The affordability of safety: COVID and Affordable Housing in Gwinnett County

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# Introduction

The COVID-19 pandemic has highlighted and exacerbated many of the underlying inequalities and injustices in America over the past two years. Key among those is the unavailability and unaffordability of housing. The amount of people paying rent paycheck to paycheck became apparent as soon as a drop in unemployment occurred, and national eviction moratoriums had to be put in place to prevent mass eviction and homelessness.

Less clear has been the impact of housing on COVID-19. When households must be larger and more dense to afford rent, quarantining and social distancing becomes more difficult. When workers are unable to lose income without becoming unable to pay rent, they may have to make tough decisions after a potential exposure or showing symptoms. If more affordable housing does help slow the spread of disease, this should inform policy makers and add one more social benefit to the creation of more affordable living situations.

This paper examines the impacts of affordable housing availability on the spread of COVID-19, focusing specifically on Gwinnett County in Georgia as it compares to the rest of the Atlanta metro area. While there is insufficient evidence to establish a relationship between low income housing units and COVID spread, there is indication that larger household size may increase exposure rates. This could warrant further study into the relation of policy, household size and disease spread.

# Background

## Affordable Housing

There is significant study relating to housing, evictions and COVID-19. However, the majority of the literature focuses on how COVID has impacted housing conditions, and less common are studies of how COVID transmission has been impacted by housing.

There is some indication that “Counties with a higher percentage of households with poor housing had higher incidence of, and mortality associated with, COVID-19.” (Ahmad, 2020) In this study, poor housing included overcrowding and high housing cost, but also incomplete facilities. Affordable housing is included in this definition and correlated with both COVID spread and mortality. However, it is not separated form other characteristics such as incomplete kitchen and toilet facilities, and the effect of affordable housing specifically is not clear.

Eviction, one outcome of a lack of affordable housing especially when combined with economic disruptions, has been found to increase the spread of COVID-19. (Benfer, 2021) Even more concerningly, “Disproportionate rates of both COVID-19 and eviction in communities of color compound negative health effects” (Benfer, 2021) However, the authors suggest eviction moratoriums and other supportive measures as a solution, which would likely mitigate the negative effects of evictions, but would not necessarily increase the supply of affordable housing, and would not help to treat any disparities caused by the lack thereof.

This research supports this paper’s hypothesis that a lack of affordable housing could increase COVID transmission rates. It also adds additional reasons affordable housing would aid in the pandemic, such as mitigating the costs of eviction and the disproportionate effects on at-risk groups. However, it also suggest that there may be some more specific measures that are truly important, such as household size and living conditions, that affordable housing just serves as an indicator of.

## COVID Transmission Models

A large amount of work has been done in attempts to model COVID transmission. One such robust model is presented by Yang and Wang, (Yang & Wang, 2020). They model COVID transmission in a series of differential equations, breaking populations into exposed, infected and hospitalized people and tracking transmission rates and transition rates between each group and the environment. However, they still model actual transmission between groups as a single rate or interaction, without the differentiation between exposure and actual transmission that this paper’s model includes.

They also conclude that their “approach based on different transmission rates in different time periods has a better performance than that based on the standard approach of using uniform, constant transmission rates throughout the entire time domain.” (Yang & Wang, 2020) This paper’s model borrows this same method, of refitting the rates on regular intervals to capture changes in behavior that happen throughout the progression of the pandemic.

# Methodology

## Data Collection and Processing

Multiple datasets were combined for this analysis. The full list of data sources can be found in the data section below. Daily case data was gathered from the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University, representing daily cumulative case counts by county.

Mask compliance data was used from a New York Times survey in July 2020. The survey asked “How often do you wear a mask in public when you expect to be within six feet of another person?” and participants responded one of “Never”, “Rarely”, “Sometimes”, “Frequently”, “Always”. This data was assigned values of 0%, 25%, 50%, 75% and 100% compliance respectively to consolidate it into a single estimated rate of mask usage.

Low Income housing data came from the HUD National Low Income Housing Tax Credit (LIHTC) Database. This data relates to units designated as Low Income by the department of Housing and Urban Development, which landlords receive a tax credit for maintaining. Specifically, the number of such tax-credit low income units in each county was used.

Demographic data came from the US Census Bureau. The mean household income, household size and total population was used form this 2019 census data.

Data was joined together at the county level, and a series of additional calculations was performed on the case count data. New Cases were calculated as the different in total case count form day to day. This displayed a large amount of weekly seasonality, likely due to reporting and testing patterns, so a rolling seven day average was used for further calculations. The number of estimated active cases was calculated as the number of new cases in the past 14 days, representing an average 14 day active period of infections in line with CDC guidance. Finally, the estimated vulnerable population, those still able to be infected, was taken as the total population minus the total case count. This analysis assumes that people cannot get COVID twice.

## Transmission Model

A simplified transmission model was used that allowed for two free parameters: transmission chance and exposure rate. Transmission chance represents the average chance of a transmission happening when an infected person and vulnerable person come into contact. This would take into account effects such as natural immunity, mask wearing, ventilation, and other factors that would make it more or less likely for an interaction between two people to result in a transmission. The other factor is the exposure rate, representing the number of people per day, infected or not, that a vulnerable person might be exposed to. This would take into account any efforts at social distancing, adherence to gathering bans, workplace attendance, and any other factors that would change the daily amount of exposures.

Using these two parameters, the number of new cases is modeled. The exposure rate and proportion of the current population that is actively infected is used to model the expected amount of exposures to an infected person that a vulnerable person would experience in a day. The transmission chance is then used to determine the chance that aa transmission occurs, by taking the additive inverse of the chance that no tranmissions occur.

# Works Cited

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