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Increasing Mississippi's HPV Vaccination Rate: A Proposal Based on Providers' Insights

Madison N. Thornton
University of Mississippi

INCREASING MISSISSIPPI'S HPV VACCINATION RATE: A PROPOSAL BASED ON PROVIDERS' INSIGHTS

By
Madison Thornton

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Approved By:

_____
Advisor: Dr. Melissa Bass

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Reader: Dr. Kyle Fritz

_____
Reader: Dr. John Green

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ABSTRACT

MADISON THORNTON: Increasing Mississippi's HPV Vaccination Rate: A Proposal Based on Providers' Insights (Under the direction of Dr. Melissa Bass)

Despite high childhood vaccination rates for required vaccinations for kindergarten, including the MMR vaccine, Mississippi has the lowest HPV vaccination rate in the nation. This is so even though the HPV vaccine can prevent multiple cancers, including cervical cancer, of which Mississippi has the nation's highest mortality rate. This study seeks to understand the factors surrounding Mississippi's low HPV vaccination rate as well as potential policy solutions to increase this rate. To accomplish this, the author conducted interviews with 13 Mississippi physicians in various specialties to gather qualitative data. As a result of these interviews, the author found that the anti-vaccination movement, the association of HPV with sexual activity, education of providers and parents, the lack of an HPV vaccination requirement, and patients forgetting to schedule second dose appointments are key factors contributing to Mississippi's low HPV vaccination rate. Potential policy solutions to increase the HPV vaccination rate in Mississippi include educating providers to make more effective recommendations, mandating the HPV vaccine for school attendance, requiring providers to recommend the HPV vaccine to their patients, and automatically scheduling second dose appointments. Increasing the HPV vaccination rate in Mississippi by implementing some or all of these strategies is critical to improving the health and wellness of all Mississippians.

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LIST OF ABBREVIATIONS

HPV	Human papillomavirus
TDaP/DTaP	Combination vaccine against tetanus, diphtheria, and pertussis
STD	Sexually-transmitted disease

Chapter 1: Introduction

Each year in Mississippi 149 women are diagnosed with cervical cancer and 58 women die of the disease, leaving Mississippi with the highest age-adjusted cervical cancer mortality rate in the United States at 3.5 per 100,000 (as compared to the national rate of 2.3 per 100,000) (Mississippi State Department of Health, 2018). These cervical cancer cases and tragic deaths are not necessary and do not have to keep happening. Mississippi women are dying of a cancer we have the ability to prevent.

Most cases of cervical cancer, as well as other cancers including oropharyngeal and penile cancers, are caused by human papillomaviruses (HPVs), which are sexually transmitted (Juckett & Hartman-Adams, 2010). HPV is very prevalent in the United States, with 80 million Americans having the virus currently and 14 million new cases each year (Blackmore, 2021). The HPV vaccine prevents multiple cancer-causing strains of HPV, preventing these cancers in the future, and the vaccination is most effective when given prior to sexual activity, which is why the HPV vaccine is recommended for children at ages 11 to 12 (CDC, 2019). The HPV vaccine requires two doses, with the second dose administered 6-12 months after the first, and people vaccinated after age 15 require three doses (CDC, 2019). The HPV vaccine is currently the only vaccine available with the ability to prevent cancer, and preventing these cancers with the HPV vaccine not only would save lives but also would prevent illness and related suffering and reduced quality of life as well as reduce costs for patients, insurers, and the state.

Despite this, many people, including most Mississippians, are not taking advantage of this potential lifesaver. Mississippi has the lowest HPV vaccination rate in the nation, even though Mississippi is constantly at the top of the list for other childhood vaccinations (Campbell, 2019). In 2020, only 28.8% of eligible Mississippians were up-to-date on their HPV vaccinations, as compared to the national average of 40.5% and to Rhode Island's nation-high rate of 77.7% (Blakemore, 2021). Less than a third of Mississippians are up-to-date on a vaccination that prevents cancer, and people are dying because of that. Because the HPV vaccination rate in Mississippi is so low compared both to other states and to our other vaccination rates, and because our cervical cancer mortality rate is the highest in the nation, I was interested to explore the reasons surrounding this disparity and generate potential policy solutions so we can increase the HPV vaccination rate in Mississippi and prevent future cancers and deaths from affecting our fellow Mississippians.

In this thesis, I explore the factors that impact the HPV vaccination rate in Mississippi, including religiosity, conservatism, provider recommendations, and education, among other factors. Because provider recommendations are one of the most important factors in vaccination compliance, including for HPV vaccination, and because Mississippi has the lowest HPV vaccination provider recommendation rate in the nation at 59.5% (CDC, 2019), I focus on this factor the most. I interviewed physicians across the state to assess their perspectives on the current status of the HPV vaccination rate in Mississippi and what they as health care providers believe would be the best ways to increase the rate.

In writing this thesis and reviewing the literature, I discovered groups with distinct reasons for not vaccinating their children with the HPV vaccine. These groups include: 1) people who are opposed to all vaccinations ("anti-vaxxers"), 2) people who are only opposed to the HPV vaccine ("anti-HPV vaxxers"), and 3) people who get their child vaccinated with the first dose of the HPV vaccine, but fail to get them the second dose ("partial vaxxers"). The anti-vaccination population is against all vaccinations in principle, so most strategies are ineffective at persuading this group to vaccinate their children. The people who are against the HPV vaccination but not other vaccinations usually object to the HPV vaccination's association with sexual activity, as HPV is an STD. The third group are those who do not get their children vaccinated with the second dose of the HPV vaccine, usually because the second dose has to be administered after at least six months and they simply forget. I distinguished these groups because it is important to recognize the different reasons people have for not vaccinating their children when developing policy recommendations.

By increasing the HPV vaccination rate in Mississippi, hopefully, in the future, we can bring the number of women dying of preventable cervical cancer down to zero. All Mississippians deserve to live a long and healthy life, and the HPV vaccine is one way that we can improve the health and wellbeing of all Mississippians, one shot at a time.

Chapter 2: Background

To understand the reasons behind Mississippi's low HPV vaccination rate and how impactful this is, it is necessary to understand what HPV actually is and how it is transmitted, as well as how the vaccine itself works and how safe it is. Additionally, it is important to recognize the culture of vaccinations in Mississippi, including rates of other vaccinations in comparison to the HPV vaccine. After looking at these important details, I can then address the factors that contribute to the low HPV vaccination rate in Mississippi and figure out the best approaches and policies to address this.

HPV and the HPV Vaccination

Human Papillomaviruses (HPVs) are sexually transmitted diseases (STDs) that can cause genital warts and various cancers, including cervical cancer, vaginal cancer, penile cancer, oropharyngeal cancer, and anal cancer (Juckett & Hartman-Adams, 2010). The article "STD facts – Human papillomavirus (HPV)" from the Centers for Disease Control and Prevention (CDC) explains that HPV is the most common sexually transmitted infection (STI) in the U.S. and that 79 million Americans have HPV. HPV is so common that the majority of sexually active people of all genders will contract the virus at some point (CDC, 2019). HPV is transmitted through contact with infected genital skin or mucosa, as spread during vaginal, anal, and/or oral sex (Juckett & Hartman-Adams, 2010). HPV vaccinations can prevent the spread of several strains of HPV, in turn preventing the associated cancers (CDC, 2019). The HPV vaccination is

recommended before sexual activity in order to promote a better immune response and increase effectiveness (CDC, 2019).

The article "Human Papillomavirus (HPV) Vaccines" from the National Cancer Institute details the mechanisms of the HPV vaccine. The article explains that the HPV vaccine stimulates "the body to produce antibodies that, in future encounters with HPV, bind to the virus and prevent it from infecting cells" (National Cancer Institute, 2019). HPV vaccinations utilize Virus-like Particles (VLPs) that are not infectious as they lack the viral DNA necessary to be pathogenic, and these VLPs stimulate the human immune system to produce antibodies that prevent future HPV infection when a person comes in contact with HPV (National Cancer Institute, 2019). As explained in "Vaccinating Boys and Girls against HPV," the CDC recommends that children get the first dose of the HPV vaccine at 11-12 years of age and the second dose 6-12 months later. If people get vaccinated after the age of 15, they need three doses of the vaccine instead of two (CDC, 2019). The article also explains that the HPV vaccine is safe and effective, and the possible side effects are mild (CDC, 2019).

The report "HPV Vaccine Safety and Effectiveness Data" from the CDC further details the safety and efficacy of the HPV vaccination. Like any vaccination, anaphylaxis, or a severe allergic reaction, to the HPV vaccination is possible, but there have been only three cases of anaphylaxis for every one million doses of the vaccination (CDC, 2019). With the exception of syncope, or fainting, there have been no confirmed adverse effects "occurring at higher than expected rates" following administration of the HPV vaccination (CDC, 2019). According to the data on the HPV vaccination, specifically Gardasil 9, in the U.S., there were 7,244 reported adverse events from 28

million vaccine doses, and only 3% of those events (217) were considered serious (CDC, 2019). Moreover, there is no evidence suggesting that the HPV vaccination could result in death (CDC, 2019). The lack of a significant number of adverse events as well as the fact that the HPV vaccination is not correlated with death demonstrates the safety of the HPV vaccine.

Regarding the effectiveness of the vaccine, within ten years of vaccine introduction in the U.S., HPV infections of the four types targeted by the vaccination decreased by 86% among adolescent girls ages 14-19 and decreased 71% among women ages 20-24 (CDC, 2019). Additionally, data from 2008 to 2014 indicate that the HPV vaccination has successfully prevented the most dangerous strains of HPV, types 16 and 18, that cause nearly 70% of cervical cancers (Stephens, 2019). Specifically, the rates of prevalence of HPV-positive CIN2+, a type of cervical cancer caused by HPV, decreased from 52.7% to 44.1% in that six-year span (Stephens, 2019). Moreover, according to the CDC in 2019, the HPV vaccination provides at least ten years of protection from HPV, and there is no suggestion this protection decreases over time.

Additionally, the article "HPV Vaccination and the Risk of Invasive Cervical Cancer" from *The New England Journal of Medicine* details the results of a study of the efficacy and effectiveness of the HPV vaccination in Sweden. Drawing on a sample of 1,672,983 females who were between the ages of 10 and 30 from 2006 to 2017, researchers analyzed the correlations between HPV vaccination and the prevalence of invasive cervical cancer, controlling for various factors (Lei et al., 2020). The researchers found that HPV vaccination was correlated with a significantly decreased risk of cervical cancer at the population level in Sweden, indicating that the vaccination is

effective in reducing cervical cancers (Lei et al., 2020). This efficacy data is significant in demonstrating that the HPV vaccination definitively provides protection against cervical cancer, indicating that the HPV vaccine is fulfilling its purpose.

Mississippi and the HPV Vaccine

Despite the cancer prevention potential of the HPV vaccine and its safety record, many states, including Mississippi, have much lower HPV vaccination rates than rates for other vaccines. Mississippi is 50th in HPV vaccination rates among teenagers, the worst in the entire nation (Campbell, 2019). The article "Immunization for Human Papillomavirus in Mississippi – Room for Improvement" from the Mississippi State Department of Health provides background on the HPV vaccine and shows that it is underutilized in Mississippi. Specifically, the article compares HPV vaccination data for Mississippi to the national rate. In 2014, 45.8% of females between the ages of 13 and 17 in Mississippi received one or more doses of the HPV vaccination, as compared to 60.0% of females in that same age cohort nationally, demonstrating a significant disparity (Mississippi State Department of Health, 2015). This article also discusses how the rate of cervical cancer in Mississippi (in 2012) at 9.68 cases per 100,000 women was 23% higher than the national rate at 7.9 per 100,000, indicating the necessity of increasing the HPV vaccination rate in Mississippi to decrease its rate of cervical cancer (Mississippi State Department of Health, 2015). I use this article as a justification for the significance of my research.

Mississippi's low HPV vaccination ranking is in sharp contrast to its school-age vaccination rate – close to 100% in kindergarten – that is first in the nation (Campbell, 2019). In her article "Mississippi, First in School-Age Vaccines, Lags in Immunization

Rates for Teens, Adults," Campbell discusses these disparities, citing Mississippi's "health culture" and "intrinsic social barriers" (Campbell, 2019). Campbell also refers to other states' policies regarding the HPV vaccine, such as Massachusetts, which has "adopted an incentive program, rewarding families that comply with recommendations with gift cards and vouchers" (Campbell, 2019). In my thesis, I use this article to discuss Mississippi's low HPV vaccination rate and possible factors impacting the rate.

Before attending kindergarten, Mississippi requires children to receive the following vaccinations: "Diphtheria, Tetanus, Pertussis (DTaP); Polio (IPV); Hepatitis B; Measles, Mumps; Rubella (MMR); and Chickenpox (Varicella)" (Mississippi State Department of Health, 2020). For required vaccinations, the state only allows medical exemptions and not religious, philosophical, or conscientious exemptions, unlike most other states (Mississippi State Department of Health, 2020). This means that children are required to be vaccinated unless the MSDH Medical Exemption Request Form (Form 139) is signed by a licensed physician in the state of Mississippi stating that the child has a medical condition preventing them from receiving the vaccine (Mississippi State Department of Health, 2020). The HPV vaccination is only recommended – not required – by the Mississippi State Department of Health, so decision-making is entirely up to parents, with no exemptions needed (Mississippi State Department of Health, 2020). Parents who receive a provider recommendation are more likely to have their child receive the HPV vaccine (Dorell et al., 2013). However, Mississippi has an HPV provider recommendation rate of 59.5%, the lowest of any state (CDC, 2019).

The 2018 article "UMMC Experts: Raising Recommended HPV Vaccine Age Range Could Save Lives" explains that the expansion of the HPV vaccination age range

in Mississippi from the current range of 9-26 to the age of 45 could reach a larger population of unvaccinated Mississippians. The article also states that many Mississippi clinics recommend the HPV vaccine at the same time as the DTaP (Diphtheria, Tetanus, Pertussis) booster vaccine, which the Mississippi State Department of Health requires for students to attend 7th grade (Cummins, 2018). I use this resource to discuss the possibility of expanding the HPV vaccination age range in Mississippi, as well as the policy of recommending the HPV vaccination be given with the required DTaP vaccination.

The article "Vaxxed Out: A Look Inside Mississippi's Vaccine Rights Movement and the Doctors Who Oppose It" from WMC Action News explores the anti-vaccination movement in Mississippi. The article discusses MaryJo Perry, the co-director of Mississippi Parents for Vaccine Rights (MVPR), an anti-vaccination Facebook group that has over 10,000 followers (Carter, 2019). On its website, MVPR tells its followers to "Be the voice for vaccine choice" and refers to Mississippi's vaccination requirements as "draconian" because they violate "religious liberty" (Mississippi Parents for Vaccine Rights Blog, 2020). I use these resources to discuss the prevalence of the anti-vaccination, or "vaccine choice," movement in Mississippi and how it can influence parental hesitancy to vaccinate their children, including against HPV, and how this movement is affecting vaccination rates in the state.

The significantly low HPV vaccination rate in Mississippi in comparison to high rates of childhood vaccinations, as well as the much lower Mississippi HPV vaccination rate as compared to the national average, provides a rationale for my thesis. Understanding the mechanisms of HPV and the HPV vaccine and how the sexual

transmission of the virus is important when discussing the HPV vaccination rate in a conservative and religious state like Mississippi, especially in the wake of anti-vaccination movements in the state. By exploring these factors, I hope to determine the most significant factors affecting the HPV vaccination rate and the best ways to address these factors to increase the HPV vaccination rate for the betterment of the health and wellness of all Mississippians.

Chapter 3: Literature Review

To place my research in conversation with other scholarly works, I conducted a review of related literature. For this literature review, I generated several categories, including: HPV Association with Sexual Activity, Why People Do Not Get the HPV Vaccine for Their Children, Provider Recommendations and the HPV Vaccine, and Studies and Policies to Increase HPV Vaccination Rates. These categories allow me to organize the literature in line with my thesis research.

HPV Association with Sexual Activity:

Mullin's article "Why HPV Vaccine Rates Continue to Lag in Rural States" discusses the reasons HPV vaccination rates are so low in rural states like Mississippi. These reasons include the HPV vaccination's link to "a taboo in American culture: sexual activity among teenagers" (Mullin, 2017). Mullin explains that many parents are uncomfortable with this association and believe that their children "don't need it because they're not sexually active."

The article "Sexual Activity–Related Outcomes after Human Papillomavirus Vaccination of 11-to 12-Year-Olds" from *Pediatrics* provides results from a study about sexual activity following HPV vaccination. The researchers found that "HPV vaccination in the recommended ages was not associated with increased sexual activity–related outcome rates*"* (Bednarczyk et al., 2012, p. 798). I use these sources to understand sex as a reason for parental hesitancy and to demonstrate that the HPV vaccine is not associated with increased sexual activity, despite parental concerns.

Why People Do Not Get the HPV Vaccine for Their Children

Regarding why people do not get the HPV vaccine for their children, a large number of studies explore factors behind parental hesitancy and possible responses. The article "Barriers to Human Papillomavirus Vaccination among US Adolescents: A Systematic Review of the Literature" from *JAMA Pediatrics* details barriers to the HPV vaccine. According to the article, health care professionals claim that common barriers include "financial concerns and parental attitudes and concerns" (Holman et al., 2014, pp. 76-82). The literature also found that parents felt that they needed more information about the vaccine (Holman et al., 2014). Additional barriers to HPV vaccination included concerns about "the vaccine's effect on sexual behavior, low perceived risk of HPV infection, social influences, irregular preventive care, and vaccine cost" (Holman et al., 2014, pp. 76-82). According to the article, parents stated that provider recommendations were "one of the most important factors in their decision to vaccinate their children" (Holman et al., 2014, pp. 76-82).

The 2018 article "The HPV Vaccine: Why Parents Really Choose to Refuse" from Johns Hopkins Medicine details reasons parents decide against the vaccine. The researchers found that parental hesitancy stems from factors including "safety worries, lack of necessity, knowledge about HPV and absence of physician recommendation" (Johns Hopkins Medicine, 2018). The researchers concluded that public health campaigns and providers in recommending the HPV vaccination should focus on its strong safety record as well as its potential to prevent cancers in their children (Johns Hopkins Medicine, 2018).

In response to parental hesitancy, several states have passed or have attempted to pass legislation to allow dependent minors to get vaccinations, including the HPV vaccination, without their parents' consent, as Anna Almendrala discusses in her article "When Parents Say 'No' to HPV shots, Teens Have No Choice. Some States are Changing That." The New York State Department of Health changed its regulations to allow teenagers to obtain the HPV vaccination without parental consent, and Delaware, California, and Washington, D.C., allow teenagers under the age of 18 to be vaccinated for both HPV and hepatitis B, another sexually-transmitted disease, without their parents' consent (Almendrala, 2019). The article also discusses factors influencing parental hesitancy, including that it is "new," that HPV is "not likely to kill you," and that other preventive measures like Pap smears can help prevent HPV-related cancers (Almendrala, 2019).

The 2017 article "Factors Associated with Parents' Intent to Vaccinate Adolescents for Human Papillomavirus: Findings From the 2014 National Immunization Survey–Teen" discusses the findings of a survey regarding parental intent to get their children vaccinated against HPV. The researchers analyzed data from parents of 10,354 adolescent children from the 2014 National Immunization Survey – Teen (Mohammed et al., 2017). The researchers found that maternal education, Hispanic ethnicity, and provider recommendation were the strongest predictors of parental intention to get the HPV vaccination for their children (Mohammed et al., 2017).

The article "Parental Intent to Initiate and Complete the Human Papillomavirus Vaccine Series in the USA: A Nationwide, Cross-Sectional Survey" from *The Lancet Public Health* discusses another study about parental intent. The researchers used data

from the 2017–18 National Immunization Survey (NIS-Teen), with the study's participants all parents of adolescents (Sonawane et al., 2020). The researchers found that the most common reason that parents cited for lack of intent to get their children vaccinated was "safety concerns," with lack of a provider recommendation being a secondary factor (Sonawane et al., 2020, p. 492).

The article "Stories about HPV Vaccine in Social media, Traditional Media, and Conversations" from *Preventive Medicine* details a study in which researchers investigated the effects of stories and social media on the HPV vaccination rate. The researchers surveyed 1263 U.S. parents of teenagers who had not yet received the HPV vaccination, asking the parents if they had heard positive or negative stories regarding the HPV vaccine (Margolis et al., 2019). According to the results, 19% of parents recalled stories about the harms of the vaccine, 11% recalled stories about benefits and vaccine-preventable diseases, and 15% recalled stories about both harms and benefits (Margolis et al., 2019). For stories about harm, the most common source was media, particularly social media, while for benefits, the story source was conversations (Margolis et al., 2019). Furthermore, stories about the harm of the HPV vaccine are negatively correlated with HPV vaccination compliance, indicating that these negative stories deter parents from getting their children vaccinated (Margolis et al., 2019). I use this article to discuss the effect of social media and stories on the HPV vaccination rate, as well as to propose potential solutions to better educate Mississippians about the HPV vaccine and promote positive stories through social media and other campaigns.

The 2019 article "Going Beyond the Individual: How State-Level Characteristics Relate to HPV Vaccine Rates in the United States" investigated how state-level

characteristics impact HPV vaccination rates. The researchers found that significant predictors at the state level include "sex education policy, religiosity, and HPV vaccine mandate," and states with the lowest HPV vaccination rates were "conservative and highly religious," both of which are characteristics of Mississippi (Franco et al., 2019, p. 1). I am using this source to discuss the specific characteristics of the state of Mississippi that contribute to the low HPV vaccination rate.

Several sources explore how anti-vaccination campaigns affect parental decision-making regarding HPV. The 2019 article "The HPV Vaccine is on Trial as Anti-Vaxxers Mobilize against Effective Cancer Prevention" focuses on anti-vaccination resistance against the HPV vaccine, as well as conservative and religious opposition to the vaccination. The article discusses leading anti-vaxxer Robert Kennedy's articles and documentary *Vaxxed 2: The People's Truth* that are "intent on scaring parents and teens away from the HPV vaccine" (Smith, 2019).

Moreover, the article "'Anti-vax' Noise Will Jeopardise HPV Breakthrough" from the *British Dental Journal* discusses the worldwide anti-vaccination movement and its impact on HPV vaccination rates in other nations. The article discusses instances of "anti-vax leaflets snuck into children's books sold via Amazon warehouses" with "baseless claims" of the HPV vaccine causing injuries, conditions, and even death (Acclaimed, 2019). The article states that "panic" over these claims caused the HPV vaccination rate in Japan to drop from over 70% to less than 1% (Acclaimed, 2019). I use these resources to explore the effect of the anti-vaccination movement in the U.S. and worldwide on the HPV vaccination rate.

Provider Recommendations and the HPV Vaccine

Research shows that provider recommendations significantly influence HPV vaccination rates. The article "National, Regional, State, and Selected Local Area Vaccination Coverage Among Adolescents Aged 13–17 Years - United States, 2018" from the CDC showed that provider recommendations lead to an increase in the HPV vaccination rate. The article also detailed specific information about the rural South, where parents "indicated that they did not have enough information on the vaccine or its purpose" (CDC, 2019), information health care professionals are expected to provide. The article also demonstrated how insurance coverage impacts all vaccination rates, including the HPV vaccine rate, with uninsured adolescents having much lower HPV vaccine coverage (CDC, 2019). Also, their statistics demonstrated that Mississippi had the lowest provider recommendation rate for the HPV vaccine, at 59.5% (CDC, 2019).

The article "Factors that Influence Parental Vaccination Decisions for Adolescents, 13 to 17 Years Old: National Immunization Survey–Teen, 2010" from *Clinical Pediatrics* detailed the factors that influence parental vaccination decisions. The survey found that "vaccination coverage estimates were significantly higher among parents who reported receiving a provider recommendation" (Dorell, Yankey, & Stokely, 2010, p. 162).

Additionally, the article "Provider Communication and HPV Vaccination: The Impact of Recommendation Quality" from *Vaccine* shared results from a survey of parents regarding their providers recommendations regarding the HPV vaccine. According to the article, about "half (48%) of parents reported no provider recommendation for HPV vaccination," "16% received low-quality recommendations,"

and “36% received high-quality recommendations” (Gilkey et al., 2016, p. 1187). The researchers used an index of quality indicators, including whether providers “endorsed HPV vaccination strongly, encouraged same-day vaccination, and discussed cancer prevention,” to divide provider recommendations into low-quality and high-quality categories (Gilkey et al., 2016, p. 1187). In comparison with no provider recommendation for the HPV vaccine, high-quality recommendations were correlated with over “nine times the odds of HPV vaccine initiation” (Gilkey et al., 2016, p. 1187).

Furthermore, the article “Health Care Provider Recommendation, Human Papillomavirus Vaccination, and Race/Ethnicity in the US National Immunization Survey” from the *American Journal of Public Health* used the NIS-Teen Survey to assess HPV vaccination rates in adolescent females. The researchers found that 56.9% of females ages 13-17 had received a provider recommendation for the HPV vaccination, and those adolescent females who received a provider recommendation were five times more likely to get the HPV vaccination than those who did not receive a recommendation (Ylitalo,, Lee, & Mehta, 2013). Additionally, the study found that racial and ethnic minorities were less likely than whites to receive a provider recommendation and that all groups were equally likely to be vaccinated with the HPV vaccination if receiving a provider recommendation (Ylitalo, Lee, & Mehta, 2013). I am using this resource to exhibit the significance of provider recommendations in HPV vaccination compliance, as well as the necessity of increasing provider recommendations to increase the HPV vaccination rate.

I use these articles to discuss how provider recommendations lead to an increased HPV vaccination rate. Following the logic of these studies, increasing the provider

recommendation rate in Mississippi should lead to an increase in the HPV vaccination rate.

Studies and Policies to Increase HPV Vaccination Rates

Regarding literature on increasing HPV vaccination rates, I looked at several studies from across the nation, including the article "Improving Provider Communication about HPV Vaccines for Vaccine-Hesitant Parents through the Use of Motivational Interviewing" from the *Journal of Health Communication* (2018). This article focused on how motivational interviewing, which is an "empirically developed, guiding style of communication that emphasizes the evocation and reinforcement of intrinsic motivation (i.e., change talk) within a compassionate, collaborative, and autonomy supportive relationship," increases HPV vaccination rates, and the methodology in this study was focus group interviews with health care providers (Reno et al., 2018, p. 2).

The article "Missed Clinical Opportunities: Provider Recommendations for HPV Vaccination for 11–12-Year-Old Girls are Limited" from *Vaccine* discusses a study in which the researchers surveyed providers regarding HPV vaccination recommendation. The researchers found that across specialties "34.6% of physicians reported they 'always' recommend the HPV vaccine to early adolescents, 52.7% to middle adolescents, and 50.2% to late adolescents/young adults" (Vadaparampil et al., 2011, p. 8634).

The article "HPV Vaccine Hesitancy: Findings from a Statewide Survey of Health Care Providers" from the *Journal of Pediatric Health Care* presents a study where researchers surveyed physicians in Minnesota regarding their HPV vaccination recommendations to their patients. Many of the providers in the survey claimed that

"perceptions of parental hesitancy keep them from recommending it regularly" (McRee et al., 2014).

The 2015 article "Quality of Physician Communication about Human Papillomavirus Vaccine: Findings from a National Survey" reported the findings of a national survey of physicians about the HPV vaccine. The researchers found that a "sizeable minority of physicians reported that they do not strongly endorse HPV vaccine (27%) or deliver timely recommendations for girls (26%) or boys (39%)" (Gilkey et al., 2015, p. 1673).

The article "Providers' Attitudes toward Human Papillomavirus Vaccination in Young Men: Challenges for Implementation of 2011 Recommendations" from the *American Journal of Men's Health* focused mainly on the HPV vaccination in boys. The researchers used a methodology of interviewing 23 physicians and 8 nurse practitioners in 25-60-minute interviews and found that although 77% of the providers were in favor of vaccinating males, only 12% actually did vaccinate males (Perkins & Clark, 2012).

The 2011 article "HPV Vaccine Decision Making in Pediatric Primary Care: A Semi-Structured Interview Study" utilized a methodology of "semi-structured individual interviews with 20 mother-adolescent-clinician triads" (Hughes et al., 2011, p. 2) to find themes of HPV vaccination, including that when parents were reluctant about the vaccine, "clinicians were hesitant to engage them in discussion." (Hughes et al., 2011, p. 1). The researchers also found that clinicians either presented the HPV vaccination as a "routine vaccine with no additional information" or as "optional and highlighting risks and benefits" (Hughes et al., 2011, p. 1).

The article "Effective Strategies for HPV Vaccine Delivery: The Views of Pediatricians" from the *Journal of Adolescent Health* discussed a study in which the researchers conducted "in-depth, semi-structured interviews" with pediatricians and "audiotaped and transcribed" the interviews, using "Framework Analysis" for qualitative data interpretation (p. 119). Two of the providers in the study stated that "African-American parents may mistrust the medical establishment and therefore be reluctant to accept vaccination in general" (Tissot et al., 2007, p. 121).

Additionally, the article "The Challenge of HPV Vaccination Uptake and Opportunities for Solutions: Lessons Learned from Alabama" from *Preventive Medicine* discusses a study regarding "barriers and facilitators to HPV vaccination in Alabama" (p. 124). The researchers utilized both quantitative and qualitative data, including a "survey of pediatric care providers and structured interviews with pediatricians, parents, nurses and community stakeholders" (Dilley et al., 2018, p. 124).

I use these articles as examples of previous studies about the HPV vaccine in developing my methodology. Specifically, I use these sources to compose my own semi-structured interview questions. I also focus on provider recommendations like many of these studies do. My research differs from these articles in that I focus on the HPV vaccine in the specific geographical area of Mississippi.

The article "Racial Differences in HPV Knowledge, HPV Vaccine Acceptability, and Related Beliefs among Rural, Southern Women" from the *Journal of Rural Health* featured a study in which researchers interviewed adult women in rural North Carolina to assess their awareness of HPV, cervical cancer, and the HPV vaccine. The researchers found that there were gaps of knowledge between black and white women in this rural

area, including that fewer black women believed that cervical cancer could be a serious threat to the health of their daughters and that white women had higher HPV knowledge than black women (Cates et al., 2009). I use this resource to provide an example of a study about the HPV vaccine and to provide context about the racial divide of health care knowledge in rural areas like Mississippi.

The 2017 article "Human Papillomavirus (HPV) Vaccine Knowledge, Attitudes, and Uptake in College Students: Implications from the Precaution Adoption Process Model" discussed a survey of college students about the HPV vaccine, and they found that college students have less than optimal HPV vaccine coverage. They also found that "the strongest predictor of vaccination in this sample was the recommendation by a health care provider" (Barnard et al., 2017, p. 7). I use this resource as another HPV vaccination study and as support for the predictive value of provider recommendations in increasing the HPV vaccination rate.

The article "Impact of Louisiana's HPV Vaccine Awareness Policy on HPV Vaccination among 13-to 17-Year-Old Females" from *Health Education and Behaviors* discusses the effects of Louisiana's vaccination awareness policy on their HPV vaccination rate. Although the study found that HPV vaccination rates "did not increase significantly in Louisiana compared to Alabama or Mississippi," the researchers did find that "physician recommendation for HPV vaccination was significantly associated with vaccination" (Pierre-Victor et al., 2017, p. 548). I use this resource as an example of a failed policy in increasing the HPV vaccination rate in a state similar to Mississippi when I am discussing my own policy recommendations, as well as to provide more support for the association between provider recommendations and vaccination rates.

Moreover, the article "Parents Who Decline HPV Vaccination: Who Later Accepts and Why?" from *Academic Pediatrics* discusses parental secondary acceptance of the HPV vaccination for their children after initial denial. In their online national survey of parents of children ages 11-17, the researchers found that "45% of parents reported secondary acceptance of HPV vaccination," and that 24% intended to get their children vaccinated for HPV within the next year (Kornides, McRee, & Gilkey, 2018). Also, only 53% of parents in the survey reported receiving follow-up counseling from their providers (Kornides, McRee, & Gilkey, 2018). The reasons that the parents provided for secondary acceptance included the child getting older (45%), learning more about HPV vaccine (34%), and receiving a provider recommendation (33%) (Kornides, McRee, & Gilkey, 2018). The authors of the study conclude that providers should seek to achieve secondary acceptance of parents through "delivering repeated, high-quality recommendations for HPV vaccination" (Kornides, McRee, & Gilkey, 2018). I use this resource as another HPV vaccination study as well as a support of provider recommendations and educating parents about the HPV vaccination.

Additionally, the article "Pediatrician-Parent Conversations About Human Papillomavirus Vaccination: An Analysis of Audio Recordings" from the *Journal of Adolescent Health* examines how physician communication with parents impacts HPV vaccine compliance. The researchers analyzed recordings of pediatrician-parent conversations and performed a logistic regression to determine the correlation between the communication approaches of physicians and children receiving a same-day HPV vaccination (Sturm et al., 2017). 29% of encounters they analyzed resulted in a same-day vaccination, and the researchers found that pediatricians provided parents with

"inconsistent, mixed messages" and sometimes inaccurate information about HPV and the vaccine (Sturm et al., 2017, p. 246). HPV vaccination acceptance occurred more often when pediatricians did not verbally mention delaying the vaccine, and presumptive language, or using language assuming that the patient will receive the vaccination, was also associated with higher HPV vaccination compliance (Sturm et al., 2017). I use this resource to highlight the importance of physician communication with patients to increase the HPV vaccination rate, as well as to provide specific strategies I can potentially propose as policy solutions.

Furthermore, the article "Trust and Experience as Predictors of HPV Vaccine Acceptance" from *Human Vaccines* details an English study of factors that influence HPV vaccination. The researchers sent a questionnaire to 1205 mothers of girls ages 8 – 14 in England (Marlow et al., 2007). The researchers found that mothers who had "high trust in doctors or the government" were more likely to get their children the HPV vaccination (Marlow et al., 2007, p. 171). Additionally, mothers who delayed or refused other childhood vaccinations were more likely to refuse the HPV vaccination as well (Marlow et al., 2007). I use this resource to highlight the importance of trust of physicians, as well as previous vaccination refusals or delays, in predicting the HPV vaccination rate and how these factors can influence communication approaches of physicians.

Moreover, the article "Factors Associated with Adolescent HPV Vaccination in the U.S.: A Systematic Review of Reviews and Multilevel Framework to Inform Intervention Development" from *Preventive Medicine* details a study in which researchers conducted a systematic review of reviews to identify factors associated with

HPV vaccination compliance. The researchers found that provider recommendations are "consistently associated with adolescent HPV vaccine uptake" (Rodriguez et al., 2020). Also, they found that factors at both the provider and clinic levels are the most important in determining HPV vaccination series completion (Rodriguez et al., 2020). I use this source to highlight the importance of provider recommendations to the HPV vaccination rate.

Regarding policies to increase the HPV vaccination rate, as of July 2020, the following U.S. jurisdictions, including Virginia, the District of Columbia (Washington, D.C.), Rhode Island, Puerto Rico, and Hawaii, have HPV vaccination school-entry requirements (Skinner, 2020). The article "Association Between Human Papillomavirus Vaccination School-Entry Requirements and Vaccination Initiation" from *JAMA Pediatrics* features a study in which researchers analyzed the correlation between HPV vaccination policies and the HPV vaccination rate. The researchers found that HPV vaccine school requirements are associated with increases in the HPV vaccination rate in those jurisdiction (Ko et al., 2020). I use this source as an example of HPV vaccination requirements in the U.S. and a potential policy solution to address the low HPV vaccination rate in the state of Mississippi.

Additionally, the article "Learning More About Ways to Improve Adolescent HPV Coverage" from *Pediatrics* discusses HPV vaccination coverage across the nation and the relationships between state policies and HPV vaccination rates. The researchers did not find statistical support that school mandates result in higher HPV vaccination coverage; however, they acknowledged that the fact that there are a small number of states with such a mandate limits conclusion about these policies (Dempsey, 2020). The

strongest correlation with the HPV vaccination rate was "legislation to improve HPV education," which was correlated with a 3 – 14% increase in vaccination coverage (Dempsey, 2020, p. 2). Additionally, higher pediatrician density was associated with higher HPV vaccination rates (Dempsey, 2020). I use this source to discuss policies that are correlated with HPV vaccination coverage as well as potential factors affecting the HPV vaccination rate in Mississippi, including low pediatrician density.

Theoretical Framework

For my theoretical framework, I utilize nudge theory and choice architecture. To ethically justify my theoretical framework, I utilize utilitarianism. A consequentialist theory, utilitarianism holds that an action is right if it produces the maximum utility, which refers to the net value of an action's consequences, for society (Timmons, 2012). Utilitarianism was developed by Jeremy Bentham and later refined by John Stuart Mill (Timmons, 2012). Mill also developed a Harm Principle, which he explains in *On Liberty* in 1859 "That the only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others." Based on utilitarianism and Mill's Harm Principle, nudge theory and choice architecture are ethically justified in limiting autonomy if they produce the maximum utility for society and prevent harm to others.

Thaler and Sunstein in their 2009 book *Nudge: Improving Decisions about Health, Wealth, and Happiness* described choice architecture as the different ways in which choices can be designed for consumers and how this design impacts their decisions. Thaler and Sunstein described a nudge as "any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any

options or significantly changing their economic incentives" (Thaler and Sunstein, 2009, p. 6). Nudges increase the probability of individuals making certain choices without forcing them to do so (Thaler and Sunstein, 2009).

Navin's 2017 article "The Ethics of Vaccination Nudges in Pediatric Practice" discusses the impact of nudges on vaccination compliance. In response to the debate over the charge that nudges undermine autonomy, Navin claims that "autonomy-undermining nudges may be morally justified" because "parental autonomy in pediatric decision-making is not as morally valuable as the autonomy of adult patients" and "because the interests of both the vaccinated child and other members of the community can sometimes be weighty enough to justify autonomy-infringing pediatric vaccination nudges" (Navin, 2017, p. 43). These interests of the vaccinated child and the community justify these nudges on the basis of utilitarianism and the Harm Principle. Potential nudges that Navin discusses as potentially effective for pediatric vaccinations include presumptive, or "opt-out," formats, "framing devices" like presenting vaccination information "in terms of potential gains, rather than potential losses," and "incentives to nudge parents to vaccinate" (Navin, 2017, p. 45). I am utilizing the nudge theory and choice architecture to discuss possible ways to increase the HPV vaccination rate, and in my interviews with providers, I am asking their opinions on effective "nudges" to increase HPV vaccination compliance.

The literature that I have reviewed for my thesis provides a foundation for my research methodology and context for discussing my results. In conducting research for this thesis, the overall goal is increasing the rate of HPV vaccination in Mississippi.

Chapter 4: Methodology

The purpose of this research is to explore the factors (religiosity, conservatism, the anti-vaccination movement, provider recommendations, health care culture, and education) underlying the low HPV vaccination rate in Mississippi with a specific focus on provider recommendations. This is significant because increasing the provider recommendation rate and increasing the HPV vaccination rate could lead to a reduction in these cancers and related deaths and improve Mississippi health outcomes. Moreover, I plan on exploring possible policies to address these factors and increase the HPV vaccination rate in Mississippi and reduce the levels of HPV and HPV-related cancers in Mississippians. My formal research question is the following: Provider recommendations and parental beliefs seem to be the most important factors causing Mississippi to have the lowest HPV vaccination rate in the nation. How can we best address these factors to increase the HPV vaccination rate in Mississippi?

I hypothesized that physicians would discuss in their interviews that making the HPV vaccination required for school attendance would lead to an increase in the vaccination rate, but I also hypothesized that physicians would see this as not politically feasible in Mississippi. Additionally, I hypothesized that physicians would discuss the association of HPV with sexual activity and how this is a factor leading to the low HPV vaccination rate in Mississippi. I also hypothesized that the physicians would discuss

how they recommend the HPV vaccine with school-required vaccinations, including the TDaP.

Research Protocol

In order to study HPV vaccination provider recommendations in Mississippi, I planned on collecting primary qualitative data through semi-structured interviews. I aimed to interview approximately 12-15 physicians (pediatricians and family physicians, specifically) across the state of Mississippi from varying geographic areas in order to have a sample of physicians from every region of the state. I planned on interviewing physicians in both public and private practice, and I also intended to interview physicians who take Medicaid in order to assess their perspective. Additionally, I aimed on obtaining interviews with both MD and DO physicians to obtain multiple perspectives from different physician trainings. Furthermore, I planned to interview as diverse a group of Mississippi physicians as possible, including by race, gender, age, and stage of career. I designed the interviews to be semi-structured and approximately 30 minutes long, conducted through video conference (specifically on the Zoom platform) due to COVID-19 restrictions. I planned to record both the audio and the video of these interviews with the consent of the interviewees, and I planned on storing these recordings in my password-protected Panopto account through Zoom. Additionally, I planned to utilize a transcribing service, Otter.ai, to generate the transcripts of these interviews for me to analyze. For those who were unable to interview via Zoom, I aimed to interview them via telephone, on speaker, and utilize Zoom on my personal laptop as a recording device. I planned to utilize convenience sampling and recruit physicians to interview based on my own contacts as well as by calling and emailing pediatric and family

practices across the state and recruiting interested physicians. I also planned to use snowball sampling, asking my interviewees for recommendations for other physicians to interview. I aimed to keep track of whom I recruited to interview in an Excel spreadsheet, along with the dates and platform I utilized to contact them and any responses or follow-up communications.

I developed my interview questions from reading the literature of other studies about the HPV vaccination, along with focusing on my specific research question regarding provider recommendations and parental beliefs. I also utilized the book *Constructing Questions for Interviews and Questionnaires: Theory and Practice in Social Research* (1994) to help construct my questions. Below is the list of questions I developed for my interviews:

1. Mississippi has the lowest HPV vaccination rate in the nation. Why do you think that is?
2. How important is it for your patients to get the HPV vaccine? Why?
3. How do you discuss the HPV vaccine with your patients?
4. How much information do you provide to your patients?
5. Do you as a provider recommend the HPV vaccine to your patients?
    a. Why or why not?
    b. If sometimes, under what circumstances?
6. How do you respond when parents oppose your recommendation?
7. Do you try to "sandwich"/co-administer the HPV vaccine with other required vaccinations?
8. How important do you think it is to increase provider recommendations?

    a. Do you think any incentives would increase provider recommendations?

9. How do you think we can increase the HPV vaccination provider recommendation rate in Mississippi?
10. What kind of incentives do you think would make parents more receptive to the HPV vaccination?
11. What do you think is the best way to increase the HPV vaccination rate in Mississippi and make more parents receptive to their children getting this vaccination?
12. How important is it to increase the HPV vaccination rate in Mississippi? If it is important, what do you think is the best way to do this?

I submitted my IRB exemption application and received approval to do these interviews on August 25, 2020 (See Appendix A). After collecting data from my interviews, I planned to generate summary narratives from my analysis of the transcripts followed by thematic analysis.

Chapter 5: Results

Ultimately, I conducted 13 total interviews from September 2020 to December 2020, including six pediatricians, two family physicians, one child abuse pediatric specialist, one pediatrics infectious disease specialist, one pediatrics and internal medicine specialist, and two pediatric adolescent medicine specialists. These physicians included eight white men and five white women, and the interviewees had a range of experience in medicine from some who had just completed residency to others who are nearing retirement. The physicians also were from a variety of locations within the state of Mississippi, including Gulfport, Jackson, Hattiesburg, Oxford, Madison, Indianola, Olive Branch, Flowood, and Starkville. Additionally, I expanded the scope of my study beyond Mississippi and was able to interview a pediatrician in Virginia who is originally from Mississippi. See Appendix B for a chart of physicians interviewed. The following are summaries of each interview written under pseudonyms.

Summaries

Dr. A, a pediatrician, was my first interview. He discussed how parents get apprehensive because of how many required vaccinations there are and how this can reduce HPV vaccination rates. He said that many parents choose to put off this vaccine because it is not required for school, and school compliance is their main concern. He also discussed the anti-vaccination movement and conspiracy theories about the vaccine and reaffirmed that the HPV vaccine is one of the safest vaccinations out there. Dr. A

talked about how important the HPV vaccination is because it prevents cervical cancer, and he said that parents may not realize how serious that is until later. Dr. A said that he discusses the vaccine with his patients and their parents by discussing its cancer prevention potential and saying that they would regret not getting it if their children get cancer later.

Dr. A recommends the HPV vaccination to all of his patients and strongly pushes it with the required vaccinations for seventh grade, like the DTaP. Dr. A tries to convince parents who oppose the vaccination to still get it for their children by talking with them and respecting them, but he said that some are not possible to convince. Dr. A said that education of providers would help to increase the HPV vaccination provider recommendation rate. He also said that educating and advertising to parents would help increase HPV vaccination compliance in Mississippi. Additionally, Dr. A said that a school mandate would definitely help increase the rate, but he did not think that would be politically feasible in Mississippi. At the end of the interview, Dr. A provided me with a contact at the University of Mississippi Medical Center (UMMC) Department of Pediatrics to help recruit more interviewees.

Dr. B, a child abuse pediatrics specialist, said that he thinks a general fear of vaccines and anti-vaccination conspiracy theories have led to the low HPV vaccination rate in Mississippi. Additionally, Dr. B thinks that the anti-science culture in Mississippi could contribute to the low HPV vaccination rate. He also thinks that the fact that HPV is sexually transmitted could be a factor in the low rate. In his practice, he works directly with sexually abused children, many of whom are sexually active beyond their abuse. Because of this, he thinks that it is extremely important for his patients to get the HPV

vaccination. Dr. B discusses the HPV vaccination with his patients in direct manner, emphasizing that it is the only vaccine that can prevent cancer. He utilizes the CDC handouts about HPV and individually discusses the vaccine with the child first and then with the parents for permission second.

Dr. B always recommends the HPV vaccination to his patients. He said that it is rare for parents to oppose his recommendation and that more want time to think before deciding. He thinks that it is very important to increase the provider recommendation rate. Dr. B thinks that a school mandate would help to increase the rate but is not sure if that would ever happen. Dr. B thinks that increasing the HPV vaccination in Mississippi is very important and that emphasizing HPV's potential to cause cancers and genital warts could encourage more people to get the vaccine. Following the interview, Dr. B reached out to one of his colleagues to recruit him to be an interviewee.

Dr. C, a pediatric infectious disease specialist, said that the initial marketing of the HPV vaccination made it a "sex vaccine" rather than an anti-cancer vaccine, and that association of sex with the vaccination has resulted in the low rate in Mississippi. He had done a study comparing TDaP doses with HPV vaccination doses in Mississippi clinics, and he found that providers are not giving enough doses of the HPV vaccination in comparison to the TDaP. Dr. C also claimed that educated whites are more likely to encounter anti-vaccination information. He said physicians should not waste time trying to convince parents who are anti-vaccinations. Dr. C thinks that it is absolutely necessary to increase the HPV vaccination rate in Mississippi due to its potential to prevent cancer. However, he no longer sees patients and instead does more research.

To increase the HPV vaccination rate in Mississippi, Dr. C said that physicians should try to strongly push the HPV vaccination when children come to get their TDaP vaccination for the seventh grade. However, he said that it is difficult to get patients to return for the second dose of the HPV vaccination, and he also said that logistical issues and paperwork can make it difficult to vaccinate. Dr. C said that we need a better system to encourage people to return for the second dose. Additionally, he said that we need to have a more aggressive approach in recommending the HPV vaccination in Mississippi to increase the vaccination rate. During the interview, Dr. C provided me with recommendations of articles to incorporate in my literature review as well as other potential interviewees to contact.

Dr. D, an adolescent medicine specialist, told me that he has only been in Mississippi for a year and previously practiced in Ohio. He said that he thinks that a lack of stable health care providers for many Mississippians could be a factor in the low HPV vaccination rate. He also said that Southern culture and conservatism could be why the provider recommendation rate is so low in Mississippi. Dr. D believes that the HPV vaccine is important for adolescents, and he said he has seen a drastic reduction in patients with venereal warts since the introduction of the vaccine. He discusses the vaccination with his patients by highlighting its ability to prevent genital warts and various cancers as well as the lack of negative side effects. Dr. D said that he recommends the vaccine to all of his patients, both male and female. He says he tries to have a discussion with parents who oppose his recommendation and tell them how safe and effective the vaccine is. Dr. D said that physicians should think of the HPV vaccination as a required vaccine in how strongly they recommend it, and he believes that

increasing the HPV vaccination rate in Mississippi is critical because of the amount of early sexual activity and poverty in the state.

Dr. E, a pediatrician, said he thinks that a large part of the Mississippi population does not have access to regular primary care, which he believes is a factor contributing to our low HPV vaccination rate. Dr. E also said that there were concerns at the beginning regarding side effects of the HPV vaccine, but he said that has settled down. Dr. E said it is important to increase the HPV vaccination rate in Mississippi because of the high incidence of underage sexual activity and increased incidence of cervical cancer. He stated that HPV vaccinations are a high priority for his patients and that they start the conversation at the earliest recommended age as well as talk about it with the seventh grade TDaP vaccination. Dr. E said that he discusses the HPV vaccination like all of the other vaccinations he administers and focuses on its protection against germs that are dangerous both now and in the future, and he said he discusses the HPV vaccine along with the TDaP and the meningococcal vaccinations. He said he recommends the vaccine for all of his patients, both boys and girls.

Dr. E said he tries to honor the concerns of parents who oppose his recommendation and address those concerns. He said he believes the best way to increase the HPV vaccination rate in Mississippi is to utilize social media as well as track people and their vaccination records when they come to clinics in order to provide more recommendations. Additionally, Dr. E thinks reducing the stigma of sexual activity associated with the HPV vaccination and instead emphasizing its cancer prevention potential would help increase the rate in Mississippi. At the conclusion of his interview, Dr. E provided me with names of physicians I could contact to interview.

Dr. F, a family physician, said she believes that the lack of longitudinal relationships between patients and physicians in Mississippi is a contributing factor to the low HPV vaccination rate. Dr. F also said the association of HPV with sex is a factor in the low provider recommendation rate and low vaccination rate. She said that the HPV vaccine is very important for her patients because she has a high-risk sexual population, due to a prevalence of early sexual activity. Dr. F said that she recommends the vaccine to all of her patients in a direct way, explaining why it is important, and she begins recommendations with the TDaP. She believes that having more dialogue and discussion with patients about the vaccine could help to increase the vaccination rate. Additionally, she said that some clinics do not do immunizations, and if more clinics offered vaccinations, that would help to increase the HPV vaccination rate. Dr. F thinks it is very important to increase the HPV vaccination rate in Mississippi to decrease cervical pathology and that we need to educate providers at all levels to talk to patients and educate them about the vaccine and its purpose.

Dr. G, a pediatrician, said she thinks that the HPV vaccination rate in Mississippi is low due to fear surrounding the vaccine as well as that it is not required by the state. She also said the vaccine is important for her patients as we are seeing cervical cancer rates decrease due to the vaccine. Dr. G said she tells her patients that if there was a vaccination for leukemia, you would get it, so you also should get the HPV vaccination. When parents oppose her recommendation, Dr. G asks them why and tries to have a discussion with them. She begins discussing and recommending the HPV vaccination with the TDaP and the meningococcal vaccine. Dr. G also said it takes time for providers to discuss non-required vaccinations, making it easy for providers to not discuss them

with their patients because of the lack of reimbursement for this extra time. She also thinks that education of providers would help to increase the provider recommendation rate. Furthermore, Dr. G thinks that social media campaigns to combat the anti-vaccination movement would help to make parents more receptive to the HPV vaccine.

Dr. H, a pediatrician, said the marketing of the HPV vaccine as a vaccine against an STD rather than an anti-cancer vaccine contributed to the low HPV vaccination rate in Mississippi. She also claimed that many family practices across the state do not carry the HPV vaccine, which can hinder vaccination rates. Furthermore, Dr. H discussed the anti-vaccination movement in Mississippi and its large following on social media, as well as how social media websites including Facebook are trying to reduce the spread of anti-vaccination rhetoric. Additionally, she said it is important for all of her male and female patients to get the vaccine because of the cancers it prevents and that the vaccine should be used universally. Moreover, Dr. H tries to make strong recommendations for the HPV vaccine and presents it as an anti-cancer vaccination. She also tries to persuade parents to get their children vaccinated sooner rather than later by informing them that if they do it early, it will only be two shots rather than three. Dr. H stated that she tries to do the HPV vaccination along with the TDaP booster, meningococcal vaccine, and flu shot at the 11 or 12-year-old check-up.

Dr. H said she believes that younger providers are most likely making stronger recommendations than older providers and that the language providers use, regarding STD versus anti-cancer vaccination, are important in convincing patients to get vaccinated. Dr. H also said it is important to educate providers and nurses in order to make an across the board recommendation. Additionally, Dr. H said that personal stories

resonate with families and that she always tells her patients that she got her children vaccinated at that age against HPV. Dr. H said it is very important to increase HPV vaccination in Mississippi and that each clinic should investigate their rates to figure out to improve as well as host teen vaccine clinics. She also said that improved education about HPV and its association with cancer as well as information regarding its effectiveness and safety would help to increase the rate.

Dr. I is a pediatrician in Virginia, although he is originally from Mississippi. Dr. I said he thinks the HPV vaccination rate in Mississippi is low because many Mississippians are slow to change, and he also thinks that the anti-vaccination movement has eroded trust in the safety of vaccinations. He said it is very important for his patients to get the vaccination because it prevents cancer, and he strongly recommends it by discussing HPV and its causes as well as its morbidities. Dr. I said he has discussions with parents who oppose his recommendation and tries to ask them why not without being too challenging. Additionally, Dr. I said it is easier to administer the vaccine in Virginia due to it being required for girls for school, and he said that in Mississippi, he would try to co-administer the HPV vaccination with the TDaP and meningococcal vaccines. Moreover, Dr. I said that educating providers about the details of the HPV vaccination series and how to discuss the vaccine with patients would help to increase the recommendation rate in Mississippi. He said that establishing rapport with patients and their parents as well as educating them also could help to increase the vaccination rate. At the end of the interview, Dr. I offered to connect me with other physicians.

Dr. J, a pediatrician, said it is harder to get people vaccinated with the HPV vaccination because it is not a required vaccination for school. He also said people are

uncomfortable discussing STDs with their children at such a young age. Dr. J said he believes that it is important to increase the HPV vaccination rate in Mississippi due to our high rate of STDs and that education is key to doing this. Dr. J said he explains the importance of receiving the vaccine so early so it is before the age of sexual activity, and he likens it to getting a flu shot before encountering the flu. Additionally, he tells his patients he will vaccinate his own daughter when she is 11. Dr. J said he always recommends the vaccine unless a patient has a documented immune system problem.

When parents oppose his recommendation, Dr. J says he reaffirms his recommendation and gives them a handout. He says he tries not to be too firm as that could hinder the patient-physician relationship and reduce the chance of getting the patient vaccinated at the next check-up. Moreover, Dr. J said he tries to give the HPV vaccination when patients come for the TDaP and meningococcal vaccinations at the 11-year-old check-up. He stated that further education for providers would help to increase the provider recommendation rate and that stronger provider recommendations would make parents more receptive to the vaccine.

Dr. K, a pediatrics and internal medicine specialist, said he thinks the HPV vaccination rate in Mississippi is low due to the lack of patients who regularly go to clinics. He also said that conservatism impacts perceptions regarding HPV, as well as concerns about vaccine side effects. Moreover, he thinks the HPV vaccination having multiple doses rather than one leads to the low rate as well. Dr. K said he recommends the vaccine to all of his patients, and he tells them that his 11-year-old child just got vaccinated. He recommends it at that visit because of the required school vaccinations that children come to the clinic to get, and he lists it with those vaccinations and does not

emphasize it. Dr. K thinks testimonials regarding the effectiveness of the vaccine would help to make parents more receptive to the HPV vaccine and increase the rate. Additionally, Dr. K said that physicians have difficulty in recommending optional vaccinations, especially HPV due to its STD status and that it prevents cancers so far in the future. Dr. K thinks this is not just as issue for the HPV vaccination but also a problem for all of the optional vaccinations in Mississippi, and he thinks improving the standard of care and better recommending all vaccinations would help to increase the rate.

Dr. L, a pediatrics adolescent medicine specialist, said that she believes the low HPV vaccination rate in Mississippi is due to its association with sex and that Mississippi is such a religious state. She said that when she discusses the vaccine with her patients, she tries to focus on cancer prevention rather than its association with an STD. She also compares getting the vaccination to other preventive measures, like wearing a seatbelt. Dr. L also points out to parents that their children may not choose to be sexually active and may be sexually abused, and getting children vaccinated against HPV protects them from the virus in all situations. She compared the HPV vaccination to the Hepatitis B vaccination, which is now universal at birth, and she believes that the HPV vaccination will be and should be universal at birth to protect children who will be sexually abused.

Dr. L begins recommending the HPV vaccination when her patients are 11, and she recommends it along with the required TDaP vaccine as well as with the meningococcal vaccine. She said that parents who refuse the vaccine for their children are mostly fearful because of things they have read on the internet and social media. Dr. L thinks educating providers, especially older providers, about the HPV vaccination will

help to increase the provider recommendation rate in Mississippi. She also thinks that emphasizing positive stories as well as cautionary anecdotes about cervical cancer patients and utilizing social media will help parents be more receptive to their children getting the HPV vaccine. Dr. L thinks we need to be more creative in presenting vaccination information to patients to be more in tune with this technological generation.

Dr. M, a family physician, said she thinks that the fact that the HPV vaccination is only recommended in Mississippi and not required for school attendance is a reason that the rate is so low in the state. She also thinks that perceptions of the vaccine regarding negative side effects and its association with sexual activity have played a role in the low rate. Dr. M thinks the HPV vaccine is very important for her patients as it is the only vaccination currently that can prevent cancer. She said when she introduces the topic, she tries to gauge parents' feelings before determining her further approach in recommending the vaccine. Dr. M also said she discusses how the vaccination is most effective the earlier it is given and how it can prevent future HPV infections and related cancers, and she provides resources that parents can refer to. Dr. M recommends the HPV vaccination when children come in for the required TDaP booster, and she makes sure to schedule a follow-up appointment for the children to receive the second dose of the HPV vaccine.

Dr. M believes further education and engaging providers would help to increase the provider recommendation rate. Dr. M also thinks that educating parents and connecting with them through stories would help to target them and make them more receptive to getting their children vaccinated. She believes overall that education at all levels is the key to increasing the HPV vaccination rate in Mississippi.

Themes of Interview Data

In analyzing the data from the interviews, several themes emerged, including education of providers and parents, vaccination hesitancy and how to combat it, the association of HPV with sexual activity, the patient-provider relationship, and required and recommended vaccinations.

Education of Providers and Parents

Eleven of the physicians interviewed discussed the importance of education of patients, parents, and providers in increasing the HPV vaccination rate in Mississippi. Regarding educating providers, these interviewees said that education for providers and parents would be the best way to increase the HPV vaccination rate in Mississippi. They specifically emphasized educating parents and patients about the safety and effectiveness of the HPV vaccine in preventing cancer. In discussing the HPV vaccine with his patients and their parents, Dr. I said that it is "kind of like getting the flu shot before you encounter the flu" in getting them "vaccinated before they're sexually active" in order to better educate patients and parents on the preventive measure of the HPV vaccination.

They also discussed the importance of having effective across-the-board recommendations from all members of the health care team. Dr. F said that "we've got to reach out to the physicians and the nurse practitioners and the people taking care of people and educate them on how to talk to patients" about the HPV vaccine and "how to get them to see it, how to get them to understand, you know, what it's protecting them from and why." Similar to this, Dr. H said that educating providers about the "language in making that recommendation is important." She said that "it's not just about educating providers and physicians, it's also about educating nurses on the proper language to use

and making an across-the-board recommendation for everyone." Moreover, these interviewees discussed the importance of providing better educational materials for parents and patients, including targeted advertisements, websites, and social media posts.

Vaccination Hesitancy and How to Combat It

Seven of the interviewees talked about the impact of the anti-vaccination movement on HPV vaccination uptake in Mississippi. They discussed how some parents are hesitant to get their children vaccinated against HPV because of negative stories of side effects of the vaccine that have spread through social media. To demonstrate the severity of the anti-vaccination movement, Dr. A even said that some of his patients "get up and just walk out" because they are that against vaccinations and that when faced with anti-vaccination patients, he tries "to talk it out with them." To combat this, five interviewees discussed the utilization of personal stories and anecdotes regarding the HPV vaccination, as well as data regarding its safety and efficacy, to encourage people to get the HPV vaccine. Moreover, three of the interviewees discussed how they talk about how their own children were vaccinated to alleviate parents' concerns. Additionally, interviewees talked about using cautionary tales about people who did not get the HPV vaccination and later got cervical cancer or other cancers.

Also, 11 interviewees discussed how when parents refuse their recommendation, they try to continue having a discussion with them about the benefits of the HPV vaccine and provide them with more information in the hopes of changing their minds. When people oppose her recommendation for the HPV vaccine, Dr. H asks them what they "know about this vaccine" or what they "know about HPV." Moreover, all 13 of the interviewees discussed the importance of focusing discussion of the HPV vaccine on its

ability to prevent cancer. For example, Dr. L said that she tells parents "if I had a vaccine that prevented breast cancer, they would line up and down" the street to get it and compares getting vaccinated to "wearing your seatbelt" and "washing your hands" in that it prevents cancer. Dr. L said that when parents refuse, she tries to "plant the seed" and use "little tricks like that" to win over parents.

To persuade people who are hesitant about vaccinating their children against HPV, Dr. A said he tells his patients "if you finish the vaccine about the time you're 15, you only need two shots, not three," and that this is "one of the selling points" that convinces "parents to go ahead and get it."

The Association of HPV with Sexual Activity

Twelve of the physicians interviewed discussed how the association of HPV with sexual activity results in parental hesitancy in getting their children vaccinated. Specifically, seven interviewees discussed how the conservative culture of Mississippi contributes to the low HPV vaccination rate in the state. Dr. L said that being in the "Bible Belt," some parents may feel that by getting their children vaccinated, they are "giving the child a free pass to have sex." She even said that she even had partners that were "resistant to give it at first." Some interviewees discussed how the HPV vaccination was originally presented as a vaccine against an STD, and they think that presenting it as an anti-cancer vaccination would help to increase the vaccination rate. Dr. B in particular highlights that it is "the only available vaccine-preventable cancer that exists." Dr. C says "don't talk about it in terms of sex, talk about cervical cancer." Dr. C said "it's a cancer-preventing vaccine, period." Dr. H echoes this in talking about the HPV as an "anti-cancer shot" and asking parents "how many people in your family have

had cancer." Shifting the focus of the HPV vaccination discussion from preventing an STD to preventing cancer is key in persuading more parents to vaccinate.

Additionally, three of the interviewees discussed how they talk about the potential for sexual assault with parents and how the HPV vaccine can protect their children in those situations. Dr. L in particular discussed how she talks about how the HPV vaccine selects out "for children who are sexually abused," and talking about this "puts a different spin on it for their parents" because "sometimes in children, sex is not by choice." Moreover, Dr. L tells parents that "you may believe that your child is going to remain a virgin until they're married, but what if they marry a really godly guy" who "had one misstep and acquired HPV" that "can cause your child to have cancer." This framing and messaging can help persuade parents who are against the HPV vaccine because of its association with sex.

The Patient-Provider Relationship

Four of the interviewees talked about the importance of the patient-physician relationship in increasing the HPV vaccination rate in Mississippi, especially since the vaccination is multiple doses and requires a follow-up visit to receive the subsequent dose. These interviewees talked about how a foundational relationship with patients and their families can make it easier to have difficult conversations like that of recommending the HPV vaccine. These interviewees also discussed how many Mississippians do not have a regular health care provider. Additionally, these physicians said that working to establish better patient-provider relationships and increasing the number of Mississippians who receive regular primary care could help to increase the HPV vaccination rate in the state. Specifically, Dr. F said that increasing the HPV vaccination

rate “comes down to that relationship” between the patient and provider. Additionally, Dr. I said that “you’ve got to develop rapport and continue to introduce” the idea of the HPV vaccine in wellness checks. Dr. E said that “there’s a large portion of our state that did not grow up in families to obtain regular primary care.” Dr. E also said that “as we can get more people into a primary care home and used to the fact that you get a checkup every year” that will help increase vaccinations. Moreover, Dr. J says that he tries “not to twist too many arms or get too upset about it” when people oppose his HPV vaccination recommendation because he thinks that “erodes my chances of getting it done in the future at our next checkup.” Establishing and maintaining better relationships between providers and patients and longitudinal primary care in Mississippi is key to increasing the HPV vaccination rate.

Required and Recommended Vaccinations

Seven of the physicians interviewed discussed how recommended vaccinations like the HPV vaccine have lower immunization rates than vaccinations that are required for school. Dr. A said that many parents only want school-required vaccinations for their children because “that’s what they care about” and they want “that 121 form so they can take their kid to daycare and school.” Dr. G said that parents say “Oh it’s required, yes we’ll get it” and “oh, it’s not required, we’re not touching it.” To address parents who may forget to schedule a second-dose appointment for the HPV vaccine, especially since it is only recommended and not required, Dr. M said that she always schedules “them an appointment with my nurse to come back and get the second dose.”

Four physicians said that requiring the HPV vaccination for school in Mississippi like in some other states would result in an increase in the rate, but they did not think that

it would be politically feasible in the state. Dr. B said that regarding the HPV vaccine, "one thing you could do as a public health measure" is "mandate that it's necessary to have for school," but he did think that will be difficult to accomplish in Mississippi "because people don't die right away" and "it's not a transmissible infection except through sex."

Additionally, all 13 interviewees talked about how they recommend the HPV vaccination along with other required vaccinations for school, including the TDaP vaccination that is required for seventh grade in Mississippi. If parents do not have questions, Dr. K "won't really emphasize it a lot" and will "throw it in with the other vaccines." Additionally, Dr. H said that she combines recommended and required vaccinations in discussing them with patients by saying things like "your daughter is due for X, Y, and Z" so that "it becomes a normal routine part of the checkout process." Dr. C said that "when it comes to the TDaP, you have to have that for school" and "there's no reason why every physician can't go ahead and push the HPV at the same time."

Conclusion

The 13 interviews that I conducted allowed me to obtain perspectives of Mississippi physicians about the low HPV vaccination rate in the state and what we should do to increase that rate. In summarizing the interviews and extrapolating overall themes, I was able to see the commonalities and differences in each physician's viewpoint. Being able to interview physicians in multiple specialties from a variety of regions in the state allowed me to see different evaluations of this issue that will be helpful in constructing my policy recommendations.

Chapter 6: Discussion and Policy Recommendations

My interviews with Mississippi physicians corroborated several key points from my literature review and helped to enlighten my perspective on how to increase the HPV vaccination rate in Mississippi. Conducting these interviews virtually afforded me the opportunity to interview multiple physicians on the same day without having to consider travel, and this worked to the advantage of both my and my interviewees' schedules. I did face challenges in recruiting physicians to interview, and my sample of interviewees was not as diverse as I would have liked, especially since I did not conduct any interviews with Black physicians. A possibility for further research regarding the HPV vaccination rate in Mississippi would be to survey providers to obtain more data than in this study as well as a more representative sample. Hearing the thoughts of physicians from multiple backgrounds and specialties across the state who have a variety of patient populations opened my eyes to approaches to recommending the HPV vaccine as well as setbacks to increasing the rate in Mississippi that I had not before considered.

Many of the physicians noted that the association of HPV with sexual activity discourages some parents from vaccinating their children due to Southern culture, conservatism, and being in the "Bible Belt," as well as that Mississippi is a rural state. This lines up with the literature showing that states with the lowest HPV vaccination rates are "conservative and highly religious" like Mississippi (Franco et al., 2019, p. 246). Additionally, rural states like Mississippi have lower HPV vaccination rates because,

again, of the vaccine's connection to "a taboo in American culture: sexual activity" (Mullin, 2017). However, these perceptions are unfounded as the HPV vaccine is not in any way correlated with increased sexual activity (Bednarczyk et al., 2012).

Coinciding with this, many of the interviewees talked about how they think that presenting the HPV vaccination as an "anti-cancer" vaccination rather than an anti-STD vaccination would promote more vaccination uptake. Some of the physicians even would tell parents that if there was an anti-leukemia vaccination, for example, they would not hesitate to vaccinate their children, and the HPV vaccine is no different. By focusing on the cancer-prevention potential of the HPV vaccine and not its association with sexual activity, more parents might be swayed to vaccinate their children to protect them from cancer in the future. This aligns with what I found in the literature, as when researchers from Johns Hopkins (2018) concluded that providers and public health campaigns should focus on the HPV vaccine's potential to prevent cancers, as well as its strong safety record (Johns Hopkins Medicine, 2018).

Additionally, several of the physicians discussed how the anti-vaccination movement has impacted vaccination rates in Mississippi, including the HPV vaccination rate, and how unfounded rumors spread wildly through social media, particularly Facebook, have made more parents vaccine hesitant. These "safety worries" of parents align with the literature, as stories about the potential harm of the HPV vaccine circulated on social media discourage parents from getting their children vaccinated (Margolis et al., 2019). From my discussions with my interviewees, I was able to see the significant impact that the anti-vaccination movement has had on their ability to vaccinate children against HPV and how necessary it is to adopt a tactical strategy to address this issue.

Further, many of the interviewees discussed the importance of educating providers and how this would improve provider recommendation rates. Some of their recommendations included specifically informing providers of how to have conversations with their patients and parents about the HPV vaccine, including what language to use and what strategies to utilize. This aligns with the literature finding that the "strongest predictor of vaccination in this sample was the recommendation by a health care provider" (Barnard et al., 2017). Additionally, another 2018 study from Academic Pediatrics had found that "delivering repeated, high-quality recommendations for HPV vaccination" was associated with higher parental acceptance rates (Kornides, McRee, & Gilkey, 2018).

Moreover, many of the interviewees discussed how they recommend the HPV vaccine at the same time their patients are coming in to receive their required TDaP booster for seventh grade. They also discussed recommending the HPV vaccine along with less controversial flu and meningococcal vaccines. This aligned with my theoretical framework of nudge theory and choice architecture (Thaler and Sunstein, 2009). By presenting the HPV vaccine with other vaccinations that are required for school attendance, or that parents more readily accept, providers can "nudge" patients and parents to getting the HPV vaccine, increasing the HPV vaccination rate. Another approach utilized by one of my interviewees is including the vaccination as a part of the appointment and letting parents and patients opt-out if they refuse. Presenting the HPV vaccine as an opt-out decision rather than an opt-in normalizes receipt of the HPV vaccine; it tells parents and patients that receiving the vaccine is the expected – although not mandatory – choice, which encourages higher vaccine compliance. This would

specifically address the population of people who are against the HPV vaccine specifically and not other vaccines.

Although it did not come up in my interviews, the non-physician medical practice staff is more diverse than the physician staff. This diversity, as well as diversity of physicians, could be important for patient and parent interactions in vaccine recommendations, including for the HPV vaccine. The article "Effective Strategies for HPV Vaccine Delivery: The Views of Pediatricians" from the Journal of Adolescent Health in 2007 details a study in which researchers conducted semi-structured interviews with pediatricians in three states. The researchers found that two participants in the study noted that "congruence of race or ethnicity between the provider and family may enhance acceptance of a provider's recommendation for an HPV vaccine," including non-physician medical staff (Tissot et al., 2007, p. S39). Racial congruence between providers and parents and patients could help to increase the HPV vaccination rate in Mississippi by making parents, especially minorities, more receptive to that recommendation.

My discussions with my interviewees presented me with multiple potential policy solutions and strategies to increase the HPV vaccination rate in Mississippi, and these respective approaches can be utilized separately or in tandem to alleviate this policy problem. One of these approaches is better educating providers on what language to utilize to best encourage receipt of the HPV vaccine, including educating nurses and receptionists. Encouraging providers to frame the HPV vaccine as an anti-cancer vaccine rather than an anti-STD vaccine is one way to accomplish this. Furthermore, as many of the interviewees discussed, providing patients with personal anecdotes and stories about

the HPV vaccine, as well as solidifying the physician-patient and physician-parent relationships and building trust, would help providers in making effective recommendations. Also, one of the physicians interviewed explained how she discusses with parents the potential of their child being sexually abused, framing the HPV vaccination as a way to protect their child from something that might not be their choice. This approach could work with parents who are against the HPV vaccination because of its association with sexual activity. These strategies connect with nudge theory and choice architecture because they involve how the physician presents the HPV vaccine to patients and parents which influences their decision whether or not to vaccinate.

Educating providers to make effective recommendations for the HPV vaccination is a significant way to increase the HPV vaccination rate in Mississippi as the literature indicates that provider recommendation rates are one of the strongest factors in influencing and increasing HPV vaccination uptake and that Mississippi currently has the lowest provider recommendation rate in the nation (CDC, 2019). Additionally, the literature specified that provider recommendations are "consistently associated with adolescent HPV vaccine uptake" (Rodriguez et al., 2020). This means that educating providers is key to increasing the provider recommendation rate in Mississippi and subsequently increasing the HPV vaccination rate in Mississippi. Making effective recommendations for the HPV vaccine would encourage people who are against the HPV vaccine and people who forget about the second dose of the vaccine to get their children vaccinated.

Another important strategy to increase the HPV vaccination rate in Mississippi is to utilize social media and technology to spread more awareness about HPV and the HPV

vaccine by meeting people where they are: online. Because the anti-vaccination movement has been able to spread like wildfire on social media sites like Facebook, it is important to counter this rhetoric with truthful information, including the facts about HPV and the HPV vaccine as well as positive anecdotes and cautionary tales against foregoing the vaccine. Countering anti-vaxxer rhetoric with fact-based information about the HPV vaccine would potentially reduce the number of anti-vaxxers and persuade more people to get the HPV vaccine for their children.

Getting patients and parents to accept the HPV vaccine is not, however, the only challenge. The HPV vaccine requires two shots, 6-12 months apart, and only 34% of girls and 25% of boys in Mississippi get all required doses of the vaccine (Mullin, 2017). A policy recommendation that could be implemented at the clinic level is scheduling an appointment for patients to receive the second dose of the HPV vaccine at the time of their initial vaccination. This strategy would encourage higher receipt of the second dose because parents and patients would not have to remember to schedule these appointments because it would already be on their calendar. This is a simple administrative change that clinics could adopt to improve their HPV vaccination rate, specifically regarding second dose acquisition, and it would address the population of patients who receive the first dose and forget about the second dose.

Another potential policy solution that would address both vaccine refusal and lack of follow-up for a second dose is making the HPV vaccination a requirement to attend school. The Mississippi State Department of Health Comprehensive Cancer Control Plan for 2018-2022 includes advocating for a mandate for the HPV vaccine in order to prevent cervical cancer. Many of the physicians interviewed indicated that this solution would

definitely result in an increase in the HPV vaccination rate as required vaccinations have a much higher uptake rate than vaccines that are just recommended. However, several of the interviewees indicated that although this policy would be successful, they do not think that it is politically feasible to implement in the state's current climate, especially due to Mississippi's conservatism and religiosity. Additionally, some of the physicians did not think that it was necessary to require it because of HPV's transmission characteristics, as it is spread during sexual activity and not airborne or spread by respiratory droplets, making it not as contagious as other diseases prevented by vaccinations like measles. Nevertheless, some of the physicians believe that one day in the future, the HPV vaccination could be a school requirement in Mississippi, but it is not an immediate solution to the current low HPV vaccination rate in Mississippi.

Despite this, another policy solution could be requiring all providers to recommend the HPV vaccination when patients are due to receive school-required vaccinations like the TDaP booster for seventh grade (Mississippi State Department of Health, 2020). Making this an actual policy rather than an informal strategy would result in higher provider recommendations for the HPV vaccination and lead to higher rates of HPV vaccination, aligning with the nudge theory and choice architecture by encouraging more parents to vaccinate their children. The Mississippi State Board of Medical Licensure has the power and responsibilities of "setting policies and professional standards regarding the medical practice of physicians, osteopaths, podiatrists and physician assistants practicing with physician supervision" (Miss. Code Ann. §73-43-11, 1972). In its Practice of Medicine Regulation filing in 2017, the Board lays out the policies and professional standards of medical practice, including policies surrounding

vaccinations. Therefore, the Mississippi State Board of Medical Licensure should add to its vaccination policies a responsibility for physicians to recommend the HPV vaccination to eligible patients. This policy would encourage people who are against the HPV vaccine specifically and people who forget about the second dose to get their children vaccinated.

Overall, incorporating one, several, or all of these approaches would help to increase the HPV vaccination rate in Mississippi. Based on what I have learned from analyzing the literature and conducting interviews with physicians across the state, I think the best immediate policy solution to address the low HPV vaccination rate in Mississippi would be to provide better education to health care providers and give them the tools to make effective recommendations to their patients. Because the provider recommendation rate is one of if not the most important factor in HPV vaccination uptake, increasing the provider recommendation rate in Mississippi for the HPV vaccination is paramount to increasing the HPV vaccination rate. Other additional strategies, including a social media campaign to address the anti-vaccination movement, automatically making a second dose appointment, and a strong encouragement to providers to recommend the HPV vaccine along with required vaccinations for school, could coincide with this policy solution and help immediately. Maybe one day in the near or distant future, Mississippi will be in a place where it is feasible to make the HPV vaccination a requirement for school, a policy that would result in a sharp increase in the HPV vaccination rate that would promote the health and wellness of all Mississippians.

Chapter 7: Conclusion

The low HPV vaccination rate in Mississippi contrasts with the state's high childhood vaccination rate, and because the HPV vaccine is safe and effective at preventing HPVs that can lead to cervical cancer, this low vaccination rate is resulting in abundant deaths of Mississippians that could be prevented. In reviewing the literature, I was able to explore the many factors impacting the HPV vaccination rate in Mississippi, including the association of HPV with sexual activity, conservatism and religiosity, the fact that Mississippi is a rural state, the anti-vaccination movement in Mississippi and nationwide, and the low HPV vaccination provider recommendation rate in Mississippi.

Because of the importance of provider recommendations in vaccination compliance, I decided for my methodology to interview physicians around the state to determine their perspectives on the HPV vaccination rate in Mississippi and what policies we should implement to increase the rate. My 13 interviews presented me with information supporting what I found in the literature, as well as potential policy solutions. These policies to increase the HPV vaccination rate in Mississippi include better educating providers to make effective recommendations, requiring providers to recommend the HPV vaccine, automatically scheduling a second dose appointment so that patients will not forget, and mandating the HPV vaccination for school attendance.

Limitations of my study include the lack of racial diversity in my sample as well as the nature of a qualitative study. Further research could be done to assess the perspectives of more Mississippi physicians through a survey, as well as collecting data from parents to evaluate their viewpoints. Doing this would give more support to the conclusions of this study and potentially generate new conclusions and policy recommendations to increase the Mississippi HPV vaccination rate.

This study confirms that importance of the HPV vaccination, especially in a state like Mississippi, for public health and disease prevention. The results of this study could also be useful to other states that suffer from a low HPV vaccination rate and have similar characteristics to Mississippi. Implementing some or all of the recommended measures from this study could help to increase the HPV vaccination rate in Mississippi. Women do not have to keep dying of cervical cancer in Mississippi; we can prevent it with the HPV vaccine. Increasing the HPV vaccination rate in Mississippi is necessary to promote the health of all Mississippians and prevent these needless deaths. Every HPV vaccination dose, every provider recommendation, every educational measure through media is one step closer to increasing the HPV vaccination rate in Mississippi, preventing cancer, and saving Mississippi lives, and it is vital to implement policies to achieve this goal.

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APPENDICES

Appendix A

IRB Approval:

PI:

This is to inform you that your application to conduct research with human participants, "A Proposal to Increase the Mississippi HPV Vaccination Rate on the Basis of Providers' Opinions" (Protocol #21x-034), has been determined as Exempt under 45 CFR 46.101(b)(#2).

Please remember that all of The University of Mississippi's human participant research activities, regardless of whether the research is subject to federal regulations, must be guided by the ethical principles in The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research.

It is especially important for you to keep these points in mind:

- You must protect the rights and welfare of human research participants.
- Any changes to your approved protocol must be reviewed and approved before initiating those changes.
- You must report promptly to the IRB any injuries or other unanticipated problems involving risks to participants or others.
- If research is to be conducted during class, the PI must email the instructor and ask if they wish to see the protocol materials (surveys, interview questions, etc) prior to research beginning.

If you have any questions, please feel free to contact the IRB at irb@olemiss.edu.

COVID-19 Update: The UM IRB/IACUC is continuing operations while working remotely. The fastest way to reach our staff is via email at irb@olemiss.edu/iacuc@olemiss.edu.

Miranda Core
Research Compliance Specialist
IRB Administrative Office
Research Integrity and Compliance
Office of Research and Sponsored Programs
The University of Mississippi
100 Barr Hall
University, MS 38677-1848
irb@olemiss.edu | www.olemiss.edu

Appendix B

Physician Pseudonym	Specialty	Gender	Race	Part of Career	Interview Date
Dr. A	Pediatrics	Male	White	End of career	9/20/2020
Dr. B	Pediatrics; Child Abuse Pediatrics Specialist	Male	White	Middle to end of career	10/2/2020
Dr. C	Pediatrics, Infectious Disease Specialist	Male	White	End of career	10/5/2020
Dr. D	Pediatrics, Adolescent Medicine Specialist	Male	White	Middle of career	10/6/2020
Dr. E	Pediatrics	Male	White	Middle to end of career	10/28/2020
Dr. F	Family Medicine	Female	White	Beginning to middle of career	10/30/2020
Dr. G	Pediatrics	Female	White	Beginning to middle of career	10/30/2020
Dr. H	Pediatrics	Female	White	Middle of career	11/4/2020
Dr. I	Pediatrics	Male	White	Beginning of career	11/5/2020
Dr. J	Pediatrics	Male	White	Middle of career	11/12/2020
Dr. K	Pediatrics and Internal Medicine	Male	White	Middle of career	11/18/2020
Dr. L	Pediatrics, Adolescent Medicine Specialist	Female	White	Middle of career	12/2/2020
Dr. M	Family Medicine	Female	White	Beginning of career	12/3/2020