

**Motivational Interviewing as a Strategy to Reduce Vaccine Hesitancy in Rural Michigan: A
DNP Evidence Based Practice Project**

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Abstract

Background and Review of Literature: Vaccination hesitancy has become an important topic of discussion for health care providers, as well as for the general public. There are multiple reasons individuals experience vaccination hesitancy and chose not to become vaccinated. However, not receiving vaccinations leaves individuals at increased risk for serious vaccine-preventable illnesses. Individuals in rural areas are more likely to experience vaccine hesitancy. Health care providers have used different strategies to decrease vaccine hesitancy. An effective strategy to address behavior change, including vaccine hesitancy, is to use motivational interviewing in one-on-one discussions with patients. However, health care providers do not regularly use motivational interviewing (MI).

Purpose: The purpose of this evidence-based practice (EBP) project is to provide an education session to the Michigan State University (MSU) Extension vaccine team members that are instrumental in the delivery of health care information to the rural population of Michigan, on why and how to use MI with clients, specifically focusing on addressing vaccine hesitancy.

Methods: A two-person team of Doctor of Nursing Practice (DNP) students developed an educational information session on MI, in consultation with an MI expert. This session provides educational information for members of the MSU Extension vaccine team, focusing on strategically employing MI to address vaccine hesitancy. The educational session was administered over a synchronous zoom session to members of the MSU Extension vaccine team.

Implementation Plan/Procedure: A survey was administered to participants pre-and post-the motivational interviewing session, to assess for changes in knowledge and confidence in utilizing motivational interviewing. This survey consisted of 3 participant characteristic questions, 4

questions to gauge baseline understanding of participants knowledge of MI, and 9 pre- and post-survey questions that assessed knowledge related to MI.

Results: There was an improvement of knowledge and confidence among participants regarding MI and its use. In addition, several participants were qualitatively surveyed after the educational session and overall they agreed that this intervention was beneficial, and they would like to continue to learn more about MI.

Implications/Conclusion: This project highlights the continued need for MI education with healthcare providers and team members who regularly interact with the rural population regarding vaccine hesitancy.

Keywords: Vaccine hesitancy, Vaccinations, Rural Michigan, Motivational Interviewing

Motivational Interviewing as a Strategy to Reduce Vaccine Hesitancy in Rural Michigan: A DNP Evidence Based Practice Project

Vaccinations are a proven strategy for preventing diseases (Centers for Disease Control and Prevention [CDC], 2020). In fact, vaccinations have allowed for the smallpox eradication and near elimination of polio (CDC, 2020). Vaccines have even been described as one of the top ten health achievements in health care in the 20th century (The College of Physicians of Philadelphia, 2022a). However, many individuals choose to not become vaccinated. Strategies have been employed to tackle this health care concern; yet primary health care providers still struggle to address the importance of obtaining vaccinations with their patients. Specifically, the rural population in the United States has been shown to have increased rates of vaccine hesitancy and resistance to vaccines (Saelee et al., 2022). This paper describes an EBP project that seeks to improve knowledge of motivational interviewing (MI) for use in promoting vaccinations and the increase of vaccine uptake among individuals in rural Michigan. The project is centered on the development and delivery of an interactive educational session about using MI to address vaccine hesitancy, for members of the MSU Extension vaccine team.

Background & Significance

The World Health Organization (WHO) (2019) has named vaccination hesitancy as a top ten threats to global health in 2019. According to the WHO (2019), vaccine hesitancy is defined as “the reluctance or refusal to vaccinate despite the availability of vaccines” (para. 27). Vaccinations have been found to be one of the most cost-effective strategies in avoiding diseases and the lack of vaccine uptake has threatened to reverse the advancement made in tackling these preventable diseases (WHO, 2019). Vaccines assist to prevent 2-3 million deaths a year,

additionally “1.5 million deaths could be avoided if global coverage of vaccinations improved” (WHO, 2019, para. 27).

Since the early 1800’s and the creation of the first vaccine, vaccine hesitancy has remained a prominent topic in health care and in society (The College of Physicians of Philadelphia, 2022a). The foundations of individuals' negative attitudes towards vaccines have varied including religious reasons, misinformation about vaccines, and political objections (The College of Physicians of Philadelphia, 2022a). Since the creation of vaccines, there have been continued shifts in the scientific and public arena regarding vaccines effectiveness and safety. Most notably in 1995, a group of researchers published a cohort study that described a relationship between the vaccine for Measles, Mumps, and Rubella (MMR) and bowel disease, these researchers believed that receiving the MMR vaccine led to increased and persistent infection in the intestinal tissues leading to increased rates of bowel disease among those who had received the vaccine. (The College of Physicians of Philadelphia, 2022b). Several years later one of the researchers who was a member of the initial team published a second study linking the MMR vaccine to autism, leading to an immediate drop in vaccination rates and mistrust in vaccines overall (The College of Physicians of Philadelphia, 2022b). However, no evidence has been found that vaccines are linked to increased rates of autism, and it was also determined that the study information had been falsified by the researchers (The College of Physicians of Philadelphia, 2022b). With the creation of new vaccines including the COVID-19 vaccination, there continues to be skepticism about vaccines and the scientific rationale behind them.

The history of vaccine hesitancy has shown that there are many reasons individuals chose to not become vaccinated including for political, religious, or social reasons (The College of Physicians of Philadelphia, 2022a). Demographics also play a large role in whether individuals

chose to become vaccinated (Yasmin et al., 2021). A study done specifically for COVID-19 vaccine hesitancy found that in general, males were more willing to receive the COVID-19 vaccine, while breastfeeding and pregnant women as well as the general African American population were the least likely (Yasmin et al., 2021). This information should be alarming to health care providers, pharmaceutical companies, and society that there is a divide among those who are willing and not willing to be vaccinated. Given these facts, efforts need to focus on exploring why patients have the perspectives that they do, with vaccinations. It is demonstrated that non-vaccinated individuals experience increased hospitalization and greater adverse effects of COVID-19, which leads to potential threats to the financial stability and overall health of the country (Yasmin et al., 2021). A strategic approach is needed to restore trust in vaccines and medical professionals, especially targeting individuals in these groups (Yasmin et al., 2021). This study confirms that demographic factors significantly influence hesitancy of vaccination, which necessitates the implementation of education and access for all demographic populations.

There is also a significant gap in COVID-19 vaccinations between rural populations and urban populations (Saelee et al., 2022). Specifically in April 2021, the COVID-19 vaccination rates of rural populations in the United States were 39% and urban populations was at 46%, while in January 2022 these two populations were at 59% and 75%, respectively (Saelee et al., 2022). These statistics stress the need for education and outreach to the rural communities about the importance and value of vaccines. Not only are COVID-19 vaccination numbers lower in rural populations, but other vaccinations are also falling behind as well. According to Brandt et al. (2021), the National Immunization Survey-Teen (NIS-Teen) data in 2019 showed HPV vaccinations were lower among rural youths compared to individuals in urban arenas, with rural adolescent rates at 47.3% which increased 6.6% from 2018, compared to 54.2% in the United

States which increased 3.1% from 2018. This study also discussed that rural residents face a unique set of barriers to receiving adequate health care; these include lower knowledge of vaccinations, health care provider shortages leading to fewer access points for health care services including telehealth services, and lower socioeconomic status (Brandt et al., 2021).

In Michigan, immunization rates have remained stable among the adult population, despite the COVID-19 pandemic, but there is area for improvement (Michigan Department of Health and Human Services [MDHHS], 2022a). According to data from MDHHS (2022a), many counties are below 70% for routine adult vaccination rates. Four of the five counties in Michigan with the lowest vaccination rates reside in rural Michigan; Clare, Gladwin, Iron, Lake, and Oscoda counties are all below 60% vaccination rates for many routine vaccinations (MDHHS, 2022a). COVID-19 statistics are also low. Only 67.4% of people in Michigan have received at least one dose of the COVID-19 vaccine (MDHHS, 2022b). This means 32.5% are unvaccinated, of that 32.5%, about 70% reside in rural communities (MDHHS, 2022b).

Studies have shown that rural areas are prone to poor health care outcomes which also includes lower childhood and adult vaccination rates. Based on the Kaiser Family Foundation (KFF) Vaccine Monitor of December 2020, rural communities are among the most vaccine hesitant, with only 31% being willing to get the COVID-19 vaccine, and 25% adamant against getting the vaccine when compared to urban areas with 42% willing to get the vaccine and only 15% adamantly opposed to getting vaccinated (Kirzinger, Muñana, & Brodie, 2021). In this same study it is discussed that a major factor that effects rural individuals choosing to become vaccinated against COVID-19 is the trust in their physician or other health care provider (Kirzinger, Muñana, & Brodie, 2021). Eight six percent of rural residents say that they trust the health care provider to deliver reliable information regarding the COVID-19 vaccine helping

them to make an educated decision (Kirzinger, Muñana, & Brodie, 2021). These barriers combined with limited literature focusing on rural populations, specifically regarding immunization rates, and the hesitancies of rural populations make it imperative to connect with rural populations utilizing effective methods to address vaccine hesitancy.

Motivational interviewing (MI) is a behavior change strategy that is used by health care providers to assist patients in making a change to better their health. Health care providers tap into patients' motivations and engage them in the decision to make a behavior change as opposed to directly telling the patient what they should be doing to improve their health status (Rollnick, Miller, & Butler, 2008). There are three components that make MI successful. These include: fostering engagement in the patient relationship, cultivating a culture of partnership and empathy, and targeting the goal of the intervention, and understanding the patient/caregiver and adapting to their specific needs (Gagneur, 2020). Not only has MI been used successfully to improve health concerns such as decreasing alcohol abuse, gambling, smoking, drug use, poor dietary habits, and hypertension, there is also promising evidence that MI can improve vaccine uptake in hesitant individuals (Gagneur, 2020; Rollnick, Miller, & Butler, 2008).

Problem Statement

Vaccine hesitancy has remained a prominent topic in health care for many decades. With the COVID-19 pandemic this has become an even greater concern with part of the population choosing not to be vaccinated for various reasons (Green et al., 2021). Vaccine hesitancy has been shown to have negative effects on individuals and society (Green et al., 2021). Rural populations are disproportionately prone to be vaccine hesitant leading to increased illness in this population (Kirzinger, Muñana, & Brodie, 2021). Research on vaccine hesitancy has focused on causes, populations, and strategies for improvement. While there is a research specific to vaccine

hesitancy there is limited research focusing on the use of motivational interviewing in the rural population to improve vaccination rates.

Gap Analysis

The Ishikawa Model or “fishbone diagram” is used in this project to examine and organize the obstacles that lead to decreased vaccination rates in the rural population in Michigan (American Society for Quality [ASQ], 2022; Canva, n.d.). Determining the possible causes for decreased vaccination rates in this population was essential to directing the focus of this project and creation of the intervention.

A fishbone diagram was constructed using four main categories that were determined from the literature, which could potentially be the cause of decreased vaccination rates (See Appendix A). These four categories are a) personal values, b) knowledge gaps, c) system level barriers, and d) health care provider considerations. Personal barriers that were identified were religious reasons for not vaccinating, lack or social support for vaccines, political reasons for not vaccinating, and mistrust in vaccinations overall (Fisher et al., 2020; Wang et al., 2021; Yasmin et al., 2021). Knowledge gaps play a large role in understanding vaccines, it was determined that individuals who lack knowledge of vaccines and limited access to credible sources leads to lower vaccination levels in the rural population (Wake, 2021). System level barriers that were identified are false information portrayed in the media, lack of access to care, and lack of transportation to receive vaccines (Gisondi et al., 2022; Wake, 2021). Finally, health care providers who are responsible for administering vaccines may feel discomfort with discussing vaccine uptake with individuals who are vaccine hesitant, they may feel hesitant to receive vaccines themselves (Ahmad, Akande, & Majid, 2022). Application of the fishbone diagram allowed for the examination and analysis of potential factors leading to decreased vaccination

rates in rural Michigan and aided with the development of the project intervention.

Purpose of the Project

The aim of this project is to focus on motivational interviewing as a strategy to improve **knowledge and confidence** in using MI among the MSU Extension Vaccine Team, which will hopefully contribute to increasing vaccine uptake, specifically in the rural population. This aim was accomplished by engaging the MSU Extension team in an interactive MI training experience. This session included a presentation on the purpose, goals, and methods of performing MI, as well as some role-play and practice using the skills taught for motivational interviewing. As the MSU Extension team members are already present in every county of Michigan, this training facilitates positive communication and information sharing within the rural communities. This training experience was accomplished in November 2022, and evaluation of this project was completed by May 2023. Evaluation was accomplished by analysis of the pre- and post-training surveys and demonstrating evidence of change in knowledge and confidence in using MI techniques through statistical analysis. With this improved knowledge, the hope is that the staff of MSU Extension will utilize MI to increase vaccination rates among the rural population of Michigan.

Evidence Based Practice Quality Improvement Model

The Health Belief Model

The evidence-based practice model used to facilitate the intervention of this DNP project is the Health Belief Model. The Health Belief Model focuses on using evidence to anticipate health behaviors (LaMorte, 2019). Developed by the U.S. Public Health Service, this model was used to understand why people do not adopt healthy practices and focus on methods to overcome this lack of perceived “compliance” (LaMorte, 2019). The basis of this model suggests that

personal beliefs of the effectiveness of specific health behaviors will anticipate the likelihood of embracing these behaviors (LaMorte, 2019). Two major factors that affect individuals' decisions are the perceived severity and susceptibility of contracting a particular disease or illness (Zampetakis, 2021). These two factors are instrumental in understanding why individuals may or may not choose to become vaccinated.

With the current pandemic and rise of vaccine hesitancy among the population, the Health Belief Model has been used to predict the hesitancy of the population with regard to the COVID-19 vaccine. A study by Zampetakis (2021), analyzed the role the Health Belief Model plays in how people decided whether or not to become vaccinated to COVID-19. This study demonstrates that public health campaigns should be designed and implemented at different levels to address intention to vaccinate (Zampetakis, 2021). Examining vaccine hesitancy through the lens of the Health Belief Model allowed for a greater understanding of how to effectively and appropriately interact with individuals who are vaccine hesitant (Zampetakis, 2021). The Health Belief Model was used to develop this intervention based on evidence from the literature on rural populations, vaccine hesitancy, and overall health status in Michigan. When creating the proposed intervention, the DNP students utilized the main concepts of the Health Belief Model, perceived susceptibility, perceived severity, perceived benefits, and perceived barriers to influence the educational materials with a focus on how to apply these in conversations with the rural population utilizing MI (LaMorte, 2019).

The MSU Extension team is present in all counties of Michigan and brings the resources and education available from MSU to the entire state. The MSU Extension team has established themselves as a trusted member of Michigan's rural communities and provides resources for health education. It is evident from the literature that trusted members of the community are

pivotal in shifting mindsets of those who are vaccine hesitant (Alcendor, 2021; Hubach et al., 2022; Kirzinger, Muñana, & Brodie, 2021). By educating members of the MSU Extension team on the process of MI, MI can be used as a strategy with this population to address vaccination hesitancy in rural Michigan.

Synthesis of the Evidence

Search Strategies

A literature search was conducted to examine the available literature on vaccination hesitancy among rural populations and the use of MI in with patients who are vaccine hesitant. To conduct this review, various searches were utilized in several databases including Cumulative Index for Nursing and Allied Health Literature (CINAHL), EBSCO research platform, PubMed, and Google Scholar. Furthermore, reference lists of several articles were also analyzed for additional sources. Vaccination hesitancy was defined as individuals' rejection toward becoming vaccinated even if vaccines are available to them (WHO, 2019). Rural populations were defined as individuals who live outside of the urban area (Health Resources & Services Administration [HRSA], 2022). Motivational interviewing is defined as a behavior change technique used by health care providers to motivate positive change in the patient's health (Rollnick, Miller, & Butler, 2008). Sources and articles published between 2014 and 2022 were considered for this literature review.

The literature search was conducted between June 10, 2022, and July 1, 2022. An initial search was performed. Initial search teams included "vaccine" or "vaccination" AND "hesitancy" or "refusal", a total of 5,296 articles were identified. After this search it was determined there needed to be a narrower focus, but this allowed the reviewers to visualize the vast amount of information that is available on vaccination hesitancy. Additional searches

included key search term such as “vaccination hesitancy” AND “impacts” or “effects” or “consequences”, which yielded 1274 articles, “vaccine hesitancy* or “vaccine refusal” AND “healthcare providers” or “healthcare professionals” or “clinicians” or “nurses” or “doctors” returned 1738 articles, “vaccine hesitancy” AND “motivational interview*” or “MI”, a total of 124 articles were identified. When the search terms “vaccine hesitancy” or “vaccine refusal” AND “rural population” or “rural community” were utilized, the search yielded 26 results.

Selection Criteria

Studies were selected based on their relevance to vaccination hesitancy or refusal for all vaccination types, including COVID-19. Studies were excluded if they were not published in English. The preliminary selection of studies was based on the title and abstract. The number of studies was further narrowed by confirming the concepts aligned with the original inclusion criteria and were published within the last five years except for one exception which was published in 2014. A total of 20 articles were utilized in the final literature synthesis and the following themes were identified: prominent factors influencing vaccines hesitancy, instruments used to assess vaccine hesitancy, examination of increased rates of vaccine hesitancy in the rural population, and motivational interviewing as a strategy to reduce vaccine hesitancy. A summary of the articles used for the literature synthesis can be found in the literature table in Appendix B.

Factors Influencing Vaccine Hesitancy

Understanding why individuals choose to not become vaccinated is essential to combating the problem of vaccine hesitancy. As noted, vaccine hesitancy has been a long-standing concern in the health care community and the public (The College of Physicians of Philadelphia, 2022a). Many of the reasons individuals have chosen to not be vaccinated have remained constant. Individuals have stated their discomfort towards receiving vaccinations stems

from medical mistrust, political views, religious beliefs, perceived barriers to receiving the vaccine, perceived effectiveness, and lack of access to vaccine due to geographic location, such as in rural populations (Fisher et al., 2020; Wang & Liu, 2021; Yasmin et al., 2021). There are also two specific populations that are regularly found to be more vaccine hesitant, these are women and individuals in the black population (Rane et al., 2022; Wang & Liu, 2021). The COVID-19 pandemic has put a narrow lens on vaccine hesitancy and there has been a substantial amount of research performed on how people receive their information about vaccines and if this plays a role in their decision to become vaccinated. Several studies confirmed that individuals were more likely to be vaccine hesitant if they received their information from social media (Wake, 2021; Wang & Liu, 2021). Health care providers who are equipped with the knowledge that these specific groups may be more prone to vaccine hesitancy are better able to address this at each health care encounter.

Instruments Used to Measure Vaccine Hesitancy

Many studies have assessed vaccination uptake in rural populations and vaccine hesitancy overall. Several survey instruments have been created to evaluate individuals rationale for not vaccinating. The results of these studies show that there may be a cultural aspect to hesitancy, that perceived safety, effectiveness, necessity, acceptance of vaccination schedule, positive opinions of the effectiveness, and perceived reliability and legitimacy of authorities to require vaccines may affect vaccine uptake (Akel et al., 2020; Anderson, 2014; Sarathchandra et al., 2018). Along with those opinions, the education of vaccine recipients, while increasing access to vaccines, and completing the routine audits of adult and pediatric practices would be an additional way to increase vaccine uptake. (Akel et al., 2020; Anderson, 2014; Sarathchandra et al., 2018). These models and surveys could be used to evaluate the hesitancy of rural populations

against getting vaccinations so more effective methods of communication could be developed for this population. These studies show that analyzing the aspects of hesitancy as well as using surveys to poll the population desired, display the types of information and the way to present them to this population (Akel et al., 2020; Anderson, 2014; Sarathchandra et al., 2018). From this information we can use our motivational interviewing project to address the specific concerns of the rural population regarding vaccine hesitancy, whether it be the COVID-19 vaccine, flu vaccines, or routine immunizations.

Rural Population and Vaccine Hesitancy

According to the WHO (2019), major reasons for vaccine hesitancy are “complacency, inconvenience of access to vaccines, and lack of confidence to vaccines”. This is echoed specifically in the rural population in a study that discusses reasons for lower vaccinations rate in this population include concerns about vaccine safety and the belief that vaccines are not necessary (Albers, Thaker, & Newcomer, 2022). Rural populations have continuously been shown to be among some of the most vaccine-hesitant groups, leading to increased risk for vaccine preventable diseases (Albers, Thaker, & Newcomer, 2022; Kirzinger, Muñana, & Brodie, 2021). Kirzinger, Muñana, & Brodie (2021) also discuss the statistics of rural populations to get the COVID-19 vaccine, approximately 35% of individuals surveyed “probably will not” or “definitely will not” get this vaccine. Studies have shown that the rural populations have unique barriers to health care; health care worker shortages, specifically pediatricians, fewer hospital beds, limited access to health care, and increased risk of death due to prevalence of chronic diseases (Albers, Thaker, & Newcomer, 2022; CDC, 2021; Kirzinger, Muñana, & Brodie, 2021). The CDC (2021) confirms in their Morbidity and Mortality Weekly Report in

May 2021, that COVID-19 vaccine hesitancy is substantial when comparing rural to urban populations.

There is limited research that has been conducted in rural populations related to vaccine hesitancy, which presents a unique challenge that must be overcome. While research may be inadequate, there are key themes that have been identified when it comes to vaccine hesitancy in the rural population. Rural Americans have a lower health literacy and a greater distrust of the government, which are contributing factors leading to decreased vaccine uptake (Alcendor, 2021). Many vaccine interventions that have targeted the rural population have been focused on clinical initiation of vaccine discussions. This limits the reach of these interventions as rural Americans tend to have inadequate access to health care compared to their urban counterparts (Albers, Thaker, & Newcomer, 2022; CDC, 2021; Hubach et al., 2022). To increase vaccine uptake in rural communities', guidance must be facilitated by trusted community members including health care providers and other trusted members of the community such as faith leaders and rural community influencers (Alcendor, 2021; Hubach et al., 2022; Kirzinger, Muñana, & Brodie, 2021). These trusted community members need to provide the opportunity to achieve a higher level of health literacy to make informed decisions about vaccines and prevent infections by having open discussion regarding basic vaccine information and safety (Alcendor, 2021). This guidance should occur in locations in which these rural populations come together such as churches, grocery shops, feed, and supply stores, etc. (Alcendor, 2021). This research confirms that there are key factors that must be considered when engaging with the rural population regarding vaccine hesitancy such as location of interactions and the trust in the individuals who are providing the information.

Use of Motivational Interviewing to Reduce Vaccine Hesitancy

Evidence based approaches are essential for providers to incorporate when it comes to reducing vaccine hesitancy (Breckenridge, Burns, & Nye, 2021). MI is a proven technique that has been shown to be effective at decreasing vaccine hesitancy (Breckenridge, Burns, & Nye, 2021; Gagneur A., 2020; Reno et al., 2018). Several studies have demonstrated its effectiveness with numerous types of vaccines including human papilloma virus (HPV), diphtheria, tetanus, pertussis (DTaP), MMR, and COVID-19 (Breckenridge, Burns, & Nye, 2021; Cole et al., 2022). Engaging patients and care givers in conversations regarding their reluctance towards vaccinations is a significant component of MI and allows for providers to target patients concerns and adapt the information provided to result in increased uptake of vaccines (Gagneur A., 2020). Application of the MI approach to combat vaccine hesitancy has been implemented with several methods including, provider education and direct use of MI by researchers (Cole et al., 2022; Gagneur et al., 2019; Reno et al., 2018).

Provider Education

Two studies examined the effects of provider education to improve techniques of MI to utilize during health care encounters with vaccine hesitant parents. (Cole et al., 2022; Reno et al., 2018). Cole et al. (2022), created a MI tool called MOTIVE, or MOtivational interviewing Tool to Improve Vaccine acceptancE, that guides health care providers through conversations with parents who are vaccine hesitant. This study provided education to health care providers in the use of MI and how to utilize the created tool effectively (Cole et al., 2022). The second study utilized a training program that was specific to HPV and empowered providers to utilize an approach that assumed parents were willing to vaccinate their child for HPV (Reno et al., 2018). Both studies involved the opportunity for health care providers to role-play MI techniques and

receive feedback to improve their methods (Cole et al., 2022; Reno et al., 2018). Both interventions ultimately demonstrated that providers feel more confident when using the technique of MI when it comes to discussing vaccine hesitancy and Cole et al. (2018) was able to determine a significant increase in vaccination uptake in the study populations (Reno et al., 2018).

Direct MI Application in Addressing Vaccine Hesitancy

A study conducted by Gagneur et al. (2019), implemented an intervention in the hospital setting, specifically in four university hospital maternity wards, for new mothers by teaching research assistants to employ MI to attempt to increase vaccination rates for newborns. This study focused on five main areas of vaccine hesitancy including, vaccine-preventable diseases consequences, vaccines effectiveness, the importance of the immunization schedule in infants, reluctance to vaccinate and side-effects, and vaccination facilities in each of the examined regions (Gagneur et al., 2019). Questionnaires were utilized before and after the intervention to assess effectiveness (Gagneur et al., 2019). While Gagneur et al. (2019) utilized a different approach to applying MI, this technique was also shown to be effective at decreasing vaccine hesitancy and enhancing the intention to vaccinate.

Literature Synthesis Summary

The current available literature documents numerous reasons individuals choose to not become vaccinated; these are compounded in the rural population as they have decreased trust in the systems that provide vaccines and they have more limited access to vaccines and vaccine information (Alcendor, 2021; Fisher et al., 2020). Several tools have been created in order to measure vaccine hesitancy, and these tools may be useful to utilize in the rural population. MI is a technique to help combat vaccine hesitancy in many populations but has mainly focused on

targeting parents of young children through newborn and HPV vaccinations (Gagneur A., 2020; Reno et al., 2018). Trusted members of the community are crucial when it comes to delivering information about vaccines as the rural population has shown more confidence in understanding the importance of vaccines through this delivery method (Alcendor, 2021). Through the implementation of this EBP project, the aim is to gain trust and improve the knowledge of this vulnerable community through proven techniques. It is essential that more research is conducted on the rural populations with established techniques, such as MI, to gain a better understanding of how to increase vaccine uptake and decrease fear of receiving vaccinations.

Goals, Objectives, and Expected Outcomes

To assess this EBP project and the administered intervention it is essential to define the intended goals and objectives. The primary outcome for this EBP project is to increase knowledge and confidence about motivational interviewing among MSU Extension team members. MSU Extension team member specifically includes those individuals who are a part of the Michigan Vaccine Project Team. This outcome was achieved by completing a one-time 3-hour presentation on MI with an emphasis on vaccine hesitancy in November 2022 to the members of the MSU Extension team via virtual format. This goal will be achieved if there is a statistically significant increase in results from a pre- and post- survey to examine for knowledge and confidence in using MI.

Methods

Population, Project Site, and Key Stakeholders

The targeted population for this EBP project is the team members at MSU Extension vaccine team across Michigan. These individuals regularly have opportunities to connect with members of the rural Michigan community who comprise the members of the group this project

is ultimately aiming to effect by increasing their vaccination rates. The percentage of the population in Michigan that is considered rural is around 20% (United States Department of Agriculture [USDA], 2021). Rural populations can be defined as those populations outside urban areas (Citizen's Research Council of Michigan, 2018). According to the 2010 decennial census, rural is defined as territories and settlements outside of towns and cities with fewer than 2,500 residents (Ratcliffe et al., 2016). Most of Michigan's rural population lies above the 43rd parallel or "Bay City line" (Citizen's Research Council of Michigan, 2018). Images of the rural population distribution for the state of Michigan can be shown in Appendix C (Citizen's Research Council of Michigan, 2018). These images show that most of the area of the state of Michigan is rural, including most of the Upper Peninsula and the upper area of the Lower Peninsula (Citizen's Research Council of Michigan, 2018). Major populated urban counties include Wayne, Washtenaw, Oakland, Kent, Ingham, Bay, Midland, Saginaw, Genesee, Muskegon, and Kalamazoo, while most of the other counties are considered rural (Citizen's Research Council of Michigan, 2018).

The community partner for this EBP project is MSU Extension. MSU Extension is an organization that brings all the resources and knowledge of MSU throughout the counties of the state of Michigan. The mission statement of MSU Extension is to "help people improve their lives through an educational process that applies knowledge to critical issues, needs and opportunities" (MSU, n.d.). This organization has a representation in every county in the state of Michigan including the Upper Peninsula and rural areas. This facilitates usage of MSU programs and services throughout the state and in every population. This provides a tremendous advantage for these counties to have resources at their disposal they otherwise would not have, more importantly, these programs and services are from a trusted source and major educator in the

state. These resources include health care, economic, and agricultural. MSU Extension team members connect with members of the Michigan population by many avenues including face-to-face interactions, television advertisements, printed flyers, radio advertisements, and telephone communication to name a few. MSU Extension focuses on “helping to grow the agricultural economy, sustainably using natural resources, or helping manage chronic illnesses to decrease health care costs and preparing the future leaders. MSU Extension is building better communities to keep Michigan strong and prosperous” (MSU, n.d.). With respect to our project, MSU Extension received a \$7 million grant from the CDC and the MDHHS to explore vaccination rates and strategies to improve vaccination rates in rural Michigan among adult populations (MSU, 2021).

Key stakeholders for the proposed intervention are the health care providers caring for members of the rural community in Michigan, the team at MSU Extension, and the rural population in Michigan. All individuals in the state of Michigan can potentially benefit from this intervention, increasing vaccination rates in any population will lead to a greater likelihood that a disease will not be transmitted to others.

Ethical Considerations

Michigan State University Internal Review Board (IRB) approval was obtained prior to initiating the DNP Project. This project was deemed not to be research. The official IRB Determination Form was submitted after the proposal was approved. Informed consent was obtained from all participants before initiation of the intervention. By obtaining informed consent, the risks and benefits of participating were explained and accepted by each participant. Participants of this project were informed their information would be kept anonymous and abide by all HIPPA, Michigan State University, and IRB policies. All information regarding the project

and its results was secured by password protected computers, no print information was utilized or provided for this intervention reducing potential data and information breaches.

All interactions and interventions throughout the planning and implementation of this project took place virtually to minimize potential exposure to COVID-19. To gain better understanding of the objectives of the MSU Extension team, project team members worked closely with MSU Extension staff to ensure practicality and sustainability of the intervention.

Setting Facilitators and Barriers

For recognizing facilitators and barriers for this project a SWOT table analysis was utilized to identify strengths, weaknesses, opportunities, and threats to the community organization we are partnering with, in this case, MSU Extension. A SWOT analysis is used to help develop a broader awareness of an organization in order to explore solutions to a given problem and provides an organized format for determining where change may be possible (Renault, n.d.). See the SWOT table in Appendix D for further information of the SWOT analysis.

The Intervention and Data Collection Procedure

After examination of the literature and discussion with the project site it was determined the best direction to take was creating an intervention to educate the MSU Extension team. The initial intent of this project was to interact with members of the community by utilizing motivational interviewing techniques to invoke discussion about vaccine hesitancy and ultimately help rural community members come to the decision to become vaccinated. With the COVID-19 pandemic still affecting in-person communication with community members, it was ultimately decided the most safe and effective intervention would take place virtually and by educating members of the MSU Extension team about MI who have regular contact with this

rural population. The intervention is occurring in three phases, the first phase involved examining the available literature and gaining an understanding from the MSU Extension team about their needs in regard to reducing vaccine hesitancy. The second phase involved carrying out the proposed intervention with the MSU Extension vaccine team and collecting the data to assess the outcome of the intervention. Finally, the third phase is currently underway, and consists of data analysis and presentation of the EBP project findings. A full timeline of the project implementation can be found in Appendix E. An explanation of the project budget is located in Appendix F, with resources being donated in-kind for completion of the DNP Project.

PDSA Model

The Plan Do Study Act (PDSA) model was used to guide development and implementation of procedures in this project. PDSA is an evidence-based instrument utilized to guide individuals through the process of creating, implementing, and adjusting change interventions (Institute for Healthcare Improvement [IHI], 2022). The PDSA tool has been effectively applied in the health care setting for many types of change interventions. Each of the four steps of the PDSA model help to analyze the change intervention to allow for effective, thoughtful modification at each step of the process. The “plan” step involves gaining an understanding of what change needs to be achieved and how to gauge when this change has successfully occurred (IHI, 2022). During this step, it is crucial to determine what data needs to be collected and begin in development of the plan for the intervention (IHI, 2022). The “do” stage is when the actual intervention is carried out and data is collected, it is essential during this stage to monitor and track unexpected outcomes (IHI, 2022). During the “study” stage, data is analyzed and compared with the expected outcomes (IHI, 2022). Reflecting on lessons learned throughout the implementation process can help to assist with adjusting the intervention as

needed (IHI, 2022). Finally, the “act” step is when the intervention is either adapted, adopted, or abandoned based on the collected data (IHI, 2022). This step is when a plan for the future of the intervention is created, this may involve utilizing the PDSA tool multiple times throughout the process (IHI, 2022).

The PDSA tool was applied to this EBP project as it allowed for an evidence-based guided approach to create the utilized intervention. The projected outcomes of this EBP project include increasing the number of MSU Extension team members that can apply MI when interacting with vaccine hesitant individuals in the rural community in Michigan. With the implementation of the PDSA cycle, the DNP students have been able to utilize the available literature to gain a better understanding of the problem and create a sustainable change intervention. During the “plan” stage the DNP students regularly met with the MSU Extension staff and faculty advisor for assistance in guiding the direction of the intervention. This step also included the creation of intervention material including the pre- and post- survey as well as the educational materials. The “do” phase consisted of the intervention implementation in which the DNP students provided the educational session about MI to the MSU Extension vaccine team. During this step, the pre- and post-survey were administered to the participants utilizing the Qualtrics system provided through MSU. The “study” step includes analyzing the data collected from the pre- and post- surveys after the intervention was administered. Finally, the “act” stage involves modification of the intervention and providing the MSU Extension staff with the resources needed to make the intervention sustainable. A detailed explanation of the PDSA tool for the applied intervention can be found below.

Plan

To gain knowledge about the targeted population and understanding of its needs, two family nurse practitioner students met with the director of MSU Extension's Health and Nutrition Institute as well as several MSU Extension team members who are a part of the Michigan Vaccine Project Team. This allowed for better understanding of the needs of the organization and the vulnerable community they were trying to target. After this collaboration, it was determined the best potential option to impact the large rural population in Michigan was to implement a training program focused on the individuals who interact with this population regularly, the MSU Extension vaccine team.

The DNP students implemented the MI educational session in the month of November to the MSU Extension staff. This was done through a secured virtual meeting as it allows for limited contact to decrease the potential COVID-19 exposure. The education that was provided focused on the main principles of MI, techniques to become more confident with using MI, exemplars showing effective and ineffective MI technique, and finally working through scenarios to interact with MSU Extension team members. Recruitment of individuals who took part in this intervention, was completed by the director of MSU Extension and a member MSU Extension Michigan vaccine team who was designated as the DNP students' point person.

Do

The DNP students facilitated the educational experience in the month of November. On the selected date of the session, the DNP students, and 15 members of the MSU Extension team met via a synchronous zoom session. Before beginning the educational activity, the DNP students administered the initial pre-survey to participants and consent was obtained. Several techniques were used throughout the synchronous zoom session, to educate the MSU Extension

staff about the technique of MI and how to apply it to individuals who are vaccine hesitant, including PowerPoint presentation, video examples, and role-play opportunities. After the conclusion of the educational session, the post-survey was administered to assess knowledge, confidence, and likelihood to apply MI skills. Additional information was collected from several participants utilizing a semi-structured interview approach in order to understand areas for potential improvement of the educational materials. All surveys were administered electronically, and information obtained was secured on a password protected laptop to ensure compliance and privacy of the collected information.

Study

The goal of this EBP project is to assess for change in knowledge and confidence of applying MI techniques to vaccine-hesitant individuals who live in rural Michigan at public event settings. The DNP students hope this will result in increased vaccination rates among this vulnerable population. After the completion of the educational session, the DNP students were then able to assess change from the completed pre- and post-surveys and calculate for statistical significance. This is outlined more in the analysis portion of the proposal. The DNP students also assessed possible changes that could be made to the applied intervention and looked for areas of improvement that can be made if this intervention were to be implemented in other settings.

Act

After the completion of the data analysis, changes will be made to the educational materials to make improvements for potential further use. After the intervention is complete, feedback was compiled from the individuals who attended the educational session to assist with the necessary changes to make an improved intervention. This was done through a brief post-intervention meeting with several individuals who attended the session. The brief interview

guide can be found in Appendix H. Information gathered from the data analysis will be provided to the director of MSU Extension and disseminated to the MSU Extension team. In collaboration with MSU Extension, it will be determined if the modified intervention can be applied and utilized for future staff of the MSU Extension Vaccine Team.

Study Measures

In order to measure the outcomes of this DNP project 3-part survey was used (Appendix G). The survey was created from incorporating information from the available literature including reviewing tools used to measure MI knowledge and confidence in various settings, discussion with the MSU Extension team members, and discussion with a statistician. In the first part of the survey (delivered only pre-MI intervention training), participant characteristic information (role, years with MSU extension, experience with MI) was collected. The second part of the survey had four yes/no/unsure questions related to knowledge about MI. The third part of the survey was adapted from a tool that was used to evaluate corrections officers in New Mexico after a MI training (Willits, Albright, Broidy, & Lyons, 2009). The tool has nine questions, and uses a 5-point Likert scale, that address knowledge and confidence, about vaccine hesitancy and MI. Both the second and third parts of the survey were delivered pre- and post-MI intervention. The pre- and post-survey was placed into the Qualtrics Survey Tool provided through MSU.

At the conclusion of the intervention, qualitative data was collected from participants including the community project advisor, community project liaison, and several members of the MSU Extension team, utilizing a brief interview guide (Appendix H) to assess for potential improvements to the administered educational session and materials. The questions included asking what the participant thoughts of the educational session and what they believe could be

done to improve the intervention. The qualitative questions were delivered by two DNP students, with one student asking the interview questions, and one student taking field notes.

Analysis

Prior to the analysis of the data the DNP students met with a statistician to discuss the data analysis process. The pre- and post- surveys were paired within the Qualtrics system by utilizing a participant number which consisted of the individuals entering their first initial, last initial, and last four digits of their phone number. The pre- and post- test were then paired by utilizing the time stamps of when the questionnaires were taken.

In the pre- and post-survey for the knowledge and confidence-based questions, the first six questions using nominal data were analyzed using a comparison of pre- and post-proportions. Assuming the assumptions of a normal distribution were met, a paired T-test was used to compare the pre- and post-survey data, on each of the individual remaining nine questions. SPSS, version 28.0.1.0, was used for data analysis. Finally, information from the brief interviews was reviewed, and answers were analyzed for similar content.

Data Outcomes

After the intervention took place, it was determined that there were 16 total participants who attended the educational session, and we had a response rate of 14 participants. One outlier participant completed only the pre-survey and one outlier participant completed only the post-survey, leading us to eliminate these results.

Of the 14 participants, 57% ($n = 8$ of a total 14 participants) who took part in the educational session are known as Program Instructors, these are individuals who frequently interact with the rural population in various settings by attending and hosting public events (Table 1). The other 43% ($n = 6$ of a total 14 participants) of participants have varying roles

within the MSU Extension organization. The majority of the individuals who took part in the intervention also reported having less than 1 year of experience working at MSU Extension and also limited experience with MI, with the majority of individuals (57%, $n = 8$ of a total 14 participants) stating they had some or limited experience utilizing MI prior to the intervention.

Previous knowledge and experience utilizing MI was also collected (Table 2). There were 79% ($n = 11$) of the participants reported having previous knowledge of MI and nine of the 14 participants recall having been provided education in the past about MI. Regarding the participants understanding of MI, the majority (86%, $n = 12$ of a total 14 participants) reported being unsure or did not know the four main processes of MI. The post-intervention results show that 100% of the participants reported an understanding of MI and 13 of the 14 participants felt confident that they gained further understanding of the four main processes of MI.

Statistical significance was found in five of the nine pre- and post-survey questions (Table 3). Of note, knowledge of MI and confidence of utilizing MI in the field improved significantly. 64% of participants ($n=9$) reported improvement in understanding the basic ideas and principles of MI. While, 86% of participants ($n=12$) reported an improvement in feeling proficient and able to use MI in their practice after the intervention.

Utilizing the brief question guide found in Appendix H, participants were asked their overall experience of the intervention and possible changes that could be made to improve the intervention. Overall, feedback was extremely positive from the participants, no recommendations were made for changes to the intervention.

Sustainability Plan

MI is a proven technique that can be utilized to tackle many health care areas such as vaccine hesitancy. Improving the knowledge and confidence of those who interact with vaccine

hesitant individuals, in utilizing techniques such as MI, is essential to continue to improve vaccination rates in those who seeking care less frequently from health care providers such as the rural population. Due to the positive results obtained from this intervention, a potential sustainability plan could be providing a similar education session on MI and requiring this as an annual training for all MSU Extension staff interacting with the rural population of the state of Michigan. Utilizing individuals such as DNP students or staff from MSU Extension team to carry out the educational intervention in the future could increase the likelihood of its sustainability and be a cost-effective option.

Implications for Nursing

Increasing knowledge and confidence of MI in individuals who frequently interact with vulnerable populations could lead to improved vaccination potential in Michigan. All individuals in every aspect of health care are responsible for continued learning and improving their knowledge, taking part in educational opportunities such as this intervention could fulfill a knowledge gap health care practitioners may have. Utilizing an established behavior change technique in a non-health care setting can help to reach populations that do not regularly see a health care provider. Additionally, the potential knowledge gained from this intervention could allow for advanced practice providers to approach patients differently who have had tailored conversations about their vaccine hesitancy beliefs and to build on the patient's new knowledge.

While much research has been conducted on vaccine hesitant individuals and techniques used to improve vaccination rates, little research has been done specifically on rural populations. This intervention will be specifically focused on improving knowledge about MI and confidence in using MI with individuals who regularly interact with members of the rural Michigan community hopefully leading to improved vaccination rates. Additional research could be done

at the completion of this project to see the actual implications of the intervention in terms of improving vaccination rates in the targeted population.

Conclusion

Vaccine hesitancy remains an important health concern among the health care community and the public (The College of Physicians of Philadelphia, 2022a). The rural population is disproportionately vaccine hesitant compared to their urban counterparts (Saelee et al., 2022). Several techniques have been effectively utilized to reduce the overall rates of vaccine hesitancy, including MI (Breckenridge, Burns, & Nye, 2021; Gagneur A., 2020; Reno et al., 2018). A key factor in individuals adjusting their beliefs about health care recommendations and procedures is receiving this information from a trusted source such as a reliable community member or health care provider (Kirzinger, Muñana, & Brodie, 2021).

This EBP project was accomplished by two DNP students administering an interactive educational session to the MSU Extension vaccine team focusing on improving MI skills. This EBP project was intended to increase members of the MSU Extension Vaccine Teams' knowledge and confidence of MI in regard to addressing vaccine hesitancy. The hope is in turn this would contribute to an improved vaccination rates of the population that they interact with most, members of rural Michigan. Data collected before and after the intervention demonstrated an increase in knowledge and confidence in the use of MI. to assess for change.

There is a continued need for research on improving vaccine hesitancy specifically using MI. The hope is that this intervention will help to continue to build on the already available knowledge and enable future researchers to continue to expand to improve the health and welfare of the rural community.

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Table 1

Table 1. Characteristics of Participants	
Role at MSU Extension	# of Participants (n=14)
Program Instructor	8
Supervising Educator	3
Director	2
Health Immunization Specialist	1
Years Experience	
< 1 year	10
1-5 years	1
5+ years	4
Experience/training with MI	
No experience	4
Some or limited experience	8
Extensive experience	2

Table 2

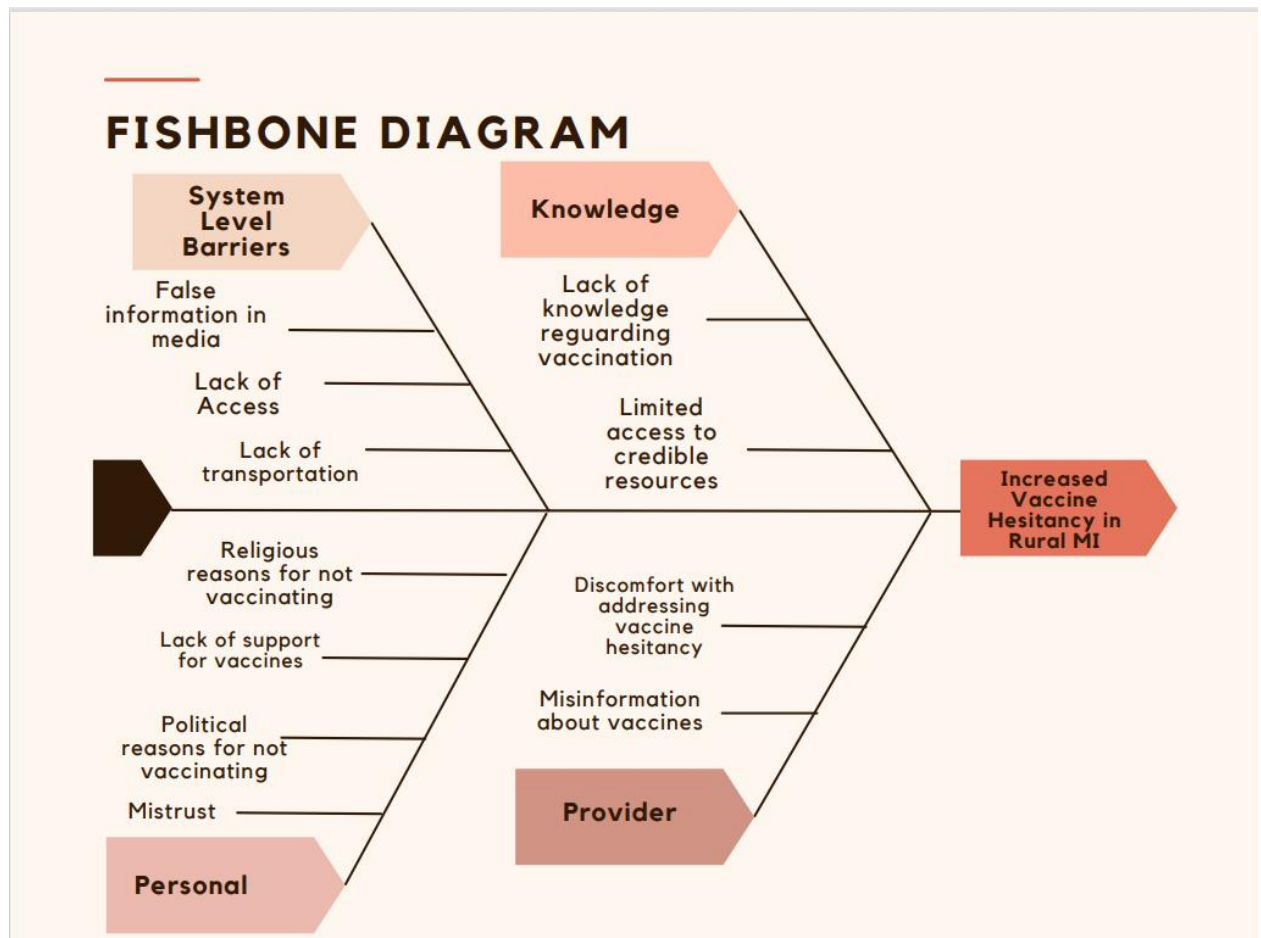
Table 2. Knowledge About Motivational Interviewing (n=14)	# of Participants	
1. Do you know what motivational interviewing is?	Pre- test	Post- test
Yes	11	14
No	1	0
Unsure	2	0
2. Have you utilized motivational interviewing before?		
Yes	8	8
No	1	1
Unsure	5	5
3. I have been provided education about motivational interviewing.		
Yes	9	14
No	5	0
Unsure	0	0
4. Do you know what the 4 main processes of motivational interviewing are?		
Yes	2	13
No	7	0
Unsure	5	1

Table 3

Table 3. Comparison of Pre- and Post-MI Intervention Survey (n=14)				
	Pre-test M (SD)	Post-test M (SD)	<i>t</i>	<i>p</i>
Questions				
1. I understand the basic ideas and principles of motivational interviewing.	3.29 (1.14)	4.57 (0.51)	-3.80	<0.01
2. Motivational interviewing is applicable to my work.	4.14 (0.77)	4.57 (0.51)	-3.12	<0.01
3. I will use motivational interviewing in my work.	3.93 (0.73)	4.43 (0.85)	-2.88	0.01
4. I feel proficient and able to use motivational interviewing in my practice.	2.71 (0.99)	4.07 (1.00)	-5.04	<0.01
5. I believe that a client's own level of motivation for change is important.	4.57 (0.51)	4.71 (0.47)	-1.00	0.34
6. If a client is not initially motivated, I do not think that I will be able to increase his or her motivation.	2.86 (1.23)	2.64 (1.15)	0.51	0.62
7. I am a skillful and good listener.	4.00 (0.78)	4.21 (0.89)	-1.39	0.19
8. Some clients will never change regardless of how I interact with them.	3.36 (1.34)	3.43 (1.40)	-0.43	0.67
9. I think that the most effective way to motivate clients or patients to change is by drawing on their own internal motivations.	4.36 (0.75)	4.79 (0.43)	-2.48	0.03

Appendix A

Gap Analysis

Figure 1. *Gap Analysis*

Appendix B
Literature Table

Author/ Date	Title of Article/DOI hyperlink	Design/Level of Evidence/Pur pose	Sam ple	Purpose	Findings	How does this relate to your project?	Strengths/ Weaknesse s/Implicati ons
Ahmad, M., Akande, A., & Majid, U. (2022).	Health care provider trust in vaccination: a systematic review and qualitative meta- synthesis https://doi.org/10.1093/eurpub/ckab209	Qualitative meta- synthesis (Level V)	22 stud ies	To explore the factors that influence vaccine hesitancy amongst nurses and physicia ns	Findings revealed that vaccine hesitancy amongst nurses and physicians stemmed predomina ntly from two factors: distrust in health authorities and their employers, and distrust in vaccine efficacy and safety.	When individuals who are responsible for providing vaccines to patients do not believe in vaccines or have mistrust in them, their patients are likely not receiving information or receiving them either, which is perpetuating the cycle of vaccine hesitancy.	This study provides valuable insight for understand ing why nurses and physicians may be hesitant to vaccinate, it also gives informatio n about how to combat this such as putting systems in place to report reactions and providing better education to this population regarding vaccine efficacy.
Akel, K.B., Masters, N.B., Shih, S.F., Lu, Y., & Wagner,	Modification of a vaccine hesitancy scale for use in adult vaccinations in the United	Cross- sectional surveys (Level VI)	245 2 parti cipa nts in Unit ed Stat	To evaluate vaccine hesitancy between the United States	Findings revealed that the participant s in China were much less hesitant to receive the	This shows a distinct difference between vaccine hesitancy in China and vaccine hesitancy in	This study was a simple survey administer ed in China in March 2020, and in United

A.L. (2021)	States and China https://doi.org/10.1080/21645515.2021.1884476		es and Chi na	and China.	COVID-19 vaccine, whereas the participant s in the United States were almost 3x less likely to get the vaccine.	the United States which indicates there may be a cultural aspect influencing vaccine hesitancy.	States in March and June 2020. This survey was limited to only China and United States and was administer ed in the beginning of the pandemic when a vaccine had not yet been developed. The survey was administer ed through those that answered social media and advertisem ents looking for the participant s. Much more research in multiple countries is needed.
Albers, A. N., Thaker, J., & Newco mer, S. R. (2022)	Barriers to and facilitators of early childhood immunizatio n in rural areas of the United States: A	Systematic Review (Level I)	17 stud ies	To evaluate reasons for decrease d vaccine uptake in rural	There are 5 key reasons for decreased uptake in this population: relationshi ps	This is essential to gain a better understand of the studied population in this EBP project	Limitation-small sample size due to lack of available research

	<p>systematic review of the literature https://doi.org/10.1016/j.jpm.2022.101804</p>			<p>populations</p>	<p>with clinic staff and providers, immunization tracking and reminder/recall, parental vaccine hesitancy, accessing health services, and other immunization challenges in rural areas</p>		
<p>Alcendor, D.J. (2021)</p>	<p>Targeting COVID vaccine hesitancy in rural communities in Tennessee: Implications for extending the COVID-19 pandemic in the South https://doi.org/10.3390/vaccines9111279</p>	<p>Multiple Randomized Controlled Trials (Level I)</p>	<p>90 counties surveyed</p>	<p>This compilation of studies were down across the 90 counties in Tennessee to assess vaccine hesitancy in the state as a whole.</p>	<p>Findings show that of the 90 counties, 70 are considered rural. This also shows that the level of hesitancy is higher in the rural communities than in the urban communities, representing a large portion of the population.</p>	<p>This article focuses on the stark differences between rural and urban communities with regards to vaccine hesitancy. This is important to our project because it shows that not just Michigan rural communities, but out-of-state rural communities are also vaccine hesitant.</p>	<p>This study is very interesting and covers the entire state. There is no evidence of level of participation throughout the counties but does confirm the suspicion that rural communities are more hesitant than urban communities to get vaccinated with regards to</p>

							COVID-19.
Anderson, E.L. (2014)	Recommended solutions to the barriers to immunizations in children and adults https://pubmed.ncbi.nlm.nih.gov/25211867	Opinions of Authorities (Level VII)	1 study	To investigate ways of communicating with patients and families about the importance of vaccinations with regards to health.	This study shows us methods of communicating as well as important subjects to discuss with patients by health care providers.	These methods can be used along with motivational interviewing to provide accurate information to patients, as well as providing information for health care providers on how to breach the topic of vaccinations with their patients.	This study is based on the opinions of authorities on specific topics to discuss with patients regarding immunizations in children and adults. No actual results are given, just recommendations.
Brandt, H.M., Vanderpool, R.C., Pilar, M., Zubizarreta, M., & Stradtmann, L.R. (2021)	A narrative review of HPV vaccination intervention in rural U.S. communities https://doi.org/10.1016/j.jpm.2020.106407	Narrative Review (Level VI)	30 studies	To investigate strategies used to increase HPV vaccine uptake in rural communities.	This study shows that more studies with regards to rural communities need to be conducted.	This significantly affects our project as we need to delve deeper into rationale for vaccine hesitancy in rural communities, not just with regards to HPV.	This study is effective in showing that more research needs to be done. However, it does not implicate specific practices to be used or evaluation of the use of these practices. The study size is small and the barriers for rural communities are

							evident from the lack of evidence in this study.
Cataldi, J.R., Kerns, M.E., & O'Leary, S.T. (2020)	Evidence-based strategies to increase vaccination uptake: a review https://doi.org/10.1097/MOP.0000000000000843	Opinion of Authorities (Level VII)	1 study	Summarizes current evidence-based studies to improve immunization rates.	This study gives us examples of effective communication strategies for providers to have with patients and parents to increase vaccine uptake.	This study states that interventions for physician behaviors, improvement in public health processes, policies, and patient behaviors directly impacts the prevalence of vaccine uptake. This study suggests the implementation of multiple studies will work in different settings to address the current barriers and optimize vaccine uptake in the pediatric population.	This study is based on current opinions of pediatricians and more research needs to be done to assess effective strategies for communicating with vaccine-hesitant patients and parents.
Cole, J. W., M H Chen, A., McGuire, K., Berman, S.,	Motivational interviewing and vaccine acceptance in children: The MOTIVE study.	Systematic Review (Level I)	2504 baseline period, 1954	To determine vaccination coverage after an education	The use of MI increased vaccine rates significantly in the adolescent	MI was shown to be an effective technique at increasing vaccine uptake in the	Strength-A large and diverse study population was utilized.

Gardner, J., & Teegala, Y. (2022)	https://doi.org/10.1016.j.vaccine.2022.01.058		intervention	nal intervention for providers utilizing MI and a created MI tool	population study for recommended vaccines.	given population.	Limitation- There was variable utilization and uptake by providers at the single site for this study. New staff were not provided education on the use of the MI tool.
Fisher, K. A., Bloomstone, S. J., Walder, J., Crawford, S., Fouayzi, H., & Mazor, K. M. (2020).	Attitudes toward a potential SARS-CoV-2 vaccine: A survey of U.S. adults https://doi.org/10.7326/M20-3569	Cross-sectional Survey (Level IV)	1000 participants	To assess intent to become vaccinated with a COVID-19 vaccine when is becomes available	Overall, 57.6% of participants (n = 571) intended to be vaccinated, 31.6% (n = 313) were not sure, and 10.8% (n = 107) did not intend to be vaccinated	The information from this article allowed us to understand intent for vaccination, specifically for COVID-19	Participant's intent to be vaccinated was explored before a vaccine was available and when the pandemic was affecting a narrower swath of the United States. Questions about specific information or factors that might increase vaccination acceptance were not included. The survey

							response rate was 16.1%.
Gabarda, A., & Butterworth, S.W. (2021)	Using Best Practices to Address Vaccine Hesitancy: The Case for the Motivational Interviewing Approach https://doi.org/10.1177/15248399211016463	Randomized Controlled Trial (Level I)	22 studies	This is a good review of multiple studies looking at using motivational interviewing with regards to vaccine hesitancy in Canada.	Reveals that motivational interviewing has been shown to increase vaccine uptake when used effectively and appropriately.	This article emphasizes our project goals and methodology. This confirms that motivational interviewing has been a proven method for changing health behaviors in the population.	This study is limited to Canada and not to the rest of the world, but the population and amount of studies assessed was significant as well as the types of patients surveyed. This does not focus on rural populations, but on the general population as a whole.
Gagneur, A., Battista, M. C., Boucher, F. D., Tapiero, B., Quach, C., De Wals, P., Lemaitre, T., Farrand, A., Boulianne, N., Sauvage	Promoting vaccination in maternity wards — motivational interview technique reduces hesitancy and enhances intention to vaccinate, results from a multicentre non-controlled pre- and	Randomized Controlled Trial (Level I)	1,223 participants	To assess vaccination intention and vaccination hesitancy among parents who received an individual motivational interview	MI was effective at decreasing vaccination hesitancy and increasing vaccination intention in the studied population.	This study provides a different approach to effective use of MI in improving vaccination rates.	Strengths—the study population was diverse, the tool used were validated and reliable questionnaires Limitation—the initial reason for vaccine refusal was not collected

au, C., Ouakki, M., Gosseli n, V., Petit, G., Jacques, M. C., & Dubé, È. (2019)	post- intervention RCT-nested study, Quebec, March 2014 to February 2015. https://doi.org/10.2807/1560-7917.ES.2019.24.36.1800641			(MI) based intervent ion on infant immuniz ation during post- partum stay at a maternit y ward			
Gagneur , A. (2020)	Motivational Interviewing : A powerful tool to address vaccine hesitancy https://doi.org/10.14745/cdr.v46i04a06	Opinion of Authorities (Level VII)	1 artic le	This article confirms that motivati onal interview ing is a valid tool for causing healthcar e changes.	Highlights emphasizin g autonomy with patients while reducing defensiven ess and encouragin g healthy behaviors in patients.	This confirms the validity of our project purpose and emphasizes our aims. This is especially relevant given the current COVID-19 pandemic and subsequent vaccine hesitancy.	Not a study but a relevant source of informatio n from best practices used. No specific target population but good informatio n.
Green, J., Petty, J., Whiting , L., Orr, F., Walker, K., Brown, A.M., Crisp, E.P., Fowler, C., & Jones,	The Impact of the Anti- Vaccination Movement and Vaccine Hesitancy on the Health of the Child The impact of the anti- vaccination movement and vaccine hesitancy on the health of	Opinion of Authorities (Level VII)	1 artic le	This paper emphasiz ed the importan ce of talking to, only the patient, but that family members may inhibit vaccinati	This emphasizes that parents own fear, or past experience s, may contribute to their hesitancy to get their children vaccinated and can perpetuate	This article summarizes the methods needed to educate patients and their parents about the importance of, the effectiveness of, and purpose of requirement of vaccines. Does not	This is an informatio nal article on educating parents about the importance of vaccines and informing them of the benefits and decrease in risk since

L.K., (2021)	the child — Charles Sturt University Research Output (csu.edu.au)			on, particularly with regards to children.	the hesitancy.	directly relate to motivational interviewing but emphasizes a hurdle we must overcome with a subset of this population.	they had been vaccinated. Not a study, but informational.
Hubach, R. D., Shannon, B., Morgan, K. D., Alexander, C., O'Neil, A. M., Ernst, C., & Giano, Z. (2022)	COVID-19 vaccine hesitancy among rural Oklahomans https://doi.org/10.22605/RH7128	Cross-sectional study (Level III)	391 participants	To explore perceptions regarding COVID-19 vaccination among unvaccinated residents of rural Oklahoma.	The rural population has several prescribed barriers and benefits to receiving the COVID-19 vaccine. Including: rapid vaccine development, lack of long-term data, and vaccine availability, the greatest benefit was perceived decreased risk of contracting the disease	This study highlights key reasons why individuals in the rural community choose to become or not become vaccinated.	Limitations : small sample size in Oklahoma (may not be generalizable) Participation was voluntary Implications: new and modified interventions responsive to rural communities must be developed to address vaccine hesitancy
Olson, O., Berry, C., & Kumar, N. (2020)	COVID-19 vaccine hesitancy among rural Oklahomans https://doi.org/10.22605/RH7128	Systematic Review (Level I)	75 articles	To assess communication strategies to overcome	The findings of this systematic review indicate early building of	This review gives steppingstones for addressing vaccine hesitancy, which can	This review is older, evaluating data between 2008 and 2019, and

				parental hesitance towards vaccinati on	trust with parents, communic ating with these parents specifically relating to their hesitancies , and increased vaccination education are the best methods to reduce vaccine hesitancy.	be tailored to the rural populations.	does not include current hesitancies caused by the COVID-19 pandemic which will directly relate to our project. Search size and amount of data is appropriate , just dated.
Rane, M. S., Kochhar , S., Poehlei n, E., You, W., Roberts on, M. M., Zimba, R., Westmo reland, D. A., Romo, M. L., Kulkarn i, S. G., Chang, M., Berry, A., Parcese pe, A. M., Maroko, A. R., Grov,	Determinant s and trends of COVID- 19 vaccine hesitancy and vaccine uptake in a national cohort of US Adults: A longitudinal study https://doi.org/10.1093/aje/kwab293	Cohort Study (Level IV)	4,19 1 parti cipa nts	~Measur e trends in vaccine hesitancy in the United States for adults ~Identify subpopul ations that might be less willing to be vaccinate d ~Examin e sociode mograph ic and behavior al factors as well as COVID-	Over time there are many reasons why individuals choose not to become vaccinated, this does shift and change as new informatio n becomes available.	This study provides a picture of the difference several months can make when it comes to deciding to become vaccinated.	~This study was done online so the population does not encompass individuals who do not have a smart phone or use the internet. ~Participan ts had to opt into the study ~Not all participant s responded to each survey.

C., Nash, D., & Chasing COVID Cohort Study Team (2022)				related risk perceptions that correlate with vaccine hesitancy ~Assess the association between vaccine hesitancy and subsequent vaccine uptake			
Reno, J. E., O'Leary, S., Garrett, K., Pyrzanski, J., Lockhart, S., Campagna, E., Barnard, J., & Dempsey, A. F. (2018).	Improving Provider Communication about HPV Vaccines for Vaccine-Hesitant Parents Through the Use of Motivational Interviewing https://doi.org/10.1080/10810730.2018.1442530	Randomized Controlled Trial (RCT) (Level I)	16 practices (8 intervention, 8 control)	Intervention applied to examine if the technique of motivational interviewing increase vaccine acceptance among parents in children who are recommended to receive the HPV vaccine	88% of providers who used MI when engaging with parents who are vaccine hesitant toward the HPV vaccine, found this helpful and effective at increasing vaccination rates as opposed to not utilizing MI.	MI was shown to be an effective technique at increasing vaccine in the given population.	Providers were not assessed or observed for their proficiency in using MI outside of the training sessions Additional research is needed as there are very few studies that focus on HPV vaccine uptake and the use of MI.

Roy, D.N., Biswas, M., Islam, E., & Azam, M.S. (2022)	Potential factors influencing COVID-19 vaccine acceptance and hesitancy: A systematic review https://doi.org/10.1371/journal.pone.0265496	Systematic Review (Level I)	47 articles	To identify the potential reasoning and rationale that influence COVID-19 vaccination and refusal to do so, and to determine the statistics for countries.	This study shows that there are multiple factors influencing vaccine hesitancy, including psychological, societal, and reservations about vaccines in general.	This study is valuable to our project as it shows worldwide rationale for not receiving the vaccine. While some of these reasons will not be changeable (I.e., cultural views), some reasons can be influenced by increasing access to and education about vaccines.	This study shows us how much work we must do to counter some of the misconceptions about vaccines. The data is overwhelming as it encompasses 47 articles covering the worldwide issue of vaccine hesitancy.
Saelee, R., Zell, E., Murthy, B.P., Castro-Roman, P., Fast, H., Meng, L., Shaw, L., Gibbs-Scharf, L., Chorba, T., Harris, L.Q., Murthy,	Disparities in COVID-19 Vaccination Coverage Between Urban and Rural Counties – United States, December 14, 2020 – January 31, 2022 https://dx.doi.org/10.15585.mmwr.mm7109a2	Mortality and Morbidity Report	64 jurisdictions and 5 federal entities	Urban populations are more vaccinated than rural populations, and the gap between the percentages has only grown over the last 2 years.	Significant difference in vaccination status between urban and rural populations.	This shows us the disparities in COVID-19 vaccinations between urban and rural regions in the United States.	While these statistics are staggering, and provided by the CDC, there are no signifiers on the differences between states. More statistical analysis must be done for Michigan

N. (2022)							specifically .
Sallam, M. (2021)	COVID-19 Vaccine Hesitancy Worldwide: A Concise Systematic Review of Vaccine Acceptance Rates https://doi.org/10.3390/vaccines9020160	Systematic Review (Level I)	31 stud ies	To assess current vaccinati on acceptan ce rates in the world.	Large amount of variability exists worldwide regarding vaccine acceptance which could affect the progressio n of the pandemic. Vaccine hesitancy seems to play an important role.	This review shows the effect of lack of vaccination uptake worldwide, vaccine hesitancy playing a major role could allow for significant changes if hesitancy rationale is evaluated.	This study shows the overall vaccine acceptance in the world which provokes future studies for what is preventing certain areas from getting the vaccine. Unfortunat ely, this study is subjective to bias and availability of people to be surveyed. Only 2 surveys were available in African nations. This demonstrat es a need for a more in-depth study to be performed not only assessing vaccine uptake but reasons for not getting vaccinated.

Sarathchandra, D., Navin, M.C., Largent, M.A., & McCright, A.M. (2018)	A survey instrument for measuring vaccine acceptance https://doi.org/10.1016/j.jypmed.2018.01.006	Tool based on the Opinion of Authorities (Level VII)	1 article	Explanation of a tool that may be used to assess vaccine uptake.	No findings as this is not a study, but the overall tool is beneficial for our analysis. This focuses on specific aspects to evaluate why people are vaccine hesitant.	This is a possible tool we may use to evaluate the success of our overall project aim during the Analysis portion of this project.	This is not a study with results to compare, but rather a verified tool to assess vaccine uptake within a population.
Wake A. D. (2021).	The Willingness to Receive COVID-19 Vaccine and Its Associated Factors: "Vaccination Refusal Could Prolong the War of This Pandemic" - A Systematic Review. https://doi.org/10.2147/RMHP.S311074	Systematic Review (Level I)	45 articles	To assess the level of willingness to receive COVID-19 vaccine and its associated factors.	The overall rate of participants' willingness to receive the COVID-19 vaccine was ranged from 27.7% to 91.3%. There are many factors that play into this wide range.	This systematic review allowed us to gain and understanding of reasons for choice to not vaccinate, specific to COVID-19.	No limitations were discussed for this systematic review. The information provided can help us to better understand the factors that influence vaccination rates and how we can continue to improve.
Wang, Q., Yang, L., Jin, H., & Lin, L. (2021).	Vaccination against COVID-19: A systematic review and meta-analysis of acceptability	Systematic Review (Level I)	38 articles	To estimate the COVID-19 vaccine acceptance rate	Gender, educational level, influenza vaccination history, and trust in the	This systematic review provides information about predictors for vaccine	Only 36 countries are taken into consideration in the review, leaving

	and its predictors. https://doi.org/10.2147/RMHP.S311074			and identify predictors associated with COVID-19 vaccine acceptance	government were strong predictors of COVID-19 vaccination willingness.	uptake which allows us to understand why some individuals choose to become vaccinated or not.	room for error. Representability is uncertain in utilized studies, leaving room for sample bias.
Wang, Y., & Liu, Y. (2021)	Multilevel determinants of COVID-19 vaccination hesitancy in the United States: A rapid systematic review https://doi.org/10.1016/j.pmedr.2021.101673	Systematic Review (Level I)	73 studies	To determine reasons individuals, choose not to become vaccinated specifically with the COVID-19 vaccine	The choice to become vaccinated or not is multifactorial. Many of the reasons are long standing including, race, geography, politics, and mistrust. etc.	This study allows us to understand why individuals may choose to not become vaccinated which is an essential piece of our project.	This study only focuses on COVID-19, but information could potentially be generalized to other vaccines. Only PubMed was used for their literature search.
Yasmin, F., Najeeb, H., Moeed, A., Naeem, U., Asghar, M. S., Chughtai, N. U., Yousaf, Z., Seboka, B. T., Ullah, I., Lin, C. Y., &	COVID-19 Vaccine Hesitancy in the United States: A Systematic Review https://doi.org/10.3389/fpubh.2021.770985	Systematic Review (Level I)	65 articles	To determine factors that affect vaccine hesitancy in the United States	There are many factors that affect vaccine hesitancy in the United States: hesitancy was mainly driven by the lack of education and understanding of the process of vaccine	Information from this systematic review allows us to understand vaccine hesitancy in the current climate of COVID-19	The pooled percentages are subjected to spectrum bias since percentages for general population are pooled with terminally ill or marginalized groups. Percentage of COVID-

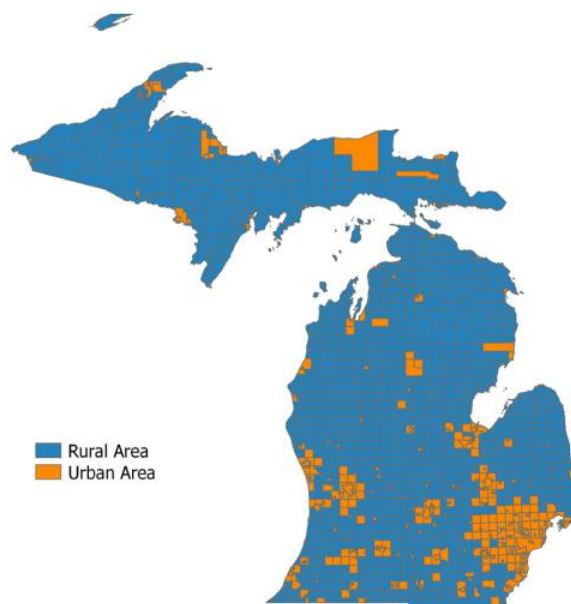
Pakpour, A. H. (2021)					development and deep-seated mistrust in the healthcare system. There are several other factors such as race, religion, and pregnancy status that effect vaccination rates.		19 vaccine acceptance is liable to random error as published studies were carried out at different phases of the coronavirus peak. Vaccine acceptance percentages by states may be affected due to demographic characteristics differing across the region.
Zolezzi, M., Paravattil, B., El-Gaili, T. (2021)	Using motivational interviewing techniques to inform decision-making for COVID-19 vaccination https://pubmed.ncbi.nlm.nih.gov/34599721	Opinions of Authorities (Level VII)	1 article	Syntheses of the current uses of motivational interviewing with respect to the COVID-19 pandemic and resultant vaccine hesitancy	Use of integrated theories to prevent vaccine hesitancy over the COVID-19 vaccine.	Using current strategies to combat COVID-19 hesitancy, which has a much larger population involved, can help us combat the overall vaccine hesitant population.	This is not a study, but rather an authority with a positive opinion of the use of motivational interviewing with regards to COVID-19. It does however give us a framework to use to enhance

							our use of motivation al interviewin g to prevent vaccine hesitancy in the rural population.
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Appendix C

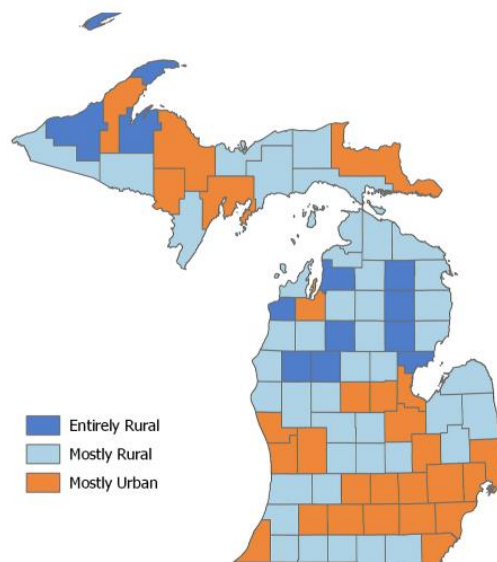
Rural Michigan Population Map

Urban/Rural Classification by City/Township⁵



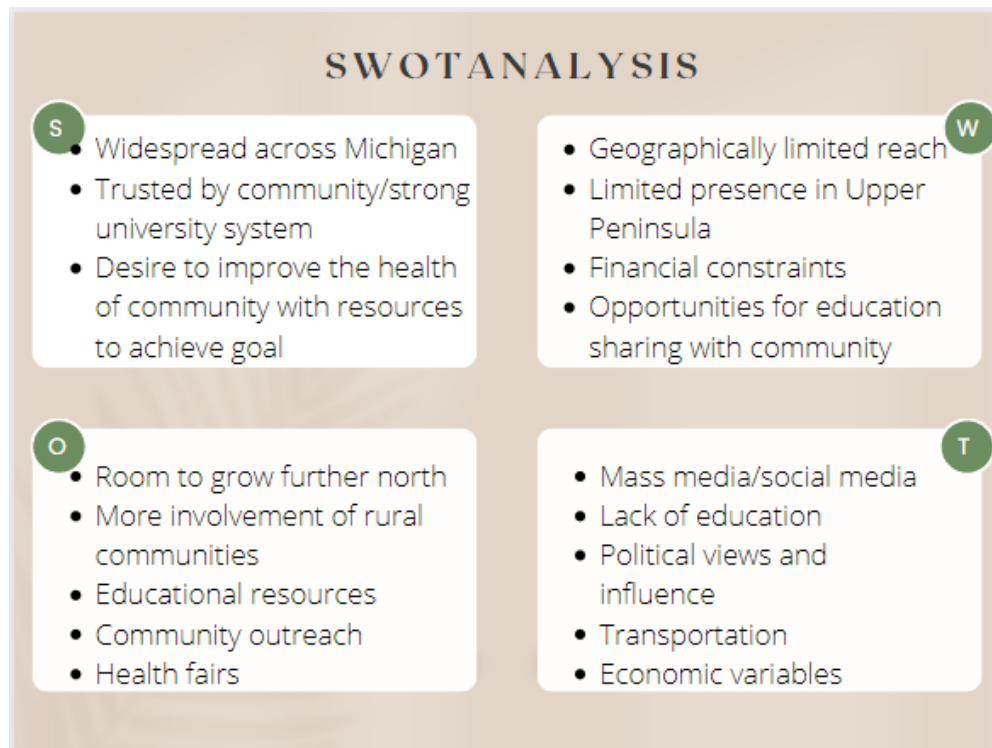
Source: U.S. Census Bureau, 2010 Census

Urban/Rural Classification by County



Source: U.S. Census Bureau, 2010 Census

Figure 2. *Rural Map of Michigan*

Appendix D**SWOT Analysis**Figure 3. *SWOT Analysis*

Appendix E

GANTT Chart: Timeline of Project

Motivational Interviewing as a Strategy to Reduce Vaccine Hesitancy in Rural Michigan

Taylor Blank and Veronica Osbourne
Michigan State
University

Project Start: Thu, 5/19/2022

Display Week: 1

TASK	DESCRIPTION OF TASK	PROGRESS	START	END
Phase 1				
Task 1	Meeting with group and advisors	100%	5/19/22	5/22/22
Task 2	Meeting with stakeholders	100%	5/22/22	5/25/22
Task 3	Literature review, Fishbone Diagram	100%	6/8/22	7/6/22
Task 4	Project Model, Key Stakeholders	100%	7/6/22	7/21/22
Task 5	GANTT Chart, Budget, Implementation	100%	7/21/22	8/11/22
Task 6	Final Paper Revisions	100%	8/11/22	8/16/22
Task 7	IRB Submission, Develop Survey	100%	8/11/22	8/21/22
Phase 2				
Task 1	Develop educational presentation	100%	9/3/22	11/2/22
Task 2	Meet with stakeholders and advisor	100%	9/5/22	9/25/22
Task 3	Implementation at MSU Extension	100%	11/22/22	11/22/22
Phase 3				
Task 1	Organize data and develop eval plan	100%	1/11/23	1/25/23
Task 2	Analyze data	100%	1/26/23	2/5/23
Task 3	Interpret results	100%	2/10/23	2/20/23
Task 4	Develop final presentation	100%	2/21/23	4/2/23
Task 5	Final Project Presentation and Paper Edits	100%	4/27/23	5/1/23

Appendix F

Project Budget

<div>BUDGET</div> <div>tracker</div>			
DATE	DESCRIPTION	AMOUNT	TYPE
May 2022 - May 2023	Taylor Blank Hours	240 hours at \$30/hr = \$7,200	In Kind Donation
May 2022 - May 2023	Veronica Osborne Hours	240 hours at \$30/hr = \$7,200	In Kind Donation
May 2022 - May 2023	Google Docs	Free	In Kind Donation
May 2022 - May 2023	Microsoft Word	\$125/year	In Kind Donation
May 2022 - May 2023	Zoom Presentations	\$150/year	In Kind Donation
	Total	\$14,675	

Figure 4. *Project Budget*

Appendix G**Motivational Interviewing Pre- and Post-Survey**MSU Extension Vaccination Team MI Event

This survey is being done to help us evaluate the change that occurs after education on motivational interviewing at MSU Extension. We are asking you to complete a survey before the initiation of the education program and again after the education program is complete. Our team would like to evaluate our motivational interviewing education and determine if we have improved motivational interview confidence and skills. Participation in this survey is voluntary and you may refuse to answer any question. You may withdraw or stop participating at any time without consequence. By completing the survey, you are indicating your voluntary agreement to participate.

Contact person: Susan Weber Buchholz, PhD, RN, ANP-BC, FAANP, FAAN, Professor,
Associate Dean for Research, Michigan State University, College of Nursing, O: (517) 432-9159; buchho44@msu.edu

Please complete the below information

Role at MSU Extension: _____

Years working at MSU Extension: _____

Previous experience with motivational interviewing:

Please answer Yes, No, or Unsure to the following four questions:

	Yes	No	Unsure
1. Do you know what motivational interviewing is?			
2. Have you utilized motivational interviewing before?			
3. I have been provided education about motivational interviewing.			
4. Do you know what the 4 main processes of motivational interviewing are?			

Please check one answer for the following nine questions, using this scale:

	1	2	3	4	5
	Strongly Disagree	Disagree	Undecided	Confident	Very Confident
1. I understand the basic ideas and principles of motivational interviewing.					
2. Motivational interviewing is applicable to my work.					
3. I will use motivational interviewing in my work.					
4. I feel proficient and able to use motivational interviewing in my practice.					
5. I believe that a client's own level of motivation for change is important.					
6. If a client is not initially motivated, I do not think that I will be able to increase his or her motivation.					
7. I am a skillful and good listener.					
8. Some clients will never change regardless of how I interact with them.					
9. I think that the most effective way to motivate clients or patients to change is by drawing on their own internal motivations.					

Appendix H

Brief Interview Guide

1. Overall, how did you feel about the education presented to you today about MI?
2. Do you feel there are any improvements that could be to this intervention?