

The Benefits, Costs, and Environmental Justice Impacts of a Drinking Water Standard for Hexavalent Chromium

Richard B. Belzer, Ph.D.

Association of Environmental Engineering and Science Professors
Biannual Conference
Advancing Healthy Communities
Ann Arbor, MI

June 22, 2017

California Safe Drinking Water Act

- No higher than federal MCL
- No lower than 'Public Health Goal'
- Must be 'technologically feasible'
- Must be 'economically feasible'

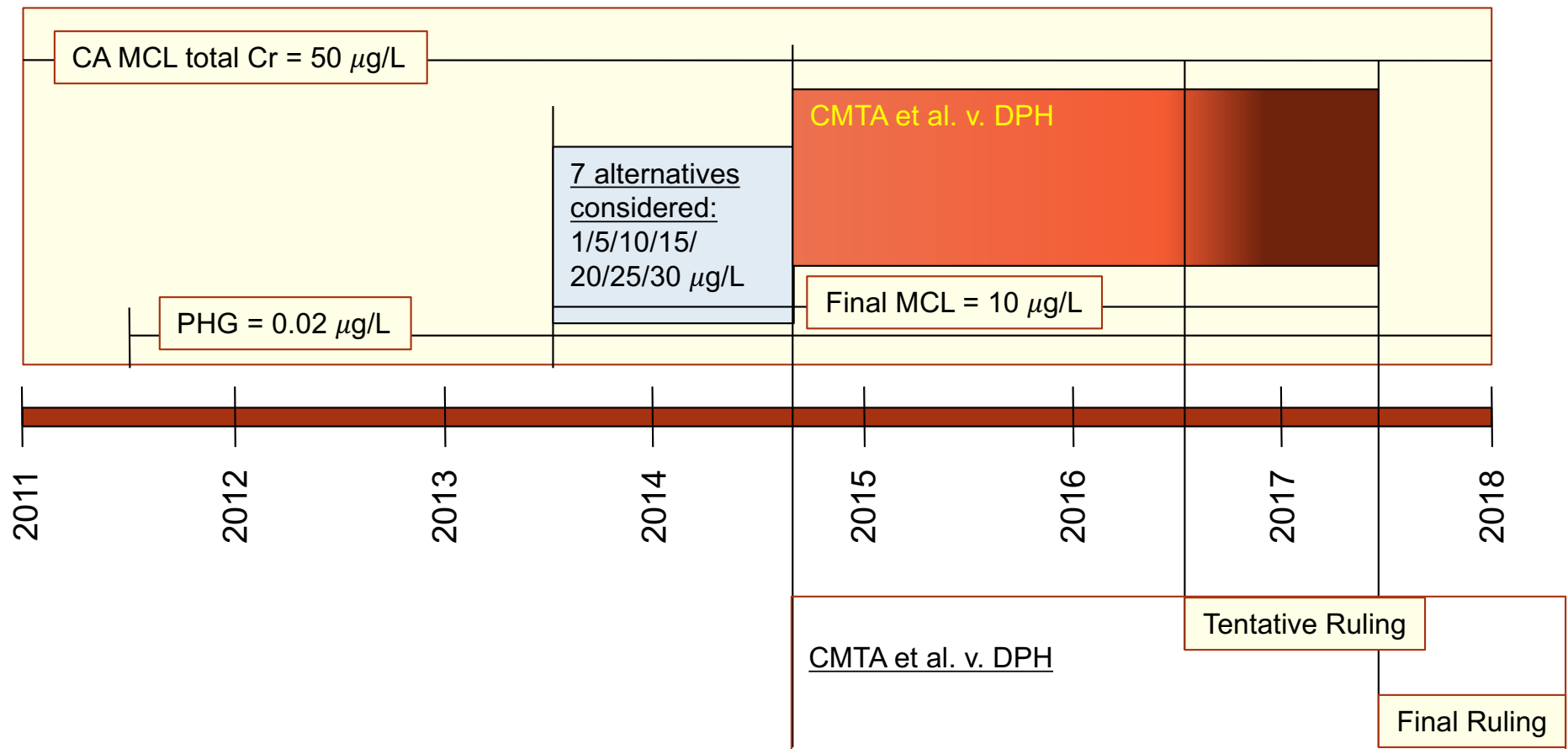
California Safe Drinking Water Act

- No higher than federal MCL
- No lower than 'Public Health Goal'
- Must be 'technologically feasible'
- Must be 'economically feasible'

Feasibility	Statute	Regulation	Practice
Technological	Not defined	Not defined	Defined
Economic	Not defined	Not defined	Not defined

LITIGATION OVER ECONOMIC FEASIBILITY

Hexavalent Chromium MCL Procedural History



CMTA et al. v. State Water Resources Control Board (May 5, 2017)

- Court's analysis
 - No reasoned determination of economic feasibility
 - Cost 'appears, on its face, to be economically *un*feasible for many people', and Dept. 'failed to consider this when it set the MCL'
- Court's decision
 - MCL is remanded and vacated
 - State must determine which MCLs (if any) are economically feasible based on economic analysis

California CrVI MCL

State-reported annualized cost/connection

MCL ($\mu\text{g/L}$)	\$/Connection-Year			
	<200	200-<1k	1-<10k	$\geq 10\text{k}$
1	\$7,160	\$1,200	\$483	\$300
5	\$6,680	\$1,090	\$398	\$117
10	\$5,630	\$857	\$326	\$64
15	\$5,870	\$1,310	\$280	\$37
20	\$5,470	\$1,040	\$190	\$25
25	\$4,240	–	\$14	\$17
30	\$4,140	–	\$200	\$11

Source: California Dept. of Public Health (2013)

California CrVI MCL

State-reported annualized cost/connection

MCL ($\mu\text{g/L}$)	\$/Connection-Year			
	<200	200-<1k	1-<10k	$\geq 10\text{k}$
1	\$7,160	\$1,200	\$483	\$300
5	\$6,680	\$1,090	\$398	\$117
10	\$5,630	\$857	\$326	\$64
15	\$5,870	\$1,310	\$280	\$37
20	\$5,470	\$1,040	\$190	\$25
25	\$4,240	–	\$14	\$17
30	\$4,140	–	\$200	\$11

Source: California Dept. of Public Health (2013)

California CrVI MCL: Households Affected and 'Affordability'

MCL ($\mu\text{g/L}$)	\$/Household/ Year	Households	Income Needed for CrVI MCL to be 'Affordable'
1	\$7,160	13,225	\$286,400
5	\$6,680	5,023	\$267,200
10	\$5,630	2,453	\$225,200
15	\$5,870	1,227	\$234,800
20	\$5,470	535	\$218,800
25	\$4,240	140	\$169,600
30	\$4,140	95	\$165,600

ECONOMIC FEASIBILITY AND ENVIRONMENTAL JUSTICE

Regulation, Risk, Economics and Information Quality ♦ Strategy and Analysis
www.rbbelzer.com ♦ rbbelzer@post.harvard.edu

'Affordability' Is Arbitrary, Inconsistent with Household Decision Making, and Regressive

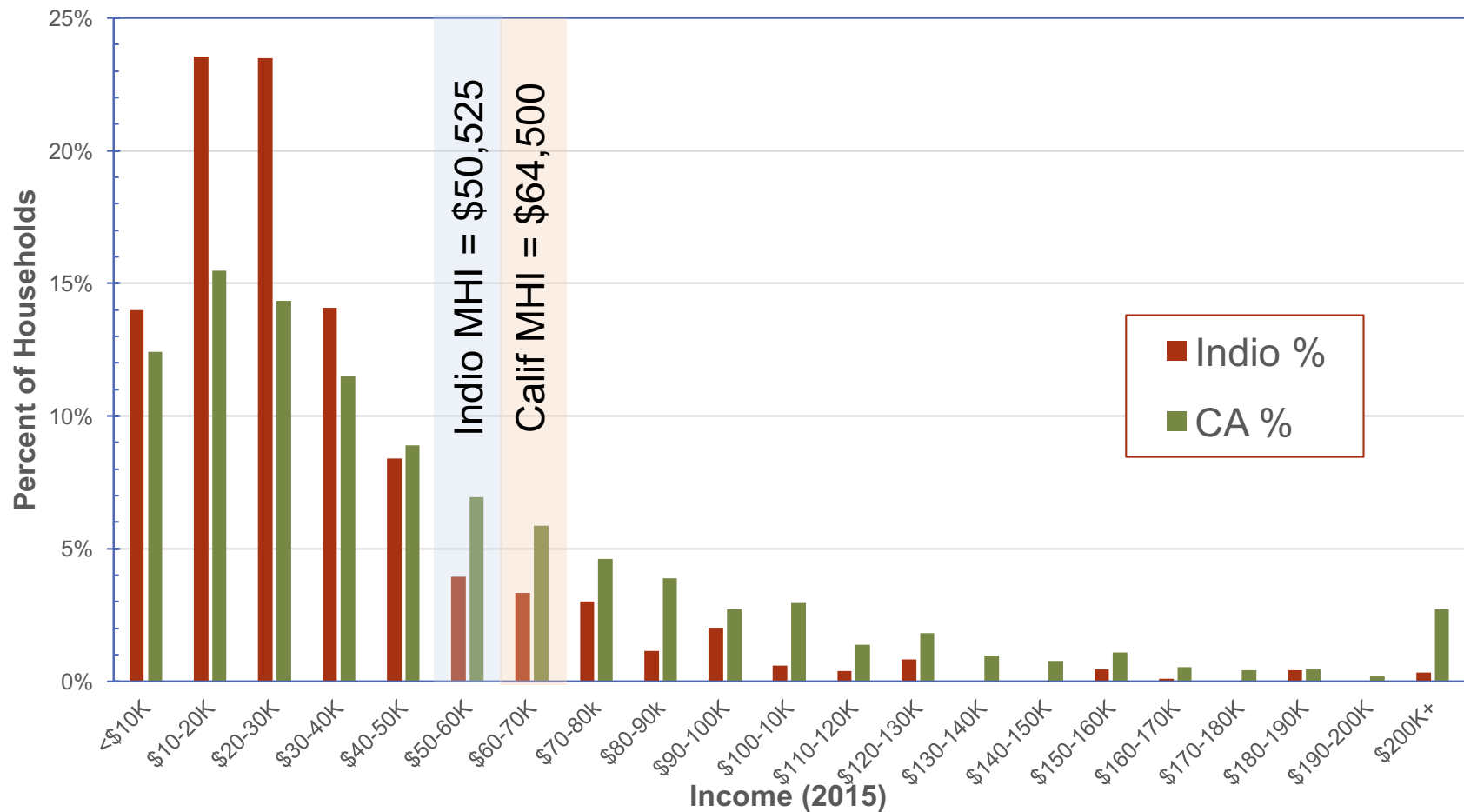
- Numerators and denominators are arbitrary
- Household decisions never ignore benefits
- Any fixed percentage of income is regressive

How 'Affordability' Makes the Poor Pay More: Alternative domains for MHI, Indio CA

Domain	Median Household Income (MHI)
US	\$ 53,889
California	\$ 64,500
Riverside County	\$ 56,603
Indio-Blythe-La Quinta	\$ 50,525

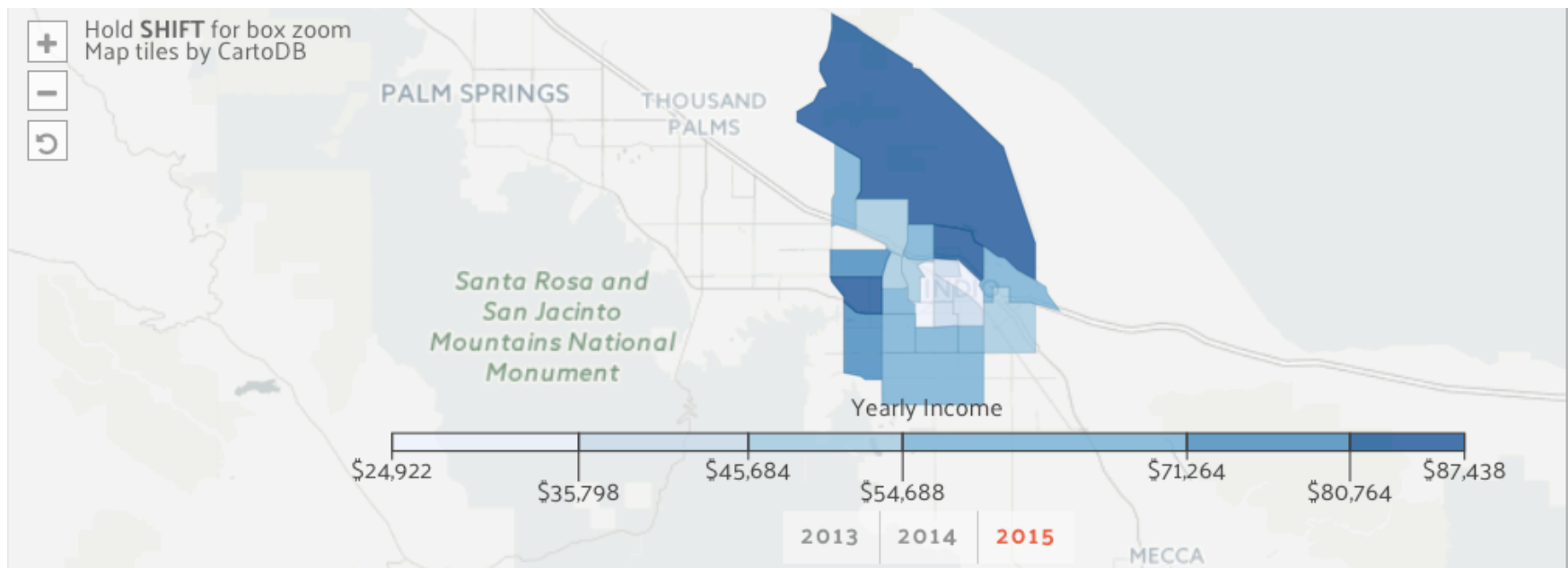
Source: DataUSA (2017)

How 'Affordability' Makes the Poor Pay More: Wage distribution, Indio v. California



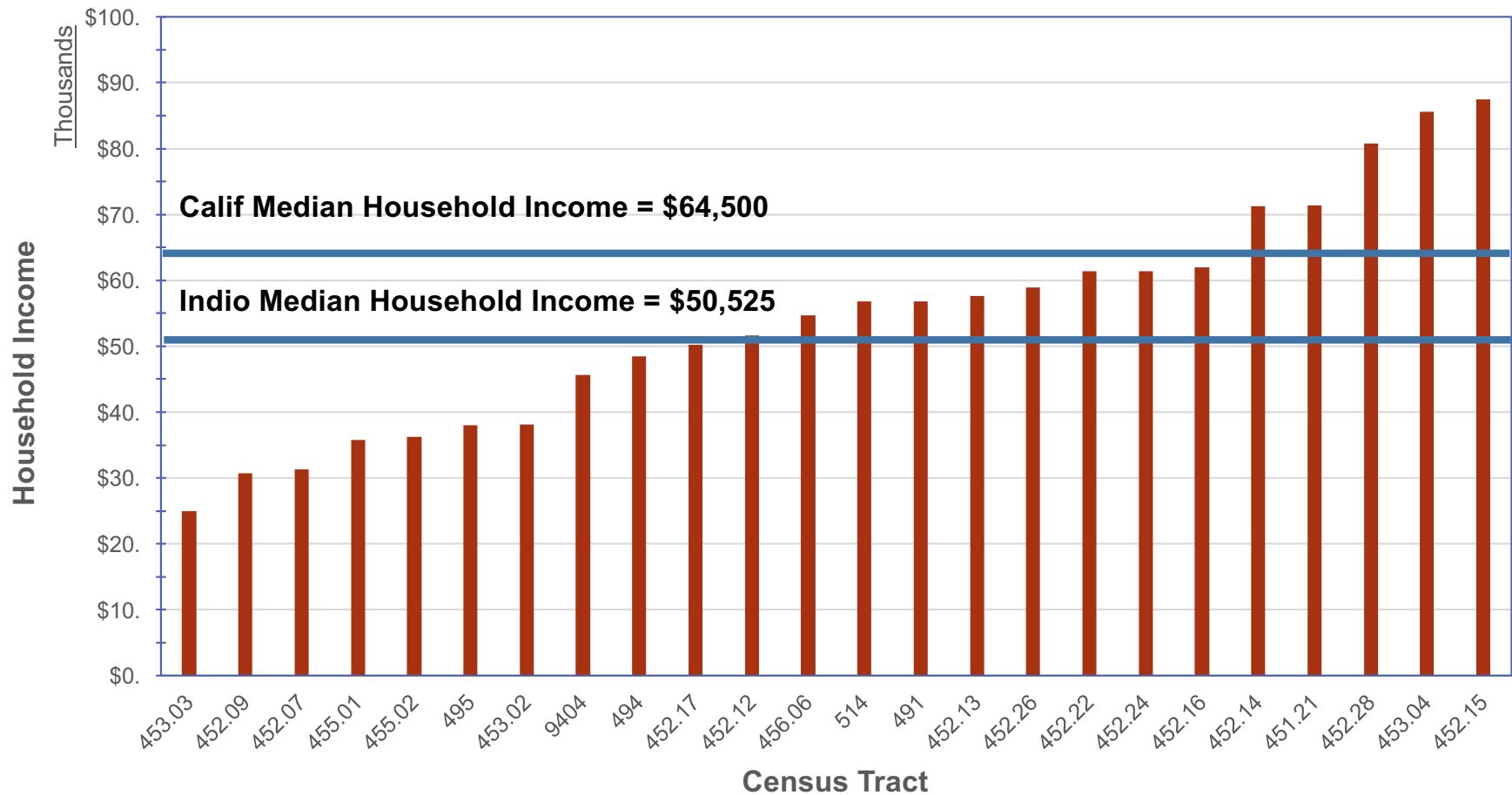
Source: DataUSA (2017)

How 'Affordability' Makes the Poor Pay More: Average household income by Census tract, Indio CA



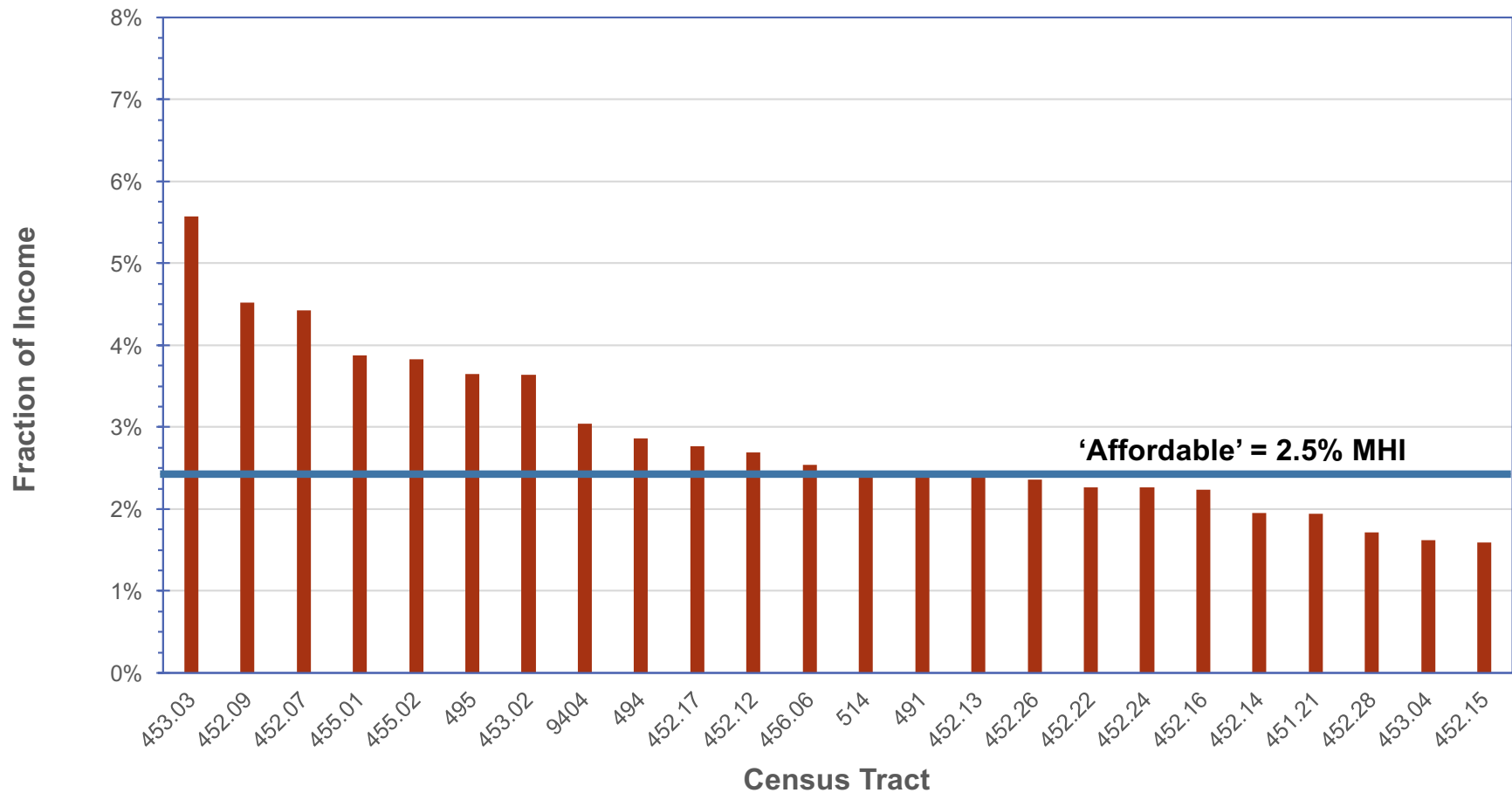
Source: DataUSA (2017)

How 'Affordability' Makes the Poor Pay More: Average household income by Census tract, Indio CA



Source: DataUSA (2017)

How 'Affordability' Makes the Poor Pay More: 'Affordability' fraction by Census tract, Indio CA

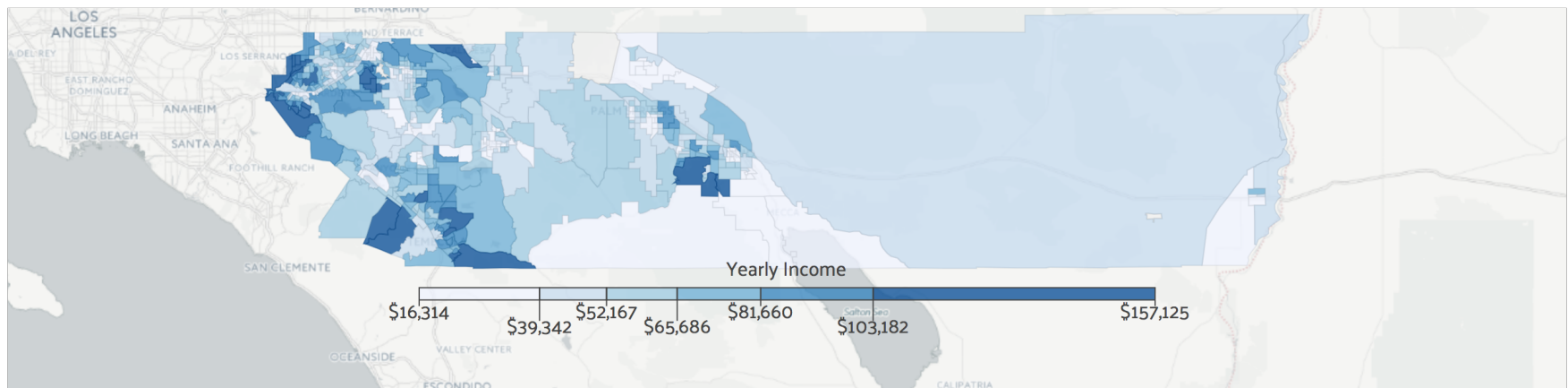


Source: DataUSA (2017)

How 'Affordability' Makes the Poor Pay More: Variability is even more extreme with larger domains

Income by Location in Riverside County, Ca

Based on data from California



Dataset: ACS 5-year Estimate
Source: Census Bureau

DATAUSA:

Census Tract	Avg Household Income Indio	Avg Household Income Riverside Co
Lowest (465)	\$24,992	\$16,314
Highest (306.01)	\$87,438	\$157,125

SOLVING THE ECONOMIC FEASIBILITY RIDDLE

A Proposed Three-Part Analytic and Decision-Making Process

- Part 1: Build the technological feasibility matrix
 - Objectively estimate full opportunity cost of treatment
 - Repeat for each system at each alternative MCL
 - Affirm for each pair if MCL can be consistently achieved
-

A Proposed Three-Part Analytic and Decision-Making Process

- Part 1: Build the technological feasibility matrix
 - Objectively estimate full opportunity cost of treatment
 - Repeat for each system at each alternative MCL
 - Affirm for each pair if MCL can be consistently achieved
 - Part 2: Build the economic feasibility matrix
 - Objectively and dynamically estimate risk reduction
 - Repeat for each system at each alternative MCL
 - Affirm for each pair if benefits exceed costs
-

A Proposed Three-Part Analytic and Decision-Making Process

- Part 1: Build the technological feasibility matrix
 - Objectively estimate full opportunity cost of treatment
 - Repeat for each system at each alternative MCL
 - Affirm for each pair if MCL can be consistently achieved
 - Part 2: Build the economic feasibility matrix
 - Objectively and dynamically estimate risk reduction
 - Repeat for each system at each alternative MCL
 - Affirm for each pair if benefits exceed costs
 - **Part 3: Manage inequitable effects on the poor**
 - **Equal protection = equal price for same risk reduction**
 - **System-specific MCLs with variances?**
 - **Public financing?**
-

References

1. Belzer, RB (2013a). A Review of the California Department of Public Health's Cost-Benefit Analysis in Support of a Proposed Primary Drinking Water Standard for Hexavalent Chromium (CrVI). Oct. 9
 2. Belzer, RB (2013b). A Review of the California Department of Public Health's Cost-Benefit Analysis in Support of a Proposed Primary Drinking Water Standard for Hexavalent Chromium (CrVI): Addendum with Third--Party Cost Estimates. Dec. 12.
 3. Belzer, RB (2013c). Costs and Benefits of a Hexavalent Chromium Drinking Water Standard in Willows and Dixon, California. Dec. 6.
 4. California Cancer Registry (2013). Invasive Cancer Incidence, 1995-2014; Small Intestine <http://www.cancer-rates.info/ca/>.
 5. CMTA et al. v. State Water Resources Control Board (Superior Court, Sacramento Co.).
 6. DataUSA. <https://datausa.io>.
 7. Najm, I (2013). Review of CDPH's Economic Analysis Supporting the Draft California MCL for Hexavalent Chromium in Drinking Water. Water Quality & Treatment Solutions, Inc.
 8. Office of Environmental Health Hazard Assessment [OEHHA] (2011). Public Health Goals for Chemicals in Drinking Water: Hexavalent Chromium (Cr VI) [PHG].
-

Questions?

Richard B. Belzer

rbbelzer@post.harvard.edu

(703) 780-1850