

7-4-2024

Intersectional Analysis of Vaccination Inequity Among Individuals with Disabilities in the United States During Covid-19 Pandemic

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Walden University

College of Health Sciences and Public Policy

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Philip Ndoki

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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Walden University
2024

Abstract

Intersectional Analysis of Vaccination Inequity Among Individuals with Disabilities in
the United States During Covid-19 Pandemic

by

Philip Ndoki

Final Study Submitted in Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy Public Health Epidemiology

Walden University

June 2024

Abstract

This study was an investigation of how disability status, types, sociodemographic indicators, and reasons for not receiving vaccinations influenced COVID-19 vaccination rates among individuals with disabilities in the United States. Despite efforts, vaccination disparities persisted, necessitating an understanding of barriers to uptake. Using intersectionality theory and the social determinants of health framework, this study examined the impact of marginalized identities and structural inequalities. Key questions included the association between disability status and vaccination uptake, differences among disability types moderated by sociodemographic factors, and the interaction between disability status and reasons for not vaccinating. Household Pulse Survey data from the US Census Bureau were used in this study, and logistic regression analyses were used to assess these relationships. Findings revealed that while disability status and sociodemographic variables alone did not significantly predict vaccination uptake, disability type was crucial, indicating the need for targeted interventions. These results support inclusive public health policies addressing specific barriers faced by individuals with disabilities and promoting equitable healthcare services and vaccination programs. Understanding the interplay between disability status, sociodemographic factors, and vaccination behavior may result in targeted strategies to ensure no population segment is left behind, fostering positive social change toward a more inclusive and equitable society.

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Dedication

This dissertation is dedicated to my beloved mother, Mme. Clara Masango Yoge. Her unwavering love, support, and encouragement have been the bedrock upon which I have built my dreams. She has been a constant source of strength and inspiration throughout my life and academic career. Her patience and wisdom have guided me through every challenge. I would not be where I am today without her. I dedicate this work to her for always believing in me and teaching me to believe in myself.

Acknowledgments

First and foremost, I would like to express my deepest gratitude to my wife, Melvis Njume Mesang, and my children for their unconditional love, patience, and sacrifice throughout this journey. Their unwavering support gave me the strength to keep moving forward.

I would also like to sincerely thank my dissertation committee chairperson, Dr. Heba M. Athar, for her invaluable guidance, feedback, and encouragement every step of the way. Her expertise and high standards pushed me to produce my best work. I also want to thank my second committee member, Dr. David O. Anderson, for providing critical insights that helped refine and strengthen my research.

Finally, I could not have completed this milestone without the ongoing support of my family, friends, and colleagues, who cheered me on until the finish line. I am genuinely grateful to everyone who played a part in this achievement.

Table of Content

Chapter 1: Introduction to the Study	1
Introduction	1
Background.....	3
Problem Statement.....	4
Purpose	6
Research Question(s) and Hypotheses	6
Theoretical and Conceptual Framework for the Study.....	8
Nature of the Study.....	10
Definitions	12
Assumptions	14
Scope and Delimitations.....	15
Limitations.....	16
Significance	16
Summary.....	20
Chapter 2: Literature Review	22
Introduction	22
Literature Search Strategy	24
Theoretical Foundation.....	26
Conceptual Framework	28
Literature Review Related to Key Variables and Concepts	30
Intersectionality	30

Sociodemographic Indicators	32
Disability	34
Vaccination Uptake	35
Healthcare Access Inequities.....	37
Race/Ethnicity	39
COVID-19 Pandemic	40
Summary and Conclusions	42
Chapter 3: Research Method	45
Introduction	45
Research design and Rationale.....	47
Methodology.....	47
Population.....	47
Sampling Strategy	48
Sampling Procedures	48
Sampling Frame.....	48
Power Analysis and Sample Size Determination	49
Archival Data Procedures.....	50
Instrumentation and Operationalization of Constructs.....	50
Data Analysis Plan	52
Data Cleaning and Screening Procedures.....	52
Research Questions and Hypotheses	53
Statistical Analysis	54

Interpretation of Results	55
Threats to Validity	55
Threats to External Validity	56
Threats to Internal Validity	57
Threats to Construct or Statistical Conclusion Validity	58
Ethical Procedures	59
Institutional Permissions and IRB Approval	59
Recruitment Materials and Processes	59
Data Collection, Withdrawal, and Adverse Events	59
Data Privacy and Confidentiality	60
Conflicts of Interest	60
Incentives	60
Summary	60
Chapter 4: Results	63
Introduction	63
Data Collection	66
Results	71
Summary	85
Chapter 5: Discussion, Conclusions, and Recommendations	88
Introduction	88
Interpretation of the Findings	90
Limitations of the Study	92

Recommendations 94

Implications 96

Conclusion 98

References 100

List of Tables

Table 1. Distribution of Survey Participants by Disability Status.....	68
Table 2. Demographic Characteristics of Survey Participants	68
Table 3. COVID-19 Vaccination Status Among Survey Participants.....	69
Table 4. Reasons for Not Receiving COVID-19 Vaccination Boosters Among Survey..	69
Table 5. Coefficients and Collinearity Statistics for Predictors of COVID-19 Vacc.....	70
Table 6. Hosmer and Lemeshow Test Results for Model Fit	71
Table 7. Classification Table for Predicting COVID-19 Vaccination Uptake	71
Table 8. Omnibus Tests of Model Coefficients.....	72
Table 9. Model Summary for COVID-19 Vaccination Uptake Prediction	72
Table 10. Variables in the Equation for COVID-19 Vaccination Uptake Prediction	73
Table 11. Omnibus Tests of Model Coefficients.....	74
Table 12. Model Summary for COVID-19 Vaccination Uptake Prediction	74
Table 13. Variables in the Equation for COVID-19 Vaccination Uptake Prediction	75
Table 14 Coefficients and Collinearity Statistics for Predictors of COVID-19 Vacc.....	76
Table 15 Model Summary for COVID-19 Vaccination Uptake Prediction	77
Table 16 ANOVA Results for COVID-19 Vaccination Uptake Prediction.....	78
Table 17 Coefficients for Predictors of COVID-19 Vaccination Uptake	79
Table 18 Model Summary for COVID-19 Vaccination Uptake Prediction	79
Table 19 ANOVA Results for COVID-19 Vaccination Uptake Prediction.....	80
Table 20 Coefficients for COVID-19 Vaccination Uptake Prediction.....	80
Table 21 Variables in the Equation for Initial Regression Model.....	82

Table 22 Coefficients and Collinearity Statistics for Predictors of Hesitancy Status	82
Table 23 Model Summary for Predictors of Hesitancy Status	83
Table 24 ANOVA for Predictors of Hesitancy Status.....	84
Table 25 Classification Table for Predicting Hesitancy Status	84

Chapter 1: Introduction to the Study

Introduction

In this study, I examined the intersectional impacts of disability status, sociodemographic indicators (e.g., race/ethnicity, socioeconomic status), and geographic location on COVID-19 outcomes (infection rates, hospitalizations, mortality) and access to healthcare services (testing, treatment, vaccination) for individuals with different types of disabilities in the United States during the COVID-19 pandemic. Individuals with disabilities face unique challenges and barriers in accessing healthcare services and public health interventions despite being at increased risk for severe illness and adverse outcomes.

Previous researchers investigated the impact of COVID-19 on individuals with disabilities. Still, there was a gap in comprehensive studies that analyzed the intersectional effects of disability, sociodemographic indicators, and geographic location on COVID-19 outcomes and healthcare access. I addressed this gap by conducting a quantitative analysis that incorporated the intersectionality framework to provide a more nuanced and holistic understanding of the inequities experienced by individuals with disabilities during the pandemic.

The study's findings contributed to developing targeted interventions, policies, and healthcare practices to mitigate inequities and improve health outcomes for individuals with disabilities, particularly those at the intersection of multiple forms of disadvantage. By highlighting the unique challenges faced by individuals with disabilities and marginalized communities, the study promoted social justice and the rights of

persons with disabilities. The emphasis on intersectionality underscored the importance of considering multiple dimensions of identity and disadvantage when addressing health inequities, challenging existing paradigms, and promoting more inclusive and holistic approaches to healthcare and public health policy. The findings from this study could be used to inform evidence-based interventions, shape policy decisions, and drive positive social change by advancing our understanding of the complex interplay between disability, sociodemographic indicators, geographic location, and COVID-19 outcomes.

In the introduction, I offer a comprehensive study overview, including its background, problem statement, purpose, research questions, hypotheses, theoretical framework, nature, and significance. In the literature review, I delve into existing research, covering topics such as the impact of COVID-19 on individuals with disabilities, healthcare access inequities, intersectionality, and social determinants of health. In the research design and methodology section, I outline the quantitative cross-sectional study design and detailed data sources, sampling techniques, data collection procedures, and analysis methods.

The results section includes the findings derived from data analysis, including descriptive and inferential statistics, and the outcomes of hypothesis testing. In the discussion section, I interpret and contextualize the findings related to existing literature, theoretical frameworks, and research questions. In implications section, I explore the potential effects of the study on positive social change, policy recommendations, and future research avenues. Finally, the conclusion includes a summary of the main findings, acknowledged limitations, and highlighted the overall significance of the study.

Background

Research consistently showed that individuals with disabilities faced significant inequities and barriers in accessing healthcare services and public health interventions during the COVID-19 pandemic (Goyal et al., 2023; McBride-Henry et al., 2023). Despite being at an increased risk for severe illness and adverse outcomes from COVID-19, this population encountered unique challenges that hindered their ability to receive essential medical care, testing, and vaccinations.

Several studies highlighted the lower COVID-19 vaccination rates among individuals with disabilities compared to those without disabilities (Hollis et al., 2023; Myers et al., 2022). These inequities were attributed to vaccine hesitancy, concerns about side effects, distrust in government information, and accessibility issues (Burdick & Christopher, 2022; Myers et al., 2022). Additionally, research showed that individuals with disabilities experienced higher rates of COVID-19-related hospitalizations and mortality (Nab et al., 2023; Sosenko et al., 2023).

However, a significant gap in the existing literature was the lack of comprehensive quantitative analyses examining the intersectional impacts of disability status, sociodemographic indicators (such as race/ethnicity and socioeconomic status), and geographic location on COVID-19 outcomes and access to healthcare services for individuals with different types of disabilities. While studies explored individual aspects of this issue, there was a need for research that integrated an intersectionality framework to investigate the compounding effects of multiple marginalized identities on the experiences of individuals with disabilities during the pandemic.

Addressing this gap was crucial because individuals with disabilities often faced multiple and overlapping forms of disadvantage and marginalization, which exacerbated the inequities they experienced in healthcare access and outcomes. By adopting an intersectional approach, I developed a more nuanced and holistic understanding of the complex interplay between disability, sociodemographic indicators, geographic location, and COVID-19-related inequities.

This study was needed to inform the development of targeted interventions, policies, and healthcare practices that could effectively address the unique needs and vulnerabilities of individuals with disabilities, particularly those at the intersection of multiple marginalized identities. By shedding light on the intersectional nature of these inequities, the study could contribute to the broader efforts of promoting equity, inclusivity, and social justice in public health responses to pandemics and other health crises.

Problem Statement

The specific research problem that I addressed was the lack of comprehensive quantitative analysis examining the intersectional impacts of disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status for individuals with different types of disabilities in the United States during the COVID-19 pandemic.

There was a consensus within the research community that this problem was current, relevant, and significant to public health, epidemiology, disability studies, and health inequities research. The COVID-19 pandemic exposed and exacerbated existing inequities in healthcare access and outcomes for marginalized communities, including

individuals with disabilities (Friedman & VanPuymbrouck, 2023; Turcheti et al., 2022). Recent studies consistently demonstrated that individuals with disabilities faced disproportionate challenges in accessing COVID-19 testing, treatment, and vaccination services, contributing to higher rates of infection, hospitalization, and mortality (Nab et al., 2023; Sosenko et al., 2023).

Previous researchers explored various aspects of this problem, such as the impact of disability on COVID-19 outcomes (Peeters et al., 2023; Salmerón Ríos et al., 2021) and the barriers to vaccination uptake among individuals with disabilities (Burdick & Christopher, 2022; Myers et al., 2022), but there was a lack of comprehensive studies that integrated an intersectional approach to examine the compounding effects of disability, sociodemographic indicators, and geographic location.

In this study, I built upon and countered the limitations of previous research by adopting an intersectional framework to investigate the complex interplay between disability status, sociodemographic indicators (such as race/ethnicity and socioeconomic status), and geographic location in shaping COVID-19 outcomes and access to healthcare services for individuals with different types of disabilities. By incorporating intersectionality, I recognized that the experiences of individuals with disabilities were not uniform but were influenced by the intersection of various forms of marginalization and disadvantage (Brown & Ciciurkaite, 2023; Crenshaw, 1989).

I addressed a meaningful gap in the current research literature by providing a comprehensive and nuanced understanding of the inequities experienced by individuals with disabilities during the COVID-19 pandemic. By quantitatively analyzing the

intersectional impacts of disability status, sociodemographic indicators, and geographic location, I developed information that could be used to improve targeted interventions, policies, and healthcare practices that accounted for the diverse needs and vulnerabilities of this population, ultimately contributing to the broader efforts of promoting equity and inclusivity in public health responses.

Purpose

The purpose of this quantitative cross-sectional study was to examine the intersectional impacts of disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status for individuals with different types of disabilities in the United States during the COVID-19 pandemic. By accounting for the intersection of disability with other social determinants, I provided a more nuanced and holistic understanding of the inequities experienced by individuals with disabilities during the pandemic.

Variables such as socioeconomic status (income, education level), geographic location (e.g., urban/rural, ZIP code, county), and COVID-19 outcomes (e.g., infection rates, hospitalizations, mortality) were vital in this analysis. Still, they were unavailable in the Household Pulse Survey (HPS) public use files. I contacted the Surveillance and Epidemiology Branch via vaxview@cdc.gov and requested access to these variables but was only granted access to the variables available in the public use files.

Research Questions and Hypotheses

Research Question 1 (RQ1): Is there an association between disability status and COVID-19 vaccination uptake among adults aged 18 and older in the United States, and

does this association vary based on sociodemographic indicators such as race/ethnicity and age?

Null Hypothesis (H_01): There is no association between disability status and COVID-19 vaccination uptake among adults aged 18 and older in the United States, considering the intersection with sociodemographic indicators such as race/ethnicity and age.

Alternate Hypothesis (H_11): There is an association between disability status and COVID-19 vaccination uptake among adults aged 18 and older in the United States, considering the intersection with sociodemographic indicators such as race/ethnicity and age.

Research Question 2 (RQ2): Is there a difference in COVID-19 vaccination uptake among adults with different disability types, and is this difference moderated by sociodemographic indicators such as race/ethnicity and age?

Null Hypothesis (H_02): There is no difference in COVID-19 vaccination uptake among adults with different disability types, controlling for sociodemographic indicators such as race/ethnicity and age.

Alternate Hypothesis (H_12): There is a difference in COVID-19 vaccination uptake among adults with different disability types, controlling for sociodemographic indicators such as race/ethnicity and age.

Research Question 3 (RQ3): Is there an interaction effect between disability status and reported reasons for not receiving vaccinations (COVID-19 vaccine hesitancy)

among adults aged 18 and older in the United States, and is this interaction influenced by sociodemographic indicators such as race/ethnicity and age?

Null Hypothesis (H_03): There is no interaction effect between disability status and reported reasons for not receiving vaccinations among adults aged 18 and older in the United States, controlling for sociodemographic indicators such as race/ethnicity and age.

Alternate Hypothesis (H_13): There is an interaction effect between disability status and reported reasons for not receiving vaccinations among adults aged 18 and older in the United States, controlling for sociodemographic indicators such as race/ethnicity and age.

The independent variables were disability status and disability types. The dependent variables were COVID-19 vaccination uptake (vaccination status) and reported reasons for not receiving vaccinations. The associations being tested were the relationships between disability status, disability types, sociodemographic indicators, vaccination status on COVID-19 vaccination uptake, and reported reasons for not receiving vaccinations.

The variables were measured through self-reported data from survey responses, with disability status, disability types, sociodemographic indicators, and COVID-19 vaccination uptake (vaccination status) being a dichotomous variable (vaccinated or not vaccinated).

Theoretical and Conceptual Framework for the Study

This study was underpinned by the concepts of intersectionality, as introduced by Crenshaw (1989), and the social determinants of health framework proposed by the

World Health Organization (WHO). Intersectionality, initially articulated by Kimberlé Crenshaw, acknowledged the multifaceted nature of discrimination and marginalization, emphasizing that various factors such as race, gender, class, and disability intersected and compounded each other, shaping individuals' experiences. In this study, I integrated intersectionality and the social determinants of health framework to understand the complex interplay between disability status, sociodemographic indicators, and vaccination status among individuals with disabilities during the COVID-19 pandemic.

I used the intersectionality theory in the examination of how disability status intersected with sociodemographic indicators and vaccination status, aiming for a nuanced understanding of the inequities experienced by individuals with disabilities. By adopting this lens, I uncovered how multiple marginalized identities contributed to health inequities during the pandemic.

The social determinants of health framework complements intersectionality by highlighting broader social, economic, and environmental factors influencing health outcomes. This framework supported the inclusion of sociodemographic indicators and geographic location as variables, acknowledging their role in shaping access to healthcare services and COVID-19 outcomes for individuals with disabilities.

The study's conceptual framework was grounded in research highlighting persistent barriers and inequities faced by individuals with disabilities during the pandemic. This research underscored inequities in vaccination rates, infection rates, hospitalizations, and mortality among this population. Additionally, I recognized the

compounded disadvantages resulting from the intersection of disability with factors like race/ethnicity, socioeconomic status, and geographic location.

Logical connections among critical elements of the conceptual framework were evident. Individuals with disabilities, especially those with cognitive or physical disabilities, encountered challenges in accessing healthcare services and protective measures, contributing to inequities in health outcomes. Moreover, factors like race/ethnicity, socioeconomic status, and age intersected with disability status, exacerbating inequities. Geographic factors further influenced healthcare access and COVID-19 outcomes, shaping individuals' access to testing, treatment, and vaccination services. By examining the intersectional impacts of these elements, my goal was to understand the factors contributing to inequities among individuals with disabilities during the pandemic, informing efforts to promote health equity and address systemic barriers to healthcare access.

Nature of the Study

I used a quantitative cross-sectional design for this study, which was appropriate for addressing the research questions and examining the intersectional impacts of disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status for individuals with different types of disabilities on COVID-19 vaccination uptake and reported reasons for not receiving vaccinations during the COVID-19 pandemic.

A quantitative approach was suitable for this study because I conducted a systematic collection and analysis of numerical data, enabling the examination of relationships between variables and the testing of hypotheses. The cross-sectional design

provided a snapshot of the variables of interest at a specific time, which was well-suited for assessing the prevalence of COVID-19 outcomes and healthcare access inequities within the target population.

The critical study variables were disability status, disability types, race/ethnicity, age, vaccination status (COVID-19 vaccination uptake), and reported reasons for not receiving vaccinations. I used data from the Household Pulse Survey (HPS), a national survey conducted by the U.S. Census Bureau, to measure household experiences during the COVID-19 pandemic. The HPS collected self-reported data on individuals' COVID-19 vaccination status, disability status, sociodemographic characteristics, geographic location, and access to healthcare services. The survey employed sampling techniques and weighting procedures to ensure the representativeness of the target population.

I used descriptive statistics to summarize and characterize the sample and inferential statistics, such as regression analyses (e.g., logistic regression, multiple linear regression), to examine the relationships between the independent and dependent variables. I employed statistical techniques such as interaction effects, stratified analyses, and intersectional regression models to examine the compounding effects of disability status, disability types, and sociodemographic indicators on the outcomes of interest, addressing the intersectional nature of the research questions.

The quantitative cross-sectional design, a national survey dataset, and appropriate statistical analyses provided valuable insights into the intersectional impacts of disability status, disability types, and sociodemographic indicators on COVID-19 uptake and reported reasons for not receiving vaccination for individuals with disabilities during the

pandemic. This approach aligned with my objectives, and I used it to develop a comprehensive understanding of the inequities experienced by this vulnerable population.

Definitions

Intersectionality: Crenshaw (1989) introduced the recognition that the interaction of multiple, intersecting social identities and systems of privilege and oppression shaped individuals' experiences.

Sociodemographic indicators: In this study, sociodemographic characteristics included race/ethnicity, age, and socioeconomic status (SES). Age indicated the age of the respondent at the time of the survey.

Socioeconomic status (SES): In this study, SES was a composite measure of an individual's economic and social position relative to others, encompassing income, education, and occupation (APA, 2022). This definition aligned with the conventional understanding of SES in public health research, which acknowledged the influence of economic and social factors on health outcomes.

Disability: Disability was broadly defined in this study as physical, sensory, cognitive, mental health, and other impairments that limited daily activities or required assistance (WHO, 2011). This inclusive definition recognized the diverse nature of disabilities and their impact on individuals' lives, encompassing various types and degrees of impairment.

Vaccination Uptake: Vaccination uptake refers to the proportion of individuals who received a vaccine among the eligible population. In this study, COVID-19 vaccination uptake pertained explicitly to the percentage of individuals vaccinated against

COVID-19 among the adult population aged 18 and older in the United States (CDC, 2020). This definition focused on the uptake of COVID-19 vaccines and distinguished it from broader measures of vaccination coverage.

Healthcare Access Inequities: Healthcare access inequities refer to unfair, unjust, and avoidable inequalities in the availability, utilization, quality, and outcomes of healthcare services among different populations (Haggerty et al., 2020). These inequities were typically rooted in systemic issues such as socioeconomic status, race, ethnicity, geography, gender, and other social determinants of health. Unlike general healthcare inequalities, which merely describe differences, healthcare access inequities emphasize the ethical and moral imperative to address and rectify these inequalities. This study examined healthcare access inequities in the context of individuals with disabilities during the COVID-19 pandemic, focusing on identifying barriers to accessing COVID-19 testing, treatment, and vaccination services.

Race/Ethnicity: Race and ethnicity refer to the racial or ethnic identity of the individual as self-reported (OMB, 1997).

COVID-19 Pandemic: The global outbreak of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) disease was declared a public health emergency of international concern in January 2020 (WHO, 2020).

Reported Reasons for not Receiving Vaccination (Vaccine Hesitancy): Reported reasons for not receiving vaccination in this study can be simply defined as COVID-19 vaccine hesitancy. Vaccine hesitancy among individuals with disabilities refers to a delay

in acceptance or refusal of COVID-19 vaccines by people with disabilities despite the availability of vaccination services (Myers et al., 2022).

Assumptions

The key assumptions for this study were as follows: firstly, I assumed that the self-reported data collected through the HPS accurately reflected individuals' disability status, sociodemographic characteristics, COVID-19 vaccination status, and access to healthcare services. The study relied on self-reported data, which might have been subject to reporting biases. However, self-reported data are commonly used in public health research, and the HPS employed measures to ensure data quality and reliability. Validating self-reported data through external sources was not feasible within the scope of this study.

Secondly, I assumed that the sample obtained from the HPS was representative of the target population of adults aged 18 and older in the United States. The HPS used sampling techniques and weighting procedures to ensure the sample was representative of the national population. However, relying on an online survey might have introduced biases related to digital access and literacy, potentially underrepresenting specific subgroups within the disability community. I acknowledged this limitation, and the findings were interpreted within the context of the study population.

The intersectionality framework accurately captured the complex interplay between disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status for individuals with different types of disabilities on COVID-19 vaccination uptake and reported reasons for not receiving vaccinations. The

intersectionality framework was a well-established theoretical social science and public health research perspective. I assumed that this was a suitable approach for examining the multidimensional and intersecting forms of disadvantage experienced by individuals with disabilities during the COVID-19 pandemic.

Scope and Delimitations

In this study, I examined the intersectional impacts of disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status for individuals with different types of disabilities on COVID-19 vaccination uptake and reported reasons for not receiving vaccinations during the COVID-19 pandemic. I chose this focus to address the significant gap in the existing literature, which needed comprehensive quantitative analyses that integrated an intersectional approach to investigate these inequities.

The study was delimited to the adult population aged 18 and older in the United States. I selected this population as the primary focus due to the availability of relevant data from the HPS, which collected self-reported information on COVID-19-related experiences and outcomes for this age group. The exclusion of individuals under 18 was a delimitation of the study, as the experiences and needs of children and adolescents with disabilities might have differed from those of adults.

Regarding theoretical and conceptual frameworks, the study was primarily grounded in the intersectionality theory and the social determinants of health framework. While other relevant theories and models (e.g., the disability rights framework and the ecological model of health) might have provided additional insights, the study was

delimited to these critical theoretical perspectives to maintain a focused and manageable scope.

Regarding generalizability, this study's findings primarily apply to the adult population with disabilities residing in the United States during the COVID-19 pandemic. Using a nationally representative dataset, such as the HPS, and applying appropriate sampling and weighting techniques were expected to enhance the generalizability of the results to the broader U.S. adult population with disabilities. However, the study's cross-sectional nature and the potential biases associated with self-reported data might have limited the generalizability of the findings beyond the study period and specific population characteristics. Cautious interpretation and acknowledgment of these limitations are necessary when discussing the broader implications of the study's results.

Overall, the scope and delimitations of this study were designed to provide a comprehensive and focused examination of the intersectional inequities experienced by individuals with disabilities in the United States during the COVID-19 pandemic while acknowledging the limitations in terms of population, theoretical frameworks, and generalizability.

Limitations

One fundamental limitation affecting the generalizability of the study was its reliance on self-reported data from the Household Pulse Survey (HPS). While the HPS was a national survey, the inherent biases of self-reported data, such as social desirability and recall bias, could have impacted the accuracy and reliability of the findings. Additionally, the study focused on adults aged 18 and older in the United States,

excluding individuals under 18. This exclusion limited the applicability of the results to the broader population, particularly children and adolescents with disabilities who might have experienced different healthcare challenges and outcomes.

The trustworthiness of the study's findings was constrained by the potential biases associated with the online survey format of the HPS. Digital access and literacy issues might have led to the underrepresentation of specific subgroups within the disability community, such as those with limited internet access or lower digital literacy. This underrepresentation could have skewed the results, making them less reflective of the disabled population. Furthermore, the study's cross-sectional design only provided a snapshot of the data at a specific point in time, limiting the ability to draw causal inferences or observe changes over time.

The study's internal validity was influenced by the quality of the self-reported data, which may not have always accurately reflected individuals' actual disability status, sociodemographic characteristics, and healthcare experiences. Reporting biases, such as over- or under-reporting of vaccination status and healthcare access issues, could have affected the validity of the findings. Additionally, the study could not validate the self-reported data against external sources, further impacting its internal validity. The complexity of measuring intersectionality through logistic regression models might have also introduced challenges in accurately capturing the nuanced interplay of multiple social identities and their compounded effects on health outcomes.

Reliability issues arose from the study's reliance on a single HPS dataset, which may not have consistently captured all relevant variables over time. The dynamic nature

of the COVID-19 pandemic and changing public health policies could have led to variations in survey responses, impacting the consistency and repeatability of the findings. Additionally, self-reported measures for critical variables, such as vaccination uptake and reasons for vaccine hesitancy, might have been subject to individual perceptions and reporting accuracy fluctuations, further affecting the study's reliability.

Significance

This study contributed to the growing body of research on the impact of the COVID-19 pandemic on individuals with disabilities by adopting an intersectional approach. By examining the interplay between disability status, disability types, and sociodemographic indicators on COVID-19 uptake and reported reasons for not receiving vaccination for individuals with disabilities during the pandemic, the study provided a more nuanced understanding of the multidimensional inequities experienced by this population during the pandemic. The findings expanded the academic knowledge in public health, epidemiology, disability studies, and health inequities research.

Moreover, the study's focus on COVID-19 vaccination uptake and the reported reasons for not receiving vaccinations among individuals with different disability types contributed to the limited research in this area. By elucidating the factors that influenced vaccination decisions and barriers to access, the study informed a more comprehensive understanding of the unique challenges faced by individuals with disabilities in accessing this vital public health intervention.

Furthermore, this study's integration of the intersectionality framework and the social determinants of health approach advanced the application of these theoretical

concepts in health-related research. By demonstrating the value of an intersectional lens in examining health inequities, the study encouraged further research that considered the complex interplay of multiple social identities and determinants of health.

Additionally, the findings of this study informed the development of targeted public health interventions, healthcare practices, and policies aimed at addressing the specific needs and barriers faced by individuals with disabilities during public health emergencies. The insights gained on the intersectional factors influencing COVID-19 vaccination uptake and healthcare access guided the design of tailored outreach, education, and service delivery strategies for this population.

Besides, the study's emphasis on the unique challenges and inequities experienced by individuals with disabilities contributed to developing more inclusive and equitable pandemic preparedness and response plans. The evidence generated informed integration of the disability community's perspectives and needs into public health emergency planning and decision-making processes.

Also, by highlighting the intersectional barriers and inequities faced by individuals with disabilities, this study contributed to advocacy efforts to promote equity and inclusion in healthcare and public health services. The study's findings informed initiatives that challenged existing paradigms and promoted more holistic, person-centered approaches to addressing the needs of individuals with disabilities, especially during public health crises.

Finally, the study's focus on the intersection of disability, sociodemographic indicators, and COVID-19 outcomes aligned with the principles of the United Nations

Convention on the Rights of Persons with Disabilities, which emphasized the right to the highest attainable standard of health and equal access to healthcare services. By uncovering the unique challenges and barriers faced by individuals with disabilities, this research contributed to the advocacy and policymaking efforts aimed at upholding the rights and improving the overall well-being of persons with disabilities.

Summary

This chapter introduced the study's aim to examine the intersectional impacts of disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status on COVID-19 vaccination uptake and reported reasons for not receiving vaccinations among individuals with different types of disabilities during the COVID-19 pandemic. It outlined the background, problem statement, purpose, research questions, hypotheses, theoretical and conceptual frameworks, study nature, definitions, assumptions, scope and delimitations, limitations, and significance of the research.

The concepts of intersectionality and the social determinants of health framed this study. These provided a solid theoretical foundation for understanding the complex interplay between disability, sociodemographic indicators, and health outcomes. The three research questions investigated the associations between these variables and how they may contribute to inequities in vaccination uptake and access to healthcare services.

The proposed research design employed a quantitative cross-sectional approach, utilizing secondary data from the Household Pulse Survey (HPS) to analyze the relevant variables. The data analysis plan included descriptive statistics, multivariate regression analyses, intersectional modeling, and sensitivity analyses to address the research

questions and hypotheses. The study acknowledged several limitations, such as the reliance on self-reported data, the cross-sectional design, and potential biases. However, the researchers outlined reasonable measures that addressed these limitations and enhanced the findings' validity, reliability, and generalizability.

The significance of the study lies in its potential to advance knowledge in public health, epidemiology, disability studies, and health inequities research. By providing a comprehensive understanding of the intersectional impacts of disability, sociodemographic indicators, and vaccination status on COVID-19 outcomes, the study aimed to inform targeted interventions, shape equitable policies, and promote positive social change that upheld the rights and well-being of individuals with disabilities, especially during public health emergencies.

Having established the research design alignment and outlined the significance of the proposed study, the next chapter delved deeper into the review of the existing literature. Chapter 2 provided a comprehensive synthesis of the relevant research on the impact of the COVID-19 pandemic on individuals with disabilities, focusing on the intersections of disability, sociodemographic indicators, and healthcare access. This in-depth literature review further contextualized the research problem, identified gaps in the current knowledge, and solidified the rationale for the current study.

Chapter 2: Literature Review

Introduction

The specific research problem that I addressed in this study was the lack of comprehensive quantitative analysis examining the intersectional impacts of disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status for individuals with different types of disabilities on COVID-19 vaccination uptake and reported reasons for not receiving vaccinations during the COVID-19 pandemic.

The purpose of this quantitative cross-sectional study was to examine the intersectional impacts of disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status for individuals with different types of disabilities on COVID-19 vaccination uptake and reported reasons for not receiving vaccinations during the COVID-19 pandemic. By accounting for the intersection of disability with other social determinants, I provided a more nuanced and holistic understanding of the inequities experienced by individuals with disabilities during the pandemic.

The existing literature highlighted the disproportionate impact of the COVID-19 pandemic on individuals with disabilities, who faced significant challenges in accessing essential healthcare services, including testing, treatment, and vaccination. Studies demonstrated that individuals with disabilities experienced higher rates of COVID-19 infection, hospitalization, and mortality compared to the general population (Hollis et al., 2023; Nab et al., 2023).

Furthermore, the literature documented the persistent barriers and inequities faced by individuals with disabilities in accessing COVID-19 vaccines, with lower vaccination

rates observed in this population (Burdick & Christopher, 2022; Myers et al., 2022).

These inequities were exacerbated by factors such as disability type, sociodemographic characteristics, and the intersection of multiple marginalized identities (Dekker et al., 2022; Wiggins et al., 2022).

However, the current body of research lacked a comprehensive, intersectional analysis with an examination of the combined influence of disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status on COVID-19 outcomes and healthcare access for individuals with different types of disabilities. This gap in the literature underscored the need for this study to address this critical research problem.

In this chapter, I examine the literature pertinent to this study's research problem and objectives. The chapter includes several vital sections. Firstly, in the section on Disability and the COVID-19 Pandemic, I synthesize current evidence concerning the disproportionate impact of the COVID-19 pandemic on individuals with disabilities, encompassing heightened rates of infection, hospitalizations, and mortality within this demographic. Secondly, in Barriers to Healthcare Access for Individuals with Disabilities, I delve into the unique hurdles faced by individuals with disabilities in accessing vital healthcare services during the pandemic, including COVID-19 testing, treatment, and vaccination.

Thirdly, in the section Intersectionality and Social Determinants of Health, I explore theoretical frameworks such as intersectionality and social determinants of health, elucidating their relevance in understanding the intricate interplay between

disability, sociodemographic indicators, and health outcomes. Next, in *Inequities in COVID-19 Vaccination Uptake*, I review existing literature on the inequities observed in COVID-19 vaccination rates among individuals with disabilities, alongside factors contributing to these inequities.

Lastly, in the section on *Gaps in the Literature*, I identify and critically evaluate gaps within current research, emphasizing the necessity for the proposed intersectional study to bridge these gaps and provide a comprehensive understanding of the multifaceted factors influencing COVID-19 outcomes and healthcare access for individuals with disabilities. I used my literature review as the groundwork for my study, substantiating the significance and urgency of the research problem and the imperative for the intended investigation.

Literature Search Strategy

For this literature review, I accessed the library databases and search engines: PubMed, CINAHL Plus, MEDLINE, APA PsycINFO, APA PsycArticles, Embase, ProQuest Health, SocINDEX, and Cochrane Library. I used key search terms and combinations, including: *COVID-19 OR coronavirus AND disability OR disabled OR disabilities, COVID-19 AND vaccination AND disability OR disabilities, COVID-19 AND healthcare access AND disability OR disabilities, COVID-19 AND health inequities AND disability OR disabilities, COVID-19 AND intersectionality AND disability OR disabilities, COVID-19 AND social determinants of health AND disability OR disabilities.*

I reviewed literature from 2020 to the present, with a particular emphasis on recent and pertinent literature emerging during the COVID-19 pandemic. I considered various types of literature, including peer-reviewed journal articles, conference proceedings, and relevant grey literature such as government reports, policy briefs, and white papers. Alongside the library databases mentioned earlier, I scrutinized the reference lists of relevant articles to uncover additional sources contributing to the discourse on the intersectional impacts of disability and COVID-19.

In cases with limited current research explicitly addressing the intersectional impacts of disability, sociodemographic indicators, and COVID-19 outcomes, I expanded the search strategy to include literature on the broader topics of disability, health inequities, and the social determinants of health. This resulted in a more comprehensive understanding of the theoretical and empirical foundations that inform the proposed study.

Furthermore, to ensure the inclusion of seminal literature, I identified vital publications and classic works on intersectionality, social determinants of health, and disability studies. I incorporated them into the review, even if they did not address the COVID-19 pandemic directly. By employing this comprehensive literature search strategy, I gathered the most relevant and up-to-date evidence to establish the research problem, justify the significance of the study, and identify the gaps in the existing knowledge that I sought to address.

Theoretical Foundation

This study was framed by the concept of intersectionality, initially coined by Kimberlé Crenshaw (1989), and the social determinants of health framework proposed by WHO. Kimberlé Crenshaw's seminal work introduced the concept of intersectionality, which was an illustration of the multidimensional and intersecting nature of various forms of discrimination and marginalization, such as race, gender, class, and disability. Crenshaw argued that the experiences of individuals with multiple marginalized identities could not be adequately captured by examining these identities in isolation, as they intersected and compounded each other in complex ways.

The intersectionality framework has been widely applied in various disciplines, including disability studies, health inequity research, and social justice advocacies. Acknowledging the intersecting nature of different social identities and power structures, the intersectionality approach was instrumental in highlighting individuals' unique experiences and challenges at the intersection of multiple marginalized identities.

In the context of this study, the intersectionality framework was particularly relevant as I used it for an examination of the compounding effects of disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status for individuals with different types of disabilities during the pandemic. I used this approach to challenge the tendency to view these factors in isolation and produce a more comprehensive and nuanced understanding of the inequities experienced by individuals with disabilities during the pandemic.

As the WHO proposed, the social determinants of health framework is used to that a wide range of social, economic, and environmental factors, including socioeconomic status, race/ethnicity, gender, disability status, and geographic location, shaped an individual's health. These determinants influence an individual's access to resources, exposure to risk factors, and overall health outcomes.

The social determinants of health framework have been extensively applied in public health research, policy, and interventions. By acknowledging the broader societal and structural factors contributing to health inequities, this approach has been instrumental in shifting the focus from individual-level factors to the systemic and environmental influences on health and well-being. In the context of this study, I used the social determinants of health framework as a complementary lens to the intersectionality approach to consider the complex interplay between disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status for individuals with different types of disabilities during the pandemic.

The integration of the intersectionality and social determinants of health frameworks in this study aligned with the research questions and objectives. By adopting these theoretical perspectives, I examined the intersectional impacts of disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status on COVID-19 vaccination uptake among individuals with different disabilities. Secondly, I investigated how the intersection of these factors shaped the reported reasons for not receiving COVID-19 vaccinations. Finally, I developed a more holistic understanding of the

multidimensional inequities and inequities experienced by individuals with disabilities during the COVID-19 pandemic.

I built upon and challenged existing theory by moving beyond simplistic, single factor analyses and embracing the complexity of the lived experiences of individuals with disabilities. My goal was to generate new insights to inform more inclusive and equity-focused approaches to healthcare and public health interventions by applying an intersectional lens and the social determinants of health framework.

Conceptual Framework

The key concepts and phenomena underpinning this study were disability and the COVID-19 pandemic, intersectionality and health inequities, and social determinants of health. Disability is a multidimensional concept encompassing a range of physical, sensory, cognitive, and psychosocial impairments that could interact with various barriers to hinder an individual's full and effective participation in society (WHO, 2001). The experience of disability is shaped by the complex interplay between an individual's health condition, personal factors, and environmental factors.

During the COVID-19 pandemic, individuals with disabilities were disproportionately affected, facing increased risks of infection, hospitalization, and mortality (Nab et al., 2023; Sosenko et al., 2023). The pandemic also exacerbated this population's barriers to healthcare access and social participation, leading to widening inequities in health outcomes (Friedman & VanPuymbrouck, 2023; Turcheti et al., 2022).

Intersectionality, as conceptualized by Kimberlé Crenshaw (1989), states that the intersection of multiple, overlapping social identities and systems of privilege and

oppression shaped individuals' experiences. This framework challenged the tendency to view social identities, such as disability, race, and socioeconomic status, in isolation. Instead, it emphasized the need to examine their complex and compounding effects on health outcomes and access to resources. In the context of health inequities research, the intersectionality approach was instrumental in highlighting the unique experiences and challenges faced by individuals with multiple marginalized identities (Harari & Lee, 2021). By acknowledging the intersecting nature of these identities, researchers could better understand the systemic barriers and inequities that contributed to health inequities.

As proposed by WHO, the social determinants of health framework posited that a wide range of social, economic, and environmental factors shape an individual's health and well-being (WHO, n.d.). These determinants included, but were not limited to, socioeconomic status, education, employment, housing, access to healthcare, and discrimination. This framework showed that health was not solely an individual responsibility but was heavily influenced by the broader social, political, and economic systems in which people lived. By addressing these social determinants, public health researchers and policymakers could work to reduce health inequities and promote more equitable health outcomes.

In this study, I integrated the conceptual frameworks of disability, intersectionality, and social determinants of health to provide a comprehensive understanding of the multidimensional inequities experienced by individuals with disabilities during the COVID-19 pandemic. By examining the intersection of disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status, my goal

was to elucidate how these overlapping identities and social determinants shaped COVID-19 vaccination uptake and healthcare access for this population. I used these conceptual frameworks to move beyond simplistic, single factor analyses and address the complex, systemic barriers that contributed to the disproportionate impact of the pandemic on individuals with disabilities. Furthermore, integrating these frameworks aligned with my objective to inform evidence-based interventions, policies, and advocacy efforts that promoted equity, inclusion, and the well-being of individuals with disabilities, particularly during public health emergencies like the COVID-19 pandemic.

Literature Review Related to Key Variables and Concepts

Intersectionality

The concept of intersectionality, initially introduced by Kimberlé Crenshaw in 1989, gained significant traction in social sciences and public health research. Intersectionality states that individuals' experiences are shaped by intersecting social identities and systems of privilege and oppression (Crenshaw, 1989). In the context of health inequities research, intersectionality shows that various social categories, such as race, ethnicity, gender, disability, and socioeconomic status, intersected to produce unique health and well-being experiences.

Studies showed that individuals with intersecting marginalized identities often experienced compounded forms of discrimination and disadvantage. For example, Breaux and Rooks (2022) investigated the intersectional effects of race/ethnicity and disability on flu vaccine uptake among US adults aged 18 and older. Using data from the

National Health Interview Survey, the researchers found significant interactions between race/ethnicity and disability, influencing flu vaccine uptake across different age groups.

Another study by Marfo et al. (2024) examined the intersectional dynamics of social privilege and disadvantage in shaping access to COVID-19 information and vaccines among ethnically diverse parents in Canada. Through semi-structured interviews with 48 participants, including both non-Indigenous and Indigenous individuals from various provinces, the study revealed how historical and contemporary experiences of racism, particularly within government and medical institutions, created barriers to trust and access to COVID-19 resources. These findings highlighted the importance of considering multiple social identities when addressing health inequities and developing interventions to promote equitable access to preventive healthcare services.

Intersectionality has been applied in various research areas, including health inequities, education, criminal justice, and workplace dynamics. In healthcare, for instance, researchers have used intersectionality to examine how race, gender, and socioeconomic status intersected to shape health outcomes, access to care, and healthcare experiences (Harari & Lee, 2021). Intersectionality provided a more nuanced understanding of social inequalities by moving beyond single-axis approaches that focused on one dimension of identity. It highlighted the complexity of individuals' lives and experiences and underscored the need for holistic, intersectional analyses in research and policymaking.

One area of debate centered on operationalizing and measuring intersectionality in research. Critics argued that intersectionality was challenging to quantify and

operationalize, making it difficult to apply in empirical studies (Harari & Lee, 2021). Ongoing discussions about the most appropriate methodological approaches for capturing intersectional identities and experiences existed. Some researchers raised concerns about the potential for essentializing identities or overlooking intra-group diversity within intersecting categories (Holman et al., 2021). For example, not all individuals within a particular racial or gender group have identical experiences, and intersectionality should account for this diversity.

The role of privilege within intersectionality frameworks was another point of contention. While intersectionality often focuses on marginalized identities and experiences, it also acknowledges that individuals may hold privileged identities that confer advantages in specific contexts (Kelly et al., 2021). However, there needs to be more debate about addressing privilege within intersectional analyses without detracting from the focus on marginalized groups.

Sociodemographic Indicators

Sociodemographic indicators encompassed a range of characteristics, including but not limited to race/ethnicity, age, gender, socioeconomic status (SES), education level, marital status, and geographic location (Beatty Moody et al., 2021). These factors were widely recognized as determinants of health, influencing individuals' access to resources, exposure to risks, and health-related behaviors. Numerous studies demonstrated associations between sociodemographic indicators and various health outcomes. For example, individuals from lower SES backgrounds tended to experience

higher rates of chronic diseases, lower life expectancy, and poorer health outcomes compared to those from higher SES backgrounds (Kim, 2022).

Race and ethnicity were extensively studied in health inequities, with racial and ethnic minority groups often facing disproportionate burdens of disease, reduced access to healthcare, and inequities in healthcare quality (Javed et al., 2022). Discrimination, socioeconomic disadvantage, and cultural differences contributed to these inequities. Age was another critical sociodemographic factor influencing health outcomes and healthcare utilization patterns. Older adults often experience age-related health challenges and may require different healthcare services than younger age groups (Allen et al., 2022).

While there was consensus on the importance of sociodemographic indicators in shaping health outcomes, there were debates regarding the relative contributions of each factor and the mechanisms underlying these associations (Holman et al., 2021). For example, some studies suggested that race/ethnicity may have substantially influenced specific health outcomes more than SES, while others emphasized the role of SES in driving health inequities.

The intersectionality of sociodemographic indicators complicated the interpretation of the study findings. Individuals may have held multiple marginalized identities (e.g., being a racial minority and low SES), and the combined effects of these intersecting factors may have amplified health inequities (Vohra-Gupta et al., 2022). However, the extent to which intersectionality influenced health outcomes remained an ongoing area of research and debate. There needs to be more consistency in the literature regarding the relationship between education level and health outcomes (Raghupathi &

Raghupathi, 2020). While higher levels of education were generally associated with better health outcomes, the strength and direction of this association may have varied across different populations and health indicators.

Disability

Disability was broadly defined in this study to include physical, sensory, cognitive, mental health, and other impairments that limited daily activities or required assistance. This study acknowledged the diverse nature of disabilities and their impact on individuals' lives, encompassing various types and degrees of impairment. Individuals with disabilities face unique challenges in accessing healthcare services, including COVID-19 testing, treatment, and vaccination, which may have exacerbated existing health inequities (Clemente et al., 2022; Gréaux et al., 2023).

Numerous studies documented the significant impact of disability on various aspects of life, including physical and mental health, social relationships, employment, education, and access to healthcare services. Individuals with disabilities often experience barriers to full participation in society and may face stigma, discrimination, and social exclusion.

Disability was associated with a higher prevalence of chronic health conditions, functional limitations, and lower quality of life than the general population (Fong, 2019). Health inequities among individuals with disabilities were well-documented, with higher rates of preventable diseases, unmet healthcare needs, and poorer health outcomes. Access to healthcare services was a critical issue for individuals with disabilities, with many facing barriers such as physical inaccessibility, lack of accommodations,

inadequate provider training, and financial constraints (Gréaux et al., 2023). These barriers contributed to healthcare utilization and the perpetuation of health inequities.

There was debate within the literature regarding the measurement and classification of disability. Different studies may have used varying definitions and criteria for identifying disability, leading to inconsistent prevalence estimates and population comparisons. Disability intersected with other sociodemographic indicators such as race, ethnicity, gender, and socioeconomic status, complicating the interpretation of study findings (Dorsey Holliman et al., 2023). The interaction between disability and other social identities may have amplified or mitigated the effects of disability on health outcomes and social participation. Some researchers argued that the medical model of disability, which focused on individual impairments and limitations, failed to capture the broader social and environmental factors that contributed to disability and shaped individuals' experiences. A shift towards a social model of disability, which emphasized the role of societal barriers and discrimination, was advocated as a more comprehensive approach to understanding disability (Zaks, 2023).

Vaccination Uptake

Vaccination uptake refers to the proportion of individuals who have received a vaccine among the eligible population. Research on vaccination uptake has focused on various vaccines, including those for infectious diseases like influenza, measles, and COVID-19. Variables influencing vaccination uptake included individual characteristics (e.g., age, race/ethnicity, socioeconomic status), access to healthcare services, vaccine

efficacy, and safety perceptions, vaccine mandates or policies, and social and cultural factors (Kolobova et al., 2022).

Numerous studies have consistently found inequities in vaccination uptake based on sociodemographic indicators. For example, older adults and individuals from higher socioeconomic backgrounds generally had higher vaccination rates than younger individuals and marginalized communities (AlShurman et al., 2021). Historically marginalized communities, including Black, Indigenous, and Hispanic populations, often faced barriers such as lack of access to healthcare services, mistrust of healthcare providers, and systemic racism, which contributed to lower vaccination rates (Roat et al., 2022). Socioeconomic status also played a significant role in vaccination uptake. Individuals from lower socioeconomic backgrounds may have encountered financial barriers, limited access to healthcare facilities, and inadequate health education, which could have impeded their ability to receive vaccinations.

There were many reasons for inequities in vaccine uptake, including discrimination, mistrust, language and cultural barriers, etc. Discrimination experienced by specific population groups, such as racial and ethnic minorities or individuals with disabilities, could have contributed to mistrust of healthcare systems and vaccine hesitancy. Historical instances of medical racism and unethical research practices have led to enduring mistrust within these communities, impacting their willingness to receive vaccines (Morgan et al., 2022). Language and cultural differences could also have affected vaccination uptake. Individuals from immigrant or non-English-speaking backgrounds may have encountered challenges in understanding vaccination information,

navigating healthcare systems, and accessing culturally competent care, leading to inequities in vaccine uptake (Salib et al., 2022).

While various interventions have been implemented to address inequities in vaccination uptake, such as targeted outreach programs, community engagement initiatives, and culturally tailored interventions, their effectiveness in reducing inequities has remained mixed. Some interventions may have had limited reach or effectiveness in addressing underlying structural barriers (Adeagbo et al., 2022). The role of healthcare providers in addressing vaccine-related discrimination and inequities was complex. While healthcare providers could have been crucial in building trust and promoting vaccination uptake, discrimination or bias within healthcare settings may have further exacerbated inequities (Allen et al., 2022). The intersectionality of social identities, such as race, ethnicity, gender, and disability, complicated the relationship between discrimination and vaccination uptake. Research exploring how multiple intersecting factors contributed to inequities in vaccination uptake was still emerging and required further investigation (Breux & Rooks, 2022).

Healthcare Access Inequities

Healthcare access inequities refer to unfair, unjust, and avoidable inequalities in healthcare services' availability, utilization, quality, and outcomes among different populations (Haggerty et al., 2020; Okonkwo et al., 2020). In this study, healthcare access inequities were examined among individuals with disabilities during the COVID-19 pandemic. This included identifying barriers to accessing COVID-19 testing, treatment, and vaccination services and inequities in healthcare outcomes.

Numerous studies have consistently documented inequities in healthcare access based on factors such as race/ethnicity, socioeconomic status (SES), gender, geographic location, and disability status. Racial and ethnic minorities, including Black, Hispanic, and Indigenous populations, often face barriers to accessing healthcare services due to systemic racism, language barriers, discrimination, and lack of culturally competent care (Banaji et al., 2021).

Individuals with lower SES, often measured by income, education, and occupation, experienced poorer healthcare access than those with higher SES. Economic factors such as lack of health insurance, transportation issues, and out-of-pocket costs contributed to these inequities (McMaughan et al., 2020). Gender inequities in healthcare access existed, with women sometimes facing challenges related to reproductive health services, maternal care, and access to specialty care (Tesda et al., 2023).

While it was widely acknowledged that inequities existed, an ongoing debate existed about the underlying causes and mechanisms driving these inequities. Some researchers emphasized social determinants of health, such as poverty, racism, and social exclusion, as root causes, while others focused on individual behaviors and healthcare system factors (Yearby et al., 2022). The role of health insurance coverage in mitigating healthcare access inequities was debated. While having health insurance was generally associated with better access to care, inequities persisted even among insured populations, indicating that insurance alone may not have been sufficient to address all barriers (Crowley et al., 2020). Studies examining the intersectionality of multiple social identities, such as race/ethnicity, gender, and SES, in healthcare access were still

relatively limited. Understanding how these intersecting factors compounded or mitigated inequities was an area of ongoing research (Vohra-Gupta et al., 2022).

Race/Ethnicity

Race and ethnicity were complex social constructs encompassing individuals' self-identified racial or ethnic identities (White et al., 2020). In research, race and ethnicity served as a proxy for social, cultural, and historical factors influencing health outcomes, healthcare access, and healthcare utilization, and understanding the role of race/ethnicity in health inequities required examining how structural racism, discrimination, socioeconomic status, cultural beliefs, and access to healthcare intersected to shape health outcomes within racial/ethnic groups.

Numerous studies have documented health inequities based on race/ethnicity, with racial/ethnic minority groups often experiencing poorer health outcomes compared to white populations. These inequities spanned various health indicators, including mortality rates, chronic disease prevalence, access to healthcare services, and vaccination rates (Yaya et al., 2020). Structural racism and discrimination contributed to health inequities by limiting opportunities for socioeconomic advancement, exacerbating poverty, and perpetuating unequal access to healthcare resources and services (Churchwell et al., 2020). Marginalized racial/ethnic groups faced systemic barriers that affected their physical and mental health outcomes. Cultural beliefs, traditions, and socioeconomic factors within racial/ethnic communities influenced health behaviors, healthcare-seeking behaviors, and treatment preferences. Understanding these factors was

crucial for developing culturally competent healthcare interventions and addressing inequities (Nair & Adetayo, 2019).

While health inequities based on race/ethnicity were well-documented, there was ongoing debate about the underlying causes and mechanisms driving these inequities. Some researchers emphasized the role of socioeconomic factors and access to healthcare, while others highlighted the impact of systemic racism and discrimination (Yearby et al., 2022). Classifying individuals into racial/ethnic categories could be challenging and might not fully capture the complexities of racial and ethnic identities. The use of self-reported race/ethnicity data in research might oversimplify individuals' identities and fail to account for intersectional experiences.

COVID-19 Pandemic

The COVID-19 pandemic was the global outbreak of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) disease. It encompassed various aspects, including epidemiology, public health measures, healthcare systems' responses, socioeconomic impacts, and individual behaviors (Muralidar et al., 2020). Understanding the multifaceted nature of the pandemic was essential for addressing its challenges and mitigating its impact on global health and society.

The pandemic had profound socioeconomic impacts, including employment, education, supply chains, and economic stability disruptions. Vulnerable populations, such as low-income individuals, racial/ethnic minorities, and those in precarious employment, were disproportionately affected (Tai et al., 2021). While public health measures such as lockdowns, mask mandates, and vaccination proved effective in

curbing transmission, there needed to be more clarity about their implementation, duration, and societal impacts (Talic et al., 2021). Controversies existed regarding the balance between public health objectives and individual freedoms.

Misinformation targeting disability communities and the absence of tailored information led to misunderstandings about vaccine safety and efficacy. Social and psychological factors, such as the influence of caregivers, family members, or community leaders who were vaccine-hesitant, and higher levels of social isolation reducing access to accurate information, further exacerbated vaccine hesitancy, along with psychological stress and mental health issues.

COVID-19 Vaccine Hesitancy

Numerous studies have reported that individuals with disabilities faced numerous specific challenges during the COVID-19 vaccination pandemic (Goyal et al., 2023). People with disabilities encountered physical and communication barriers at vaccination sites, such as a lack of ramps, elevators, transportation, and hearing or visual impairments, respectively (Sebring et al., 2022). Distrust in the healthcare system was prevalent due to past experiences of discrimination or inadequate care, historical neglect, and fears of being deprioritized or receiving lower quality care (Powell, 2020). Health-related concerns included fears of adverse reactions due to existing conditions, worries about interactions between the vaccine and ongoing treatments, and heightened anxiety about managing potential side effects without adequate support (Rodrigues et al., 2022).

Individuals who belong to multiple marginalized groups, such as a Black person with a disability living in poverty, face barriers that are not merely additive but

multiplicative, significantly intensifying their overall experience of disadvantage and skepticism (Wickenden, 2023). Public health messages and interventions often fail to consider the cultural and social contexts of intersecting identities, rendering them less effective. Additionally, those with intersecting marginalized identities may be more vulnerable to targeted misinformation, which exploits their specific fears and mistrusts, further exacerbating vaccine hesitancy (Robards et al., 2020).

Vaccine hesitancy and misinformation posed significant challenges to vaccination efforts. Studies identified various factors contributing to vaccine hesitancy, including distrust in government and pharmaceutical companies, misinformation spread through social media, and historical vaccine mistrust within specific communities (Zimmerman et al., 2023). Further research was needed to address inequities in COVID-19 outcomes and access to healthcare services among marginalized and vulnerable populations. Understanding the social determinants of health and structural inequalities was crucial for developing equitable pandemic response strategies.

Summary and Conclusions

The literature consistently demonstrated the disproportionate impact of the COVID-19 pandemic on individuals with disabilities and those from marginalized communities. Intersectionality, which considered the overlapping effects of multiple social identities, was crucial in understanding health inequities. Race, ethnicity, age, gender, socioeconomic status, and disability intersect to shape individuals' experiences and access to healthcare.

Individuals with inequities faced unique barriers to accessing healthcare services during the pandemic, including testing, treatment, and vaccination. Structural barriers, discrimination, and lack of accommodation contributed to inequities in healthcare access. Inequities in COVID-19 vaccination uptake existed based on sociodemographic indicators and disability status. Vaccine hesitancy, misinformation, and systemic barriers contributed to these inequities.

While there was existing literature highlighting inequities and barriers faced by individuals with disabilities, there was a lack of comprehensive, intersectional analysis that examined the combined influence of disability status, sociodemographic indicators, and vaccination status on COVID-19 outcomes and healthcare access. The literature established that individuals with disabilities and those from marginalized communities faced significant inequities in COVID-19 outcomes and healthcare access.

Limited comprehensive research examined the intersectional impacts of disability status, sociodemographic indicators, and vaccination status on COVID-19 outcomes and healthcare access. The present study filled the gap in the literature by providing a comprehensive, intersectional analysis of the impacts of disability status, sociodemographic indicators, and vaccination status on COVID-19 outcomes and healthcare access. By addressing this critical research gap, the study aimed to provide a more nuanced understanding of the inequities experienced by individuals with disabilities during the pandemic and contribute to evidence-based interventions and policies.

To address the gaps identified in the literature, Chapter 3 detailed the methods employed in this study to conduct a quantitative cross-sectional analysis. The methods

included data collection procedures, participant recruitment strategies, measurement tools for disability status, sociodemographic indicators, vaccination status, and COVID-19 outcomes. By employing a rigorous methodology, the study aimed to provide robust evidence that extended knowledge in the discipline and informed more inclusive and equity-focused approaches to healthcare and public health interventions.

Chapter 3: Research Method

Introduction

In this chapter, I examined the intersectional impacts of disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status for individuals with different types of disabilities on COVID-19 vaccination uptake and reported reasons for not receiving vaccinations during the COVID-19 pandemic. My goal in this study was to provide a comprehensive understanding of the inequities experienced by individuals with disabilities and to inform targeted interventions, policies, and healthcare practices to mitigate these inequities and promote health equity.

In the research design and methodology section, I provided an overview of the quantitative cross-sectional study design employed. I discussed the various components, including data sources, sampling techniques, data collection procedures, and analysis methods to address the research questions and hypotheses. In the data sources and measures subsection, I detailed the primary data source that I used in the study, the HPS. I discussed how relevant variables about disability status, sociodemographic indicators, vaccination status, and COVID-19 outcomes were measured and incorporated into the analysis.

The subsequent subsection on sampling techniques includes discussion of the strategies that I employed to ensure the representativeness of the study sample and mitigate potential biases associated with the HPS data. I elaborate on the sampling frame, methods that I used for sampling, and procedures I implemented to weight the data, thereby accounting for non-response and ensuring sample representativeness. In the data

collection procedures subsection, I offer insights into collecting data for the HPS, including details regarding survey administration, the timeframe for data collection, response rates, and measures taken to uphold data quality and reliability.

Finally, in the analysis methods section, I outlined the statistical techniques that I employed to analyze the data and assess the research hypotheses. I discuss descriptive and inferential statistical methods, such as regression analyses, interaction effects, and stratified analyses, to investigate the intersectional impacts of disability status, sociodemographic indicators, and vaccination status on COVID-19 outcomes and access to healthcare services. In this chapter, I provide a detailed overview of the research design and methodology that I employed in the study, laying the groundwork for the subsequent analysis and interpretation of findings.

Research Design and Rationale

The study variables included independent variables, dependent variables, and potential covariates. Independent variables encompassed disability status and disability types. The dependent variables included COVID-19 vaccination uptake and reported reasons for not receiving vaccination. Covariates included sociodemographic indicators such as race, ethnicity, and age.

The research design was a quantitative cross-sectional study that I conducted to understand the intersectional impacts of disability status, sociodemographic indicators, and vaccination status on COVID-19 outcomes and healthcare access during the pandemic. I used this design for simultaneous examination of multiple variables within a

specific time frame, facilitating the investigation of associations between variables and testing hypotheses.

Time and resource constraints associated with the cross-sectional design included limitations in assessing causality and temporal relationships between variables due to the single-time data collection. Additionally, resource constraints limited the ability to conduct longitudinal studies that tracked variable changes over time.

I chose the cross-sectional design because it aligned with the need to advance knowledge in the discipline by providing timely insights into the intersectional inequities experienced by individuals with disabilities during the COVID-19 pandemic. This design includes efficient data collection and analysis across diverse populations, contributing to a more comprehensive understanding of health inequities and informing targeted interventions and policies.

Without an intervention study, I examined existing associations and inequities rather than implementing interventions. However, the findings from this study could be used to inform the development of evidence-based interventions and policies aimed at addressing the identified inequities in COVID-19 outcomes and healthcare access for individuals with disabilities.

Methodology

Population

In this study, I focused on adults aged 18 and older living in the United States during the COVID-19 pandemic who self-identified as having a disability. The intended sample size for this population was 2,500 non-institutionalized adults.

Sampling Strategy

The sampling strategy for this study included probability-based and stratified sampling. Probability-based sampling ensured that every individual in the target population had a known and non-zero chance of being selected for inclusion in the sample, thereby enhancing the representativeness of the study findings. Stratified sampling resulted in the deliberate oversampling of specific subgroups, such as individuals with disabilities, to ensure adequate representation of these groups in the final sample.

Sampling Procedures

The sample for this study was drawn from the HPS, a national survey conducted by the U.S. Census Bureau. The HPS employed a dual-frame sampling approach, combining random-digit-dialing (RDD) and address-based sampling (ABS) methods to reach households across the United States. RDD randomly selected phone numbers from landline and cell phone databases, while ABS selected addresses from the U.S. Postal Service's Delivery Sequence File.

Sampling Frame

The sampling frame consisted of households in the United States eligible to participate in the HPS. The U.S. Census Bureau conducted the HPS as a national survey to collect data on household experiences during the COVID-19 pandemic. It included individuals aged 18 and older residing in non-institutionalized settings, covering various demographic characteristics, including disability status.

Power Analysis and Sample Size Determination

I used a power analysis to determine the appropriate sample size for this study, considering the desired effect size, alpha level, and power level. Researchers chose the effect size, alpha, and power levels based on standard epidemiological and public health research conventions, ensuring that the study was adequately powered to detect meaningful associations between disability status, sociodemographic indicators, and COVID-19 outcomes (Serdar et al., 2021).

Previous studies examining the association between disability status, sociodemographic indicators, and COVID-19 outcomes guided the effect size selection. They selected a medium effect size to ensure the study had sufficient power to detect meaningful differences between groups. Researchers set the alpha or significance level at 0.05, the conventional threshold for statistical significance in hypothesis testing (Brydges, 2019). The power level was set at 0.80, indicating an 80% probability of detecting an actual effect if it existed while minimizing the risk of a Type II error.

Researchers calculated the sample size using online tools such as OpenEpi or G*Power, which estimate the size for complex study designs (Kang, 2021). Given the study's multivariate regression analysis and stratified sampling approach, they determined that a minimum sample size of 1,000 individuals with disabilities would achieve adequate statistical power for detecting the hypothesized effects.

These parameters balanced detecting significant effects while minimizing the risk of Type I and Type II errors. Overall, the outlined methodology ensured that the study

sample was representative of the target population of adults with disabilities in the United States, thus enhancing the generalizability of the study findings to this population.

Archival Data Procedures

The primary dataset that I used in this study was the HPS, a publicly available dataset maintained by the U.S. Census Bureau. Participation in the HPS was voluntary and involved self-administered online surveys conducted weekly. Researchers accessed the HPS dataset through the U.S. Census Bureau's Data Portal, which provided access to various public-use files. They were not required to register for an account on the Census Bureau's website. The relevant datasets were accessed and downloaded for analysis.

I used the HPS dataset as the primary data source for this study due to its comprehensive coverage of COVID-19-related experiences and outcomes among U.S. households. The dataset, maintained by a trusted government agency, ensured data quality and reliability. Additionally, the HPS dataset provided timely and nationally representative data, making it well-suited for studying the intersectional impacts of disability, sociodemographic indicators, and vaccination status on COVID-19 outcomes. While other sources of data, such as administrative records or medical databases, could provide additional information, the HPS dataset offered the most comprehensive and accessible data for addressing the research questions of this study.

Instrumentation and Operationalization of Constructs

Disability Status

Participants self-reported their disability status, indicating whether they had a disability and specifying the type(s) of disability they experienced. Disability status was

categorized based on the types of disabilities reported, such as physical, sensory, or cognitive impairments. Scores represented the presence (1) or absence (0) of each type of disability.

Disability Types

Participants self-reported disability types from predefined categories, indicating the types of disabilities they experienced. I coded the disability types as numeric variables. These categories encompassed specific classifications of disabilities, including physical, sensory, cognitive, or mental health disabilities.

Sociodemographic Indicators (Race/Ethnicity and Age)

Participants self-reported their race/ethnicity and age, selecting their racial/ethnic identity from predefined categories and reporting their age in years. Race/ethnicity was coded using dummy variables, with values assigned to different racial or ethnic groups (e.g., 1 for White, 2 for Black). Age was treated as a continuous variable, representing the participant's age in years.

COVID-19 Vaccination Uptake (Vaccination Status)

Participants self-reported their COVID-19 vaccination status in surveys, indicating whether they had received a COVID-19 vaccine and specifying the doses received. Vaccination status could be binary, with "1" representing vaccinated individuals and "0" indicating those not vaccinated, or categorical, such as "fully vaccinated" or "partially vaccinated."

Reported Reasons for Not Receiving Vaccinations

Reported reasons for not receiving vaccinations involved the explanations provided by individuals for why they had not been vaccinated against COVID-19. Reasons for not receiving vaccinations were collected through open-ended or structured questions asking participants to specify their reasons for not vaccinating.

Data Analysis Plan

I used SPSS version 28.0 statistical software to analyze the dataset. SPSS is a widely used software program for statistical analysis, particularly in social science research. The software includes various tools for data manipulation, including descriptive statistics, inferential statistics, and data visualization.

Data Cleaning and Screening Procedures

The data cleaning and screening procedures for this study involved several steps to ensure the integrity and reliability of the dataset. Missing data were identified and handled using appropriate techniques, such as imputation or exclusion, depending on the extent and pattern of missingness. If missing data were deemed missing completely at random (MCAR), imputation methods such as mean substitution or regression imputation were used to estimate missing values. Alternatively, if missingness was related to specific data characteristics, excluding cases with missing data was necessary after carefully considering potential biases introduced by exclusion. Outliers were identified using statistical methods such as z-scores or boxplots and assessed for their impact on the analysis. Extreme values were winsorized, where the extreme values were replaced with less extreme values or transformed using appropriate transformations to mitigate their

influence on statistical analyses. The data were also checked for accuracy and consistency to ensure the reliability of the findings. This involved examining data distributions, checking for entry errors, and verifying data against established benchmarks or criteria. Any inconsistencies or discrepancies were addressed through data verification and validation procedures.

Research Questions and Hypotheses

Research Question 1: Is there an association between disability status and COVID-19 vaccination uptake among adults aged 18 and older in the United States, and does this association vary based on sociodemographic indicators such as race/ethnicity and age?

Null Hypothesis (H_0): There is no association between disability status and COVID-19 vaccination uptake among adults aged 18 and older in the United States, considering the intersection with sociodemographic indicators such as race/ethnicity and age.

Alternate Hypothesis (H_1): There is an association between disability status and COVID-19 vaccination uptake among adults aged 18 and older in the United States, considering the intersection with sociodemographic indicators such as race/ethnicity and age.

Research Question 2: Is there a difference in COVID-19 vaccination uptake among adults with different disability types, and is this difference moderated by sociodemographic indicators such as race/ethnicity and age?

Null Hypothesis (H_0): There is no difference in COVID-19 vaccination uptake among adults with different disability types, controlling for sociodemographic indicators such as race/ethnicity and age.

Alternate Hypothesis (H_1): There is a difference in COVID-19 vaccination uptake among adults with different disability types, controlling for sociodemographic indicators such as race/ethnicity and age.

Research Question 3: Is there an interaction effect between disability status and reported reasons for not receiving vaccinations among adults aged 18 and older in the United States, and is this interaction influenced by sociodemographic indicators such as race/ethnicity and age?

Null Hypothesis (H_0): There is no interaction effect between disability status and vaccination status on reported reasons for not receiving vaccinations among adults aged 18 and older in the United States, controlling for sociodemographic indicators such as race/ethnicity and age.

Alternate Hypothesis (H_1): There is an interaction effect between disability status and vaccination status on reported reasons for not receiving vaccinations among adults aged 18 and older in the United States, controlling for sociodemographic indicators such as race/ethnicity and age.

Statistical Analysis

I used descriptive statistics (e.g., frequencies, means, proportions) to summarize and characterize the sample. I employed inferential statistics, such as regression analyses (e.g., logistic regression, multiple linear regression), to examine the relationships between the independent variables (disability status and disability types) and the dependent variables (vaccination status and reported reasons for not receiving vaccinations).

I utilized statistical techniques such as interaction effects, stratified analyses, and intersectional regression models to examine the compounding effects of disability status, disability types, and sociodemographic indicators (race/ethnicity and age) on COVID-19 vaccination uptake. I reported reasons for not receiving vaccinations among adults aged 18 and above in the United States during the COVID-19 pandemic. I conducted sensitivity analyses and robustness checks to assess the reliability and validity of the findings, accounting for potential confounding factors, missing data, and other sources of bias.

Interpretation of Results

In this study, I analyzed critical parameter estimates, odds ratios, confidence intervals, and probability values to evaluate the strength and significance of associations between key variables. The results revealed nuanced insights into the health disparities experienced by individuals with disabilities, particularly in the context of COVID-19 vaccination uptake. I discussed the results in the context of the study objectives and hypotheses, considering potential implications for public health practice and policy.

Threats to Validity

Here are the threats to validity that I considered for this quantitative cross-sectional study examining the intersectional impacts of vaccination inequities among individuals with disabilities in the United States during the COVID-19 pandemic.

Threats to External Validity

Testing Reactivity:

There was a risk that participants' awareness of being observed or tested might alter their behavior, known as the Hawthorne effect (Rezk et al., 2021). To mitigate this threat, I minimized participants' awareness of the study's objectives and ensured that data collection procedures were as unobtrusive as possible.

Interaction Effects of Selection and Experimental Variables:

The possibility of interaction effects between the selection of participants and the experimental variables might have affected the generalizability of the findings. To address this, I employed random sampling techniques to enhance the sample's representativeness and minimize biases associated with participant selection.

Specificity of Variables:

The study's variables had specific characteristics that might have limited their generalizability to other contexts or populations. To enhance external validity, I tried to clearly define and operationalize variables, allowing for their application to broader populations or settings.

Reactive Effects of Experimental Arrangements:

How the experimental conditions were presented or administered influenced participants' responses, potentially affecting the study's external validity. I paid careful attention to the standardization of experimental procedures and minimized extraneous variables that could introduce reactivity.

Multiple-Treatment Interference:

The concept of Multiple-Treatment Interference (MTI) was not applicable in this study.

This study examined the relationships between disability status, sociodemographic factors, vaccination status, and reported reasons for not receiving vaccinations. By examining these factors, the study sought to understand the complex interplay and identify potential inequities in COVID-19 vaccination uptake among individuals with disabilities, providing valuable insights for public health practice and policy.

Threats to Internal Validity***History***

External events occurring during the study period could have influenced participants' responses, potentially confounding the interpretation of results. I tried to control or minimize the impact of external events through careful study design and statistical analysis techniques such as controlling for covariates.

Maturation

Over time, natural changes or developments in participants could have affected the study's outcomes. I tried to address this threat by carefully choosing the studies and employing appropriate statistical techniques to account for maturation effects.

Testing

The measurement may have influenced participants' subsequent responses, particularly in repeated-measures designs. To mitigate this threat, the researchers used counterbalancing techniques where applicable, and efforts were made to minimize the frequency and duration of testing to reduce the likelihood of testing effects.

Instrumentation

Changes in measurement instruments or procedures throughout the study may have introduced systematic biases or errors. To address this threat, the researchers tried to maintain consistency in measurement tools and procedures throughout the study period and conducted reliability analyses to ensure the consistency of measurements.

Statistical Regression

Extreme scores obtained at the initial measurement may have regressed toward the mean upon subsequent measurement, potentially leading to artificially inflated or deflated results. To minimize this threat, the researchers employed statistical techniques such as analysis of covariance (ANCOVA) to adjust for baseline differences and control for regression effects.

Threats to Construct or Statistical Conclusion Validity***Construct Validity***

The operationalization of constructs or variables may have yet to represent the underlying theoretical concepts accurately. To address this threat, I tried to use validated measurement tools and ensure that variables were operationalized consistently with existing theoretical frameworks.

Statistical Conclusion Validity

Errors in statistical analysis or interpretation might have led to incorrect conclusions about the relationships between variables. To enhance statistical conclusion validity, I employed rigorous statistical techniques and conducted sensitivity analyses to assess the robustness of findings under different analytical approaches. Additionally, I

made efforts to accurately report effect sizes, confidence intervals, and probability values to facilitate transparent interpretation of results.

Ethical Procedures

Institutional Permissions and IRB Approval

This research employed the US Census Bureau's HPS public use files (PUF), accessible on the data.gov website. These data files were anonymized and contained no protected health information or personal identifiers. As a result, the study qualified for exemption from human subject research regulations under 45 CFR 46.104(d)(4).

However, despite this exemption, an application for IRB exemption was submitted to the Walden University IRB for evaluation and approval before commencing the analysis of the HPS data. The IRB application included comprehensive information regarding the specific archival data files, research inquiries, data security measures, and ethical considerations. The IRB approval number is documented in Chapter 4.

Recruitment Materials and Processes

Direct recruitment materials or processes were optional since this was a secondary analysis of extant HPS data collected by the US Census Bureau. Archived data were downloaded directly from the data.gov website.

Data Collection, Withdrawal, and Adverse Events

The US Census Bureau collected the de-identified HPS data, and participants could voluntarily withdraw from the panel survey any time. Since this study used archived data, no direct data collection or intervention activities required additional ethical oversight related to withdrawal, non-participation, or adverse events.

Data Privacy and Confidentiality

The publicly available HPS data contained no personal identifiers or protected health information, maintaining participant anonymity. The data files were stored securely on a password-protected computer used only by me, the researcher. I did not share the data with any other parties. I reported results only in aggregate form without individual data. After completing the study, I permanently deleted the data files from my computer.

Conflicts of Interest

I had no known conflicts of interest to disclose related to conducting this study as an independent researcher using the HPS PUF dataset.

Incentives

There were no incentives for the primary data collection or this secondary analysis. These procedures ensured that the study adhered to ethical standards while analyzing and reporting secondary data from a national survey. The research advanced health equity, thus offering a significant societal benefit.

Summary

Chapter 3 delved into the intricacies of a quantitative cross-sectional study to understand the multifaceted impacts of disability status, sociodemographic indicators, and vaccination status on COVID-19 outcomes and healthcare accessibility. The overarching purpose was to shed light on the existing inequities faced by individuals with disabilities and to offer insights that could guide interventions to foster health equity. The research design and methodology section provided a comprehensive overview of the

research design employed, delineating key elements such as data sources, sampling techniques, data collection procedures, and analysis methods. It comprised distinct subsections: Research Design and Rationale, Data Sources and Measures, Sampling Techniques, Data Collection Procedures, and Analysis Methods.

The research design hinged on identifying independent variables (e.g., disability status and disability types), dependent variables (e.g., vaccination status), and potential covariates (e.g., sociodemographic indicators). It adopted a quantitative cross-sectional approach to offer a snapshot of the intersectional impacts, albeit constraints such as single-time data collection impeded causal inference. This methodology segment delineated the target population, adults aged 18 and above in the US with disabilities during the pandemic. It outlined the sampling strategy, amalgamating probability-based and stratified techniques to ensure sample representativeness. Furthermore, it elucidated the methodology involving utilizing the Household Pulse Survey (HPS) data and a power analysis to ascertain sample adequacy.

In the operationalization of constructs, the operational definitions, measurement methods, and recoding procedures for variables (e.g., disability status, sociodemographic indicators, vaccination status) were expounded. Notably, variables were transformed from string to numeric and ordinal forms for analytical purposes. The analysis plan entailed utilizing SPSS version 28.0 software and rigorous data cleaning and screening protocols to handle missing data and outliers. Moreover, it revisited the research questions and hypotheses while detailing statistical tests, covariate inclusion, and strategies for interpretation.

The threats to validity section identified potential threats to the study's validity, encompassing external (e.g., testing reactivity, selection effects) and internal (e.g., history, instrumentation) validity concerns. It also addressed construct and statistical conclusion validity threats to ensure robustness in the findings. Lastly, ethical considerations surrounding institutional permissions, IRB approvals, recruitment processes, data treatment, and confidentiality measures were meticulously delineated. Conflict of interest disclosures were provided, along with assurances that no incentives were offered for participation. Chapter 3 served as a foundational pillar, elucidating the intricate design and methodology of the quantitative cross-sectional study. It set the stage for subsequent data analysis and interpretation in Chapter 4, offering a comprehensive roadmap to navigate the research journey.

Chapter 4: Results

Introduction

Chapter 4 includes the findings of the quantitative cross-sectional study in which I examined the intersectional impacts of disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status on COVID-19 vaccination uptake and reported reasons for not receiving vaccinations among adults aged 18 and above in the United States during the COVID-19 pandemic. The purpose of this study was to provide insights into the inequities experienced by individuals with disabilities and to inform targeted interventions, policies, and healthcare practices to mitigate these inequities and promote health equity.

My research questions and hypotheses for this study were thus:

RQ 1: Is there an association between disability status and COVID-19 vaccination uptake among adults aged 18 and older in the United States, and does this association vary based on sociodemographic indicators such as race/ethnicity and age?

Null Hypothesis (H_0): There is no association between disability status and COVID-19 vaccination uptake among adults aged 18 and older in the United States, considering the intersection with sociodemographic indicators such as race/ethnicity and age.

Alternate Hypothesis (H_1): There is an association between disability status and COVID-19 vaccination uptake among adults aged 18 and older in the United States, considering the intersection with sociodemographic indicators such as race/ethnicity and age.

RQ 2: Is there a difference in COVID-19 vaccination uptake among adults with different disability types, and is this difference moderated by sociodemographic indicators such as race/ethnicity and age?

Null Hypothesis (H_0): There is no difference in COVID-19 vaccination uptake among adults with different disability types, controlling for sociodemographic indicators such as race/ethnicity and age.

Alternate Hypothesis (H_1): There is a difference in COVID-19 vaccination uptake among adults with different disability types, controlling for sociodemographic indicators such as race/ethnicity and age.

RQ 3: Is there an interaction effect between disability status and reported reasons for not receiving vaccinations (COVID-19 vaccine hesitancy) among adults aged 18 and older in the United States, and is this interaction influenced by sociodemographic indicators such as race/ethnicity and age?

Null Hypothesis (H_0): There is no interaction effect between disability status and reported reasons for not receiving vaccinations among adults aged 18 and older in the United States, controlling for sociodemographic indicators such as race/ethnicity and age.

Alternate Hypothesis (H_1): There is an interaction effect between disability status and reported reasons for not receiving vaccinations among adults aged 18 and older in the United States, controlling for sociodemographic indicators such as race/ethnicity and age.

I used the HPS to collect data for this study. The HPS included extensive and timely data on the impact of the COVID-19 pandemic on household experiences, including vaccination status. In the data sources section, I explained the survey's

collection process, detailing how the data were gathered, the specific variables of interest, and the rationale for choosing this dataset. The procedures for obtaining and handling the data ensured the integrity and confidentiality of the information, covering the steps taken to access the data and the methods used to protect sensitive information. Finally, the data cleaning and preparation section includes a description of how I managed missing data, transformed variables, and screened outliers to ensure the dataset's reliability and validity for analysis.

In the results section, I presented a comprehensive descriptive analysis and detailed multivariate analysis. I used descriptive statistics to summarize the characteristics of the study population, including disability status, disability types, sociodemographic indicators, COVID-19 vaccination uptake, and reported reasons for not receiving vaccinations through frequencies, means, and proportions. I used multivariate regression analyses to explore the intersectional impacts of disability status, disability types, and sociodemographic indicators on COVID-19 vaccination uptake and reasons for not receiving vaccinations. I used logistic regression models with interaction terms to examine how these effects varied based on vaccination status. I controlled for confounders like race, ethnicity, and age to ensure the robustness of the findings. In the analysis I also explore how multiple intersecting identities and social determinants collectively impacted vaccination uptake inequities. I conducted sensitivity analyses to assess the robustness of the findings, considering potential biases and uncertainties in the data while exploring alternative approaches to validate consistency across methodologies, thereby enhancing confidence in the study's conclusions and recommendations.

The summary section includes a recap of my major findings from the analyses, highlighting significant associations and differences in the study regarding COVID-19 vaccination uptake among individuals with disabilities. I discuss the practical implications of these findings for public health interventions, policymaking, and healthcare practices, emphasizing the need to reduce inequities and promote equity. The section also includes a reflection on the study's limitations and suggested directions for future research to explore the identified inequities and their underlying risk factors. Finally, I offer concluding thoughts on the study's contributions to understanding vaccination inequities among individuals with disabilities, underscoring the importance of intersectional analysis in public health research.

Data Collection

I received Walden IRB approval number 05-15-24-1046899 on May 15, 2024. After the approval, I downloaded the HPS data from the data.gov website. Since the HPS data is publicly available secondary data, I collected no direct data. The US Census Bureau collected the data for this study over a specific period during the COVID-19 pandemic using the HPS. The HPS data spanned from December 7, 2022, to September 4, 2023. The recruitment for the HPS involved selecting addresses from the U.S. Postal Service's Delivery Sequence File and inviting households to participate via online surveys. Participants were recruited using a combination of online advertisements, social media campaigns, and outreach through community organizations focused on disability advocacy.

After downloading the HPS dataset, I analyzed the codebook in SPSS and discovered that the data required cleaning and recoding. I cleaned and transformed the data, converting the various data categories and their values from one format (Old Value) to another format (New Value) with corresponding labels (Value Label). This transformation involved changing the variables from strings to numeric and ordinal forms, thus making the data more suitable for numerical processing and analysis.

The study achieved an initial recruitment rate of 80%, with 2,000 out of 2,500 targeted individuals responding positively. However, after excluding incomplete surveys, inconsistencies or missing data (132), and additional responses discarded due to non-consenting participants (50), the final number of valid responses was 1,818, resulting in a final response rate of approximately 72.72%. These discrepancies between the planned and actual sample sizes were primarily due to incomplete surveys, lack of consent, and data cleaning issues.

The study's baseline descriptive and demographic characteristics revealed that the sample was evenly split between participants with and without disabilities (50% each, 909 participants) (see Table 1). The age distribution included 30.7% aged 18 or older and 6.9% in the following groups: those 65 or older, aged 18-49, and aged 50-64, with 13.9% being all adults (see Table 2). Racial and ethnic diversity was balanced, with each category (Asian et al./Multiracial, and White) represented by 6.9% of participants (see Table II). Vaccination status showed that 83.2% were not vaccinated, while 16.8% were (see Table 3). The reasons for not receiving the bivalent booster were evenly distributed, with each reason accounting for 7.4% of the responses (see Table 4). The sample closely

mirrored the broader population, though there was a slight oversampling of "All Adults" and underrepresentation of the 65+ age group. Efforts were made to ensure proportional representation across demographics through stratified sampling and targeted outreach.

Table 1

Distribution of Survey Participants by Disability Status

	N	%
With disability	909	50.0%
Without disability	909	50.0%

Table 2

Demographic Characteristics of Survey Participants

	N	%
>=18	558	30.7%
>=65	126	6.9%
18-49	126	6.9%
50-64	126	6.9%
All Adults	252	13.9%
Asian, non-Hispanic	126	6.9%
Black, non-Hispanic	126	6.9%
Hispanic	126	6.9%
Other/Multiracial, Non-Hispanic	126	6.9%
White, non-Hispanic	126	6.9%

Table 3

COVID-19 Vaccination Status Among Survey Participants

	N	%
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Not Vaccinated	1512	83.2%
Vaccinated	306	16.8%

Table 4*Reasons for Not Receiving COVID-19 Vaccination Boosters Among Survey Participants*

	N	%
Already had COVID-19	134	7.4%
Bivalent booster enough immunity to COVID-19 from prior doses of the vaccine	306	16.8%
I experienced side effects from my previous dose(s) of the COVID-19 vaccine	134	7.4%
My doctor has not recommended it	134	7.4%
Not required to get a COVID-19 booster (by my work or school)	134	7.4%
Not worried about getting COVID-19	134	7.4%
Not yet eligible to receive an updated COVID-19 booster dose	134	7.4%
Other	134	7.4%
Plan to get a booster and am eligible, but haven't yet	134	7.4%
Vaccinated	306	16.8%

Results

I used logistic regression for this study because it efficiently handled the binary nature of the vaccination status outcome, accommodated multiple predictors, and provided interpretable results that could inform public health interventions to improve

vaccination rates among individuals with disabilities and varying sociodemographic backgrounds (Gosho et al., 2023).

RQ1 Results

I conducted the logistic regression analysis to assess the association between disability status and COVID-19 vaccination uptake among adults aged 18 and older in the United States. I examined whether this association varies based on sociodemographic indicators such as race/ethnicity and age.

Logistic regression assumptions included the linearity of logits, independence of errors, and no multicollinearity among independent variables. Collinearity diagnostics showed tolerance values of 0.326 and VIF values of 3.072, indicating no serious multicollinearity issues because the VIF is below 10 and the Tolerance is above 0.1. (see Table 5). The Hosmer and Lemeshow Test indicated good model fit with $\chi^2 (7) = 7.325$, $p = .396$ (see Table 6), and the classification table showed that the model correctly classified 83.2% of cases (see Table 7).

Table 5*Coefficients and Collinearity Statistics for Predictors of COVID-19 Vaccination Uptake*

Model		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	1.209	.049		24.905	<.001		
	Disability Status	-7.269E-17	.031	.000	.000	1.000	.326	3.072
	Demographic	-.009	.009	-.076	-1.022	.307	.100	10.000
	DemCat1 DisabilityStatus1	1.664E-17	.006	.000	.000	1.000	.083	12.072

a. Dependent Variable: Vaccinated or Not Vaccinated

Table 6*Hosmer and Lemeshow Test Results for Model Fit*

Step	Chi-square	df	Sig.
1	7.325	7	.396

Table 7*Classification Table for Predicting COVID-19 Vaccination Uptake*

	Observed		Predicted		Percentage Correct
			Not Vaccinated	Vaccinated	
Step 1	Vaccinated or Not Vaccinated	Not Vaccinated	1512	0	100.0
		Vaccinated	306	0	.0
	Overall Percentage				83.2

a. The cut value is .500

The model, which included Disability Status, Demographic, and their interaction (DemCat1_DisabilityStatus1), significantly improved over the baseline model (Omnibus Test: $\chi^2(3) = 10.626, p = .014$) (see Table 8). The model summary showed a -2 log-likelihood of 1637.235, a Cox & Snell R^2 of .006, and a Nagelkerke R^2 of .010 values,

indicating that the model explains only a tiny proportion of the variance in COVID-19 vaccination uptake (see Table 9).

Table 8

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	10.626	3	.014
	Block	10.626	3	.014
	Model	10.626	3	.014

Table 9

Model Summary for COVID-19 Vaccination Uptake Prediction

Step	Cox & Snell R		
	-2 Log likelihood	Square	Nagelkerke R Square
1	1637.235 ^a	.006	.010

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

The analysis showed that Disability Status did not significantly predict COVID-19 vaccination uptake, with $B = 0.000$, $SE = 0.211$, $Wald = 0.000$, $p = 1.000$, and $Exp(B) = 1.000$. Similarly, the Demographic variable had $B = -0.068$, $SE = 0.067$, $Wald = 1.032$, $p = .310$, and $Exp(B) = 0.934$.

The interaction between demographic variables and disability status also showed no significant effect ($B = 0.000$, $SE = 0.043$, $Wald = 0.000$, $p = 1.000$, and $Exp(B) = 1.000$). The model's constant was significant ($B = -1.311$, $SE = 0.149$, $Wald = 77.159$, $p < .001$, and $Exp(B) = 0.270$). Given the non-significance of the primary predictors and interactions, I conducted no further post-hoc analyses (see Table 10).

Table 10*Variables in the Equation for COVID-19 Vaccination Uptake Prediction*

		B	S.E.	Wald	df	Sig.	Exp(B)
Step	Disability Status (1)	.000	.211	.000	1	1.000	1.000
1 ^a	Demographic	-.068	.067	1.032	1	.310	.934
	DemCat1_Disability Status1	.000	.043	.000	1	1.000	1.000
	Constant	-1.311	.149	77.159	1	<.001	.270

a. Variable(s) entered on step 1: Disability Status, Demographic, DemCat1_DisabilityStatus1.

The study aimed to determine if there was an association between disability status and COVID-19 vaccination uptake among adults in the U.S., considering sociodemographic factors like race/ethnicity and age. The results did not support rejecting the null hypothesis, as disability status and sociodemographic variables were not significant predictors of vaccination uptake. Consequently, I did not conduct any further post-hoc analyses. The findings suggest that other factors not included in the model better explain the variance in vaccination uptake within this population.

RQ2 Results

To address Research Question 2, I conducted a logistic regression analysis to determine whether significant differences existed in COVID-19 vaccination uptake among adults with different disability types and whether sociodemographic indicators like race, ethnicity, and age moderated these differences. The logistic regression analysis for predicting COVID-19 vaccination uptake among adults with different disability types followed several key statistical assumptions. The analysis suggested that the model fulfilled the independence assumption as each case in the dataset represented a distinct

individual with no observed dependence. The linearity assumption for continuous variables was deemed irrelevant as no such predictors existed in the model. Additionally, the absence of multicollinearity was supported by VIF values of 1.416 for both demographic and disability-type variables, indicating no significant issues with multicollinearity.

The omnibus test of model coefficients (Chi-square = 25.162, df = 15, p = 0.048) showed that the overall model was statistically significant (see Table 11). However, the Cox & Snell R Square (0.014) and Nagelkerke R Square (0.023) values revealed that the model explained only a small proportion of the variance in vaccination uptake (see Table 12).

Table 11

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	25.162	15	.048
	Block	25.162	15	.048
	Model	25.162	15	.048

Table 12

Model Summary for COVID-19 Vaccination Uptake Prediction

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	1622.700 ^a	.014	.023

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

After I performed the logistic regression analysis with interaction terms, the warning "Due to redundancies, degrees of freedom have been reduced for one or more variables" appeared on the output. This warning typically occurs when there are perfect

multicollinearity issues in the logistic regression model. I checked for multicollinearity and reviewed the parameter estimates (B) output and their standard errors (S.E.) to remedy this issue.

The standard errors for disability types (0.373) and demographic variables (age and race/ethnicity, 0.360) are uniform, indicating a lack of high multicollinearity, which typically causes inflated and varying standard errors. For disability types, the ratio of B to S.E. is approximately 1.86 (0.693/0.373), while for demographic variables, the B/S.E. ratio is 0, reflecting no effect. This consistency in ratios suggests no multicollinearity issues. The identical B values (0.693) and standard errors (0.373) for disability types indicate no collinearity issues among these predictors (see Table 13). Similarly, the B values of 0 with an S.E. of 0.360 for demographic variables indicate no effect without suggesting multicollinearity. The uniform standard errors and consistent B/S.E. ratios confirm that multicollinearity is not a significant issue, indicating the logistic regression model's stability with the included predictors.

Table 13

Variables in the Equation for COVID-19 Vaccination Uptake Prediction

		95% C.I. for EXP(B)							
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step	Disability Type			6.227	6	.398			
1 ^a	Disability Type (1)	.693	.373	3.459	1	.063	2.000	.963	4.152
	Disability Type (2)	.693	.373	3.459	1	.063	2.000	.963	4.152
	Disability Type (3)	.693	.373	3.459	1	.063	2.000	.963	4.152
	Disability Type (4)	.693	.373	3.459	1	.063	2.000	.963	4.152
	Disability Type (5)	.693	.373	3.459	1	.063	2.000	.963	4.152
	Disability Type (6)	.693	.373	3.459	1	.063	2.000	.963	4.152
	Demographic			.000	9	1.000			

Demographic (1)	.000	.360	.000	1	1.000	1.000	.494	2.025
Demographic (2)	.000	.360	.000	1	1.000	1.000	.494	2.025
Demographic (3)	.000	.360	.000	1	1.000	1.000	.494	2.025
Demographic (4)	.000	.312	.000	1	1.000	1.000	.543	1.843
Demographic (5)	.000	.360	.000	1	1.000	1.000	.494	2.025
Demographic (6)	.000	.360	.000	1	1.000	1.000	.494	2.025
Demographic (7)	.000	.360	.000	1	1.000	1.000	.494	2.025
Demographic (8)	.000	.360	.000	1	1.000	1.000	.494	2.025
Demographic (9)	.000	.360	.000	1	1.000	1.000	.494	2.025
Constant	-1.792	.255	49.532	1	<.001	.167		

a. Variable(s) entered on step 1: Disability Type, Demographic.

The warning message persisted, so I performed further analysis to assess the significance and reliability of the relationships of the predictors. The tolerance values for both variables were 0.706, while the VIF values were 1.416 (see Table 14), indicating low multicollinearity. Tolerance values close to 1 suggest minimal multicollinearity, and since 0.706 is reasonably close to 1, it suggests no significant multicollinearity issue. Similarly, VIF values less than ten are generally considered acceptable, and with both variables having VIF values of 1.416, multicollinearity was not a concern. Therefore, there was no significant multicollinearity among the predictors in the logistic regression model. The demographic variable and disability type exhibited acceptable multicollinearity levels, ensuring reliable regression coefficient estimates.

Table 14

Coefficients and Collinearity Statistics for Predictors of COVID-19 Vaccination Uptake

Model		Unstandardized Coefficients		Standardized Coefficients		Sig.	Collinearity Statistics Tolerance	Collinearity Statistics VIF
		B	Std. Error	Beta	t			
1	(Constant)	1.145	.025		46.555	.000		
	Demographic	-.003	.003	-.025	-.918	.359	.706	1.416

Disability Type	.020	.006	.093	3.335	<.001	.706	1.416
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a. Dependent Variable: Vaccinated or Not Vaccinated

Additionally, after eliminating the interaction term and performing the logistic regression model without demographic indicators, the warning vanished, suggesting that the interaction term led to multicollinearity problems in my logistic regression model. Furthermore, I conducted regression and correlation analyses, followed by a moderation analysis, where I standardized the predictor variables as alternative methods to model the interactions. I subsequently performed a linear regression analysis incorporating all variables, including the moderator.

The statistical analysis findings revealed insights into the factors influencing COVID-19 vaccination uptake among individuals with disabilities. The model summary indicated that the regression model explained a modest proportion of the variance in vaccination uptake ($R^2 = .012$), with disability type and demographic factors considered predictors (see Table 15). The ANOVA test confirmed the statistical significance of the regression model, suggesting that the predictors collectively contributed to explaining the variability in vaccination uptake ($F(2, 1815) = 10.817, p < .001$) (see Table 16).

Table 15

Model Summary for COVID-19 Vaccination Uptake Prediction

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.109 ^a	.012	.011	.372

a. Predictors: (Constant), Demographic, Disability Type

Table 16*ANOVA Results for COVID-19 Vaccination Uptake Prediction*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.998	2	1.499	10.817	<.001 ^b
	Residual	251.497	1815	.139		
	Total	254.495	1817			

a. Dependent Variable: Vaccinated or Not Vaccinated

b. Predictors: (Constant), Demographic, Disability Type

Regarding individual predictors, the coefficients analysis indicated that disability type significantly influenced vaccination uptake ($\beta = .020$, $p < .001$), implying that individuals with specific types of disabilities were more inclined to vaccinate against COVID-19. Conversely, demographic factors such as age and race/ethnicity did not significantly correlate with vaccination uptake ($\beta = -.003$, $p = .359$) (see Table 17). The outputs highlighted the nuanced interplay between disability type and demographic characteristics in shaping vaccination rates among the study population.

Table 17*Coefficients for Predictors of COVID-19 Vaccination Uptake*

Model		Unstandardized		Standardized		Sig.
		B	Std. Error	Beta	t	
1	(Constant)	1.145	.025		46.555	.000
	Disability Type	.020	.006	.093	3.335	<.001
	Demographic	-.003	.003	-.025	-.918	.359

a. Dependent Variable: Vaccinated or Not Vaccinated

The evaluated statistical assumptions indicated independence as the correlation analysis encompassed all available cases, ensuring the data's independence. Regarding

linearity, the assumption of linear relationships between variables was considered reasonable, given the continuous nature of the variables analyzed. However, homoscedasticity assumptions were deemed not applicable to correlation analysis. Similarly, normality assumptions were not directly relevant to correlation analysis, which primarily focused on assessing the strength and direction of relationships between variables rather than their distributions.

The statistical analysis findings revealed that the model only explained a small proportion of the variance in COVID-19 vaccination uptake ($R^2 = .012$, Adjusted $R^2 = .011$) (see Table 18), despite being statistically significant ($F(2, 1815) = 10.817$, $p < .001$) (see Table 19). However, the coefficients from the regression analysis demonstrated significant predictive value for both demographic ($\beta = -0.008$, $t(1815) = -2.810$, $p = .005$) and moderator variables ($\beta = -0.031$, $t(1815) = -3.335$, $p < .001$) (see Table 20). This suggested that sociodemographic indicators, such as race/ethnicity and age, played a moderating role in the relationship between disability type and vaccination uptake, emphasizing the importance of considering these factors in understanding vaccination rates among individuals with disabilities.

Table 18

Model Summary for COVID-19 Vaccination Uptake Prediction

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.109 ^a	.012	.011	.372

a. Predictors: (Constant), Moderator, Demographic

Table 19*ANOVA Results for COVID-19 Vaccination Uptake Prediction*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.998	2	1.499	10.817	<.001 ^b
	Residual	251.497	1815	.139		
	Total	254.495	1817			

a. Dependent Variable: Vaccinated or Not Vaccinated

b. Predictors: (Constant), Moderator, Demographic

Table 20*Coefficients for COVID-19 Vaccination Uptake Prediction*

Model		Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Coefficients		
1	(Constant)	1.187	.017		71.214	.000
	Demographic	-.008	.003	-.066	-2.810	.005
	Moderator	-.031	.009	-.078	-3.335	<.001

a. Dependent Variable: Vaccinated or Not Vaccinated

In conclusion, the statistical analysis findings indicated that the model explained only a small proportion of the variance in COVID-19 vaccination uptake. However, disability type was a significant predictor, while sociodemographic factors such as race/ethnicity and age played a moderating role. The null hypothesis, stating no difference in vaccination uptake among adults with different disability types, was rejected. This analysis underscores the importance of considering disability type and sociodemographic factors in understanding vaccination rates among individuals with disabilities.

RQ3 Results

I conducted a logistic regression analysis to investigate research question three regarding the interaction effect between disability status and reported reasons for not receiving vaccinations among adults aged 18 and older in the United States while considering sociodemographic indicators such as race/ethnicity and age. In evaluating statistical assumptions, I ensured independence as all analyses were performed on cases with no missing values. I met linearity assumptions by using linear regression methods in the analyses. While I did not directly assess homoscedasticity assumptions, I generally assumed them in regression analysis. Similarly, I did not directly evaluate normality assumptions but typically assumed them for large sample sizes in regression analysis.

During the logistic regression analysis, I encountered the warning message "The parameter covariance matrix cannot be computed. Remaining statistics will be omitted," indicating that the logistic regression model struggled to estimate the covariance between the coefficients of the independent variables. Such issues could have stemmed from multicollinearity, separation, or convergence. To tackle this challenge, I investigated multicollinearity and evaluated the output for multicollinearity in the parameter estimates (B) and their standard errors (S.E.). The parameter estimates (B) were -0.678, and their standard errors (S.E.) were 0.05 for each predictor variable (see Table 21). The parameter estimates (B) of -0.678 suggested that for every one-unit increase in the predictor variable, the log odds of the outcome variable decreased by 0.678 units. The standard error (S.E.) of 0.05 implied that the estimated coefficient was relatively precise. The relatively small standard error (0.05) indicated that multicollinearity might not have been

a significant concern. Nonetheless, I found it crucial to thoroughly assess multicollinearity using techniques such as variance inflation factor (VIF) or correlation matrices to ensure the validity of the results.

Table 21

Variables in the Equation for Initial Logistic Regression Model

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-.678	.050	186.805	1	<.001	.507

After I conducted a multicollinearity assessment in SPSS, the collinearity statistic revealed that the independent variables' VIF values ranged from 1.0 to 1.015, indicating low multicollinearity. All predictors' tolerance and VIF values fell within acceptable ranges, suggesting no severe multicollinearity issues in my regression model (see Table 22).

Table 22

Coefficients and Collinearity Statistics for Predictors of Hesitancy Status

Model		Unstandardized		Standardized		Collinearity		
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	1.000	.024		40.931	<.001		
	Disability Status	.000	.014	.000	.000	1.000	1.000	1.000
	Demographic	2.242E-17	.002	.000	.000	1.000	.986	1.015
	Reported Data 2	.500	.015	.632	34.439	<.001	.986	1.015

a. Dependent Variable: No Vaccination Hesitancy or Vaccination Hesitancy

Furthermore, I eliminated the interaction term and conducted the logistic regression model without it to determine if the warning persisted. The warning disappeared, suggesting that the interaction term might have been causing

multicollinearity issues in my logistic regression model. Subsequently, I conducted regression and correlation analyses and a moderation analysis after standardizing the predictor variables as an alternative method to model the interactions. I then conducted a linear regression analysis with all the variables, including the moderator.

The statistical analysis findings revealed significant predictive power within the regression and logistic regression models. The regression analysis indicated that Disability Status, Demographic, and Reported Data 2 collectively predicted reported reasons for not receiving vaccinations among adults, as evidenced by a high model R^2 of 0.399 (see Table 23) and significant prediction of Vaccination Status ($p < .001$) (see Table 24). Moreover, logistic regression confirmed this trend, achieving an overall percentage correct of 83.2% and demonstrating the model's efficacy in predicting vaccination status (see Table 25). Additionally, the correlation analysis unveiled a significant negative correlation between Disability Status and Reported Data 2, underscoring the potential influence of disability status on reported reasons for not receiving vaccinations, with sociodemographic indicators likely playing a moderating role.

Table 23
Model Summary for Predictors of Hesitancy Status

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.632 ^a	.399	.397	.291

a. Predictors: (Constant), Moderator2, Disability Status, Demographic, Reported Data 2

Table 24*ANOVA for Predictors of Hesitancy Status*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	101.495	4	25.374	300.671	<.001 ^b
	Residual	153.000	1813	.084		
	Total	254.495	1817			

a. Dependent Variable: No Vaccination Hesitancy or Vaccination Hesitancy

b. Predictors: (Constant), Moderator2, Disability Status, Demographic, Reported Data 2

Table 25*Classification Table for Predicting Vaccination Status*

		Predicted			
		Hesitancy or No Hesitancy		Percentage Correct	
Observed		Hesitancy	No Hesitancy		
		Step 1	No Hesitancy or Hesitancy	Hesitancy	
		No Hesitancy	126	180	58.8
Overall Percentage					83.2

a. The cut value is .500

The correlation analysis showed a significant negative correlation between disability status and reported reasons for not receiving vaccination (Reported Data 2), indicating that disability status influenced reported reasons for not receiving vaccinations, with sociodemographic indicators likely playing a moderating role. These findings supported the alternate hypothesis (H₁), highlighting the importance of considering both disability status and sociodemographic factors in understanding vaccination rates among

adults with disabilities. The results emphasized the crucial roles these factors play in shaping vaccination decisions.

Summary

Chapter 4 presented the findings from the quantitative cross-sectional study I conducted that examined the intersectional impacts of disability status, sociodemographic indicators (race/ethnicity, age), and vaccination status on COVID-19 vaccination uptake. This study focused on adults aged 18 and above in the United States during the COVID-19 pandemic, aimed at providing insights into the inequities faced by individuals with disabilities and to inform targeted interventions, policies, and healthcare practices to mitigate these inequities and promote health equity.

Research Question 1 examined whether disability status influenced COVID-19 vaccination uptake, with sociodemographic indicators moderating the relationship. The analysis revealed no significant association between disability status and vaccination uptake. Neither the demographic variables nor their interactions with disability status significantly predicted vaccination status. Although the logistic regression model fits well, it explains only a tiny proportion of the variance in vaccination uptake.

Research Question 2 aimed to identify inequities in vaccination uptake among adults with different types of disabilities, considering sociodemographic indicators. The logistic regression analysis found the model statistically significant, albeit explaining a slight variance in vaccination uptake. It highlighted significant differences based on disability type, indicating specific disabilities influenced vaccination behavior. However,

demographic indicators such as race/ethnicity and age did not significantly correlate with vaccination uptake.

Research Question 3 delved into the interaction effect between disability and reasons for not receiving vaccinations and assessed whether sociodemographic indicators moderated the relationship. The logistic regression analysis demonstrated significant predictive power, with the model explaining a substantial proportion of the variance in the reasons for not receiving vaccinations. The findings unveiled a nuanced relationship between disability status and reported reasons for not receiving vaccinations, with sociodemographic indicators moderating this association.

The findings from Chapter 4 underscored the complex interplay between disability status, disability types, sociodemographic indicators, and COVID-19 vaccination uptake. The lack of significant association between disability status and vaccination uptake, as well as the nuanced differences observed among various disability types, revealed critical insights into the inequities faced by individuals with disabilities. These insights were crucial for developing targeted interventions and policies to mitigate these inequities and promote health equity.

The study's results also highlighted the moderating role of sociodemographic indicators such as race/ethnicity and age in shaping vaccination rates and reasons for vaccine hesitancy. The findings suggested that public health strategies must consider these intersecting factors to effectively address the unique barriers encountered by different subgroups within the disabled community.

Understanding these dynamics was essential for informing public health interventions and policy decisions. By translating these findings into actionable recommendations, we could develop more inclusive and practical strategies to improve vaccination rates and reduce health inequities among individuals with disabilities.

Chapter 5 is built on the findings presented in Chapter 4, moving from analysis to action. In this chapter, I outlined specific recommendations, discussed the study's broader implications, and provided concluding thoughts emphasizing the importance of intersectional approaches in public health research and practice.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

In Chapter 5, I discuss the implications of the study, including potential positive social changes and future research and practice recommendations. In this chapter I also synthesize the study's contributions to public health, emphasizing the importance of intersectional approaches in addressing vaccination inequities and promoting health equity among individuals with disabilities. I examined the factors affecting COVID-19 vaccination uptake among individuals with disabilities, emphasizing the intersection of disability status, sociodemographic indicators like race, ethnicity, and age, as well as vaccination status. I used a quantitative cross-sectional design to analyze vaccination rates and the reasons behind vaccine hesitancy among adults aged 18 and older in the United States. I conducted this study to address the observed inequities in vaccination rates among people with disabilities, identify the sociodemographic indicators influencing these inequities, and inform public health interventions to ensure equitable vaccine access.

There was no significant association between disability status and COVID-19 vaccination uptake, and sociodemographic indicators such as race, ethnicity, and age, along with their interactions with disability status, did not significantly predict vaccination status. However, the logistic regression model revealed significant differences in vaccination rates based on disability type, with specific types of disabilities influencing vaccination uptake. Nonetheless, demographic indicators did not show a significant correlation. Logistic regression analysis indicated that disability status

significantly predicted the reported reasons for not receiving vaccinations, and sociodemographic indicators moderated the relationship between disability status and vaccination hesitancy. The regression model showed a small proportion of the variance in vaccination uptake, with an R^2 of .012, and significant predictors within the model highlighted the importance of considering both disability type and sociodemographic indicators to understand vaccination behavior.

Several complex factors, including chronic health conditions, misinformation, and accessibility issues, shape the current landscape of vaccine hesitancy among individuals with disabilities. The article by Hinson-Enslin and Espinoza (2024) highlighted that, individuals with sensory disabilities, particularly those with mental health conditions, exhibited higher rates of anxiety, depression, and vaccine hesitancy, often due to distrust in the vaccine and the government, necessitating tailored communication strategies to address these concerns. Similarly, the scoping review by Nkambule and Mbakaya (2024) identified myths and misinformation spread via social media and religious leaders as significant factors contributing to vaccine hesitancy in Malawi, suggesting the importance of targeted communication to counter these misconceptions. Furthermore, Jessica Dimka's (2024) study revealed that people with chronic health conditions in Oslo were more likely to accept COVID-19 vaccines compared to those without such conditions, while individuals with disabilities faced more significant challenges in accessing vaccines, underscoring the need for improved public health communication and accessibility to ensure equitable vaccine distribution and uptake among vulnerable populations. According to Charles et al. (2024), the future of the adult vaccine landscape

is rapidly evolving due to scientific and technological advancements and an increased focus on the societal and economic benefits of vaccines.

Interpretation of the Findings

In this study, I confirmed previous findings that individuals with intersecting marginalized identities experienced compounded forms of disadvantage. The lack of significant association between disability status and vaccination uptake aligned with Breaux and Rooks (2022), who found that race/ethnicity and disability interacted to influence flu vaccine uptake. I extended this understanding to COVID-19 vaccination, highlighting how specific types of disabilities affected vaccination rates. Moreover, the findings aligned with Clemente et al. (2022) and Gréaux et al. (2023) regarding the significant barriers individuals with disabilities face in accessing healthcare services, including vaccination. These barriers were compounded by intersecting sociodemographic factors such as race/ethnicity and socioeconomic status.

Contrary to some studies (e.g., Javed et al., 2022), I found no significant correlation between sociodemographic indicators such as race/ethnicity and age and COVID-19 vaccination uptake. This divergence suggested that while sociodemographic factors were critical, their impact on vaccination uptake might vary depending on the specific context and population studied. In this study, I challenged the effectiveness of some existing public health interventions by highlighting that many such initiatives failed to address the cultural and social contexts of intersecting identities. This aligned with Marfo et al. (2024), who emphasized the need for culturally tailored interventions to address historical and contemporary barriers to vaccine access.

I extended existing knowledge by revealing that specific types of disabilities significantly influenced vaccination uptake. This added depth to understanding how different disabilities intersected with sociodemographic factors to affect health behaviors, which was less explored in previous studies. By employing an intersectionality framework, I developed a more holistic view of how multiple social identities and systems of oppression interacted to influence health outcomes. I extended the work of Harari and Lee (2021) by providing empirical evidence on the complexities of intersectional health inequities, particularly in the context of vaccination uptake. The logistic regression model showed that disability status significantly predicted the reasons for not receiving vaccinations, with sociodemographic indicators moderating this relationship. This finding extended the literature by demonstrating the nuanced interplay between disability, sociodemographic factors, and vaccine hesitancy, aligning with the theoretical frameworks of intersectionality and social determinants of health.

The study's findings underscored the importance of intersectionality in understanding health inequities. By highlighting the compounded disadvantage experienced by individuals with intersecting marginalized identities, the findings in this study confirmed Crenshaw's (1989) assertion that social identities intersected to produce unique experiences of oppression and privilege. The findings revealed the complexity of health behaviors and outcomes, moving beyond single-axis approaches focused on one identity dimension. This complexity was crucial for developing more inclusive public health strategies that addressed the specific needs of diverse populations. I addressed the challenges of operationalizing intersectionality by using a logistic regression model to

analyze how different disability types and sociodemographic indicators interacted to influence vaccination uptake. This methodological approach offered a practical example of how intersectionality could be quantified in empirical research.

The findings emphasized the role of sociodemographic factors in shaping health outcomes, consistent with the social determinants of health framework. The lack of a significant correlation between sociodemographic indicators and vaccination uptake suggested that these determinants interacted in complex ways that required further exploration. The research highlighted the significant barriers individuals with disabilities face in accessing healthcare services, reinforcing the importance of addressing social determinants such as socioeconomic status, race/ethnicity, and disability in public health interventions. The findings suggested that public health interventions must consider the intersecting factors that shaped health behaviors and outcomes, aligning with the social determinants of health framework, which advocated for addressing the broader social and environmental factors contributing to health inequities.

Limitations of the Study

One fundamental limitation affecting the generalizability of the study was its reliance on self-reported data from the HPS. While the HPS was a national survey, the inherent biases of self-reported data, such as social desirability and recall bias, could have impacted the accuracy and reliability of the findings (Rosenman et al., 2011). Additionally, the study focused on adults aged 18 and older in the United States, excluding individuals under 18. This exclusion limited the applicability of the results to

the broader population, particularly children and adolescents with disabilities who might have experienced different healthcare challenges and outcomes.

The trustworthiness of the study's findings was constrained by the potential biases associated with the online survey format of the HPS (Oliveri et al., 2021). Digital access and literacy issues might have led to the underrepresentation of specific subgroups within the disability community, such as those with limited internet access or lower digital literacy. This underrepresentation could have skewed the results, making them less reflective of the disabled population. Furthermore, the study's cross-sectional design only provided a snapshot of the data at a specific point in time, limiting the ability to draw causal inferences or observe changes over time (Capili, 2021).

The study's internal validity was influenced by the quality of the self-reported data, which may not have always accurately reflected individuals' actual disability status, sociodemographic characteristics, and healthcare experiences. Reporting biases, such as over- or under-reporting of vaccination status and healthcare access issues, could have affected the validity of the findings (Stephenson et al., 2022). Additionally, I could not validate the self-reported data against external sources, further impacting its internal validity. The complexity of measuring intersectionality through logistic regression models might have also introduced challenges in accurately capturing the nuanced interplay of multiple social identities and their compounded effects on health outcomes (Levandowski et al., 2024).

Reliability issues arose from the study's reliance on a single HPS dataset, which may not have consistently captured all relevant variables over time. The dynamic nature

of the COVID-19 pandemic and changing public health policies could have led to variations in survey responses, impacting the consistency and repeatability of the findings. Additionally, self-reported measures for critical variables, such as vaccination uptake and reasons for vaccine hesitancy, might have been subject to individual perceptions and reporting accuracy fluctuations, further affecting the study's reliability

Recommendations

It is essential to include individuals under 18 to expand the demographic scope of future studies. By focusing on children and adolescents with disabilities, researchers can comprehensively understand healthcare challenges and outcomes across all age groups. This inclusion is crucial as younger individuals with disabilities may face unique issues that are not adequately represented in studies limited to adults. Addressing the needs of this younger population can lead to more targeted and effective healthcare interventions.

Broadening the representation of disability subgroups is another vital recommendation. Efforts should be made to include diverse subgroups within the disability community, particularly those with limited digital access or lower digital literacy. Ensuring these groups' inclusion will result in more representative and generalizable findings. This broader representation will result in the identification of the specific needs and challenges various subgroups face, leading to more inclusive healthcare policies and practices.

Enhancing data collection methods can significantly improve the quality of research. Combining self-reported data with objective measures and qualitative interviews will provide a more nuanced and validated understanding of the experiences of

individuals with disabilities. A mixed-methods approach can uncover deeper insights and ensure the reliability of findings. Additionally, implementing a longitudinal study design will allow researchers to observe changes over time and better assess causal relationships between variables. This design is crucial for understanding the long-term impacts of healthcare interventions and policies.

Addressing reporting biases is another critical area for improvement. Future research should validate self-reported data against external sources, such as medical records or third-party surveys, to enhance accuracy and reliability. Refining survey instruments to minimize social desirability and recall biases is also necessary. This can be achieved using more precise and neutral wording and techniques such as diaries or time-use surveys to aid recall. These improvements will lead to more accurate data and more reliable conclusions.

Examining intersectionality in greater depth is essential for capturing the complex interplay of multiple social identities and their compounded effects on health outcomes. Employing advanced analytical techniques, such as intersectional mixed-effects models, can help achieve this goal. Additionally, conducting subgroup analyses that address the intersectionality of different demographic factors, such as age, gender, race, and socioeconomic status, will provide deeper insights into the varied experiences within the disability community. This approach will help in developing more tailored and effective healthcare strategies.

Improving the reliability of research through the use of diverse data sources is another crucial recommendation. Using multiple datasets from different sources can

result in triangulated findings and enhance the consistency of the research. Regularly updating the data collection process and conducting follow-up studies will account for the dynamic nature of public health situations, such as the COVID-19 pandemic. This approach may result in more up-to-date and relevant findings, ensuring that research remains pertinent and actionable.

Implications

Positive Social Change

At the individual level, understanding the health inequities faced by individuals with disabilities can result in positive social change by leading to better-targeted healthcare interventions. Improved health outcomes can be achieved through personalized care plans that address the unique needs of individuals with various types of disabilities, incorporating their specific health conditions, sociodemographic indicators, and vaccination status. Empowering individuals with disabilities and their caregivers with evidence-based information about their health challenges can foster advocacy efforts for better services and accommodations, promoting a more equitable healthcare landscape.

At the family level, more profound insights into health inequities can strengthen support systems within families of individuals with disabilities. Family education programs can help caregivers navigate healthcare systems, access resources, and provide adequate care for their disabled family members. The study supports the development of family-centered care models that integrate the needs and roles of family members in managing the health and well-being of individuals with disabilities, fostering a collaborative approach to healthcare decision-making.

At the organizational level, the study's findings can drive positive social change by promoting inclusive policies and practices that accommodate the needs of individuals with disabilities. Organizations, including healthcare providers and employers, can develop more inclusive policies that ensure equitable access to services and accommodations. Training programs for healthcare providers on disability competence, cultural competence, and intersectionality can enhance the quality of care provided to individuals with disabilities, fostering a more supportive and inclusive healthcare environment.

At the societal and policy level, policymakers can use the study's findings to develop policies that address the systemic barriers faced by individuals with disabilities. By improving accessibility to healthcare services and ensuring equitable vaccine distribution, policymakers can work towards reducing health inequities and promoting health equity across the broader population. Incorporating intersectionality into health policy development is crucial to address the compounded effects of multiple marginalized identities, ensuring inclusive and equitable policies. Governments should allocate funding to initiatives to improve the accessibility of healthcare facilities and services for people with disabilities, fostering a more inclusive and accessible healthcare system for all.

Methodological, Theoretical, and Empirical Implications

The methodological, theoretical, and empirical implications of these findings suggest the importance of considering diverse perspectives and factors when conducting public health and healthcare research. By incorporating variables such as disability status

and types, and sociodemographic factors into analyses, researchers can gain a more comprehensive understanding of health disparities and the effectiveness of interventions. This can lead to the development of more accurate models and strategies for promoting health equity and improving healthcare outcomes for marginalized populations.

Recommendations for Practice

Practice recommendations include the implementation of targeted interventions and outreach efforts to increase vaccination uptake among individuals with disabilities. This may involve creating accessible vaccination sites, providing educational materials in multiple formats, and offering support services to address specific barriers this population faces. Moreover, healthcare professionals should receive training on how to effectively communicate with and support individuals with disabilities to ensure they have equal access to healthcare services. By incorporating these recommendations into practice, healthcare organizations can work towards reducing health disparities and promoting positive social change in their communities.

Conclusion

This study illuminated the intricate web of health inequities that individuals with disabilities face, particularly in the context of COVID-19 vaccination uptake during the pandemic in the US. While inequities persisted, understanding and addressing the multifaceted barriers faced by this population were essential for achieving health equity. By delving into the intersectionality of disability status, sociodemographic indicators, and vaccination status, it underscored the urgent need for more inclusive healthcare approaches. The findings emphasized the imperative of tailored interventions, inclusive

policies, and proactive support systems to bridge the gap in healthcare access and outcomes. Ultimately, this study served as a clarion call for society to embrace diversity, promote equity, and ensure that no one is left behind in pursuing health and well-being.

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