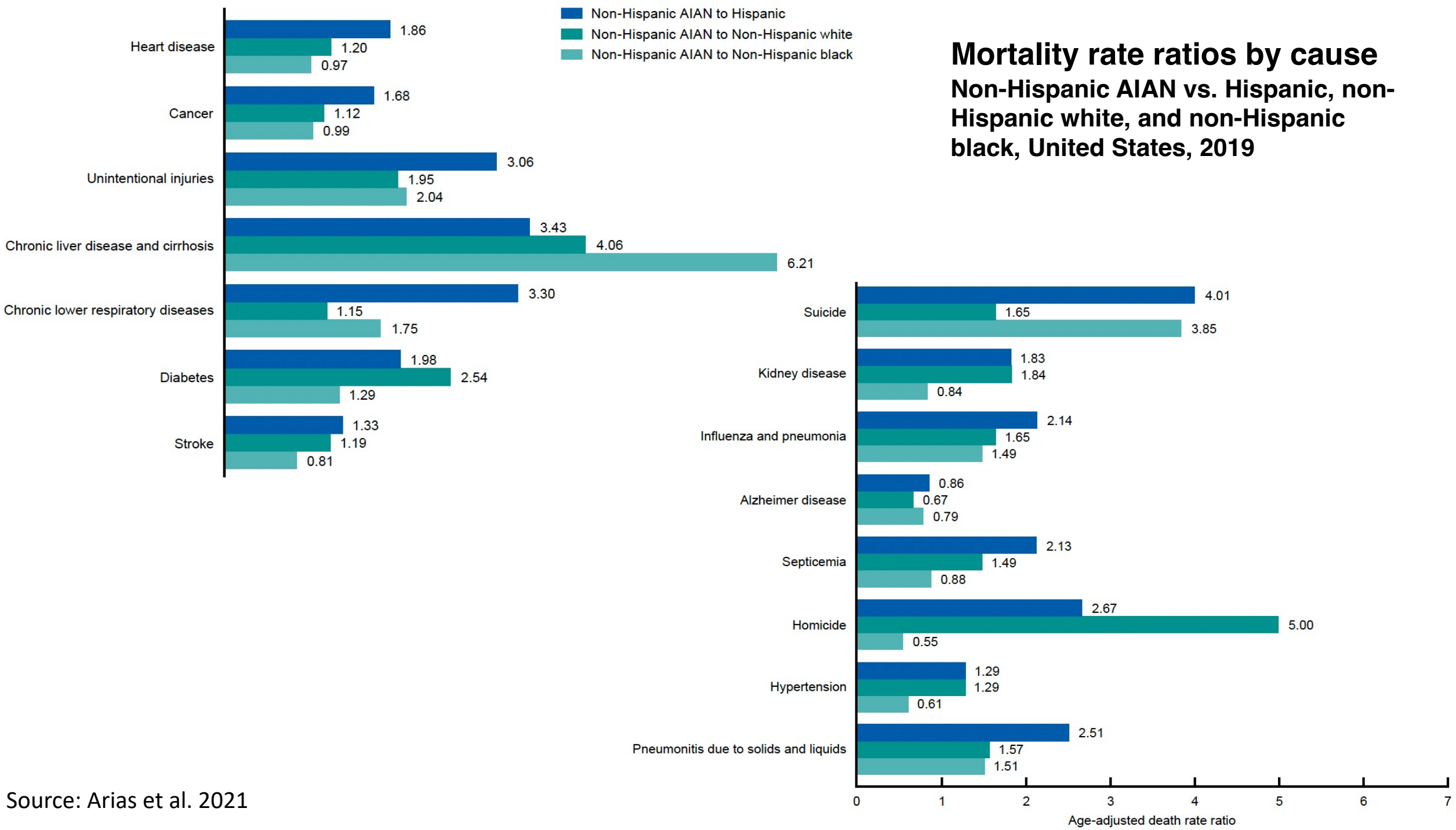
Non-Hispanic AIAN vs. Hispanic, non-Hispanic white, and non-Hispanic black, United States, 2019



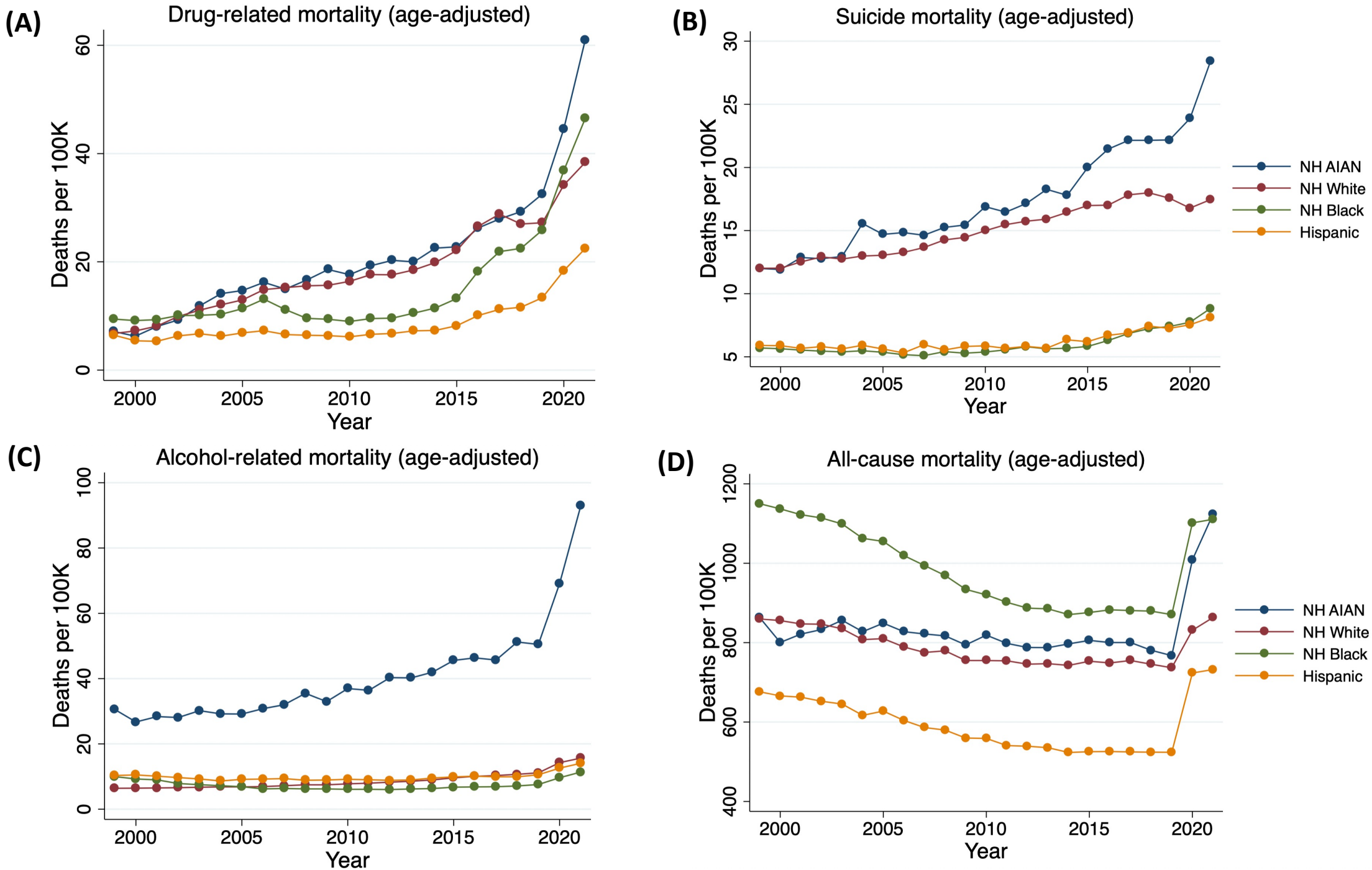
Source: Arias et al. 2021

Mortality rate ratios by cause

Non-Hispanic AIAN vs. Hispanic, non-Hispanic white, and non-Hispanic black, United States, 2019



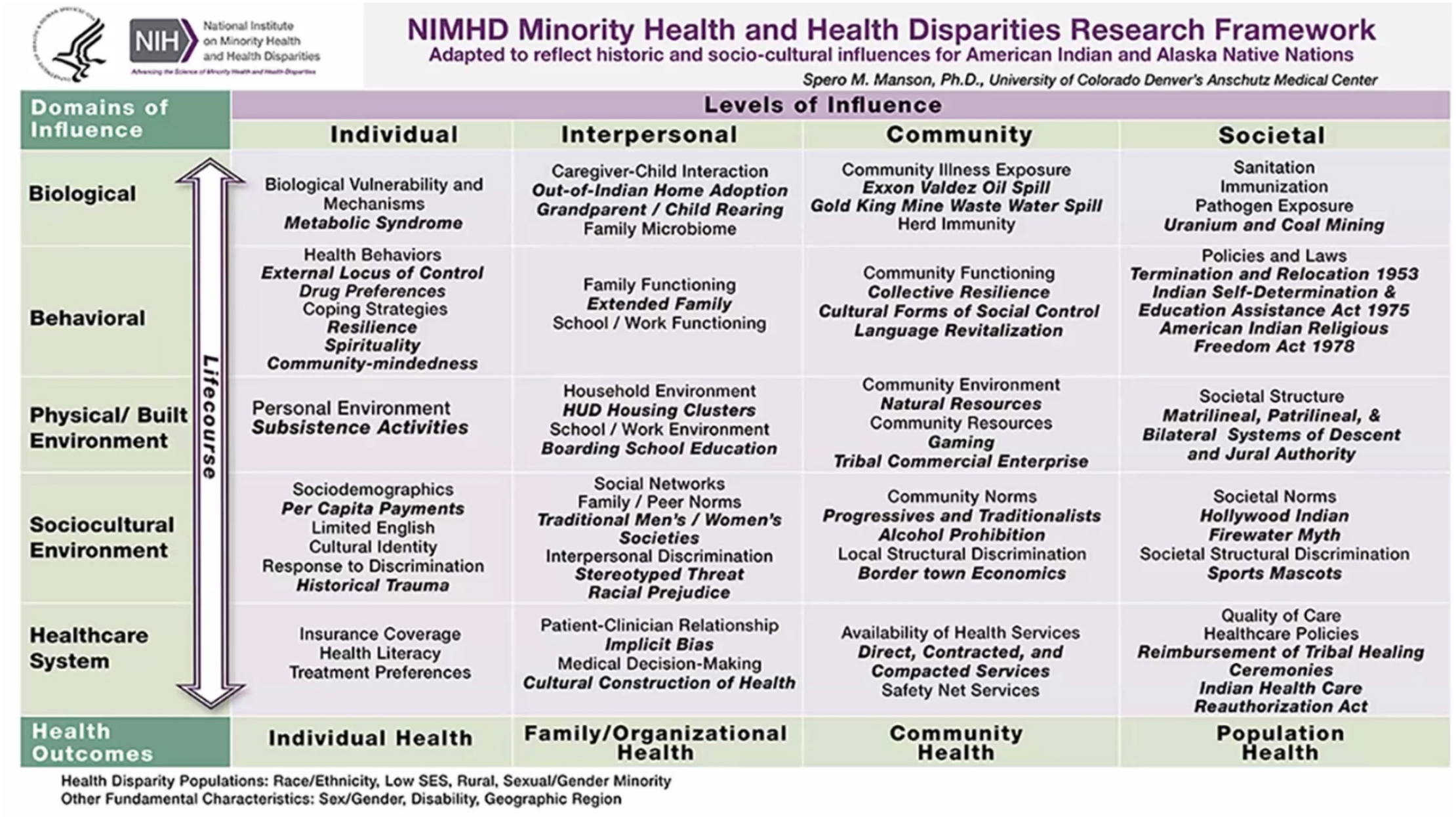
Source: Arias et al. 2021


(A)
Drug-related mortality (age-adjusted)
Deaths per 100K
0
20
40
60
2000
2005
2010
2015
2020
Year
(B)
Suicide mortality (age-adjusted)
Deaths per 100K
5
10
15
20
25
30
2000
2005
2010
2015
2020
Year
NH AIAN
NH White
NH Black
Hispanic
(C)
Alcohol-related mortality (age-adjusted)
Deaths per 100K
0
20
40
60
80
100
2000
2005
2010
2015
2020
Year
(D)
All-cause mortality (age-adjusted)
Deaths per 100K
400
600
800
1000
1200
2000
2005
2010
2015
2020
Year
NH AIAN
NH White
NH Black
Hispanic

National Institute on Minority Health and Health Disparities Research Framework

		Levels of Influence*			
		Individual	**Interpersonal**	**Community**	**Societal**
Domains of Influence *(Over the Lifecourse)*	**Biological**	Biological Vulnerability and Mechanisms	Caregiver–Child Interaction Family Microbiome	Community Illness Exposure Herd Immunity	Sanitation Immunization Pathogen Exposure
	Behavioral	Health Behaviors Coping Strategies	Family Functioning School/Work Functioning	Community Functioning	Policies and Laws
	Physical/Built Environment	Personal Environment	Household Environment School/Work Environment	Community Environment Community Resources	Societal Structure
	Sociocultural Environment	Sociodemographics Limited English Cultural Identity Response to Discrimination	Social Networks Family/Peer Norms Interpersonal Discrimination	Community Norms Local Structural Discrimination	Social Norms Societal Structural Discrimination
	Health Care System	Insurance Coverage Health Literacy Treatment Preferences	Patient–Clinician Relationship Medical Decision-Making	Availability of Services Safety Net Services	Quality of Care Health Care Policies
Health Outcomes		**Individual Health**	**Family/ Organizational Health**	**Community Health**	**Population Health**

National Institute on Minority Health and Health Disparities, 2018
*Health Disparity Populations: Race/Ethnicity, Low SES, Rural, Sexual and Gender Minority
Other Fundamental Characteristics: Sex and Gender, Disability, Geographic Region



https://www.nimhd.nih.gov/about/overview/research-framework/adaptation-framework.html