



Understanding the Possible Role of Microbial Contamination in Digestive Health of Navajo Communities



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Is contaminated drinking water causing a rise in health issues among the people of the Navajo Reservation?

Background: As a community we struggle with access to safe drinking water, fresh and healthy food, and outdated infrastructure. Besides reportedly high levels of arsenic, uranium and other chemicals; microbial contamination can also be linked to gastric cancer, peptic ulcers, gastritis, and many other health issues.

Aim: Our initial focus is to identify possible presence of waterborne pathogens and contaminants in windmill wells & other water resources within the Navajo communities.

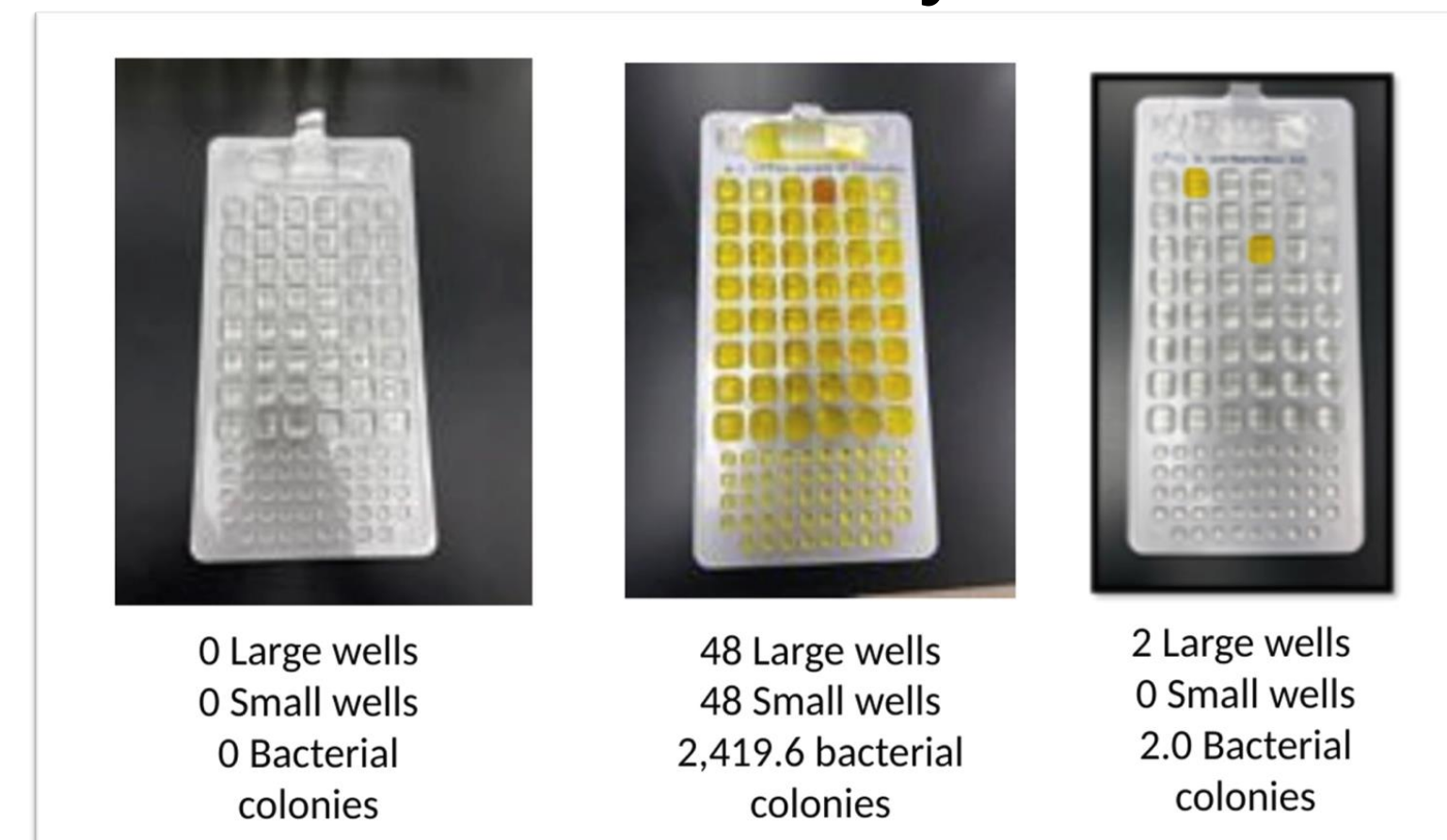
Methods: A total of 70 water samples (well, spring, household storage, streams, reservoir) were collected in sterile Nalgene bottles and tested for presence of Coliforms & Non-Coliform bacteria using MPN technique, IDEXX Colilert Quanti-tray system, and API 20E system.

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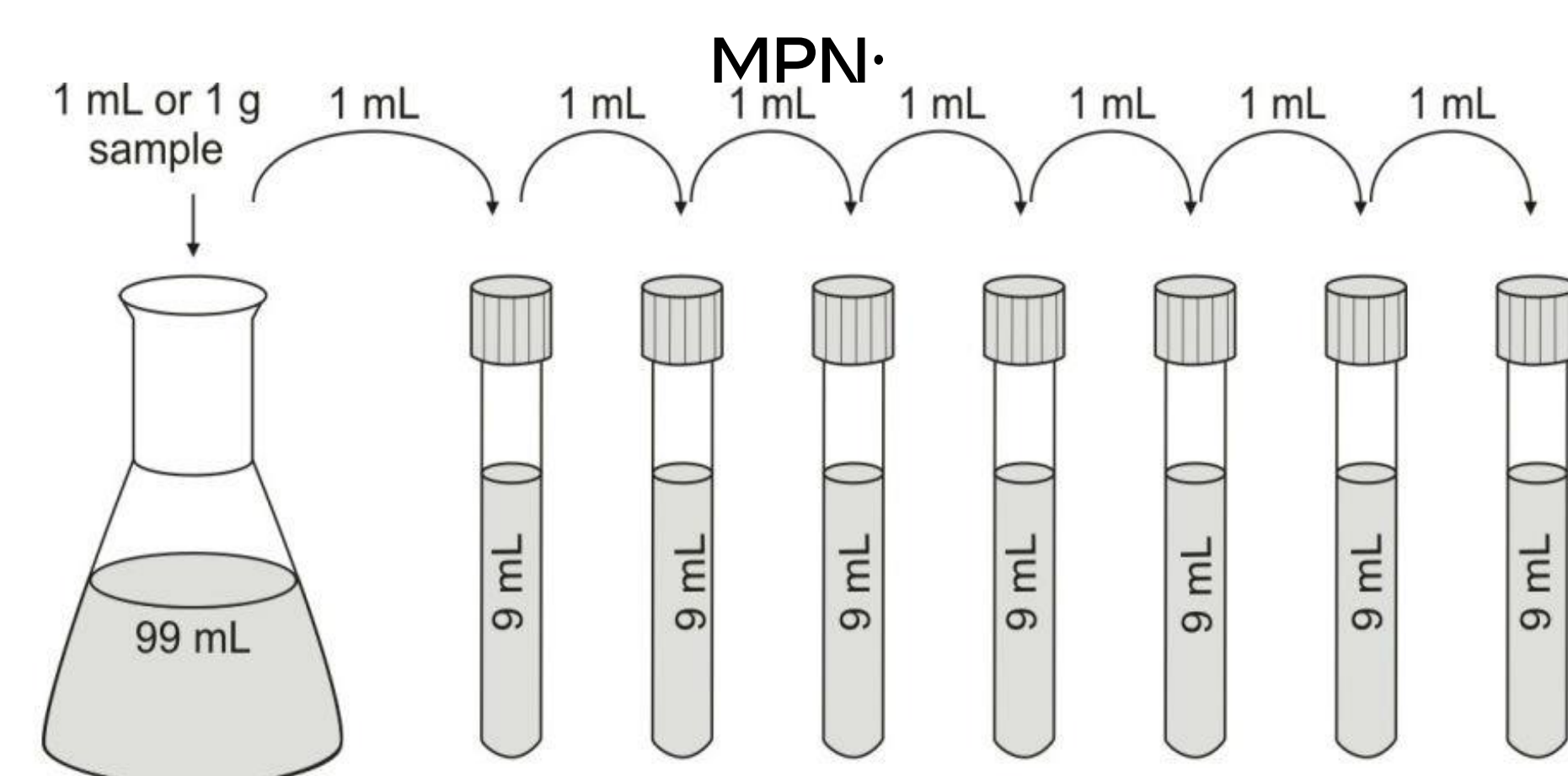


Materials and Methods:

IDEXX Quanti-Tray 2000:

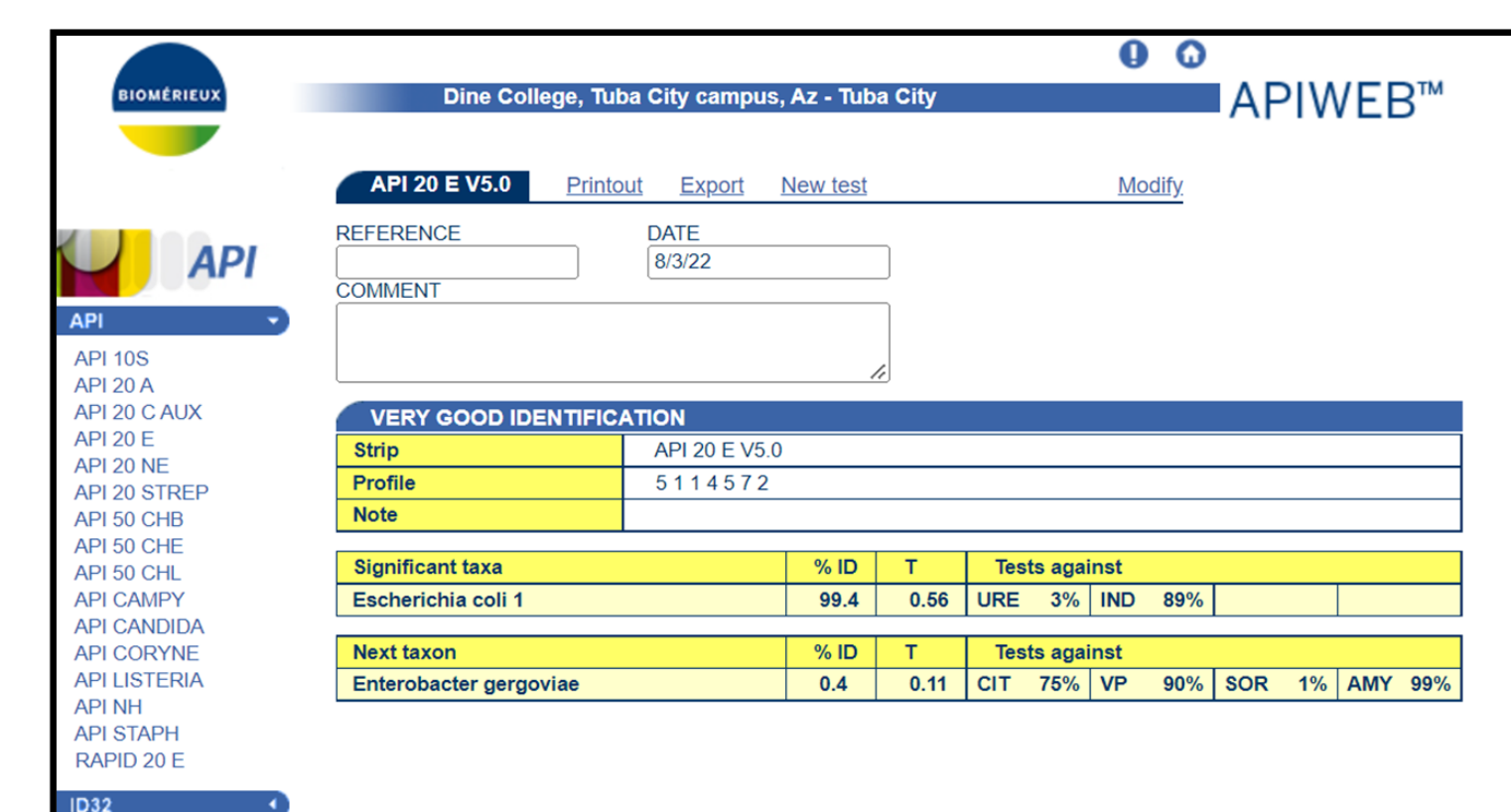


Parameter	Test method	Average values of testing results for water samples (N=50)			Over all Result for Water samples N=50	Units	Acceptable limit
		Well Water (n=27)	Spring Water (n=13)	Household Water Storage (n=10)			
Germ or Pathogens	Colilert & Quanti-Tray/2000	275 cells per 100 ml of water 14 samples were positive	521 cells per 100 ml of water 09 samples were positive	34 cells per 100 ml of water 05 samples were positive	A total of 28 out of 50 samples i.e. 56% samples found contaminated with coliforms	Cells per 100 mL of water	None detectable or <3 E. coli per 100 mL

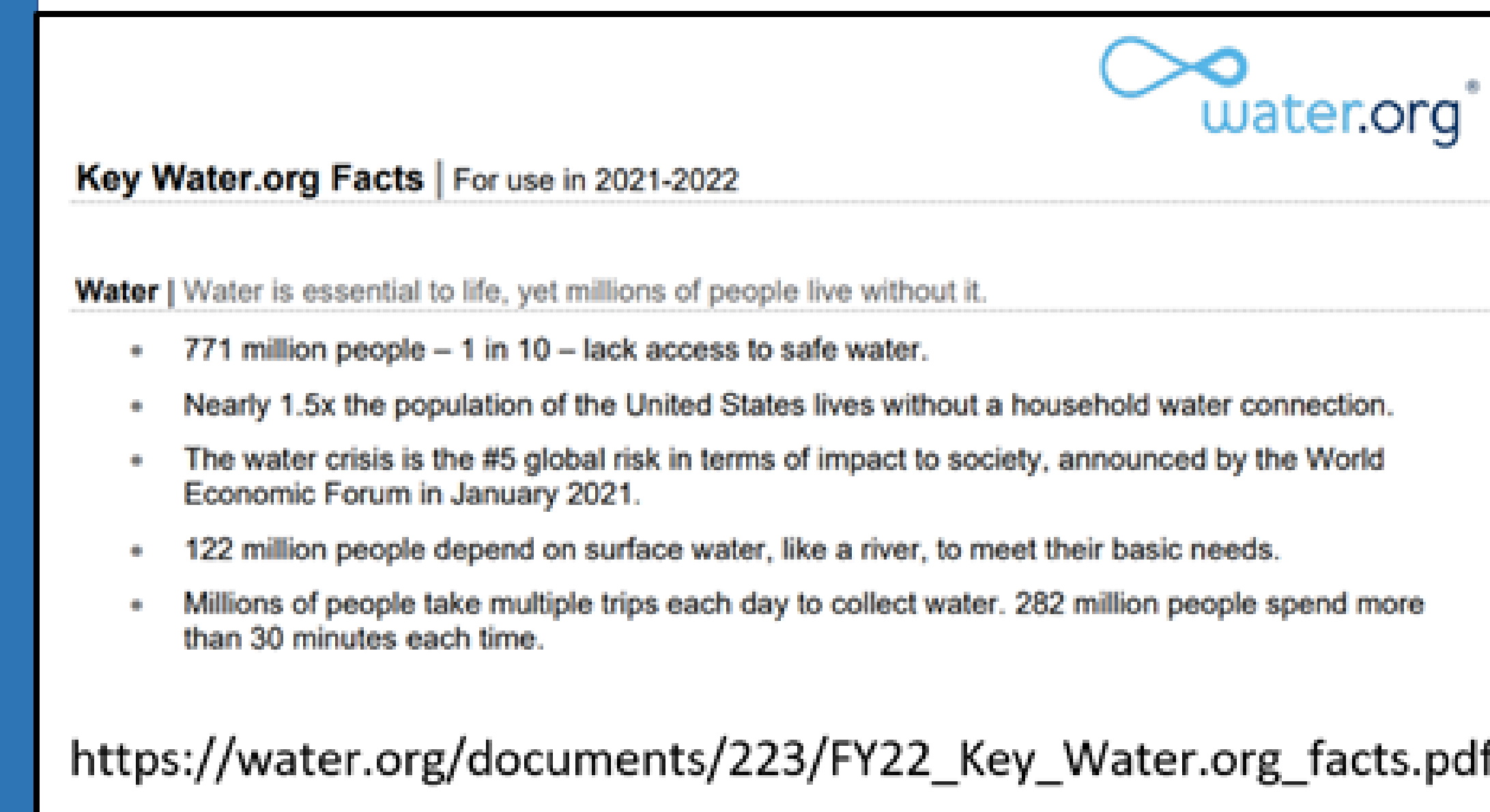
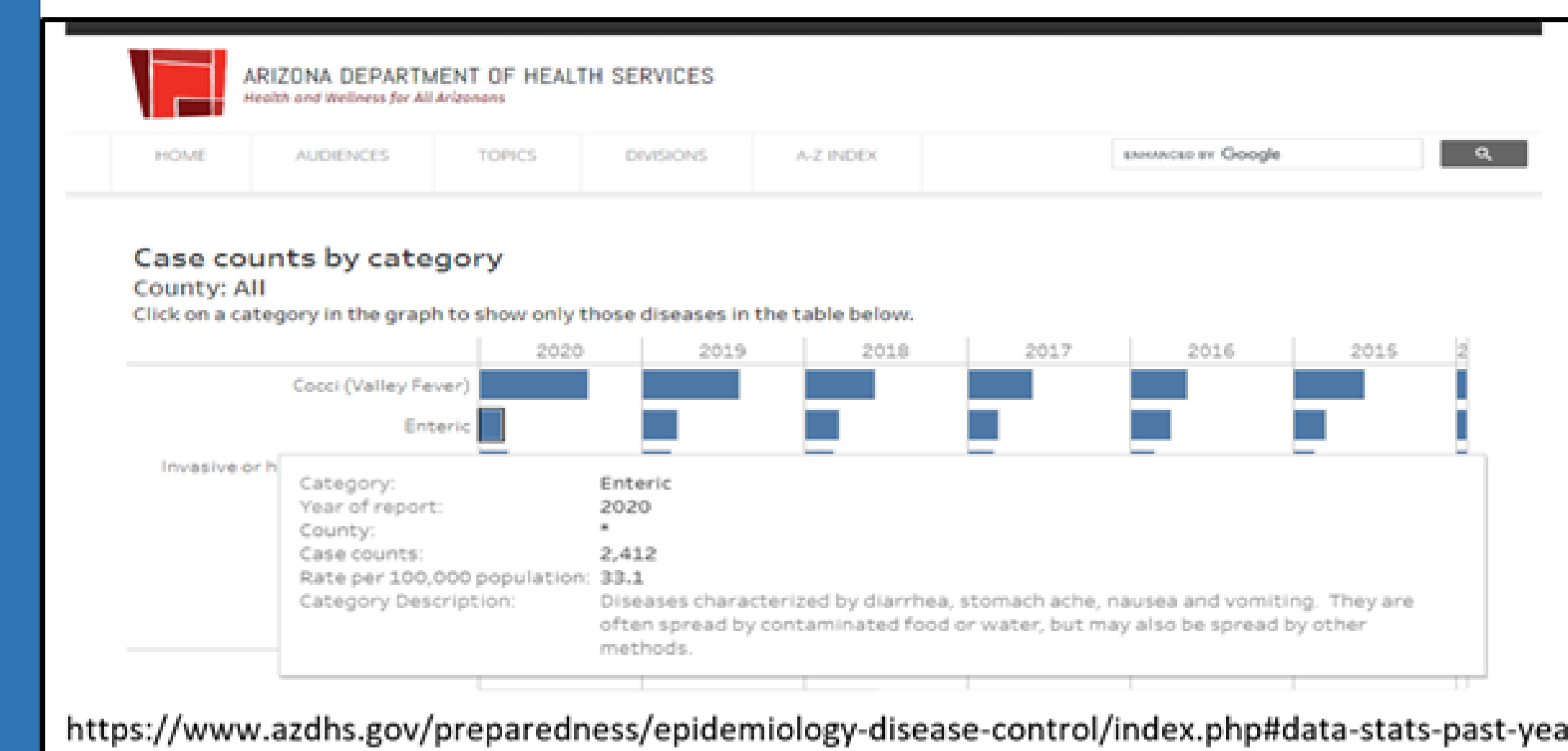


(Most Probable Number) 10-Fold Serial Dilution

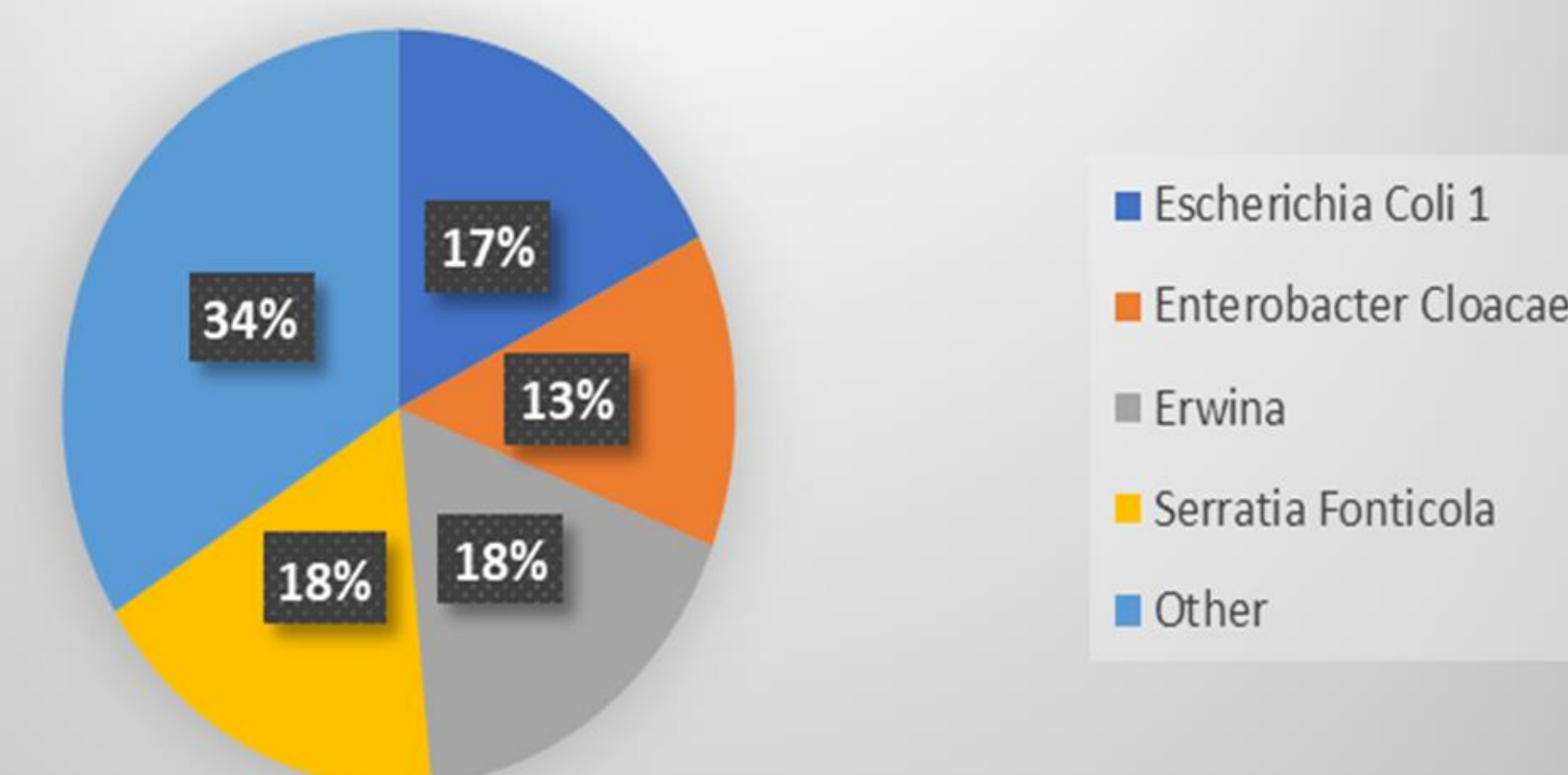
API:



Comparison:



Most Common Bacterial Isolates in tested water samples identified using API 20 E (API web)



Discussion: The availability of community water systems, the use of hauled water for drinking, and issues related to waterborne infectious diseases among Diné communities within Navajo Nation is not very well documented. Nearly 35-40% of locals living in a household that does not have access to running water. They have to use hauled water, sometimes from regulated or treated sources (e.g., chapterhouses) and sometime from sites that have restricted to use for livestock only (e.g. windmill well water, spring water). These unregulated resources increase the risk of exposure to pathogens that might infect the consumer and results in severe damage (e.g., peptic ulcers caused by H. pylori). We do not have enough data available from Navajo nation, which is why this study is going to develop an obvious impact on water quality decision support system in future.

Results and References: As of today, out of total 70 water samples, 8% were found totally unsuitable for drinking and household consumption due to heavy Coliform contamination, 20% can be consumed after some treatment while 72% of water samples were suitable for drinking and household consumption with no or less than 100 coliforms/liter of water. Pathogenic protozoa were not found in any samples.

Conclusions: This is an ongoing study, we are also looking for viral contamination via PCR, while spreading the specimen collection to other parts of the Navajo Reservation simultaneously.