

Frequently Asked Questions: The Flint Rash Investigation

This document provides answers to some frequently asked questions about the investigation and related report. Read the [full report](#).

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What are the main findings of the investigation?

For the first part of the investigation comprehensive interviews were done with 390 participants who complained of rashes and/or hair loss; extensive testing of current water was done on 170 homes, and 122 skin examinations were done by volunteer dermatologists. The dermatologists did not see any rashes that were caused by bacteria or viruses. Most of the rashes seen were eczema type rashes which are also the type most commonly seen in the winter and spring in Flint. An attempt was made to correlate the water test results and the rashes that were felt to be possibly related. EPA investigators were not able to identify anything in the current water that could cause rashes or make pre-existing rashes worse. Investigators could not identify a pattern to the water quality in homes where people with rashes live. Because there wasn't a pattern, they could not identify a water related cause of the rashes.

In the second part of the study a historical review was done of the only available data on the water at the treatment plant when the Flint River was the water source. An analysis of this data found there were profound swings in pH, hardness, and chlorine during this entire time interval and these rapidly returned to pre-switch levels when Lake Huron was reinstated as the water source.

What are the main conclusions of the investigation?

Levels of known skin irritants, such as chlorine, pH and water hardness are not at levels in the current Flint water that would cause rash or hair loss.

When the Flint River was the water source profound swings in pH, hardness, and chlorine were found which could have triggered the main type of rash found. Because there is no water quality data available from homes during that period, this association cannot be proven.

How were rash and water quality concerns investigated?

The investigation took about 6 months and had three different parts:

Between late January and March of 2016, investigators contacted Flint residents who participated in the investigation and asked them questions from a survey designed specifically for this study. Investigators were able to interview 390 people.

In February 2016, four dermatologists (skin doctors) from the Flint area volunteered to give the investigation participants free dermatology evaluations. They examined 122 people.

Between January and May of 2016, investigators conducted water-quality tests. They did this by taking hot and cold water samples from the bathroom sink, bathroom shower, bathroom tub, and kitchen sink faucets of 170 homes in Flint where people reported rashes. The investigators also reviewed historic water-quality data that the Flint water treatment plant produced when the Flint River was the city's source for municipal water.

How were people selected to participate in the investigation?

Investigators identified participants in several different ways. All of these methods required permission from the participants before their information was given to the investigators.

MDHHS issued three press releases that instructed area residents with rashes to call a hotline.

MDHHS asked doctors in the surrounding counties to refer patients with rashes to the investigation.

Investigators visited homes in the area and identified people with rashes.

The Genesee County Health Department forwarded information to the investigators for anyone who called with a rash.

These methods identified 614 potential participants. An investigator called these potential participants to determine if they met the criteria for the investigation. These criteria were: being exposed to Flint municipal water and having a current rash that started or worsened on or after October 16, 2015. Investigators identified 429 participants who met these criteria.

About rashes

Why do people still have rashes? How long will people have to deal with rashes? Will they ever go away?

Rashes are very common in the general population and are one of the most common reasons that people seek medical care. Some types of rashes can be difficult to treat, however most respond quickly if a proper diagnosis is made and effective treatment initiated. A total of 71 participants reported having a pre-existing skin condition such as eczema (42), psoriasis (9), or some other dermatitis (7). Because these individuals had skin problems even before the city switched to receiving water from the Flint River, it is possible that they are continuing to experience symptoms related to their pre-existing condition.

Also, some individuals in the investigation reported changing their behavior in a manner that could make their rashes worse. Stopping bathing altogether may contribute to some skin conditions, such as seborrheic dermatitis and folliculitis.

Others reported applying rubbing alcohol or putting alcohol-based hand sanitizer directly on rashes, which can lead to further loss of moisture from the skin and increase the risk of skin irritation and itching. This is why it is very important that people discuss any changes in bathing, showering or even general skin care with their doctors.

The investigation did not identify any current water quality parameters or other irritants like metals that might be causing or making the rashes worse. However, investigators cannot rule out the possibility that there is a water constituent untested for that might be contributing to rashes that residents are continuing to report.

If you have a rash please see your doctor. If you don't have a doctor you can still receive medical care at one of the community health centers in Flint. The doctor you see will evaluate your rash and determine if the diagnosis and treatment plan is straightforward or if referral to a specialist might be helpful. Transportation services may be available to take you to the doctor. Figuring out what causes different types of rashes can be difficult, which is why Flint area dermatologists (skin doctors) are working with primary care doctors to help them better understand and treat rashes.

What about new babies who were born after the city's water source was switched back to Lake Huron?

We didn't identify anything in the current Lake Huron water that should be an issue for new babies. Up to 30 percent of children develop eczema regardless of their water source and over half of them have the onset before their first birthday.

Is the prevalence of rashes in Flint greater than other cities in Genesee County?

In Michigan, rashes only have to be reported to the State if they are caused by a reportable disease (for example, chickenpox or Lyme disease) so how often people in the county or the state get rashes is difficult to determine. However, recent estimates from the U.S. Center for Health Statistics indicate that 13% of adults in Michigan have dermatitis, eczema or any other red, inflamed skin rash.

In general, rashes are very common across the United States. According to the National Institutes of Health, atopic dermatitis affects up to 30% of people in the U.S.; about 20 percent of school-age kids have the most common type of rash, called atopic dermatitis.

Is there a map showing where people with rashes live?

Approximately 400 people with rashes participated on the investigation. To protect their privacy, the government agencies involved cannot post exactly where the participants live. The rash investigation report includes a map of the number of participants by Flint City ward (see Appendix B3), including different maps for participation in each part of the investigation (survey, water testing, and dermatology screening).

What did the dermatologists find?

Four dermatologists in Flint offered free screenings to participants in this investigation. The dermatologists obtained written consent for the exams and release of information. During the exams, the dermatologist sought to do the following:

- identify the characteristics of the rashes and other skin conditions, as well as hair loss,
- assess the relationship between the participants' skin conditions and their exposure history,
- make a clinical diagnosis when appropriate, and
- provide recommendations to the participants' doctors.

The results from the dermatology exams were divided into four categories: conditions and diagnoses that were definitely unrelated to the water; dermatitis diagnoses that were considered possibly related to water exposure; non-dermatitis diagnoses that were considered possibly related to water exposure; resolved or inactive rashes possibly related to water exposure

The volunteer dermatologists examined 122 participants. The table below shows the number and percent of participants diagnosed in each category of the investigation.

Clinical Category*	% (N)
1) Diagnoses definitely unrelated to Flint municipal water exposure	19.8% (24)
2) Dermatitis possibly related to water exposure	43.8% (53)
3) Non-dermatitis skin conditions possibly related with water exposure	22.3% (27)
4) Resolved/inactive rash possibly related with water exposure	14.0% (17)

*One individual had no skin condition based on clinical assessment.

Here are some of the key findings from the dermatologists (read "Section 5: Dermatologic Screening Results" in the full report for more information):

- Of 80 diagnosed conditions deemed possibly related to water exposure, 51 (63.8%) were mild, 18 (22.5%) were mild-moderate, and 11 (13.8%) were severe.
- Several patients reported that their symptoms started or worsened within minutes to hours after showering with Flint municipal water; they reported a lack of similar response when they began showering at locations not serviced by Flint municipal water. Furthermore, participants reported that any re-exposure to Flint municipal water through showering would elicit similar dermatologic (skin) reactions (often generalized itching with or without an erythematous rash with small papules).
- The dermatologists did not identify any bacterial or viral infectious causes for rash or skin problems among the 122 participants they examined.

- Differences between people whose rashes started before or after the switchback date of October 15th were looked at closely as these would be from exposures to two different water sources. People who has onset after October 15th (Lake Huron source) were more often found to have rashes that were “definitely unrelated” and to have rashes that resolved quickly with treatment. People who had onset before October 15 (Flint River source) were more likely to have rashes that were more severe and eczema type, and were more commonly found clinically to be “possibly related” to municipal water exposure.
- The dermatologists also concluded the following regarding hair loss:
 - While hair loss was reported by a significant proportion of study participants when interviewed (43.6%), only 14 of 122 (11.5%) reported hair loss during their clinical evaluations.
 - Of these, 9 (7.3%) were found to have objective signs of hair loss (e.g., breakage, clear thinning, patches of baldness) on examination. Half of the diagnoses made by dermatologists regarding hair loss were deemed to be “definitely unrelated.” The other half that were deemed to be “possibly related” were hair loss diagnoses not known to be related to water exposure but since people noted some improvement with stopping Flint municipal water, they were still labeled “possibly related.”

These dermatology results are not generalizable to the population of Flint because most study participants were self-selected. Also, even though over half of participants who were interviewed were scheduled for evaluations, 39.5% of those scheduled did not keep the doctor appointment; this added an additional element of self-selection. Therefore, the results should be interpreted with caution.

About the water testing as part of the rash investigation

What were the water samples tested for?

Investigators tested water samples for a wide range of metals and other substances that affect water quality (these are called “water-quality parameters”). You can find information about all of the metals and water-quality parameters tested by reading “Section 4: Water Testing Results” in the [full report](#). The investigation focused on the following metals and water-quality parameters that could cause rashes or other skin problems:

- Arsenic
- Chromium, total
- Copper
- Nickel
- Silver
- Chlorine
- Water Hardness
- pH (acidity)

Investigators then used special software (called “SAS”) to perform statistical analyses of the test results. During these analyses, they compared the water sample results from Flint homes to:

- federal drinking water standards or health advisories,
- water from the Detroit Water Treatment Plant, the current water source for the City of Flint,
- other water systems that use chlorine to disinfect their water supply, and
- health-based screening values from ATSDR and EPA.

Investigators conducted additional analyses to look at the differences in the hot and cold water samples.

What were the results of the water tests?

Water samples from 170 homes were collected and analyzed for a wide range of water-quality issues, including metals and other parameters (e.g. hardness, pH), but the investigation focused on metals and parameters associated with skin effects.

The types of metals and minerals that were detected in these homes can generally be found in any water system that uses surface water as a drinking water source. In addition, the levels of metals and minerals are generally similar to levels reported from the Detroit water system which, like the Flint water system, uses Lake Huron as its source. However, some homes do have higher levels of some metals possibly due to service lines and/or internal plumbing as a result of inadequate corrosion control when the Flint River served as the water source. These metals included aluminum, cadmium, copper, iron, lead, manganese, and zinc. None of these metals are known to be associated with rashes. However, with the exception of cadmium and lead, these metals are all common causes of changes in water color and taste

When investigators looked at the results of their water tests, they could not identify a pattern to the water quality in homes where people with rashes reside. And because there wasn't a pattern, they could not identify the specific cause of the rashes. It's important to remember, however, that the investigators took water samples after the city returned to using Lake Huron as the source for municipal water. The water quality could have been different during earlier periods of time, before the investigation began. For example, when the city was using the Flint River as a source for municipal water and for a period of time after the switch back to the Lake Huron water, some metals may have been higher.

Are any of the chemicals or metals found in the water known to cause rash or hair loss?

Certain metals in water (such as arsenic, chromium, copper, nickel, and silver) can cause skin reactions. However, the water samples from the 170 homes in Flint did not show high enough levels of these or other substances to cause or worsen rashes.

In water samples tested from the homes of participants, the levels of arsenic, chromium and silver did not exceed EPA's standards for drinking water. The amount of copper and nickel in the Flint municipal water was above standard guidance levels but at a relatively low amount (0.9% for copper and 0.1% for nickel). However, homes with reported rashes generally did not have high levels of these metals.

Other water quality indicators that could potentially cause skin problems are chlorine, water hardness, and pH (acidity). Homes that were tested in Flint had enough chlorine in the water to protect against microbial contamination, but not too much to cause skin irritation. Both water hardness and pH levels were within the standard range.

It's important to note that a majority of residents who complained of rashes or hair loss reported experiencing these effects before October 2015, when the city was using the Flint River as the source for municipal water. According to historical records of the Flint River water from April 2014—October 2015, water hardness, pH, and chlorine levels increased significantly. Elevated levels of those elements are associated with some rashes like eczema. The City of Flint switched back to Lake Huron as the source of municipal drinking water on October 16, 2015. This rash investigation was conducted after the switch back to Lake Huron water.

Finally, nothing analyzed in the current water from Lake Huron could have caused hair loss.

Lead, Chlorine, Orthophosphates, Other Metals and Minerals and How They Affect the Skin

Water quality parameter or contaminant	Source in the water	Does it cause a rash?	How do they affect the skin?
Chlorine	Added to water to control microbes	Chlorine may cause irritation of the eyes, skin, or mucous membranes	May be drying
pH	From the source water and adjusted by the water treatment plant	pH may cause rashes if it's too high or too low, but not at levels typically found in drinking water.	Levels that are very low or very high (lower and higher than what is found in drinking water) could damage the skin and cause redness or a rash
Hardness	Hardness mostly depends on the amount of minerals in the water	Hardness may contribute to the development or worsening of rashes.	Hardness/soap interaction
Lead	Corrosion of household plumbing	No	Lead does not affect the skin.
Copper	Corrosion of household plumbing	If people are allergic to this metal, it may cause a rash.	Allergic individuals may react to copper
Disinfection byproducts (trihalomethanes and haloacetic acids)	Byproducts of adding chlorine to the water to control microbes	Chlorine may cause rashes in sensitive individuals.	No direct skin effects due to disinfection byproducts have been identified
Phosphoric acid	Added to the water to coat the pipes and reduce lead and other metal, forms phosphate in water	There is no information that links phosphate to rashes	No information available

Water quality parameter or contaminant	Source in the water	Does it cause a rash?	How do they affect the skin?
Legionella bacteria	Naturally occurring in freshwater environments, like lakes and streams. It can become a health concern when it grows and spreads in human-made water systems like cooling towers or plumbing systems in large buildings	No. Legionella bacteria cause infections that can present as either a severe form of pneumonia (Legionnaires' disease) or a flu-like illness without pneumonia (Pontiac fever).	Legionella bacteria are not known to cause skin effects

Hydrants in my neighborhood have been running for a month to get the chlorine circulating. Can unstable chlorine levels cause rashes?

Chlorine levels have been relatively stable since switching back to water provided by Detroit (and supplemented in Flint). The purpose of using hydrants for flushing is to raise chlorine levels in areas where residuals are lower than normal. None of the monitoring locations indicate chlorine that is higher than normal. Some people can be sensitive to chlorine; however, the levels of chlorine are not at high levels that would cause concern for the general public.

How often do they put chlorine in the water? At what levels? How does that affect skin?

Chlorine is continuously fed into the water in Detroit and now at the Flint Treatment plant. Additional chlorine, in pellet form, is added to reservoirs as needed. Please contact the city for more information on their practices. Chlorine in the system ranges up to just over 1 mg/L in water. This level of chlorine should not affect the skin unless the individual has a special sensitivity to it. Chlorine levels in the Flint distribution system are within regulatory levels for drinking water.

How often do they put orthophosphate in the water? At what levels? How does that affect skin?

Orthophosphate is added to drinking water to prevent corrosion and lead leaching through the pipes.

Orthophosphate is continuously fed into the water in Detroit and boosted at the Flint Treatment Plant. Current orthophosphate levels range close to 3 mg/L. Orthophosphate in the Flint distribution system are within regulatory levels for drinking water. Orthophosphate is not known to be a skin irritant.

What are the recommendations of the investigation?

Investigators provided the following recommendations at the end of their study:

- If you have a rash or are concerned that you may have a metal allergy, schedule an appointment with a doctor who will look at the rash and may suggest treatment or give you a referral to a specialist such as a dermatologist or an allergist. Expanded access to care is now available in Flint through Medicaid and through the federally qualified health centers.

- Take proper care of your skin, particularly if it is sensitive. See [Dr. Barkey's Dos and Don'ts of Rashes](#) for recommendations from this local dermatologist.
- If water in your home is discolored or has an unusual odor, flush water until the discoloration disappears. If the discoloration or odor does not go away or your water has not been tested, home water testing kits are available along with free bottled water, water filters, and replacement cartridges at any distribution center. Every ward now has a distribution center. More information is available online at the [Taking Action on Flint Water website](http://www.michigan.gov/flintwater) (<http://www.michigan.gov/flintwater>) or residents may call United Way 2-1-1.
- Flint residents are encouraged to discuss any adaptive strategies with their doctors, such as changes in showering frequency or source of water, changes in showering products, and general skin care changes.

What happens now? Will there be more studies? Are you going to keep monitoring the problem?

The federal government and State of Michigan will continue to monitor residents' reports of rashes and hair loss in Flint. As part of this monitoring, experts from CDC will be on the ground in Flint starting this week to talk with community members and public health officials about the results of the investigation and what residents should do if they continue to experience these conditions. Residents who are still experiencing rashes, hair loss, and other skin problems should contact their doctor or a community health center for follow-up services, which may include referral to a dermatologist. Residents who would like help accessing health, nutrition, education, and water support services that are available to Flint residents, should call 211 or visit [Flint Cares](#).