COVID-19 INCIDENCE RATES IN URBAN AREAS: ROLE OF STRUCTURAL INEQUALITY AT THE NEIGHBORHOOD SCALE

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INTRODUCTION

Does Lockdown policies affect all demographics the same? Why some groups are at higher risk?

Background: Local and federal social distancing policies implemented in the Spring of 2020 in response to the growing COVID-19 pandemic, as well as subsequent lockdown policies thereafter, have undoubtedly saved many human lives [1]. Despite this, emerging research suggests that such policies have not resulted in equal outcomes for all demographics [1]; specifically for low income and minority populations. Research efforts in this area have been unable to fully explain the mechanisms that produce these outcomes.

Our attempt: We used a novel approach that enables us to focus on the micro-processes of “structural inequality” at the neighborhood (zip code) level to study the impact of stay-at-home policies on COVID-19 positive case rates in Salt Lake County (or SLCo) urban setting (Figure 1) over three study periods (Table 1).

METHODS

Our research explores three propositions about the relationship between lockdown policies, structural factors of inequality (Figure 2), and COVID-19 positive case rates for the study periods.

1. Do social distancing policies keep people at home?
2. Do stay-at-home orders benefit all populations equally?
3. Do all groups have similar COVID-19 incidence rates?

Figure 1. Salt Lake County (study area).

RESULTS

Table 1. Study Periods (2020)

<table>
<thead>
<tr>
<th>Study Period</th>
<th>Pre-Lockdown</th>
<th>Lockdown</th>
<th>Post-Lockdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 17 - March 15</td>
<td>50.44%</td>
<td>970</td>
<td>757</td>
</tr>
<tr>
<td>March 16 - April 26</td>
<td>68.88%</td>
<td>1091</td>
<td>732</td>
</tr>
<tr>
<td>May 1 - May 28</td>
<td>76.78%</td>
<td>790</td>
<td>466</td>
</tr>
</tbody>
</table>

Figure 2. Geographic distribution of 2020 (a) per capita income, (b) percent white, and (c) percent white-collar group for each zip code of Salt Lake County, Utah.

Figure 3. Change in Median traffic volume across Lockdown periods.

Proposition 1: Do social distancing policies keep people at home?

- The overall median traffic volumes in SLCo (Figure 3) showed decreasing trends; 30-40% (during lockdown) and 20-30% post-lockdown. However, at certain zip code areas, the traffic volumes indicate that the directives have minimum impact on population mobility.

Table 2. Median traffic volume and percent change by structural factor.

**Traffic Counts (VPH)**

<table>
<thead>
<tr>
<th>Group</th>
<th>Median Traffic Volume (VPH)</th>
<th>Traffic Change (%)</th>
<th>Traffic Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Lockdown</td>
<td>5109.49</td>
<td>76.78%</td>
<td>-20.39</td>
</tr>
<tr>
<td>Lockdown</td>
<td>790</td>
<td>970</td>
<td>-29.32</td>
</tr>
<tr>
<td>Post-Lockdown</td>
<td>466</td>
<td>732</td>
<td>-38.25</td>
</tr>
</tbody>
</table>

Figure 4. COVID-19 cases for each Per Capita Income zip code group of Salt Lake County.

Proposition 2: Do stay-at-home orders benefit all populations equally?

- At zip code level, pre-Lockdown traffic volumes and income levels are comparable among the three groups (Table 1).
- On the contrary, transition to the lockdown period showed the reduction in traffic to be lowest in Group 1 (Low income/High Minority) compared to Groups 2 and 3.

Table 3. Median traffic volume and percent change by structural factor.

<table>
<thead>
<tr>
<th>Group</th>
<th>Median Traffic Volume (VPH)</th>
<th>Traffic Change (%)</th>
<th>Traffic Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Lockdown</td>
<td>39.92</td>
<td>18.03</td>
<td>35.91</td>
</tr>
<tr>
<td>Lockdown</td>
<td>732</td>
<td>76.78%</td>
<td>-22.00</td>
</tr>
<tr>
<td>Post-Lockdown</td>
<td>34.46</td>
<td>68.88%</td>
<td>-26.35</td>
</tr>
</tbody>
</table>

Figure 5. COVID-19 cases by Percent White group.

Proposition 3: Do all groups have similar COVID-19 incidence rates?

- Over the study period, the lowest income neighborhood/zip code (84104: $14,533) has a positive rate of 21%, while the most affluent neighborhood (84108: $43,068) showed 13% (Figure 4).
- This suggests that low income and high minority groups have more incidence rates in comparison (Figures 5-6).

Figure 6. COVID-19 cases by Percent White Collar group.

DISCUSSION

- Unlike previous studies, our zip code level analysis found that more than race, income and occupation were the greatest confounding factors.
- Structural factors were the greatest cause of variability in COVID-19 outcomes (mobility and incidence rates).

CONCLUSIONS

- Our research suggests that structural factors of inequality interact with public health, policy, and disease transmission.
- The reduction in traffic suggests differing response to lockdown policies which is likely a factor influencing different COVID-19 incidence rates.
- The rebound of traffic after easing of lockdown policies is comparatively swift for affluent groups.
- Unlike affluent communities, low income, high minority status communities showed smaller rebound on post-lockdown recovery.

POLICY IMPLICATIONS

- Future policies should include remedies to deal with inequalities (found in our research) so that most vulnerable populations can be benefited.
- As vaccination efforts continue, vulnerable and affected populations should be considered for equitable distribution.

REFERENCES


ACKNOWLEDGEMENTS

This research was funded by the Emerging COVID-19/SARS-CoV-2 Research Program of the Health Science Research Unit, University of Utah. We express our gratitude for their support.