Data Article

Child maltreatment data in the state of New Mexico across space and time

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A B S T R A C T

Child maltreatment is a serious public health problem. Previous research demonstrates that child maltreatment clusters in low-income, racially homogenous neighborhoods. Little is known, however, about the structural correlates of spatial risk in small areas such as census tracts. Here we present additional information regarding the data and methods used in the recent article published in Child Abuse & Neglect entitled “Variability and stability in child maltreatment risk across time and space and its association with neighborhood social & housing vulnerability in New Mexico: A Bayesian space-time model” [1]. The present dataset merges child maltreatment data from the New Mexico Department of Public Health with multiple sources of publicly available data to create a novel public health analysis. Bayesian spatiotemporal modeling techniques were used to map the relative risk of substantiated child maltreatment across census tracts in the state, and to elucidate spatial and temporal heterogeneity in risk. The data was initially collected by the New Mexico Children, Youth and Families Department, the state organization that suspected child abuse and neglect cases are reported to and the organization that then substantiates these cases. The data were then sent to the New Mexico Community Data Collaborative, a data analytic organization under the umbrella of the New Mexico Department of Health. The point file consisting of home addresses of sub-

\textsuperscript{a} Reference Article: Variability and Stability in Child Maltreatment Risk Across Time and Space and its Association with Neighborhood Social and Housing Vulnerability in New Mexico: A Bayesian Space-Time Model

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stantiated cases of child abuse was then aggregated by census tract, mapped for the entire state of New Mexico and made available to the public for research and analysis by different public health organizations and researchers (including the present researchers). The very purpose of making the data available to the public was to allow deeper investigations into trends and associations with other social determinants of health. This analysis demonstrates the public health importance of data sharing and accessibility.

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### Specifications table

| Subject | Public Health and Health Policy |
| --- | --- |
| Specific subject area | Prevention of child abuse and neglect in the State of New Mexico based on regional surveillance of high-risk neighborhoods. |
| Type of data | Excel file |
| How data were acquired | Reports of suspected cases of child or neglect that were subsequently substantiated in the state of New Mexico were provided by the New Mexico Department of Public Health. All other data are freely available online. |
| Data format | Raw data |
| Parameters for data collection | Only substantiated cases of child abuse or neglect among children between the ages of 0–17 were included in the analysis. |
| Description of data collection | Every person in the state of New Mexico is considered a mandatory reporter of child abuse or neglect. If anyone has a reasonable suspicion that this may be occurring, they are required by law to report it. These reports made to the New Mexico Children, Youth and Families Department are then substantiated or dismissed. A list of all substantiated cases, along with home addresses for each case were then given to the New Mexico Community Data Collaborative, a data analytic organization under the umbrella of the New Mexico Department of Health for analysis. |
| Data source location | All 499 census tracts in the state of New Mexico. |
| Data accessibility | Maltreatment Data: The New Mexico Community Data Collaborative Data identification number: 83c7f96193b642c290f5b5a2944fe14d Direct URL to data: [http://nmcdc.maps.arcgis.com/home/item.html?id=83c7f96193b642c290f5b5a2944fe14d](http://nmcdc.maps.arcgis.com/home/item.html?id=83c7f96193b642c290f5b5a2944fe14d) CDC Social Vulnerability index: [https://svi.cdc.gov](https://svi.cdc.gov) Princeton University Eviction Lab data: [http://www.evacutionlab.org](http://www.evacutionlab.org) USDA food atlas: [https://www.ers.usda.gov/data-products/food-access-research-atlas](https://www.ers.usda.gov/data-products/food-access-research-atlas) ESRI diversity index: [https://www.arcgis.com/home/item.html?id=e1fc0c02fe90451596db7b4100a84c36](https://www.arcgis.com/home/item.html?id=e1fc0c02fe90451596db7b4100a84c36) |
| Related research article | Barboza-Salerno, G. E. (2020). Variability and stability in child maltreatment risk across time and space and its association with neighborhood social & housing vulnerability in New Mexico: a Bayesian space-time model. *Child Abuse & Neglect, 104*, [https://doi.org/10.1016/j.chiabu.2020.104472](https://doi.org/10.1016/j.chiabu.2020.104472) [1]. |

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### Value of the Data

- These data make it possible to map differential trends in child abuse and neglect in census tracts throughout the entire state of New Mexico. This enables an examination of spatial heterogeneity and the ability to correlate different neighborhood characteristics with changing rates of child abuse.

- Understanding the neighborhood factors associated with child maltreatment can inform prevention efforts attempting to target risk and protective factors for child abuse.

- As illustrated in the article accompanying this data brief (Barboza, 2020), the data can be further correlated with other social determinants of health and other potential risk factors to target interventions towards these associated factors.
The data are additionally valuable to demonstrate whether current efforts in various communities are producing improved rates of child abuse.

1. Data description

The dependent variable describes child maltreatment substantiations for the state of New Mexico. The independent variables were derived from multiple sources and merged with the child maltreatment data by census tract. First, census tract data from the Center for Disease Control’s Social Vulnerability index was downloaded including the percentage of persons with no vehicle access, census tract population per square mile, and the percentage of persons with a disability. Second, data on housing insecurity was downloaded from the Princeton University Eviction lab including the census tract eviction rate, rent burdened households and median household income. The diversity index from the Environmental Science Research Institute (ESRI) was also downloaded to measure the amount of segregation in each census tract. Finally, the United States Department of Agriculture’s Food Atlas provided information on whether the census tract qualifies as a food desert, whether the tract is low income, and whether the tract is urban or rural. The supplemental files accompanying this article contain a shapefile of New Mexico Census Tracts (ch_2016_35_tract_500k.shp) [2] and the data file used for the analysis (data.csv) provided by the New Mexico Department of Public Health [3]. The data file contains counts of child maltreatment for each census tract in New Mexico along with the number of children under 18 in each tract and the covariates included in our published analysis [1]. More specifically, Table 1 describes the variables that are available in the data file.

2. Experimental design, materials and methods

Child maltreatment substantiation data for each of the 499 census tracts was indexed \( i = 1 \ldots 499 \) across the 9 time periods, indexed \( t = 1, \ldots 9 \). Standardized incidence ratios (SIRs)
were calculated to control for demographic differences and mapped. The observed number of child maltreatment substantiations was assumed to follow a Poisson distribution with mean \( \lambda_{it} = e_{it}r_{it} \) and \( y_{it} \sim \text{Pois}(\lambda_{it} = e_{it}r_{it}) \), where \( y_{it} \) is the observed count of substantiated maltreatment and \( r_{it} \) is the relative risk of maltreatment in census tract \( i \) at time \( t \). The relative risk quantifies whether a census tract has higher \( (r_{it} > 1) \) or lower \( (r_{it} < 1) \) risk than the average risk in New Mexico state [4].

A random effects model (also called a frailty model) was fit to the data as a baseline model \( (y_i = \beta_0 + u_i) \), where \( \beta_0 \) is the intercept and the \( u_i \)'s represent the unstructured spatial random effects that are assumed to be independent and identically distributed in the absence of spatial autocorrelation [5]. Then a convolution model was estimated that incorporated to account for spatial dependence. The convolution model was specified as follows:

\[
y_{it} \sim \text{Pois}(\lambda_{it} = e_{it}r_{it}),
\]

\[
\log(\lambda_{it}) = \log(e_{it}) + \log(r_{it}).
\]

\[
\eta_{it} = \log(r_{it}) = \beta_0 + u_i + v_i + (\beta_1 + \delta_i) \times t_i
\]

\[
u \sim \Phi(0, \tau_v),
\]

\[
v \sim \Phi\left(\frac{\bar{\nu}_\delta - \tau_v}{\eta_\delta}\right).
\]

Here, \( \beta_0 \) is the intercept, \( u_i + v_i \), is an area level random effect, \( \beta_1 \) is the global linear trend effect, and \( \delta_i \) is the differential time trend (i.e. the difference between the global trend \( \beta_1 \) and the area specific trend). In this model, \( u_i \) and \( \delta_i \) are modeled with a CAR distribution, and the \( v_i \)'s are independent and identically distributed normal variables. Each census tract therefore has its own time trend with spatial intercept \( (\alpha + u_i + v_i) \) and slope \( (\beta + \delta_i) \). The effect \( \delta_i \) is called differential trend of the \( i \)th area and denotes the amount by which the time trend of area \( i \) differs from the overall linear time trend, \( \beta_1 \). An interaction effect for space and time was then incorporated into the model to account for the behavior of a census tract for each year above and beyond the common spatial and temporal terms. Once the best fitting model was selected, multiple covariates, \( C \), were included in the final model.

All analysis was performed using the R statistical programming package. The code to replicate the figures in the paper appears below.

3. Excerpts of R code used for analysis

The code to accompany the article entitled “Variability and Stability in Child Maltreatment Risk Across Space and Time and its Association with Neighborhood and Housing Vulnerability in New Mexico: A Bayesian Space-Time Model" [1] is available from the first author upon request.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships which have, or could be perceived to have, influenced the work reported in this article.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.dib.2020.105759.

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