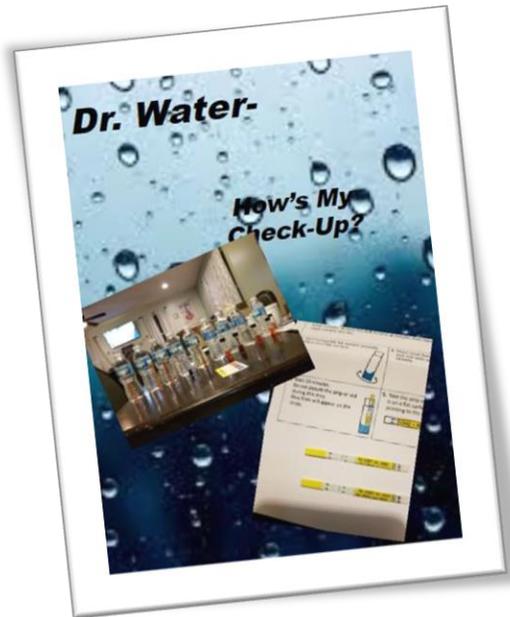


What's the Prognosis on my Water Check Up-- Which Bottled or Tap Water Should Be Consumed by Humans?



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Abstract:

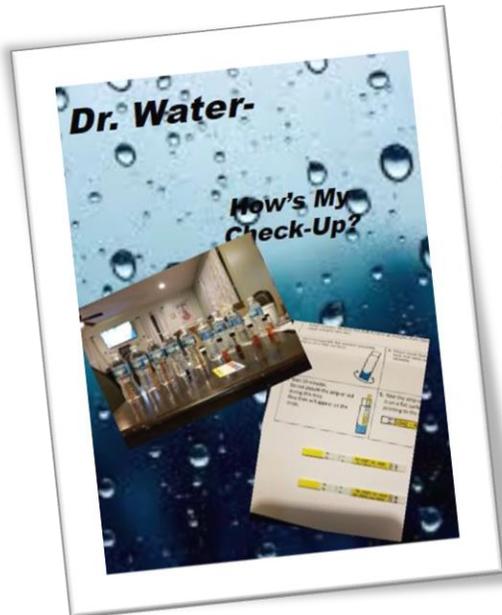
The purpose of this project was to determine if there is any difference in the quality and healthiness of the drinking water used in bottled brands and community tap water. The local Detroit supplied tap water company claims they have the best process in the world and it is much safer to drink this water than to waste money on bottled water.

Ten trials were run on five popular bottled water brands: CORE, FIJI, Nestle Pure Life, Smart Water, and Ice Mountain. Five randomly chosen Detroit supplied residential samples were also obtained from: Detroit proper, Newport, Flat Rock, Novi, and Riverview. All samples were tested using the same equipment and were obtained from the same place: the back of the toilet since that water is not modified by softeners, or other purification methods.

Data was recorded and analyzed to determine if the hypothesis was supported or disproved. The Novi sample was discarded because the lemon smell from the original container was still evident and could skew the tests.

The results were concerning! Many of the bottled waters contained toxins harmful and dangerous to human living! Some of the same tap water was healthy in one community but not in another. Lead was found in both tap water and bottled water samples.

Further research is necessary. The data strongly suggests that there are problems with both tap water and bottled water.



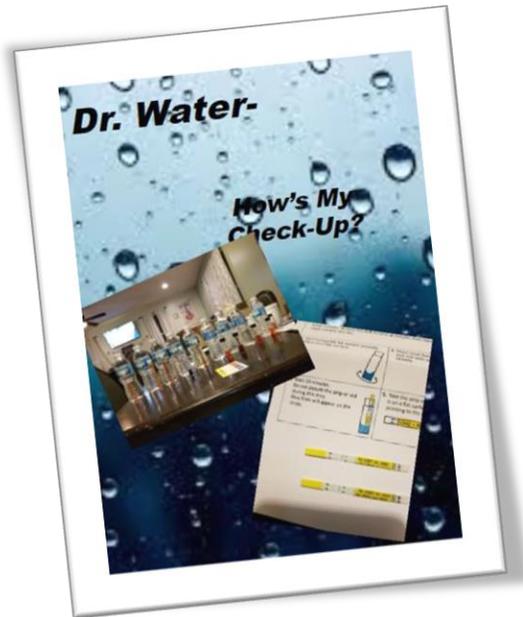
Introduction:

Which type of water is healthier for humans to drink: bottled or tap?

My grandma has been teaching her students about water ever since I can remember. She always dragged my older brothers around with her and I had to stay home and wait to hear about what adventures they had. One time, the police followed them around because they didn't believe all they were after was a glass of water from some river in Toledo! I got to go that time but I was asleep in my car seat and missed all the fun!

For those of us who live in Michigan, water has been a hot topic. I never really thought about things like this before, you just turned on the water and there it was. When the news came out about Flint and my grandma started talking to my dad about it, we started drinking bottled water instead. This year, I wanted to see what all the fuss was about and why we started drinking cases of bottled water at home all the time.

The research shows that heavy metals are a problem in many urban communities, not just in Flint or Detroit. The problem there went deeper than that. People were very untruthful and falsified data and now innocent children are suffering because of it.

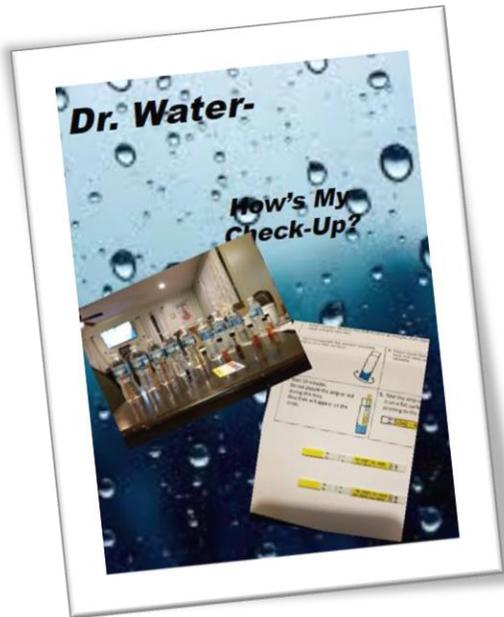


Introduction:

Which type of water is healthier for humans to drink: bottled or tap?

The purpose of this research was to determine which kind of water was healthier for human consumption: bottled or our local tap water. It was discovered that my community gets its water from Detroit. The local water department informed this researcher that her house was the “last place on the Detroit line.” Detroit advertises that they hold the reputation for having the best water treatment facility in the world and people from all over the world came to see how it was done.

If this is accurate, then tap water should be healthier for human consumption.



The hypothesis tested was that the bottled water will be healthier for drinking because they go through more purifying processes than tap water does, according to the marketing claims. (All those extra processes should surely make it better to drink, right?)

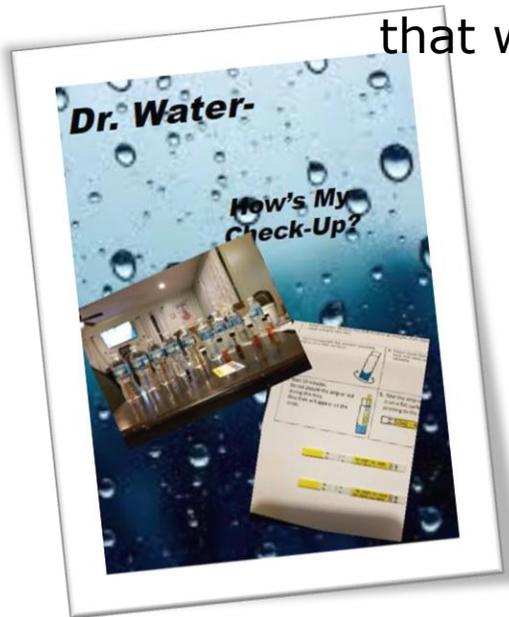
Methods:

Experimental Design and Procedures

Ten trials were run on five popular bottled water brands: CORE, FIJI, Nestle Pure Life, Smart Water, and Ice Mountain. Five randomly chosen Detroit supplied residential samples were also obtained throughout the area Detroit supplies.

Communities selected were: Detroit proper, Newport, Flat Rock, Novi, and Riverview. All samples were tested using the same equipment and were obtained from the same location: the back of the toilet since that water is not modified by softeners, or other purification methods.

The Novi sample was not included because lemon was still smelled in the container that was used to collect the sample and that might affect the test results.



The tests conducted were: nitrates, phosphates, copper, lead, pH, water temperature.

Professional LaMotte test kits were used, along with Vernier probeware for pH and oxygen levels. GLOBE protocols were strictly followed.

All data collected was recorded in the logbook for future analysis. Pictures were taken to document results.

Methods:

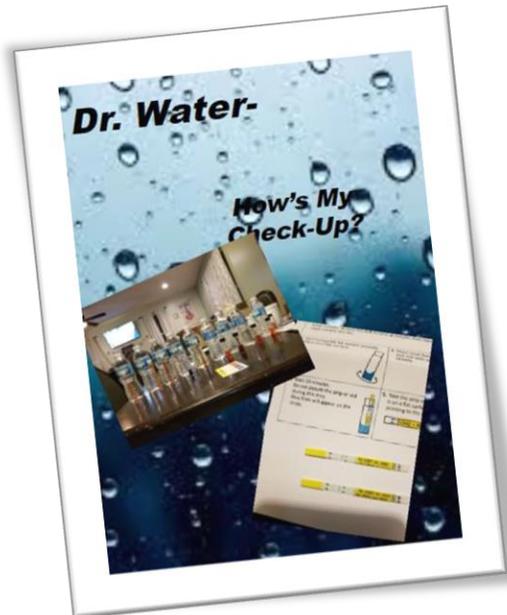
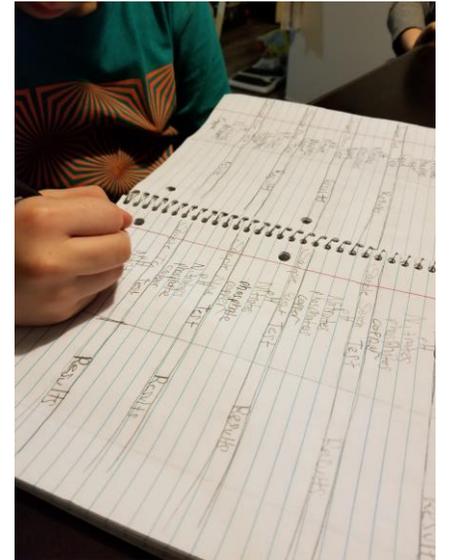
Experimental Design and Procedures

For the bottled water, this research was intended to only test the water so all the samples were purchased from the same location to control for error from water bottled at different locations which might affect the test results.



Each test was completed and data gathered was recorded in the log book for later analysis.

The data was surprising so many pictures were taken for later study.

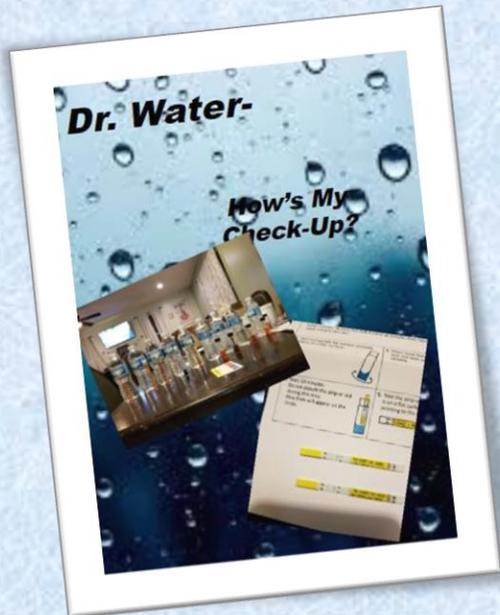


Results:

What did the data show?

Test Name	Test Results
Copper	0 ppm
pH	6.9
Nitrates	4 ppm
Phosphates	0.5 ppm
*Lead	NO danger
*results show either above or below the danger zone of 15 ppb	

CORE Hydration averaged



All samples showed nitrates in the water , Copper was found in this testing in Fiji. Although this sampling did not indicate lead, past samples have.

Test Name	Test Results
Copper	1 ppm
pH	6.3
Nitrates	5 ppm
Phosphates	4 ppm
*Lead	NO***
*results show either above or below the danger zone of 15 ppb	
***tested positive for lead in past research	

Fiji samples averaged

Test Name	Test Results
Copper	0 ppm
pH	6.4
Nitrates	3 ppm
Phosphates	0 ppm
*Lead	NO danger
*results show either above or below the danger zone of 15 ppb	

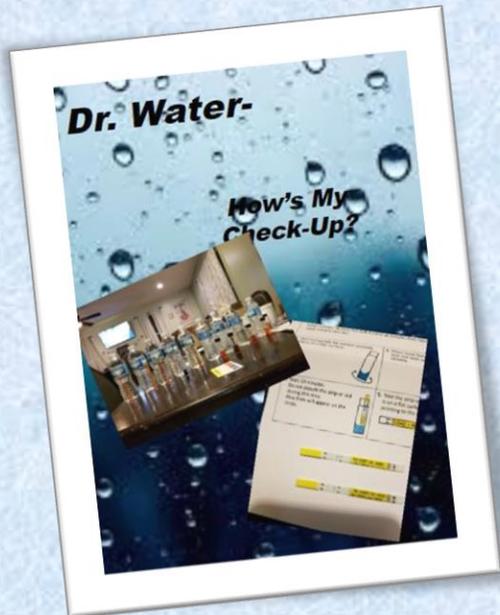
Nestle Pure Life averaged

Results:

What did the data show?

Test Name	Test Results
Copper	1 ppm
pH	6.4
Nitrates	1.1 ppm
Phosphates	1 ppm
Lead*	YES! Danger
*results show either above or below the danger zone of 15 ppb	

Ice Mountain averaged



Ice Mountain had everything it should not have had! Smart Water had heavy metals but no indication of lead ABOVE the minimum levels. The test only shows if lead is present ABOVE the maximum allowed.

Test Name	Test Results
Copper	1 ppm
pH	5.8
Nitrates	4 ppm
Phosphates	1 ppm
Lead*	NO
*results show either above or below the danger zone of 15 ppb	

Smart Water averaged

Results:

What did the data show?

Test	Results
pH	6.57
Phosphates	1 ppm
Nitrates	5 ppm
Copper	0 ppm
Lead*	YES Danger

*results show either above or below the danger zone of 15 ppb

Young Detroit sample

Test	Results
pH	7
Phosphates	3ppm
Nitrates	0.5 ppm
Copper	0 ppm
Lead*	NO

*results show either above or below the danger zone of 15 ppb

42.094 N
83.342 W

Flat Rock sample

Jackson Detroit Sample	
Test	Results
pH	6.28
Phosphates	5 ppm
Nitrates	1 ppm
Copper	1.5 ppm
Lead*	YES DANGER

*results show either above or below the danger zone of 15 ppb

Test	Results
pH	6.02
Phosphates	1 ppm
Nitrates	5 ppm
Copper	0 ppm
Lead*	YES Danger

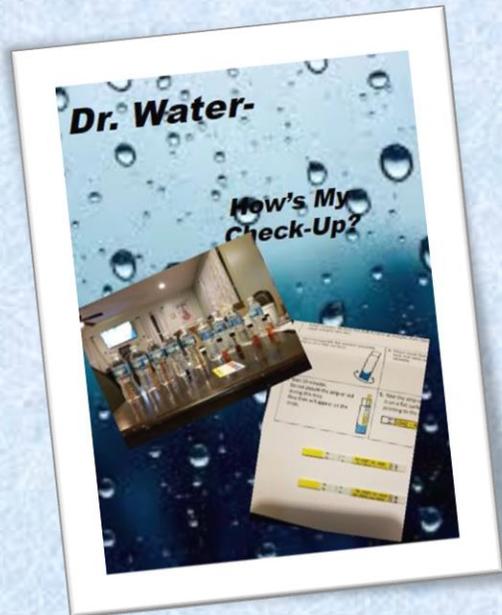
*results show either above or below the danger zone of 15 ppb

Newport residential sample

Test	Results
pH	6.07
Phosphates	2 ppm
Nitrates	1 ppm
Copper	1.5 ppm
Lead*	YES Danger

*results show either above or below the danger zone of 15 ppb

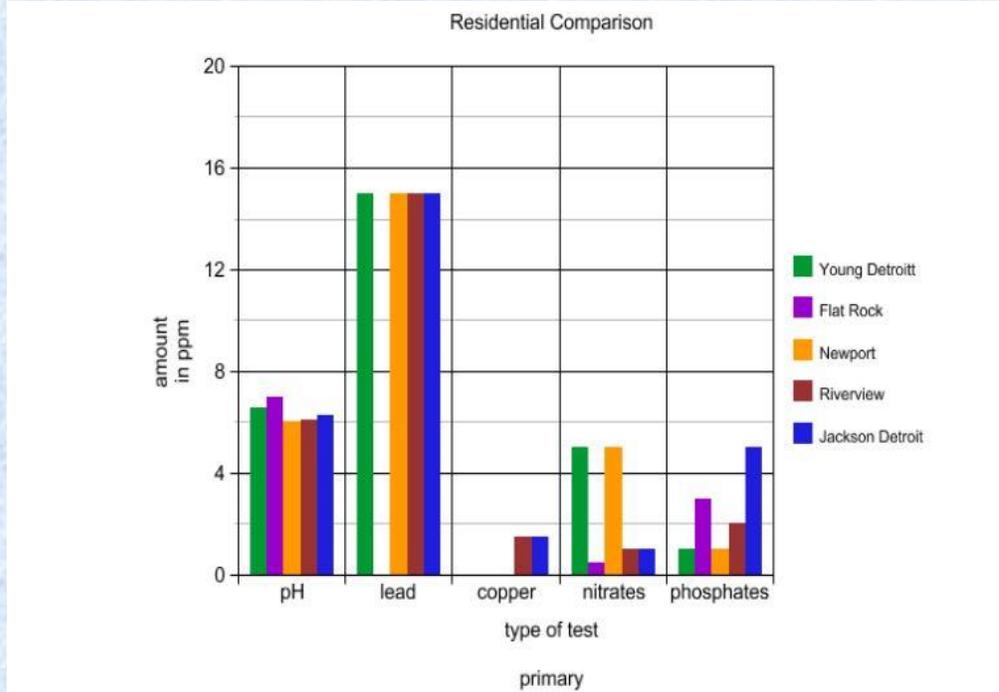
Riverview residential sample



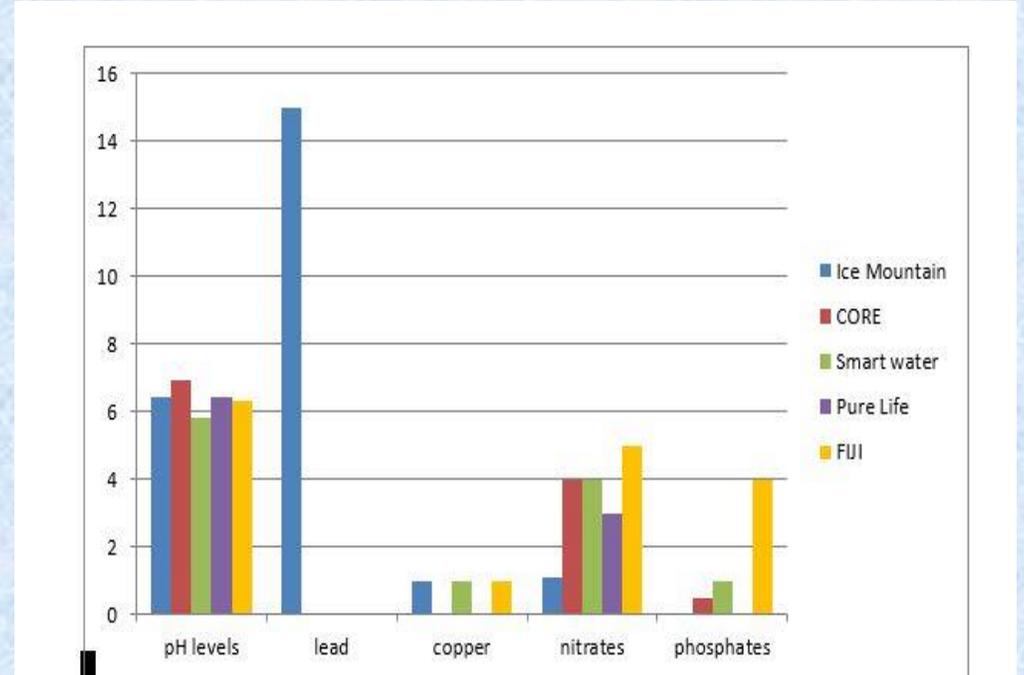
This is the same water coming through the same pipelines from Detroit, yet the water tested differently. The Flat Rock and Newport samples were both from new builds so no lead delivery pipes were used, but one has lead and the other doesn't.

Results:

What did the data show?



	Young Detroit	Flat Rock	Newport	Riverview	Jackson Detroit
pH	6.57	7	6.02	6.07	6.28
lead	15	0	15	15	15
copper	0	0	0	1.5	1.5
nitrates	5	0.5	5	1	1
phosphates	1	3	1	2	5



	Ice Mountain	CORE	Smart Water	Pure Life	FIJI
pH	6.4	6.9	5.8	6.4	6.3
Lead	15	0	0	0	0
copper	1	0	1	0	1
nitrates	1.1	4	4	3	5
phosphates	1	0.5	1	0	4

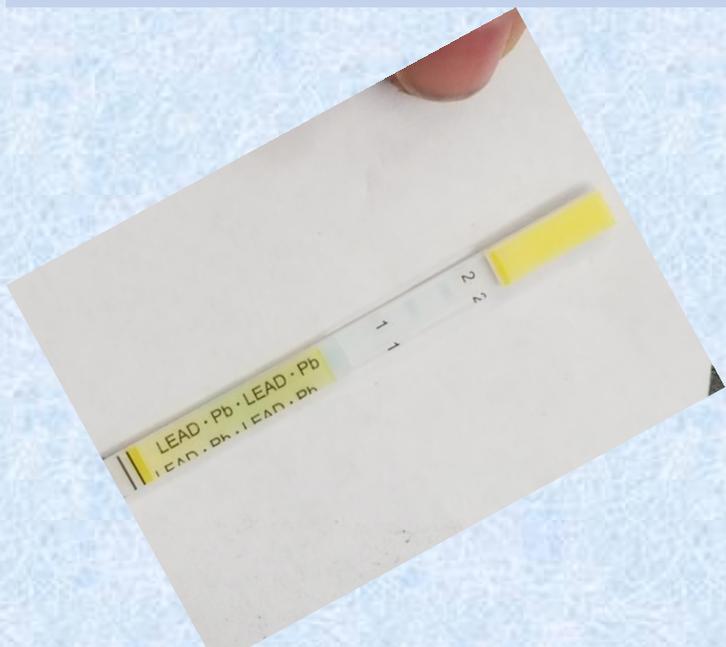
Results:

What did the data show?

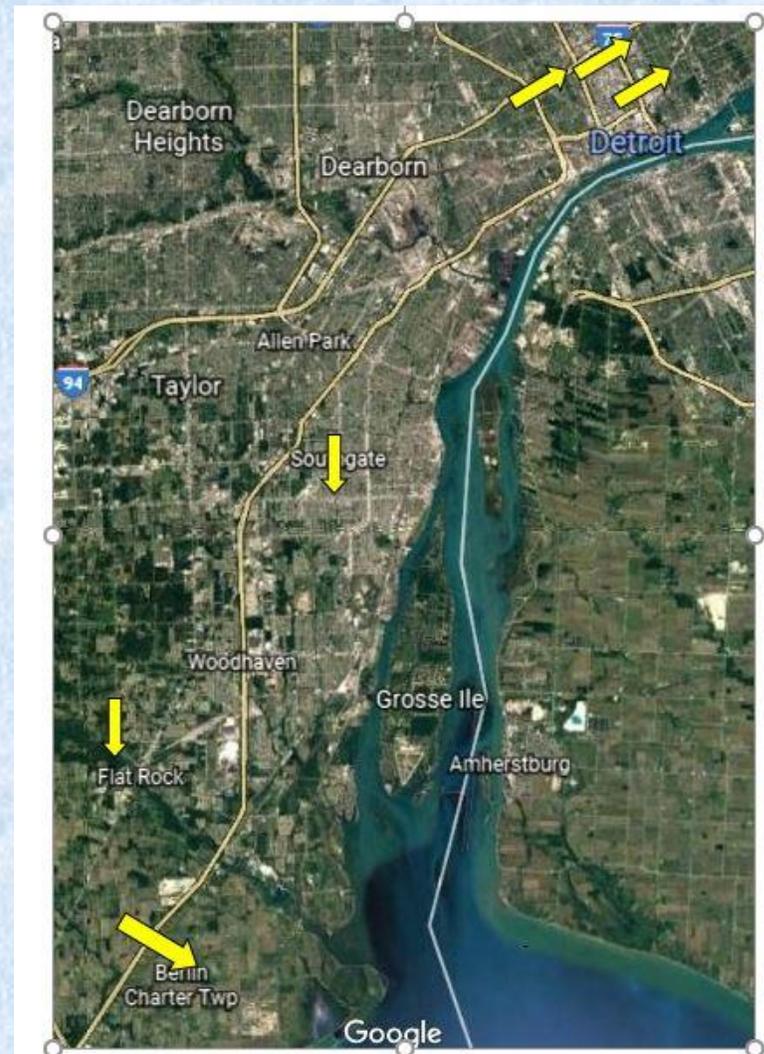
Samples were taken around the city and down the pipeline to the very last house on the line. (Mine)

Detroit Water Department assured us that the same pipeline carried the water to all the other locations and that it was "pristine" when it left their facility.

Why, then, was it less than stellar when it reached these locations?



The two faint lines indicate lead is above what is determined 'safe' for human consumption. This is my house.



Location of Detroit water samples collected
Newport, MI
Flat Rock, MI
Riverview, MI
Detroit proper, MI

Base image taken from Google Earth

Discussion:

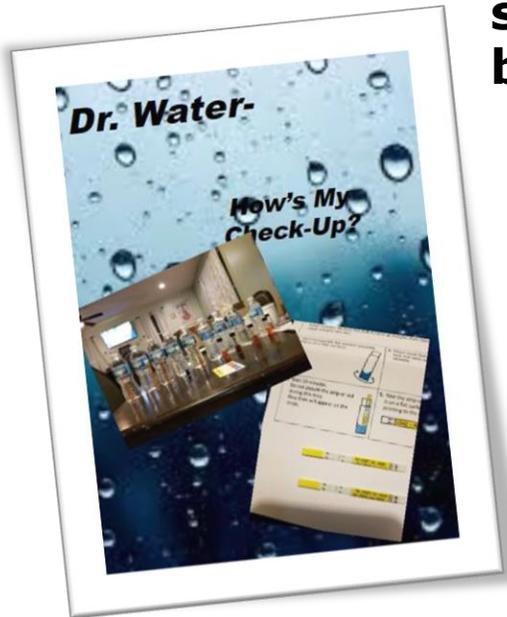
How were the results interpreted?

My hypothesis was that the bottled water will be healthier for drinking because they go through more purifying processes than tap water does, according to the marketing claims. All those extra tests should surely make it better to drink, right?

The question seemed simple to answer: Which type of water is healthier for humans to drink: bottled or tap? It really wasn't simple. This researcher was really tired of doing all the tests on all those samples! Many surprises kept popping up.

All the samples tested had problems. The Detroit samples tested positive for lead in several locations, including my house. Flat Rock was clear but several others also had lead. It appeared to support my hypothesis that bottled water would be healthier.

The testing of the bottled water was really shocking! Ice Mountain performed the most poorly of them all! My samples tested 3/10 for lead and 7/10 high in copper! My family poured out the rest of the case. No one in my house wanted to drink it after that!



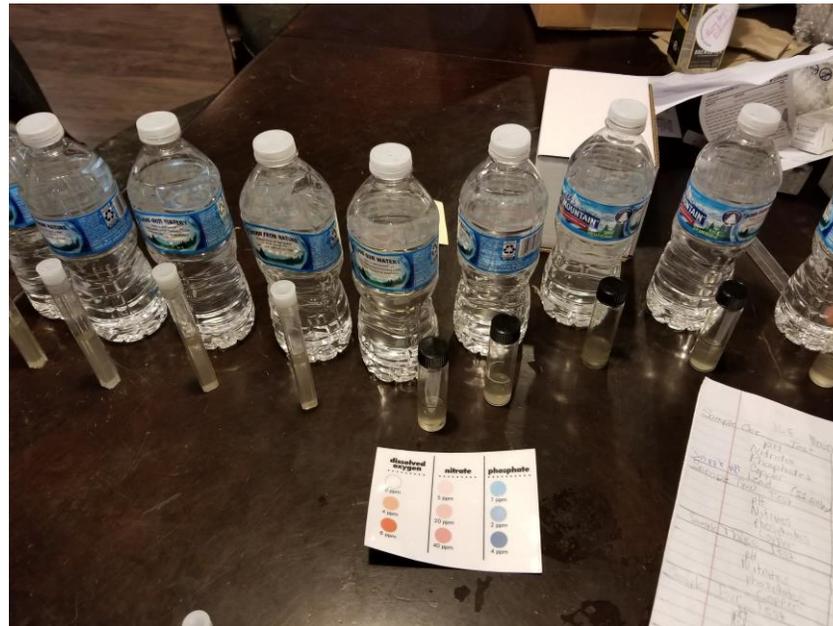
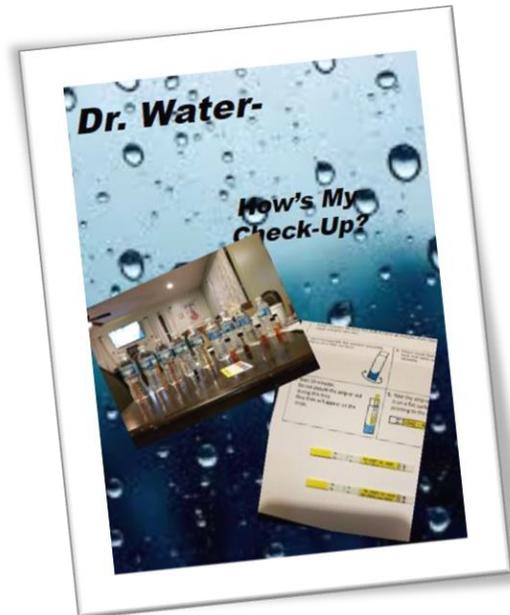
Discussion:

How were the results interpreted?

The CORE water and Nestle Pure Life were the best for drinking according to my results. Only the Ice Mountain tested positive for lead.



Both the tap water and the bottled water showed the same types of water quality issues

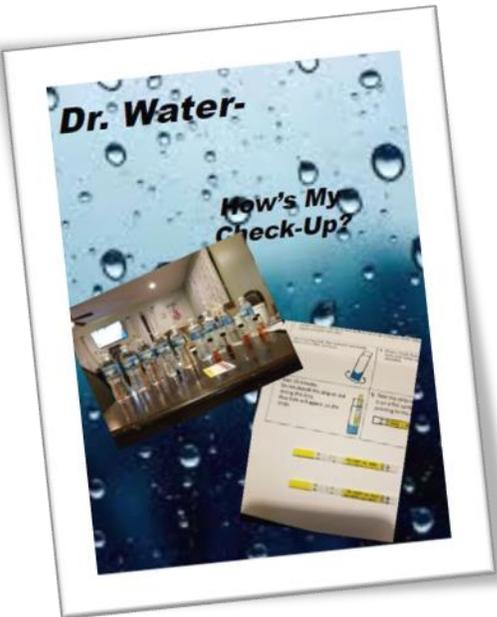


Conclusions:

What do these results mean in the context of my experiment?

- **Both the bottled water and the tap water had problems that made it unhealthy for human consumption.**
- **While the bottled water had heavy metals such as lead and copper in them, not all of the brands did. This partially supports the hypothesis that bottled water is healthier for humans to consume AS LONG AS THEY DRINK A BRAND THAT TESTS WELL.**

Further research is imperative! This sample was a lot of bottles but is still a small sample in the whole picture. Samples from other locations might prove to be more healthy than the ones tested in this research. Problems could be in the factory where the water was processed.



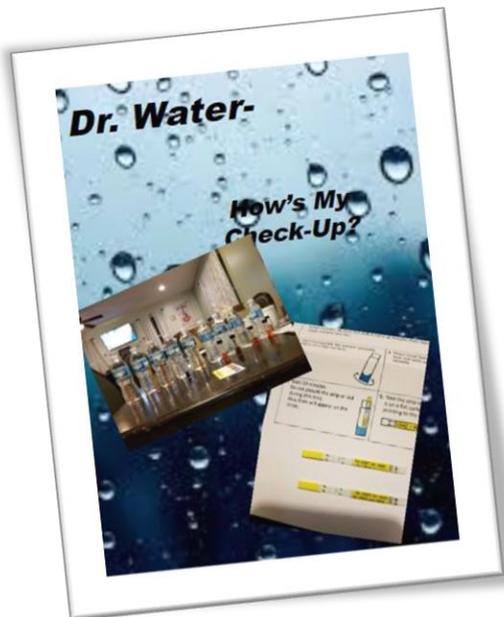
Conclusions:

What do these results mean in the context of my experiment?

For this research, the hypothesis that bottled water was healthier was supported.

The research indicated a vital need for more research and SOLUTIONS for the spoiled water. The townships that buy their water from a larger municipality also have ownership in the problem.

When my family called to report lead in our house water, we were told that the township does not test the water before sending it through to individual houses. They do not even know what the water delivery pipes are made from.

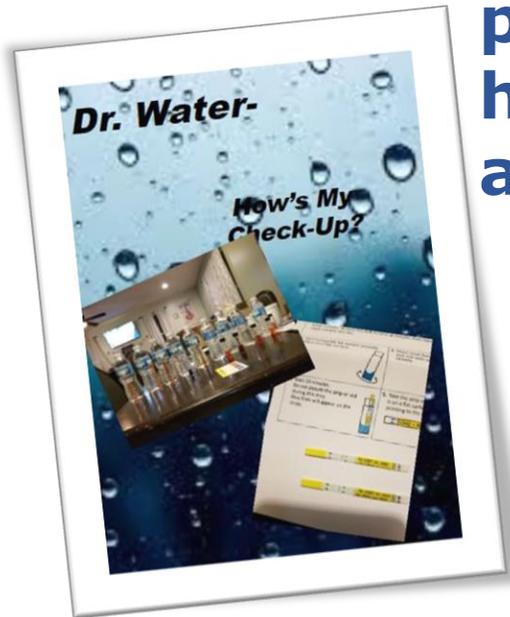


Conclusions:

What do these results mean in the context of my experiment?

Next steps should be considered seriously. Instead of pointing fingers and making it a political avenue, all people need to be involved.

This research would be of interest to city planners, Individual households, water quality specialists, and pretty much the entire GLOBE. We all need clean, healthy water to survive. It is not a renewable resource and we need to take of it!



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