

Social Determinants of Prematurity: Alaska Specific

Richard David, MD
September 27, 2012

Alaska specific?

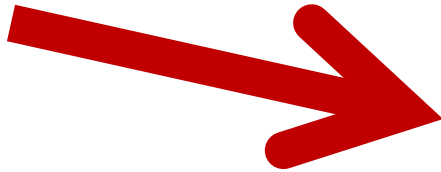


[Disclaimer slide]

- Personal experience
- Research experience:
 - > Racial disparities
 - > Class disparities

[Disclaimer slide]

- Personal experience



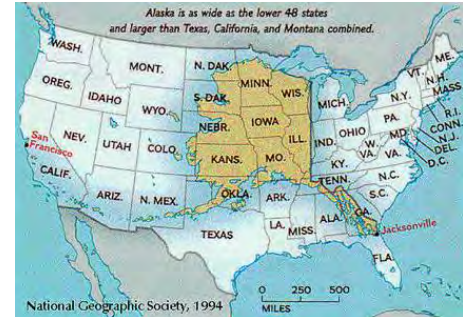
- Research experience:
 - > Racial disparities
 - > Class disparities



	FL	NC	IL	US	AK
Births	231K	130K	176K	4.2M	11K
AA Births	57K	31K	31K	671K	0.4K (434)
Median income	\$46K	\$45K	\$53K	\$51K	\$61K

[Disclaimer slide]

- Personal experience



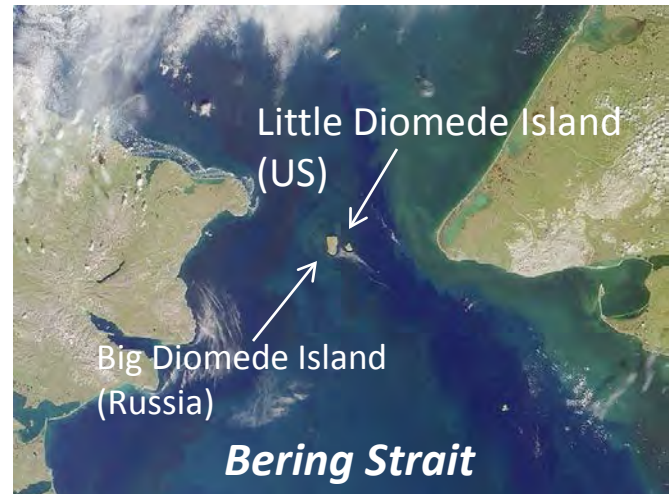
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Alaska specific:

- Largest state
- Lowest population density
 - > 722,718 people in 656,425 square miles
- 4th highest median household income
- Closest to Russia (2.4 mi)
- 3 million lakes
- 25 hospitals



Alaska: Population characteristics

- Over 40% live in Anchorage
- 52.3% live in “frontier areas”
- Racial/ethnic composition:
 - > 67% white
 - > 16% Alaska native
 - > 5% Asian
 - > 4% African American
- Low income inequality

Total Possible Points 105
 Minimum Points Necessary for Frontier Designation = 55
 “Extremes” = 55-105

DENSITY - PERSONS PER SQUARE MILE	POINTS
0-12	45
12.1-16	30
16.1-20	20
NOTE: PER COUNTY OR PER DEFINED SERVICE AREA WITH JUSTIFICATION	
TOTAL POINTS DENSITY	
DISTANCE - IN MILES TO SERVICE/MARKET	
>90 Miles	30
60-90	20
30-60	10
<30	0
NOTE: STARTING POINT MUST BE RATIONAL, EITHER A SERVICE SITE OR PROPOSED SITE	
TOTAL POINTS DISTANCE IN MILES	
TRAVEL TIME - IN MINUTES TO SERVICE/MARKET	
>90 Minutes	30
60-90	20
30-60	10
<30	0
NOTE: USUAL TRAVEL TIME; EXCEPTIONS MUST BE DOCUMENTED (i.e. WEATHER, GEOGRAPHY, SEASONAL)	
TOTAL POINTS TRAVEL TIME IN MINUTES	
TOTAL POINTS ALL CATEGORIES	

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Income inequality

- 2nd lowest income inequality of 50 states
- Gini coefficient 0.42
(0.42 Utah, 0.50 NY)
- US overall one of OECD's highest at 0.47
(c.f. Sweden 0.25, Namibia 0.71)

Income inequality by borough

Rank	National Rank	County	Per Capita Income	Median House-hold Income
1	95	<u>City and Borough of Juneau</u>	\$26,719	\$62,034
2	112	<u>Denali Borough</u>	\$26,251	\$53,654
3	134	<u>Municipality of Anchorage</u>	\$25,287	\$55,546

25	2806	<u>Yukon-Koyukuk Census Area</u>	\$13,720	\$28,666
26	2981	<u>Bethel Census Area</u>	\$12,603	\$35,701
27	3135	<u>Wade Hampton Census Area</u>	\$8,987	\$30,184

Case Study: Bristol Bay Region

- Remote area, accessed only by air or water
- Pristine environment
- Alaska Native populations (3 groups)
- Russians from 1818
- Currently continuing economic development, integration



Case Study: Bristol Bay Region

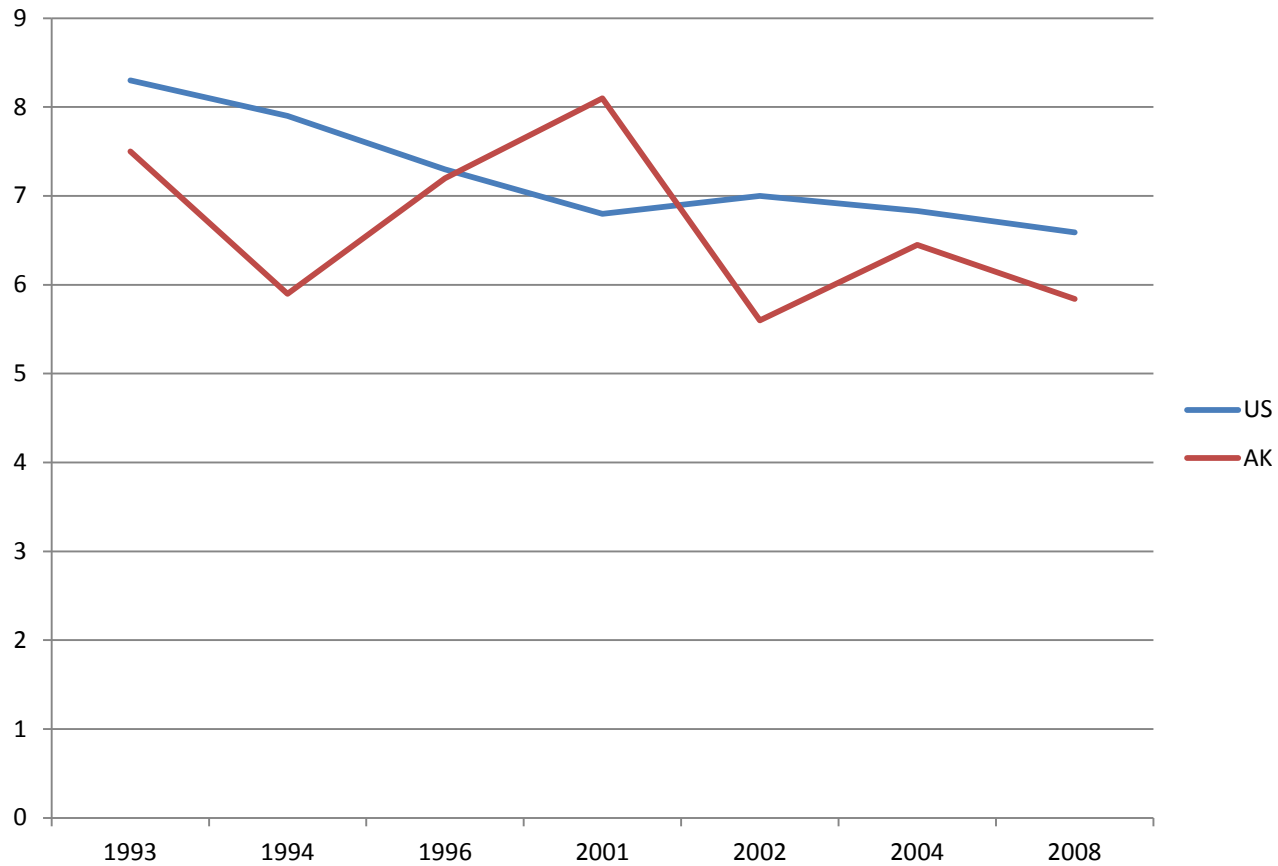
- Yup'ik Alaska Native elders note drivers of change by Europeans:
 - > disease epidemics
 - > reorganization of residential patterns
 - > altered relations between men and women
 - > 'management' of natural resources
 - > restrictions on Native languages

Case Study: Bristol Bay Region

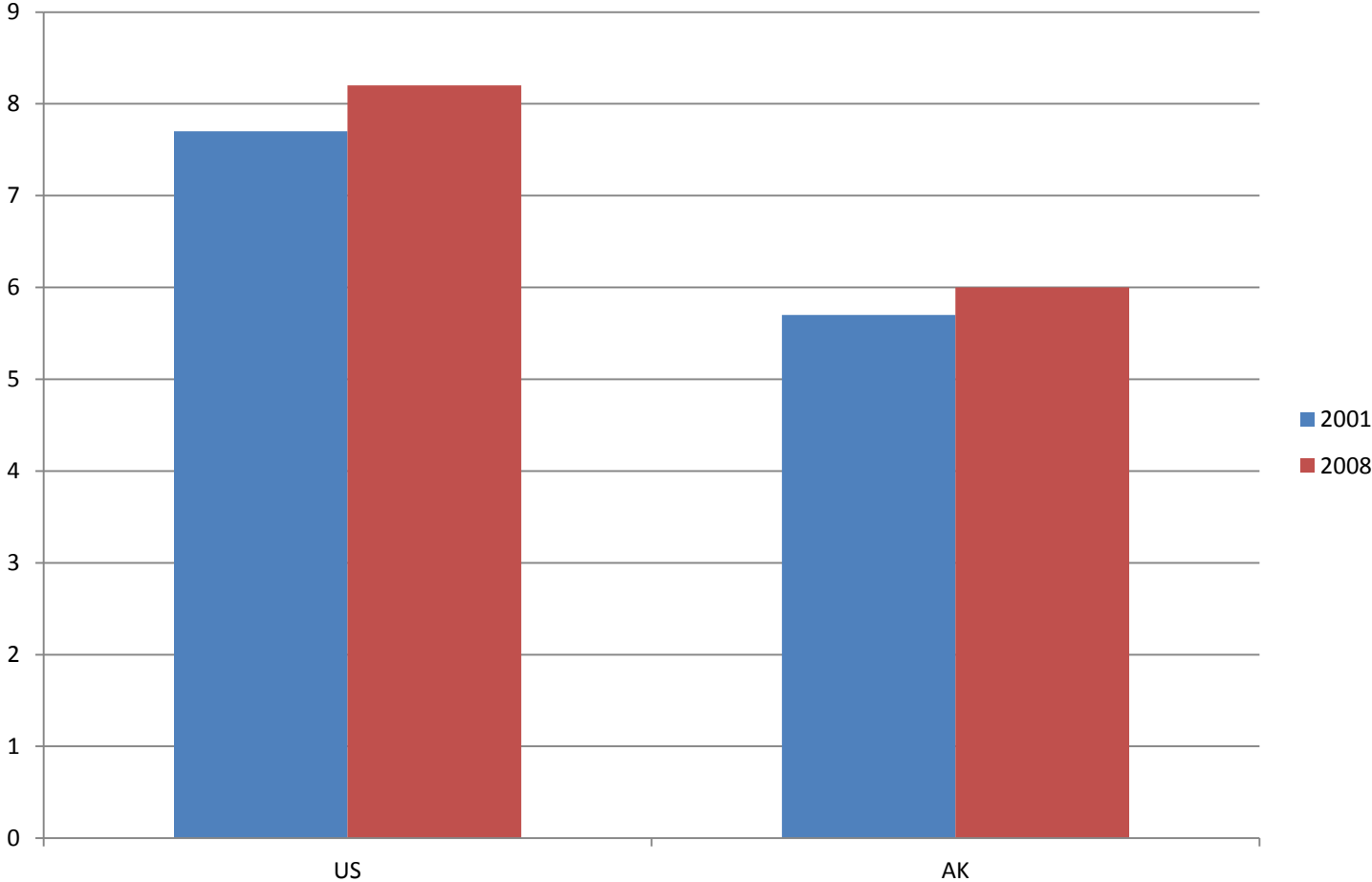
- Subsistence: “the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption.”
- “In Bristol Bay, subsistence has historically defined livelihood, exchange and social networks...”
- Also employed in Alaska Native corporations and state, federal and tribal government organizations, including health and education
- Enter: commercial fishing, mining, tourism



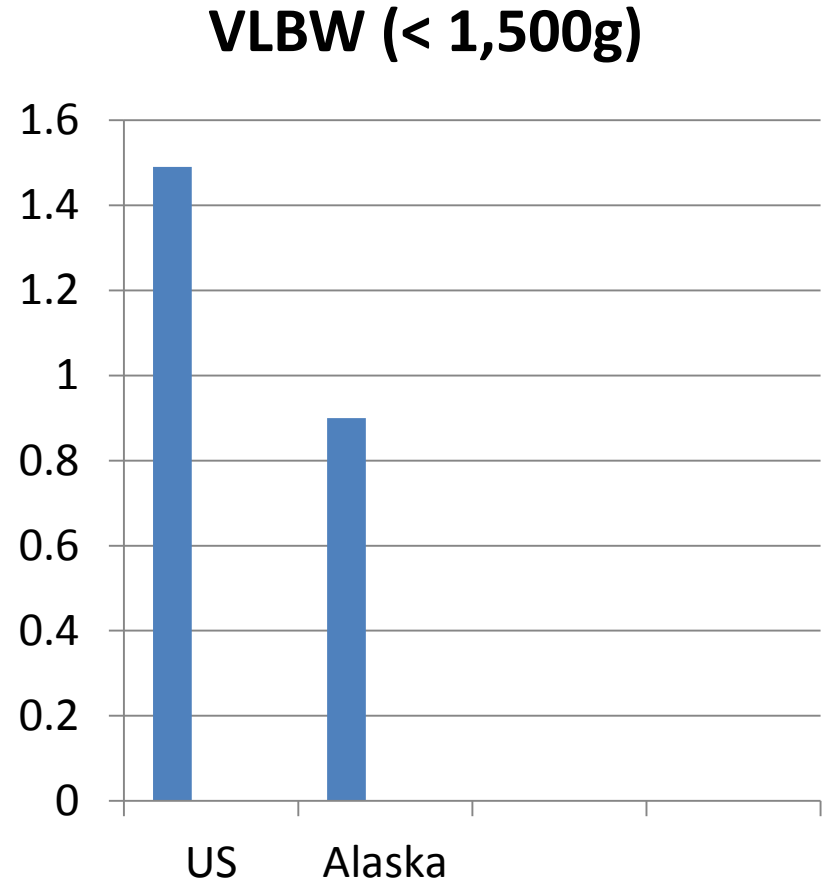
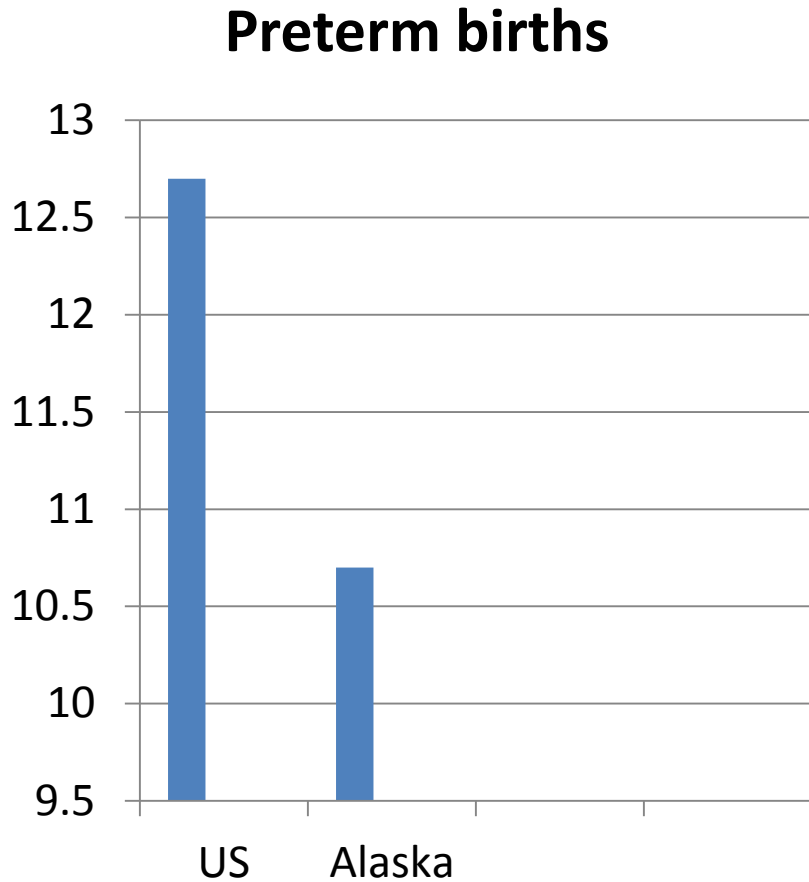
Infant mortality trends: US and AK



LBW trends: US and AK



PTB and VLBW: US and AK, 2005



Data from: Alaska Dept. of Health, 2007

Where is the mortality?

- Statewide maternal-infant mortality review (for 1992-2001, published 2006)
 - > 755 of 759 infant deaths reviewed
 - > Analysis of causes and age of deaths by maternal factors
- Neonatal mortality in Alaska is 29% lower than US
- BUT -- post-neonatal mortality is 43% *higher* than US
- Post-neonatal deaths made up about half of total

Two components of Infant Mortality

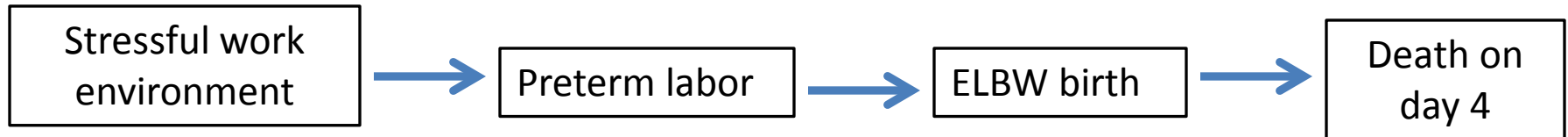
Neonatal (0-27 days)

- About 2/3 of IMR
- Most deaths are preterm
- NICU care important
- Social determinants work through PTB/IUGR

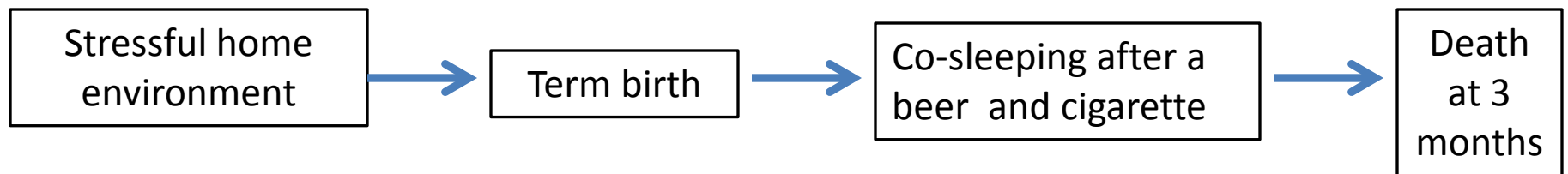
Post-neonatal (28-365d)

- About 1/3 of IMR
- Most deaths are term
- Home / social environment important
- Social determinants work through many pathways

Neonatal death scenario

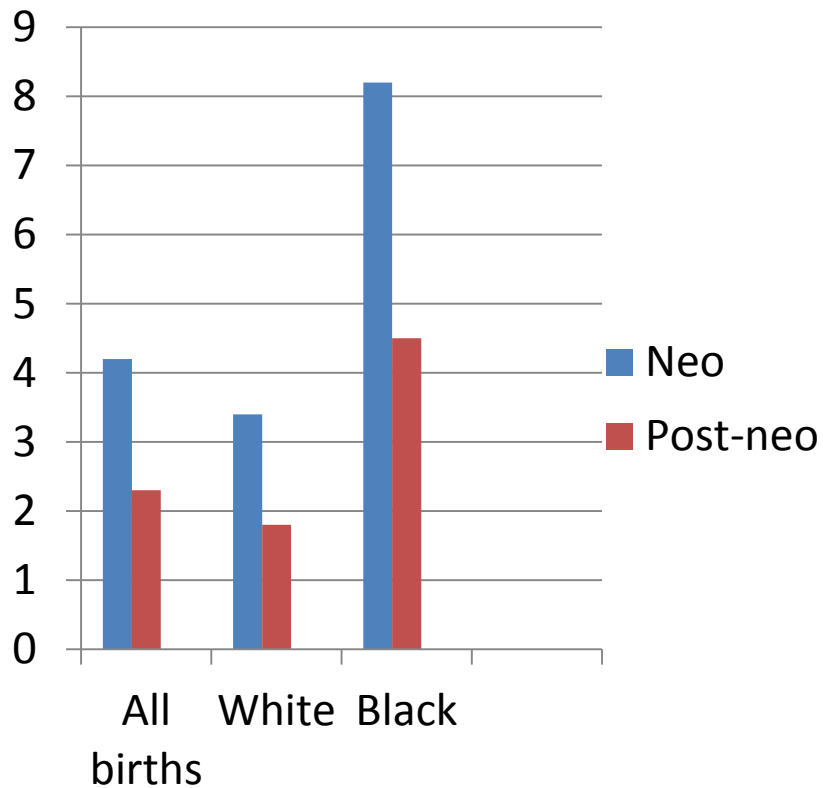


Post-neonatal death scenario

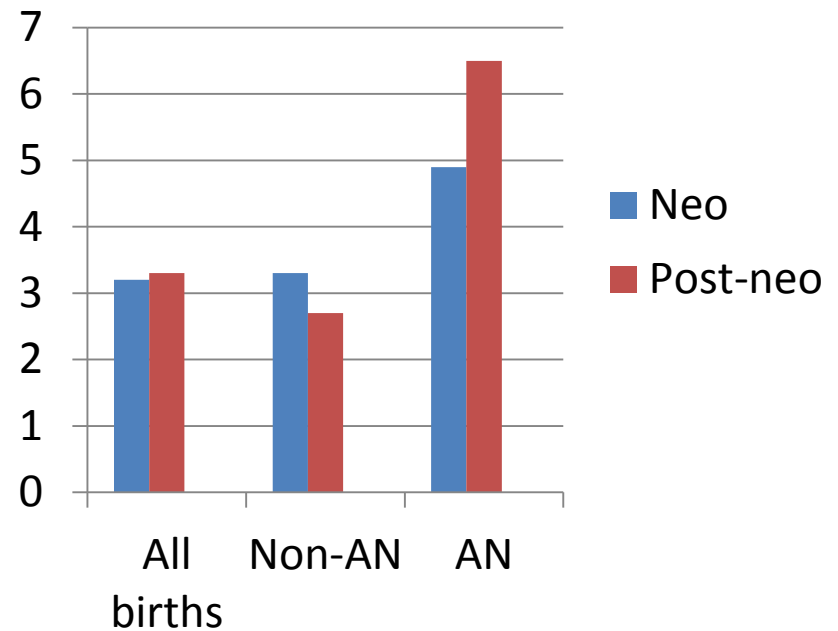


Two components of Infant Mortality

United States, 2009



Alaska, 1992-2001

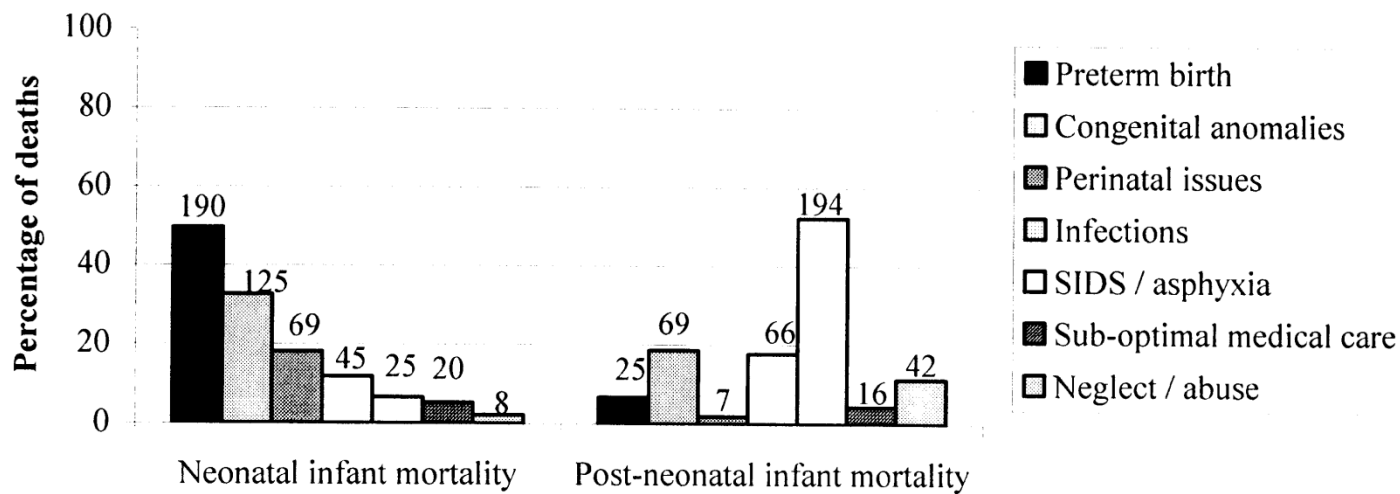


Leading causes of infant mortality

Alaska, 1992-2001

- Top 3:
 - > SIDS/asphyxia 217
 - > preterm birth 215
 - > congenital anomalies 193
- Others
 - > infections 110
 - > perinatal issues 76
 - > other causes 76
 - > neglect/abuse 50
 - > sub-optimal medical care 36

Figure 2. Percentage and number of neonatal and post-neonatal deaths by committee-determined causes -- Alaska MIMR, 1992-2001

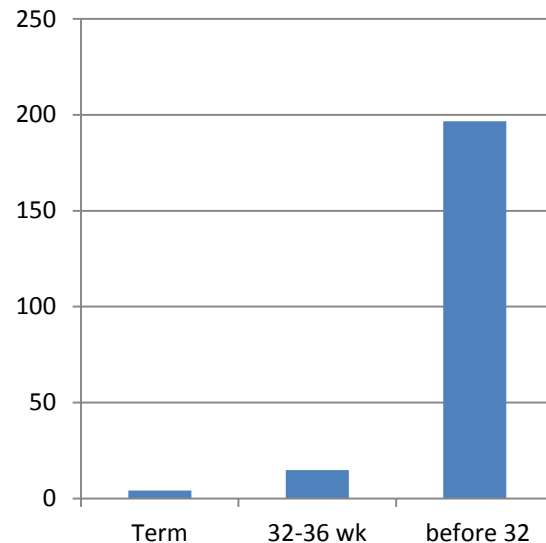


Is premature birth a cause of post-neonatal mortality?

- Infants born < 34 weeks have 4.6-times the risk of post-neonatal death
- However, Maternal-Infant Mortality Review of post-neonatal deaths 1989-2009 attributed only about 3-7% of post-neonatal deaths prematurity

Preterm birth and infant mortality Alaska, 1992-2001

- Mortality from preterm birth fell
- Percent PTB increased (mostly 32-36 weeks)
- (Mortality risk is exponentially higher at lower gestational age)



Preterm birth trends – Alaska 1989-2006

- Birth certificate data used to classify all preterm births as spontaneous, medical intervention or PROM
- 18-year trends, by Native/non-Native status
- Different patterns for different mechanisms
- AN / non-AN ratio highest for spontaneous
-> Sp-PTB fell for AN, little change for non-AN
- AN and non-AN had rises in Med Int PTB



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<http://www.dhss.alaska.gov>

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Beverly Wooley, Director

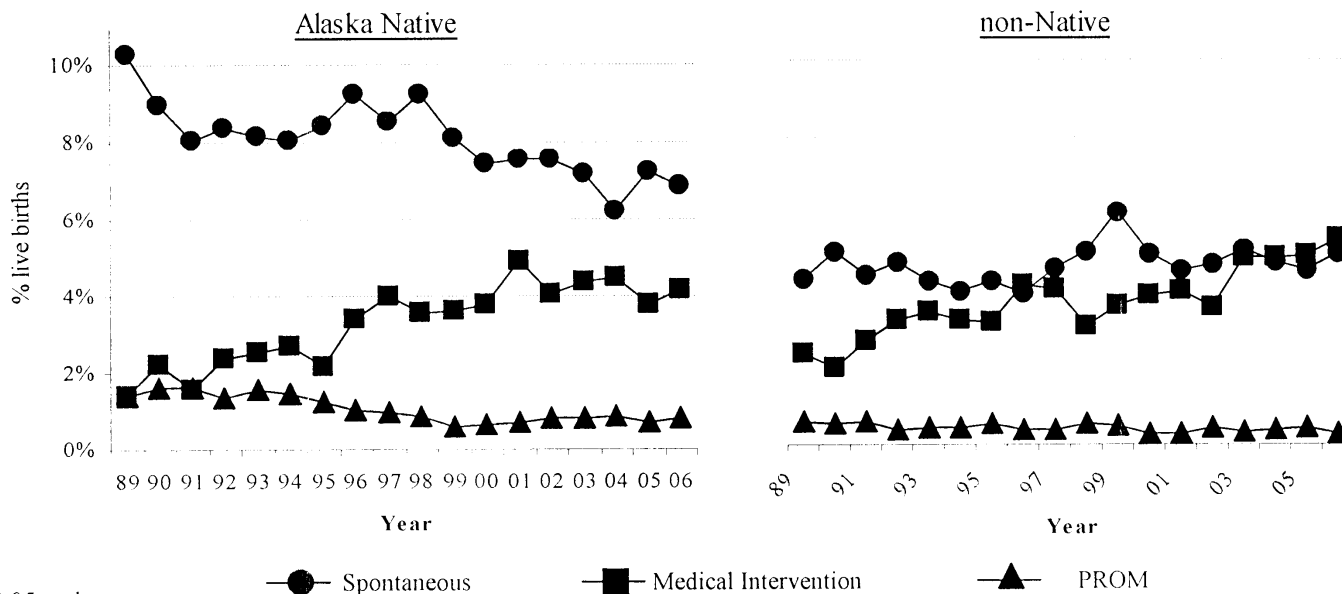
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Bulletin No. 12 May 2, 2008

Preterm Birth Trends — Alaska, 1989–2006

Figure 1. Preterm Birth Rates by Clinical Subtype and Alaska Native status — Alaska, 1989–2006[†]



[†] p<0.05 each strata

● Spontaneous ■ Medical Intervention ▲ PROM

Spontaneous preterm labor and delivery

- PRAMS data from 27 states, 2000-2002
- 28% of the 107,926 women had PT contractions
 - > Women with PT Ctx had 3-fold PT birth
 - > If they were admitted, 6-fold risk
- 58% of women giving birth preterm had PT Ctx
- PT contractions increased with
 - > low income
 - > less education
 - > Medicaid (cf private insurance)

Mechanisms of PTL

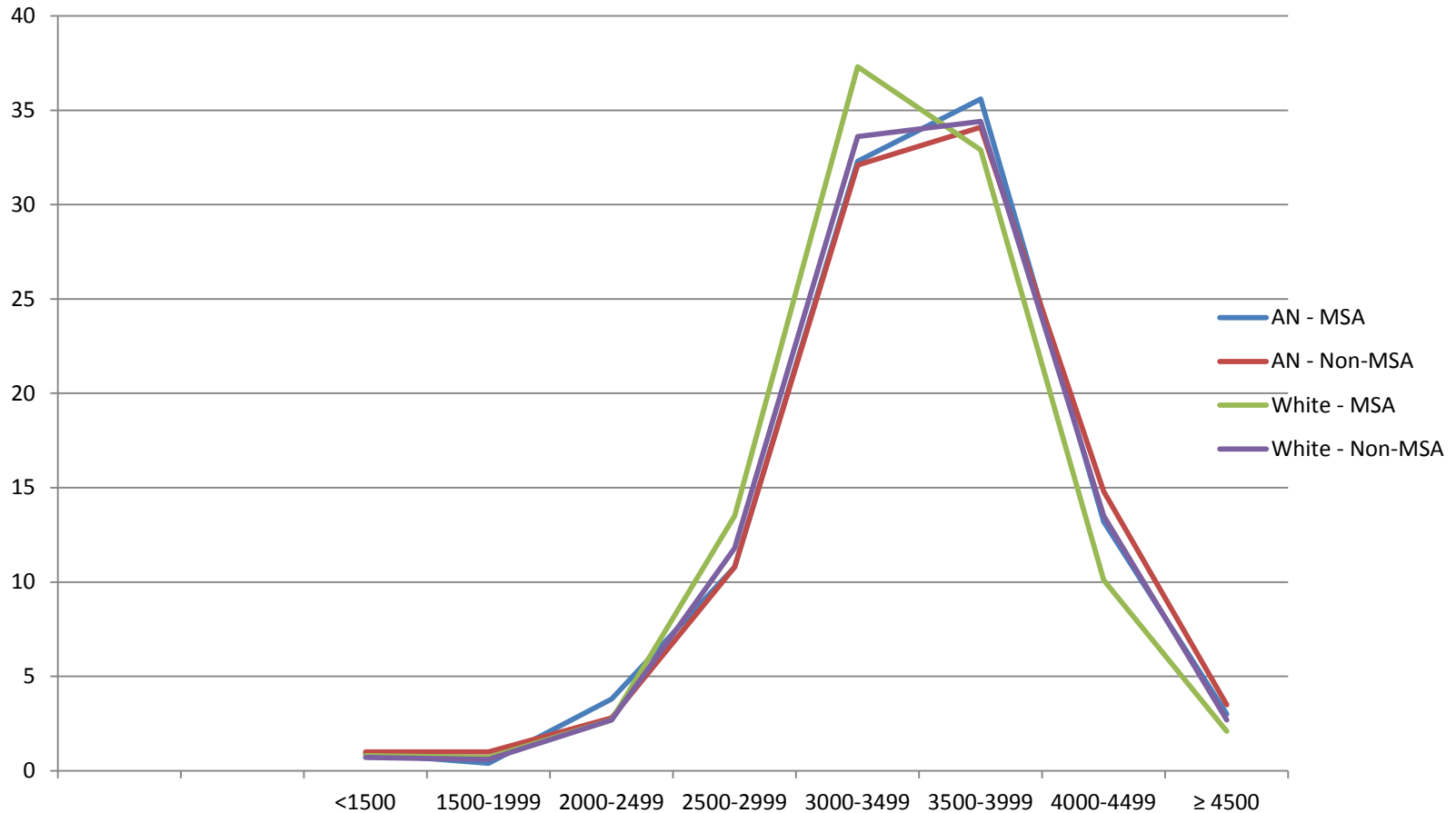
- How does “stress” work?
- Stressful life events, job strain, other?
- Anxiety during pregnancy
- “Being poor’s a hassle.”

Methodological question: Are we missing any births?

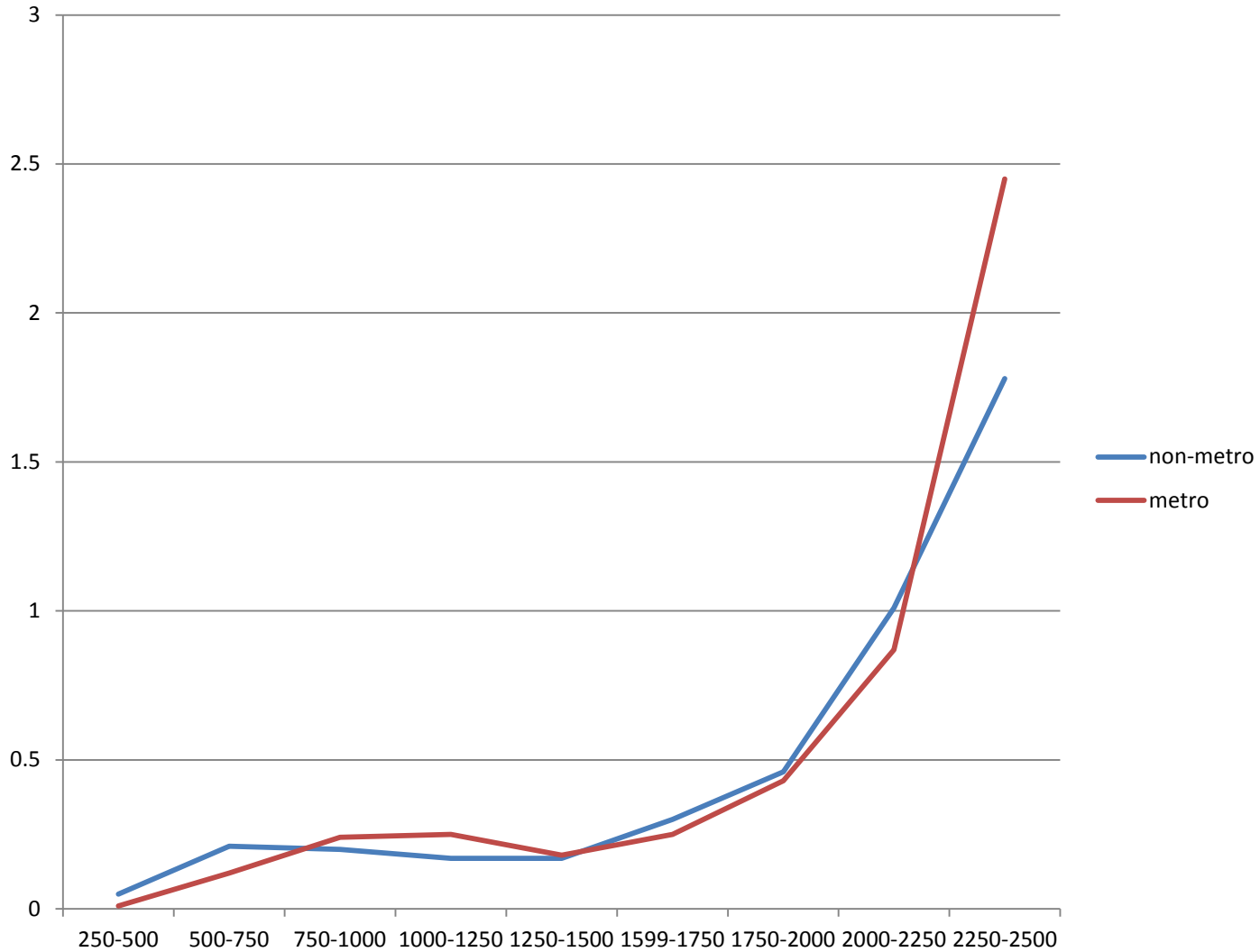
- VLBW rate below 1% -- Really?
- Compared VLBW in 50 states for 2002-5
 - > Average 1.45%
 - > Range of VLBW: 0.98 to 2.24%
 - > Alaska 0.99 (1 of 2 states below 1.0%)
- Compare states on missing BW
 - > Average missing 0.10%
 - > Range missing 0.01 to 0.42%
 - > Alaska 0.27%

BW distributions by Alaska Native status and metropolitan/non-metropolitan residence

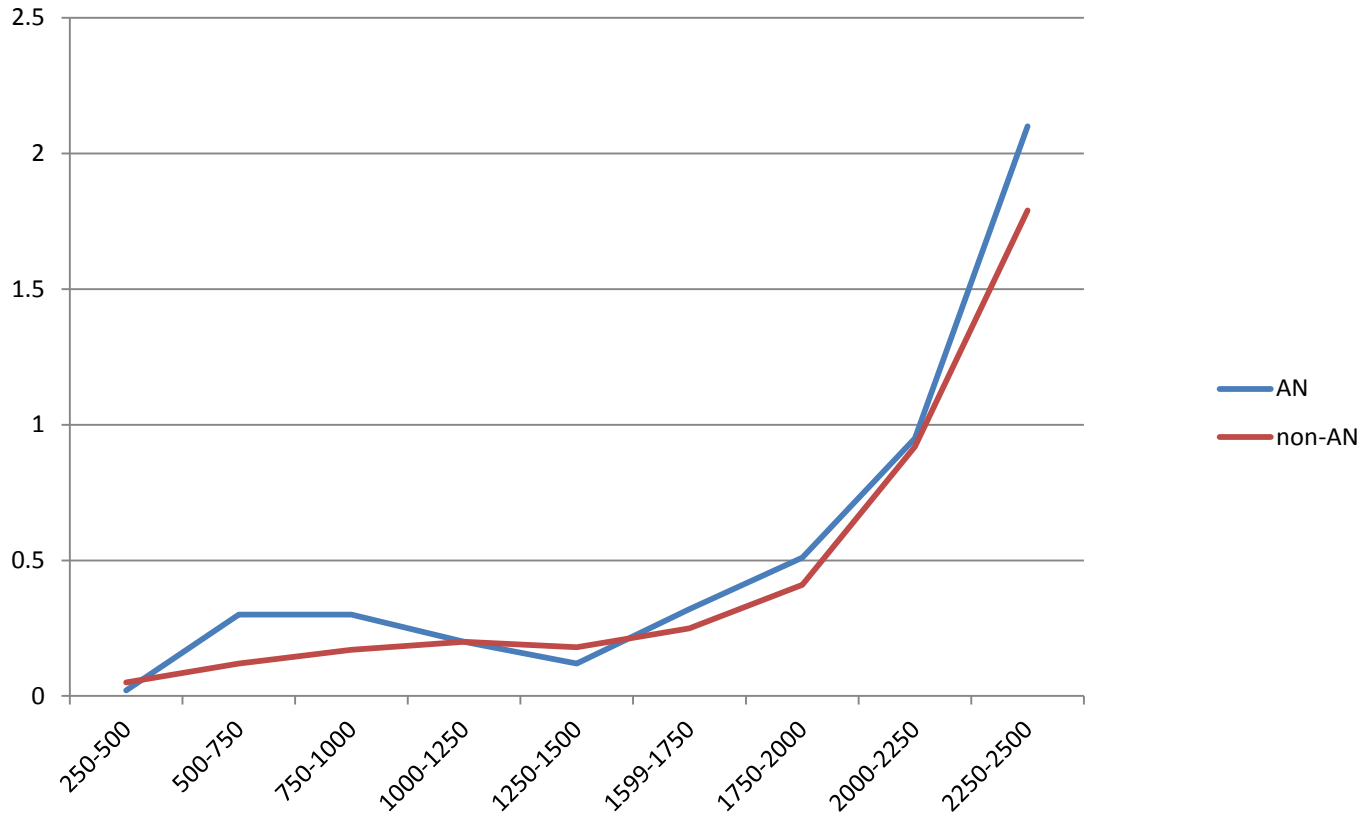
Alaska, 2003-4



Births in the LBW tail

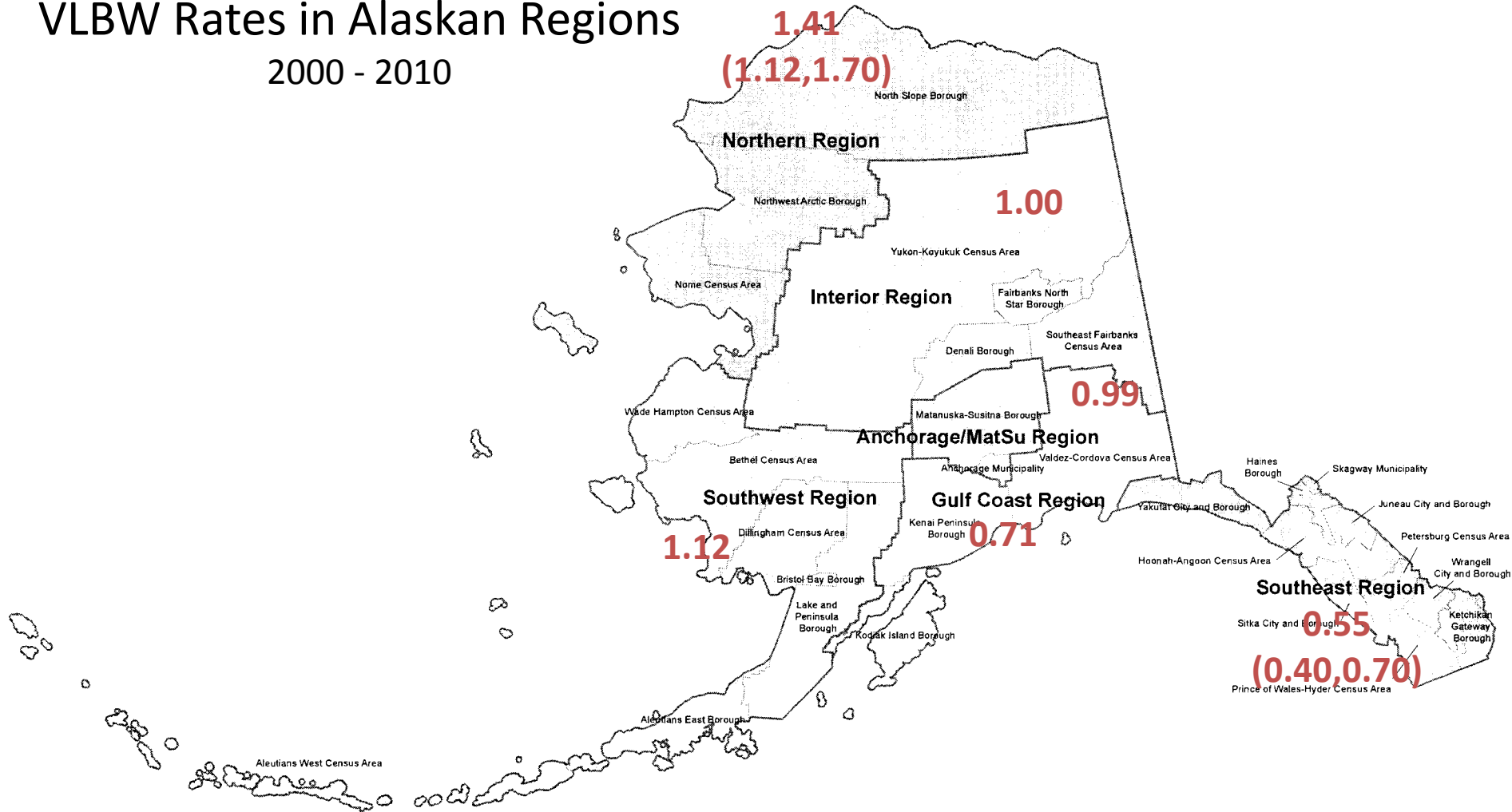


Births in the LBW tail



VLBW Rates in Alaskan Regions

2000 - 2010



Birth data from Alaska BVS
provided by Y. Goldsmith

How can premature infants get NICU care is such a huge state?

- About 2/3 of all Alaska Native births in the state are at the Alaska Native Medical Center
- Highest neonatal mortality rate in the nation about 25-30 years ago
- Babies born in the village and not in a hospital
- Alaska Native Tribal Health System and others began transferring women from the village at 36 weeks
 - > Regional Medical Center (e.g. Bethel, Nome, Kotzebue, etc) or
 - > Anchorage if high risk

Post-neonatal deaths

- Biggest disparity between Alaska Native and non-AN populations
- One component that is worse than other states
- Wide range within Alaskan regions
- SIDS + congenital anomalies + infections = 73% of all post-neonatal deaths

Social determinants of post-neonatal mortality

Risk factor	Relative risk
Maternal education (< 12 vs > 12)	4.1
Maternal age (< 20 vs > 25)	2.1
Region of residence (Northern vs. Interior)	2.6
Ethnicity (Alaska Native vs. Non-AN)	2.4

A genetic risk for post-neonatal death?

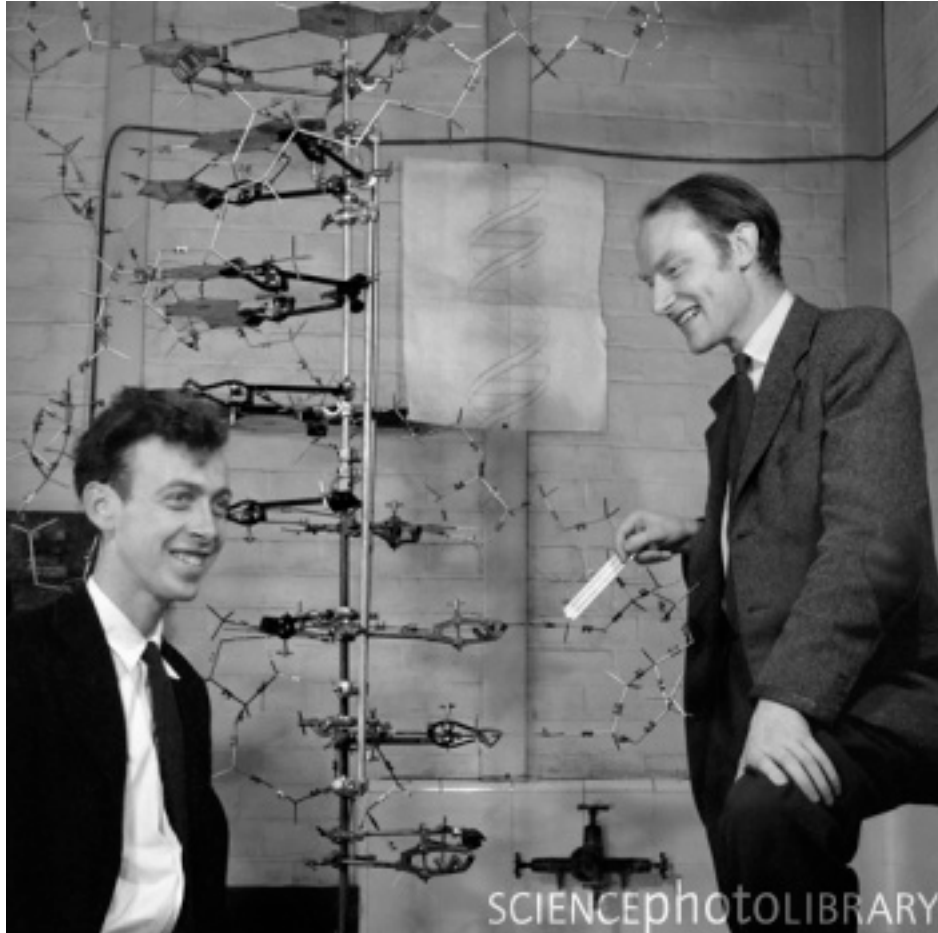
- CPT1A deficiency: a rare genetic disease with infant death or severe illness (hepatic failure triggered by fasting)
- Carnitine palmitoyl transferase 1A facilitates movement of fatty acids into mitochondria
- Severe mutations: 0-5% (usually < 1%) CPT1A activity
- Milder (arctic) variant of the CPT1A gene, c.1436C→T (or, in terms of the protein, p.Pro479Leu) : 5-20% enzyme activity
- Arctic variant often not detected by standard screening on newborn screen (metabolite assay)

CPT1A and post-neonatal deaths

- 2499 blood spot specimens tested for the arctic variant allele
- Found 166 homozygous infants; 165 had at least one Alaska Native parent
- None (0 of 166) detected by newborn screen assay
- 165 of 633 Alaska Native specimens (26%) were homozygous
- In Northern and Western regions, over 50% of AN infants tested were homozygous
- The variant allele was associated with higher infant death risk (case linkage and ecological association)

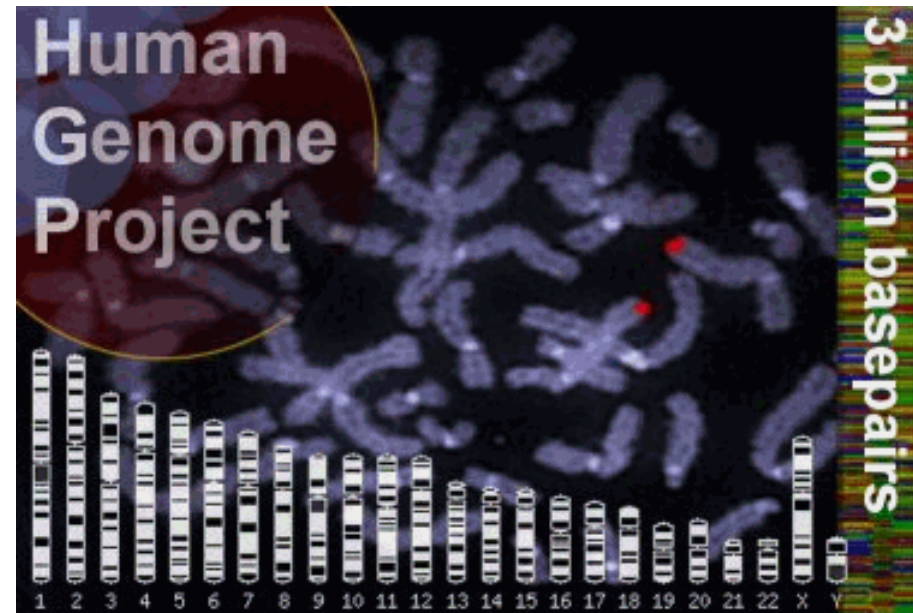
Genetic explanation for racial health differences?

- High tech appeal: clean, objective
- Clinical picture ranges from well infant to ...
SIDS death?
- Why is 1 gene's effect so different in 2 babies?
 - > Epigenetics?
 - > Environment?



1953

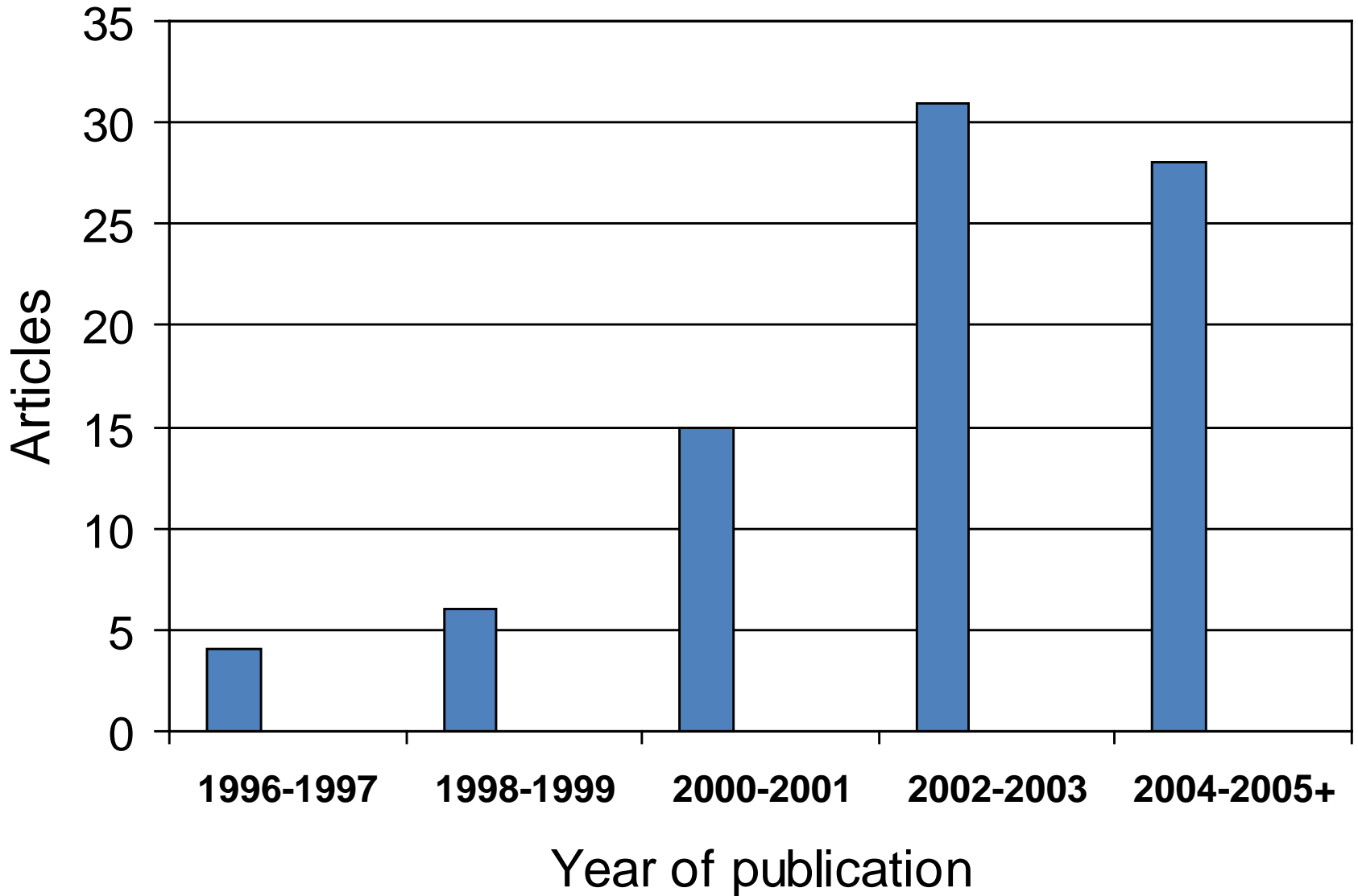
2003



How genetic thinking can mislead us

- Over-simplification (minimize environment)
- Wrong model for most mass diseases
- Stimulates “us” and “them” thinking and identity politics

Indexed Articles: "Preterm Birth" and "Genetics"



“Watson book tour cancelled after racism claims”

Telegraph.co.uk (London)
Oct. 20, 2007



Sunday Times interview:

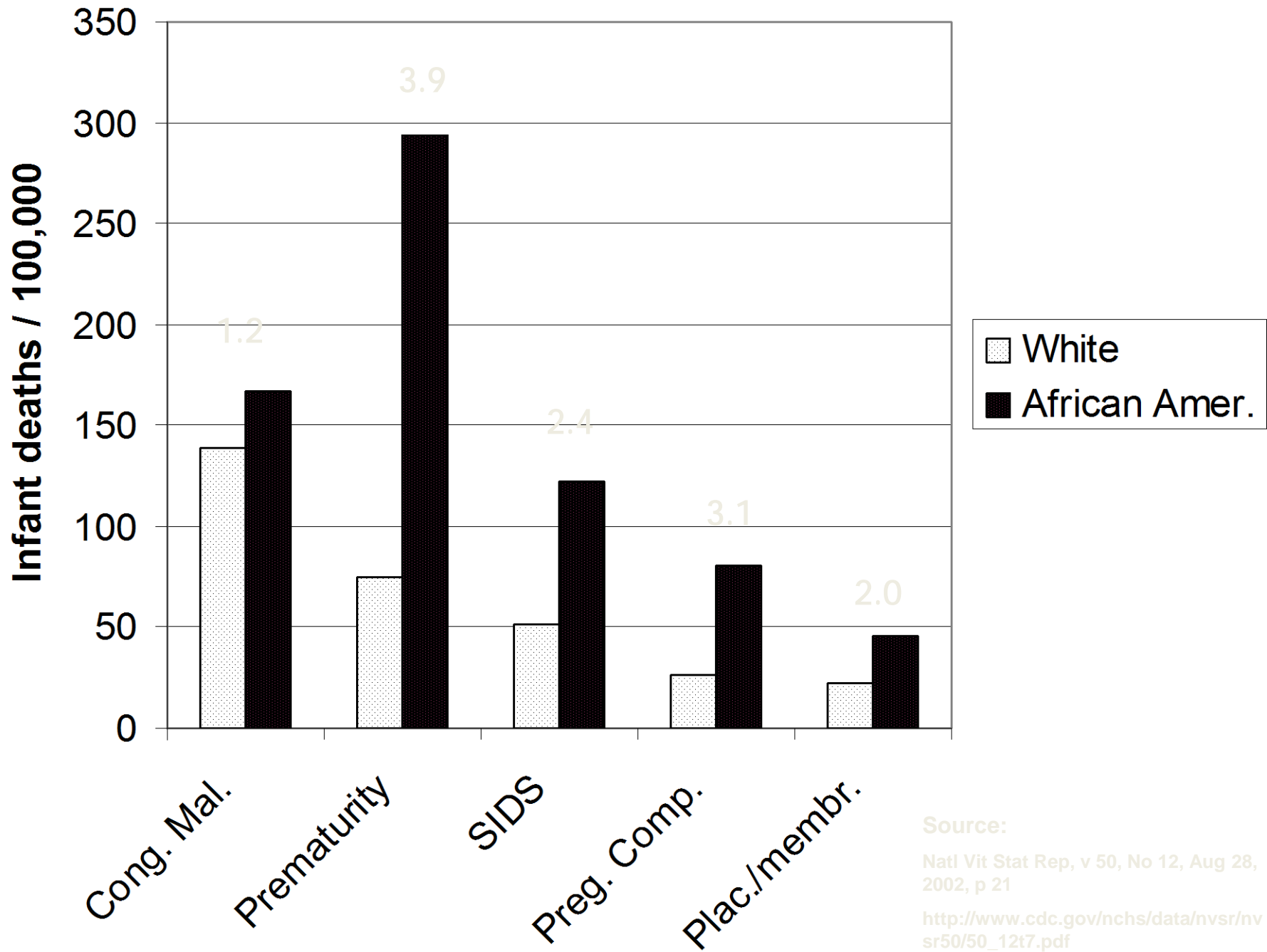
"inherently gloomy about the prospect of Africa" because

"all our social policies are based on the fact that their intelligence is the same as ours - whereas all the testing says not really".

Racial disparity in the leading causes of infant mortality

Alaska, 1992-2001

- Top 3: RR
 - > SIDS/asphyxia 2.7
 - > preterm birth 1.7
 - > congenital anomalies 1.6
- Others
 - > infections 2.2
 - > perinatal issues 1.2
 - > other causes 1.9
 - > neglect/abuse 2.2
 - > sub-optimal medical care 1.6



8 diseases, 2 populations

$$(0.5)^8 = 0.0039$$

(Why should one population have all the bad luck?)

What do we do now?

- Public health response to sickle cell
- ‘Low tech’ interventions are our big success
- Public health means social justice
- Substance abuse, domestic violence, mental illness, environmental exposures, stress

Public health means social justice

We provide health services for all not
just to get better numbers, but
because it's the right thing to do

What do we do now?

Keep up the good work.