A95 Assessing the Spatial Patterns of Undocumented Border Crosser (UBC) Deaths in the Southern Arizona Desert

Caitlin C.M. Vogelsberg, MS, Michigan State University, Dept of Anthropology, 354 Baker Hall, East Lansing, MI 48824*

After attending this presentation, attendees will better understand the application of Geographic Information Systems (GIS) to the field of forensic anthropology through the analysis of spatial patterns of the recovery locations of deceased individuals over a large geographic area.

This presentation will impact the forensic science community by highlighting the utility of geospatial analyses for providing supplemental information to the investigation of UBCs recovered from the southern Arizona desert and potentially leading to more identifications.

Undocumented immigration into the United States via the Mexican border has been a topic of national debate for well over two decades, in part due to the continually high number of deaths as individuals attempt to enter the country via clandestine means. Since 2001, more than 2,600 UBCs have died in the Sonoran Desert and surrounding regions falling under the jurisdiction of the Pima County Office of the Medical Examiner (PCOME) in Tucson, AZ. The PCOME contracts with 11 of 15 Arizona counties, including the four bordering Mexico, averaging roughly 169 UBC deaths a year with an identification rate remaining steady at around 64%.[1]

Migration is an inherently patterned process, including a person's motivation for leaving, the routes they take, and the places they reside; so, presumably, patterns may emerge as to where they die. A directed analysis of the location and distribution of undocumented migrant deaths processed by the PCOME was warranted due to previous studies being only preliminary or limited to the geography of where people are dying in southern Arizona.[2] PCOME case recovery protocol includes the recording of GPS coordinates of the location of the remains, which is stored and mapped at both the PCOME internal database and on the Open GIS (OGIS) platform at www.humaneborders.info. Public data available via OGIS is limited and, therefore, was supplemented using PCOME records of 1,681 identified individuals to include nationality. The majority of identified individuals recovered at the PCOME are of Mexican origin (*n*=1,403, 84%), followed by the next two largest groups of Guatemalans (*n*=154, 9%) and Salvadorans (*n*=45, 3%).[1]

The purpose of this research was to examine the geospatial properties of deceased migrants recovered from southern Arizona to potentially aid in both the investigative and identification processes. Therefore, a combination of exploratory spatial data and GIS analyses was conducted on several demographic variables of identified UBCs (*n*=1,681). Spatial autocorrelation analyses — including Moran's I and Local Indicator of Spatial Association (LISA) cluster maps — for the variables of recovery year, sex, and nationality or country of origin revealed significant positive spatial relationships for each. As the majority of individuals examined at the PCOME are young, Mexican males, further tests were conducted on nationality, which also resulted in statistically significant positive spatial autocorrelation and areas of spatial clustering. Furthermore, clusters of recoveries from both the beginning and second half of the study period (2001–2016) were visualized using LISA cluster maps and express an east-west movement of case locations. These results may indicate that route choice, as seen through death and recovery location, is also patterned via a person's sex, country of origin, and when they crossed. This supplements other anthropological, sociological, and criminal justice research on the topic and provides further information to the study of international migration along the United States-Mexico border.

Future research will combine these geospatial data with the predictive powers of the biological data (craniometrics and morphometrics) on ancestral affiliation for identified individuals to potentially predict where an unknown individual is from and thus facilitate a more efficient identification.

Reference(s):

1. Pima County Office of the Medical Examiner (PCOME) Annual Report, 2017.
2. Chamblee J.F., Christopherson G.L., Townley M., DeBorde D., Hoover R. *Mapping Migrant Deaths in Southern Arizona: The Humane Borders GIS.* Unpublished report, 2006.

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*Presenting Author