



# Understanding the Psychosocial Effects of the Flint Water Crisis on School-Age Children in Michigan



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## Authors

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## Policy Issue

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In early 2016, the Flint Water Crisis captured national attention; major news outlets reported that the city's tap water had been contaminated with lead since April of 2014. While Flint residents alerted officials about the changes to their drinking water, city and state officials insisted that the water was safe. A landmark study on children in Flint published in 2016 demonstrated that the fraction of children identified with blood lead levels above the CDC's acceptable threshold (5  $\mu\text{g}/\text{dL}$ ) roughly doubled from 2.5% to 5%, with the greatest increases in neighborhoods with highest water lead levels. Given the well-documented detrimental effects of lead exposure in early childhood on cognitive development, many worried that the academic progress of Flint's youngest residents may have been impacted. While several years have passed since Flint's water crisis garnered national headlines, the need to improve substandard infrastructure remains salient. Also, over the past few years, important data has become available, allowing researchers to rigorously study and measure impacts of the lead water crisis on children in Flint.

Thank you to Dr. Mona Hanna-Attisha for her expertise on the Flint Water Crisis and helpful comments during the writing of the working paper. The authors would also like to thank Dr. Paula Lantz, Health Policy Professor at the Ford School, Thomas Ivacko, Executive Director of the Center for Local State and Urban Policy (CLOSUP), Nicole Wagner Lam and the EPI staff team for helpful comments while editing the policy brief.

# Key Findings

For the very first time, report authors Jacob, Trejo and Yeomans-Maldonado match student-level longitudinal data from Michigan and data from household-level service line inspections conducted by Flint's Fast Action and Sustainability Program to examine how the Flint Water Crisis affected school-age children's academic outcomes. Collectively, the findings provide some insight into the ways in which experiencing a community crisis profoundly affected the educational trajectory of Flint children. The study draws three noteworthy conclusions.

- 1 Overall, average math achievement for school-age children in Flint decreased noticeably during the time of the Flint Water Crisis.** When compared to students in Michigan districts with similar characteristics to Flint, researchers found a 0.14 standard deviation decrease in math achievement for school-age children in Flint, an effect size considered moderate.
- 2 The proportion of school-age children with special needs increased in Flint as a result of the water crisis.** Compared with districts similar to Flint, the crisis led to a 9% increase in the proportion of students with qualified special educational needs. Special needs designation rates in Flint were increasing before the crisis, and the water crisis led to a more pronounced increase relative to other similar districts (see figure 1).
- 3 There was little difference in the academic outcomes of school-age children living in homes with lead pipes compared to observationally similar Flint children living in homes with copper pipes.** This finding suggests that lead exposure through *home plumbing* was not a significant contributor to the citywide achievement effects documented.



# Policy Implications

As current lawmakers set out to address systemic health inequities through improving America's infrastructure, the results of this study have salient implications for education.



First, while lead exposure is often viewed as the primary cause for medical concern when detected in communal drinking water, the findings add additional evidence that community crises such as the Flint Water Crisis may have effects on health and well-being beyond those tied directly to exposure to lead in the water supply (Sobeck, et al, 2020). This suggests that lead exposure is not the only way the Flint Water Crisis disrupted the educational trajectories of Flint's children. As increased infrastructural investments take hold across the country to improve water safety, policymakers must also consider how to address the social damage felt by communities experiencing lead water crises that are not directly tied to lead exposure.

Second, the key findings imply that student outcomes in the long run were impacted in part because these children lived in a city grappling with a community

water crisis. Because water safety is such an important facet of overall health, even the thought of any measurable contamination can reasonably spark community anxiety and create a stressful learning environment for a community's youngest residents. The communal trauma experienced during a lead water crisis can also last well beyond the height of the crisis. With this in mind, policy makers should think proactively about how to invest in cost-effective preventative measures that minimize both real and perceived threats of water contamination in the future. Preventing community crises before they occur can potentially have a profound impact on the academic progress and general well-being of children for years to come.

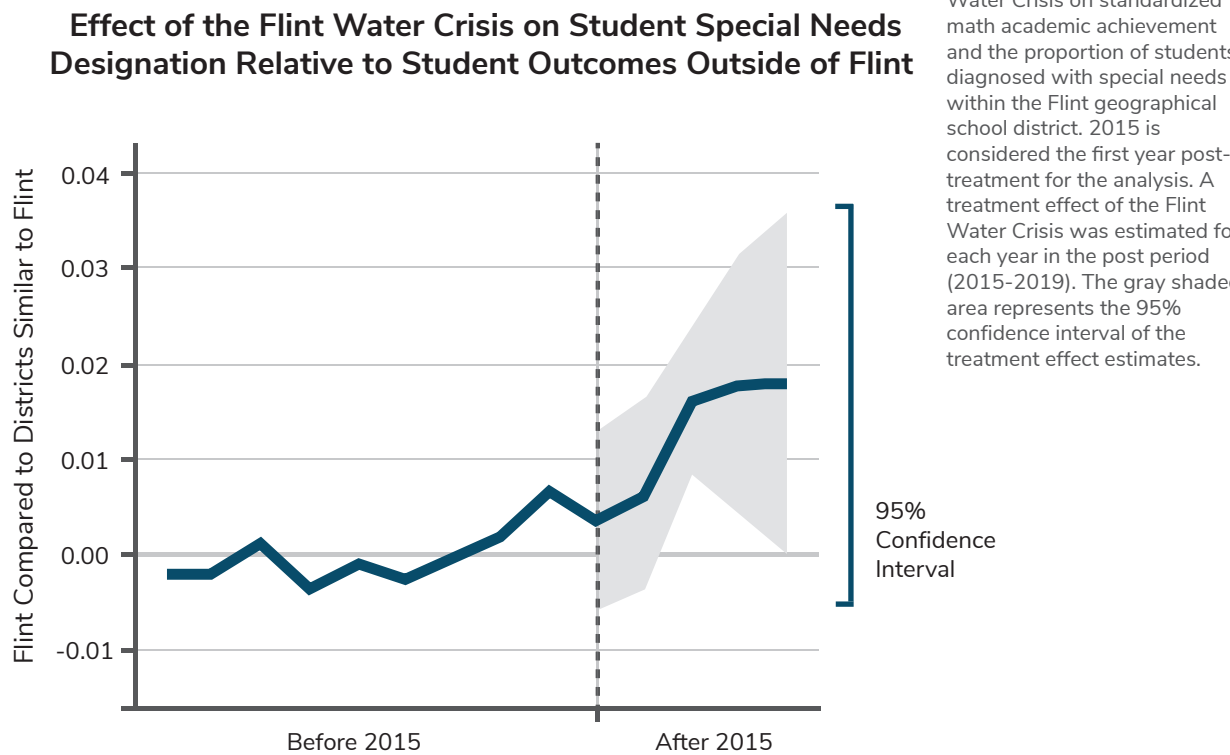
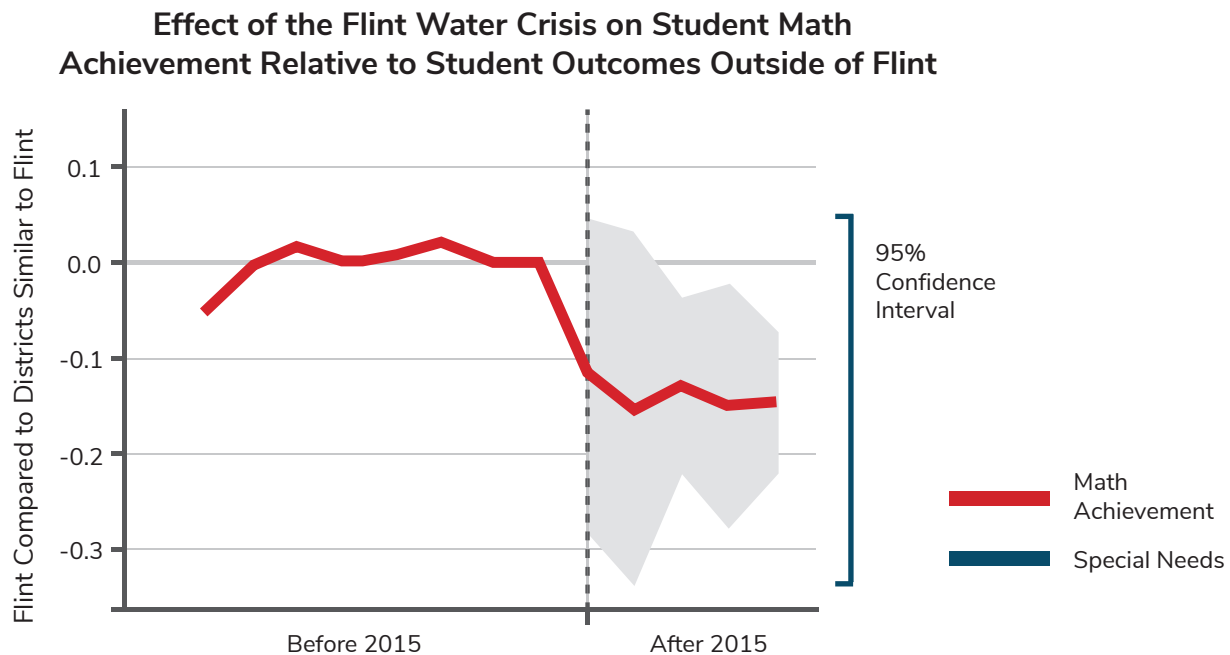


Finally, this study opens the door to continue research efforts to better understand the full effect of Flint's Lead Water Crises on academic outcomes for school-age children. As the city of Flint continues to [test](#) water in businesses and other public facilities for lead, more data will become available to better understand the extent to which lead exposure outside of the home has affected school-age children and their academic outcomes.

# Data Findings

**Figure 1 Estimates of the Effect of the Flint Water Crisis on Student Outcomes**

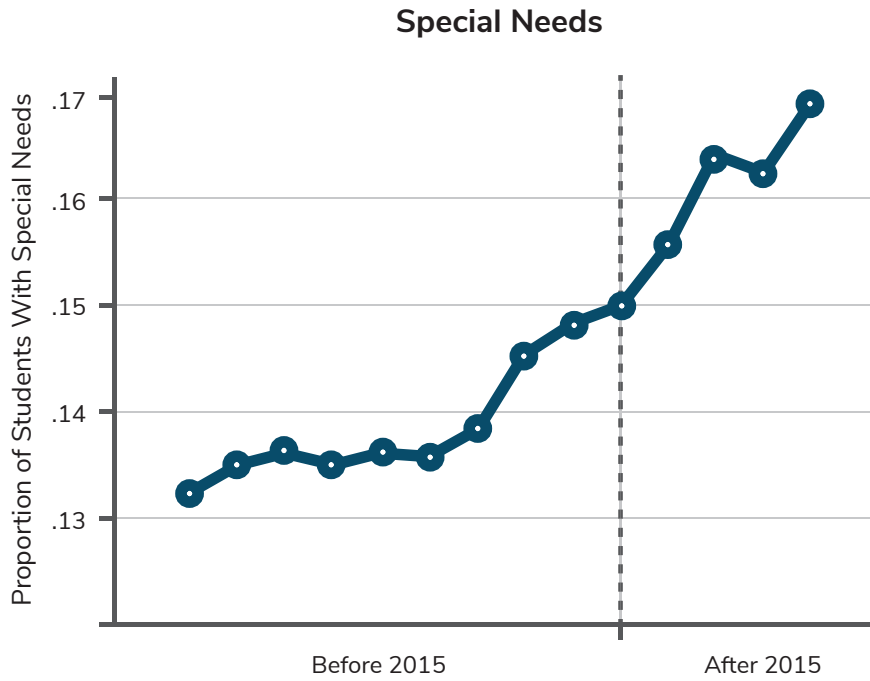
These figures display descriptive trends in the mean academic outcomes for the Flint geographic district from 2006 to 2019. Data is taken from the Michigan Department of Education’s longitudinal administrative database.



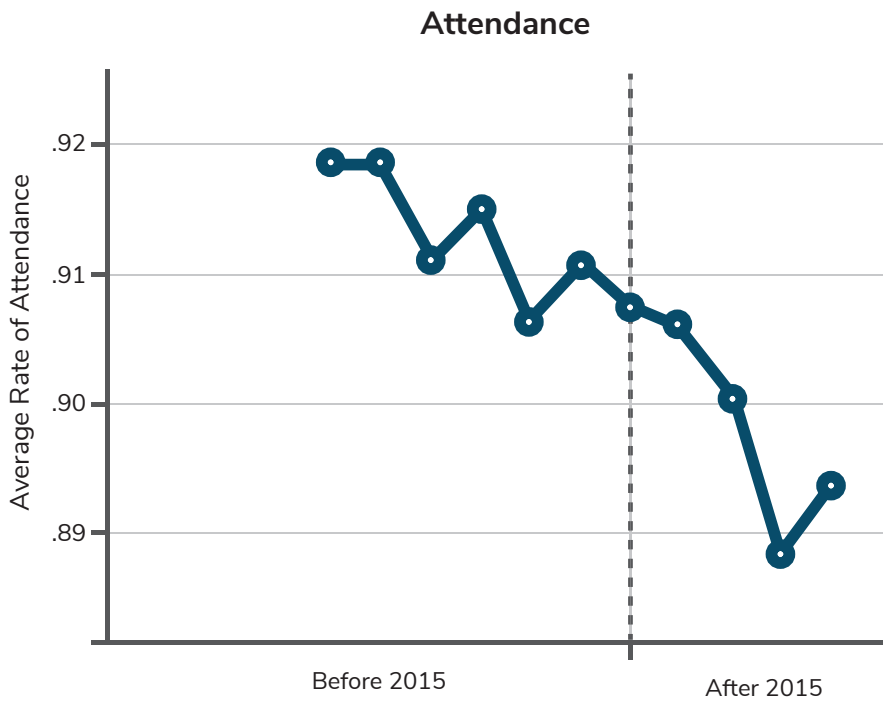
**Notes:** The figures estimate the causal effects of the Flint Water Crisis on standardized math academic achievement and the proportion of students diagnosed with special needs within the Flint geographical school district. 2015 is considered the first year post-treatment for the analysis. A treatment effect of the Flint Water Crisis was estimated for each year in the post period (2015-2019). The gray shaded area represents the 95% confidence interval of the treatment effect estimates.

## Figure 2 Mean Educational Outcomes Over Time in Flint

These figures display descriptive trends in the mean academic outcomes for the Flint geographic district from 2006 to 2019. Data is taken from the Michigan Department of Education’s longitudinal administrative database.

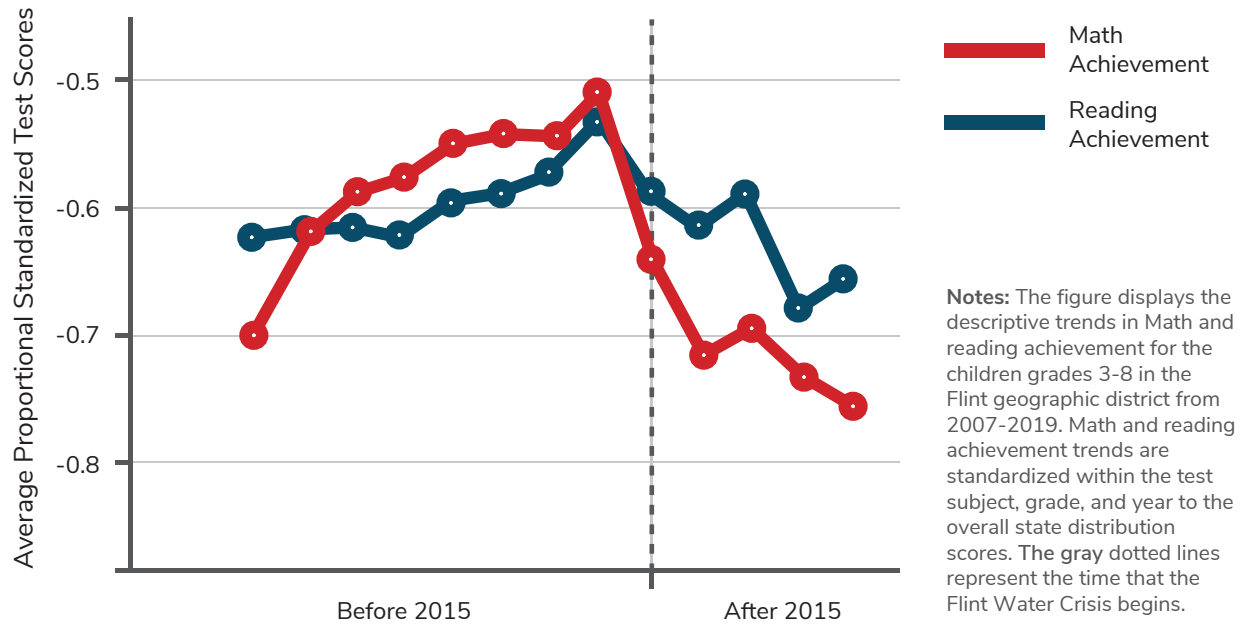


**Notes:** This figure displays the descriptive trends in Special Needs designations for children grades K-12 in the Flint geographic district from 2006 to 2019. The gray dotted lines represent the time that the Flint Water Crisis begins.



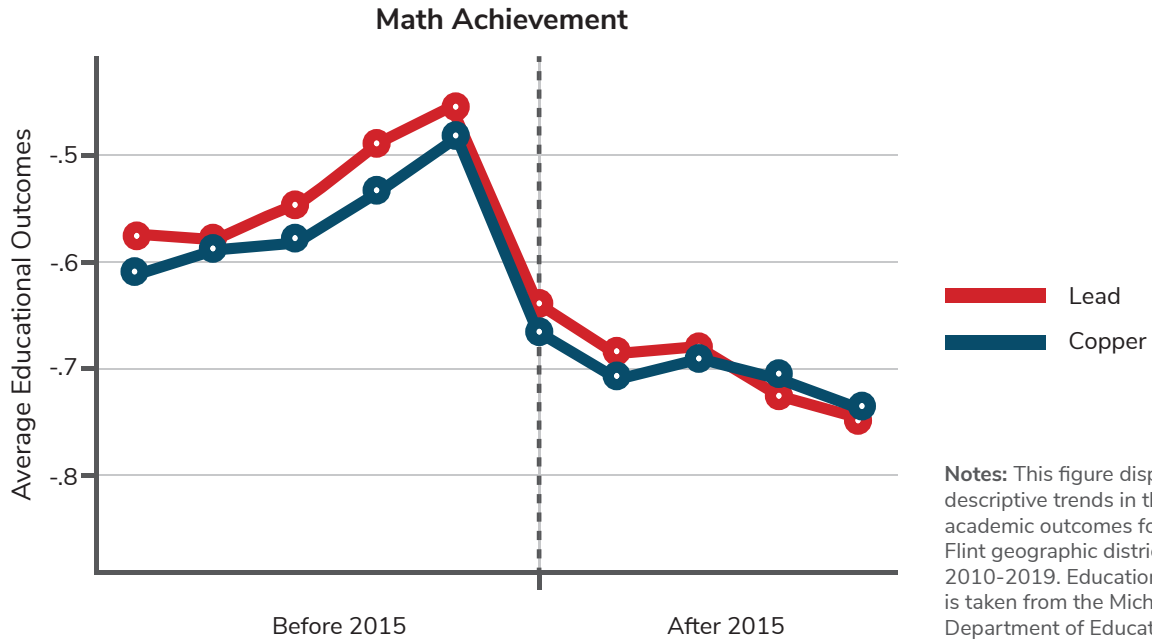
**Notes:** This figure displays the descriptive trends in average attendance rates for children grades K-12 in the Flint geographic district from 2009 to 2019. The gray dotted lines represent the time that the Flint Water Crisis begins.

## Math Achievement and Reading Achievement

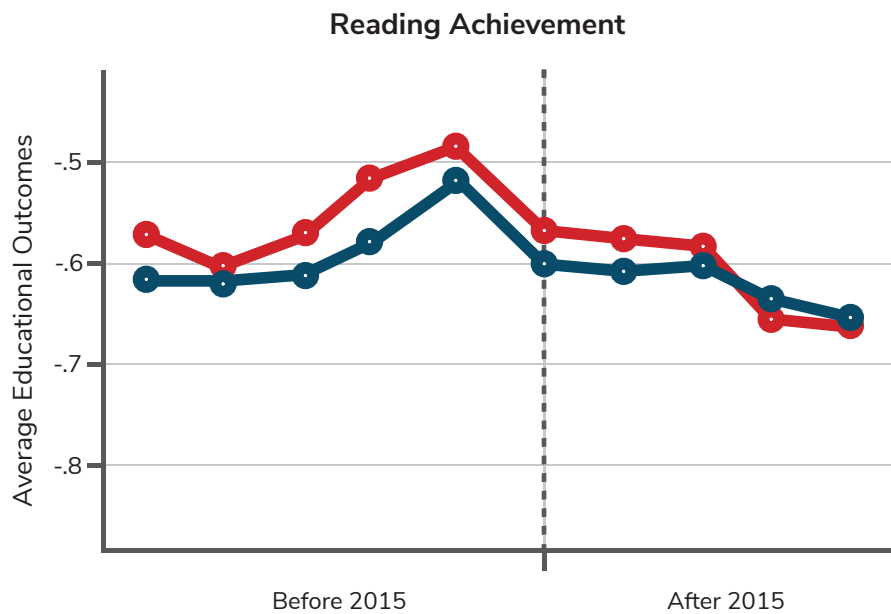


### Figure 3 Mean Educational Outcomes Over Time in Flint by Service Line Material

These figures display descriptive trends in the mean academic outcomes for the Flint geographic district from 2006 to 2019. Data is taken from the Michigan Department of Education’s longitudinal administrative database.



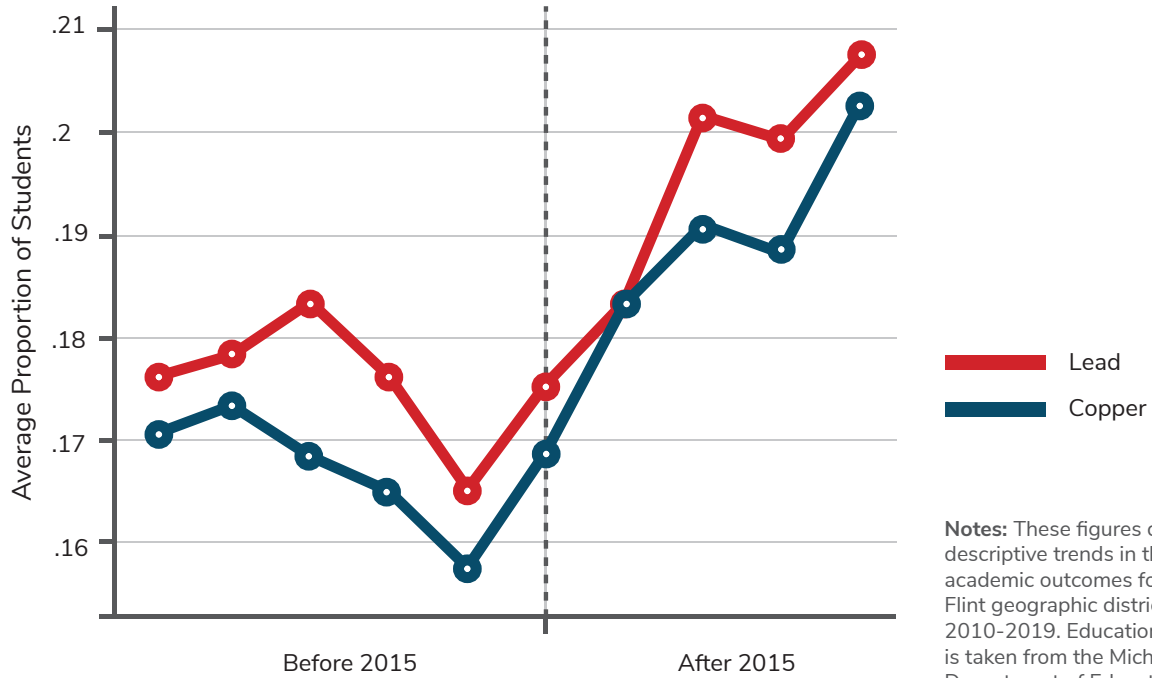
**Notes:** This figure displays descriptive trends in the mean academic outcomes for the Flint geographic district from 2010-2019. Education data is taken from the Michigan Department of Education’s longitudinal administrative data base. The black lines display students living in homes with copper service lines, while the red lines display students living in homes with lead service lines. Service line material data was collected during the City of Flint’s service line inspection and replacement program that was implemented in the aftermath the Crisis. The gray dotted vertical line represents time that the Flint Water Crisis begins.



Math and reading achievement are observed in only grades 3-8, whereas special needs and attendance are observed in grades K-12.



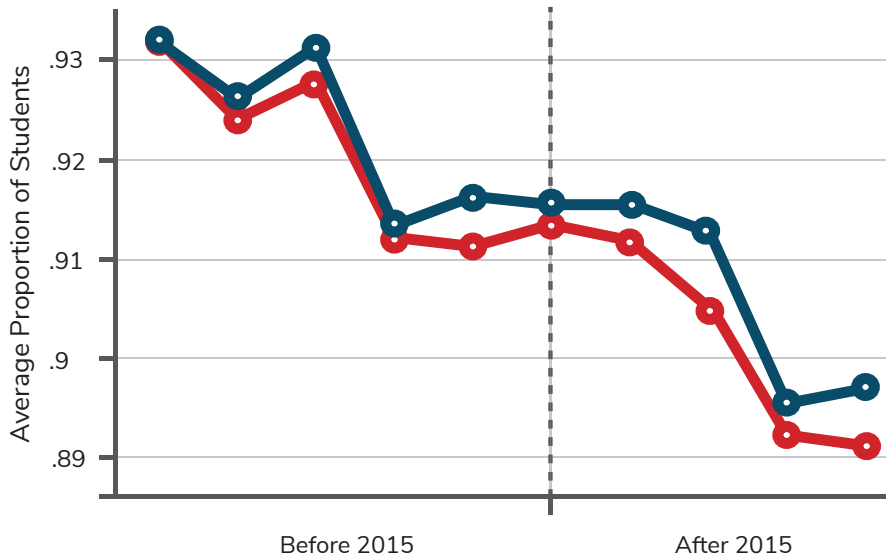
### Special Needs



**Notes:** These figures display descriptive trends in the mean academic outcomes for the Flint geographic district from 2010-2019. Education data is taken from the Michigan Department of Education's longitudinal administrative data base. The black lines display students living in homes with copper service lines, while the red lines display students living in homes with lead service lines. Service line material data was collected during the City of Flint's service line inspection and replacement program that was implemented in the aftermath the Crisis. The gray dotted vertical line represents time that the Flint Water Crisis begins.

Special Needs and Attendance are observed for children age K-12.

### Attendance



# Limitations & Conclusion

As this was the first study which matched student-level data for school-age children with lead service line data for households in Flint, there are a few limitations from this study worth noting.

- 1 Due to data limitations, this study does not focus on children who were infants or toddlers at the time of the crisis. This is particularly important because prior research suggests these very young children are most affected by lead exposure, which this study cannot capture.
- 2 It is possible that additional support provided to Flint children during and after the water crisis mitigated potential negative impacts of lead exposure.
- 3 The authors were unable to measure lead exposure through water sources outside the home (for example, water consumed at school or at a friend's house).
- 4 The authors could not identify the specific mechanisms through which the Flint Water Crisis affected children's educational performance.

Readers who would like to dive deeper into the study and explore the researchers' approach to isolating the effects of the Flint Water Crisis on school-aged children should refer to the working paper released in October 2021, found on both EPI and NBER's websites. <https://www.nber.org/papers/w29341>

Much of the data used for this project was structured and maintained by the MERI-Michigan Education Data Center (MEDC). MEDC data is modified for analysis purposes using rules governed by MEDC and are not identical to those data collected and maintained by the Michigan Department of Education (MDE) and/or Michigan's Center for Educational Performance and Information (CEPI). Results, information, and opinions solely represent the analysis, information and opinions of the authors and are not endorsed by, or reflect the views or positions of, grantors, MDE and CEPI or any employee thereof.

# References

Eggert, D. What \$1T federal infrastructure law means for Michigan. Click on Detroit, 2021. <https://www.clickondetroit.com/news/michigan/2021/11/15/what-1t-federal-infrastructure-law-means-for-michigan/>

Sobeck, J., Smith-Darden J., Hicks M., Kernsmith P., Kilgore, P., Treemore-Spears, L. & McElmurry, S. (2020) Stress, Coping, Resilience and Trust during the Flint Water Crisis, *Behavioral Medicine*, 46:3-4, 202-216, DOI: 10.1080/08964289.2020.1729085

Trejo, S. and Yeomans-Maldonado, G. and Jacob, B. A.(2021). The Psychosocial Effects of the Flint Water Crisis on School-Age Children NBER Working Paper No. w29341, Available at SSRN: <https://ssrn.com/abstract=3940027>

“Free Water testing available for Flint residents as part of city of Flint’s Water infrastructure projects.” City of Flint News. August 26, 2021. <https://www.cityofflint.com/2021/08/26/free-water-testing-available-for-flint-residents-as-part-of-city-of-flints-water-infrastructure-projects/>

“Lead levels jump higher in Flint water testing but remain below federal action level.” Ron Fonger. MLive. January 20,2022. <https://www.mlive.com/news/flint/2022/01/lead-levels-jump-higher-in-flint-water-testing-but-remains-below-federal-action-level.html>

## EPI Mission Statement

The central mission of the initiative is to engage in applied education policy research. The Education Policy Initiative is a program within the Ford School that brings together nationally-recognized education policy scholars focused on the generation and dissemination of policy-relevant education research. The primary goals of the initiative are to:

- Conduct rigorous research to inform education policy debates in Michigan and nationwide
- Disseminate best practices in education reform to local, state, and national policymakers, as well as to educational practitioners, parents, and students
- Train graduate students and others to conduct cutting-edge research in education
- Facilitate interactions between students and faculty from different schools and/ or departments who share an interest in education reform.

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