Consolidated Management of Nitrate Treatment: Implementation, Demonstration, and Affordability Assessment

UC-Davis - CA Prop 50 Nitrate Project

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Agenda

- What does affordability mean?
- How is it measured?
- What can we do about it?
- What we can investigate in this research

Affordability: What Does it Mean?

- Affordability is a subjective concept
  - It is normative; it involves judgment
  - There is no right or wrong measure
  - There is no bright line; there is a continuum
- Affordability concerns large as well as small systems
- Affordability is a growing concern
  - Water bills already rising at pace > CPI
  - Many future upward pressures on water costs
  - Real incomes of the poor are going down

Three Levels of Applicability

- **National** Level
  - Regulatory context (I.e., is a rule affordable?)
  - Financial support (E.g., is SRF adequate?)
- **Utility or Community** Level
  - Do collectable revenues meet cost recovery?
  - Will lenders offer needed capital financing?
- **Household** Level
  - Can increased water bill be paid? (Will it?)
  - What does household sacrifice to pay water bill?

Affordability Begins at the Household Level

- Affordability ultimately concerns households, because households ultimately bear the costs
- Affordability not solely an issue for regulatory concerns
  - Pertains to any factors that drive water costs up to levels that adversely affect households
  - E.g., infrastructure renewal costs, security-related expenses, new source development
- Affordability concerns for potable water compounded by cost escalations for wastewater and stormwater management

Defining Affordability

- Household monthly water bills that do not impose ***undue economic hardship*** on low-income households.
- Households do not need to ***displace other essential services*** (e.g., medical care, food, or energy) to pay their water bills.
- Affordability is subjective:
  - What constitutes a “low income” household?
  - What types and levels of economic tradeoffs constitute an undue hardship?

Affordability is a Growing Concern

- Water bills already rising at pace > CPI
- Many future upward pressures on water costs
- The portion of low-income households in the US is significant.
  - In 2016, approximately 14% of the U.S. population lived below the federal poverty level (FPL)
  - **200% of FPL needed for a low-income family to meet basic needs – 32% of U.S. residents live below 200% of the FPL**
- Real incomes of the poor are going down
- Inability to pay bills increases utility costs associated with collections and shut-offs

Evidence of Economic Hardships for Low Income Households

About 1 person in 5 lives in a household that had at least one difficulty meeting basic needs (Bauman, 1998)

- Did not pay full gas, electric, oil: 9.9%
- Needed to see dentist but did not: 7.0%
- Did not pay full mortgage or rent: 6.8%
- Needed to see doctor but did not: 5.7%
- Not enough food to eat: 4.8%
- Telephone disconnected: 3.8%
- Evicted for nonpayment of rent: 0.4%

Water Affordability Through the Ages

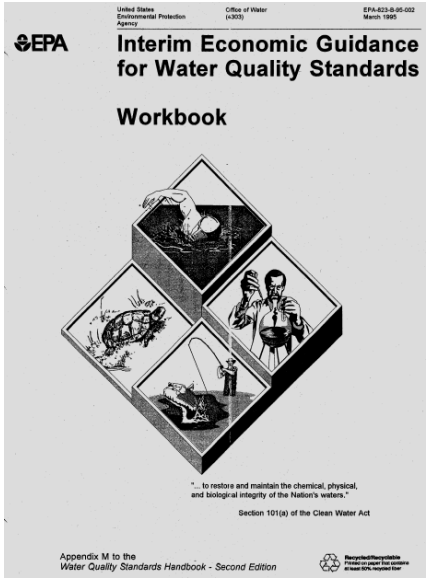
- Late 1970s: Small systems the focus
  - Costs per customer high due to lack economies of scale
  - Federal grants envisioned (akin to large CWA Construction Grants program for wastewater treatment systems)
  - Regionalization envisioned as remedy
- 1980s: EPA regulatory inaction prompts backlash of prescriptive 1986 SDWAA
  - Mandate for many new regs
  - Switch from grants to SRF approach, and limited federal funding
- 1990s: Arsenic and slew of other MCLs prompt cost outcry, and SDWAA of 1996 offers limited relief
  - Benefit-cost to justify MCLs
  - Small system variance technology provision

Affordability through the Ages (cont.)

- 2000s: EPA's Small System Variance Technology
  - Mandated in SDWAA of 1996
  - Activated by response to Arsenic MCL affordability
  - NDWAC and SAB weigh in, but no real action
- 2010s: Focus shifts to Larger Systems
  - Escalating water sector costs and, hence water bills
  - More economically challenged households
  - Emphasis on Utility-led Customer Assistance Programs
- 2017: Court Ruling on Chrome VI MCL
  - "Feasibility" includes *economic* feasibility
  - Economic feasibility implies household affordability
  - Small system costs per household deemed unaffordable

Measuring Affordability: EPA Criteria for Wastewater

- Relieve undue economic stress from federal **wastewater-related** mandates
- Indicates when EPA should provide flexibility:
  - Compliance standards (1995)
  - Schedule (1997)
- EPA Guidance includes a two-tiered economic "test"



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Measuring Affordability: EPA Criteria for Wastewater

The indicator everybody loves to hate (aka the 2% rule)

Residential Affordability Indicator

$$= \frac{\text{Average total water pollution cost per household}}{\text{Median household income}}$$

Low economic impact: < 1.0% of MHI
Mid-range economic impact: between 1.0% - 2.0% of MHI
Large economic impact: > 2.0% of MHI

Affordability at the National Level (under the 1996 SDWAA)

- Arises in context of whether a national drinking water regulation is “affordable”
- Under SDWAA of 1996, specific provision for EPA to define a “Small System Variance Technology”

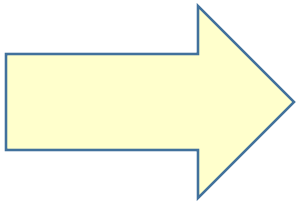
Affordability at the National Level (under the 1996 SDWAA)

- Arises in context of whether a national drinking water regulation is "affordable"
- Under SDWAA of 1996, specific provision for EPA to define a "Small System Variance Technology"
- IF EPA finds none of the BATs for rule "affordable", then EPA may define a "variance technology"
  - Variance technology costs less than BAT, and also delivers less contaminant removal
  - States can opt to allow a small CWS to use variance technology in lieu of BAT

Measuring Affordability: EPA input for Drinking Water

EPA established 2.5% of MHI for assessing national-level affordability …. Based on bottled water costs

…. Developed in context of developing its "small system variance technology" threshold



Combined annual water and wastewater bill < 4.5% of MHI is affordable

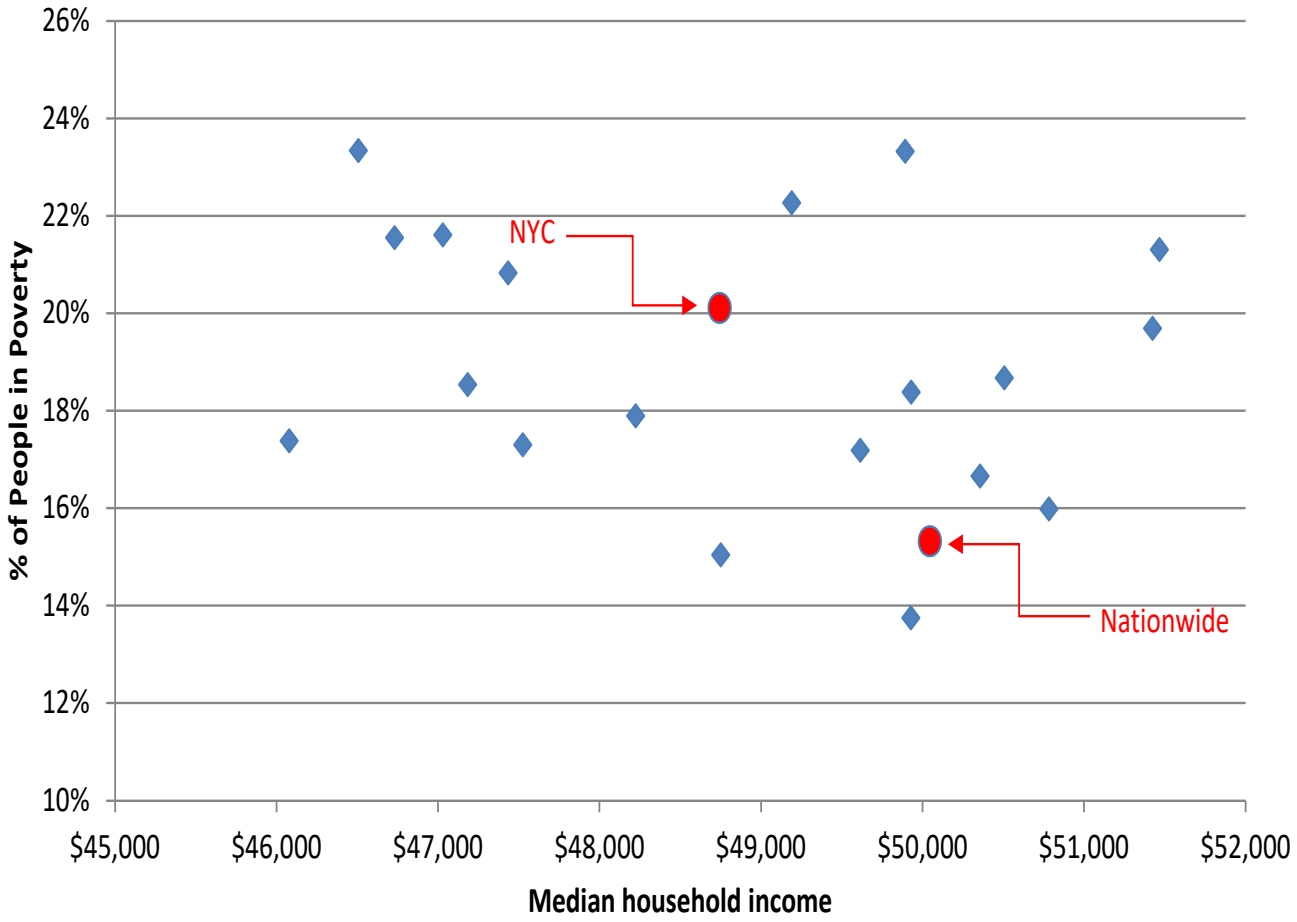
Measuring Affordability: Why 2%, 2.5%, 4.5%?

- Use of MHI metric dates back to at least 1970s, when EPA introduced affordability into its Construction Grants program for WWTPs
- EPA adopted 2% metric to evaluate whether utilities had the capacity to finance and manage WWTPs
- EPA may have adopted 2% from programs that predate the 1972 federal CWA (e.g., USDA rural assistance programs)

Why MHI? MHI Alone is Poor Indicator of Affordability

- Does not capture impacts across large and/or highly diverse communities
  - Across household types and at different ends of income spectrum
- Bears little relationship to poverty or other measures of economic need
- Does little to inform customer assistance program development

MHI is a Poor Indicator of Poverty and Affordability



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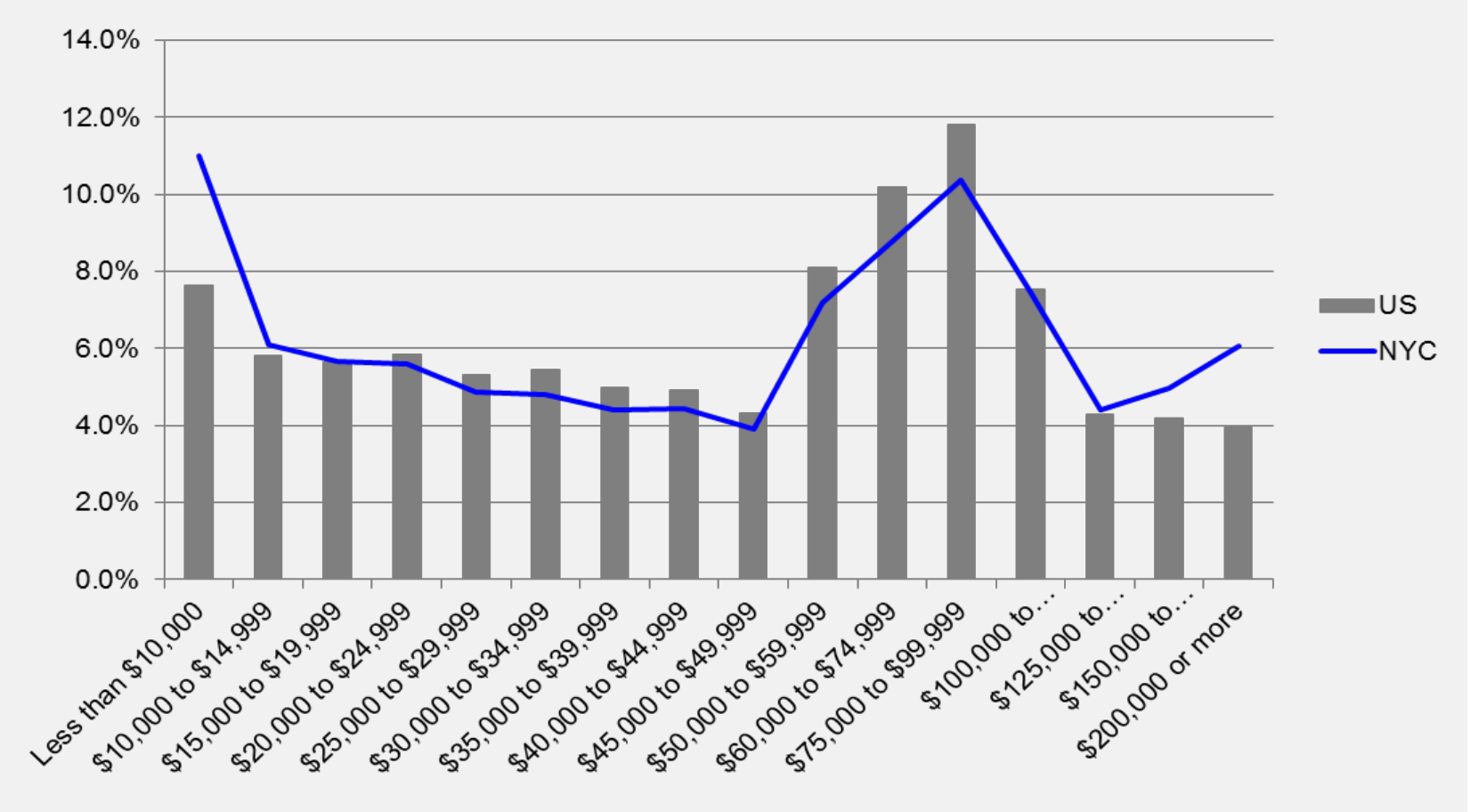
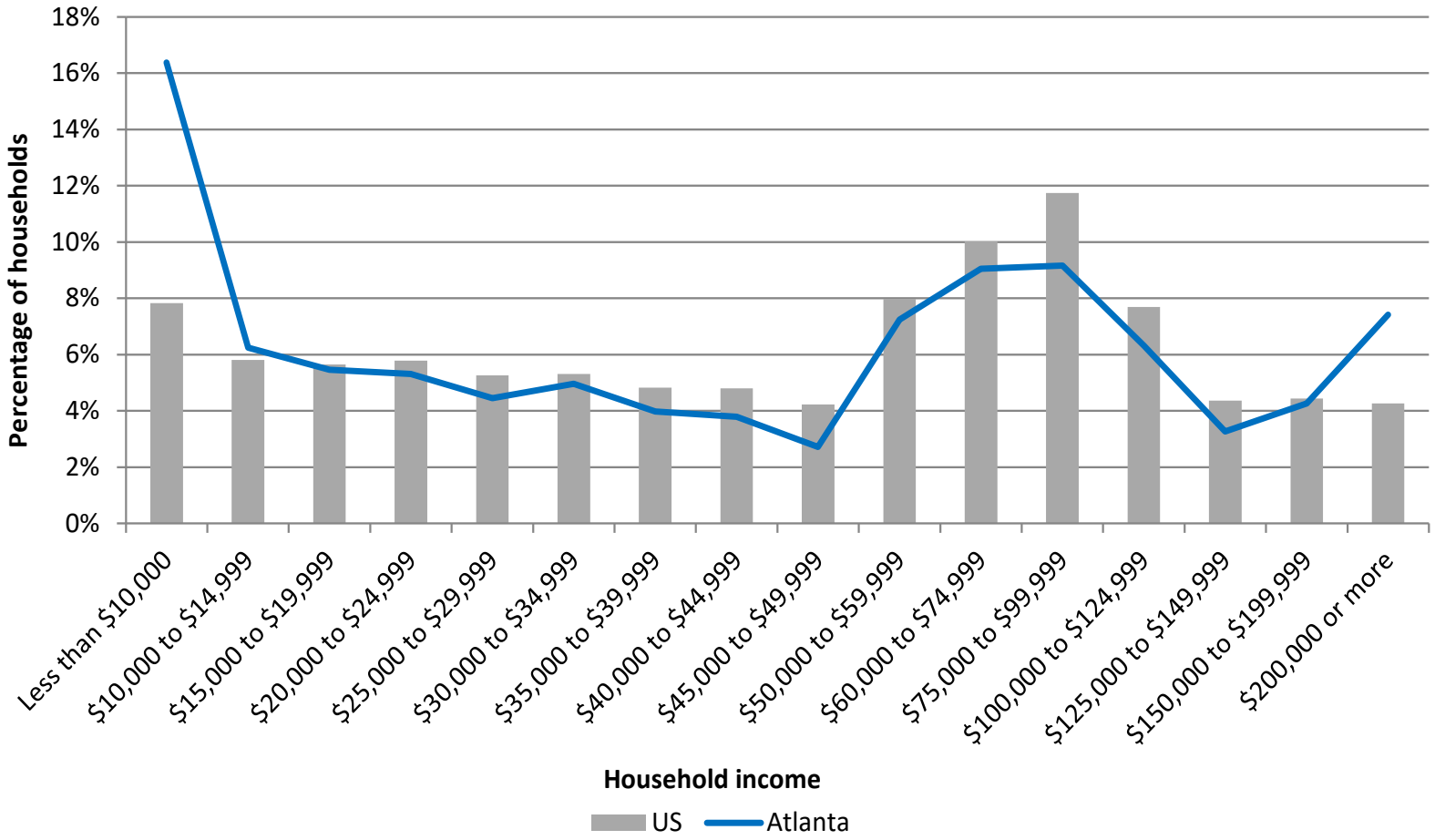
US and NYC Income Distributions



Socioeconomic Indicators: Income Distribution (Atlanta)



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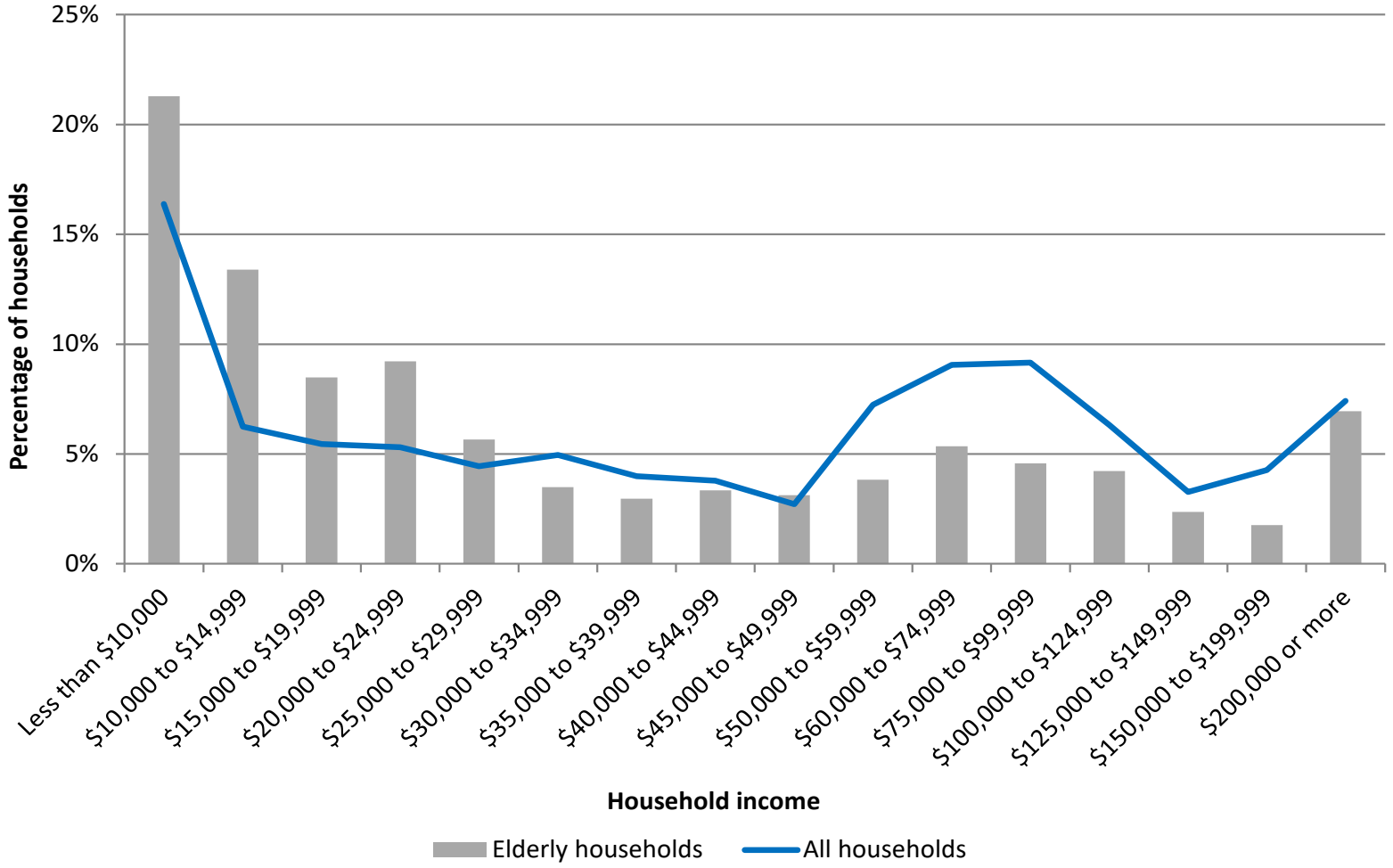
Income Distribution for *Elderly* Households (Atlanta)



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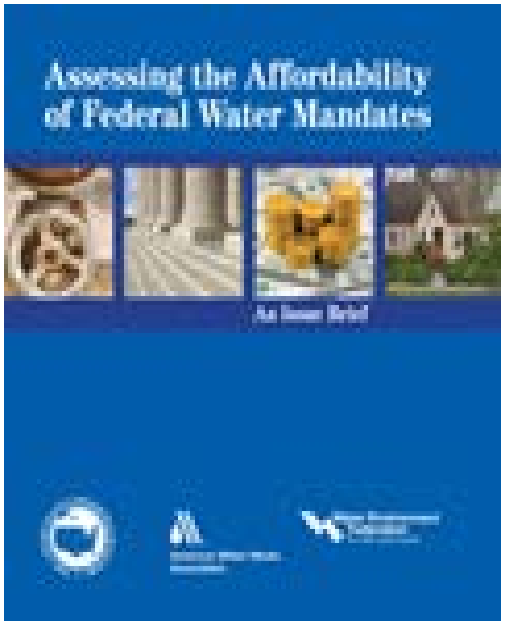
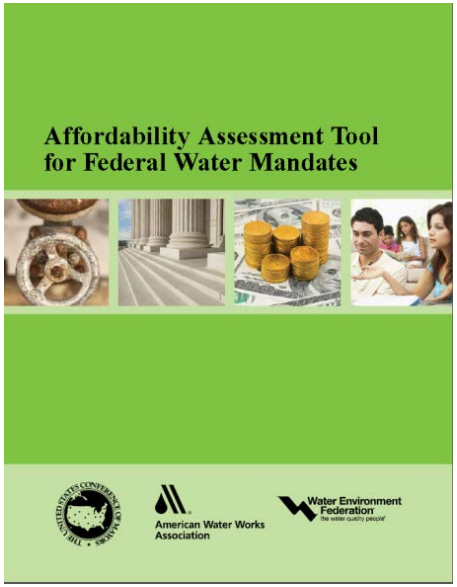
Recent Affordability Assessment Resources

- Jointly sponsored by AWWA, WEF, and U.S. Conference of Mayors
- *Assessing the Affordability of Federal Water Mandates: Issue Brief*
- *Affordability Assessment Tool for Federal Water Mandates*



What's Included in the Tool?

- Background on affordability issues
- Limitations of EPA's approaches for assessing affordability
- Presentation of alternative metrics
- Relevant data sources
- Spreadsheets and templates



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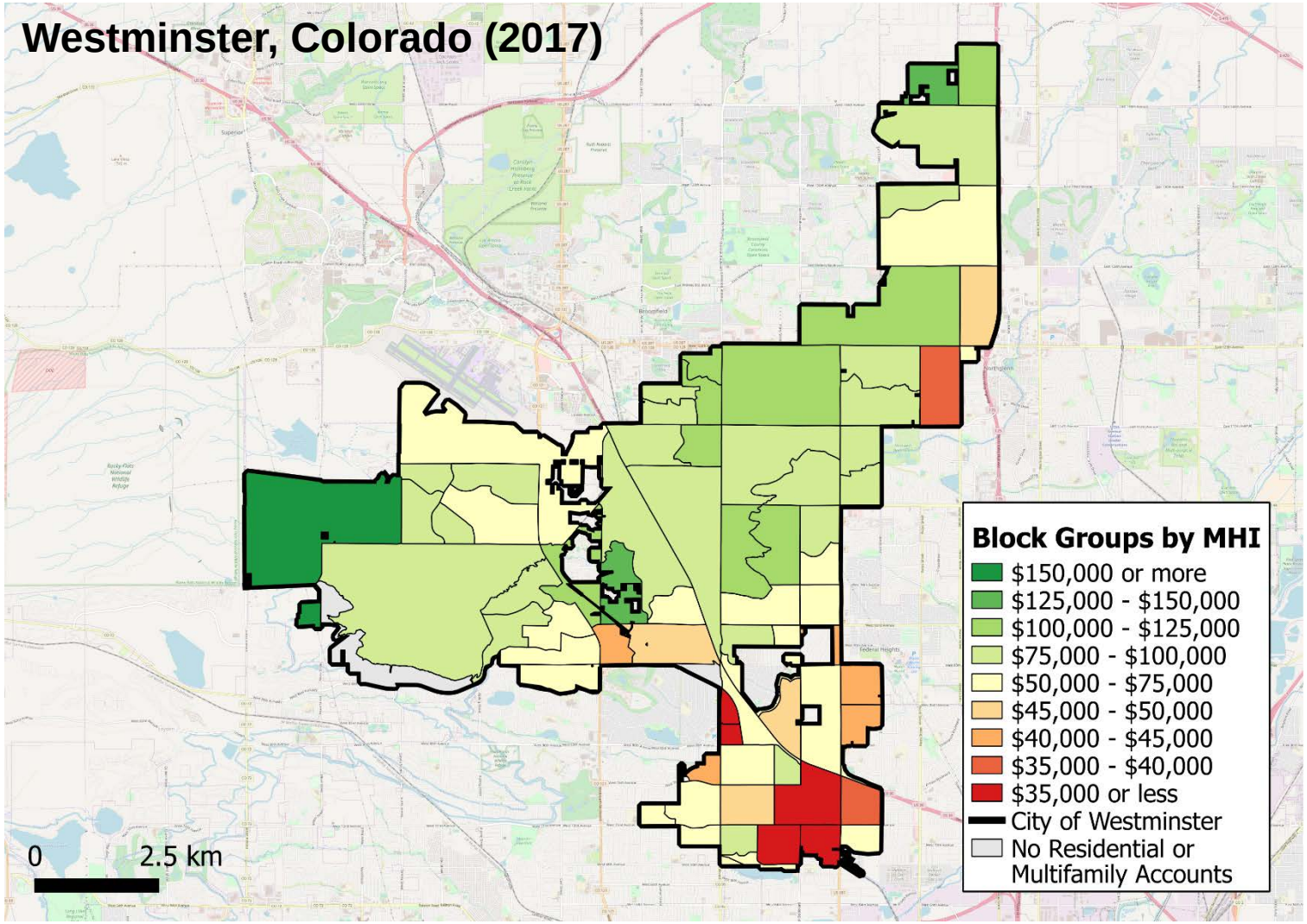
Better Measures of Economic Need

- Impact on low- and fixed-income households
- Identify at-risk households by
  - Income distribution
  - Poverty rates
  - Unemployment
  - Neighborhood
  - Household type
  - Delinquency rates
- Housing burden and other nondiscretionary spending

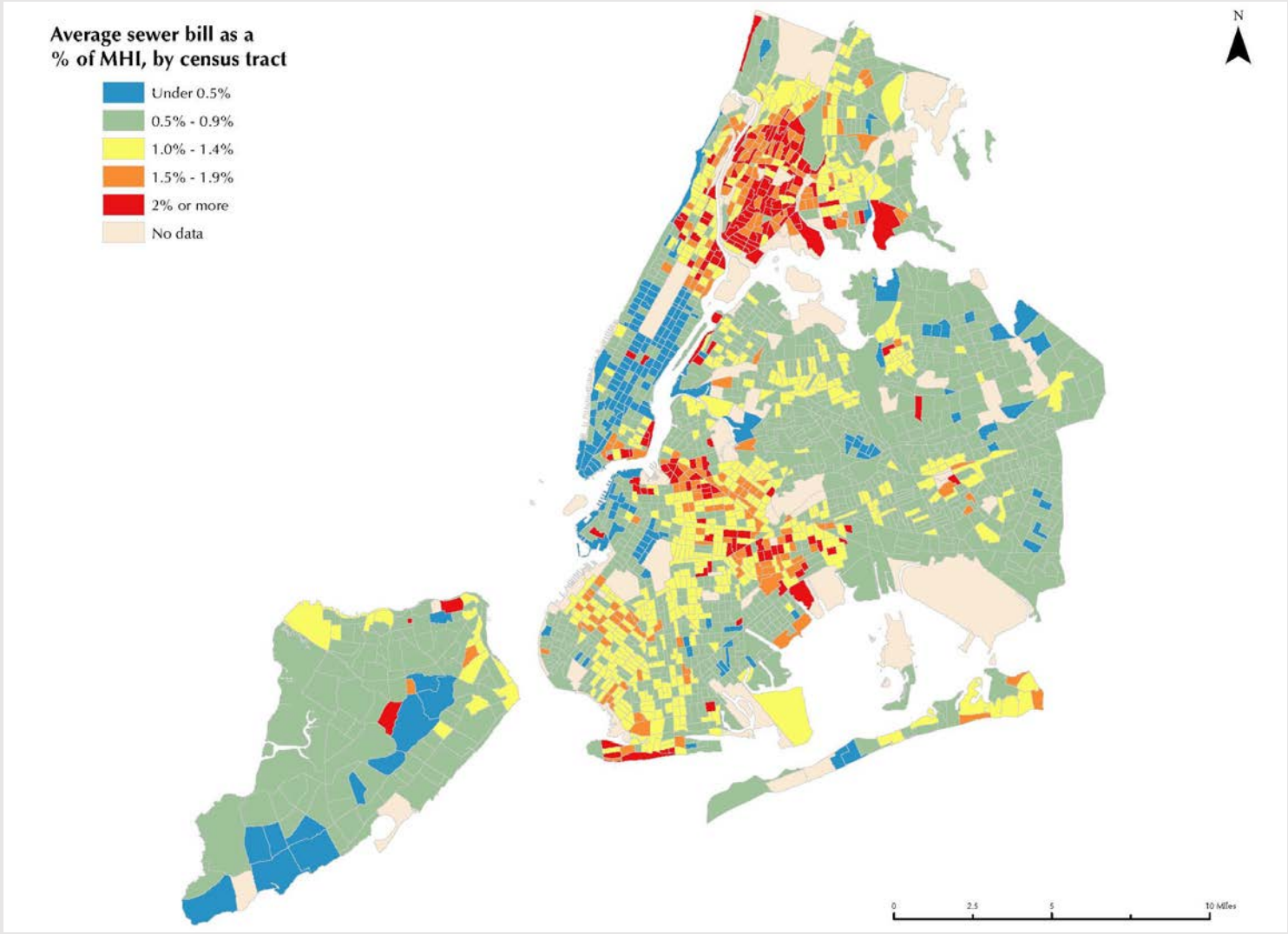
Income Levels Vary by Neighborhood



Source: U.S. Census 2011-2015 ACS 5-Year Estimates in 2015 Inflation-Adjusted Dollars

. . . . And Water/Wastewater Burden

New York City, NY (2011)



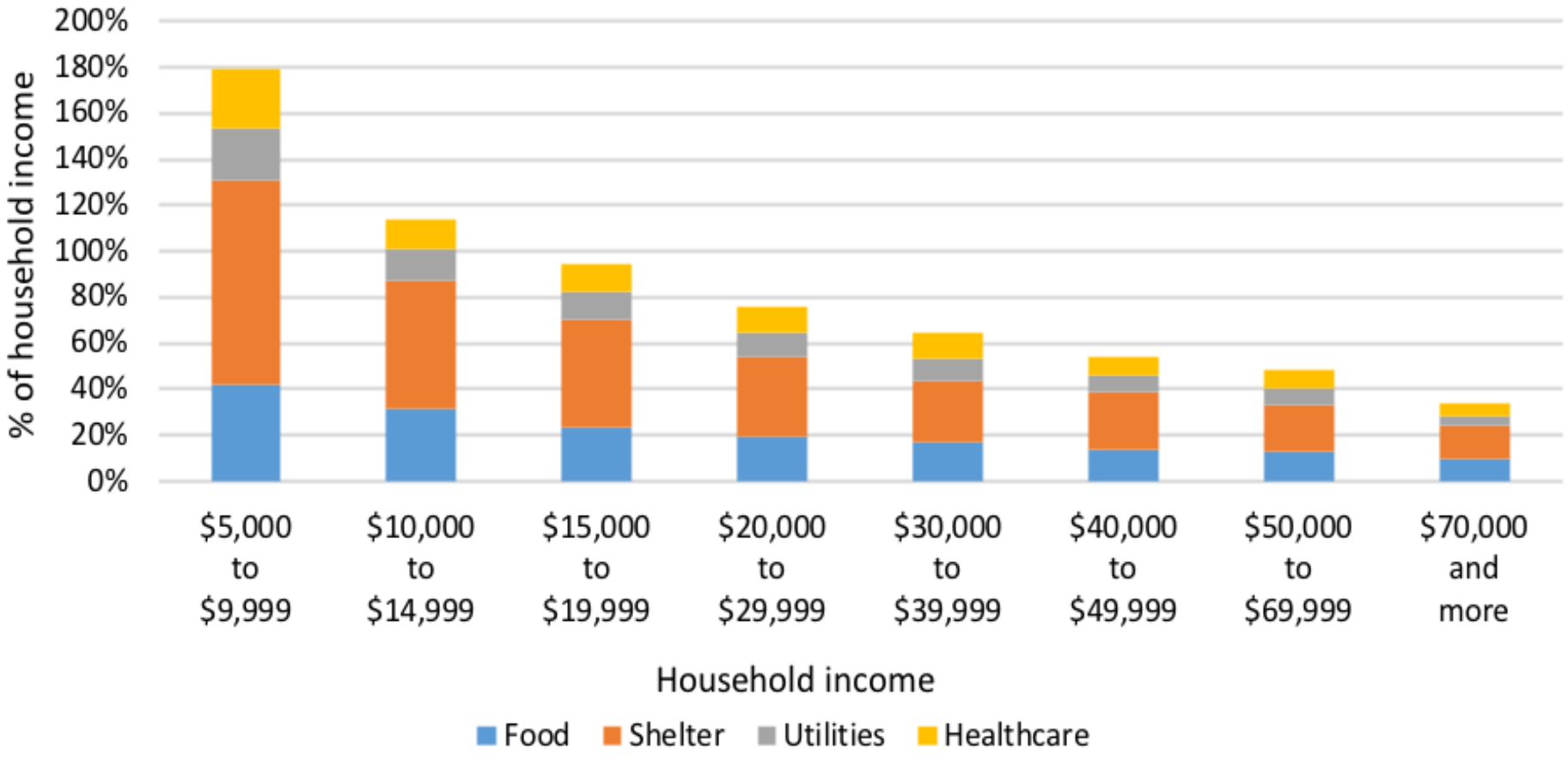
MHI Varies Across Household Type

City of Denver, Colorado (2012)

MHI (2012$)	
Household type	Inside City
All households	$50,488
Elderly households	$34,927
Renter-occupied	$33,629
Owner-occupied	$75,233
Multi-family	$37,378
Single-family	$72,735

Source: U.S. Census ACS, 2012-single year estimates and 2007-2011 average estimates, updated to 2012 USD based on CPI; 2012 PUMS data (multi-family and single-family homes)

Income and Water/Wastewater Burden Don't Tell the Whole Story



Source: BLS CEX, 2017

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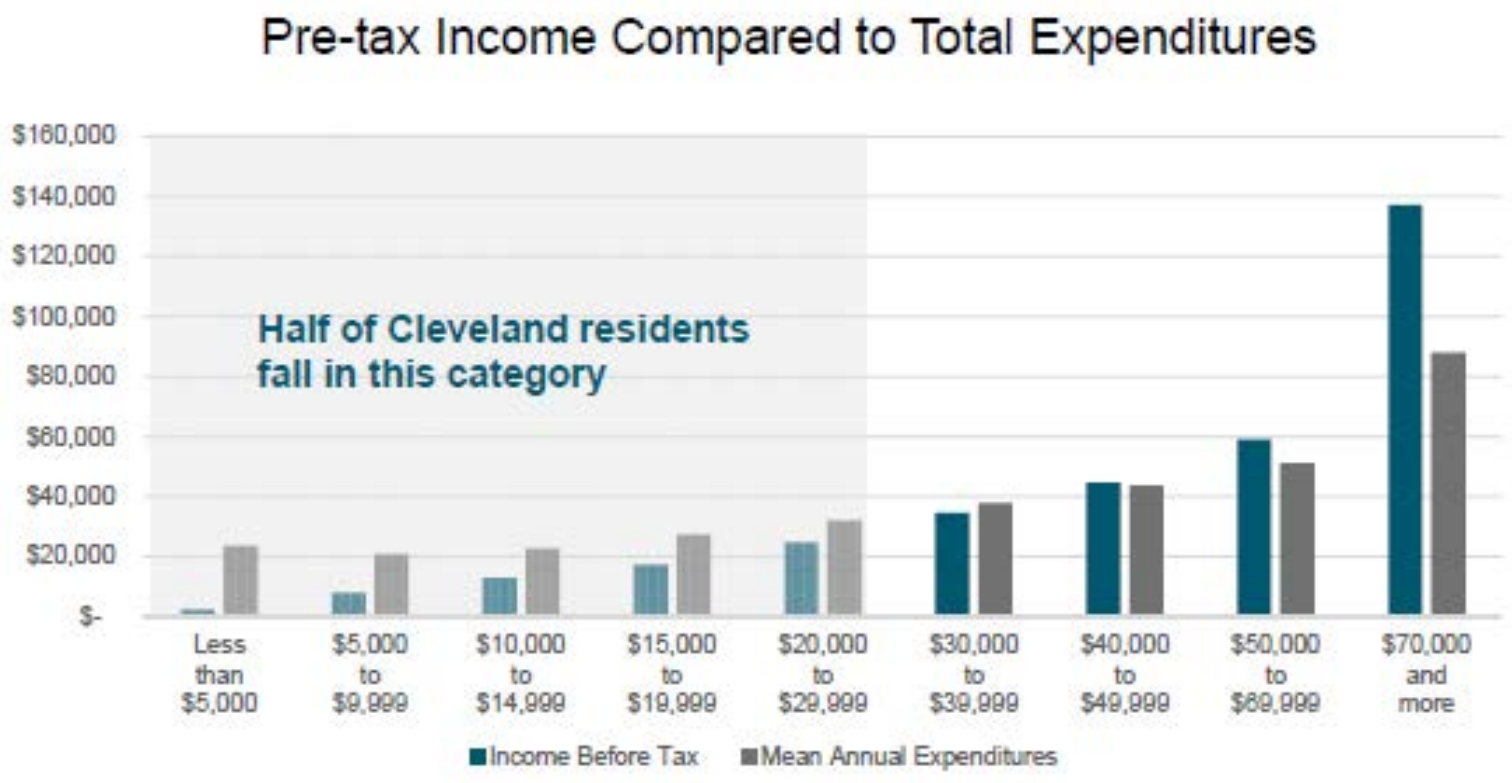
Pre-tax Income Compared to Total Expenditures



Source: Hawksley Consulting, 2016, based on Bureau of Labor Statistics Consumer Expenditure Data

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Alternative Metric: Affordability Ratio

(Teodoro Index)

AR_{20} :

- Focuses on individual customers
- Provides for BASIC SERVICE (not average)
- Accounts for essential nonutility costs
- Focus on low-income (not avg/median)
- Focuses on those at 20th percentile, that typically don't qualify for public assistance

Affordability Ratio - AR_{20}

Calculation:

[Cost of per capita Water/Sewer Service X Household Size] / [Household income - essential costs]

Affordability Detail
Ten Major US Cities

City	Monthly Essential Service Cost*	20th Percentile Annual Income	Disposable Monthly Income	Minimum Wage	AR20
Atlanta	$ 157.00	$ 15,671	$ 548	$ 7.25	28.7%
New York City	121.12	18,085	614	12.00	19.7%
San Diego	108.71	26,381	758	11.50	14.3%
Philadelphia	58.54	13,546	534	7.25	11.0%
Houston	74.87	19,109	687	7.25	10.9%
Dallas	59.82	18,585	665	7.25	9.0%
Los Angeles	73.11	19,063	907	15.00	8.1%
Chicago	47.27	17,386	631	10.50	7.5%
Miami	52.38	16,826	724	8.05	7.2%
Phoenix	37.28	21,401	891	10.00	4.2%
Ten-city Avg	*$ 79.01*	*$ 18,605*	*$ 696*	*$ 9.61*	*12.1%*

Small System Issues: Rural versus Metro Areas

- Significant differences exist between communities served by small water systems in *rural* versus more *urban* settings
  - Based on a *national* study for NRWA
- Levels of income and poverty significantly different
  - MHI is 25-30 percent lower in rural than metro area systems;
  - Poverty rates are 50-60% higher in rural than metro area water systems;
- Rural water systems are substantially smaller than those located in MAs.

Rural Areas are a Focus for Small System Affordability Problems

- One out of every 8 small water systems in non-metro areas is economically at risk
  - One out of every 200 small water systems in Metro Areas faces a similar affordability risk.
- Essentially all small water systems at risk of unaffordable water costs are located in non-metropolitan areas.

What We Can Examine in This Study – Options for Discussion

- Existing affordability challenges for small, rural, economically disadvantaged communities
- Added affordability challenge associated with nitrate removal (based on in-field cost experience)
- Cost savings associated with regionalized approaches for mutual residuals management

What We Can Examine in This Study – Options for Discussion

- Existing affordability challenges for small, rural, economically disadvantaged communities
- Added affordability challenge associated with nitrate removal (based on in-field cost experience)
- Cost savings associated with regionalized approaches for mutual residuals management
- Degree of relief and affordability if
  - Capital costs covered by state
  - O&M and capital costs both covered by state
  - CAP and other options (funded by state or ?)
- Evaluate assistance options, and associated costs to state (e.g., potential funding needs for LIRA, SB 623)

Evaluation Criteria for Assistance Programs

- Administrative Burden (utility, state, and household)
- Target Efficiency
- Horizontal Equity
- Vertical Equity
- Economic Efficiency
  - Incentives for work, and conservation
- Who Pays?
  - Ratepayers, taxpayers, and/or others

Questions/Discussion

Thank you.

For additional information contact:

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