

5-2022

## **COVID-19 Vaccine Hesitancy: Examining the Relationship between Perceptions of COVID-19 Vaccine Safety and Intention to Receive it among African Americans in Mississippi**

Tija L. Johnson  
*The University of Southern Mississippi*

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COVID-19 Vaccine Hesitancy: Examining the Relationship between Perceptions of  
COVID-19 Vaccine Safety and Intention to Receive it among African Americans in  
Mississippi

by

Tija L. Johnson

A Thesis  
Submitted to the Honors College of  
The University of Southern Mississippi  
in Partial Fulfillment  
of Honors Requirements

May 2022



Approved by:



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Jennifer L. Lemacks, Ph.D., Thesis Advisor,  
School of Health Professions

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Charkarra Anderson-Lewis, Ph.D., Director,  
School of Health Professions

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Sabine Heinhorst, Ph.D., Dean  
Honors College

## ABSTRACT

In March of 2020, the World Health Organization declared a global pandemic due to the ongoing spread of SARS-CoV-2, the causative agent of COVID-19 disease. While scientific developers were seeking to understand the biochemical mechanism of SARS-CoV-2, political and public health leaders implemented non-pharmaceutical interventions, such as social distancing measures, to reduce the transmission of COVID-19. As the world began to adjust to the new realities, the race to create an effective vaccine was on. With the later development of the COVID-19 vaccine, receptiveness to the vaccine across the world varied, and in the United States, vaccine hesitancy was an apparent phenomenon, especially in Mississippi. This study sought to explore the relationship between the perceptions of COVID-19 vaccine safety and vaccine uptake intention among African American adults in Mississippi. Participants were recruited via social media, email, social networks, and community-based organizations to participate in an online survey. Eligible participants for this study were African American, Mississippi residents over the age of 18 years old. Pearson correlation analyses revealed age, education level, income levels, and knowing a family member who experienced an adverse reaction were associated with vaccine hesitancy. Linear regression results showed perceptions of vaccine safety for self/community, not vaccine safety perceptions, were a significant predictor of vaccine hesitancy, after controlling for several variables. Limitations of this study include limited generalizability. Future studies on vaccine hesitancy in African Americans should examine vaccine hesitancy while accounting for any historical or current events such as the Tuskegee experiment that may have led to medical mistrust.

*Keywords: Pandemic, COVID-19 Vaccine, Vaccine Hesitancy, Safety Perception, Vaccine Uptake Intention, Vaccine Safety, African Americans*

## **DEDICATION**

To the African American residents of Mississippi and the MS Delta, this is for you. Thank you for instilling such rich lessons in me and crafting me into the young woman I am. I will never stop reflecting on where I am from, encouraging young people following me, or being the dreams of my elders. In our counties, I will never stop seeing endless potential and beauty.

## ACKNOWLEDGMENTS

Dear God, I must submit this written gratitude to you for keeping me along my way for the last four years. This journey has been a beautiful, transformative one. I am blessed to have graced the presence of so many individuals who wish for nothing but my endless success. Though I may not have accomplished all I set out to do, I have done what I can, and for that I am thankful. To my parents, thank you for supporting me always, listening to my endless rants, and believing in me on days the weight of my responsibilities felt unbearable. You have raised a phenomenal young woman, and I hope I forever make you proud. To my aunt, Annette Chiles, you gained your wings before you could see me complete this project and walk across the stage. Wherever you are in this universe, I will always cherish and remember the last words you spoke to me: “I believe in you, Associate.” To my village which has molded me, crafted me, and nurtured me into the young woman, scholar, friend, leader, and the person I am today, look at me and see the reflection of your work. Know I am forever thankful. To my friends, the days we laughed until pain erupted were the fuel, I needed throughout my time here. You all have immersed me in love and support during this project.

To Dr. Matthew Casey, thank you for making me feel seen and heard among first-year students. Though I sometimes felt my work was never good enough, three years later, I see you only wanted me to maximize my fullest potential. To Dr. Sabine Heinhorst, you met me on an Honors College preview day, learned my name, and called me by it ever since. Thank you for entrusting me to pour into our future Honor Scholars. To Dr. Ellen Weinauer, my words may never encompass the effect you have had on my time at Southern Miss and in the Honors College. You are a flame used to light others,



and I am honored to have met you. To Dr. Jennifer Lemacks, “thank you” and “I appreciate you” are vast understatement of the gratitude in my heart. Thank you for not “throwing me away.” I know this honor thesis journey with me has not been easy, but you helped me get it done. Thank you for the gentle encouragement and the firm guidance when I needed it most. You have been the perfect advisor and I am endlessly appreciative of all you and your team have done for me. Finally, to myself, you did it! The long nights, the early mornings, the late submissions, the busiest of excitement about your work, the fear of disappointment, and the lessons taught by this journey have molded you. Continue to be your most authentic, curious, and personable self. May you never forget your path is ordained by the most high.

This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant # P20GM103476.

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## LIST OF ILLUSTRATIONS

Figure 1: Three C's Model of Vaccine Hesitancy



## LIST OF ABBREVIATIONS

WHO	World Health Organization
SARS	Severe Acute Respiratory Syndrome
MERS	Middle East Respiratory Syndrome
CoV	Coronavirus
PHEIC	Public Health Emergency of International Concern
MSDH	Mississippi Department of Health
EUA	Emergency Use Authorization
MCM	Medical Countermeasures
Vax	Vaccine
USFDA	United States Food and Drug Administration
MTM	Multi Theory Model

## CHAPTER I: Introduction

### SARS Coronavirus 19: A Global Pandemic

In January 2020, the members of the World Health Organization (WHO) noticed rising pneumonia cases in China with no known cause (Pneumonia of Unknown Cause -- China). As members continued to monitor the cases of pneumonia, it was reported that a novel coronavirus was the causative agent of the pneumonia cases (Khan). Coronavirus (CoV) is a large viral family that causes upper respiratory infections. Within this family, there are several types of coronaviruses. Common reservoirs for these coronaviruses are in animals including bats, pigs, and cats, but coronaviruses are not limited to animals. In the 1960s, scientists began to discover human coronaviruses. Of the seven coronaviruses affecting humans, Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) was discovered between 2002 and 2003 (*CDC SARS Response Timeline*).

With this knowledge in mind, Chinese scientists hypothesized coronavirus was a pneumonia-causing agent in patients. “Chinese authorities subsequently reported that laboratory tests ruled out SARS-CoV, MERS-CoV, influenza, avian influenza, adenovirus and other common respiratory pathogens” (*WHO Statement regarding cluster of pneumonia cases in Wuhan, China*) As scientists and physicians continued to rule out known coronaviruses, it was determined a novel or new coronavirus caused the pneumonia cases in Wuhan, China.

As scientists began to identify and track these cases, the World Health Organization declared a public health emergency of international concern (PHEIC). According to the WHO, a PHEIC is defined as “an extraordinary event which is determined to constitute a public health risk to other states through the international

spread of disease and to potentially require a coordinated international response” (*International Health Regulations*). As countries around the world began to prepare for the effects of COVID-19 outbreaks, cases continued to rise. On March 11, 2020, the WHO Director General stated they “made the assessment that COVID-19 can be characterized as a pandemic” (*WHO Director-General's Opening Remarks at the Media Briefing on COVID-19 - 11 March 2020*). The Director-General deemed it imperative countries took proactive measures in protecting their citizens. In a press conference, the Director General believed the course of this pandemic could change if countries “detect, test, treat, isolate, trace, and mobilize their people in the response” (*WHO Dir. Gen's opening remarks briefing on COVID-19*).

### **Efforts to Control and Contain the Spread of COVID-19 in the United States**

In the United States, following the declaration from the WHO Director General, President Donald J. Trump “proclaim[ed] that the COVID-19 outbreak in the United States constitutes a national emergency...” (*Proclaim on Decl. a Nat'l Emergency*. 1). As the citizens of the United States began to understand the severity of this new disease, states, local towns, businesses, and schools began to develop a plan in response to the pending pandemic. In congruence to the national emergency declared by President Trump, California Governor, Gavin Newsom, issued the first stay-at-home orders on March 19, 2020, making California the first state to do so. Under these orders, “all individuals living in the state of California are to stay home or at their place of residence except as needed to maintain continuity of operations of the federal critical infrastructure” (*Executive Order N-33-20* 1). During this time, it was expected citizens only leave their homes for essential items such as food and medicine. Healthcare workers

were expected to go to work while other occupations were forced to adapt to hybrid or online working environments.

As the months continued, other states in the United States began to follow California's lead issuing stay-at-home orders, including Mississippi. In Mississippi, Governor Tate Reeves signed Executive Order 1466 which implemented a "shelter in place order" on March 31<sup>st</sup> that went to effect on April 3<sup>rd</sup> (*Executive Order NO. 1466 1*). The stipulations of the shelter in place order had specific conditions: individuals will only be allowed to leave their house for health-related reasons, to obtain food and common household supplies, to engage in individual outdoor activity, and to work in an essential business. Those businesses include but are not limited to, hospitals, healthcare facilities, grocery stores, pharmacies, childcare centers, as well as a variety of functions from sectors such as utilities, transportation, agriculture, manufacturing, and finance and banking. This order was implemented in hopes of curving the number of COVID-19 cases and deaths in Mississippi. In addition to the statewide shelter in place order, the governor also issued a statewide mask mandate. In an executive order, the Governor instructed every Mississippian to wear a form of face-covering while inside public spaces or spaces where the minimum six-foot distance requirement could not be met. Since COVID-19 is a respiratory virus and causes a respiratory infection, it was important to limit transmission by covering the nose and the mouth. With these measures in place, Mississippi began to see low occurrences of COVID cases, but this began to change nearing June as President Trump and Governor Reeves began to allow businesses to reopen. The average number of new cases in Mississippi peaked to over 1,000 cases in July of 2020. Seeing this, the Governor decided to issue an order allowing specific school



districts to delay their start time for the next academic year as they attempted to control the number of cases.

According to the Mississippi Department of Health (MSDH), the number of COVID-19 cases went from less than 1,000 cases in April of 2020 to more than 5,000 cases in October of 2021 (*MSDH COVID-19 Vaccination Reporting*). Of these confirmed cases, 35.5% of them have been confirmed in Black people and 38.8% of them are confirmed deaths of Black people. As of October 7, 2021, there were 3,714 deaths between March 1, 2020, and September 30, 2021. On March 27, 2020, the Secretary of Health and Human Services, Alex M. Azar II, “declared that circumstances exist justifying the authorization of emergency use of drugs and biological products during the COVID-19 pandemic...” (*Regulations.gov*). Declaring the Emergency Use Authorization (EUA) authorizes the use of medical countermeasures when a national public health threat arises. Medical countermeasures include “biologic products, drugs, and devices” (*FDA.gov*). In the case of COVID-19, the vaccines would be considered a biological product. This pronouncement set off a cascade of research to develop vaccines to fight the pandemic. In December 2020, the U.S. Food and Drug Administration issued authorization for two COVID-19 vaccines to be used to counter the number of cases. With two vaccines available, vaccines began to be distributed among the eligible, and as eligibility expanded, more Americans were becoming vaccinated. While American citizens slowly began to become receptive of the medical counter measure that many had hoped would flatten the curve, some citizens were hesitant to receive the COVID-19 vaccine. In Mississippi, according to the MSDH COVID-19 Vaccination Reporting report, Mississippi experienced an initial influx of Mississippians being vaccinated

followed by a steady decline between December 2020 and July 2021 (*MSDH COVID-19 Vaccination Reporting*). Additionally, according to the John Hopkins University Coronavirus Resource Center, only 50.93% of Mississippi's population is vaccinated. The question has evolved to, "why aren't the other 49% of Mississippians getting vaccinated if they are eligible?"

### **Vaccine Hesitancy in African Americans**

According to the SAGE Working Group, Vaccine Hesitancy "refers to delay in acceptance or refusal of vaccination despite availability of vaccination services... The Vaccine Hesitancy Determinants Matrix displays the factors influencing the behavioral decision to accept, delay or reject some or all vaccines under three categories: contextual, individual and group, and vaccine/vaccination-specific influences" (MacDonald et al. 1). This model indicates vaccine hesitancy is a multifaceted phenomenon and in the black community, one important factor influencing vaccine hesitancy is scientific or medical mistrust that is rooted in racism, prejudice, and historical experimental research (Schaff et al. 1).

History portrays unethical treatment of African Americans in medical research and advancement. Two prominent cases of unethical treatment include the story of Henrietta Lacks, gynecological research on enslaved black women, and the Tuskegee experiment. In "More than Tuskegee: Understanding Mistrust about Research Participation," researchers found mistrust in the healthcare system as a pivotal influence discouraging participant engagement in medical research (Schaff et al. 4-6). Historical events such as the Tuskegee experiment and ongoing discrimination were credited to perpetuating reasons (Schaff, Darrell P., et al. 1). While many African Americans have

taken the vaccine, these lingering feelings of medical mistrust in the healthcare system embedded in the community may be one reason there are many African Americans still hesitant to obtain the COVID-19 vaccine.

## **CHAPTER II: REVIEW OF THE EVIDENCE OF VACCINE HESITANCY AMONG AFRICAN AMERICANS**

While the ongoing pandemic has yielded numerous studies into COVID-19 over the last two years, vaccine hesitancy is not a new concept. Prior studies have explored vaccine uptake intentions both internationally and nationally in order to detect commonalities and differences to address the phenomenon. On this subject matter, many studies have been performed on African American populations in comparison to their White, non-Hispanic counterparts. These studies explored race, socioeconomic factors, demographics, education level, trust in government agencies, and trust in health care providers as possible determinants influencing the attitude and behavior of vaccine uptake.

In “Exploring racial influences on flu vaccine attitudes and behavior: Results of a national survey of White and African American adults,” researchers explore race, racism, and racial influences as a public health concern that influences vaccine uptake because “racism [contributes] to negative health outcomes” (Quinn et al 1168). The study analyzes results from 1643 participants — 838 White participants and 819 Black participants. Participants were surveyed through Growth from Knowledge (GfK), a data and analysis company. In this survey, demographics and flu vaccination behavior intention questions were collected from participants, including sex, age, marital status, education, income, and vaccine behavior and intentions. After completing demographic questions, participants were asked questions that measured various concepts/variables. The survey measures in question were “racial factors, trust & risk perception, vaccine beliefs, flu vaccine knowledge, vaccine hesitancy and confidence, and social norms”

(Quinn et al. *Table 2* 1170). Upon completion of the survey, participants were compensated with a \$5 cash equivalent. When the data were examined, 53.4% of White non-Hispanic participants reported having gotten the flu shot in comparison to 44.4% of African American, Non- Hispanic participants. The study also revealed statistically significant vaccine attitudes among White Americans and African Americans, which confirmed the hypothesis in question. It was reported White Americans had higher trust in the flu vaccine, higher risk perception of flu, and lower vaccine risk perception compared to African American participants. African Americans reported higher perceived vaccine side effects risks than the actual disease. When examining the variables measuring the influence of racial factors, it was reported that “racial consciousness in a health care setting emerges as a more powerful influence for African Americans, associated with lower trust in the vaccine and the vaccine process” (Quinn et al 1167). African Americans had a higher level of skepticism about the vaccine and the vaccine process than their White counterparts (Quinn et al 1173). This skepticism was attributed to the medical mistrust within the healthcare field, with a specific emphasis on the Tuskegee Syphilis Study in Tuskegee, Alabama. This study provides support for the idea that African Americans' perceptions of vaccine safety perception, and thus vaccine uptake, are correlated with racial influences among other factors.

In a similar study, “Socioeconomic status, demographics, beliefs, and A(H1N1) vaccine uptake in the United States,” researchers explore the association between socioeconomic factors and the H1N1 vaccine uptake. To do so, researchers surveyed approximately 1600 Americans over the age of 18. Of the H1N1 related beliefs, two examined were further examined: “those related to A(H1N1) perceived susceptibility and

A(H1N1) vaccine safety” (Galatea, Minsky, Viswanath 5285). There were three independent variables tested in this study socioeconomic status and demographics, H1N1 related beliefs, and seasonal flu vaccination uptake. The dependent variable was the H1N1 vaccine uptake. After the survey was completed, researchers performed a series of regression models. Their first model revealed a relationship between a few of the demographic factors. The final regression model revealed a correlation between age and vaccine uptake with younger participants being more likely to be vaccinated. In addition to age, it was determined vaccine safety perception influenced the uptake of the H1N1 vaccine. Their results yielded an association between age, urbanicity, and H1N1 flu vaccine safety and H1N1 vaccinations (Galatea, Minsky, Viswanath 5288). Though limitations of this study included only studying the uptake for one particular flu vaccine, the results drawn from vaccine hesitancy and its relation to vaccine uptake may be applied to future vaccine issues, such as the COVID-19 Vaccine.

In “Black-white disparities in 2009 H1N1 vaccination among adults in the United States: A cautionary tale for the COVID-19 pandemic,” researchers use the prior research on the H1N1 vaccine uptake beliefs and intentions as precedent to what could occur in relation to the COVID-19 vaccine. In this study, researchers used data from the National 2009 H1N1 Flu Survey to examine the H1N1 pandemic among black women, black men, white women, and white men. The data from this study comes from the National 2009 H1N1 Flu Survey which was administered over 8 months beginning in October of 2009. Like previous studies, this study also acknowledged the health disparities among minority populations, and in this case, black participants. Unlike other studies, this study explored sex and race as a paired entity in relation to H1N1 Vaccinations. Their goal was to

examine the role of “health beliefs, socioeconomic status (SES), pre-existing conditions, and healthcare” to determine disparities in vaccination uptake. In a study examining race and sex as a combined factor, the results revealed black females were least likely to report against the flu vaccination while black females were the most likely to (Burger, Reuther, Mamelund et al. 946). The study also showed black participants were more likely to express concern or doubt about receiving the vaccine in comparison to their white counterparts (Burger et al. 943). Because of their findings, they suggest health care professionals use their findings as an indication of the COVID-19 vaccine uptakes.

In “Correlates of COVID-19 Vaccine Hesitancy among a Community Sample of African Americans Living in the Southern United States,” researchers address the disproportionality of COVID-19 Vaccinations among African Americans living in Central Savannah River Area in Georgia (Moore 1). Researchers sampled 257 community members between December 2020 and April 2021. During this time, researchers were seeking to find vaccine hesitancy determinants. Researchers solicited participants over the age of 18 years old for this study during another study, the SeroPrevalence And Respiratory Tract Assessment (SPARTA). In their survey, they collected both demographics on each participant in addition to questions assessing subjects’ beliefs on COVID-19. These five questions asked to determine their beliefs. Of their 257 participants, 68.1% of responses indicated acceptance, 16.3% indicated resistance, and 15.6% indicated hesitancy. Results revealed African Americans who experienced who housing insecurity due to COVID-19 were the most resistant to the vaccination (Moore 14). By studying COVID-19 Vaccine hesitancy in African Americans in the south, this study mimics and supports the research being conducted.

Knowing of the COVID-19 Vaccination issue among African Americans, researchers of “A Theory-Based Analysis of COVID-19 Vaccine Hesitancy among African American in the United States: A Recent Evidence,” seeks to develop the theory-based interventions to combat this issue. Between July and August, researchers used a psychometric valid questionnaire survey through Qualtrics to assess vaccine hesitancy in 428 unvaccinated African Americans. This Multi-Theory survey model asked participants 15 demographical questions in addition to 13 COVID-19 vaccine behavior questions. In total, four constructs were examined throughout this model: advantages of COVID-19 vaccination, disadvantages of COVID-19 vaccinations, behavioral confidence, and changes in the physical environment (*Table 1: Framework of MTM*). Initial results revealed nearly half of the participants were hesitant to receive the COVID-19 vaccine. Of the vaccine-hesitant population, they were concerned with the long-term efficiency of the vaccine. When final regressions and results were examined, “MTM constructs predicted nearly 65% of variance” in COVID-19 vaccine uptake within the vaccine-hesitant group. (Sharma, Batra, K., Batra, R. 1). Based on these findings, they proposed an educational session on COVID-19 Vaccine should take place in hopes of increasing the number of vaccinated African Americans.

The literature examined supports the presence of vaccine hesitancy among African American populations. All results and findings of this literature not only give health care professionals insight into COVID-19 vaccination uptake data may look amongst African Americans, but also insight on how to potentially increase vaccination among African Americans by addressing the causes listed in the literature.



## CHAPTER III: METHODS

The Mississippi INBRE Vaccine Hesitancy survey was utilized for this study. The data was designed to examine COVID-19 vaccine hesitancy and related factors among Mississippians following the SAGE Working Group on Vaccine Hesitancy model (*Three Cs Model of Vaccine Hesitancy*). The data was collected from June 2021 to February 2022. Before participating in the survey, participants were notified of the purpose of the survey which was to explore factors that influenced vaccine uptake among Mississippians. Eligible participants were adults (>18 years of age) residents of Mississippi. Participation solicitation was done through social media, e-mail and other electronic means through social networks of the Mississippi INBRE Community Engagement and Training Core, research staff/students, and community-based organizations. Upon successful completion of the survey, participants were offered an electronic twenty-dollar Walmart gift card as compensation for completion. While 564 participants completed the study, only African Americans were selected from the total sample to examine the perception of COVID-19 vaccine safety and vaccine hesitancy among African American Mississippi residents.

### **Variables Description**

#### *Independent Variables*

For this study, there were two kinds of independent variables: independent variables of interest and control or accounted independent variables. Vaccine safety perceptions were measured based on two variables. The first was a 7-point Likert agreement response from strongly disagree to strongly agree to the statement, “I am concerned about the safety of the COVID-19 vaccine.” The second was a 7-point Likert

agreement response from strongly disagree to strongly agree to the statement, “The COVID-19 vaccine is safe for me and my community.” Variables accounted for included age, gender, education level, household income level, having past experiences that discouraged you from receiving COVID-19 vaccine, and knowing a family member or close friend to have an adverse reaction to the vaccine.

#### *Dependent Variables*

The dependent variable explored was vaccine hesitancy. This variable was created based on the SAGE working group model by combining two variables: VAC\_1 (*Have you received the 1<sup>st</sup> dose of a COVID-19 Vaccine?*) and VAC\_2b (*How likely are you to get the COVID-19 vaccine in the next 3 months?*). Participants’ answers to these questions were used to measure the likelihood of vaccine uptake. For question VAC\_1, participants’ survey choices were ‘yes’ and ‘no.’ For question VAC\_2b, survey choices were the 7-point Likert agreement response from extremely unlikely to extremely likely. There was also an option for “received 1<sup>st</sup> dose of COVID-19 vaccine.”

#### *Statistical Analysis*

Descriptive, frequency, correlation, and linear regression analyses were conducted using IBM SPSS Statistics 27.0 software. Mean +/- standard deviation was calculated and provided for age, and frequencies were calculated to determine data distribution for categorical variables. Pearson correlation analysis was computed to examine the relationship between potential control variables and the dependent variable.

Linear regression was computed to determine the ability of the independent variables to predict vaccine hesitancy, after controlling for select perceptions and demographics.

Alpha level  $\leq 0.05$  was considered statistically significant.

## CHAPTER IV: RESULTS

Survey participants for this study included 268 African American Mississippians over the age of 18 years old. Though exploring the variables that old influence vaccine uptake, demographic variables for each participant was recorded and accounted for. These variables included age, gender, education level, and income level. Table 1 displays full demographic information for the population sample.

**Table 1: Demographic Variables**

		Mean	SD	n	%
Age		37.61	14.078	268	100.0%
Gender	Men			103	38.4%
	Women			164	61.2%
	Unknown			1	0.4%
Education Level	Less than a high school degree			2	0.7%
	A high school degree			29	10.8%
	Some college, but not a college degree			58	21.6%
	A 2-year or vocational degree			29	10.8%
	A 4-year college degree or higher			150	56.0%
Income Level:	\$0 to \$19,999			40	14.9%
	\$20,000 to \$29,999			35	13.1%
	\$30,000 to \$39,999			31	11.6%
	\$40,000 to \$49,999			26	9.7%
	\$50,000 to \$59,999			19	7.1%

	\$60,000 to \$69,999			23	8.6%
	\$70,000 to \$79,999			19	7.1%
	\$80,000 to \$99,999			26	9.7%
	\$100,000 to \$119,999			13	4.9%
	\$120,000 to \$139,999			12	4.5%
	\$140,000 or greater			24	9.0%

Correlation analyses revealed a significant linear relationship between vaccine hesitancy and knowing a family member who had a bad reaction, age, education, and household income level, but not gender or remembering past events. Table 2 contains complete correlation analysis results. Thus, control variables for regression analyses were determined to be knowing a family member who had a bad reaction, age, education, and household income level.

**Table 2: Correlations**

		Past Discouraging Events	Knowing someone who had a Bad Reaction	Age	Gender	Education Level	Household Income Level
Vaccine Hesitancy	r	.110	.182**	-.395**	-.038	-.177**	-.195**
	p-value	.073	.003	.000	.538	.004	.001
	n	268	268	268	267	268	268

Table 3 contains complete regression analyses and model summary information. Model 1 included demographic predictors only and accounted for 16.1% of the total variation in vaccine hesitancy. Model 2 included demographics and select perceptions, which accounted for 19.0% of the total variation in vaccine hesitancy. Model 3 included Model 2 control variables and the two main predictors, which accounted for 39.7% of the total variation in vaccine hesitancy. Agreement with concern about the safety of the COVID-19 vaccine was not a significant predictor of vaccine hesitancy.

**Table 3: Regression Analyses and Model Summary Results**

Model		Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Coefficients		
1	Constant	-4.018	.540		-7.441	.000
	Age	-.060	.010	-.364	-5.734	.000
	Education	-.092	.129	-.044	-.707	.480
	Income Level	-.031	.046	-.044	-.688	.492
R <sup>2</sup> =0.16, F=16.46, p<0.001						
2	Constant	-4.274	.538		-7.943	.000
	Age	-.061	.010	-.370	-5.924	.000
	Education	-.104	.127	-.051	-.817	.415
	Income Level	-.006	.046	-.008	-.130	.897
	Bad Reaction	.968	.317	.175	3.055	.002
R <sup>2</sup> =0.19, F=15.07, p<0.001						
3	Constant	-1.222	.646		-1.890	.060
	Age	-.038	.009	-.232	-4.140	.000
	Education Level	-.094	.111	-.045	-.845	.399

	Income Level	.008	.040	.011	.191	.848
	Bad Reaction	.412	.285	.074	1.446	.150
	COVID-19 Vaccine Safety Concerns	-.018	.069	-.013	-.262	.794
	COVID-19 Vaccine is safe for me and the community.	-.728	.078	-.491	-9.361	.000
R <sup>2</sup> =0.40, F=28.01, p<0.001						

Results also showed each of the models was a significant predictor of vaccine hesitancy. For Model 1, age was a significant predictor of vaccine hesitancy where for each increase in age by 1.0-year, vaccine hesitancy decreased by 0.364, after controlling for education and household income levels. For Model 2, knowing a family member or close friend with a bad COVID-19 vaccine reaction was a significant predictor of vaccine hesitancy, indicating that vaccine hesitancy is higher for those who knew someone than for those who did not, after controlling for age, education, and household income. For Model 3, the perception that COVID-19 vaccine was safe for self and community was a significant predictor of vaccine hesitancy, indicating that 1.0 unit increase in agreement with this perception, vaccine hesitancy decreased by 0.491 units, after controlling for age, education, household income, and knowing a family member or friend with a bad reaction. Agreement with concern about the safety of the COVID-19 vaccine was not a significant predictor of vaccine hesitancy.

In the survey, participants were asked if there were events that discouraged their likelihood of receiving the COVID-19 Vaccine. If participants answered yes, they were able to expand on the specific events that discouraged them. Of the 268 participants surveyed, 66 participants indicated they remembered events that discouraged them from receiving the vaccine. These responses were placed in four categories: Historical Events, Side Effects & Adverse Health Events, Governmental & Organizational Mistrust, and Other. Of the 66 participant responses, 57.6% of responses credited side effects and adverse health events, 18.2% of responses credited other influences, 12.1% of responses credited governmental and organizational mistrust, and another 12.1% of responses credited historical events, including the Tuskegee Experiment.

**Table 4: Events Discouraging COVID-19 Vaccine Uptake**

Categories	n	%
Historical Events:	8	12.1%
Side Effects & Adverse Health Events:	38	57.6%
Governmental & Organizational Mistrust:	8	12.1%
Other:	12	18.2%

## CHAPTER V: DISCUSSION AND CONCLUSIONS

The Sage Working Group defined Vaccine Hesitancy as the “delay in acceptance or refusal of vaccination despite availability of vaccination services” (MacDonald 1). Though present, the cause of this phenomenon cannot be summed up due to one incidence but rather an accumulation of external influences such as health inequities and disparities and socioeconomic determinants. In this study, we sought to determine if there was a relationship between COVID-19 vaccine hesitancy and COVID-19 vaccine safety perceptions in African American Mississippians. We wondered how African American Mississippians’ decision to receive the COVID-19 vaccine may be influenced due by the perceived quick development of the vaccines and the lack of data and research surrounding long term side effects. With this question in mind, 268 African American Mississippians were given an online survey to assess whether their vaccine safety perceptions of the vaccine influenced their vaccine uptake decision. Participants reported demographic variables (age, gender, education level, and household income level). They also indicated their agreement or disagreement with the questions and statements relating to the COVID-19 vaccine: *I am concerned about the safety of the COVID-19 vaccine* and *The COVID-19 vaccine is safe for me and my community*. Based on the initial correlation analysis, age, education, household income level, and knowing a family member who had a bad reaction was set as control variables for regression analyses. Results from the Pearson correlation analysis revealed the relationship between vaccine safety perceptions and vaccine uptake were not statistically significant and thus not an effective predictor of vaccine hesitancy in this population, but the other some of the demographic variables were. Of the variables examined, age, education, household income, and knowing a



family member who had a bad reaction were found to be predictors of vaccine hesitancy among the African American population examined.

While these results do not support literature charging vaccine safety perceptions as a reason for vaccine hesitancy, the results do support published literature arguing vaccine hesitancy is present among patients and African Americans, specifically. The results also support other studies whose vaccine hesitancy determinants are age and household income levels (Soares et al). Although these studies will continue to provide clarity on vaccine hesitancy among African Americans and other minority groups, further research is needed to explore how historical events such as the Tuskegee experiment and the story of Henrietta Lacks may have influenced health care trust in African American populations. Using these results, healthcare providers will be able to better address this population who may have a learned mistrust of the government and healthcare system.

In conclusion, vaccine hesitancy is an idea heavily influencing vaccine uptake against disease-causing pathogens. While this study sought to explore how COVID-19 vaccine safety perceptions influenced COVID-19 vaccine uptake, results revealed the relationship between these two variables was not statistically significant and thus not an effective predictor of vaccine hesitancy in this population. Though vaccine safety perceptions were not a significant predictor of vaccine hesitancy, these findings give healthcare professionals insight on how to proceed in addressing vaccine hesitant individuals. Based on these findings, it is proposed healthcare professionals take a number of actions in hopes of increasing vaccine uptake against future viral pathogens. These actions include increasing educational efforts on the biological mechanism of the vaccine, explaining the importance of vaccine uptake against viral infections, increasing

access and transportation to vaccine distribution centers, acknowledging events that may have led to governmental and health care mistrust, and addressing varied vaccine reactions among individuals.

Limitations in the study design included generalizability. Because subjects in question were only African American Mississippi residents, the reasonings causing vaccine hesitancy in this population may or may not be applicable to all other races and minority groups who are vaccine hesitant. Because of that, further studies should also examine vaccine hesitancy in a general population and mechanisms to increase vaccine uptake among said population.

## APPENDIX A: SELECT SURVEY ITEMS USED FOR THIS STUDY

### DEPENDENT VARIABLE: Vaccine Hesitancy

**Vaccine Hesitancy:** Combination of \_Vac1 and Vac2b

- a. Extremely unlikely to get vaccine in next 3 months (1)
- b. Very Unlikely (2)
- c. Somewhat Unlikely (3)
- d. Neutral, neither likely or unlikely (4)
- e. Somewhat likely (5)
- f. Very Likely (6)
- g. Extremely likely (7)
- h. Received 1<sup>st</sup> dose of COVID-19 vaccine (8)

**Vaccine Hesitancy was created based on the SAGE working group model and by combining the two variables VAC\_1 and VAC2b**

**VAC\_1** Have you received the 1st dose of a COVID-19 vaccine? NOMINAL

- a. Yes 1
- b. No 0

**VAC\_2b** How likely are you to get the COVID-19 vaccine in the next 3 months? NOMINAL

- i. Extremely unlikely (1)
- j. Very Unlikely (2)
- k. Somewhat Unlikely (3)
- l. Neutral, neither likely or unlikely (4)
- m. Somewhat likely (5)
- n. Very Likely (6)
- o. Extremely likely (7)

### INDEPENDENT VARIABLES OF INTEREST: Vaccine Safety Perceptions

**IGVU\_C\_2** I am concerned about the safety of the COVID-19 vaccine ORDINAL

- a. Strongly disagree (1)
- b. Disagree (2)
- c. Somewhat disagree (3)
- d. Neither agree nor disagree (4)
- e. Somewhat agree (5)
- f. Agree (6)
- g. Strongly agree (7)

**VIVU\_A\_1** The COVID-19 vaccine is safe for me and my community. ORDINAL

- a. Strongly disagree (1)
- b. Disagree (2)
- c. Somewhat disagree (3)
- d. Neither agree nor disagree (4)
- e. Somewhat agree (5)
- f. Agree (6)
- g. Strongly agree (7)

### CONTROL INDEPENDENT VARIABLES:

**CIVU\_C\_1** Do you remember any events in the past that may have discouraged you from getting a COVID-19 vaccine for yourself, even if you overcame it and got the vaccine? NOMINAL

- a. Yes (1)
- b. No (0) = skip the follow up question

**CIVU\_C\_2** What event(s) do you remember that discouraged you from getting the COVID-19 vaccine? NOMINAL

Text entry

**IGVU\_A\_4** Do you know a family member or close friend who has had a bad reaction to the COVID-19 vaccine? NOMINAL

- a. Yes (1)
- b. No (0)

**Q2 AGE** What is your age? Scale or Ratio

- a. Enter years < Ineligible if <18

**Q3 GENDER** What is your gender? Nominal

- a. Male (0)
- b. Female (1)

**Q7 EDUCATION** Please indicate the highest level of education you have received. Nominal

- a. Less than a high school degree (1)
- b. A high school degree (2)
- c. Some college, but not a college degree (3)
- d. A 2 year or vocational degree (4)
- e. A 4-year college degree or higher (5)

**Q10** What is your household current yearly net income level? In other words, think about each person that pays the bills and contributes to household expenses. If you add up what each of those people make, about how much money is brought home each year?

Ordinal

- f. \$0 to \$19,999 (1)
- g. \$20,000 to \$29,999 (2)
- h. \$30,000 to \$39,999 (3)
- i. \$40,000 to \$49,999 (4)
- j. \$50,000 to \$59,999 (5)
- k. \$60,000 to \$69,999 (6)
- l. \$70,000 to \$79,999 (7)
- m. \$80,000 to \$99,999 (8)
- n. \$100,000 to \$119,999 (9)
- o. \$120,000 to \$139,999 (10)
- p. \$140,000 or greater (11)

# APPENDIX B: IRB Approval Letter



INSTITUTIONAL REVIEW BOARD  
**STANDARD (ONLINE) INFORMED CONSENT**

**STANDARD (ONLINE) INFORMED CONSENT PROCEDURES**

The Project Information and Research Description sections of this form should be completed by the Principal Investigator before submitting this form for IRB approval. Use what is given in the research description and consent sections below when constructing research instrument online.

Last Edited May 10<sup>th</sup>, 2019

Today's date:		
<b>PROJECT INFORMATION</b>		
Project Title: Addressing SARS-CoV-2 Vaccine Hesitancy in Underserved Communities in Mississippi		
Principal Investigator: Jennifer Lemacks	Phone: 601-266-8825	Email: jennifer.lemacks@usm.edu
College: Education and Human Science	School and Program: Kinesiology and Nutrition	
<b>RESEARCH DESCRIPTION</b>		
<b>1. Purpose:</b>		
The purpose of this survey is to learn about factors that influences Mississippians decision to receive or not receive the COVID-19 vaccination.		
<b>2. Description of Study:</b>		
In order to complete the survey, you must be 18-years-old or older. Your participation is completely voluntary. You will be asked to complete an online survey. The survey will have questions relating to demographics, standard health information, and COVID19 health history and vaccination history, attitudes and behaviors. The survey will take approximately 15-20 minutes to complete. Each question must be answered to complete the survey. The answers you provide will be used to assist other agencies and organizations in your area with developing programs and providing resources that will address the needs of your community. The information will also be used by Mississippi INBRE Outreach Scholars to develop their research projects and outreach activities as part of their summer research program.		
<b>3. Benefits:</b>		
Upon completion of this survey, you will be invited to enter your information to receive a \$20 e-gift card. Your input will also be used to improve the health of your community.		
<b>4. Risks:</b>		
There is minimal risk associated with completing the survey other than the inconvenience of the time. We have designed the survey to be finished as quickly and easily as possible.		
<b>5. Confidentiality:</b>		
No identifiable information will be associated with the survey results. If you decide receive the gift card incentive, you will be asked for your contact information for the sole purpose of delivering the gift card to		

you. Your contact information for the gift card will be collected and stored separately from the survey data. We will have no way of connecting your survey responses to your contact information.

**6. Alternative Procedures:**

The survey may only be completed electronically at this time. There will be no other alternative procedures provided.

**7. Participant's Assurance:**

This project and this consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5125, Hattiesburg, MS 39406-0001, 601-266-5997.

Any questions about this research project should be directed to the Principal Investigator using the contact information provided above.

**CONSENT TO PARTICIPATE IN RESEARCH**

I understand that participation in this project is completely voluntary, and I may withdraw at any time without penalty, prejudice, or loss of benefits. Unless described above, all personal information will be kept strictly confidential, including my name and other identifying information. All procedures to be followed and their purposes were explained to me. Information was given about all benefits, risks, inconveniences, or discomforts that might be expected. Any new information that develops during the project will be provided to me if that information may affect my willingness to continue participation in the project.

**Include the following information only if applicable. Otherwise delete this entire paragraph before submitting for IRB approval:** The University of Southern Mississippi has no mechanism to provide compensation for participants who may incur injuries as a result of participation in research projects. However, efforts will be made to make available the facilities and professional skills at the University. Participants may incur charges as a result of treatment related to research injuries. Information regarding treatment or the absence of treatment has been given above.

**CONSENT TO PARTICIPATE IN RESEARCH**

By clicking the box below, I give my consent to participate in this research project.

Check this box if you consent to this study, and then click "Continue." (Clicking "Continue" will not allow you to advance to the study, unless you have checked the box indicating your consent.)

If you do not wish to consent to this study, please close your browser window at this time.

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