Appalachian
STATE UNIVERSITY®
BOONE, NORTH CAROLINA

COVID-19 And Nursing Home Care In The US: Regional Differences Associated With Disparities In Race, Ethnicity And Community And Facility Characteristics (Presentation)

By: **Dr. Sandi J. Lane, Dr. Adam Hege, Dr. Trent J. Spaulding, Dr. Lakshmi Iyer,** and **Dr. Maggie Sugg**

Abstract

Purpose: To investigate U.S. nursing homes associated COVID-19 cases in relation to county-level and nursing home facility characteristics. Study Motivation: As of July 2020, there were approximately 1.3 million people residing in 15,483 nursing homes in the United States. Nursing homes account for approximately 40% of COVID-19 deaths in the United States, and many individuals residing in nursing homes have underlying respiratory conditions, making them especially susceptible to increased severity and harm from the virus. Infection control deficiencies are the most common deficiency nursing homes receive with almost 40% of the nation's nursing homes having at least one infection control deficiency in 2017. Media reports indicate that nursing homes that have more staff shortages, and experience more survey deficiencies have a larger number of staff and residents who are positive for COVID-19.

COVID-19 and Nursing Home Care in the US: Regional Differences

Dr. Sandi J. Lane, Dr. Adam Hege, Dr. Trent J. Spaulding, Dr. Lakshmi Iyer, Dr. Maggie Sugg
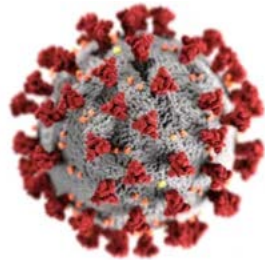
Study Motivation

- As of July 2020, there were approximately 1.3 million people residing in 15,483 nursing homes in the U.S.
- Nursing homes account for approximately 40% of COVID-19 deaths in the U.S.
- Many individuals residing in nursing homes have underlying respiratory conditions, making them especially susceptible to increased severity and harm from the virus.
  - living in small rooms, with little to no space between resident beds,
  - residents have multiple comorbid conditions that weaken their immune systems, and
  - many require assistance with activities of daily living.
- Infection control deficiencies are the most common deficiency nursing homes receive with almost 40% of the nation's nursing homes having at least one infection control deficiency in 2017.
- Media reports indicate that nursing homes that have more staff shortages, and experience more survey deficiencies have a larger number of staff and residents who are positive for COVID-19

Sandi Lane

Purpose

To investigate U.S. nursing homes associated COVID-19 cases in relation to county-level and nursing home facility characteristics.

Sandi Lane

Research Questions

1. What organizational characteristics contribute to the spread of COVID-19 in nursing homes?

2. What quality metrics of nursing homes and their residents contribute to the spread of COVID-19?

3. What socio-economic variables contribute to the spread of COVID-19 in nursing homes?

4. Are there regional differences (e.g. urban/rural, coastal/mountainous, state) in the spread of COVID-19 in nursing homes?

Sandi Lane

Data Sources

- **Centers for Medicaid and Medicare Services (CMS) nursing home data,**
- **County-level data from the 2010 Census and 5-year estimates from the American Community Survey, and**
- **County-level COVID-19 infections rates from USAFacts.org**

Trent Spaulding

Data Cleansing and final data set

- 15,403 facilities reported to CMS in 2020
- 14,886 facilities reported to CMS every year since 2016
- Some facilities missing staffing data for 2020
- Some facilities missing star-rating data for 2020
- 13,294 facilities reported to CMS COVID-19 data
- 86.3% of the full population of U.S. nursing homes included in the final analysis

Trent Spaulding

Methods

Zero-Inflated Poisson allows us to account for a large number of facilities with no infection. Further, the method models two processes.

1) How the virus gets into the facility
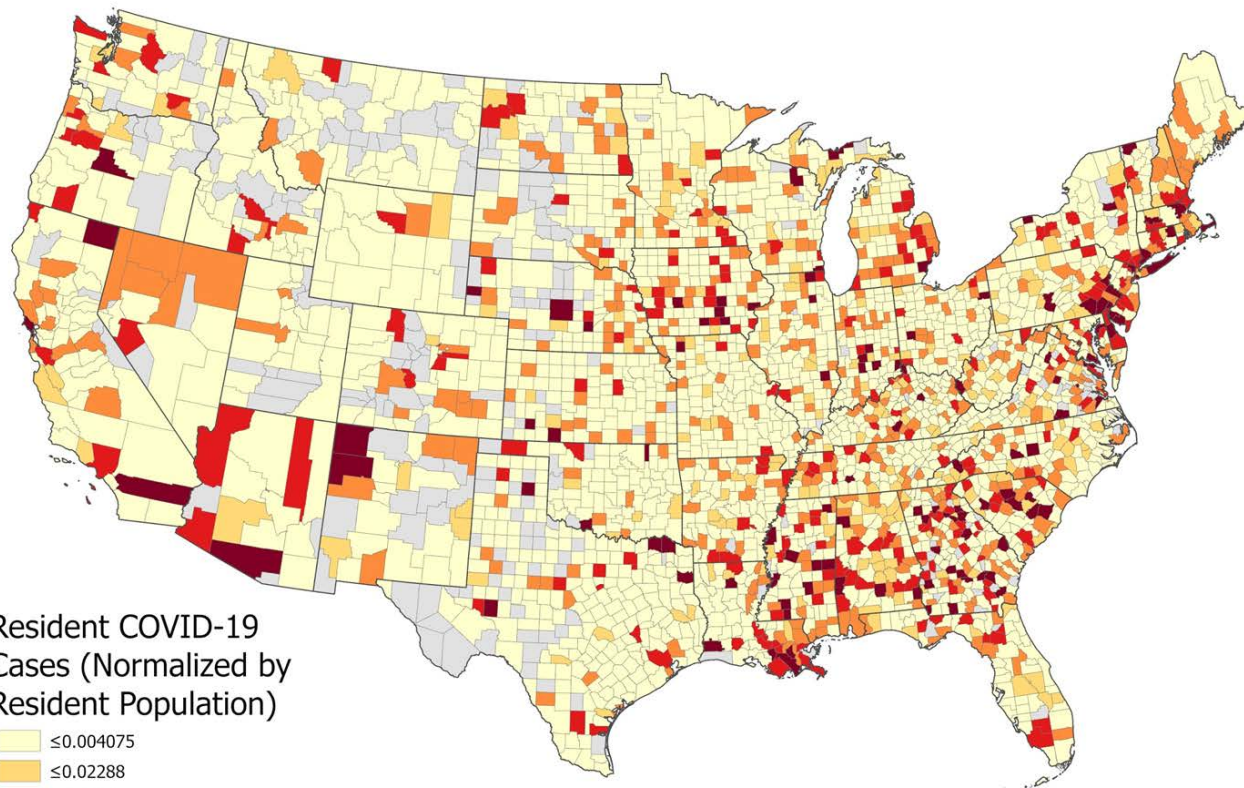2) How the virus spreads in the facility

Trent Spaulding

Results - Impacts on the Virus Getting into a Facility

- Higher county infection rates → more likely to have an infection
- Recently purchased facilities → less likely to have an infection
- Higher percentages of Blacks and Asians → more likely to have an infection
- Older populations → less likely to have an infection

Trent Spaulding

Results - Impacts on the Spread of the Virus

- Most of the IVs were significant
- More nurses and nurse aids → lower infection spread
- More licensed practical nurses → higher infection spread
- Recently purchased facilities → lower infection spread
- NFP and local government → less spread than FP
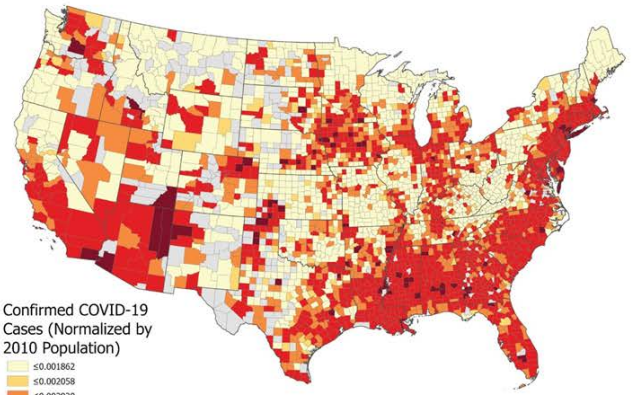- Higher percentage of Blacks, Asians, and Hispanics → higher infection spread

Trent Spaulding

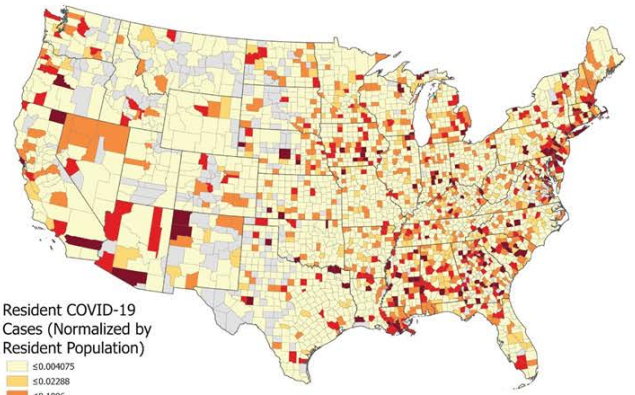Resident COVID-19
Cases (Normalized by
Resident Population)

☐ ≤0.004075
☐ ≤0.02288
☐ ≤0.1096
☐ ≤0.5099
☐ ≤2.357
☐ No Data

MAGGIE
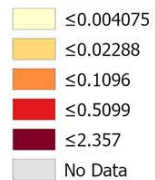
A — Confirmed COVID-19 Cases (Normalized by 2010 Population)
- ≤0.001862
- ≤0.002058
- ≤0.003920
- ≤0.02156
- ≤0.1887
- No Data

B — Resident COVID-19 Cases (Normalized by Resident Population)
- ≤0.004075
- ≤0.02288
- ≤0.1096
- ≤0.5099
- ≤2.357
- No Data
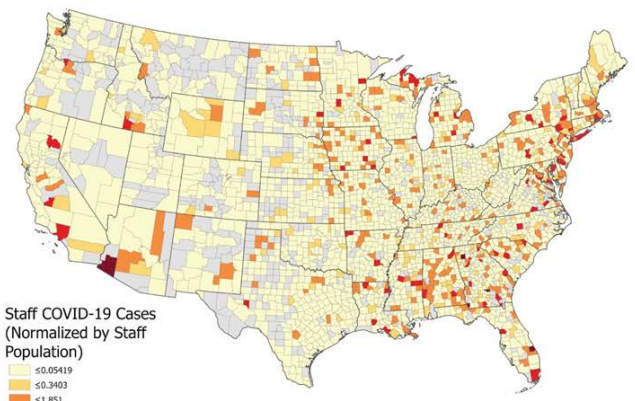
C — Staff COVID-19 Cases (Normalized by Staff Population)
- ≤0.05419
- ≤0.3403
- ≤1.851
- ≤9.829
- ≤51.95
- No Data
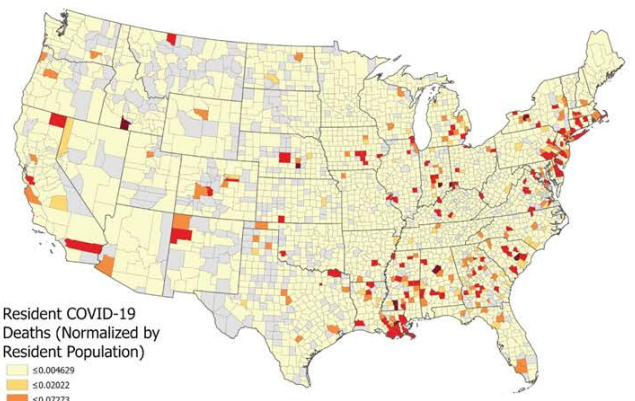
D — Resident COVID-19 Deaths (Normalized by Resident Population)
- ≤0.004629
- ≤0.02022
- ≤0.07273
- ≤0.2496
- ≤0.8451
- No Data

MAGGIE

Spatial Patterns

Significant spatial clustering of COVID-19 in the general populations and among nursing home residents.

COVID-19 Hotspots in the Contiguous US

COVID-19 County Cases

Getis-Ord Gi* for COVID-19 Cases

Cold Spot - 99% Confidence	Hot Spot - 90% Confidence
Cold Spot - 95% Confidence	Hot Spot - 95% Confidence
Cold Spot - 90% Confidence	Hot Spot - 99% Confidence
Not Significant	No Data

COVID-19 Resident Cases

MAGGIE
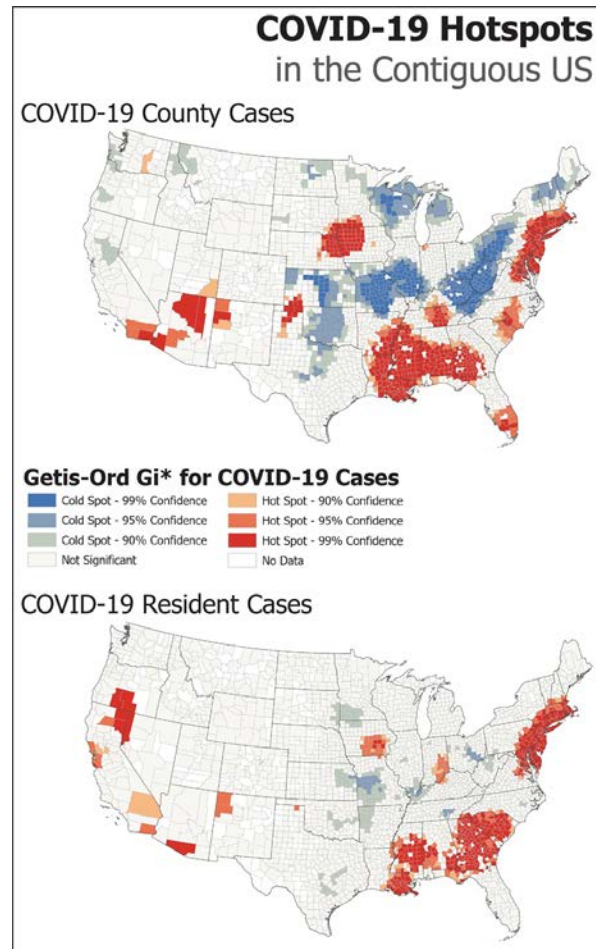
Conclusions

Different factors affect how the virus gets in and how it spreads once in.

Findings suggest that racial and ethnic demographics of an U.S. county are a larger influence on nursing home associated COVID-19 cases than staffing and other nursing home characteristics.

Systemic racial and social inequities have been linked with COVID-19 associated health disparities and also helps to predict county-level nursing home outbreaks.

Adam

Public Health Implications

- COVID-19 is affecting the U.S. at much higher rates than other nations.
- Concurrently, the nation is dealing with hundreds of years of systemic racism and injustice.
- Communities housing nursing home facilities must address both while attempting to prevent and mitigate both the short and long-term effects of a global pandemic.

Adam

Project Outcomes and Next Steps

Lane, S.J. Spaulding, T.J., Sugg, M., & Iyer, LS.. *Predicting COVID-19 Outbreak in U.S. Nursing Homes Based on Location, Quality Metrics, and Staffing Levels.* Accepted for presentation at the 2021 Forum on Advances in Healthcare Management Research at the ACHE's Annual Congress on Healthcare Leadership, Chicago, IL (March 22-25, 2021).

Sugg, M.M**.,** Spaulding, T., Lane, S.J, Runkle, J., Harden, S*, Hege, A., Iyer, L.S., Mapping Community-Level Determinants of COVID-19 Transmission in Nursing Homes: A multi-scale approach. *Science of the Total Environment.* https://doi.org/10.1016/j.scitotenv.2020.141946 (Impact Factor: 6.551)

Hege, A., Lane, S., Spaulding, T., Sugg, M., Iyer, L. COVID-19 and nursing home facilities in the United States: Regional differences associated with disparities in race, ethnicity, and community and facility characteristics. *American Journal of Public Health* (Under Review). (Impact Factor: 5.38)

- Continue to collect updated data on COVID-19 cases - overall and we as in nursing homes in USA
- Cleanse data and further analyze to see if there are changes in trends
- Create a dashboard to inform stakeholders with appropriate information for decision/policy making
- Explore other funding opportunities
    - Qualitative interviews with Nursing Home Staff
    - Survey of Community Health Directors

Lakshmi

Thanks to Appalachian State University's Office of Research funding support for this project.

Sandi Lane