

The Impact of Water Aesthetics & Safety Perceptions on Water Consumption by Kentucky Families Inside & Outside of Appalachia

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Center for Rural Development – Somerset, Kentucky, USA



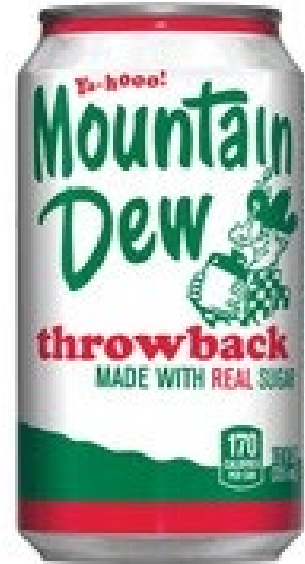
Presenter Disclosures

Jason W. Marion

The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:

“No relationships to disclose”





Marion

VA



EKUTM

Acknowledgements

- Foundation for Healthy Kentucky
- *Founded in 2001, they have invested over \$27M into health policy research & advocacy in Kentucky through their endowment managed by their nonpartisan Foundation.*

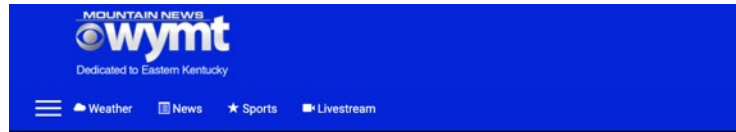


Introduction

- Recent events have raised public awareness pertaining to drinking water as a viable route for lead exposure.
- Longstanding concerns exist in Appalachian coalfields where public systems experience routine pressure drops, boil water advisories, and workforce shortages



Introduction



Home / Local / Article

Boil Water Advisory for Hazard Water System partially lifted



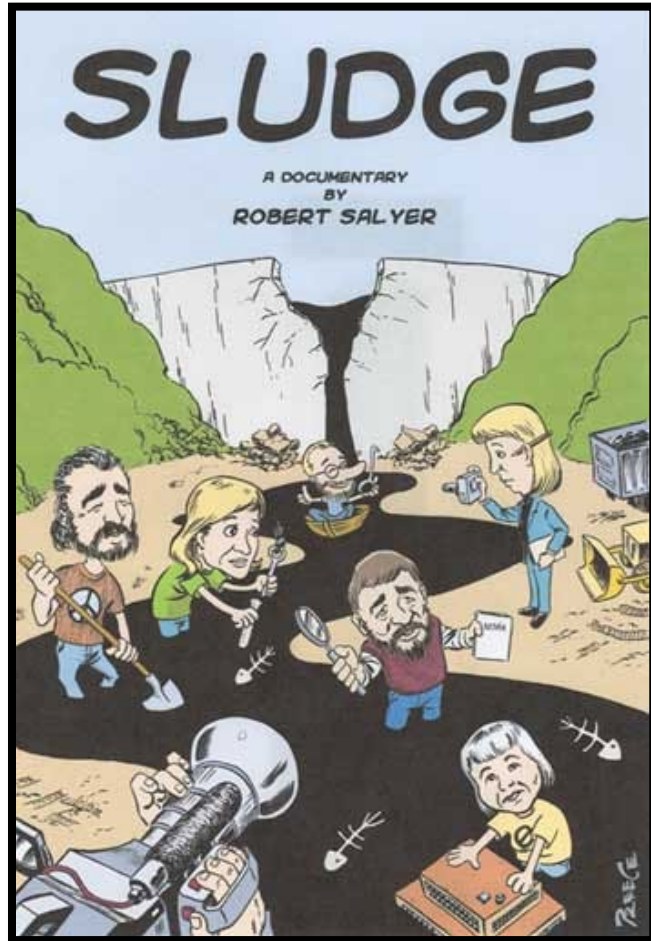
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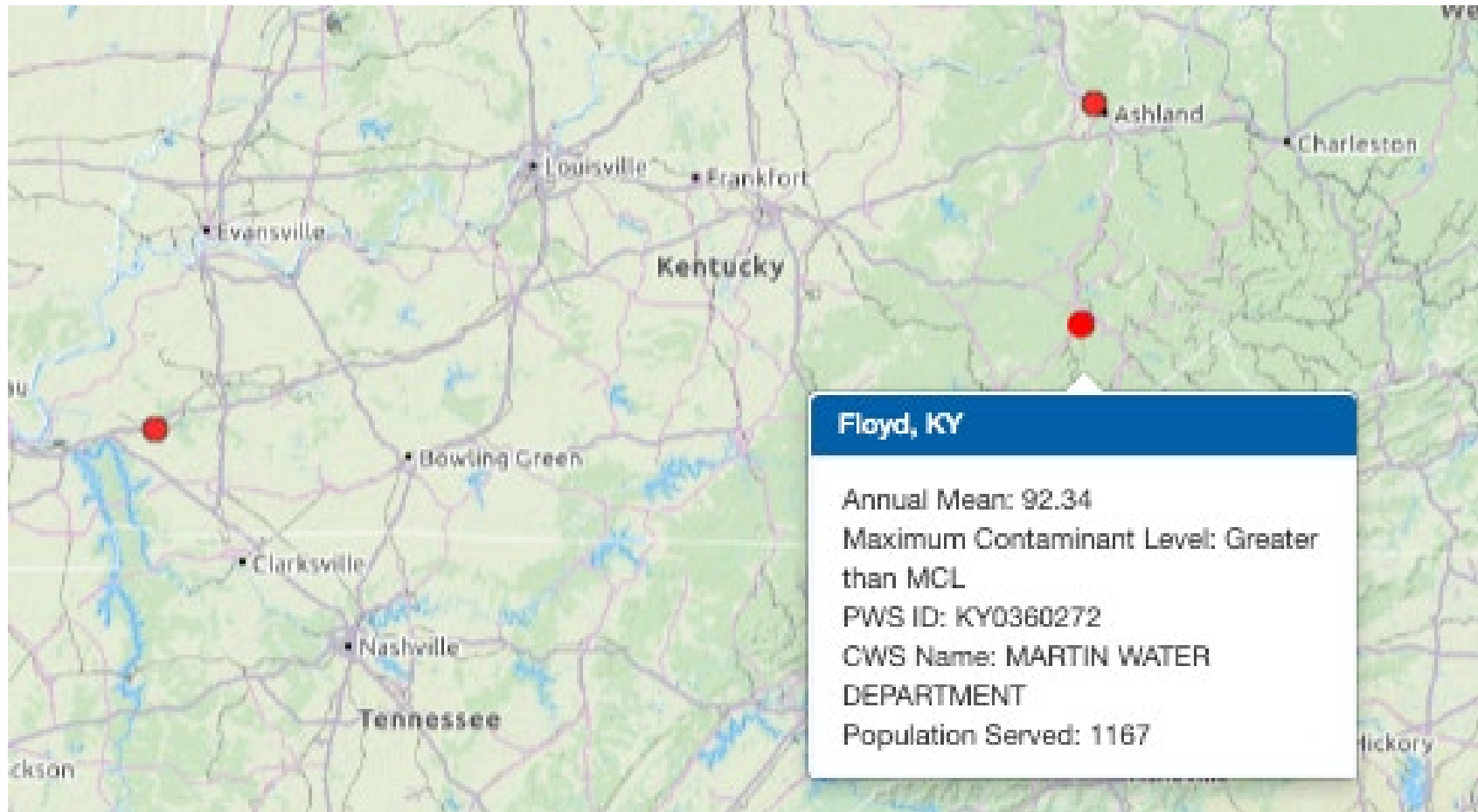
Introduction



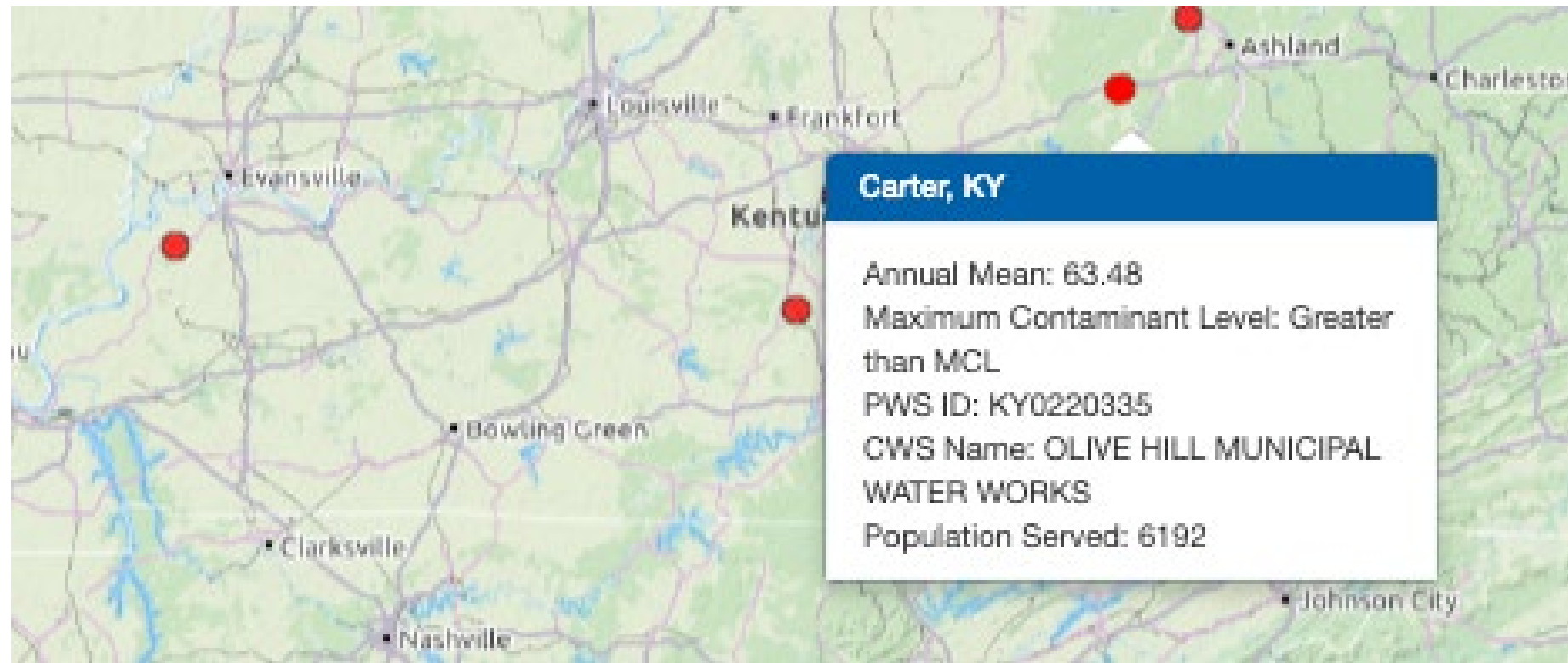
Introduction



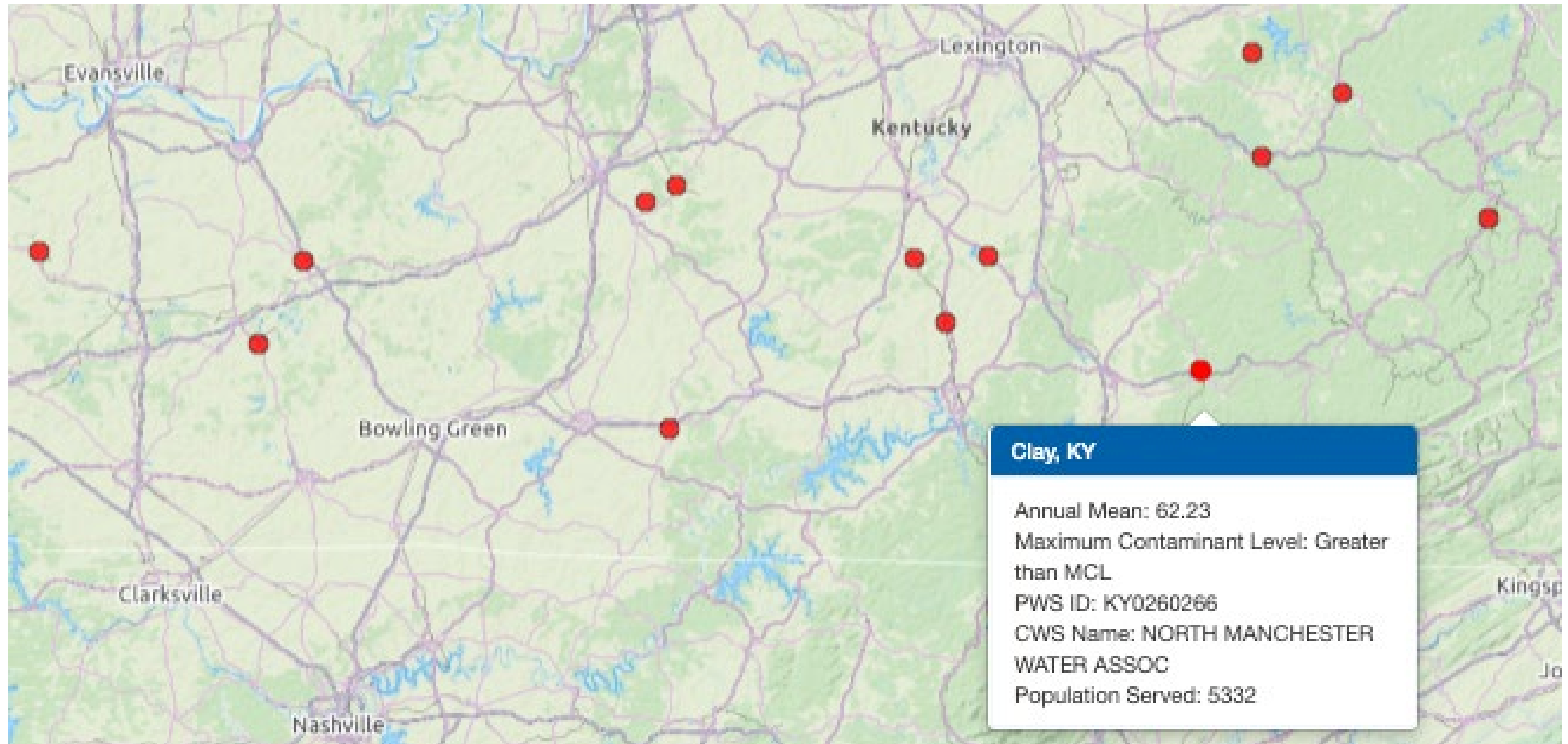
Environmental Public Health Tracking Network Data (>MCL for 2018 THMs) (n = 3)



Environmental Public Health Tracking Network Data (>MCL for 2018 HAA5)



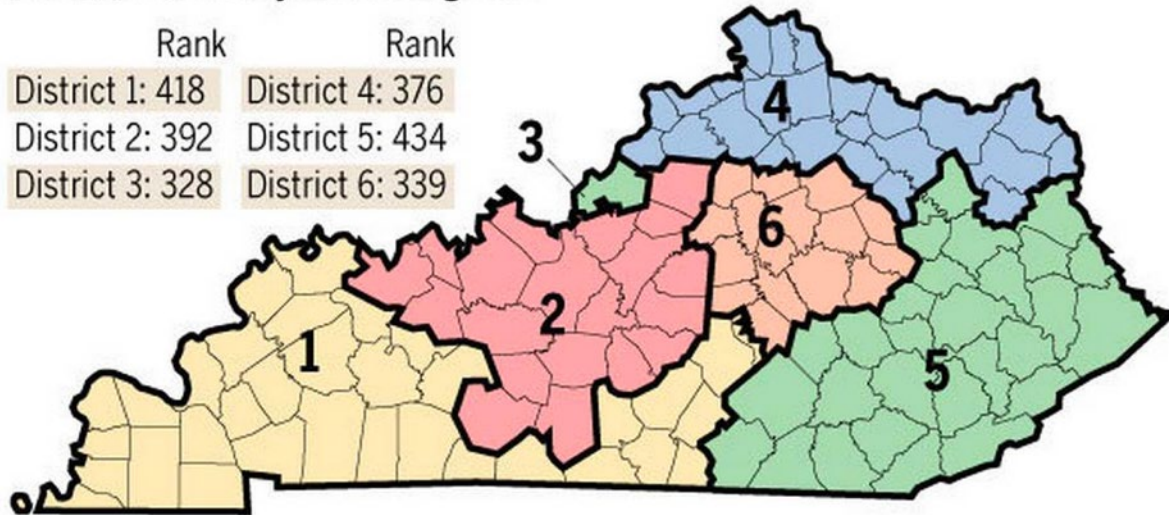
EPHTN Data (>MCL for HAA5 since 2004)



Introduction

Feeling bad in Eastern Kentucky

The congressional district covering Eastern and Southern Kentucky ranked the lowest among 434 nationwide included in a survey of people's perception of well-being. Kentucky ranked 49th among states, above only West Virginia.

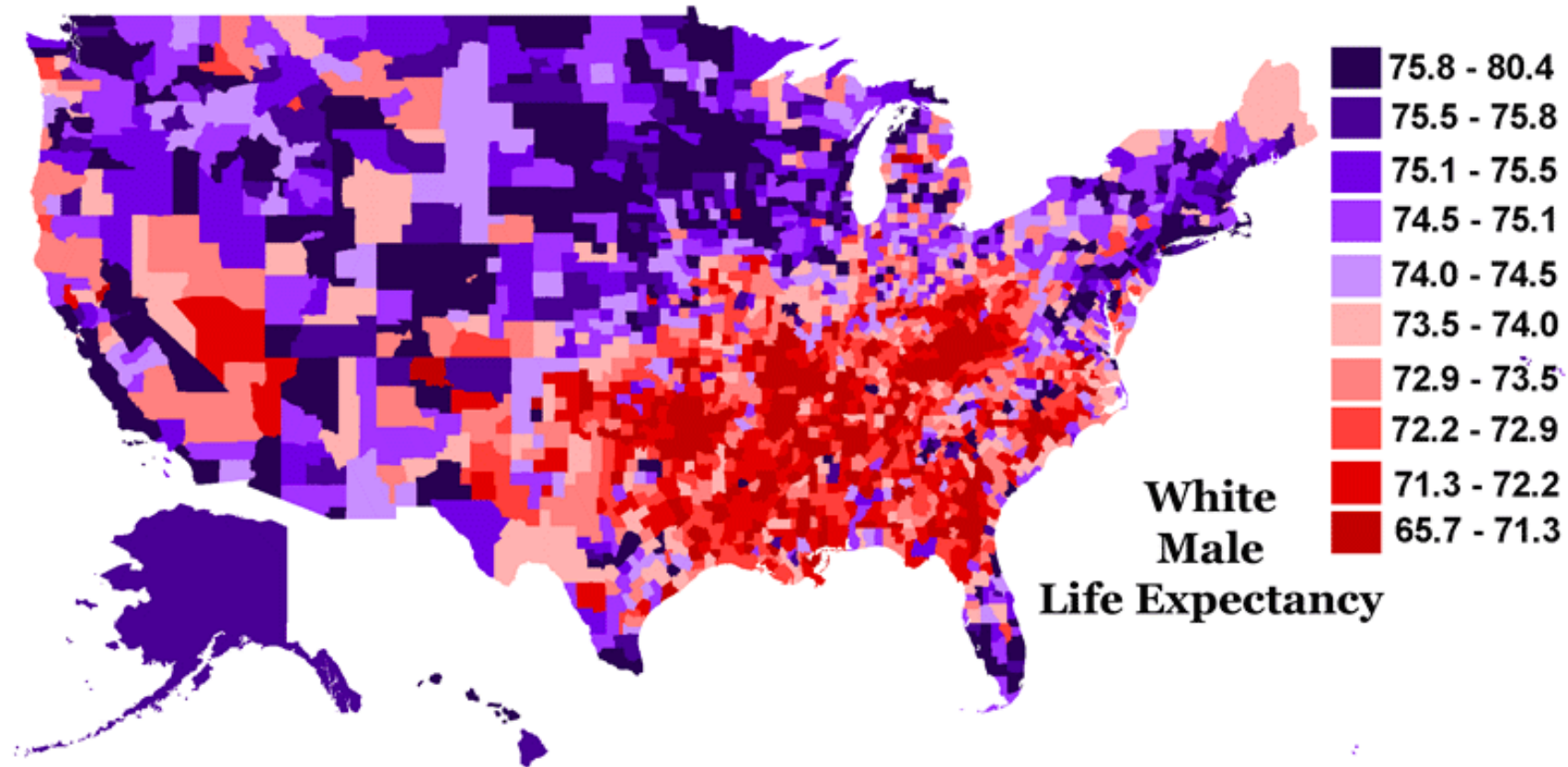


Source: Gallup-Healthways Well-Being Index

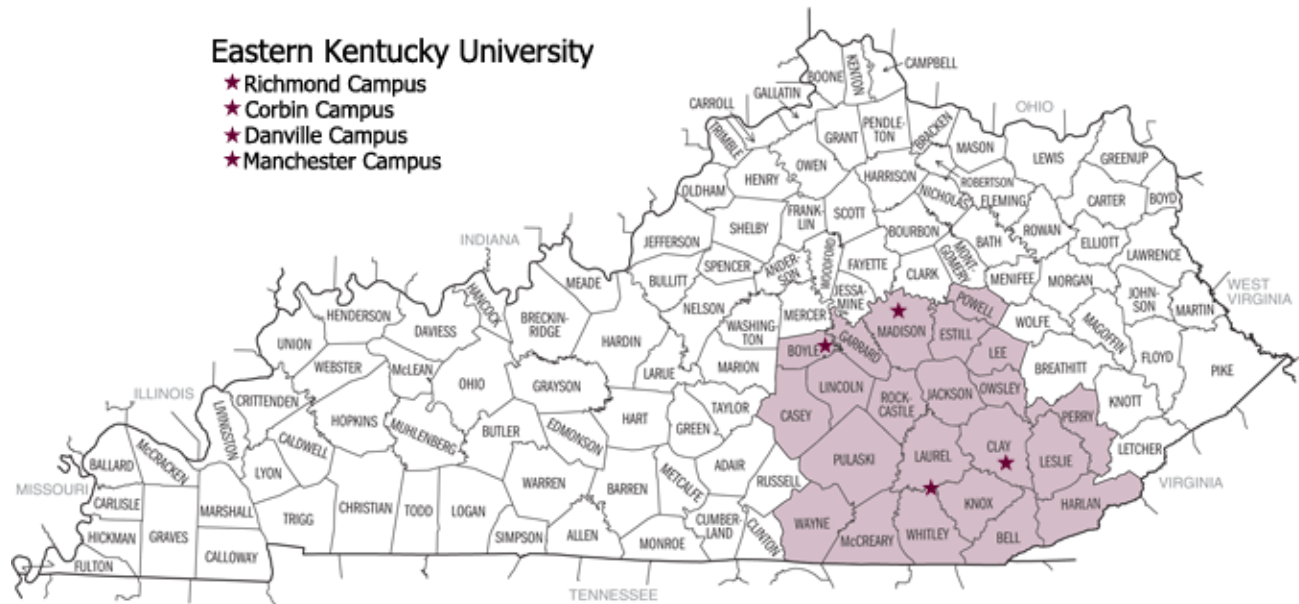
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Life Expectancy



EKU Service Region

The logo for Eastern Kentucky University (EKU) is located in the bottom right corner. It features the letters "EKU" in a bold, maroon, italicized serif font. A horizontal maroon bar with a white outline is positioned below the letters. A small "TM" trademark symbol is to the right of the bar.

Question...

Are Appalachian Kentuckians drinking recommended amounts of water daily? What's recommended?

- A. Four cups per day? (32 oz.)
- B. Seven? (56 oz.)
- C. Eight? (64 oz.)
- D. 10? (80 oz.)
- E. 16? (128 oz.)



Question 2...

Are Appalachian
Kentuckians drinking more
bottled water than their
non-Appalachian peers?
*(and does this matter more
if children are in the home?)*



Question 3...

Does income or 'being from' Appalachia impact water consumption or bottled water use?



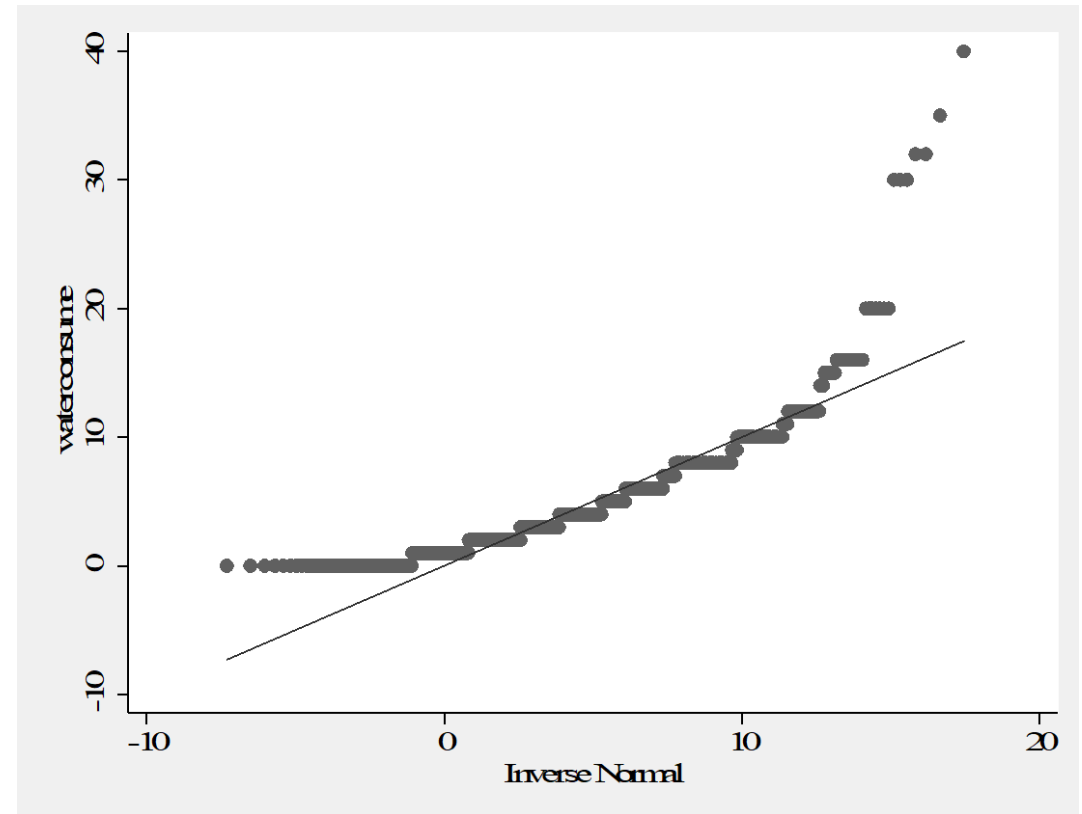
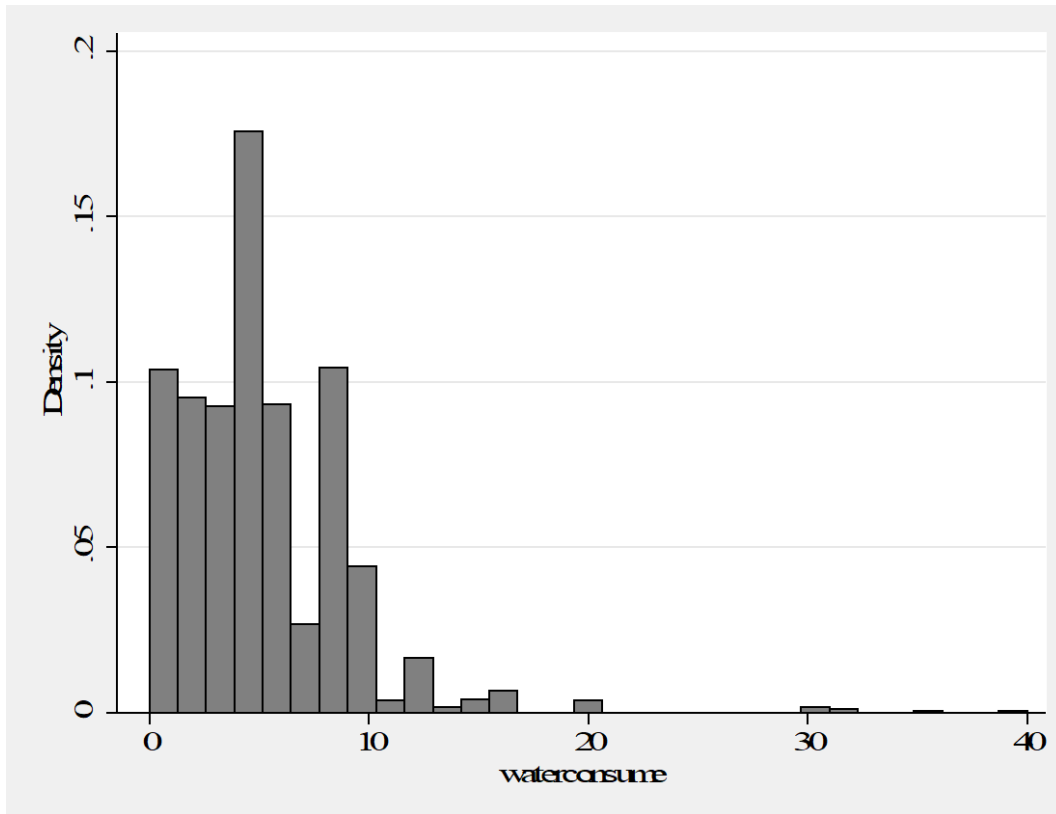
Methods

Data were obtained from the Kentucky Health Issues Poll in 2013 and had not been statistically analyzed.

- $n = 1,680$ Kentuckians
 - 1,360 landline interviews and 320
- Telephone-based (on variety of issues)



Statewide Water Consumption Results



Results

Parameter	Range	25%ile	Median	75%ile	Mean
Cups per day Non-App KY n = 1,169	0 - 40	3	4	7	5.1
Cups per day App KY n = 370	0 - 30	2	4	7	5.0

p = 0.556 (Mann-Whitney // Two-Sample Wilcoxon Rank-Sum Test)

Statewide Bottled Water Consumption

Location	Bottled Water Users	%Bottled Water User
Non-App	381/1,122	34%
App KY	200/352	57%
Statewide	581/1,474	39%

$p < 0.001$ || Chi-Square Test

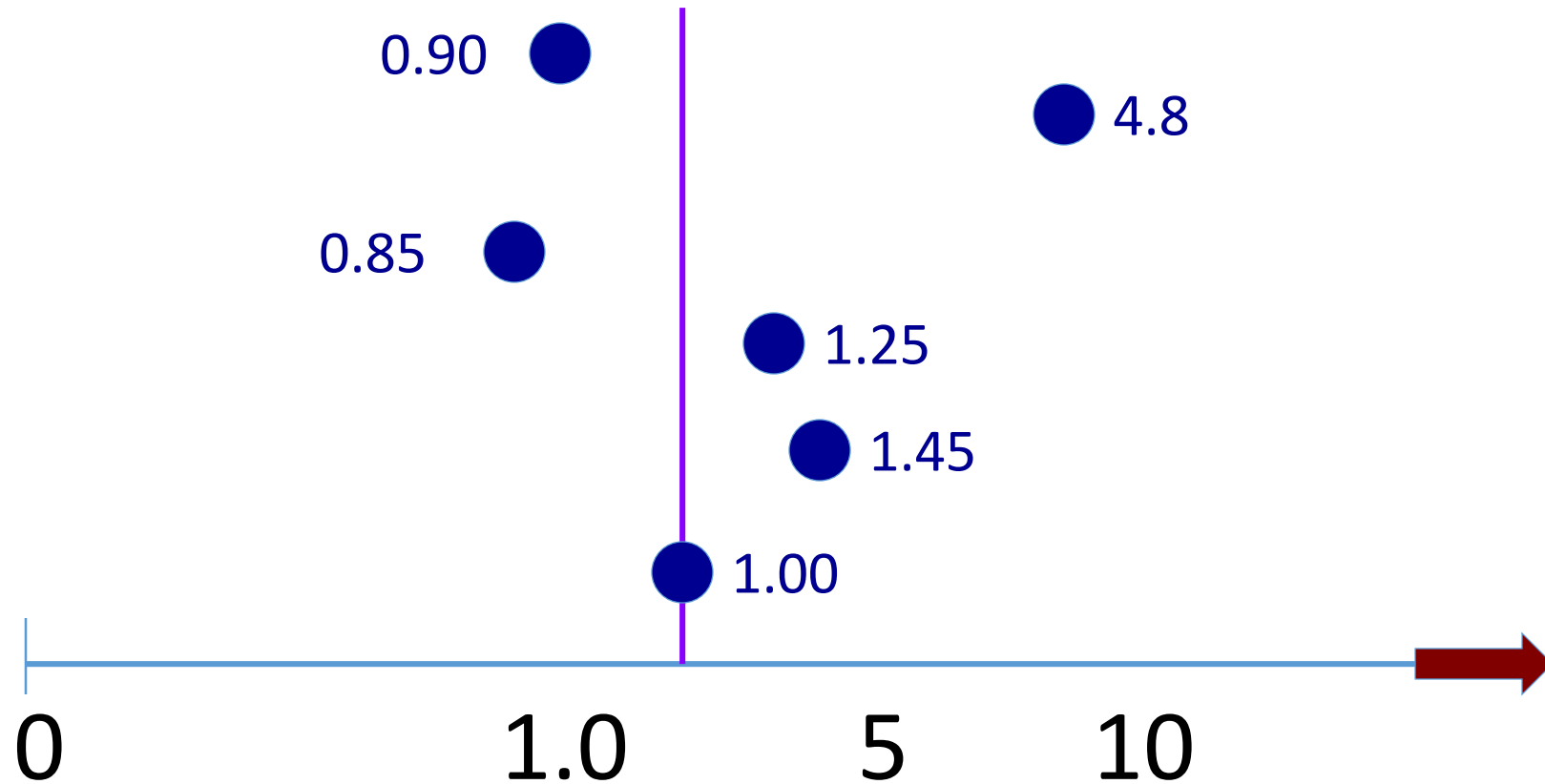


Bottled Water Results (by County & Heritage)

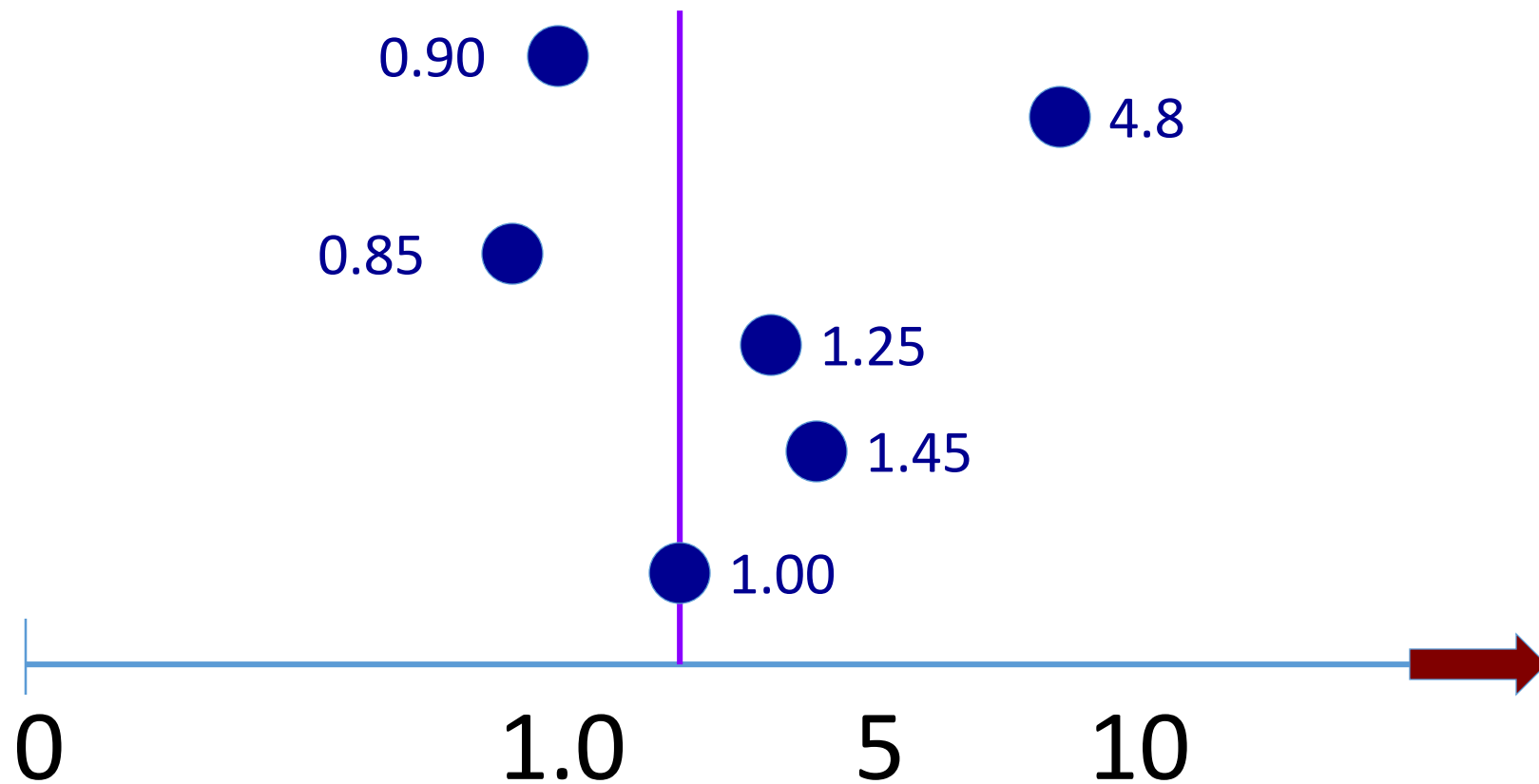
Group	Bottled Water Users	Total	Percent
Non-App Roots, Non-App County	287	856	34%
App Roots, Non-App County	94	266	35%
App County, Non-App Roots	41	85	48%
App County & App Roots	159	267	60%

p < 0.001 || Chi-Square Test

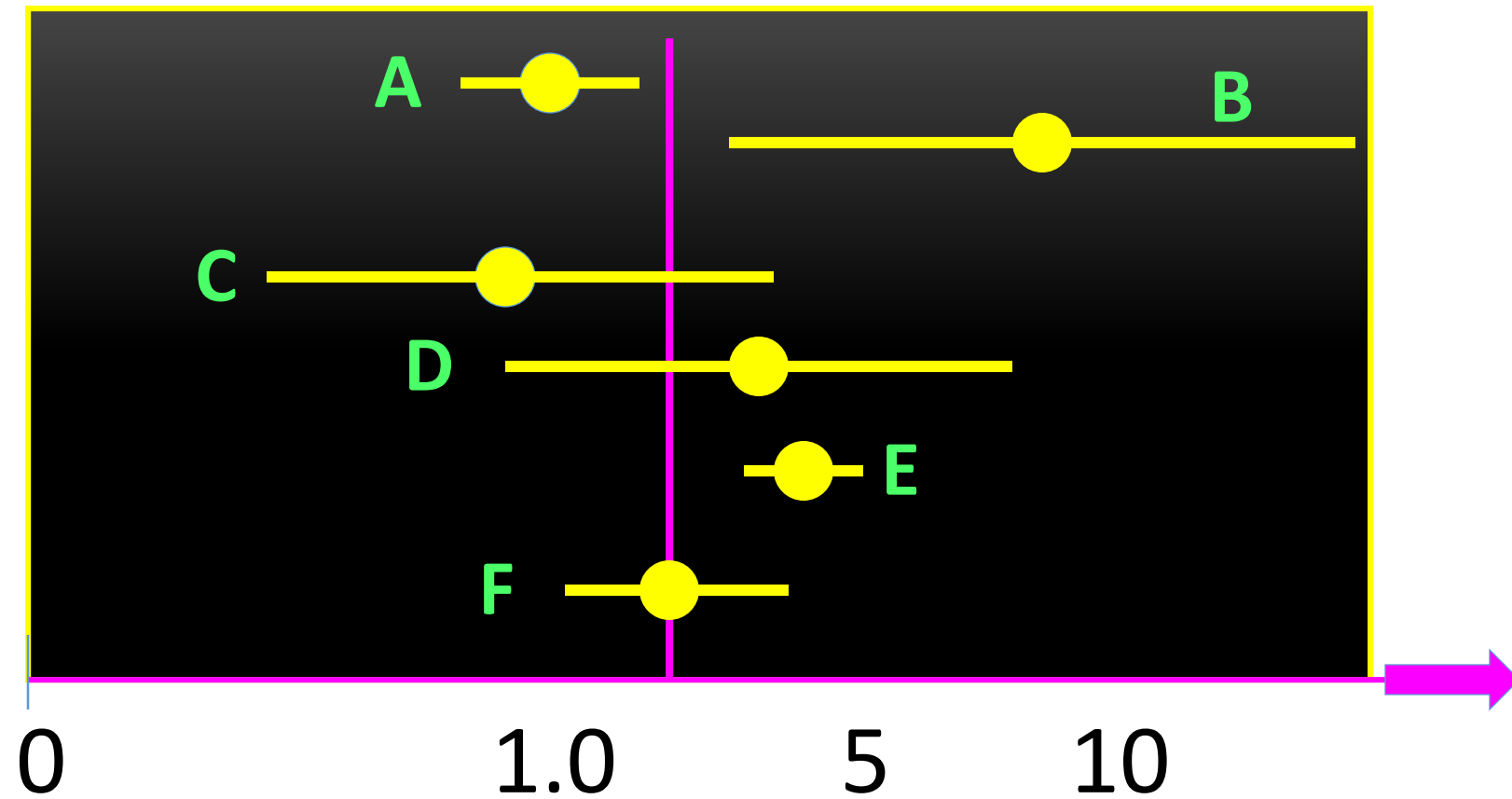
SOME PROFESSIONAL DEVELOPMENT:
INTRO TO BASIC EPIDEMIOLOGY DATA INTERP



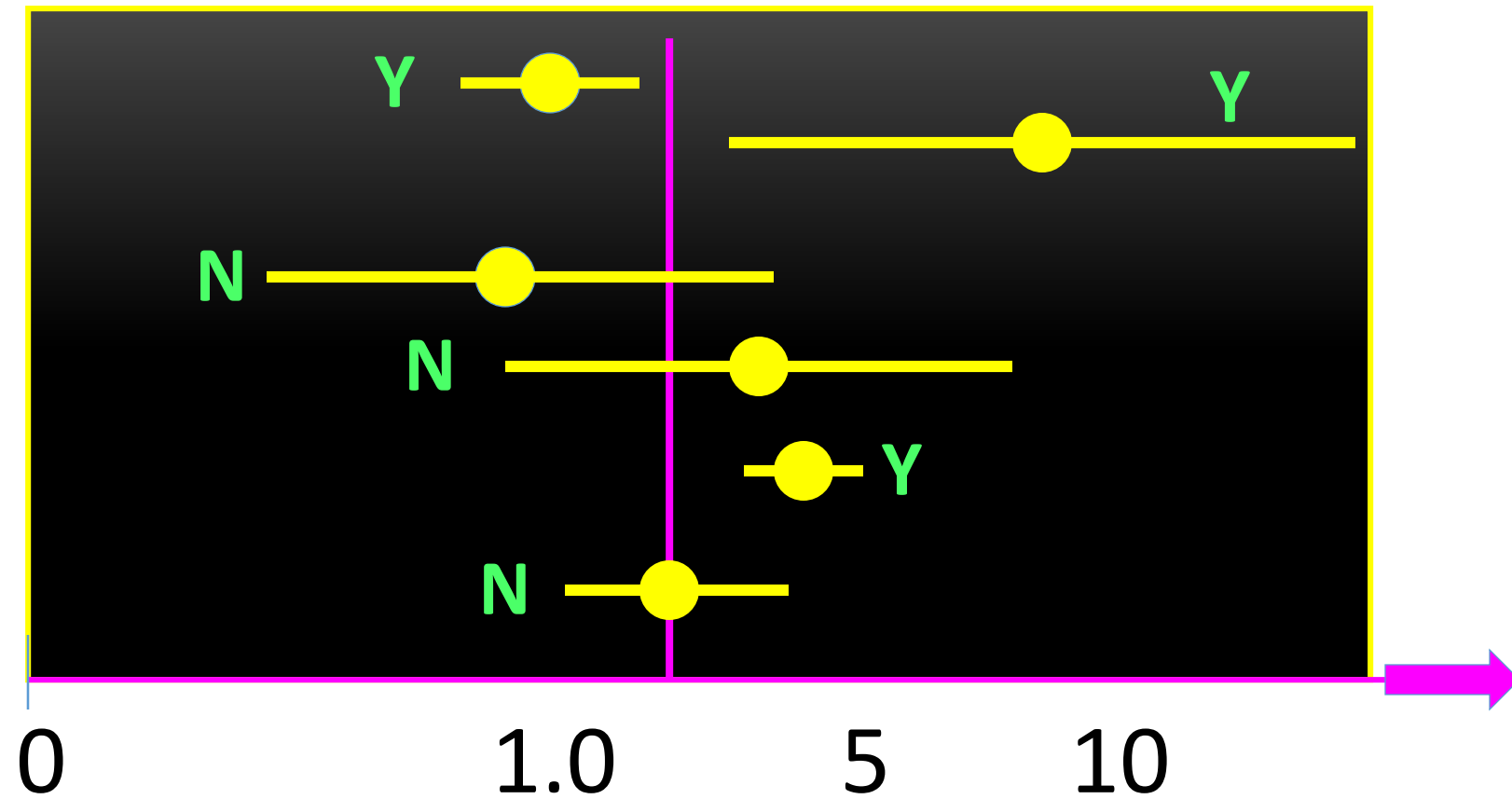
Preliminary Estimates... SUGGESTS HARMFUL OR PROTECTIVE?



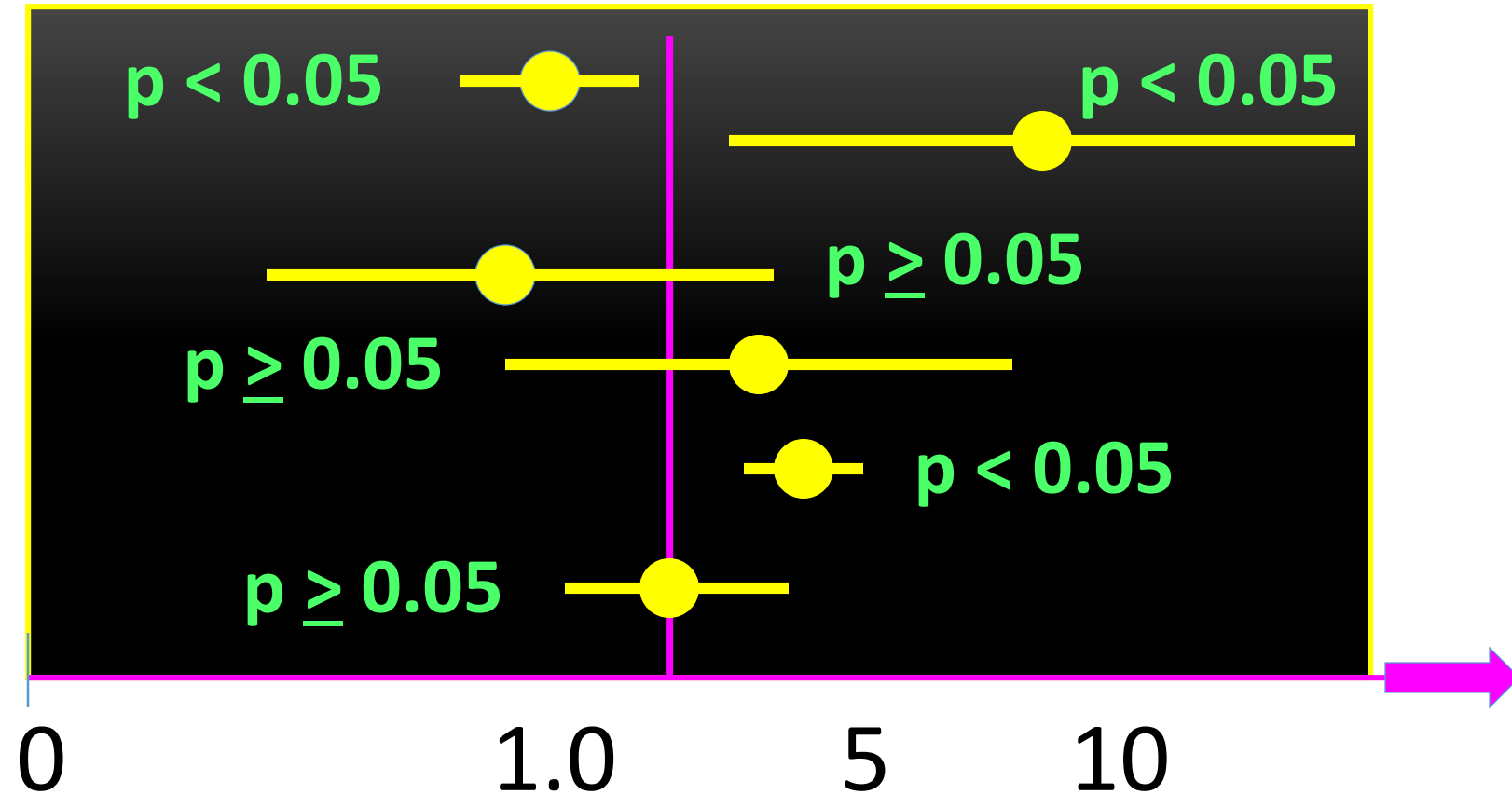
95% CI... SIGNIFICANT OR NOT?



95% CI... SIGNIFICANT OR NOT?



95% CI... SIGNIFICANT OR NOT?



Bottled Water Results (by County & Heritage)

Group	OR	p	95% CI
Non-App Roots, Non-App County	REF		
App Roots, Non-App County	1.1	0.586	0.8-1.5
App County, Non-App Roots	1.8	0.007	1.2-2.9
App County & App Roots	2.9	<0.001	2.2-3.9

What is the main reason you do not consume more tap water?

What is the most important reason you do not drink tap water more often?	<u>appcounty</u>		
	0	1	Total
Bad taste	172 61.43	108 38.57	280 100.00
Bad smell	11 52.38	10 47.62	21 100.00
Not safe	39 52.70	35 47.30	74 100.00

Bad Taste Water (by County & Heritage)

Group	OR	p	95% CI
Non-App Roots, Non-App County	REF		
App Roots, Non-App County	1.1	0.725	0.7-1.7
App County, Non-App Roots	1.6	0.123	0.9-2.9
<i>App County & App Roots</i>	<i>1.5</i>	<i>0.036</i>	<i>1.0-2.1</i>

Bad Smell Water (by County & Heritage)

Group	OR	p	95% CI
Non-App Roots, Non-App County	REF		
App Roots, Non-App County	1.4	0.646	0.4-5.2
App County, Non-App Roots	3.2	0.097	0.8-12
App County & App Roots	2.0	0.203	0.7-6.0
<i>In Poverty (Below FPL up to 133% FPL)</i>	2.6	0.042	1.0-6.4

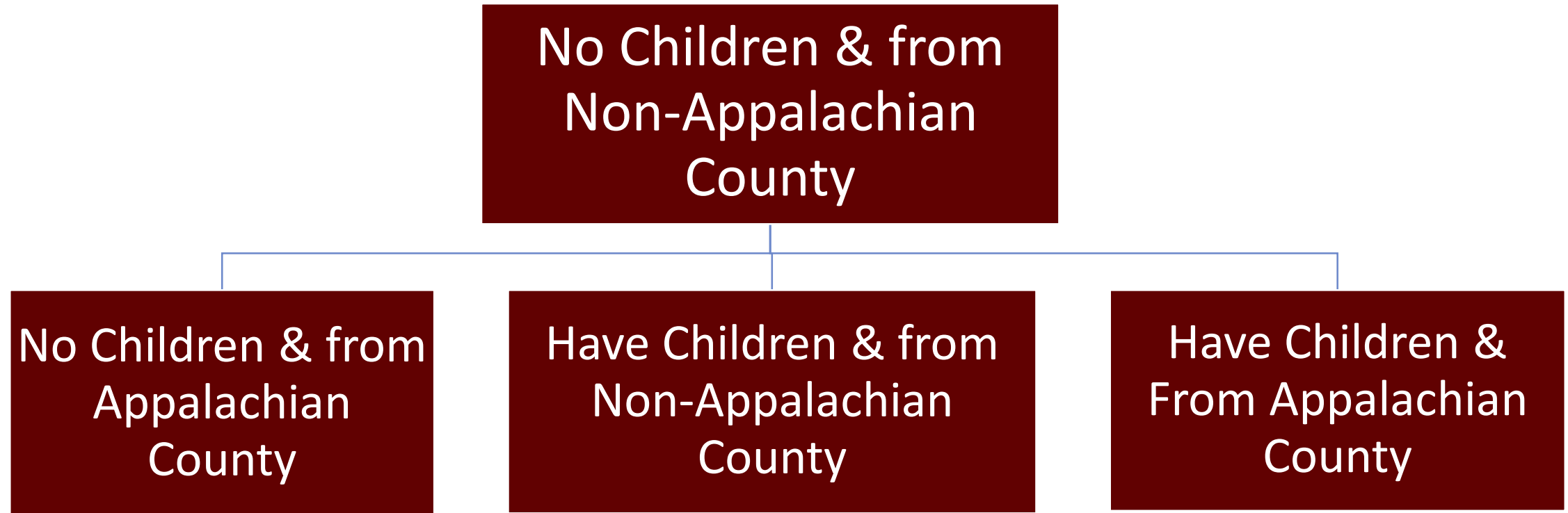
Water Not Safe (by County & Heritage)

Group	OR	p	95% CI
Non-App Roots, Non-App County	REF		
App Roots, Non-App County	0.6	0.241	0.2-1.4
App County, Non-App Roots	2.2	0.068	0.9-5.1
<i>App County & App Roots</i>	<i>2.9</i>	<i><0.001</i>	<i>1.7-4.9</i>

Who's Drinking Sufficient Water?

Group	OR	p	95% CI
Non-App Roots, Non-App County	REF		
App Roots, Non-App County	1.0	0.852	0.8-1.4
App County, Non-App Roots	1.6	0.055	1.0-2.5
App County & App Roots	0.9	0.361	0.6-1.2

What about water consumption & children (by region)?



Breakdown of the Data by Household

Group	Households	%
No Children & Non-App County	842	55%
No Children & App County	249	16%
Children & Non-App County	324	21%
Children & App County	123	8%

Who's Reporting to Drink Sufficient Water?

Group	Households/N	%
No Children & Non-App County	181 of 835	22%
No Children & App County	59 of 245	24%
<i>Children & Non-App County</i>	<i>96 of 323</i>	<i>30%</i>
Children & App County	31 of 123	25%

Who's Reporting to Drink Sufficient Water?

sufficientwater	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
appchild						
2	1.146142	.1964535	0.80	0.426	.8191033	1.603754
3	1.528075	.2260098	2.87	0.004	1.14353	2.041933
4	1.217511	.2727376	0.88	0.380	.7848621	1.888655
_cons	.2767584	.0232443	-15.30	0.000	.2347526	.3262805

Who's Reporting to Drink Sufficient Water?

Group	Households/N	%
<i>Children & Non-App County</i>	<i>96 of 323</i>	<i>30%</i>

cOR = 1.5 (95%CI: 1.14-2.04)

Who's Drinking Bottled Water?

Group	Households/n	%
No Children & Non-App County	247 of 800	31%
No Children & App County	127 of 235	54%
Children & Non-App County	131 of 312	42%
Children & App County	72 of 116	62%

Who's Drinking Bottled Water?

Group	cOR	p	95% CI
No Children & Non-App County	REF		
<i>No Children & App County</i>	<i>2.6</i>	<i><0.001</i>	<i>2.0-3.5</i>
<i>Children & Non-App County</i>	<i>1.6</i>	<i><0.001</i>	<i>1.2-2.1</i>
<i>Children & App County</i>	<i>3.7</i>	<i><0.001</i>	<i>2.4-5.5</i>

What about why folks don't use tap water?

*Their #1 Reason... Is it bad taste/smell?

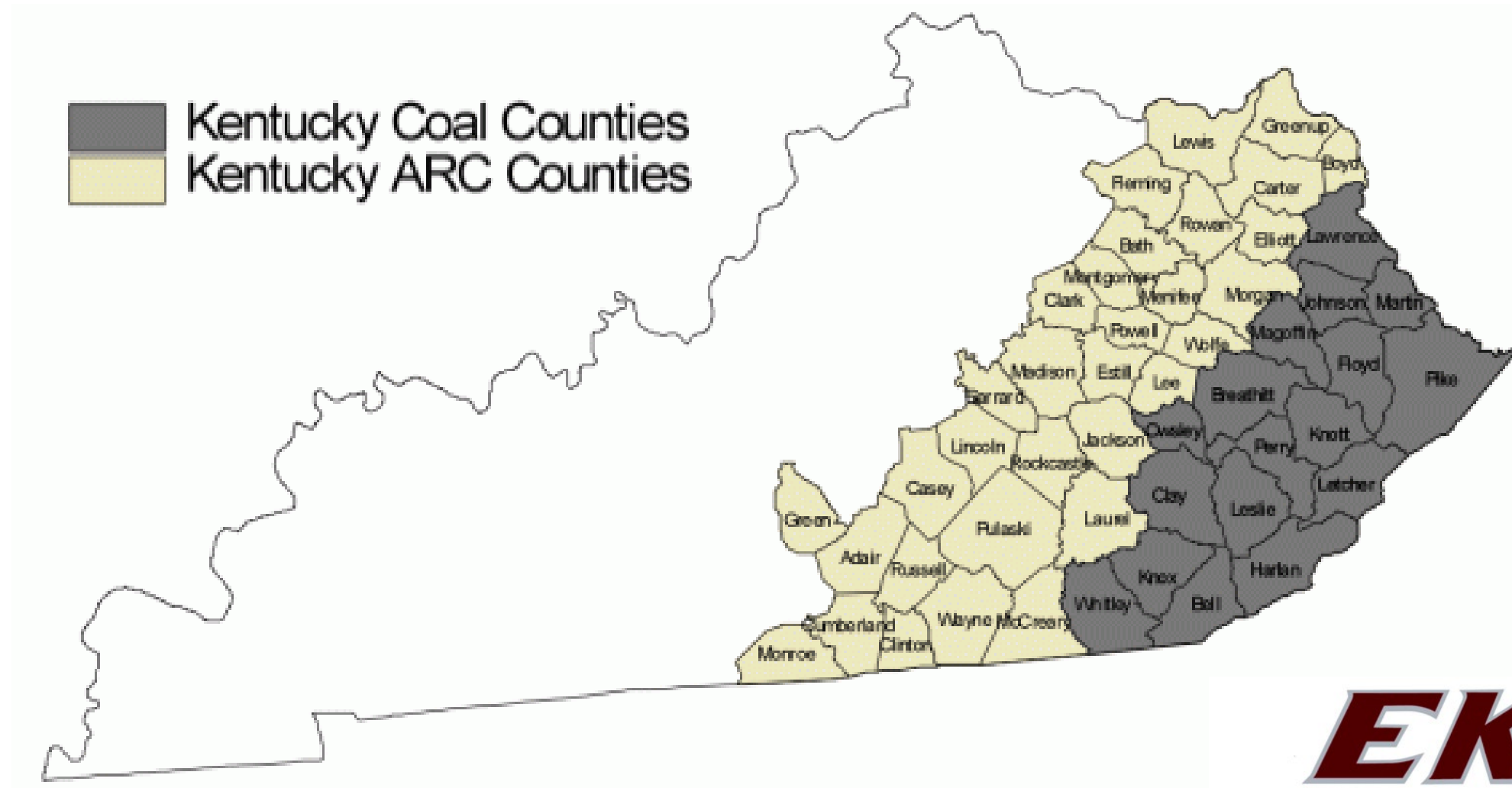
Group	cOR	p	95% CI
No Children & Non-App County	REF		
<i>No Children & App County</i>	<i>2.1</i>	<i><0.001</i>	<i>1.4-3.2</i>
Children & Non-App County	1.1	0.589	0.75-1.7
Children & App County	1.1	0.742	0.66-1.8

What about why folks don't use tap water?

*Their #1 Reason... Is it not safe or not clean?

Group	cOR	p	95% CI
No Children & Non-App County	REF		
No Children & App County	0.93	0.804	0.53-1.6
Children & Non-App County	0.60	0.121	0.32-1.1
<i>Children & App County</i>	<i>2.00</i>	<i>0.024</i>	<i>1.1-3.7</i>

Kentucky's Appalachian Counties



The Big Model (Multivariable w/Survey Design)

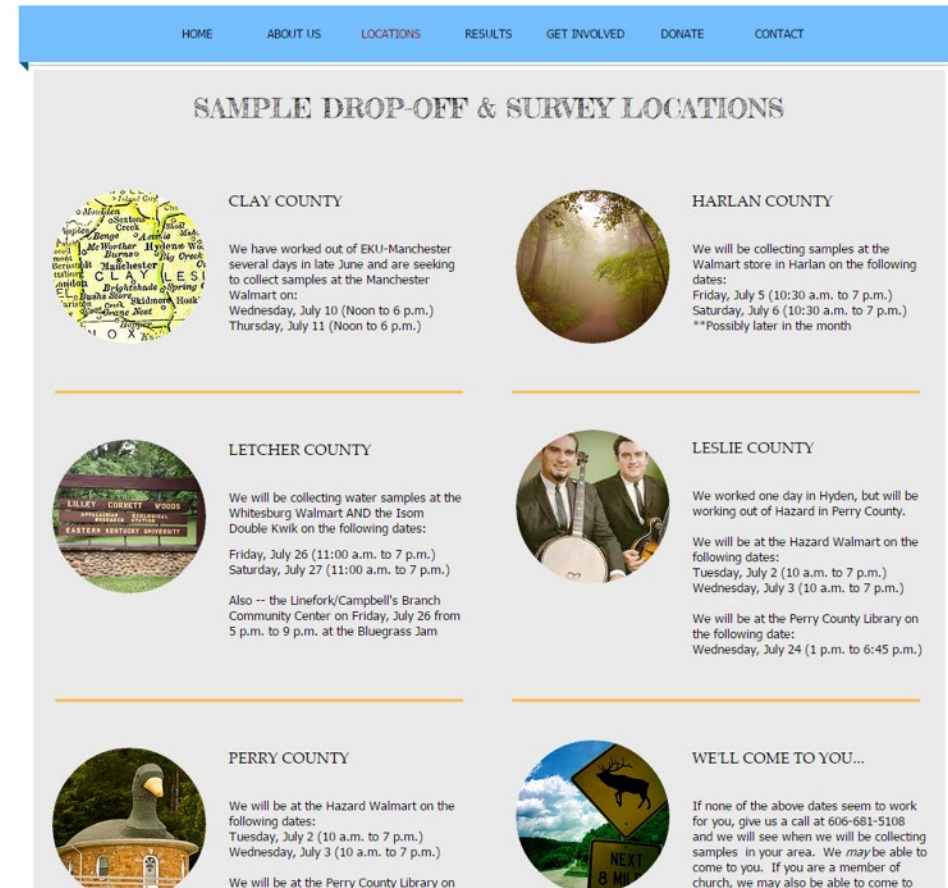
Group for Predicting Bottled Water Consumption	aOR	p	95% CI
<i>Some College or More</i>	<i>0.61</i>	<i>0.008</i>	<i>0.43-0.88</i>
<i>No Children & App County</i>	<i>3.3</i>	<i><0.001</i>	<i>2.0-5.3</i>
<i>Children & Non-App County</i>	<i>2.2</i>	<i><0.001</i>	<i>1.4-3.4</i>
<i>Children & App County</i>	<i>3.8</i>	<i><0.001</i>	<i>2.0-7.4</i>
<i>Non-White</i>	<i>1.9</i>	<i>0.021</i>	<i>1.1-3.4</i>
Below Fed. Pov. Level	1.3	0.460	0.71-2.2
<i>>133% Fed. Pov. Level</i>	<i>1.9</i>	<i>0.006</i>	<i>1.2-2.9</i>

Discussion Items

- Initial results show most of Kentucky does not drink an adequate amount of water (or the survey design generated a misclassification of water consumption)
- Appalachian Kentuckians were more likely to consume bottled water than non-Appalachian Kentuckians
- Appalachian Kentuckians who leave the region do not hold onto bottled water tendencies as much as those who live in the region
- Appalachian Kentuckians are overwhelmingly more concerned about the safety of their water and it impacts their consumption.

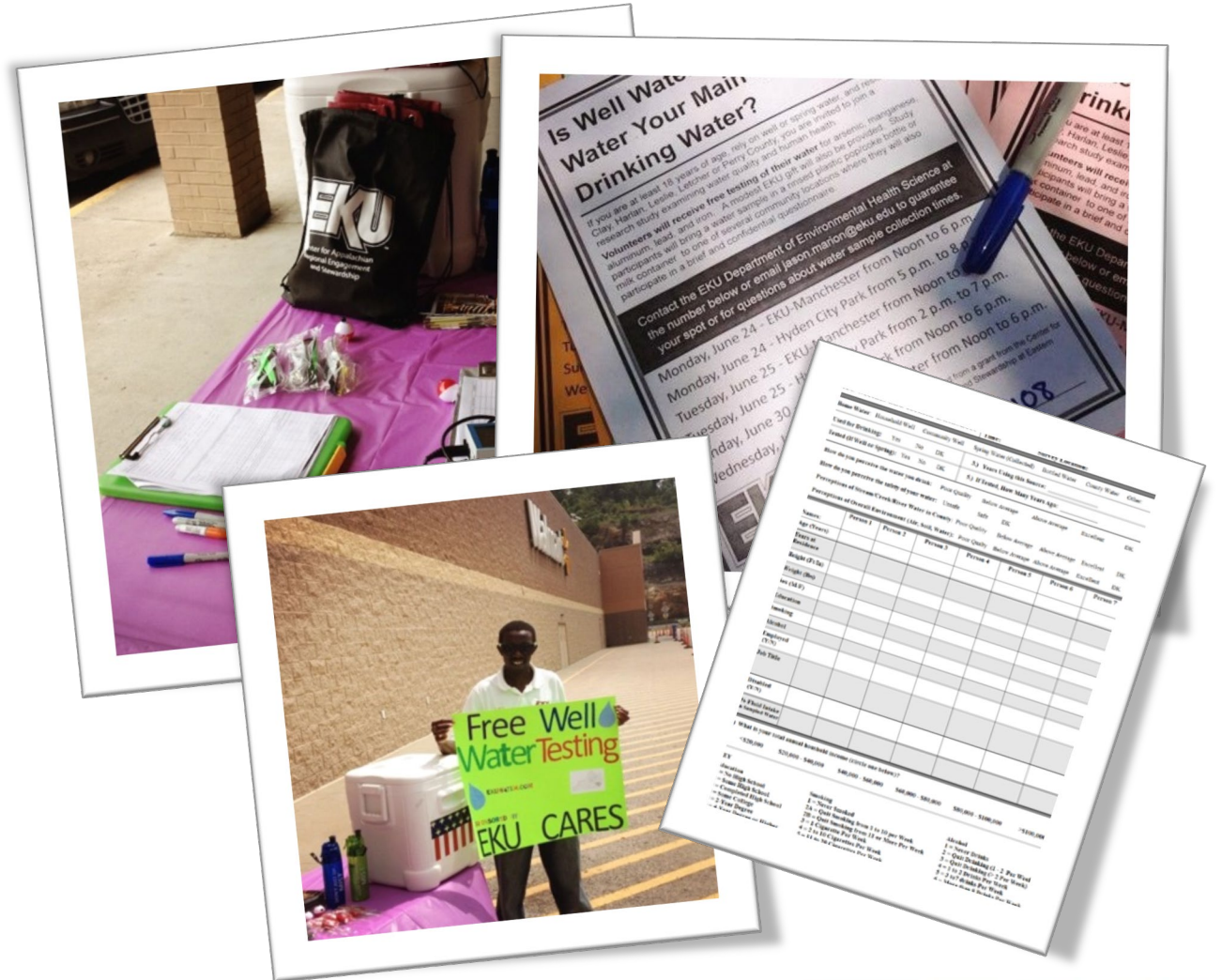


Discussion



Discussion Items

- Previous work in the region by ECU studying 194 households indicated the following:
 - 62% of households reported consuming water from a well or spring source they do not recall ever being tested.
 - For the 38% who had their water tested, on average, samples had not been obtained or tested for 9.5 years with some samples not being tested for up to 30 years.



RECOMMENDATIONS

- Water filters capable of removing lead and other metals should be provided by SNAP/food stamp programs to promote more water consumption
- Children and vulnerable populations are being impacted
- More testing and support of the water systems (public and private) are needed – and possibly with outside resources – some of which are due to this region via the legacy-related coal mining funds, such as the AML Program.
- There is a tremendous shortage of certified drinking water operators in all of KY, but especially in rural areas.



Thank You
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