Racial polarization and Medicare disparities: problems in the United States during the pandemic*

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15, 2024

Abstract

The COVID-19 pandemic exposes disparities between high levels of medical care and crisis realities in the United States. Using reduced and reworked data provided by Nuzzo and Ledesma, we analyzed how racial differentiation, economic disparities, and differences in medical care levels affected COVID-19 outcomes. Our analysis shows that racial differentiation significantly affects protection against infectious diseases and that non-whites are associated with higher mortality rates and lower life expectancy. These findings emphasize the need for new targeted protection strategies that address the public's lack of prevention of infectious diseases, and future research should be targeted at increasing life expectancy and controlling population mortality.

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#Introduction

The COVID-19 pandemic exposed the discrepancy between the high level of medical care and the reality of the crisis in the United States. Despite high levels of pandemic preparedness, the United States experienced the devastating effects of COVID-19, even lowering life expectancy for all races in the U.S., highlighting the

*Code and data underpinning this paper are available at: https://github.com/jerry-maker-765/Treatment-Covid-Analysis.git. Selected aspects of the original paper that underpins this paper were reproduced and a record of this is available at: DOI : https://doi.org/10.48152/ssrp-v3tf-qn13

disconnect between theoretical preparedness and actual response. This study builds on published research by the American Economic Association that delves into the impact of the epidemic and mortality rates by region, and it also examines racial stratification and differences in levels of medical care, which are key factors affecting the degree to which policy implementation is accomplished and the overall effectiveness of the response. By shedding light on these dynamics, the study aims to reveal the fundamentals of public health system resilience and adaptation, providing nuanced insights for a more agile and forward-looking response to future global health emergencies. This integrated approach seeks not only to understand the past, but also to inform more robust preparedness and response strategies for the future.

Using data from the article "Why Did the Best Prepared Country in the World Fare So Poorly during COVID?" (Nuzzo and Ledesma 2023) as the source data, our analysis examines the impact of the epidemic on life expectancy in the U.S. by race, region, and country around the world. life expectancy in the U.S. by race, region, and even mortality in countries around the world is explored in great detail. After reducing and redoing the data provided by Nuzzo and Ledesma, we aim to explore the relationship between pandemics and mortality in greater depth and specificity to better inform our discussion of the factors that contribute to increased mortality and suggest meaningful intervention policies. We have also shifted our focus from the disease to other confounding factors such as the polarization of health security.

Figure 1 explores the comparison between the Global Health Security (GHS) Index and the actual COVID-19 mortality outcomes, providing a sobering view of the predictive value of the Readiness Index. It gives us inspiration for the research that follows. The graph provides insight into the Global Health Security Index (GHSI), which assesses a country's preparedness to respond to a health crisis such as a pandemic, taking into account factors such as disease detection, healthcare capacity, and the overall risk environment. The index ranks countries based on their capacity, but as the COVID-19 pandemic revealed, a high ranking does not guarantee an effective response to an actual health emergency. The index is designed to help countries identify gaps in health security and strengthen their preparedness for future threats. (Haider et al. 2020) A higher score on the index indicates that a country has stronger health security measures and is better prepared to detect, respond to and mitigate the impact of health emergencies. Conversely, a low score indicates weaknesses in a country's health security, implying that there are significant gaps in its ability to deal with such crises that need to be improved.

As we respond to major infectious diseases, we must understand the factors contributing to the disparities and also develop workable plans to strengthen our defenses. In subsequent sections of this paper we will first take an in-depth look at our research methods, data cleaning, and data measurement in Part 2. Next, we will present our findings in detail through graphs and tables in Section 3. Finally, we will discuss how these results were generated in Sections 4 and 5. By elucidating these key relationships and extending previous findings, our results corroborate and Nuzzo and Ledesma's findings are correct. Our study is also contributing to the discussion of interventions regarding epidemic transmission.

Data Source

The study utilizes data from seven publicly available sources, including reports and databases from Bell et al. (2021), Arias et al. (2022), The World Bank (2022), United Nations Department of Economic and Social Affairs Population Division (2022), Dong et al. (2020), Wang et al. (2022), and Ledesma et al. (2023). These datasets encompass various aspects such as the Global Health Security (GHS) Index, life expectancy by race, all-cause death rates, population counts, excess deaths, and age-standardized excess deaths.

Methodology

R version 4.1.2 was used for the analysis, and various packages were implemented to efficiently process and visualize the data. The packages used were `ggpubr` for enhancing the publication quality of `ggplot2` figures, ggplot2 for creating comprehensive and customizable visualizations, `data.table` for high-performance data

manipulation, `readxl` for reading Excel files, and `lubridate` for managing date-time data. As part of this methodology, five figures were created to show the effects of COVID-19, using three fast programs that processed and visualized the data in a comprehensive manner. Using these particular packages, the analysis used R's statistical computing capabilities to examine the data, which came from datasets that were made available to the general public.

Data Cleaning

Environment Setup

The analysis started with clearing the R environment to ensure a clean workspace, followed by loading necessary R packages for data manipulation and visualization (ggpubr, ggplot2, data.table, readxl, lubridate).

Data Importation

Data were imported from various sources, including life expectancy tables, all-cause death rates, and additional datasets for COVID-19 related deaths, excess deaths, and global health security indexes, among others.

Data Transformation

The life expectancy data (life_table.csv) was reshaped using the melt function, converting wide format to long format, facilitating analysis across different racial-ethnic groups. The all-cause death rates (all_cause_dth_rates.csv) underwent a similar transformation, with further adjustments to align with the analysis years of interest (2013-2021) and comparisons between actual and predicted death rates.

Data Merging and Calculation

For visualizations concerning life expectancy changes and all-cause death rates, data were aggregated, calculated for differences across years, and reshaped for plotting. External COVID-19 datasets were processed to align with the study's focus areas.

Data Measurement

Life Expectancy Data: Measurement of life expectancy by race, involving calculations to understand disparities across different racial and ethnic groups.

All-Cause Death Rates: Analysis of mortality rates over time, identifying changes before and during the pandemic.

COVID-19 Related Deaths and Excess Deaths: Quantification of the direct and indirect impacts of the pandemic through reported COVID-19 deaths and excess death rates, compared against expected mortality trends.

Global Health Security (GHS) Index: Utilization of the GHS Index as a measure of country preparedness for health emergencies, analyzing its correlation with pandemic outcomes.

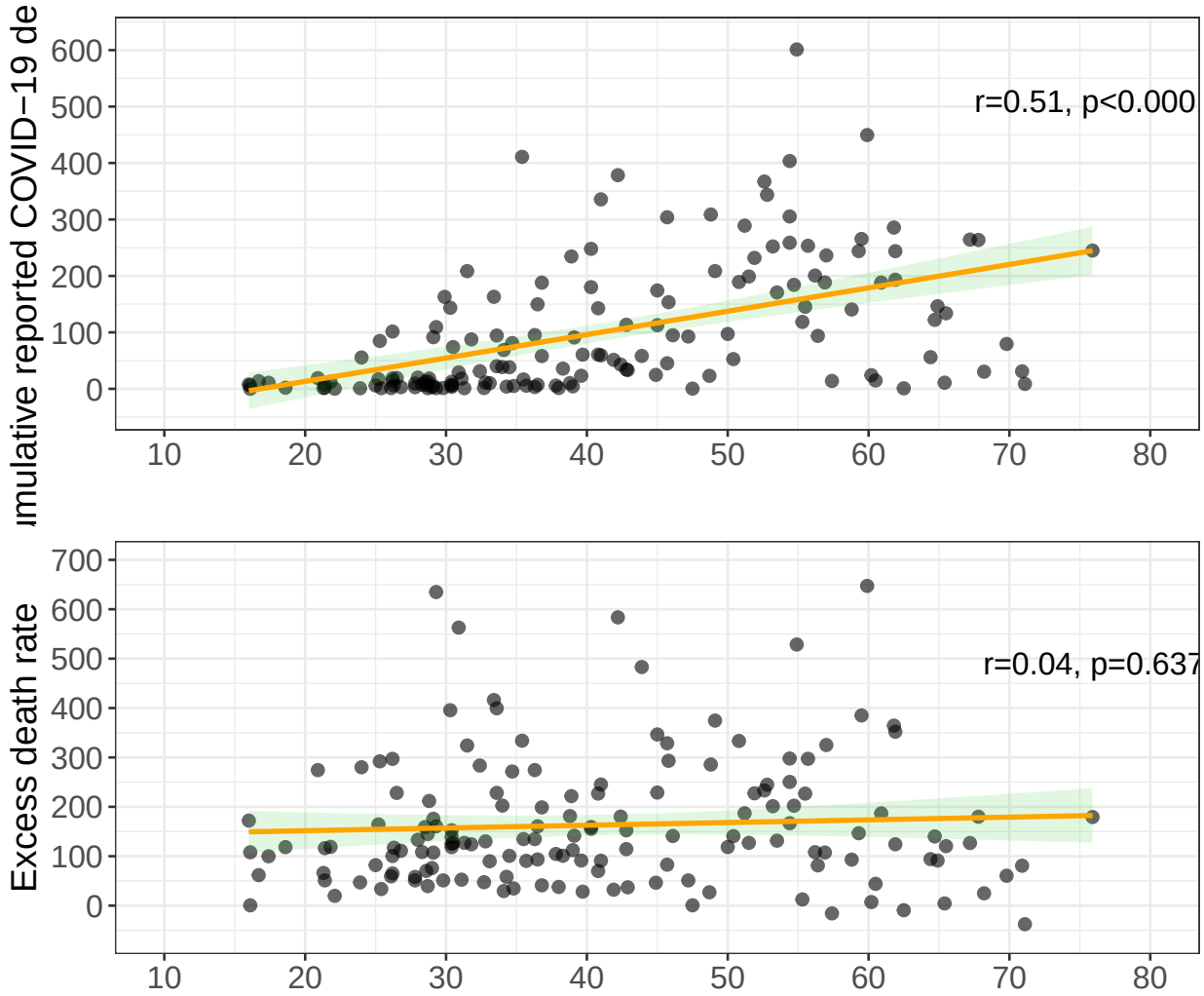
The journal used for replication was the Journal of Economic Perspectives, which explored the fact that the USA, which has the highest global health safety score, had a higher mortality rate during COVID-19 than other countries. A replication of a paper that claimed the age, race, medical system, financial status, and politics of the USA are the factors that make the higher death rate.

The original data was initiated by The World Health Organization, and the Johns Hopkins University Center for Systems Science and Engineering (JHU CSSE) began reporting real-time case data. The addition of other third-party institutions provides more reports on cases, which can enhance data accuracy. However, there are other cases of unknown death, and for this reason, we will use indirect age-standardization methods to screen out groups of different ages with high mortality rates.

Based on the original, this paper discusses the process in detail. In addition, it considers several factors that affect the United States mortality rate in COVID-19 and combines them to generate figures and results. We build graphs and analyze data using ggplot2], ggpubr, dplyr and citeR. Variables in this article: - Racial/Ethnic Groups -Age -Density -Medical system - Financial position - Politics

Result

In this section we present the results of our research. The table in Figure 1 explores the contrast between the Global Health Security (GHS) Index and the actual COVID-19 death outcomes. The second table in Figure 2 shows the decline in life expectancy at birth for different races in the United States, highlighting the uneven burden caused by pandemics. The table in Figure 3 contrasts the U.S. all-cause mortality rate with that of other countries, challenging expectations that the U.S. ranks high in preparedness.



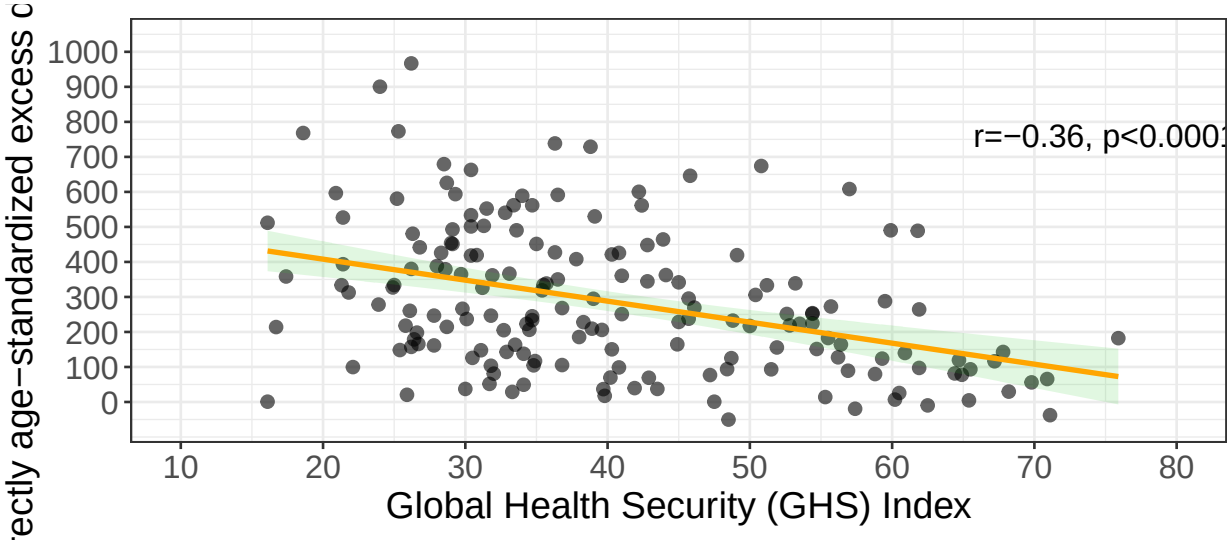


Figure 1 shows the relationship between the Global Health Security (GHS) Index and the COVID-19 mortality rate per 100,000 population results for the 2020-2021 period. In Panel A, there is a positive correlation between the GHS Index and the cumulative COVID-19 death rate per 100,000 population reported by countries. Panel B shows that there is no significant correlation between the GHS Index and COVID-19 excess mortality per 100,000 population. Excess mortality is a measure of how many more deaths there are than would be expected based on historical data. Panel C shows the negative correlation between the GHS index and the age-standardized excess mortality rate per 100,000 population for each country.

Countries with higher GHS indices tend to have lower age-standardized excess mortality rates, which can be explained by the fact that these countries are doing a better job of managing pandemics and adjusting for the age distribution of their populations, which may reflect effective medical interventions for the most vulnerable groups. The data suggest that while some aspects of preparedness may be associated with better outcomes (as shown in Panel C), others do not necessarily translate into lower mortality (as shown in Panels A and B). This may indicate that preparedness, as measured by the GHS Index, may not fully capture all the factors that influence mortality during a pandemic. As these indicators reflect, the impact of a pandemic is far-reaching and will affect different countries to varying degrees, highlighting the importance of not only preparing for a pandemic but also effectively implementing response strategies during a pandemic.

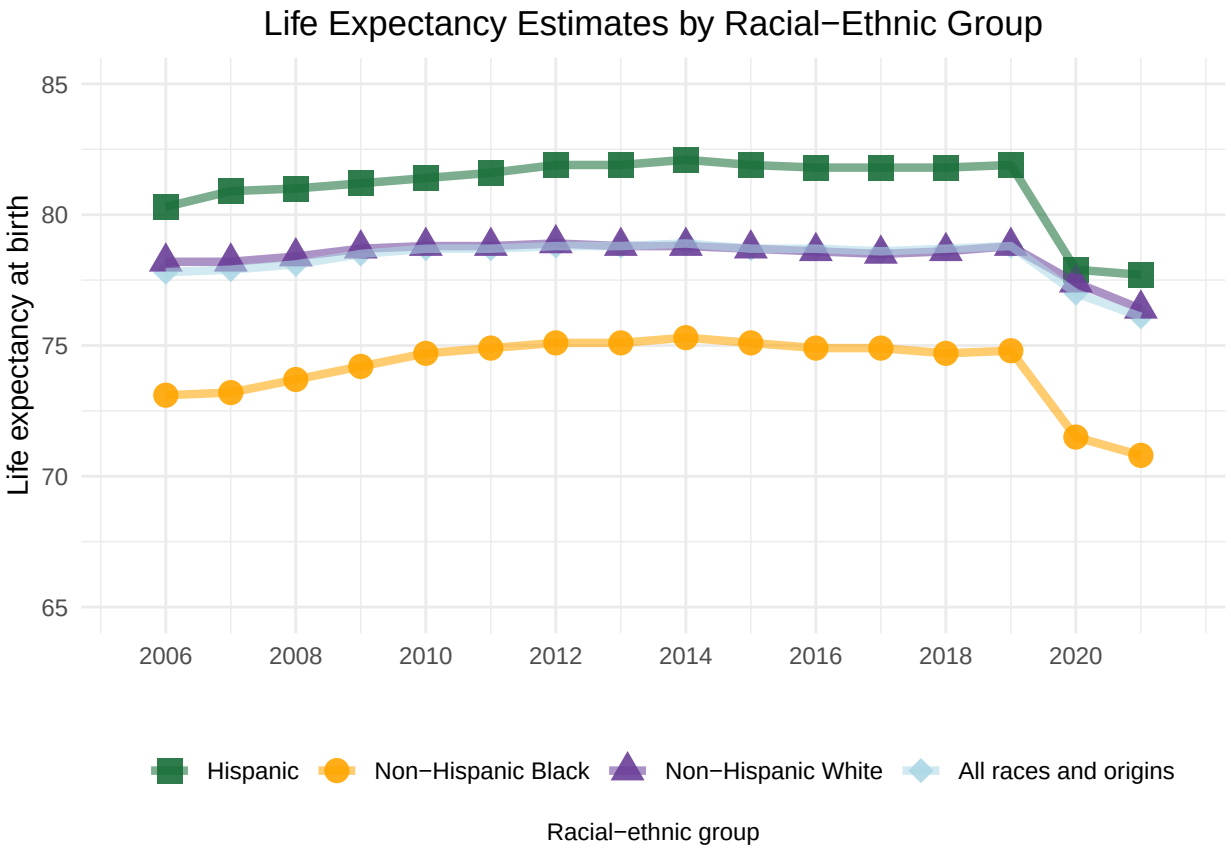
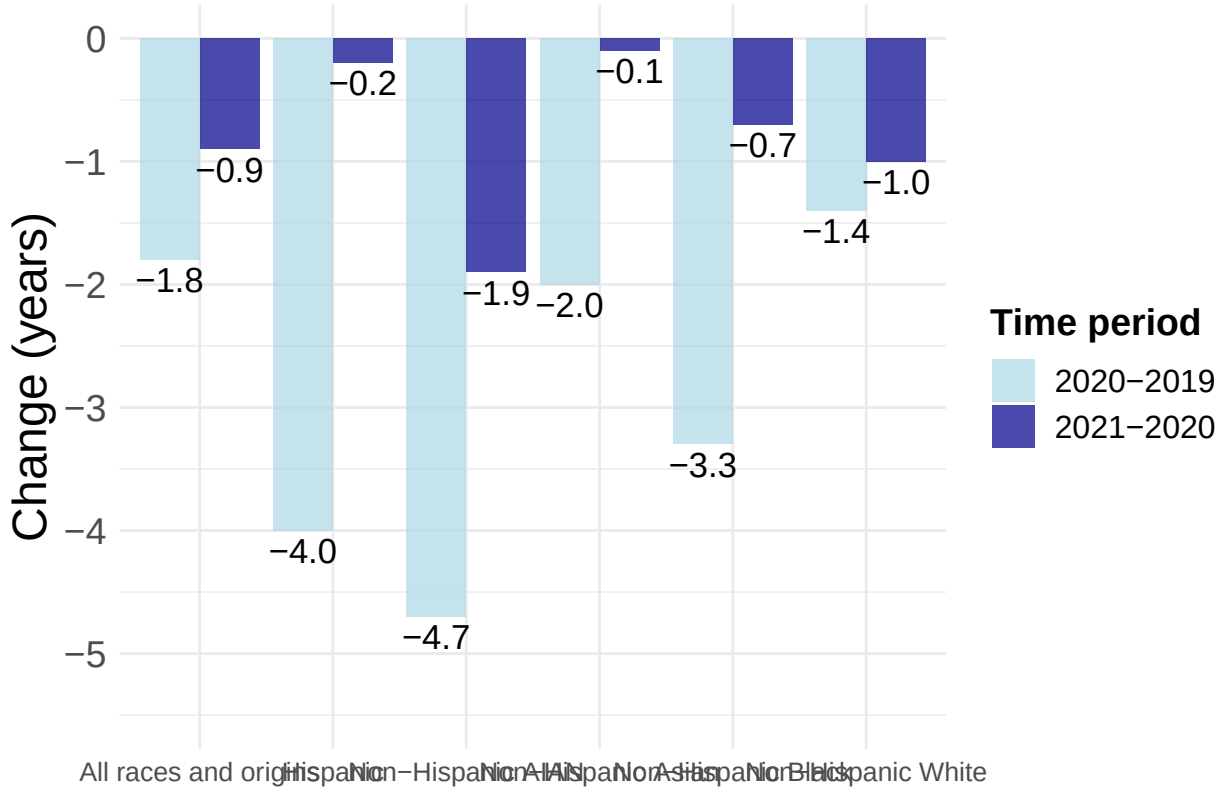
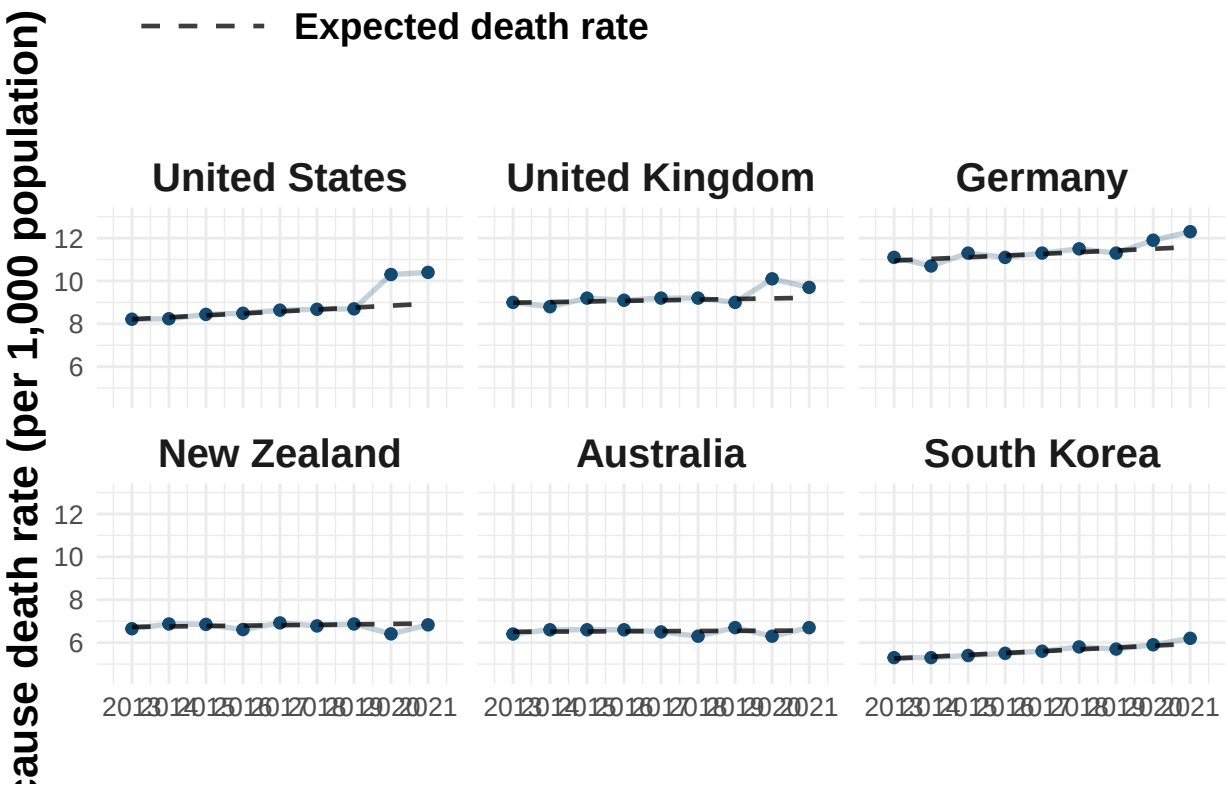


Figure 2 shows trends in life expectancy at birth for different racial/ethnic groups in the United States from 2006 through 2021. Panel A depicts estimates of life expectancy at birth over time. The trend line shows a significant decline in life expectancy in 2020 for all groups. Declines are particularly pronounced for Hispanics and blacks. Panel B shows significant declines in life expectancy for all races and origins, with the Hispanic population experiencing the largest decline, followed by Blacks, American Indians, and Alaska Natives. The white and Asian populations experienced the smallest declines. Life expectancy is a key indicator of the overall health status of a population, reflecting the impact of a variety of factors, including access to health care, socioeconomic status, and more serious events like pandemics. The steep decline in life expectancy coincided with the timing of the COVID-19 outbreak, suggesting that the pandemic had a significant negative impact on life expectancy, particularly among racial and ethnic groups that may have been already disadvantaged due to various socioeconomic factors. This highlights the disparities in health outcomes and the impact of systemic issues that may be exacerbated in crises such as pandemics.


Change (years)
0
−1
−2
−3
−4
−5
−1.8
−0.9
−4.0
−0.2
−4.7
−1.9
−2.0
−0.1
−3.3
−0.7
−1.4
−1.0
All races and origins
Hispanic
Non−Hispanic AIAN
Non−Hispanic Asian
Non−Hispanic Black
Non−Hispanic White
Time period
2020−2019
2021−2020


Expected death rate
United States
United Kingdom
Germany
New Zealand
Australia
South Korea
cause death rate (per 1,000 population)
12
10
8
6
2013
2014
2015
2016
2017
2018
2019
2020
2021

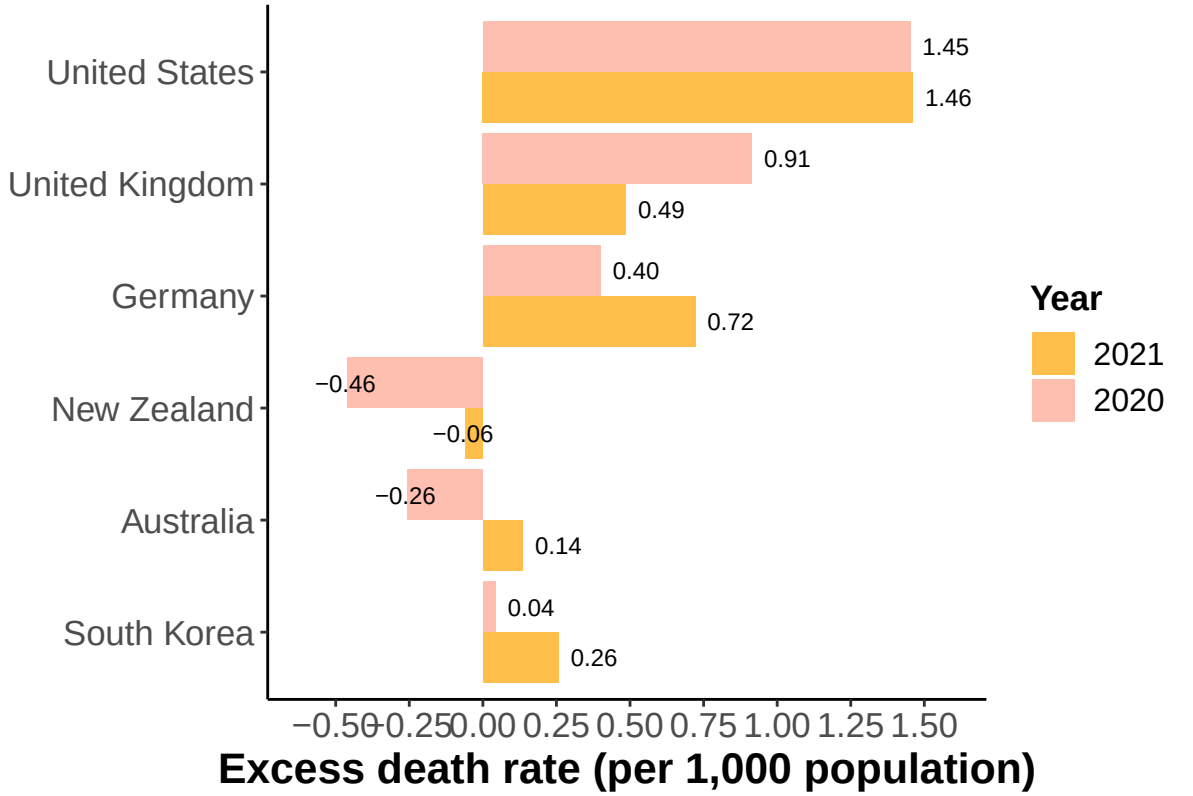


Figure 3 depicts the relationship between the Global Health Security (GHS) Index and the indirect age-standardized excess mortality rate per 100,000 population for the most prepared countries during the 2020-2021 period. As you can see from the chart, the United States has a high excess mortality rate despite being one of the highest-scoring countries on the GHS Index, indicating a high level of preparedness for health emergencies. Factors such as health system capacity, speed of response, public policy, and adherence to guidelines play a critical role in mitigating the impact of health crises beyond what can be predicted by the preparedness index. In the case of the United States, despite its high level of preparedness, high excess mortality rates may reflect challenges in these areas.

Discussion

The Impact of Racial Disparities on Health Care

Through research (Deaton and Lubotsky 2003) we found that inequality between races is evident both before and after COVID-19. (Deaton and Lubotsky 2003) explained that if the proportion of the population between different races is proportional to the average income, non-whites will be treated more unfairly than whites. At the same time, non-whites suffer more discrimination in society. White people in the society have access to good health resources. With this paper, it can be explained why white people had a lower death rate than non-white races before COVID-19. When white people have higher incomes than other races. The United States health care system requires patients to pay for themselves, as many people cannot afford medical services. Citizens do not believe the government and health services, it led people to reduce vaccinations to avoid high costs, and people are more willing to detail their judgments. This is why, in countries with high safety indices such as the United States, the proportion of vaccines is inversely proportional.

Deaton, Angus, and Darren Lubotsky. 2003. "Mortality, Inequality and Race in American Cities and States." *Social Science & Medicine* 56 (6): 1139–53. https://doi.org/https://doi.org/10.1016/S0277-9536(02)00115-6.

Haider, Najmul, Alexei Yavlinsky, Yu-Mei Chang, Mohammad Nayeem Hasan, Camilla Benfield, Abdinasir Yusuf Osman, Md Jamal Uddin, et al. 2020. "The Global Health Security Index and Joint External Evaluation Score for Health Preparedness Are Not Correlated with Countries' COVID-19 Detection Response Time and Mortality Outcome." *Epidemiology & Infection* 148: e210.

Nuzzo, Jennifer B., and Jorge R. Ledesma. 2023. "Why Did the Best Prepared Country in the World Fare so Poorly During COVID?" *Journal of Economic Perspectives* 37 (4): 3–22. https://doi.org/10.1257/jep.37.4.3.