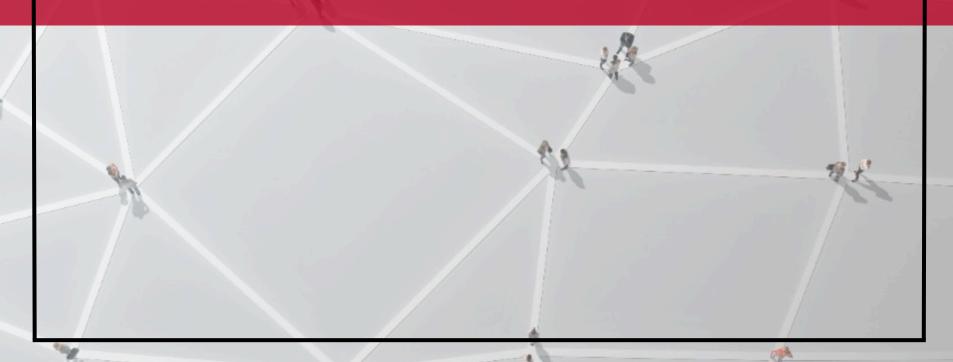
# Health Services Research Center Summer Student Research Program

June 17-July 26, 2024





# Meet the Mentors



Samudragupta Bora, PhD
Director, Health Services Research
University Hospitals
Associate Professor, Pediatrics
Case Western Reserve University



**Gautam Dagur, MD, PhD**Postdoctoral Fellow,
Health Services Research
Case Western Reserve University



Weichuan Dong, PhD

Spatial Epidemiologist

Case Western Reserve University

Saira Alli, MD, PhD

Neurosurgeon
Fellow, Advanced Endoscopic
and Open Skull Base Surgery
Cleveland Clinic



Richard Hoehn, MD

Surgical Oncologist
University Hospitals
Assistant Professor, Surgical Oncology
Case Western Reserve University



Wilson Milton Were, MBChB, MMED PCH
Senior Medical Officer
Lead, Child Health Services
World Health Organization
Geneva, Switzerland



Krysten North, MD, MPH

Neonatologist
Brigham and Women's Hospital
Instructor, Pediatrics
Harvard University



# Ask the Expert

Experts in fields related to the students' areas of interest spoke with them about their career paths.

# About the Program

# **Program Description**

The **inaugural six-week** student research program attracted a diverse cohort of high school, college, and medical school students who were competitively selected (20% acceptance rate). The virtual program included lectures on research methodology, guided learning on evidence synthesis and spatial epidemiology, and expert Q&A sessions on health-related career paths. During the final three weeks, the cohort developed and carried out individual research projects on health disparities using spatial epidemiology methods, supervised by a mentor, and disseminated their findings through a scientific poster. Students also attended the Health Services Research Center's Distinguished Speakers Series and Grand Rounds.





# **Learning Objective**

Develop a foundational understanding of health services research.

- Definition of Health Services Research
- Scope of Health Services Research
- Methods of Health Services Research
- Study Design
- Evidence Pyramid
- Systematic Review and Meta-Analysis
- Spatial Epidemiology and Health Disparity
- Spatial Epidemiology: Clustering and Data Mapping
- Reading Scientific Articles
- Designing Scientific Posters





Katherine Bollinger Second Year Saint Vincent College

"I chose to apply for the Summer Student Research Program because I am currently exploring healthcare related fields. I knew that this opportunity would provide useful insight into potential careers and teach me powerful tools to expand on my education journey. Some things I learned were how to use the Tableau software to map spacial epidemiology related data, how to design a research poster, the difference in academic reviews, and how to search for scientific articles. I am confident that these skills will help me excel in future classes and an upcoming research study I will be apart of at school. I am very grateful to have received this opportunity."

# IMPACT OF TRIGGERS ON ASTHMA PREVALENCE

# Kate Bollinger, Gautam Dagur, Weichuan Dong

<sup>a</sup> Health Services Research Center, University Hospitals Research & Education Institute, Case Western Reserve University, University Hospitals, Cleveland, Ohio b Department of Population and Quantitative Health Sciences, Case Western Reserve University School of Medicine, Cleveland, Ohio

#### Introduction

- Asthma- affects lungs, needs ongoing treatment & control of triggers
- Access mucus causes airways to swell and narrow, hard to breathe, wheezing & coughing
- Triggers: airborne allergens, allergies to dust mites or pet dander, dry/cold air, air pollutants and irritants, tobacco smoke, occupational

## Objectives

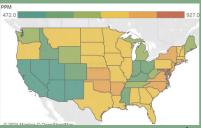
- To identify correlations between asthma cases and the prevalence of environmental factors that can potentially cause asthma throughout different States in the US
- Acquire datasets from as many asthma triggers

#### **Materials and Methods**

- · Cross-sectional study
- Mapped asthma prevalence in 2023 by US state
- · Collect data for pollen count and air quality
- · Compare the top 20 states with worst air quality and the top 20 with highest pollen counts to the states with the highest asthma prevalence

# Avg. Data Value

Figure 1: Asthma Prevalence in 2023 by US State 2



	State	Avg.		State	Avg.
1	West Virginia	11.64	11	Michigan	10.87
2	Maine	11.51	12	Conecticut	10.78
3	Kentucky	11.51	13	Alabama	10.74
4	Oklahoma	11.37	14	Mississippi	10.7
5	Rhode Island	11.2	15	Vermont	10.69
6	New York	11.12	16	Tennessee	10.65
7	Washington	11.04	17	Arizona	10.63
8	New Hampshire	11.01	18	Virginia	10.62
9	Massachusetts	10.99	19	Louisiana	10.59
10	Oregon	10.89	20	New Mexico	10.58

Table 1: US States with Highest Asthma Prevalence in 2023 <sup>2</sup>

	State	PPM		State	PPM
1	Maryland	927	11	North Carolina	786
2	Delaware	907	12	Missouri	773
3	Kansas	849	13	Minnesota	773
4	Virginia	843	14	South Dakota	773
5	Connecticut	830	15	Massachusetts	772
6	New Jersey	828	16	Pennsylvania	771
7	Arkansas	826	17	Louisiana	763
8	Oklahoma	791	18	Iowa	761
9	Rhode Island	791	19	Montana	754
10	New York	790	20	South Carolina	744

Table 2: US States with Highest Pollen Grains Per Cubic Meter <sup>3</sup>

State	Rank	State	Rank
Arizona	50	Pennsylvania	40
Nevada	49	Kansas	39
California	48	Idaho	38
New Mexico	47	Indiana	37
Utah	46	Ohio	36
Texas	45	Arkansas	35
Illinois	44	Connecticut	34
Colorado	43	Washington	33
Oklahoma	42	Oregon	32
Michigan	41	Missouri	31

Table 3: 20 Worst US States Ranked by Air

- Highlighted states in Tables 2 & 3 also appear on the asthma prevalence list (Table 1)
  - Indicates a correlation between the pollen count and air quality to asthma prevalence
- Ony 8/48 states in Figure 1 are the same color in Figure 2

#### Conclusion

- · Pollen count and air quality likely affect the number of asthma cases
- · Cleaner air and control of allergies should reduce the chance of developing
- Data falls on the lower end of support for the objectives
  - While a correlation was identified and control of these triggers might help asthma prevalence, future studies could survey multiple years or additional causes (dry/cold air, tobacco smoke, occupational exposures)

#### References

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States with the Best Air Quality | US News Best States, www.usnews.com/news/best-states/rankings/natural-

#### **Acknowledaments**

- This work was supported by the University Hospitals Health Services Research Center 2024 Summer Scholars Program.
- Dashboards were assembled using Tableau Desktop software version 2024.1 (Tableau Software)



Twitter: KateBollinger1 LinkedIn: Kate Bollinger



Khushi Brahmbhatt 12th Grade Oshwal Academy Nairobi Senior High

"Choosing this program was one of the best decisions I've made. It expanded my understanding of the various career paths available to me. While I had always heard about research, I never fully understood what it entailed until this program answered most of the guestions I had. I learned many valuable things, but what will stick with me the longest is spatial epidemiology. Before entering this program I was unaware of this field, but I have come out of it with a deep love for it and now I'm considering it as a future career possibility, alongside becoming a physician as being exposed to expert speakers who were both physicians and researchers has inspired me to pursue a similar career path which would have not been possible without this program. Finally, being part of this summer program was time well spent. Working closely with my mentors on various projects was beyond what I had expected, and I am extremely grateful for the experience. I would highly recommend this program to anyone interested in expanding their career options."

#### Does Poverty Status Have a Correlation with Spatial Clusters of Overdose Mortality Rates in Ohio Counties in 2021?

Khushi Brahmbhatt<sup>1</sup>, Gautam Dagur<sup>1</sup>, Weichuan Dong<sup>2</sup>

1. Health Services Research Center, University Hospitals Research & Education Institute, Case Western Reserve University, University, University Hospitals, Cleveland, Ohio 2. Department of Population and Quantitative Health Sciences, Case Western Reserve University School of Medicine, Cleveland, Ohio

- Ohio is among the top 10 states with the highest overdose mortality rates, ranking 7th and its poverty status being 13.4%,3,5
- Socioeconomic factors, including poverty, significantly impact health outcomes
- Communities with higher poverty statuses often face numerous challenges, such as limited access to healthcare, higher rates of substance abuse, and insurance problems.
- These factors may contribute to higher rates of overdose mortality, making it essential to examine now poverty intersects with overdose mortality rates.

#### Objectives

The main objective was to identify spatial clusters of overdose mortality rates in Ohio counties, aiming to pinpoint regions with both high poverty and high overdose mortality

#### Methodology

- The study design is a cross-sectional study using data set from CDC places 2024 "VSRR Provisional County-Level Drug Overdose Death Counts, and the US census map of "Population for Whom Poverty Status is Determined".
- Using the dataset from CDC places, we used Tableau to generate the map and form a calculation to determine the the The calculation: ([Provisional Drug Overdose Deaths] / [Population]) \* 100
- The population data was not included in the CDC places dataset, so we manually added the population for 2021 using the United States Census Dataset: "County Population Totals and Components of Change: 2020-2023."

#### Results



<sup>2</sup>Figure 1: Poverty Status (%) in Ohio Counties in 2021

Name: Khushi Brahmbhatt. Twitter: k\_\_brahmbhatt

Figure 2: Overdose Mortality Rates (%) in Ohio counties in 2021

Contact

#### Results

lowest poverty status		mortality rates	
County Name	Poverty Status (%)	County Name	Mortality Rate(%)
Delawaree	4.6	Putnam	0.000
Union	4.7	Carroll	0.000
Warren	4.8	Auglaize	0.022
Mercer	5.3	Logan	0.091
Madina	6.7	Lloino	0.165

County Name	Poverty Status(%)	County Name	Mortality Rate(%)
Athens	25.5	Scioto	1.610
Scioto	23.8	Lawrence	1.176
Meigs	20.1	Gallia	1.136
Pike	19.4	Meigs	1.010

Poverty status for the top 5 counties in Ohio with the lowest mortality rates (%)		Poverty status for the top 5 counties Ohio with the highest mortality Rates (%)		
Carroll	13.2	Scioto	23.8	

Logan	9.5	Meigs	20.1	
Auglaize	7.3	Vinton	18.9	
Putnam	6.3	Lawrence	18.8	
Union	4.7	Gallia	16.4	

Top 5 counties in Ohio with the

#### KEY FINDINGS

- As shown in Table 4, the average poverty status for the top 5 counties in Ohio with the highest mortality rate is approximately 139.02% higher than the poverty status for the top 5 counties in Ohio with the lowest mortality rate.2,3
- As shown in Table 1, Union county appears in both for the lowest poverty status (4.7%) and the lowest mortality rates (0.155%). The other 4 counties with the lowest mortality rate were not in the top 5 counties with the lowest poverty status ,however, they did fall into the lowest category of the of the poverty statuses as shown in Figure 1 with the exception of Carroll county.<sup>2,3</sup>
- As shown in Table 2, Scioto county has the second highest poverty status (23.8%) and the highest mortality rate (1.610). Additionally Meigs county has the third highest poverty status (20.1%) and has the 4th highest mortality rate (1.010%). The other 3 counties with the highest mortality rate are not in the top 5 counties with the highest status ,however, they do fall into the second highest category of poverty status according to Figure 1.2.3
- As shown in Table 3, The counties with the lowest mortality rates have a lower poverty status compared to counties with the highest mortality rates, which have a relatively higher poverty status.2,3

- A positive correlation between Poverty status and overdose mortality rates is determined however, poverty status is not be the only factor affecting the overdose mortality rates.
- In future studies other factors such as access to health care, substance availability, and prescription drug misuse should be considered to get a better overall picture of factors that contribute to the spatial clusters of overdose mortality rates.
- Additionally, this study should be repeated using zip codes, therefore being more specific to the location and easier to pinpoint the spatial clusters and their cause

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This work was supported by the University Hospitals Health Services Research Center 2024 Summer Scholars Program.



Cleveland | Ohio



# Chukwunweike (Nnamdi) Ezeanyika Third Year Northeast Ohio Medical University

# Exploring the Spatial Relationship Between Diabetes Prevalence, Physical Inactivity, and Social Determinants of Health Across Ohio Counties.

1,2 Chukwunweike Ezeanyika 1 Gautam Dagur, MD, PhD; and3 Weichuan Dong, PhD.

'Health Services Research Center, University Hospitals Research & Education Institute, Case Western Reserve University, University, University, Choise Chief Population and Cuantitative Health Sciences, Case Western Reserve University, School of Medicine, Cleveland, Otto.
<sup>3</sup> Department of Population and Quantitative Health Sciences, Case Western Reserve University School of Medicine, Cleveland, Otto.

"I chose to apply for the **UH HSRC Summer** Student Research program because it offered opportunities to participate in qualitative research and learn from

experienced professionals while building meaningful connections. The program was transformational. It

equipped me with

essential skills and connections that will be invaluable in my future career. I am genuinely grateful for the experience and the chance to be part of

such an exceptional

learning environment."

#### INTRODUCTION

Diabetes is a significant public health issue in the United States, impacting both the health and economic sectors across Ohio counties. Targeted public health interventions can be designed by understanding the spatial relationship between diabetes prevalence and a key risk factor, physical inactivity.y (Seidu et al., 2021; Budnik-Przybylska et al., 2024).

Social determinants of health like access to health care, poverty levels, unemployment, and education levels equally contribute to diabetes prevalence. Hence, exploring the spatial relationship between diabetes prevalence, physical inactivity, and four social determinants of health across Ohio counties can inform more effective targeted public health responses.

#### **OBJECTIVES**

To analyze the spatial patterns of diabetes prevalence and physical inactivity prevalence across

To identify the relation between diabetes prevalence. physical inactivity prevalence, and key SDOH factors at the county level.

#### METHODS

A cross-sectional study involving 50 out of 88 counties in Ohio.

Data on diabetes prevalence and physical inactivity prevalence were collected from the Centers for Disease Control and Prevention (CDC) Behavioral Risk Factor Surveillance System (BRFSS) data for Ohio.

Data for key SDOH factors, including access to health care, poverty rate, unemployment, and education attainment, were obtained from the U.S. Census Bureau's American Community Survey (ACS) and County Health Rankings and Roadmaps

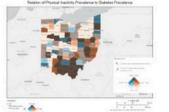
The CDC Geographic Information Systems (GIS) mapping tool ArcGIS was utilized to visualize county-level variations on choropleth maps. Individual choropleth maps were created to visualize diabetes prevalence across the counties, physical inactivity prevalence, the relationship between both, how healthcare access relates to the prevalence of diabetes, and how poverty. unemployment, and education as selected SDOH factors relate to diabetes prevalence

#### RESULTS

Table 1: Representation of diabetes prevalence, physical inactivity prevalence, and selected SDOH factors across 50 out of 88 Ohio counties (CDC, 2024; County Health Rankings and Roadmaps, n.d.).

County	(Indeted Providence (% age with alles)	Physical cractody Proving age adjusted	CACH of Health CHAPTER OF THE STRENG MOURS Agent "Streng"	Powers Flate pressured by result Living stage in SI	(%)	Companion (A
Adens	19.2	30.3	10.0	36.29	5.4	46
Allen	10.0	30.0	7.4	6.60	42	100
Awtons	11.5	29	7.2	41.59	3.0	100
Autobase	103	27.4	4.4	41.36	44	407
Attent	91.7	23.0	1.6	er.h	48	80
Augmon	101	29	6.2	46.16	31	100
Semon	122	ma	8.8	4457	6.2	in .
Street.	71.5	36.2	6.2	19.85	45	10
Beter	71.0	24.9	10.0	6.0	3.5	91
OWNE	19.9	28.4	10.5	45.00	43	80
Chargeign	91.5	28-2	8.0	89.40	3.7	91
Clerk	12.3	29	4	en.06	41	89
Cernori	10.7	25.6	8.8	67.84	34	pt.
ONEM	10	26.3	12	20.59	44	91.
COLFORM	122	26.5	10.3	45.00	48	80
Coenadon	124	27.4	**	30.40	49	85
Crewford	124	363	4.	30.40	48	90
Controps	15.5	29.7	2.8	4.50	4.9	91
Onte	75.7	36.7	4.2	45.05	3.5	91
Defence	11.9	25.4	4.5	39.50	3.0	907
Delayers	8.0	42.7	4.5	81.04	3.0	927
Srie .	10.5	242	7.8	40.30	4.0	90
Factorial	71.4	27.6	6.3	60.01	3.5	94
i syste	13	30.2	10.0	26.76	10	
Frendn	71.8	23.3	6.3	40.00	34	100
Future	71.5	39.1		39.59	40	64
Geria	197	20.0	6.2	to let	47	96
George	**	20.7	6.4	46.50	40	91
Greate	10.7	20	6.1	46.55	14	94
Guerrany.	19.0	30.0	19.2	36.30	4.9	96
rentin	12.0	26.5	7.6	40.05	34	49
irencook	169	39.2	12	45.00	3.3	94
Herdin	12.0	2.6	8.4	30.30	42	80
Hertison.	11.0	28	14	4510	43	86
Henry	11.3	22	12	20.52	45	80
нужи	12.6	21.7	10.1	40.50	48	85
Hooking	12.8	21	10.1	40.17	41	46
Horas	19.9	30.7	10	4.60	28	50
Humon	11.7	20.4	10	en.38	8.1	90
Jackson.	124	30.2	7.6	30.79	84	67
Jefferson.	91.1	36.1	44	8430	6.6	40
Kires	10.2	38.2	8.4	4541	16	102
Late	10.0	24.7	6.4	49.20	43	Set .
Lawrence	13	31.6	82	6.08	68	
userg	10.8	347	1.0	cie	24	100
Lagers	71.6	28.6	1.6	0.0	15	80
Lowin	71.6	38.1	6.3	46.51	61	91
Lices	124	27.2	2.7	0130	44	91
Mediano.	11.6	20.0	67	4100	1.2	100
24.60.00.0	100	1		To the	1.1	-







#### **Key Findings**

- Counties with a high prevalence of diabetes (>12.6%) had high rates of physical inactivity prevalence (>30.3%).
   Similarly, most counties with lower rates of
- diabetes prevalence (<10.7%) had lower rates of physical inactivity in their counties (<24%)
- Choropleth maps visualizing the relation of healthcare access to diabetes prevalence show that counties with fewer insured adults had higher diabetes prevalence rates and vice versa.
- Increased poverty, unemployment, and poor education accounted for increased diabetes



2024: CDC 2024)

#### CONCLUSIONS

- The prevalence of diabetes is strongly associated with high level of physical inactivity, which can be worsened by health disparities and social determinants of health such as low income, limited education, unemployment, and inadequate access to healthcare. Studies have demonstrated that physical inactivity contributes to
- obesity and insulin resistance, two key pathways leading to the development of diabetes (Galaviz et al., 2018).
- uver-topment or utanetes (Galaviz et al., 2018).

  The spatial clustering of physical linactivity in specific Ohio counties highlights the barriers faced by these populations, such fewer recreational facilities, and less walkable environments. The trend aligns with the social gradient in health, as discussed by Bonaccio et al. (2020).
- tomaccos et al. (course).

  The spatial disparities uncovered in this study have important implications for public health policy and practice change in Obio, therefore beath programs that promote physicial activity should prioritized, especially in areas with prevalent disparities.

  This study was limited to 50 countries in Obio, hence future research should investigate all 80 counties. Additionally, further
- studies should investigate other SDOH factors such as food security, housing, and environment that were not included in this study.

#### REFERENCES

- REFERENCES

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### Female Breast Cancer Rates Among Different Ethnic Groups in Ohio: Spatial Epidemiology Analysis



Luke Jennings-Sanders, Weichuan Dong, PhD, Gautam Dagur, MD, PhD, Samudragupta Bora, PhD,

1. Student of University Hospitals Summer Student Research Program 2024

Health Services Research Center, University Hospitals Research & Education Institute, Case Western Reserve University, University Hospitals, Cleveland, Ohio

2. Department of Population and Quantitative Health Sclences, Case Western Reserve University School of Medicine, Cleveland, Ohio

#### Introduction

- Breast cancer is the most common cancer that women face in the U.S. <sup>1</sup>Female breast cancer cases are at the top of the list for new cancer cases in Ohio, with an age adjusted rate of 132.3 per 100,000 women<sup>1</sup>.
- From 2017 to 2021, there has been 50,357 new cases of female breast cancer in Ohio. In Cuyahoga County, there has been 5,934 new cases of female breast cancer.
- Understanding the disparities in morbidity and mortality rates among different ethnic groups is essential.
- This poster examines the differences in the morbidity and mortality breast cancer rates among women of different ethnic groups in the state of Ohio and Cuyahoga County.

#### Methods

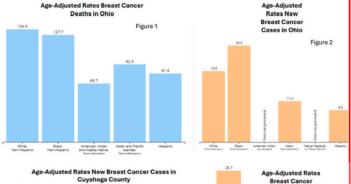
- Data for this study was obtained from the U.S. Cancer Statistics (USCS) Data Visualizations tool provided by Centers for Disease Control and Prevention (CDC) (https://gis.cdc.gov/Cancer/USCS/#/StateCountyTerritory).
- The USCS data tool was used to collect the rate of new cancers and the rate of cancer deaths across the entire state of Ohio and Cuyahoga County for the years 2017-2021.
- The USCS data tool was also used to compare mortality and morbidity rates among the following races: Caucasian, African American, Native American, Hispanic, Asian and Pacific Islander.
- Data was also obtained from Center for Disease Control(CDC) PLACES: Local Data for Better Health County Data 2023 and uploaded into the Tableau software to create a spatial map of the prevalence of cancer cases in all regions of Ohio.

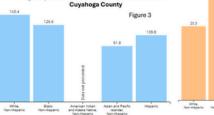
#### Objectives

 To compare and contrast morbidity and mortality breast cancer rates among women of different ethnic groups in Ohio. And Cuyahoga County

#### Findings

- In the entire state of Ohio, from 2017-2021 among Caucasian women, there were 43,318 new breast cancer cases and 6,973 cancer deaths. In Cuyahoga County, there were 4,043 new breast cancer cases and 648 cancer deaths.
- In the entire state of Ohio, from 2017-2021 among African-American women, there were 5,404 new breast cancer cases and 1,148 cancer deaths. In Cuyahoga County, there were 1,569 new breast cancer cases and 368 cancer deaths. <sup>1</sup>
- In the entire state of Ohio, from 2017-2021 among American Indian women, there were 64 new breast cancer cases and fewer than 16 cancer deaths. In Cuyahoga County, there were no new breast cancer cases and no deaths.  $^1$
- In the entire state of Ohio, from 2017-2021 among Asian and Pacific Islander women, there were 676 new breast cancer cases and 73 cancer deaths. In Cuyahoga County, there were 108 new breast cancer cases and no deaths. <sup>1</sup>
- In the entire state of Ohio, from 2017-2021 among Hispanic women, there were 642 new breast cancer cases and 70 cancer deaths. In Cuyahoga County, there were 169 new breast cancer cases and 16 cancer deaths. <sup>1</sup>





#### Conclusion

- There are considerable disparities in breast cancer morbidity and mortality rates among different ethnic groups in Ohio and Cuyahoga County.
- Caucasian women had the highest number of new cancer cases and deaths but a lower age-adjusted rate in cancer deaths when compared to African-American women.
- These findings highlight the need for preventative screening programs for African American women.
- It is also important to consider how African American women are less likely to be diagnosed at earlier stages due to poor insurance and access to healthcare<sup>2</sup>
- It is important to develop, implement, and evaluate programs that focuses on screening and treatment and recovery.

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- Institute; https://www.cdc.gov/cancer/dataviz, released in June 2024.(1)
- Borf. (2024, April 4). Black women and breast cancer: why disparities persist and how to end them. Breast Cancer Research Foundation. https://www.borf.org/blog/black-women-and-breastcancer-why-disparities-persist-and-how-end-them/
- Dashboards were assembled by first preparing the data using Tableau Prep Builder and then building the necessary views in Tableau Desktop (Tableau Software LLC)

#### Acknowledgements

This work was supported by the University Hospitals Health Services Research Center 2024 Summer Scholars Program.

Contact: Luke Jennings-Sanders



Constance Loring
Third Year
Ohio State University

"I chose to apply for this program because it was a unique opportunity in Health Services Research which encompasses more than just medicine. I want to become a doctor but this program appealed to me because it was also about social determinants of health, health disparities and more. I enjoyed this program greatly and think it will be applicable to my future career goals as I got exposure to the field of research but also was able to hear people in the medical field talk about their careers and share their paths to success. I also learned how to use Tableau and furthered my skills in Excel and presentations which I believe will be helpful for my continued studies and path to medicine. I am very grateful to have been a part of this Health Services Research Program. "

#### Association between Diabetic Prevalence and Food Desert Prevalence Across US Counties using Spatial Epidemiology

Constance Loring<sup>a,</sup> B.S. Candidate, Gautam Dagur<sup>a,b</sup>, MD, Ph.D., Weichuan Dong<sup>c</sup>, Ph.D.

<sup>®</sup>Health Services Research Center, University Hospitals Research & Education Institute, <sup>®</sup>Case Western Reserve University, University Hospitals, Cleveland, Ohio, <sup>®</sup>Department of Population and Quantitative Health Sciences, Case Western Reserve University School of Medicine, Cleveland, Ohio

University Hospitals
Research & Education Institute
Cleveland I Ohio

#### troduction

#### Background

- A total of 11.6% of the US population has diabetes and the prevalence of diabetes increased significantly in adults 18 years or older from 2001 to 2020.
- Diabetes is the eighth leading cause of death in the U.S. and non-metropolitan areas have a higher diabetic prevalence.<sup>1</sup>
- Food deserts can be classified following multiple parameters which differentiate by distance to a supermarket in rural and urban communities and income levels.<sup>3</sup>

#### hiectives

- To determine if there is a relationship between food desert prevalence and diabetic prevalence.
- To discover patterns in diabetic prevalence and food desert prevalence across all U.S. counties.
- To identify counties of the most concern across the United States due to high diabetic and food desert prevalence.

#### Materials & Methods

#### Research Design

- Cross-sectional spatial epidemiology study conducted in Tableau Desktop<sup>4</sup> cross referencing county data for diabetes and food deserts across the United States.
- Included all people who responded to the US census in 2010 and accounted for the 2015 CDC diabetes atlas.<sup>3</sup>

#### iabetic Prevalence

- Accessed 2019 County Health Rankings Data and extracted state, county, and diabetic prevalence data from the studies additional measure data.<sup>2</sup>
- Diabetic prevalence is the percentage of adults age 20 or older with diabetes and it is age adjusted.<sup>2</sup>

#### Food Desert Prevalence :

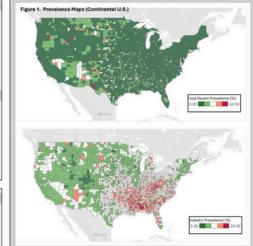
- Accessed the Food Access Research Atlas from 2019 from the USDA and extracted data on state, county, total population, and low access and lowincome populations.<sup>3</sup>
- The data used was based on the 2010 census.<sup>3</sup>
- Converted population counts into percentages based on population total at the time of study.

#### Eligibility Criteria for Food Desert:

- Population had to be 1 mile from a supermarket in urban areas and 10 miles away from a supermarket in rural areas.<sup>3</sup>
- Population had to be of low income as defined by the Food Access Research Atlas.<sup>3</sup>

#### High Concern Counties:

- Analyzed the top 100 counties with the highest diabetic prevalence and the top 100 counties with the highest food desert prevalence.
- Identified the top five counties that appeared in the top 100 search for both variables.



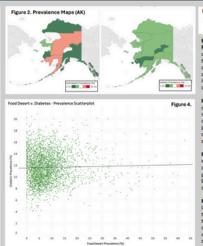




Figure Keys:
Figure 1. Amap of the U.S.
divided by county showing
food desert prevalence, on
a 5-step scale followed by
an identical map which
illustrates the prevalence of
diabetes on a 5-step scale.

Figure 2. View of Alaska divided by county, with food desert prevalence mapped on the left and diabetic prevalence mapped on the right. Both maps follow the same scales as Figure 1.

Figure 3. View of Hawaii with food desert prevalence on the left and diabetic prevalence on the right. Both maps follow the same scales as Figure 1.

Figure 4. Scatterplot with a line of best fit measuring the relationship between food desert prevalence and diabetic prevalence by county. A slightly upward stoping trend is visible.

Dank	Country	Chaha	Food Desert Prevalence %	Dishada Bassalanas M
	County	State	Food Desert Prevalence %	Diabetic Prevalence %
1	Taliaferro	Georgia	47.43%	17.5%
2	Tensas	Louisiana	38.90%	17.6%
3	Bullock	Alabama	32.34%	20.09
4	Hancock	Georgia	29.73%	18.0%
5	Perry	Alabama	27.85%	20.1%

Table 1. Represents the 5 counties of the greatest concern across the U.S. due to being in the top 100 for both food desert prevalence and diabetic prevalence, in descending order by food desert prevalence.

#### Results

- A high prevalence of food deserts did not correspond to a high prevalence in diabetes, due to a weak correlation (Figure 3).
- The epidemiological study highlighted some areas of concern for both diabetes and food deserts (Figure 1) but the correlation across all U.S. counties was not strong enough to generalize a direct relationship (Figure 3).
- Despite the high diabetic prevalence spanning across the Appalachian Mountains, high food desert prevalence did not have a trend in location.
- The counties with the highest prevalence in diabetes and in food deserts varied greatly with only 5 counties appearing in the top 100 for both factors (Table 1).

Contact Constance Loring Email: Co

Email: Contact UH Health Services Research Center for contact information

#### Conclusions

A correlation between food deserts and diabetes cannot be supported.

counties with a low prevalence for both factors or the inverse.

- Counties and regions across the U.S. facing the issues of food deserts or diabetes independently can be visualized in the maps.
- As an ecological study, the people who had diabetes were not necessarily those
  affected by food deserts which is a limitation worth further consideration.
- affected by food deserts which is a limitation worth further consideration.

  Further study is needed to account for the limitations including accounting for demographics and confounding factors and investigating the characteristics of
- Further investigation should continue to identify risk factors for diabetes and make advancements to limit the prevalence of this deadly and prominent disease.

#### References

\*\*Centers for Disease Control and Prevention, (2024, May 15), National Diabetes Statistics Report. Centers for Disease Control and Prevention, seem one control abstract-biolistate.

\*County Health Rankings & Roadmage. (2019). 2019 County Health Rankings National Data (Data set). County Health Rankings. https://www.countyhealthrankings.org/health-data/methodology-and-sources/data-documentation/national-data-documentation.20 2022

\*Economic Research Service (ERS), U.S. Department of Agriculture (USDA), (2021), Food Access Research Atlas Data Download 2019() set). Epod Access Research Atlas, https://www.ers.usda.gov/data-products/food-access-research-atlas/

Acknowledgements

This work was supported by the University Hospitals Health Services Research Center 2024 Summer Scholars Program



Vedant Natarajan 12th Grade Highland High School

"I chose to apply for the University Hospitals summer research program because of my deep interest in advancing public health through evidencebased research. The opportunity to work on a research project aligned perfectly with my passion for understanding and addressing health disparities. Throughout the program, I gained invaluable skills in research methodologies and data analysis, which will significantly benefit my future coursework and career in public health. Overall, the program exceeded my expectations, providing a comprehensive and hands-on learning experience. I am truly grateful for the opportunity to participate and for the insights and connections that will undoubtedly shape my future endeavors."



# Geographic Analysis of High Blood Pressure Prevalence Rates in Ohio



#### Vedant Natarajan<sup>1,</sup> Gautam Dagur<sup>1</sup>, Weichuan Dong<sup>2</sup>

1 Health Services Center, University Hospitals Research & Education Institute, Case Western Reserve University, University Hospitals, Cleveland, Ohio

<sup>2</sup>Department of Population and Quantitative Health Sciences, Case Western Reserve University School of Medicine, Cleveland Ohio

#### ntroduction

- In Ohio, 34.5% of adults have been diagnosed with hypertension.<sub>3</sub>
- 1/3 of adults who have hypertension remain undiagnosed.<sub>3</sub>
- Limited data exists regarding the geographic distribution of high blood pressure prevalence rates across Ohio, particularly in understanding the disparities between urban and rural regions.
- This study utilizes cross-sectional data to examine the spatial patterns of HBP prevalence rates across counties in Ohio.

BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (upper number)		DIASTOLIC mm Hg (lower number)
NORMAL	LESS THAN 120	and	LESS THAN 80
ELEVATED	120 - 129	and	LESS THAN 80
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130 - 139	or	80 - 89
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	140 OR HIGHER	or	90 OR HIGHER
HYPERTENSIVE CRISIS (consult your doctor immediately)	HIGHER THAN 180	and/or	HIGHER THAN 120

### Figure 1: Healthy and Unhealthy blood pressure ranges (Curre Definition/Framework)<sub>2</sub>

#### Objectives

 To identify the prevalence of high blood pressure across counties in Ohio into high and low prevalence regions.

#### Methodology/Materials

#### Data Collection

 Source: High blood pressure prevalence data and population data from PLACES: Local Data for Better Health, Place Data 2023 where the CDC defines high blood pressure as having a systolic mm Hg of 130 or higher and a diastolic mm Hg greater than 80,

#### Prevalence Mapping:

 Mapped using a blue-red color gradient: dark blue (low prevalence) to dark red (high prevalence) with data values included.

#### Geographic Information System (GIS) Mapping:

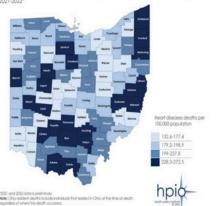
· Software: Tables

 Visually represent spatial distribution of HBP prevalence across Ohio counties.

## Figure 3: Heart Disease Death Rate Among Working-Age Ohioans,

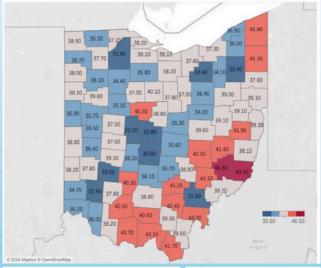
#### Heart disease death rate among working-age Ohioans, by county

Age-adjusted rate of heart disease deaths, per 100,000 population, for Ohioans ages 15-64,



#### Results

Figure 4: High Blood Pressure Prevalence in Ohio Counties with a systolic mm Hg of 130 or higher and a diastolic mm Hg greater than 80



#### Conclusion

 The prevalence map shows a wide range of high blood pressure rates across Ohio counties, indicating significant variability without a clear regional pattern.

•The data may be inaccurate due to non-response, as many high blood pressure cases are likely unreported and not captured in the database.

 Future actions should focus on increasing screenings and investigating different populations to lower the overall prevalence of high blood pressure in Ohio.

#### References

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- American Heart Association. \*Understanding Blood Pressure Readings.\* Americ Heart Association, 17 May 2004, worst-heart single-othealth suprachings blood: pressure-in-devisitanting blood pressure medings.
   PLACES: Local Data for Better Health, Place Data 2023 Release | Data | Center

#### Acknowledgements

This work was supported by the University Hospitals Health Services Research Center 2024 Summer Scholars Program.



Amanda Turner Second Year Xavier University

"I chose to apply to the University Hospitals Health Services Research Center Summer Scholars Program because as an undergraduate student pursuing a job in the medical field. I wanted to learn more about health services research. I was able to do this in the program through my own research project and hearing from current doctorate-level researchers. Overall the program was an excellent way to be introduced to research by learning crucial skills and knowledge about research in general. Furthermore, I was also able to develop my own research question, use current data to create results, and express them through a poster. I am very grateful to have been a part of this program's first cohort and thankful for the mentorship and support I received from all the people involved."



# Human Papillomavirus Vaccination Coverage in Adolescents Across the United States Based on Political Demographics

University Hospitals Research & Education Institute

Amanda Turner, BS Candidate 1; Gautam Dagur 1, MD, PhD; & Weichuan Dong 2, PhD

1. Health Services Research Center, University Hospitals Research & Education Institute, Case Western Reserve University University Hospitals. Cleveland Ohio, 2, Decertment of Population and Quantitative Health Science

#### ackground

- Adolescents who do not receive the human papillomavirus (HPV) vaccine and engage in sexual activity risk developing genital warts, genital/anal cancers, and head/neck cancers (in males and females).<sup>1</sup>
- Recieving the vaccine as a teen or preeteen is crucial because approximately 85% of people are infected with HPV in their life.<sup>2</sup>

#### Objectives

- To identify the rate of change for vaccination coverage in adolescents (13-17 years old) over 2008, 2012, 2016, and 2020.
- To access the role of political affiliation on HPV vaccine coverage, as represented by three states (Democratic, Republican, and swing state).

#### Method

#### Research Design:

- · Cross-sectional analysis
- Data obtained from CDC Vaccination Coverage among Adolescents (13-17) (2023).<sup>3</sup>
- Rate of change between two years was identified and maps of the contiguous United States were generated using Tableau Desktop software version 2024.1 (Tableau Software).
- Data was also used to create three maps of California, Wisconsin, and Mississippi over the years of 2008, 2015, and 2022.



# 200.5 200.6 210.1 176.8 77.2 353.8 183.3 1

Figure 2. Rate of Change in HPV Vaccination from 2008-2012

Figure 3. Rate of Change in HPV Vaccination from 2012-2016

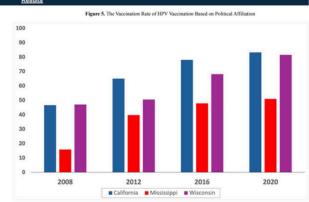


Figure 4. Rate of Change in HPV Vaccination from 2016-2020



Contact Details: Amanda Turner Twitter @Amanda Turner?

ion Mayo Clinic https://www



#### Key Findings

- The average across all three of these timepoints shows an increasing trend of HPV vaccination across the United States (Figure 2-4).
- Regardless of the political affiliation an increasing trend is seen in HPV vaccination rate across California, Mississippi, and Wisconsin (Figure 5).

#### Conclusion

- A decrease in the HPV vaccination rate of change was noted in each of the time points assessed.
- Overall the rate of vaccination has increased across the United States between 2008 and 2020.
- Given the limited amount of data political affiliation may not play a major role in vaccination coverage.
- Future studies should take into consideration political affiliation, geographical demographics, and other psychosocial characteristics at a county level to assess HPV vaccination coverage.
- Lastly, HPV vaccination coverage should be compared to other vaccination coverage against the previously mentioned variables.

Acknowledgement: This work was supported by the University Hospitals Health Services Research Center 2024 Summer Scholars Program.



college. I was

policy affects

interested in learning

healthcare outcomes.

My class had a great

diversity of thought,

with high schoolers,

undergraduates, and

medical students all

working on projects.

Being in this group

allowed me to learn

from my mentors and

peers. I am honored

to have been a part of

this program because

complete research while also hearing from medical

professionals in my field of interest "

I was able to

about how public

Madeline Turner 12th Grade Magnificat High School



# Spatial Disparities in Obesity and Diabetes Outcomes and SNAP Benefits Correlation in Ohio Counties

Madeline Turner<sup>1</sup>; & Gautam Dagur<sup>1</sup>, MD, PhD, Weichuan Dong<sup>2</sup>, PhD

1. Department of Population and Quantitative Health Sciences, Case Western Reserve University School of Medicine, Cleveland, Ohio; 2 Health Services Research Center, University Hospitals Research and Education Institute, Case Western Reserve University, University Hospitals, Cleveland, Ohio



- Obesity is having body mass index (BMI) of 30.0 or higher and is a prevailing issue affecting over 40% of the U.S. population.2
- Obesity has detrimental health implications including heart disease, diabetes, high blood pressure, high cholesterol, liver disease, sleep apnea and certain cancers.
- The Supplemental Nutrition Assistance Program (SNAP) is a form of food security benefits that allots low-income families a budget for groceries.4

To identify and evaluate spatial disparities in obesity and diabetes outcomes within Ohio counties

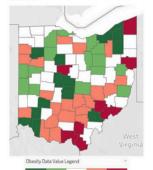
To consider the correlation between obesity/diabetes outcomes with the receipt of SNAP benefits

To examine similarities in spatial distribution and prevalence of obesity and diabetes outcomes

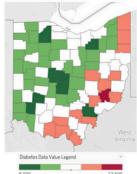
#### Research Design:

- Cross-sectional analysis (data from
- Data taken from CDC Places (2023)<sup>3</sup> put into Tableau software to create maps of the state of Ohio on the county level
- Two maps created; one to show obesity prevalence by county, one to show diabetes prevalence by county
- Data taken from the United States Census Bureau was used to find Ohio counties with the highest prevalence of SNAP recipients (2022)1 in order to compare to the maps
- · 3 tables were created to compare and contrast the three variables (SNAP, Obesity, Diabetes)
- · Data is limited due to different years from the data sets; SNAP data from 2022, Obesity/Diabetes data from 2023

#### Figure 1: Ohio Obesity Prevalence by County



## Figure 2: Ohio Diabetes Prevalence by Count



# able 1: Top 10 Counties

County	SNAP Prevalence
Erie	44.90
Cuyahoga	44.87
Montgomery	44.15
Lucas	43.89
Mahoning	43.82
Lake	43.55
Hamilton	43.14
Summit	43.02
Hancock	42.98
Trumbull	42.21

# Table 2: Top 10 Counties

County	Obesity Prevalence
Scioto	47.3
Jackson	47.0
Lawrence	47.0
Marion	46.5
Ashtabula	45.6
Columbiana	45.5
Morgan	45.3
Washington	45.2
Muskingum	44.6
Fairfield	44.4

# able 3: Top 10 Counties

County	Diabetes Prevalence
Noble	17.6
Morgan	15.8
Meigs	15.7
Vinton	15.7
Pike	15.4
Scioto	15.4
Trumbull	15.2
Adams	15.1
Guernsey	15.1
Monroe	15.1

#### **Key Findings:**

- · Overall, disparities of both obesity and diabetes were evident in the southeast regions of Ohio. o The counties there both yielded the highest percentages of both health outcomes and therefore are the most red areas.
- · Adversely, diabetes prevalence is seen far less in counties in the northwest region of Ohio. This can be seen less in obesity outcomes as there are more red counties in that region.
- . Figure 1 shows a higher standard deviation than Figure 2 due to a visual apparency that there are more dark red and dark green counties on the map.
- . Figure 2 yields a more consistent distribution of high and low prevalence then Figure 1.
- Tables 2 and 3 show that Scioto and Morgan county were common counties for high prevalence in both diabetes and obesity.
- . Tables 1 and 3 show that Trumbull county was a common county for high prevalence in SNAP recipients and diabetes.

- · Similar geographic locations of high prevalence of diabetes and obesity demonstrate a correlation between the two outcomes
- · Due to the only connection between SNAP and diabetes prevalence being Trumbull county, it is unlikely there is a direct correlation between
- · For future studies it would be beneficial to evaluate other forms of food security benefits such as child nutrition programs to see if there is any links between them and diabetes and obesity related health outcomes
- · More data is needed to evaluate direct correlations because the data in this study is superficial.

#### **Contact Details:**

Madeline Turner

- Bureau, U. S. C. (n.d.). Food Stamps/Supplemental Nutrition Assistance Program (SNAP). Explore census data. https://data.census.gov/ali7q-SNAP
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Xiuyi Zhao 12th Grade Solon High School

"I applied to the program because the program would benefit me in the long run. As I will be applying to schools for biology, I wanted to take the pre med track and felt the program could get me a start with that. The program helped me learn how to do research, and provided me information about the medical field."



#### Impact between Asthma and Air Pollution in California

Xiuyi Zhao (1), Gautam Dagur, MD, PhD (2), Weichuan Dong, PhD (3)



Solon High School, Solon, Ohio;
 Health Services Research Center, University Hospitals Research & Education Institute, Case Western Reserve University, University
Hospitals, Cleveland, Ohio
 Department of Population and Quantitative Health Sciences, Case Western Reserve University School of Medicine, Cleveland, Ohio;

Acknowledgment: "This work was supported by the University Hospitals Health Services Research Center 2024 Summer Scholars Program."

#### **Introduction**

- Asthma is a chronic respiratory condition characterized by inflammation and narrowing of the airways, leading to symptoms such as wheezing, coughing, chest tightness, and shortness of breath
- It can range from mild to severe and is often triggered by allergens, respiratory infections, exercise, and environmental factors
- Air pollution refers to the presence of harmful or excessive concentrations of pollutants in the air.
   These pollutants can include particulate matter (PM), ozone (O3), nitrogen dioxide (NO2), suffur dioxide (SO2), carbon monoxide (CO), volatile organic compounds (VOCs), and heavy metals
- Sources of air pollution include industrial emissions, vehicle exhaust, agricultural activities, and natural sources like wildfires
- Air pollution severely worsens asthma symptoms and increases the risk of developing asthma
- Pollutants trigger the airways, trigger inflammation, and make individuals have a significant increase to obtain respiratory infections. Long-term exposure to air pollution has been linked to the development and worsening of asthma, particularly in urban areas with high pollution levels

#### **Aims**

- To investigate the impact of air pollution on the incidence of asthma
- Strategies to prevent Asthma and reduce air pollution

#### Methods

- Researching for data on populations affected in California and Hawaii
- "using Tableau Desktop software version 2024.1 (Tableau Software)"
- Searching and collect research articles on PubMed

#### **Results**

- One of the most populated states-California, California faces significant air pollution challenges due to industrial activities, traffic, and geographical factors <sup>1,2,3,4</sup>
- Therefore California has a high prevalence of asthma, particularly in urban areas with poor air quality

#### **Conclusion**

- There is clearly a need to augment epidemiologic studies
- Use experimental studies to clarify how air pollution impacts asthma, identify vulnerable populations to better understanding of the complex interactions between environmental factors and asthma
- The need to Develop strategies for reducing pollution-related asthma
- In contrast, one of the least polluted states- Hawaii, benefits from its remote location in the Pacific Ocean, leading to cleaner air quality compared to mainland states, therefore the prevalence of Asthma is lower compared to states with higher pollution levels

# California Banda B

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Pollution San Jose, CA vs Honolulu, HI

Last Update:

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May 2024

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