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14 January 2021
Fall 2021 Provost Fellowship
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EMS Diversions and the Impact of COVID-19 on Magnifying Healthcare Disparities

Abstract: The objective of the project is to examine if EMS diversions have disproportionately affected minority populations during the COVID-19 pandemic, contributing to healthcare inequity and inequality for minority groups within the United States.

Introduction: EMS diversions are often used by hospitals as a tool to mitigate Emergency Department (ED) crowding, meaning healthcare facilities will generally not accept new ambulance arrivals until patients can be safely received by the ED. This tactic disproportionately affects minorities[1], which poses an issue since ED visits are often the first point of contact for minority populations in receiving medical care. The COVID-19 pandemic has pushed hospital capacities past their normal limits, leading to restricted access for many Americans in receiving ED care[2]. EMS diversions have likely been exacerbated by the COVID-19 pandemic, leading to heightened disparities for minority populations. This puts minority groups in a precarious situation where they are less likely to receive emergency care during a crisis where resources are already severely limited.

Utilizing 2020 annual utilization reports released by the California Office of Statewide Health Planning and Development (OSHPD), data regarding total EMS diversion hours was gathered for major hospitals across California. Using the U.S. Census Bureau QuickFacts database, percentages were gathered for the White population, persons in poverty, persons with disability, and persons without health insurance for the cities in which the hospitals were located. Within the context of the project, hospitals are considered minority serving if the city in which a hospital is located has a White population lower than 50 percent. Performing a cross analysis of the two datasets, we could determine if EMS diversions were disproportionately utilized by hospitals serving minority populations during the COVID-19 pandemic. Percentages regarding persons in poverty, persons with disability, and persons without health insurance were gathered to determine if minority populations experienced greater risk factors that would impede their ability to receive healthcare alongside the issue of EMS diversions. Graphs were created exhibiting any trends found, with previous literature being reviewed to determine if current trends are representative of previous research on EMS diversions and their effect on minority populations.

Data & Calculations: Data on 145 hospitals was gathered, with 50 hospitals being designated minority serving (color-coded on the graphs as orange) with the remaining 95 designated non-minority serving (color-coded on the graphs as blue). Four graphs were created, showing the

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[1] "California Hospitals Serving Large Minority Populations Were More Likely Than Others To Employ Ambulance Diversion" (2012): California Hospitals Serving Large Minority ... - Health Affairs
[2] "Hospital Utilization During the Pandemic: An Update" (2021): https://ehrn.org/articles/hospital-utilization-during-the-pandemic-an-update

connection between each hospital and total EMS diversion hours (Figure 1), persons in poverty (Figure 2), persons with disability (Figure 3), and persons without health insurance (Figure 4). For each graph, a trendline and associated coefficient of determination (R^2) was created to determine any relation between variables.

Results & Conclusion: The trends represented on the graphs showed that there was small but noticeable positive association between minority serving hospitals and the usage of EMS diversions (Figure 1). Additionally, a similar positive association could be seen between persons in poverty/persons without health insurance and minority populations (Figures 2 and 4). However, a negative correlation could be seen between minority populations and persons with disability (Figure 3), a surprising trend considering minority groups tend to suffer from higher instances of disability stemming from low socioeconomic status[3]. These results show that minority populations experienced slightly higher instances of EMS diversions during the COVID-19 pandemic, with those same populations having slightly increased risk factors associated with poverty and lack of healthcare.

While a definite association cannot be determined from the results of the project accounting for the extremely low R^2 in all the graphs, the project contributes to the established literature which shows that minority groups such as African Americans have higher mortality rates for severe, life-threatening conditions such as acute MI due to EMS diversions[4]. Furthermore, hospitals serving minority populations are more likely to utilize EMS diversion to circumvent high patient volumes, which is associated with poorer access to life-saving treatment and worse long-term outcomes[5]. Considering that minority populations are disproportionately burdened by COVID-19-related outcomes due to underlying socio-structural determinants of health which make it difficult to receive and continue medical treatment[6], diversions either directly or indirectly support the inherent health disparities minority populations endure in the United States.

Reflection: This project showed the importance of adapting to the available information, as out of the original 320 hospitals in the annual utilization reports, only 145 had usable statistics regarding total EMS diversion hours and the analyzed demographic data. This limited the scale of the project, potentially skewing the statistical relationship between minority serving hospitals and the prevalence of EMS diversions. This can be seen with the extremely low R^2 in all the figures, showing that there was a low association between the graphed variables. Additionally, this project showed the importance of narrowing one's scope when performing a research study. The datasets provided numerous healthcare statistics that would have been interesting to examine, however doing so would have not been feasible in the span of one semester. Overall, the project allowed me to investigate a subject that I feel is often overlooked when discussing the U.S. healthcare system, establishing a basis in which further research could be conducted to improve public access to healthcare.

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[3] "Racial/Ethnic Disparities in Disability Prevalence" (2015): https://link.springer.com/article/10.1007/s40615-015-0182-z

[4] "Impact Of Ambulance Diversion: Black Patients With Acute Myocardial Infraction Had Higher Mortality Than Whites" (2017): https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2016.0925

[5] "Do patients hospitalized in high-minority hospitals experience more diversion and poorer outcomes? A retrospective multivariate analysis of Medicare patients in California" (2016): https://bmjopen.bmj.com/content/bmjopen/6/3/e010263.full.pdf

[6] "COVID-19 and Racial/Ethnic Disparities" (2020): JAMA. 2020;323(24):2466-2467. doi:10.1001/jama.2020.8598

Addendum

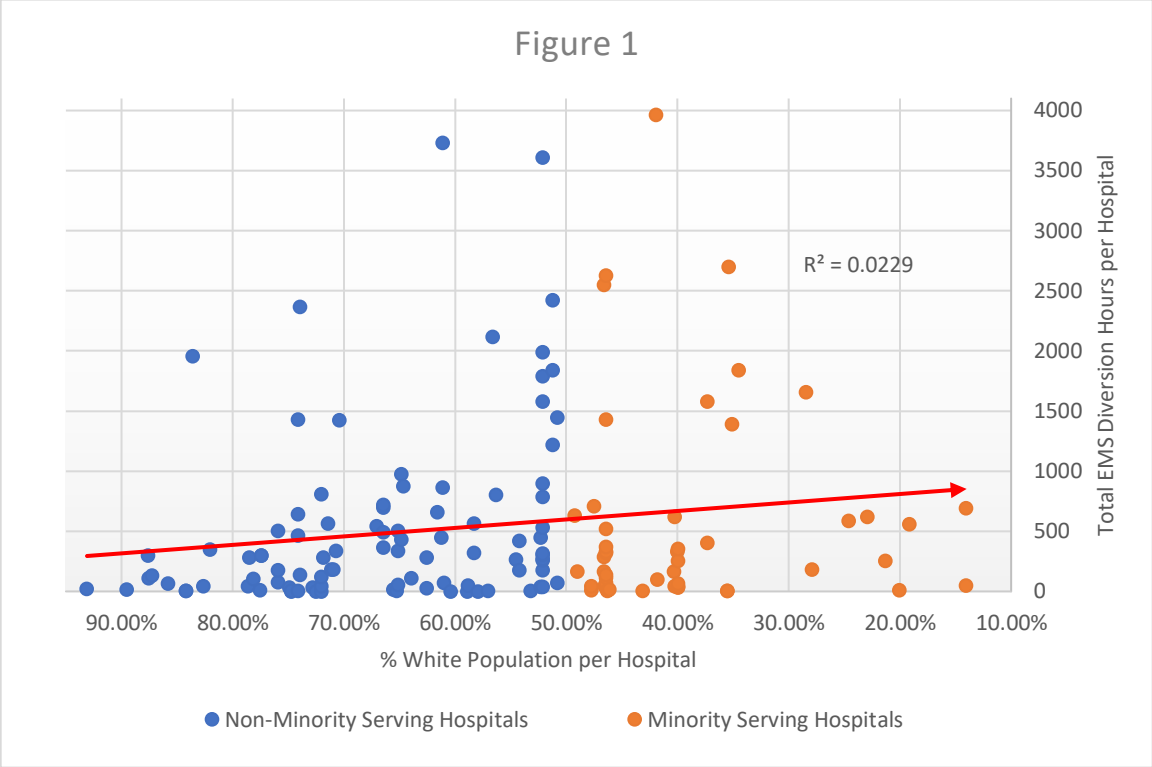
Figure 1
4000
3500
3000
2500
2000
1500
1000
500
0
Total EMS Diversion Hours per Hospital
R² = 0.0229
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
% White Population per Hospital
Non-Minority Serving Hospitals
Minority Serving Hospitals

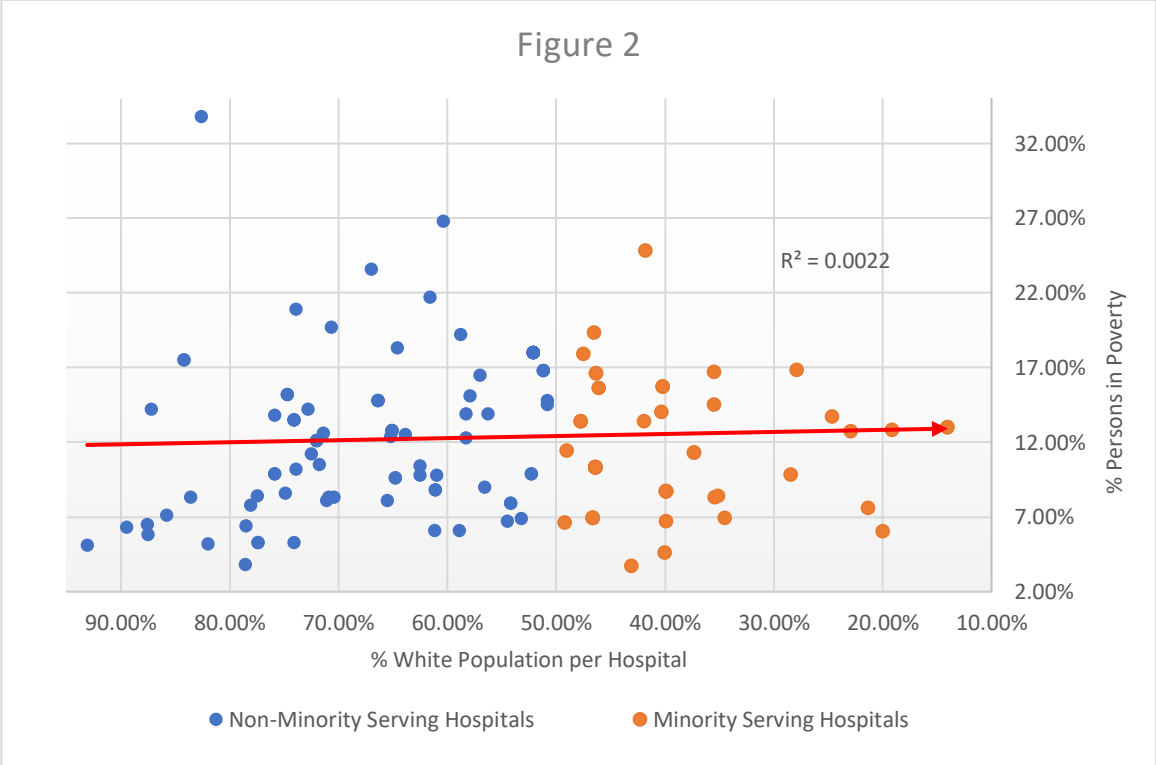
Figure 2
32.00%
27.00%
22.00%
17.00%
12.00%
7.00%
2.00%
% Persons in Poverty
R² = 0.0022
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
% White Population per Hospital
Non-Minority Serving Hospitals
Minority Serving Hospitals

Figure 3

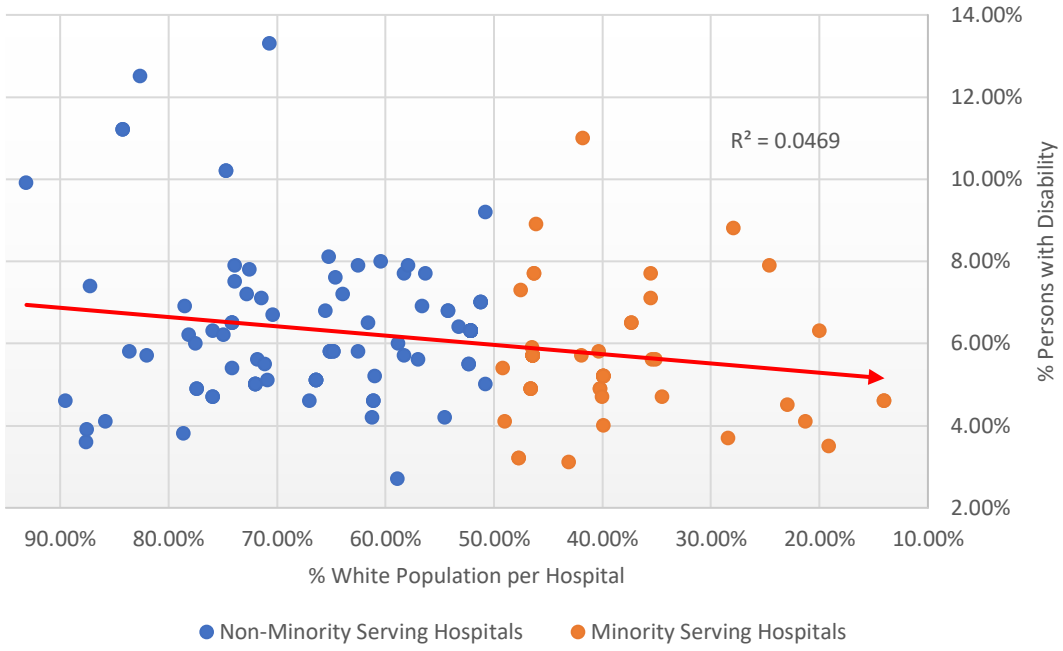

Figure 4