

A RETROSPECTIVE STUDY OF THE INCIDENCE OF ECZEMA AND ATOPIC DERMATITIS IN THE PEDIATRIC POPULATION OF FLINT DURING THE FLINT WATER CRISIS



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INTRODUCTION

- During the Flint Water Crisis, increased blood levels of lead, trihalomethane, iron and other metals were found in Flint residents. There was also a reported increase in Legionnaires disease cases and positive E. Coli cultures.^{1,2,3}
- Various studies have linked the time period of the Flint Water Crisis with an increase in the number of dermatologic cases.^{4,5,6}
- Exposure to measurable levels of lead, in particular, has been indicated to harm the skin in other contexts as well.⁷
- However, no study yet exists using an EMR to examine dermatologic trends in the city of Flint before, during, and after the crisis.
- We propose a retrospective study to analyze the incidence of eczema and atopic dermatitis in the pediatric population of Flint during the Flint Water Crisis

OBJECTIVES

The primary objectives of our study will be the following:

- To quantify the incidence of eczema and atopic dermatitis in the pediatric population of Flint during three distinct time periods (pre-crisis, crisis, and post-crisis).
- To evaluate temporal trends and associations in dermatologic diagnosis in relation to documented changes in water quality.
- To assess demographic and clinical patterns among affected children across the three time periods.
- To identify gaps in dermatologic care access or documentation that may have influenced diagnosis rates or follow-up during and after the crisis.

METHODS

Study Design: Retrospective cohort study using EMR data from pediatric encounters in Flint, MI.

Study Periods:

- Pre-crisis - October 2012 to March 2014
- Crisis - April 2014 to October 2015
- Post-crisis - November 2015 to April 2017

Population: Pediatric patients (0-18 years old) with documented clinical encounters geocoded to participating Flint-area clinics.

Data Source: EMR data queried for new diagnoses of atopic dermatitis or eczema via corresponding ICD-10 codes.

Inclusion Criteria:

- First-time documentation of relevant ICD-10 codes during study period.
- Residence within Flint zip codes.
- Age ≤ 18 at the time of diagnosis.

Exclusion Criteria:

- Repeat diagnosis or follow-up visit for previously documented diagnosis.
- Incomplete demographic or encounter data.

Flint Water Crisis Timeline ¹



DATA ANALYSIS AND EXPECTED OUTCOMES

- Rates will be expressed as the number of new diagnoses per 1,000 pediatric patients (<18 years old) residing within Flint city limits.
- Descriptive statistics will summarize demographic variables, including age, sex, race/ethnicity, and insurance status, to characterize the study population across time periods
- Temporal trends will be visualized using time-series plots to assess changes in incidence over the study duration
- Correlation analyses (e.g. Chi-square test) will examine relationships between dermatologic outcomes and environmental indicators, including water quality metrics (lead concentration, pH, chloride levels) and aggregate pediatric blood lead levels during the same periods
- All analyses will be conducted using standard statistical software, with statistical significance defined as p < 0.05.
- We expect to observe higher incidence rates of eczema and contact dermatitis during the Flint Water Crisis compared to pre- and post-crisis
- Demographic analysis may reveal disparities in disease burden by race/ethnicity and insurance status, reflecting underlying inequities in environmental exposure and healthcare access.

SIGNIFICANCE & LIMITATIONS

Significance: The study aims to bridge a gap in knowledge by quantifying a potential association between water contaminants and the incidence of eczema and dermatitis in children.

Limitations: Children unable to access to medical care are not taken into account in this study. Conditions other than eczema and dermatitis are not examined.

RESULTS & CONCLUSIONS

This is a proposed study that is currently in the planning and development phase. It is subject to change.

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