

Spatial epidemiology of summer trauma in Scott County, IA: Use of GIS to identify trauma incidence in urban and rural areas

Matthew Koch

Augustana College, Rock Island Illinois

Follow this and additional works at: <https://digitalcommons.augustana.edu/celebrationoflearning>



Part of the [Epidemiology Commons](#), and the [Geographic Information Sciences Commons](#)

Augustana Digital Commons Citation

Koch, Matthew. "Spatial epidemiology of summer trauma in Scott County, IA: Use of GIS to identify trauma incidence in urban and rural areas" (2018). *Celebration of Learning*.

<https://digitalcommons.augustana.edu/celebrationoflearning/2018/posters/9>

This Poster Presentation is brought to you for free and open access by Augustana Digital Commons. It has been accepted for inclusion in Celebration of Learning by an authorized administrator of Augustana Digital Commons. For more information, please contact digitalcommons@augustana.edu.

SETTING

- Internship site: Genesis Medical Center-Davenport (East Campus)
- Public Health services: research for innovative solutions to health problems, diagnosis and investigation of health problems, policy development
- Mission statement: "...to provide compassionate, quality health services to all those in need."⁶

PROJECT OBJECTIVES

- Identify high-risk areas in Scott County for specific mechanisms of injury (MOI)
- Identify extreme outliers of trauma incidence
- Determine what MOI are most prevalent in Scott County

BACKGROUND

- Globally, trauma is one of the leading causes of death and disability¹
- Traumatic injury is a blanket term referring to acute physical injuries which pose an immediate threat to life and limb, require immediate emergency medical care, which has the potential to cause permanent disability or death²
- Traumatic injuries are responsible for more than 30% of life years lost annually in the United States²
- The economic burden caused by traumatic injuries is over \$671 billion annually²
- Geographic information systems (GIS) have demonstrated an ability to efficaciously evaluate and analyze challenges in public health³
- Most traumatic injuries are caused by either falls or motor vehicle collisions⁴
- The summer months produce higher rates of trauma incidence compared to the winter months⁵

METHODS

The following data was collected from eligible patients:

- Date and time of arrival at trauma center
- Age
- Mechanism of injury (MOI)
- Race

These data was then combined with the geospatial location data from MEDIC EMS to form a complete spatial data set which was then plotted using ArcMap (see Cartographic Model).

Informed by the behavioral economics theory of health behavior⁷

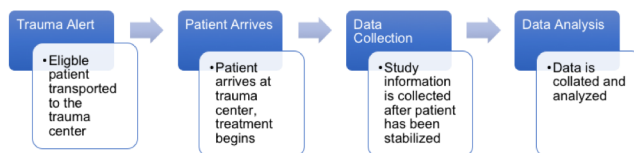


Fig. 1. Research process flowchart

RESULTS and DELIVERABLE

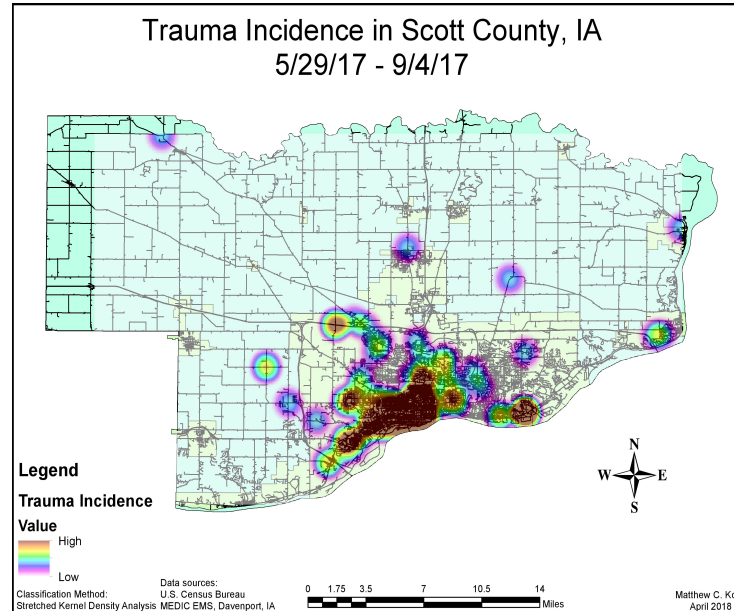


Fig. 2. Trauma incidence in Scott County, IA. Urban areas were shown to have higher rates of trauma incidence than rural ones. n=96

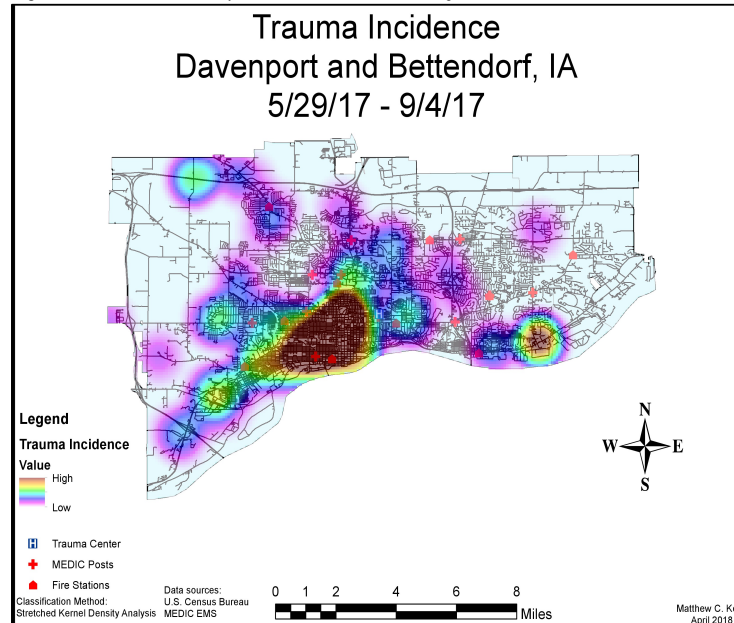


Fig. 3. Trauma incidence in Davenport and Bettendorf, IA. Highly densely populated areas, particularly south-central and southwest Davenport show much higher rates of trauma than other areas.

Cartographic Model

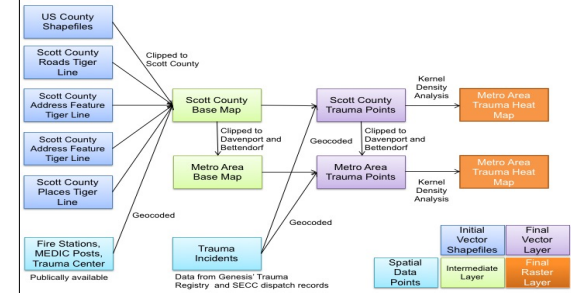


Fig. 4. Cartographic model of the project

Nature	Count
Traffic/Transportation Accidents	58
Falls	13
Stab / Gunshot / Penetrating Trauma	5
Assault / Sexual Assault	3
Hemorrhage / Lacerations	2
Unconscious / Near Fainting	2
Psychiatric / Abnormal Behavior / Suicide Attempt	2
Traumatic Injury (specific)	2
Burns (scalds) / Explosion	1
Cardiac / Respiratory Arrest / Death - Hanging	1
Interfacility Transfer / Evaluation	1
Total	96

Table 1. Frequency table of trauma alert injury nature

DISCUSSION and NEXT STEPS

Further steps for research include:

- Establishing a full and complete data set over the course of an entire calendar year (or two)
- A more thorough analysis of variables involved (i.e. plotting falls, MVCs, shootings, stabbings, all on different maps)
- An analysis of trauma alert patient outcomes
- Using the same process to analyze other adverse health events in Scott County

ACKNOWLEDGEMENTS

- Linda Frederiksen, RN, BSN, NREMT-P, CCP, Executive Director, MEDIC EMS
- Paul Andorf, NREMT-P, CCP, Information Systems Manager, MEDIC EMS
- Andrea Bladel, RN, BSN, Trauma Nurse Coordinator, Genesis Medical Center
- Sarah Castro, MPH, Senior Research Liaison, Genesis Medical Center
- Christopher Strunk, PhD, MA, Geography Department, Augustana College (IL)
- Lena Hann, PhD, MPH, CHES Public Health Program, Augustana College (IL)

REFERENCES

1. Sereide, K. (2009) Epidemiology of major trauma. *British Journal of Surgery*, 96(7), pp. 697-698.
2. UHealth. (2015, 22 Apr). *Traumatic injury*. Retrieved from <https://uhealth.org/traumatic-injury>
3. Nykirk, C., Farnham, L. (2011). Geographic information systems (GIS) for health promotion and public health: a review. *Health Promotion Practice*, 12(1), pp. 63-73.
4. Morrison, J., McConnell, N., Orman, G., Egan, G., Jansen, O. (2013). Rural and urban distribution of trauma incidents in Scotland. *British Journal of Surgery*, 100(3), pp. 351-359.
5. Sereide, K., Kriger, A., Ellingsen, C., Tjosvold, K. (2009). Pediatric trauma deaths are predominated by severe head injuries during spring and summer. *Scandinavian Journal on Trauma, Resuscitation, and Emergency Medicine*, 17(3), pp. 1-9.
6. Genesis Health System. (n.d.) Mission & Vision. Retrieved April 21, 2018, from http://www.genesishealth.com/about/mission_vision/
7. Glanz, K., Rimer, B., & Viswanath, K. (Eds.). (2015). *Health Behavior: Theory, Research and Practice* (5th ed.). San Francisco, CA: Jossey-Bass.