

Sigma Theta Tau International Research Grant Final Report

Summary of project aims

The project aims were as follows:

1. Describe the distribution of premature natural deaths in Harris County by circumstances of death and disease states.
2. Describe the geographic distribution of premature natural deaths in Harris County by describing the distribution of these deaths in relation to community resources characteristics as determined by geo-mapping.
3. Identify variables that are predictive of premature natural death based on circumstances of death, disease states, and community resources.

Theoretical/conceptual framework

Originally, the theory guiding the study was the middle-range theory of transitions developed by Meleis (George & Hickman, 2011); however, as we designed the data collection protocol, we changed to the social-ecological model (SEM; McLeroy, Bibeau, Steckler, Glanz, 1988; CDC, 2015). The SEM serves as a framework for understanding the complex web and interrelationships among individual, interpersonal, organizational, community, and societal factors. When adapted for public health prevention, the model aids in recognizing and understanding the range of variables believed to be predictive of natural deaths and provides a structure for disseminating the results, drawing implications for further study, and developing community-level interventions.

Methods, procedures, and sampling

A retrospective chart review of records of 2013 pertaining to the circumstances of death and disease states in Harris County, TX, was conducted. The records included medicolegal death investigation reports and autopsy findings completed during routine death investigation at the Harris County Institute of Forensic Sciences. In addition, the data were geocoded based on the address of the decedent to examine the community characteristics and resources related to disease states and the circumstances of death. Two groups with comparable data collected as part of the routine medicolegal death investigation were compared. The study group comprised of adults (25 to 59 years of age) who died prematurely from natural causes. The comparison group comprised adults in the same age group whose premature death was attributed to a drug overdose. The variables were abstracted using a researcher-developed instrument based on the aforementioned SEM.

This study posed a low risk to the subjects (deceased) or researchers, as the design was a retrospective chart review of death investigator and autopsy reports. After IRB approval was obtained, the records were reviewed and data were abstracted on site at the Harris County Institute of Forensic Sciences. Data abstraction has been completed and the dataset has been cleaned. Statistical analysis is currently under way. Mapping of community resources was based upon decedents' addresses and ZIP codes, census tracts, and census block groups.

Summary of findings

Of the 1284 individuals included in this sample, 911 died from natural causes, and 373 died from an overdose of prescription or illicit drugs. In the natural death group, 639 (74%) were males, whereas in the comparison group, 224 (26%) were males. The mean age was 48 years in the natural death group and 44 years in the comparison group. Whites were prominent in both groups—430 (48%) in the natural death group and 232 (62%) in the drug death group—followed by African Americans at 284 (31%) in the natural death group and 71 (19%) in the drug death group. Hispanics accounted for 174 (19%) of the natural deaths and 58 (16%) of the drug deaths, and the proportion of Asians in the natural death and drug death groups was 23 (3%) and 12 (3%), respectively.

The spatial analysis of the premature death data has begun. In order to perform the full-range of analyses that are planned, the first stage required that the case data be geocoded. For this study, geocoding took the form of taking the street address of the person who died and converting it into a geographic coordinate based on longitude and latitude. This allows us to perform our spatial analyses using incidence points, if necessary, thereby allowing for the greatest flexibility and precision in our analyses.

The use of points allows us to perform more detailed clustering and “hot spot” analyses. Because points can be aggregated to any broader geography, we are also able to perform our analyses using such areas as ZIP Codes, Census tracts, and Census block groups, thereby allowing us to use community population characteristics information. These could include area poverty rate, median income, crime rate, unemployment rate, and more

We geocoded the data using ESRI ArcMap 10.4.1 software and a national address locator base file. The original dataset contained 1284 cases. Because geocoding requires a valid street address, not all cases were able to be geocoded to longitude and latitude. The geocoding program was run twice. The cases that were not able to be geocoded the first time were reviewed for misspelled or otherwise improperly constructed street address, and rerun by the program. After two runs, 1192 cases were able to be geocoded to necessary coordinates and are the ones that will be used for the spatial analyses. The reasons that incident cases were removed included: homeless without a street address, home address in another state, home address in another country, home address outside the Houston Metropolitan Area, and otherwise invalid street address.

Initial analyses are being performed using ZIP Code geographies and US Census Bureau ZIP Code Tabulation Area (ZCTA) population data. After accounting for population density, initial observations suggest that the ZIP Codes with the higher number of deaths are those with higher poverty rates, higher unemployment rates, greater numbers of first generation immigrant populations, and greater number of minority populations. These are only preliminary results.

We have started more detailed cluster analyses and are planning to explore Census tract characteristics in the second round.

A second area explores the toxicology deaths. The ZIP Codes with greater numbers of toxicology-related deaths have similar community characteristics to those of the natural deaths. Both the natural and toxicology deaths share many of the same high number ZIP Codes. However, there are some differences and early analyses suggest that toxicology deaths are more likely to occur in areas that have high crime rates compared to those that are defined as natural. This is particularly true for the area around the City of Houston downtown core and the ZIP Codes in the south central portion of Harris County. We will look at this more closely, as we receive crime data.

Three manuscripts, specific to each aim, are currently in preparation.

Recommendations

Upon discussion, the study team identified two additional research questions. These IRB modifications are pending and will be described upon approval. The first question was related to the natural deaths. The modification will entail comparing these deaths from natural causes within the medicolegal death investigation setting to natural deaths occurring at the county level that did not require a medicolegal death investigation. The second question was related to the drug deaths. The modification will entail overlapping crime lab data (e.g. drug arrests, drug-related crimes) with the records of those dying from drug overdoses to identify any predictive patterns.

Financial summary

All funds were used as proposed.

Testimonial on how funds assisted in completing the project

The funds provided the needed support to obtain REDCap software. Given the large sample size and number of variables, REDCap allowed data to be collected and cleaned in an efficient manner. Additionally, given the volume of data, having a research assistant ensured that data could be collected within the given timeframe. Last, having the funds to prioritize statistical expertise was of high value.