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Extended Abstract: An Empirical Study Reviewing Occupational Exposure Leading to Lung Related Diseases and COVID-19 Incidences in Louisiana Parishes

[1] Dasgupta P., [2] Roy D., [3] Kuhn L, [1] Massawe E, [1] Perrone J.

[1]Department of Industrial & Engineering Technology, Southeastern Louisiana University, Hammond, LA

[2] Department of Biological Sciences, Alcorn State University, Lorman, MS

[3]Department of Mathematics, Southeastern Louisiana University, Hammond, LA

Corresponding author's Email: priyadarshini.dasgupta@selu.edu

Author Note: Dr. Priyadarshini Dasgupta is an Assistant Professor in Occupational Safety, Health, and Environment in the Department of Industrial Technology at Southeastern Louisiana University in Hammond, LA. Her research interests are the physical exposures in construction, ergonomic solutions, occupational health and safety, and behavioral safety.
Dr. Debarshi Roy is an Assistant Professor in the Department of Biological Sciences at Alcorn State University, Lorman, MS. His research interests include cancer biology, metabolic disorders, and health disparity. Dr. Roy is supported by the Mississippi INBRE, an Institutional Development Award (IDeA), Grant No. NIH P20GM103476.
Dr. Lisa Kuhn is an assistant professor in the Department of Mathematics at Southeastern Louisiana University in Hammond, LA. Mr. J. Perone is an undergraduate student at Southeastern Louisiana University in Hammond, LA

Abstract:
Per the Louisiana Department of Health, mesothelioma and asbestos related deaths are higher than the national average (https://ldh.la.gov/Coronavirus/ accessed 11_17_2021). Occupational exposure to various chemicals in different industries including, petrochemical, construction, plumbing, manufacturing etc. can lead to lung cancer and even mesothelioma. Louisiana has a comparatively higher fatality rate (66.6 in 100,000 people) than the USA national average (58.7 in 100,000 people) for lung cancer and other lung related disorders. Louisiana's five Mississippi River Ports together, make the largest port complex in the world. These ports and waterways carry a quarter of the nation's waterborne commerce including half of the nation's grain, and nearly a quarter of the nation's coal. They allow connection to major industries, such as agriculture, manufacturing, transportation/warehousing, mining, and oil/chemical. Unfortunately, these industries brought about most occupational exposure sources. However, there is no existing data source that accurately tracks the location of high-risk parishes and the predominant occupations in those parishes. Therefore, the aim of this study is to analyze the route of occupational exposure of asbestos or other lung related carcinogens in Louisiana which would help in exposure mitigation.

Methods: Statistical data on asbestos related deaths were compiled from CDC's WONDER database (URL: https://wonder.cdc.gov/), Louisiana Department of Health Report Card, Louisiana cancer registry, COVID-19 figures were compiled from Louisiana Departments of Health.

Results: Higher prevalence of lung related diseases are present surrounding the Mississippi River, north of Baton Rouge, and down to the Mississippi Delta, entering the Gulf of Mexico: the well-known "Cancer Alley" of Louisiana (name the parishes here). Our preliminary findings indicate the association of higher number of COVID-19 incidences and increased rate of lung related disorders (including lung cancer, COPD, mesothelioma etc.) in the same parishes. These findings point to causation of vulnerable lungs of individuals with an increased risk of other respiratory diseases.

Future work: Certain demographics such as age, race, income and additionally diet and nutrition related data would be assessed to find trends with chronic respiratory illnesses. Comparative analysis of these findings with geographic location including cover fatality rate (at those locations) may lead to find links that will help in earlier detection and screening processes on specific individuals.

Keywords: Louisiana Parishes, Cancer, COVID-19

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1. Introduction

Evidence in the literature shows that Louisiana's "cancer alley" is predominant with different oil and gas sites (Marquès et.al., 2020). Efforts have been made to find and correlate lung carcinogens with the type of cancer in cancer alley (Lin et.al., 2018). "Cancer alley" refers to the geographical area along the Mississippi River between Baton Rouge and New Orleans, which contain a multitude of industrial plants (Singer et.al.,2011). This area has more clusters of cancer patients than anywhere else in the state and therefore has been the topic of discussion for health workers and policy makers for a long time. Problems began in the late 1980's to early 1990's when residents began to notice an abundance of cancer cases within their communities in this area. In 2020, the EPA's Toxic Release Inventory Program data showed that Louisiana ranked second throughout the nation for total onsite releases and fourth for total on and offsite releases. Seven out of the ten plants in the state of Louisiana with the largest combination of on and offsite releases are located in Cancer Alley, and four out of ten plants with the largest onsite releases in the state are located there as well (Singer et.al.,2011). Recent COVID-19 pandemic has significantly impacted the population residing in the "cancer alley" with higher incidences and fatality. It is to be noted that patients detected with lung cancer are experiencing higher morbidity and mortality due to COVID-19 pandemic compared to the general population (Passaro et.al., 2021).

1.1 Parishes that have high COVID-19 related fatality

Strong evidence is yet to be established about the correlation of lung cancer with potential environmental carcinogens in Louisiana. Lack of properly controlled study, absence of health data in census tract level in the state have significantly made roadblocks in the research to investigate the impact of various carcinogens and their effect on human health in Louisiana in the past. Importantly, lung cancer is the leading cause of cancer related mortality in Louisiana. Louisiana's high lung cancer rate and poor cancer mortality rate trigger the urgency to find out the source of exposure to this deadly disease. There is a strong need to find out the presence of environmental factors in "cancer alley" which trigger higher incidences of cancer affecting both black and white populations and also impacting the unequal distribution of COVID-19 related fatalities in this region compared to the rest of the state.

2. Method

There are several ways in which the data was retrieved. We have used public databases and Government websites for collection of different data associated with cancer cases, mortality etc. We mined the COVID-19 data throughout the state of Louisiana. The website shows overall COVID-19 incidences and deaths for each parish in the state. This site also shows the growth of the COVID-19 rate inside each parish in different time points (TownCharts (2021), https://www.towncharts.com/Louisiana/Louisiana-zipcode-index-Economy-data.html)).

3. Tables

Table 1. Parishes with the highest lung cancer cases in Louisiana.

Parishes with highest lung cancer rates	Rates per 100,000 population	Primary Occupation
Bossier	**53.8**	**sales/office-administrative**
De Soto	**50.8**	**legal/medicine**
Iberville	***52.3***	**office and admin/healthcare**
St Bernard	**53.0**	**office/sales/construction**
St Landry	**50.1**	**office/sales/construction**
St. Martin	**50.0**	**office/sales/production**
St. Tammany	**50.1**	**sales/management/office**
Vernon	**63.5**	**office/sales/construction**

Washington	**51.8**	**office /sales/construction**
West Baton Rouge	**50.5**	**office/construction/production**
Vermillion	**49.7**	**office/construction/sales**
Terrebone	**49.6**	**sales/office/food preparation**

Table 2. Parishes with highest COVID-19 cases in Louisiana. Common parishes between Table 1 and 2 have been in Italics.

Parishes with highest COVID-19 rates	Rates per 100,000 population	Primary Occupation
Ascension	969.95	office/sales/management
Livingston	926.92	office/sales/construction
St Charles	879.47	management/office/sales
St James	857.98	office/manufacturing/material handling
St John the Baptist	744.68	office/sales/construction
St Mary	873.39	sales/production/office-administrative
St Tammany	711.93	sales/management/office
Tangipahoa	1121.27	office/sales/food preparation
Vermillion	786.41	office/construction/sales
West Baton Rouge	869.07	office/construction/production
East Feliciana	1024.3	office/sales/management
Iberville	722.83	office and admin/healthcare

Table 3. Correlation calculation between parishes of cancer alley with COVID-19 cases/100,000 population and occupation (office/administration Correlation is calculated by Spearman's rho test significant at 0.01(*) and 0.05 (**) level.

CORRELATION

	Covid cases/100,000	Cancer alley	Office/administration
Cancer alley	0.793 **	1	.431*
Covid cases/100,000	1	0.793 **	0.487 *
Office/administration	0.487 *	0.431 *	1

4. Conclusion/Future Direction

Our analysis indicates that there is an increased occurrence of COVID-19 cases in the parishes located in and around cancer alley. These parishes are also suffering with higher incidences of lung cancer cases as well. A positive correlation indicates that parishes in "cancer alley" are more prone to experience increased COVID-19 incidences compared to "non-cancer alley" parishes. Interestingly, we also found that the population employed in office/ administration related jobs are correlated to

COVID-19 incidences compared to other common professions in the cancer alley. Future studies will include collection and analysis of samples related to our study along with population-based surveys in the selected parishes.

5. References

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