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

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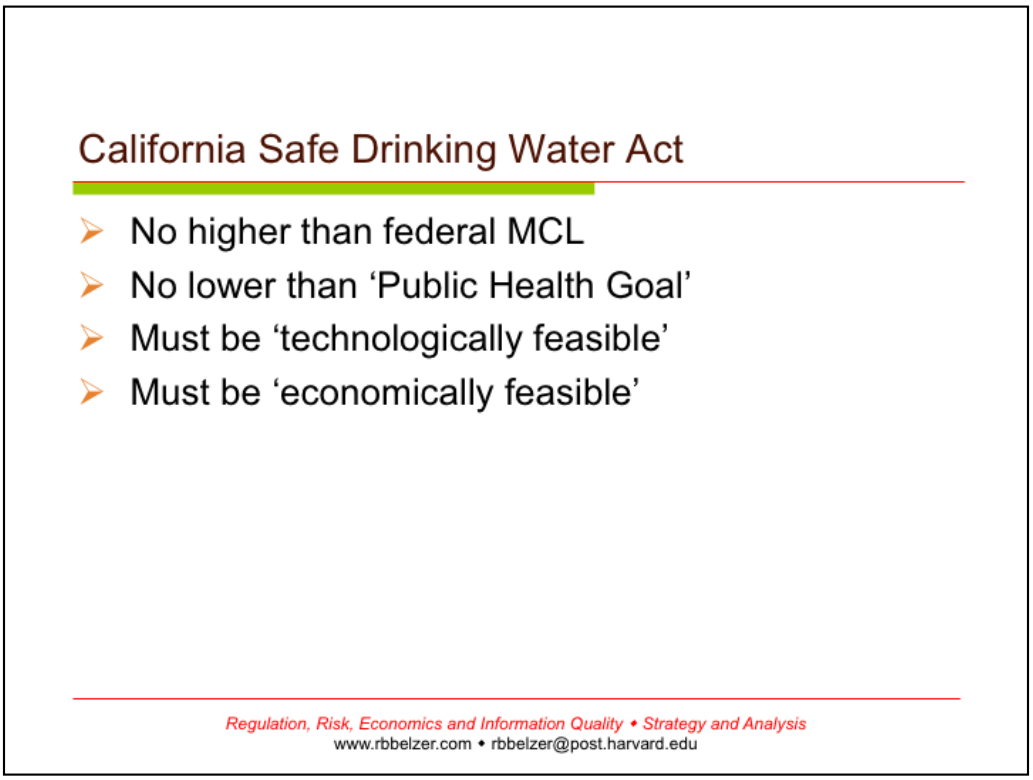
- Thank you very much for attending this early morning session. I hope to reward you by being a bit provocative.
- I am going to assume that you are:
  - familiar with hexavalent chromium,
  - possibly familiar with California's 2014 promulgation of a primary drinking water standard, and
  - not aware that the standard was remanded and vacated in May 2017.
- I am going to argue, and show with evidence, that a fundamental reconsideration of drinking water regulation is now required.



- The California Safe Drinking Water Act is very similar to federal law.
- Both require that primary standards be technologically feasible and economically feasible.
- California regulators must set the MCL as close as feasible to the "Public Health Goal," California's equivalent of an MCLG.
    - MCLGs are products of safety assessments, not risk assessments.
    - Because safety assessments are risk management tools, they cannot be used to objectively estimate the risk reduction achieved by any MCL.

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

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- Neither type of feasibility is defined by statute or regulation.
- "Technological feasibility" is defined by practice. There must be a consensus among engineers that:
  - There is a treatment technology that works,
  - This technology works reliably, and
  - Works for all water systems.
- "Economic feasibility" is not defined by practice.
  - Pre-1996, USEPA interpreted it to mean "affordability."
  - California regulators have never defined it.
- Hexavalent chromium is the end of the line for "affordability" because treatment simply isn't affordable for small systems.

LITIGATION OVER ECONOMIC FEASIBILITY

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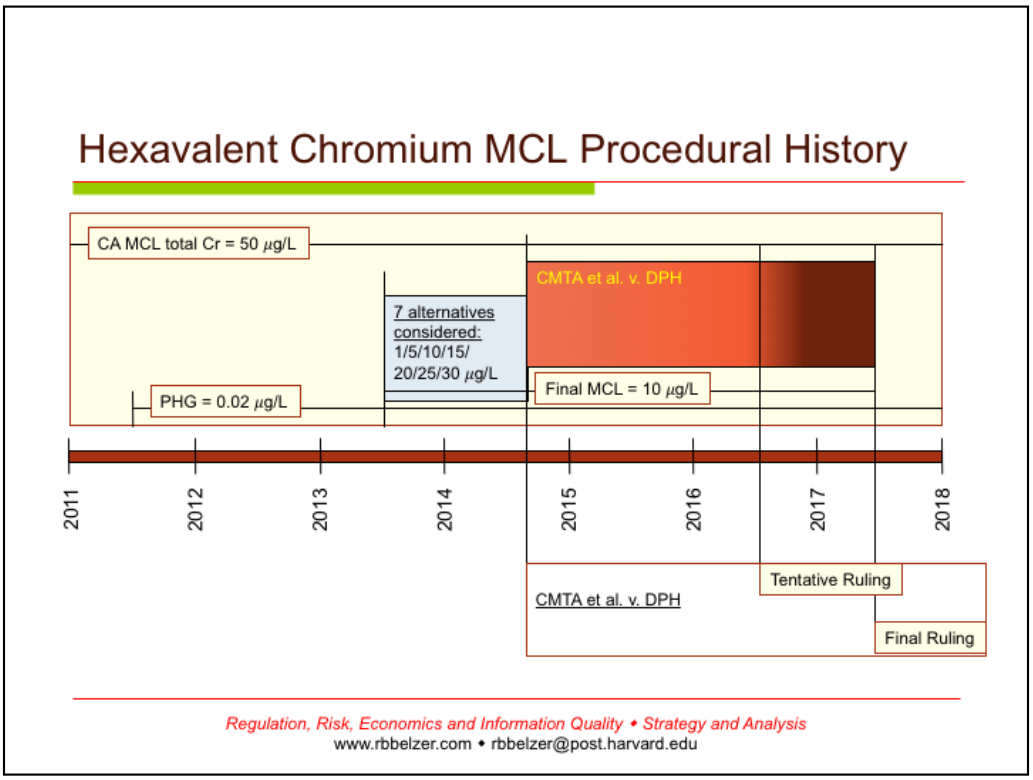
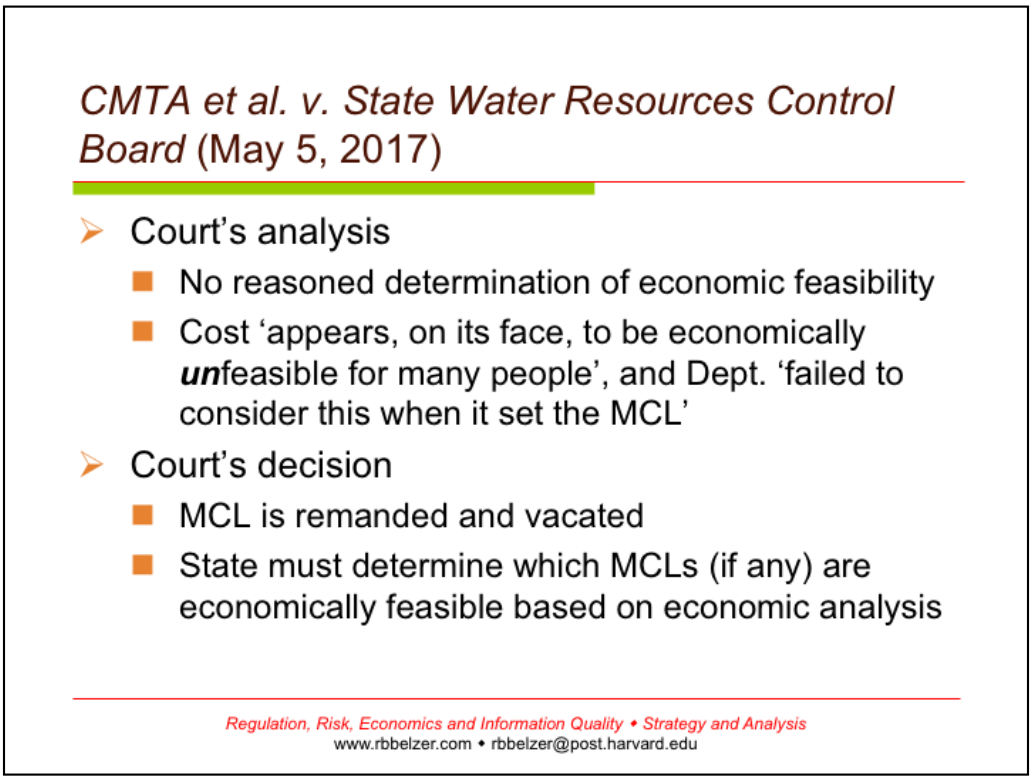


- Here is the procedural history of the Cr6 rulemaking including litigation filed in June 2014 by the California Manufacturers and Technology Association and the Solano County Taxpayers Association. (The City of Dixon, mentioned earlier, is located in Solano County. Residents there faced 2-3x increases in their water bills because of this MCL.)
- In August 2016, the court issued a tentative ruling overturning the MCL
- In May 2017, the court finalized this ruling and vacated it. Today, there is no MCL for Cr6.



- The court agreed with the plaintiffs that
  - The law requires the State to determine that its MCL is economically feasible.
  - That determination must have a reasoned basis grounded in analysis.
  - Based on the State's own cost estimates, the MCL appears not to qualify.
- So the court remanded and vacated the 2014 regulation, and directed the State to make a determination grounded in economic analysis.

California CrVI MCL

State-reported annualized cost/connection

	$/Connection-Year			
MCL (μg/L))	<200	200-<1k	1-<10k	≥10k
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)

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Here is what motivated the court to rule as it did:

- Cost for small systems was estimated at $5,650 / year, or $469 / month
- The State replied that most would pay only $64/year, an argument the court found irrelevant.

California CrVI MCL

State-reported annualized cost/connection

	$/Connection-Year			
MCL (μg/L)	<200	200-<1k	1-<10k	≥10k
1	$7,160	$1,200	$483	$300
5	$6,680	$1,090	$398	$117
10	$5,630	**$857**	**$326**	**$64**
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- The court did not address this, but the cost for households served by small systems was high regardless of the MCL.
  - The reason, of course, is that the cost of treatment does not depend on the MCL
  - All that matters is whether a water system has to install treatment

California CrVI MCL:
Households Affected and 'Affordability'

MCL (μg/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

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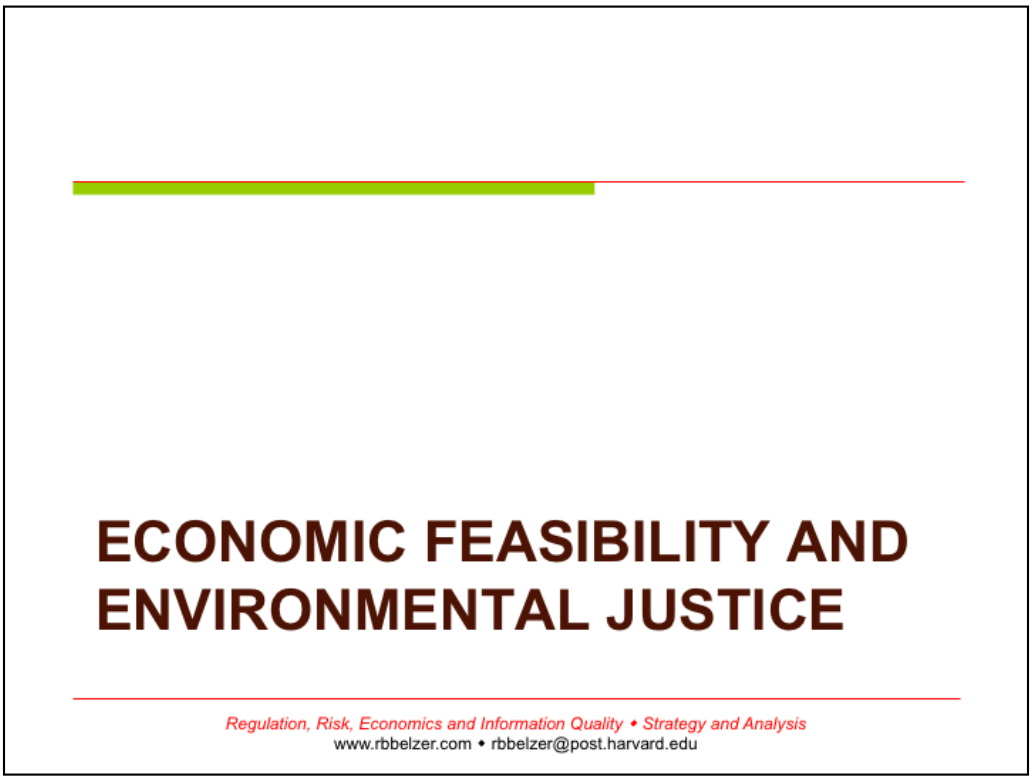
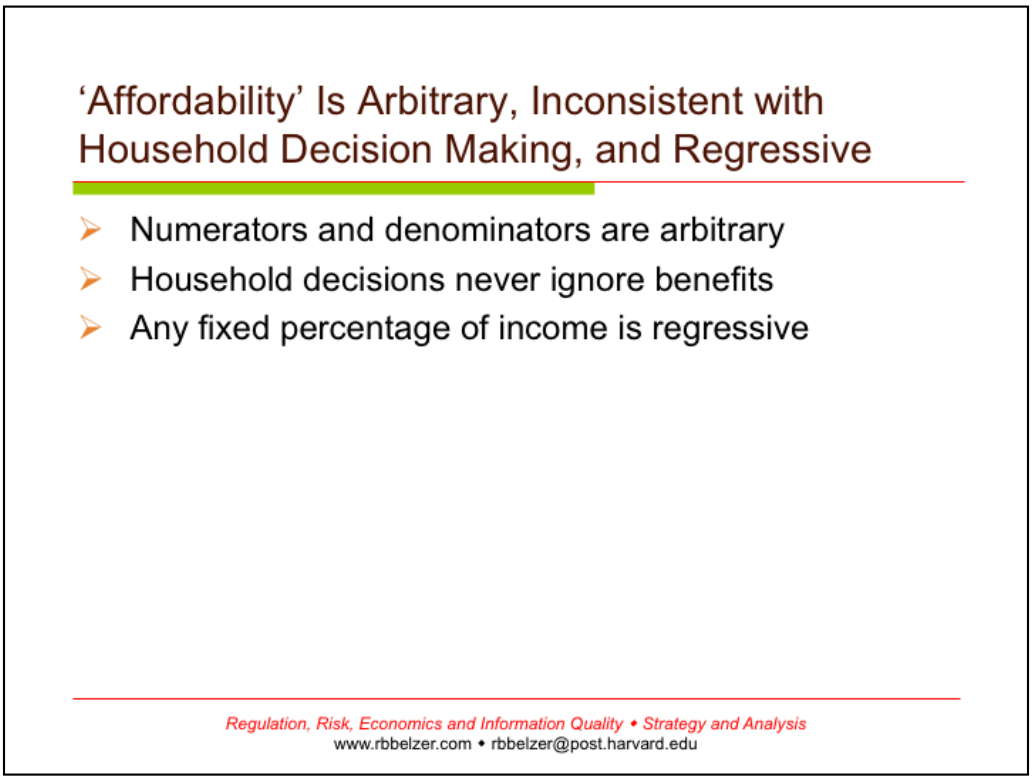
- The agency estimated that more than 2,000 households would have to pay this amount.
- The agency said they were unimportant; the Court disagreed.
- The right column does the implied arithmetic to show how much income these households must have just for Cr6 treatment alone to not exceed 2.5% of income.
- When other MCLs are taken into account, even more income would be required.
- Wealthiest county in California is Santa Clara
  - MHI = $102,340
  - Average income range across Census tracts:
    - Lowest: $22,357
    - Highest: $230,125
- $5,630 exceeds 2.5% of average income even in the richest Census tract in Santa Clara County



- I will first explain why 'affordability' is a bad conceptual proxy for economic feasibility.
- Then I will show how 'affordability' is incompatible with environmental justice



- Both the numerator and denominator are arbitrary
  - For the numerator: Why 2.5% and not 0.25% or 25%?
  - For the denominator: Why median? Median of what?
- Unlike 'affordability', Household decisions never ignore benefits
  - If price exceeds value, consumers don't buy
  - Consumers pay less if they are uncertain about value
  - And they pay nothing for 'theoretical' goods and services, like theoretical risk reductions
- Using any fixed percentage of income is regressive
  - Marginal utility of income is higher for the poor
  - If the denominator includes people who are not poor, the poor pay a higher fraction of their income

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)

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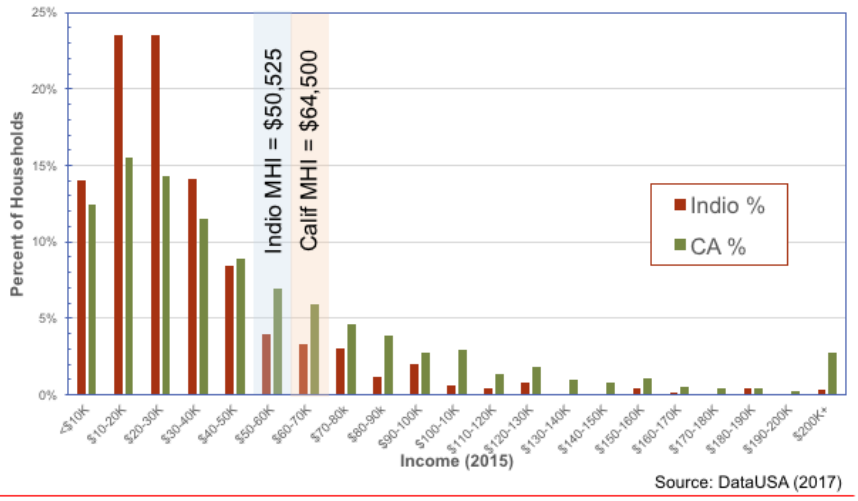
- California counties ranked by MHI
  - #1 Santa Clara $93,854
  - #22 Riverside $56,592
  - #57 Lake $35,997
- 1,440 California places ranked by MHI
  - #1 Hidden Hills (Los Angeles) $245,694
  - #858 Indio $47,922 (not a college town)
  - #1440 Verdi (Sierra Co) $4,853

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



Source: DataUSA (2017)

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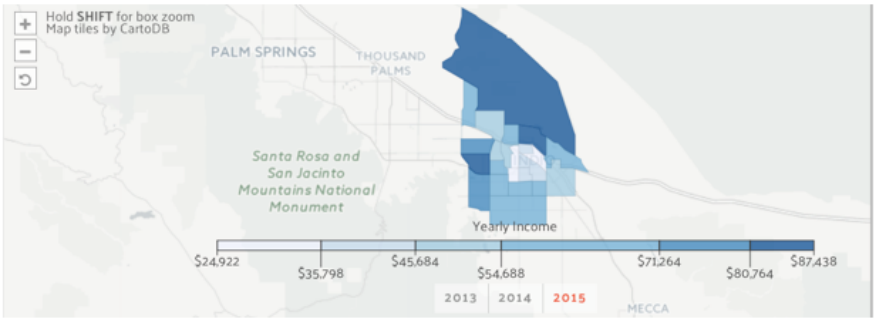
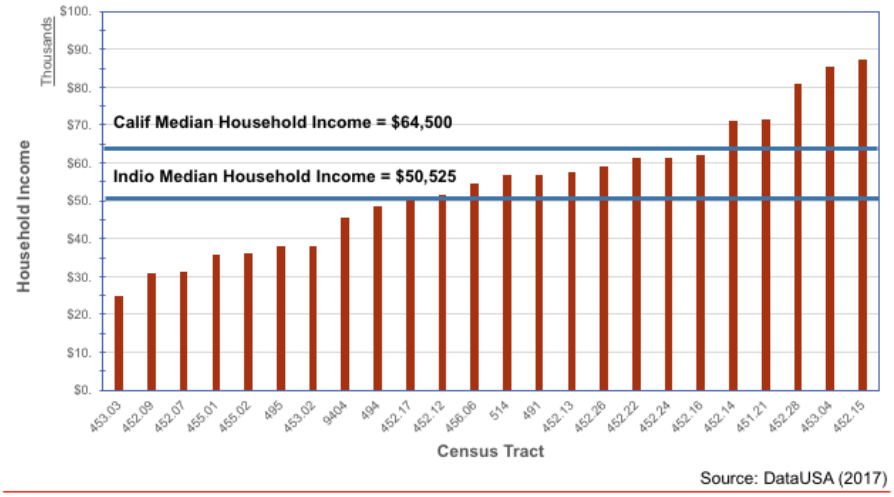
How 'Affordability' Makes the Poor Pay More:
Average household income by Census tract, Indio CA



Source: DataUSA (2017)

- Highest-income Census Tract: 0452.15
  - MHI = $87,438
- Lowest-income Census Tract: 0453.03
  - MHI = $24,922

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



Source: DataUSA (2017)

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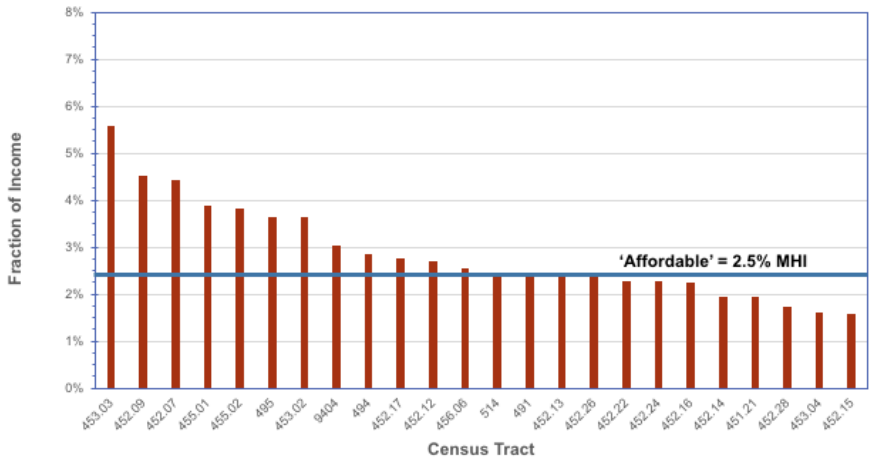
- Using the Statewide MHI (as the agency did)
  - 20 of 24 Census Tracts have lower average income
- Using the Indio MHI
  - 10 of 24 Census Tracts have lower average income
- Thus
  - Using Statewide MHI severely punishes poor communities
  - Using Indio's MHI would have punished them less, but still left substantial inequity unaddressed

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



Source: DataUSA (2017)

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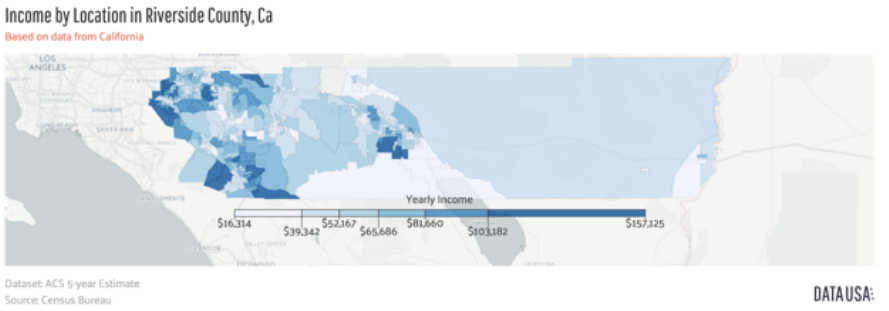
- When 'affordability' is defined as 2.5% of MHI
  - Residents of 11 of 24 (46%) Census Tracts pay more than 2.5%
  - Residents of the poorest Census Tract pay 5.6% of household income
  - Residents of 9 of 24 (38%) Census Tracts pay less than 2.5%
  - Residents of the wealthiest Census Tract pays 1.6%

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



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

Range for Indio = $62,446 (3.5x)

Range for Riverside County = $140,811 (9.6x)

SOLVING THE ECONOMIC FEASIBILITY RIDDLE

- In short, we need to abandon ‘affordability’ as a proxy for economic feasibility
    - It relies on arbitrary numerators and denominators,
    - It is inconsistent with household decision-making, and
    - It systematically penalizes people for being poor

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

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  - 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
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  - 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

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Thank you very much for your attention this morning.

I will be around the rest of the day if you have questions.