



Finance, Affordability, Asset Management, and
Efficiency Committee

Affordability of water services study in Metropolitan's service area

Item 6a

June 9, 2026

Presented by: Dr. Kurt Schwabe

Affordability of Water Services Study in Metropolitan Water District's Service Area

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Support provided by EMWD &
MWD.

Objective 1. Using MWD's retailer level data

- Highlight how water affordability measures for residential customers have changed...
 - Over time
 - Across agencies
 - Across different communities (e.g., DAC)
 - By rate structure and other factors
- Compare residential water expenditures with expenditures on other services (e.g., housing, electricity, health care)

Objective 2. Using household-level data

- Evaluate the impact of AMI on household-level water use and expenditures for subset of agencies

Objective 1

Water affordability across MWD retail agencies

Scale: Agency-level analysis

- 125 out of ~221 retail water agencies served by MWD
- ~ 5.2 million households
- ~87% of total served

Time Period: 2013-2024



Figure 2-1. Water retail agencies in the MWD service area.

Water Expenditure Ratio (WER) vs Water Affordability

- *Focus on Water Expenditure Ratio (WER)*

Water Expenditure Ratio_i (WER_i) =

$$\frac{\text{Average Monthly Water Expenditures for 6 CCFs in Agency } i}{\text{Monthly Household Income within Agency } i}$$

- Each agency *i*'s WER is calculated (125 agencies)
- Different monthly income measures evaluated, e.g., median household income (MHI) vs 20th percentile at census block level within each agency
- Includes fixed & variable charges & fees for 6 CCFs *on water bill*
 - d/n include water-related charges/transfers that might appear on property taxes, from general funds, or other assessments
- 6 CCFs per “household” ~ 50 gpcd (assume 3 people per hh)
- Why 6 CCFs? Used by SWRCB as an “Affordability Indicator”
 - *if water expenditures (6 CCFs) > 1.5% of MHI => affordability risk*

Trends in Average Water Expenditures for Residential Customers

Table 2-1. Summary statistics (2024 dollars)-6 CCF

Year	Water Expenditure (\$/6 CCF)	MHI (\$/month)	WER	Inflation rate (%)
				-
2013	45.43	7,585	0.74	
2014	42.61	7,529	0.69	1.62
2015	42.76	7,595	0.69	0.12
2016	45.28	7,743	0.72	1.26
2017	46.43	7,929	0.71	2.13
2018	46.52	8,138	0.70	2.44
2019	48.75	8,382	0.70	1.81
2020	49.97	8,586	0.70	1.23
2021	50.02	8,701	0.69	4.70
2022	48.16	8,789	0.65	8.00
2023	48.96	8,857	0.65	4.12
2024 ⁴	54.75	8,600	0.76	2.95

Note: WER is calculated as the average WER across all census tracts in our sample of agencies (125) across MWD's service area.

Trends in Average Water Expenditures for Residential Customers

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Year	Water Expenditure (\$/6 CCF)	<i>Inflation outpaced water expenditures</i>	Inflation rate (%)
			-
2013	45.43		
2014	42.61	=> 34% vs 21%	1.62
2015	42.76		0.12
2016	45.28	• 2013 to 2024	1.26
2017	46.43	(Consumer Price	2.13
2018	46.52	Index)	2.44
2019	48.75		1.81
2020	49.97	• MWD Service Area	1.23
2021	50.02	only (not CA, not U.S.)	4.70
2022	48.16		8.00
2023	48.96	• Water Expenditures for	4.12
2024 ⁴	54.75	6 CCFs (not total bill)	2.95

Note: WER is calculated as the average WER across all census tracts in our sample of agencies (125) across MWD's service area.

Trends in Average Water Expenditures for Residential Customers

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2013	45.43	7,585	0.74	<p><i>Rate of increase in water expenditures & income relatively similar</i></p> <ul style="list-style-type: none"> • 1.1% : Annual avg income growth • 1.7%: Annual avg water expenditure growth <p>=> WER relatively constant</p>
2014	42.61	7,529	0.69	
2015	42.76	7,595	0.69	
2016	45.28	7,743	0.72	
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WER (6 CCF) significantly < SWRCB 1.5% threshold (assuming MHI)

Note: WER is calculated as the average WER across all census tracts in our sample of agencies (125) across MWD's service area.

WER Over Time: Agencies Above SWRCB 1.5% Threshold (MHI)

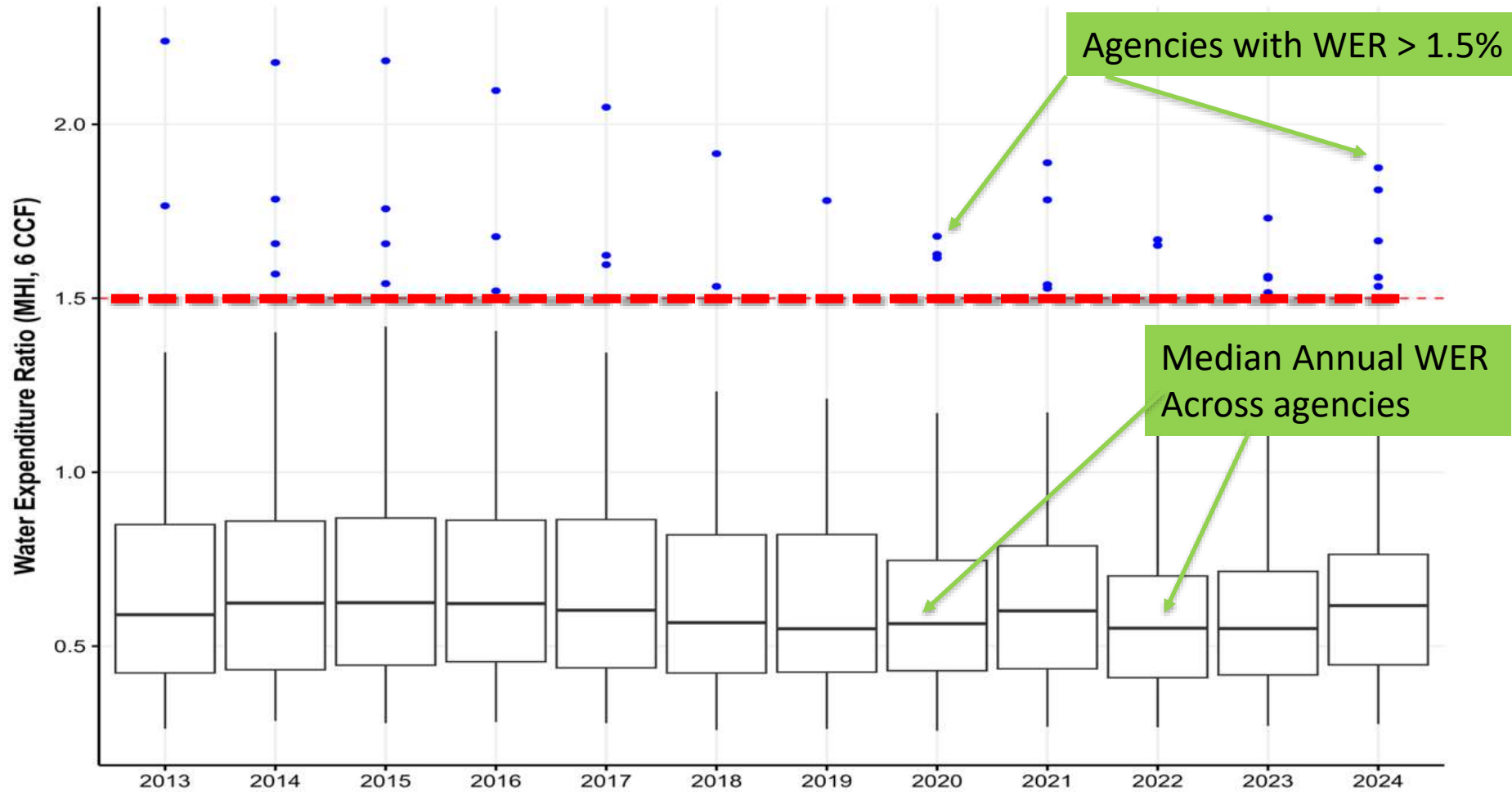


Figure 2-3. Water Expenditure Ratio (6 CCF) over time across retail agencies in the MWD service area (2013–2024).

Notes: The thick black line represents the median value, with the upper and lower edges of the box representing the 75th and 25th percentiles, respectively; lines above and below the box represent the 95th percentile values. The red dashed line indicates the 1.5% threshold (water board). The number of agencies with WER above 1.5% is 3, 4, 4, 3, 3, 3, 1, 3, 4, 2, 4, and 5 from 2013 to 2024, respectively.

WER Over Time: Agencies Above SWRCB 1.5% Threshold (MHI)

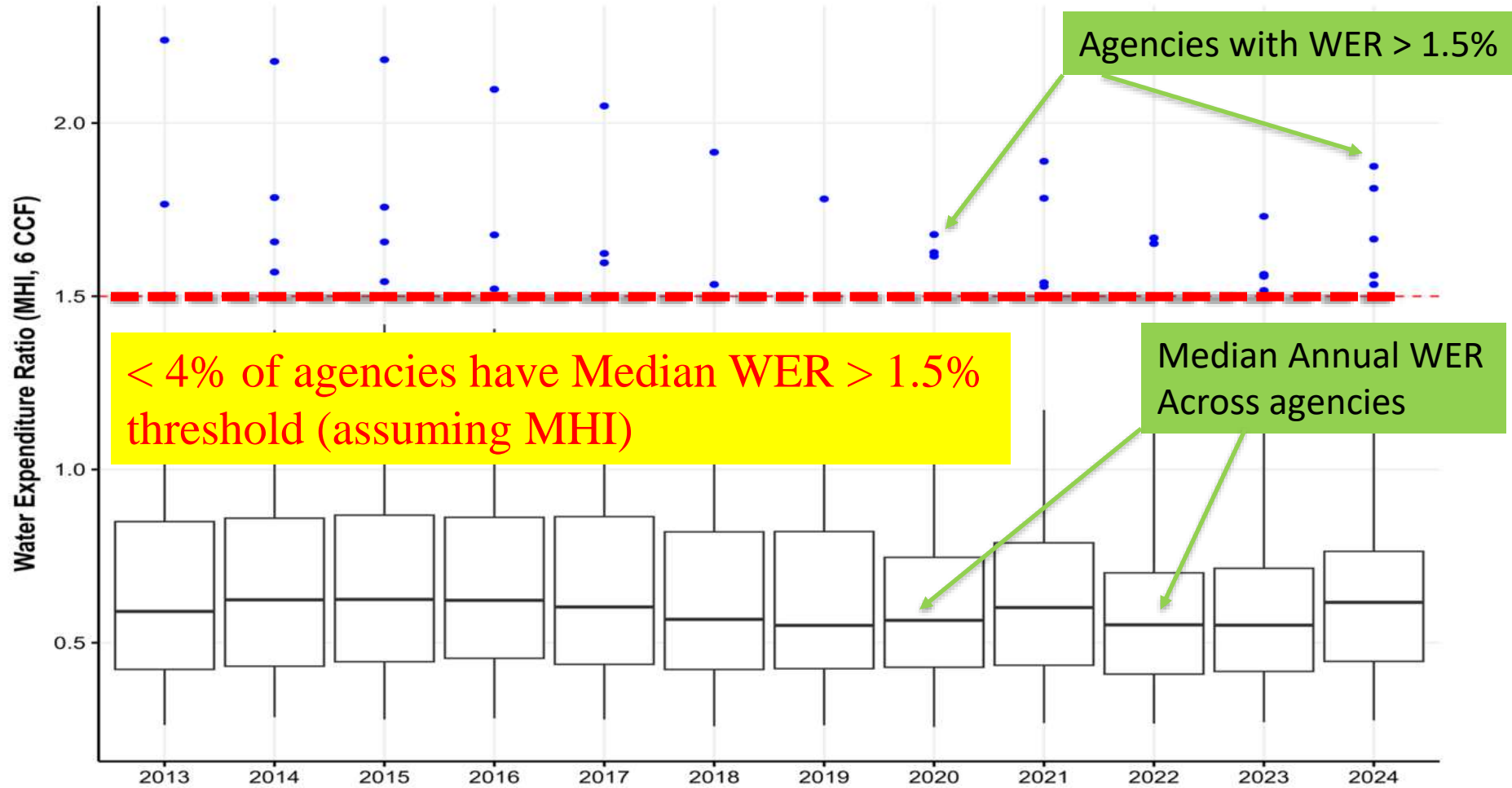


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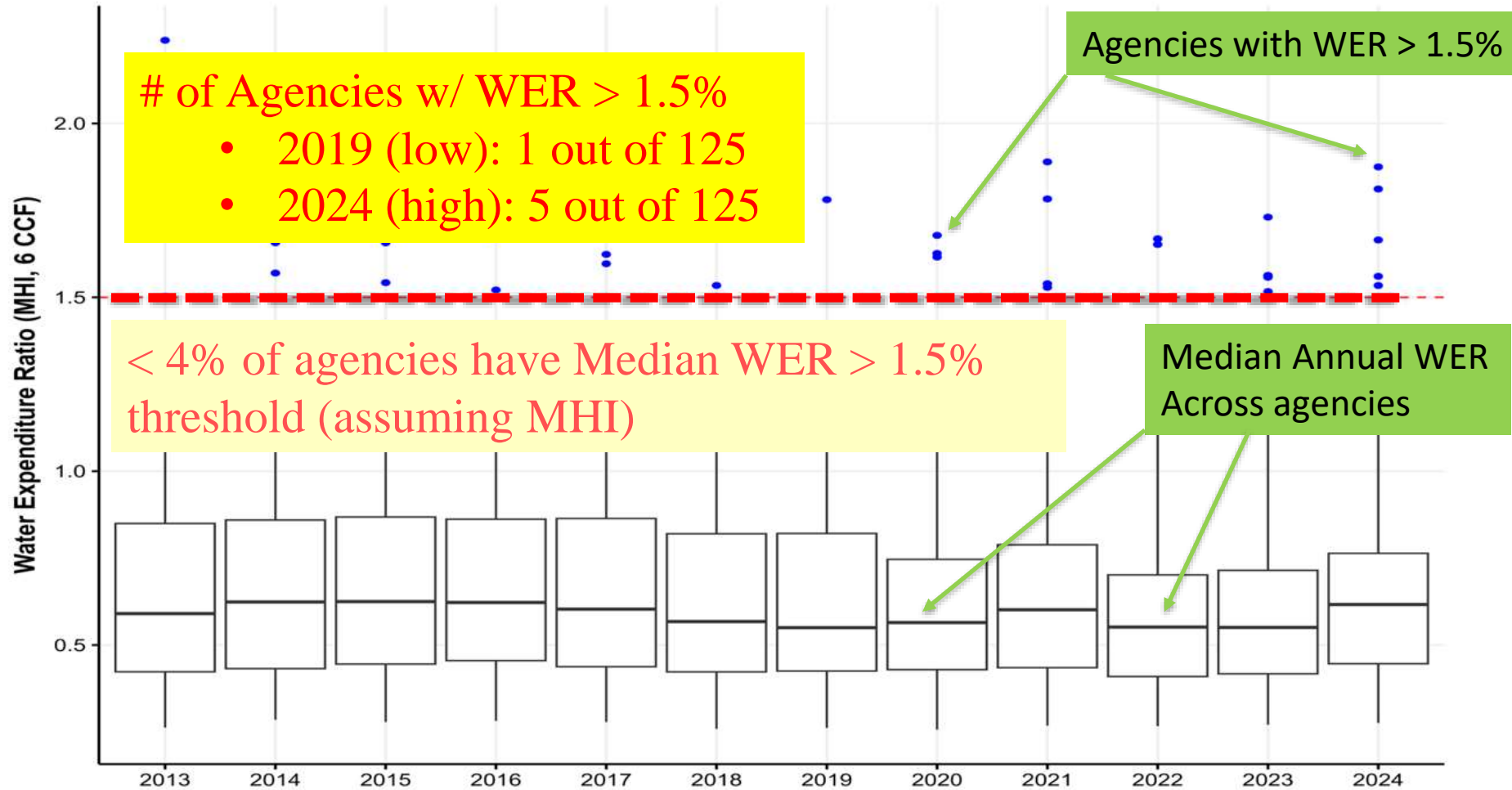
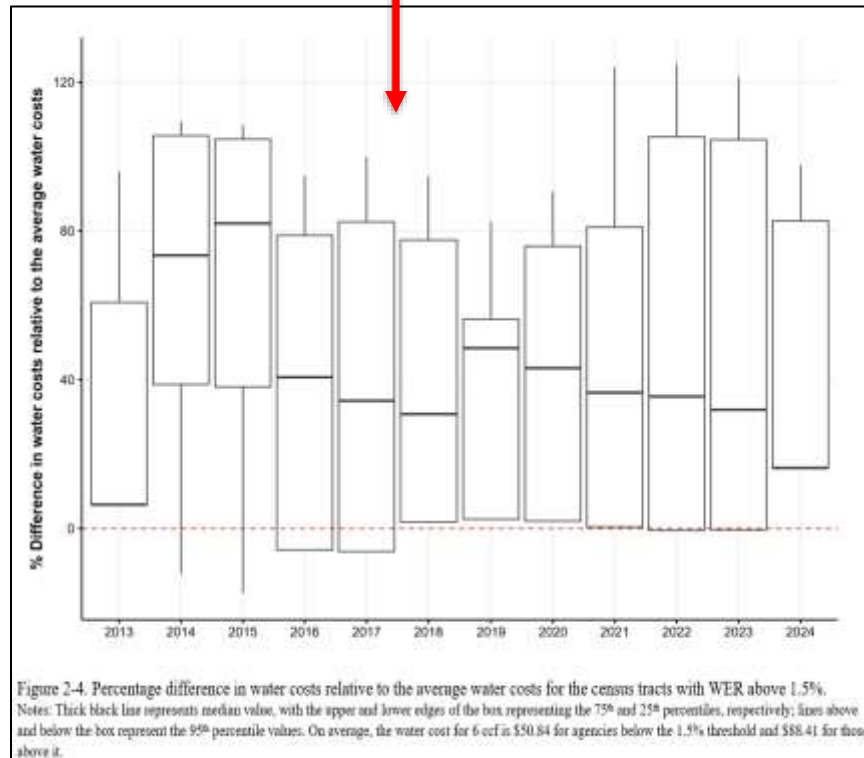


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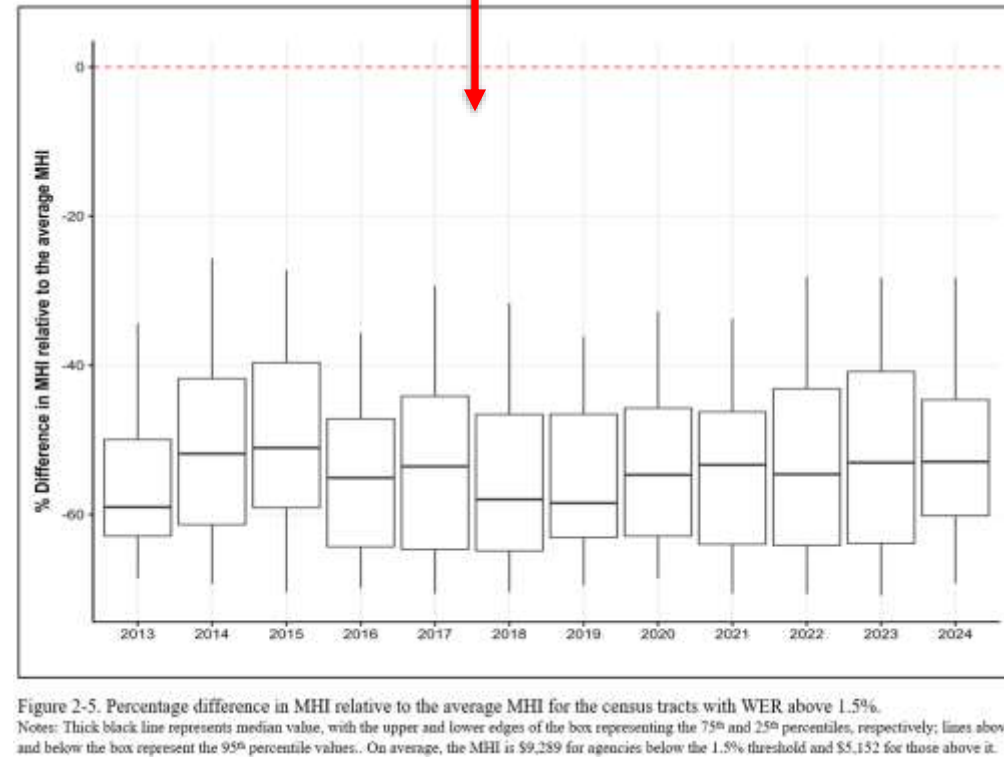
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For areas with WERs > 1.5%...

How do their *costs* compare to areas w/ WER < 1.5% ?



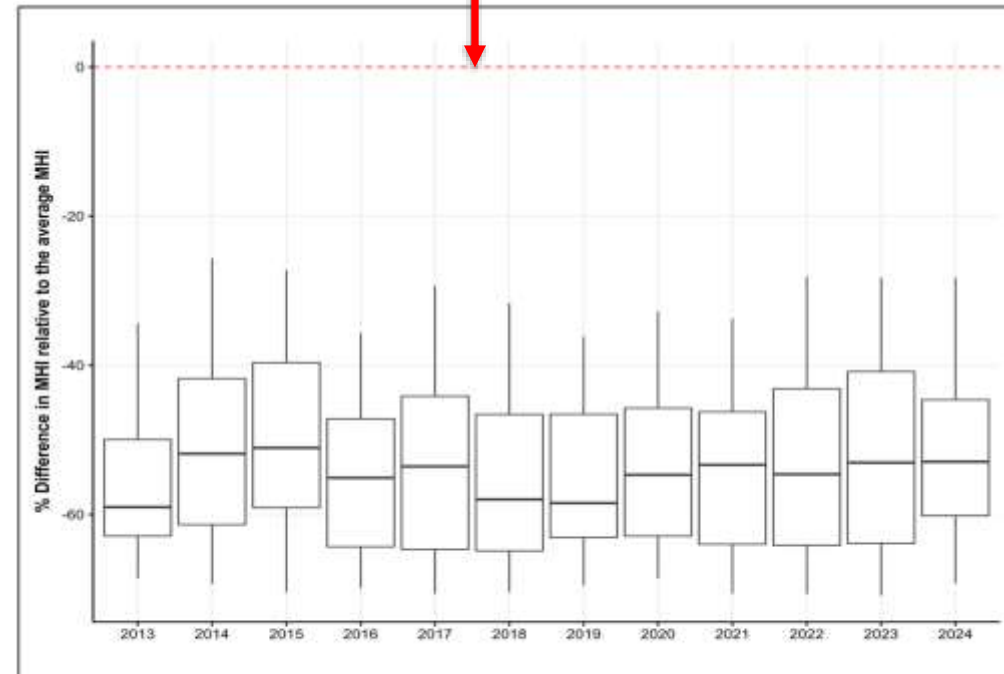
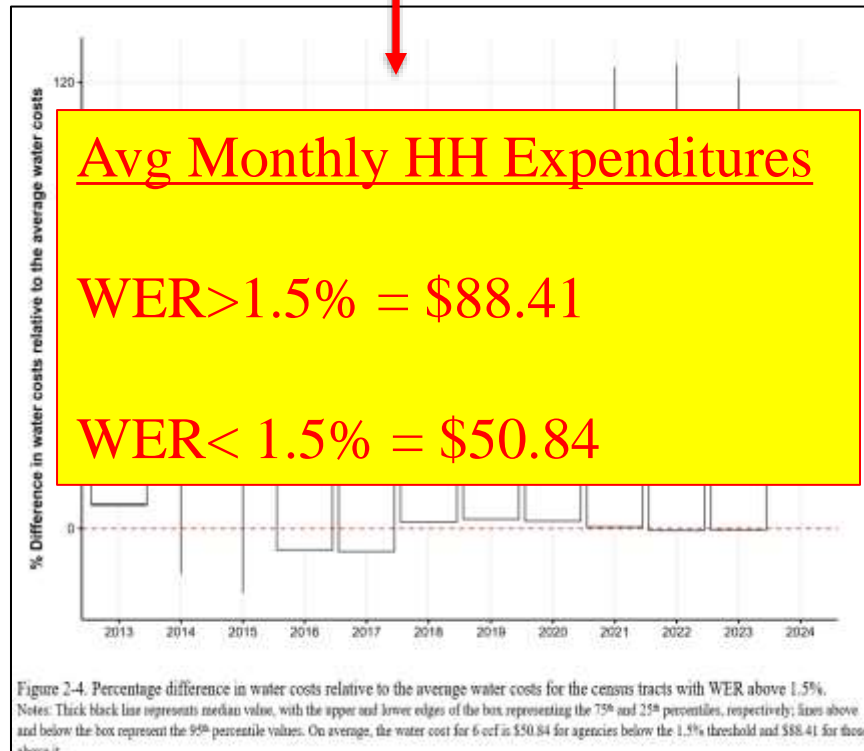
How do their *incomes* compare to areas w/ WER < 1.5% ?



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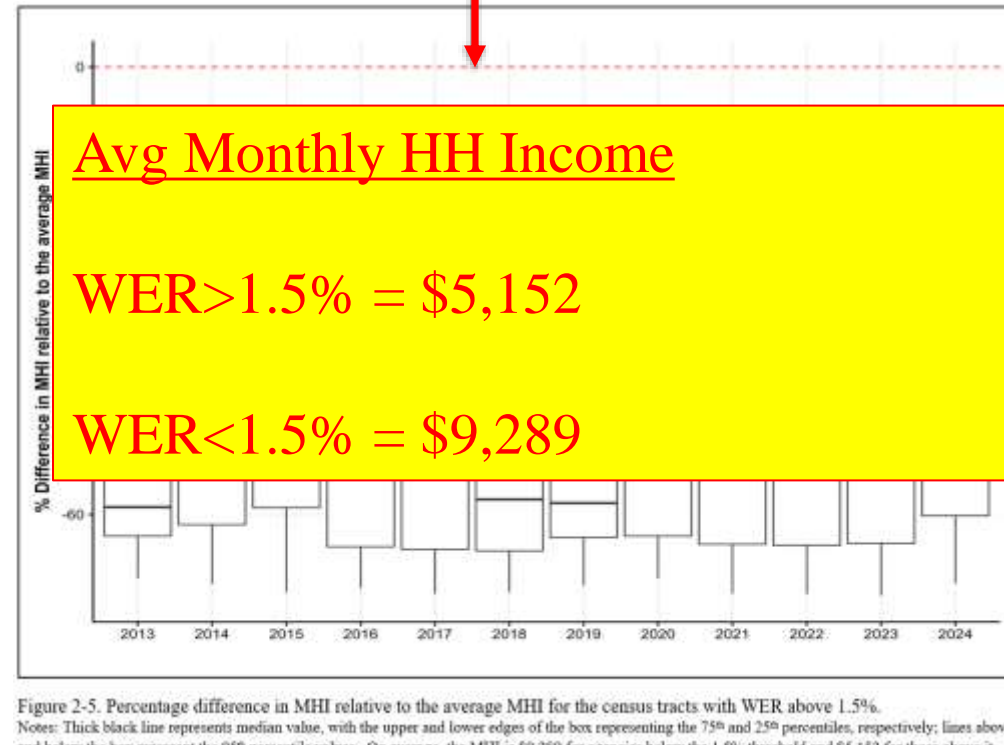
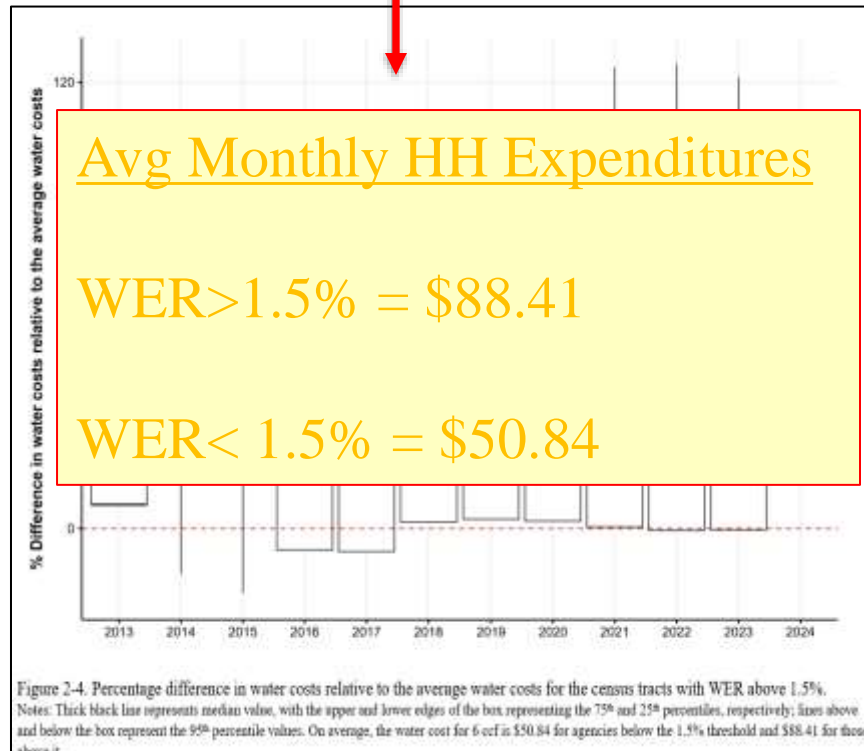
How do their *incomes* compare to areas w/ WER < 1.5%?



For areas with WERs > 1.5%...

How do their *costs* compare to areas w/ WER < 1.5%?

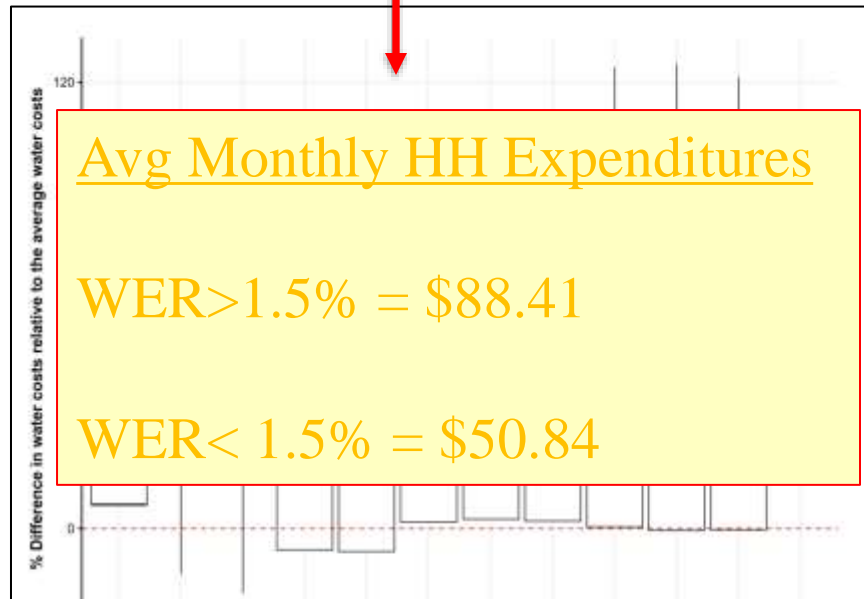
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For areas with WERs > 1.5%...

How do their *costs* compare to areas w/ WER < 1.5%?

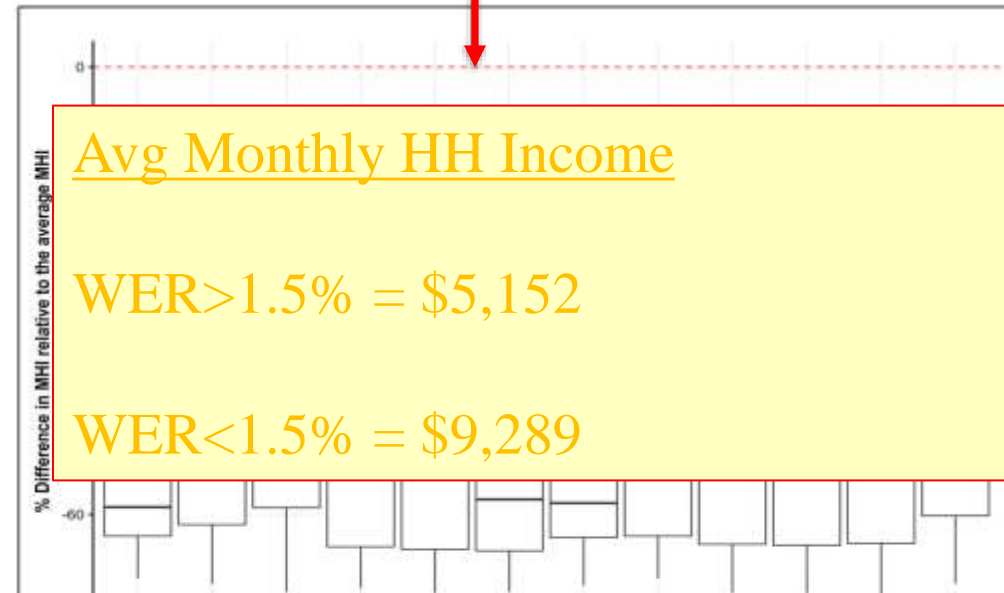
How do their *incomes* compare to areas w/ WER < 1.5%?



Avg Monthly HH Expenditures

WER > 1.5% = \$88.41

WER < 1.5% = \$50.84



Avg Monthly HH Income

WER > 1.5% = \$5,152

WER < 1.5% = \$9,289

=> Costs and Income both responsible for WERs > 1.5%

Figure 2-4. Percentage difference in water costs relative to the average water costs for the census tracts with WER above 1.5%. Notes: Thick black line represents median value, with the upper and lower edges of the box representing the 75th and 25th percentiles, respectively; lines above and below the box represent the 95th percentile values. On average, the water cost for 6 ccf is \$50.84 for agencies below the 1.5% threshold and \$88.41 for those above it.

Figure 2-5. Percentage difference in MHI relative to the average MHI for the census tracts with WER above 1.5%. Notes: Thick black line represents median value, with the upper and lower edges of the box representing the 75th and 25th percentiles, respectively; lines above and below the box represent the 95th percentile values. On average, the MHI is \$9,289 for agencies below the 1.5% threshold and \$5,152 for those above it.

Affordability for Lower-Income Households

(20th Percentile Income, 6 CCF Monthly Use, 2024 Dollars)

Year	Water Cost (\$)	20 th Income (\$/month)	MHI (\$/month)	WER 20 th	WER 50 th
2013	45.43	2,347	7,585	2.84	0.74
2014	42.61	2,311	7,529	2.63	0.69
2015	42.76	2,324	7,595	2.62	0.69
2016	45.28	2,382	7,743	2.73	0.72
2017	46.43	2,441	7,929	2.70	0.71
2018	46.52	2,522	8,138	2.62	0.70
2019	48.75	2,607	8,382	2.63	0.70
2020	49.97	2,675	8,586	2.65	0.70
2021	50.02	2,714	8,701	2.58	0.69
2022	48.16	2,712	8,789	2.47	0.65
2023	48.96	2,729	8,857	2.50	0.65
2024	54.75	2,649	8,600	2.95	0.76

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Year	Water Cost (\$)	20 th Income (\$/month)	MHI (\$/month)	WER 20 th	WER 50 th
2013	45.43	2,347	7,585	2.84	0.74
2014	42.61	2,311	7,529	2.63	0.69
2015	42.76	2,324	7,595	2.62	0.69
2016	43.81	2,337	7,661	2.62	0.69
2017	45.00	2,350	7,727	2.62	0.70
2018	46.52	2,522	8,138	2.62	0.70
2019	48.75	2,607	8,382	2.63	0.70
2020	49.97	2,675	8,586	2.65	0.70
2021	50.02	2,714	8,701	2.58	0.69
2022	48.16	2,712	8,789	2.47	0.65
2023	48.96	2,729	8,857	2.50	0.65
2024	54.75	2,649	8,600	2.95	0.76

Lower income households generally have WERS > 1.5%
=> significantly lower income

WER Over Time: Agencies Above SWRCB 1.5% Threshold (20th PI)

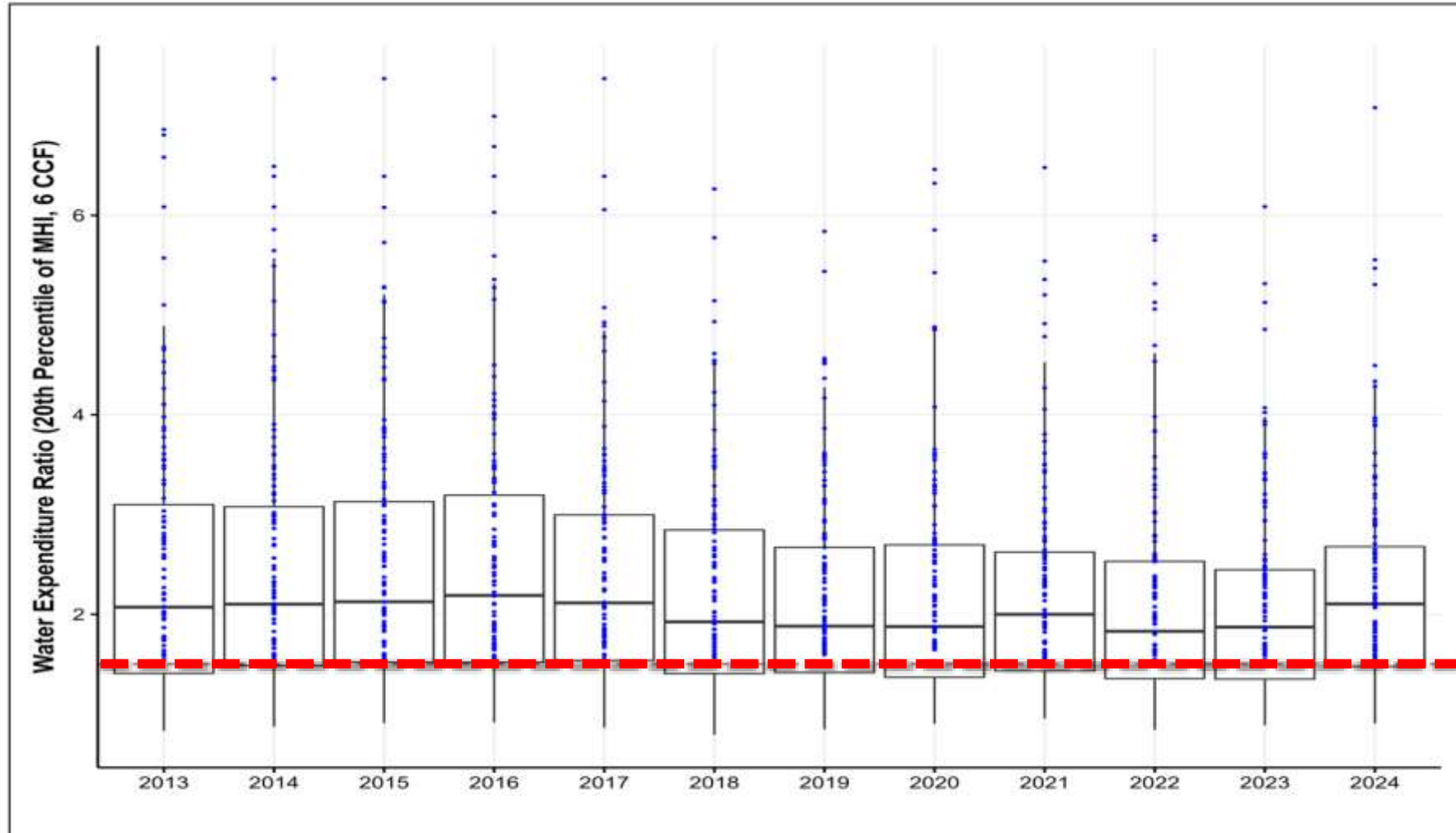


Figure 2-6. Water Expenditure Ratio (6 CCF) at the 20th percentile of MHI over time across retail agencies in MWD service area (2013–2024).

Notes: The Thick black line represents the median value, with the upper and lower edges of the box representing the 75th and 25th percentiles, respectively; lines above and below the box represent the 95th percentile values. The red dashed line indicates the 1.5% threshold (Water board). The number of agencies with WER 20th above 1.5% are 79, 82, 84, 83, 83, 77, 74, 75, 81, 74, 75, and 82 from 2013 to 2024, respectively.

WER Over Time: Agencies Above SWRCB 1.5% Threshold (20th PI)

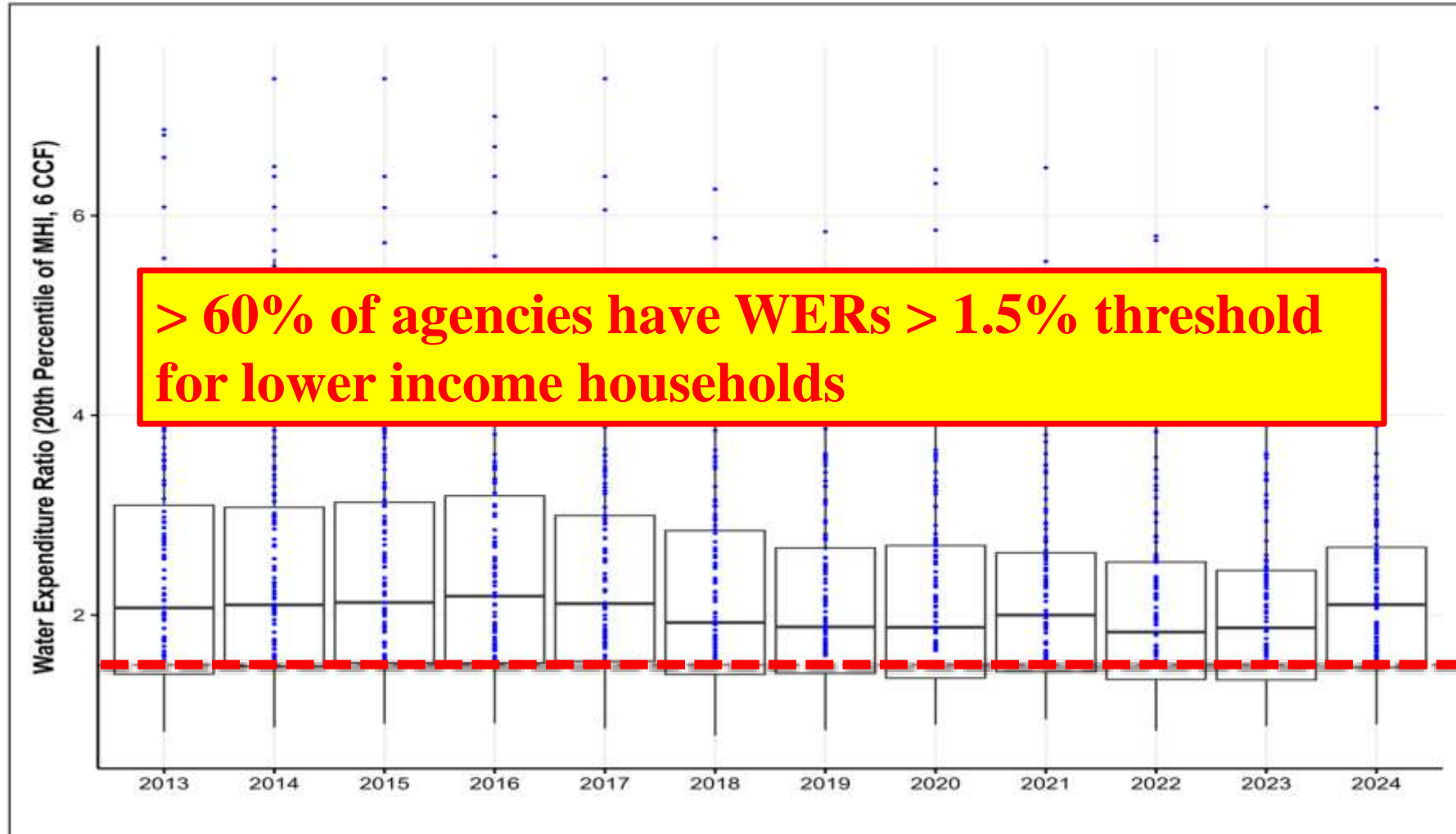


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DAC vs Non-DAC WER Over Time

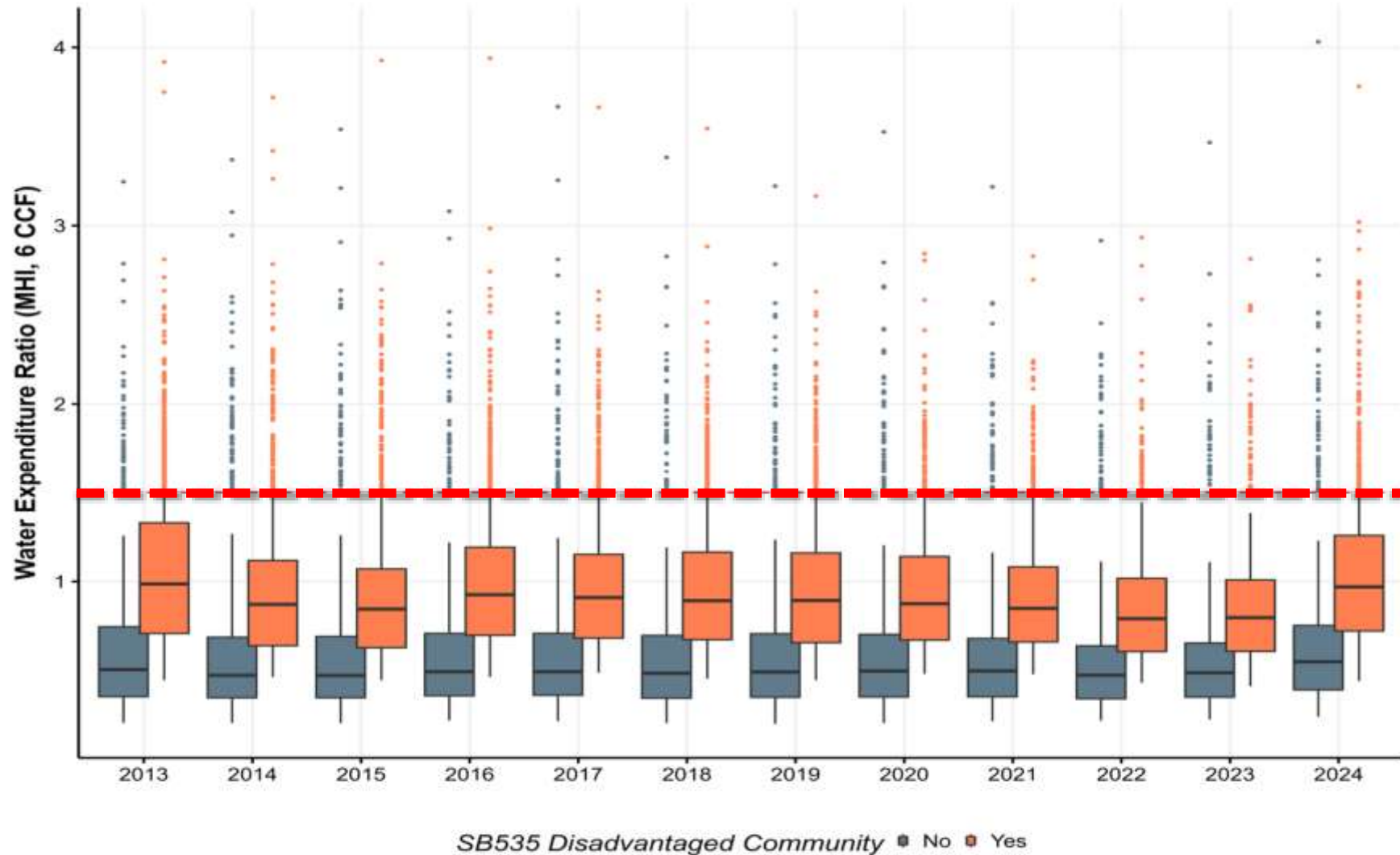


Figure 2-9. Water Expenditure Ratio (6 CCF) across census tracts in MWD service area (2013–2024) by DAC status.

Note: The thick black line represents the median value, with the upper and lower edges of the box representing the 75th and 25th percentiles, respectively; lines above and below the box represent the 95th percentile values. Dots indicate census tracts above the state’s 1.5 threshold.

DAC vs Non-DAC WER Over Time

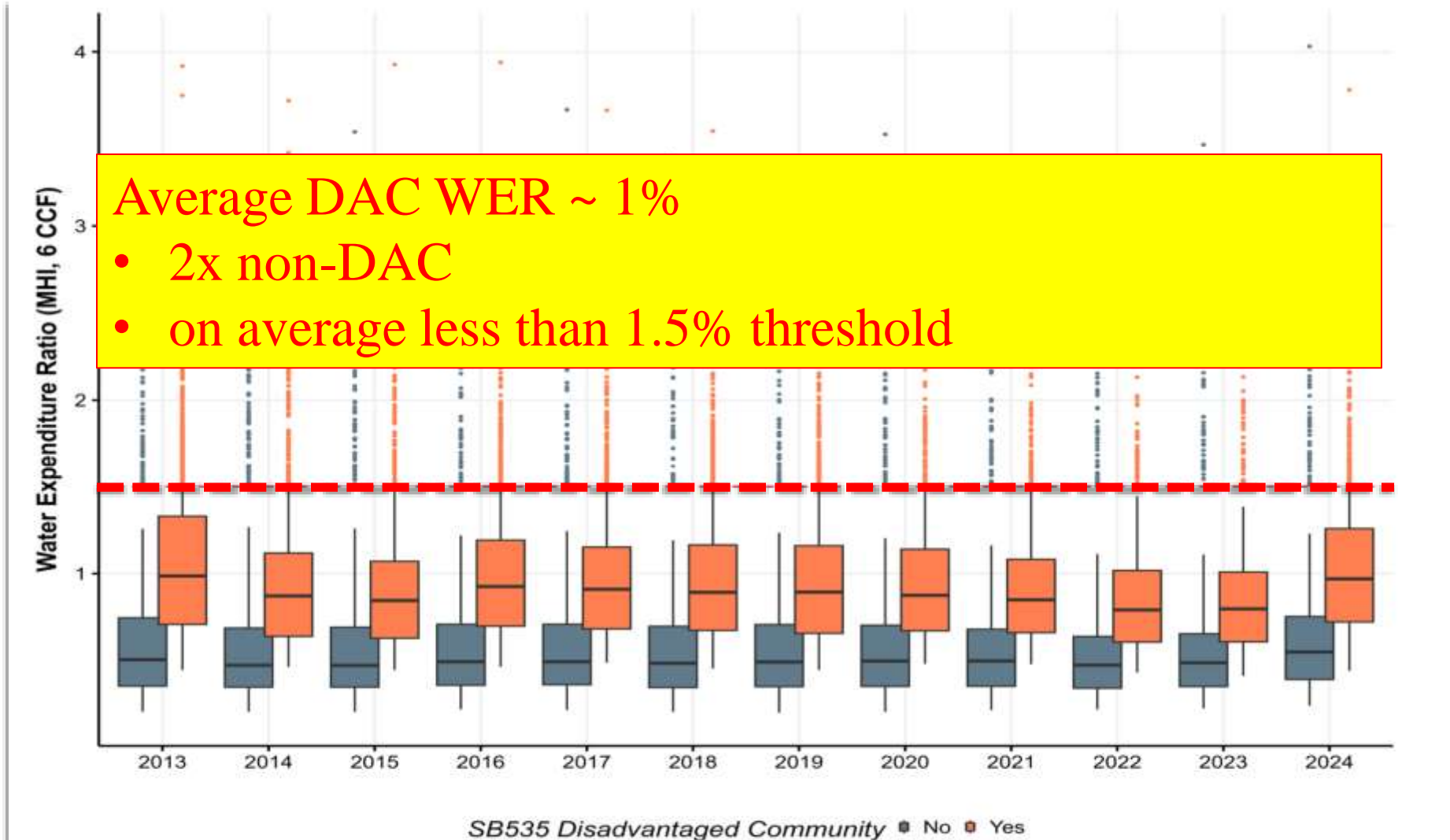


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Total Households in MWD Service Area w/ WER > 1.5% threshold (including renters)

Table 2-3. Estimated total number of households & share of households with WER > 1.5%.

Year	Total number of Households with WER>1.5%	Share from total households served
2013	812,097	5.42
2014	839,415	5.57
2015	845,104	5.57
2016	810,257	5.38
2017	776,086	5.10
2018	733,180	4.79
2019	707,891	4.60
2020	548,213	4.51
2021	557,291	4.51
2022	550,025	4.42
2023	550,293	4.40
2024	550,293	4.40

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2019	707,891	4.60
2020	548,213	4.51
2021	557,291	4.51
2022	550,025	4.42
2023	550,293	4.40
2024	550,293	4.40

Total # of
HH's w/ WER
<1.5%
decreasing

Share of hhs has
dropped
• 5.4% to 4.4%

What agency-level factors and characteristics of its service area are associated with higher WERs?

- Pricing Structure
 - Rate structure (*volumetric, tiered, budget-based rates*)
 - *Number of tiers*
- Coupled Systems (i.e., Provide both *water and wastewater services* -> perhaps captures some element of consolidation)
- Scale (*population* -> larger agencies benefit from economies of scale)
- Income (*% Rental* - likely captures relative income level)

Drivers of higher WERs?

Table 2-9. Association between various factors and WER

	(1)	(3)	(4)	(5)
Rate Structure (base: Budget)				
Tier	0.283*** (0.004)	0.361*** (0.005)	0.226*** (0.004)	0.230*** (0.004)
Volumetric	0.189*** (0.005)	0.184*** (0.005)	0.112*** (0.005)	0.088*** (0.005)
Wastewater				
		-0.022*** (0.004)	-0.051*** (0.004)	-0.055*** (0.004)
# Rate Blocks				
		-0.038*** (0.001)	-0.019*** (0.001)	-0.022*** (0.001)
Percent Rental				
			0.008*** (0.0001)	0.008*** (0.0001)
Population Served (base: <=10,000)				
10,001-100,000				-0.401*** (0.012)
>100,000				-0.435*** (0.012)
Observations	99,895	99,895	99,895	99,895
YEAR FES	YES	YES	YES	YES

Budget-based are associated w/ lower WERs relative to other rate structures

Coupled systems have a negative association w/ WERs

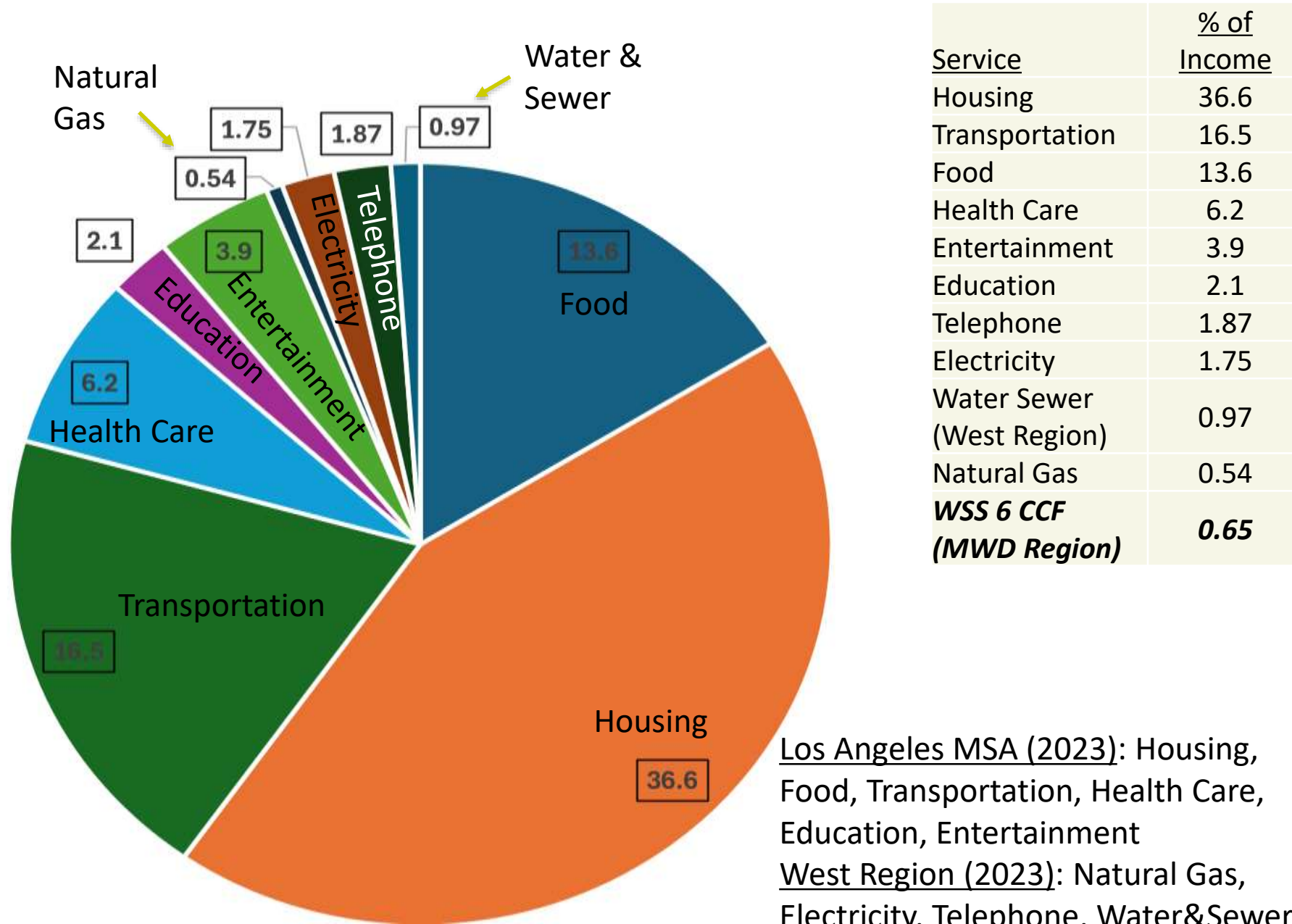
of rate blocks are negatively associated with WERs

Tracts/districts w/ more renters are associated with higher WERs

More populated districts tend to have lower WERs

Note: ***p<0.01

Comparison of residential water WSS expenditures with expenditures on other services (e.g., electricity, transportation, communications, and housing).



Los Angeles MSA (2023): Housing, Food, Transportation, Health Care, Education, Entertainment
West Region (2023): Natural Gas, Electricity, Telephone, Water&Sewer

Objective 2: Role of AMI on Water Use & Water Expenditures

of Agencies

- 4 (limited)

Time Period:

- varies (before & after rollout)

Scale

- household-level analysis

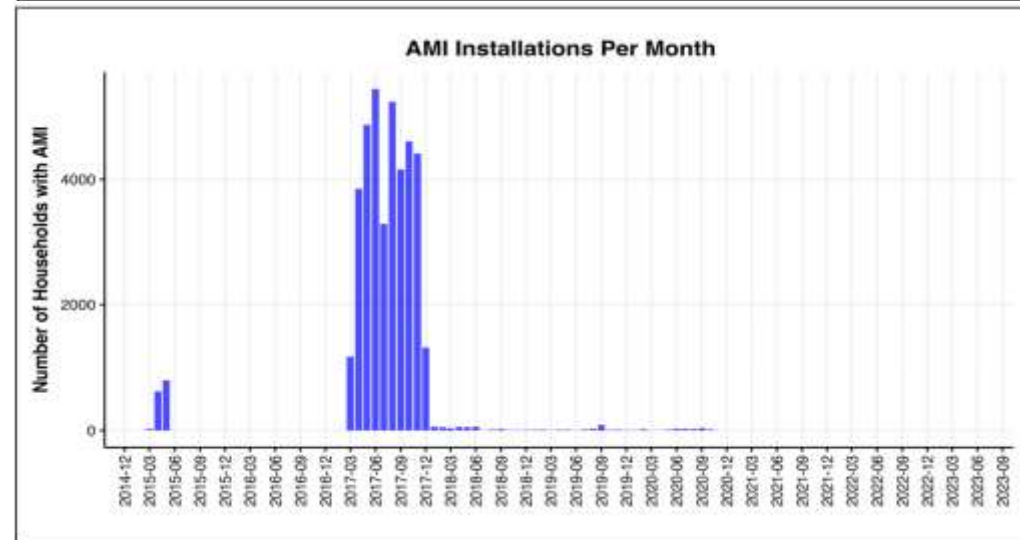
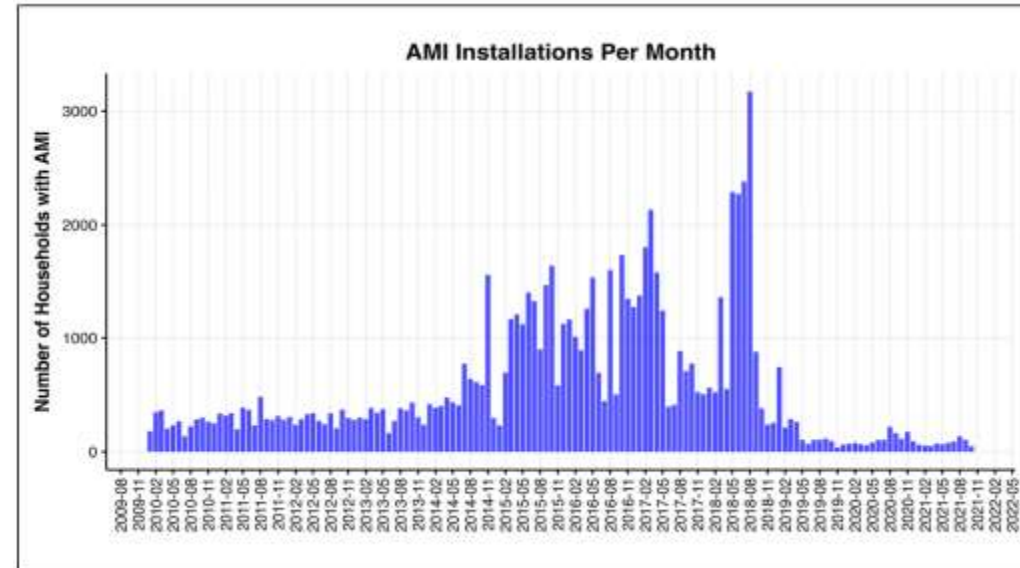
Analytical Approach

- Event study
- Diff-in-Diff Fixed Effects

Data

- Household-level: water use, bills, lat/long, & AMI install date
- Census data: MHI

Example of 2 Agencies AMI Installation Time Profile



Impact of AMI

- Generally: ~ 1-2% decrease in water use and <1% decrease in water bill (A, C, & D)
- Agency B is different: Two factors
 - LIRA program customers must register for the AMI portal (receive messaging, awareness of the program)
 - Customers who register for online bills are automatically registered for the AMI portal
 ⇒ Engagement
- Different stages of rollout/development => differences in outcomes

	Log Water Use	Water Bill (\$)
	(1)	(2)
Agency A	1.3%	0.82
Agency B	11.1%	31.05
Agency C	2.3%	0.13
Agency D	1.6%	0.70

Summary 1: Water Affordability in MWD’s Service Area

Results suggest that, on average & for 6 CCFs...

- *WER (MHI) significantly < 1.5% threshold*
- *WER (LowInc) generally > 1.5% threshold*
- Water Affordability—as measured by fraction of income spent on water services for 6 CCFs—has *generally increased but only slightly* over last decade
 - MHI has *grown slightly slower than expenditures on 6 CCFs*
- Water expenditures for 6 CCFs significantly *lower than expenses on other services*
- Affordability influenced by *rate structure, coupled services, socio-economic factors, and size of agency*

Summary 2: Role of AMI on Water Use/Expenditures

Based on limited sample of agencies installing AMI...

- ~ 1-2% decrease in water use and < 1% decrease in expenditures for 6 CCFs
 - *May be significantly greater if more customer engagement*
- Rollout & characteristics differs significantly as does level of engagement
- Limited sample – difficult to draw stronger conclusions (call us!!!)

Questions?

