

PRECONCEPTION AND PRENATAL CARE: ASSESSING AND INFLUENCING
KNOWLEDGE, ATTITUDES, AND INTENTIONS IN WOMEN OF CHILDBEARING AGE

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ABSTRACT

Maternal and infant morbidity and mortality rates in the United States (U.S.) remain alarmingly high, emphasizing the urgent need for interventions to address healthcare disparities. Access to preconception care (PCC) and early prenatal care is critical for improving health outcomes, yet barriers and lack of knowledge hinder adequate care for many women. This paper presents the findings, discussion, and recommendations from a Practice Improvement Project (PIP) to enhance education and awareness about PCC and prenatal care among women in rural and underserved communities.

Flyers were used to recruit women of childbearing age from three rural and underserved communities. The educational module included a pre-intervention survey, a short educational video, and a post-intervention questionnaire. Thirteen participants completed the entire module successfully.

Utilizing quantitative methods, the PIP revealed significant improvements in knowledge, attitudes, and intentions regarding PCC and prenatal care following targeted education. Notable increases in knowledge were observed, particularly in crucial areas such as folic acid intake and risks associated with pregnancy. Positive shifts in attitudes and intentions towards seeking care were also noted post-intervention. The project's success was underpinned by applying Dr. Nola Pender's Health Promotion Model and the Iowa Model Revised, guiding design, implementation, and evaluation phases.

Recommendations for future projects include recruiting participants in multiple languages and collaborating with clinics to increase participation rates among diverse populations. Dissemination efforts included sharing findings with nurse practitioners through professional networks and publications. Despite limitations such as small sample size and

recruitment challenges, the project highlights the importance of educating women on PCC and prenatal care benefits. Healthcare providers can play a crucial role in improving maternal and neonatal health outcomes by addressing barriers and increasing access to comprehensive education. Efforts to promote widespread access to PCC and routine prenatal care are essential for positively impacting maternal and infant health in the U.S.

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DEDICATION

I have been working hard to complete my Doctor of Nursing Practice (DNP) degree, and throughout this journey, my husband and our newborn son have been my most significant sources of support. I want to dedicate this project to them for being my strength and motivation during the countless hours of writing and studying.

I am grateful to my husband, Daniel, for your belief in me, constant reassurance, and selflessness. Your support created a nurturing environment where I could confidently and determinedly focus on my academic work. Your sacrifices and understanding during late nights and weekends spent studying did not go unnoticed, and I am forever grateful for your enduring patience and unwavering love.

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TABLE OF CONTENTS

ABSTRACT.....	iii
ACKNOWLEDGMENTS	v
DEDICATION.....	vi
LIST OF TABLES.....	xi
LIST OF FIGURES	xii
LIST OF ABBREVIATIONS.....	xiii
INTRODUCTION	1
Background and Significance.....	1
The Current Delivery and Barriers of Preconception and Prenatal Care	4
Problem Statement	5
Purpose.....	6
Objectives.....	6
THEORETICAL FRAMEWORK AND LITERATURE REVIEW	7
List of Definitions	7
Theoretical Framework	8
Perceived Benefits of Action.....	8
Perceived Self-efficacy.....	9
Activity-related Affect.....	9
Interpersonal Influences	10
Situational Influences	10
Commitment to a Plan of Action.....	11
Immediate Competing Demands and Preferences.....	11
Application to Practice Improvement Project	12
Literature Review	13

Pregnancy Intention.....	13
Preconception Health Promotion.....	15
Prenatal Care	17
Optimizing Pregnancy Health	19
Barriers and Access to Care	30
Summary.....	32
METHODS	34
Overall Project Design	34
Objectives.....	35
Implementation Plan	35
Evidence-based Practice Model or Logic Model	35
Setting.....	39
Sample/Sample Size/Recruitment	40
Consent.....	41
Incentive	41
Institutional Review Board.....	41
Evidence-based Project Interventions/Activities.....	42
Activities for NDNPA	42
Resources.....	42
Evaluation/Outcomes/Data Analysis.....	43
Objective Evaluation	44
Conclusion.....	49
RESULTS	51
Participants	51
Demographics.....	51

Objective One.....	55
Pre- and Post-Intervention Results	55
Objective Two	59
Pre- and Post-Intervention Results	59
Objective Three	61
Pre- and Post-Intervention Results	61
Barriers	63
Post-Intervention Questionnaire Evaluation.....	68
Objective 4	68
DISCUSSION AND RECOMMENDATIONS.....	70
Discussion	70
Objective One.....	70
Objective Two	73
Objective Three	75
Objective Four.....	77
Effectiveness of the Theoretical Framework	78
Recommendations	79
Implications for Practice.....	79
Implications for Future Practice Improvement Projects.....	81
Dissemination.....	82
Strengths.....	83
Limitations	84
Conclusion.....	86
REFERENCES	87
APPENDIX A: IRB APPROVAL	103

APPENDIX B: PERMISSION TO USE THE IOWA MODEL REVISED.....	104
APPENDIX C: THE IOWA MODEL REVISED: PRECONCEPTION CARE.....	105
APPENDIX D: CONSENT	107
APPENDIX E: PRE-INTERVENTION QUESTIONNAIRE.....	108
APPENDIX F: POST-INTERVENTION QUESTIONNAIRE.....	111
APPENDIX G: PROMOTIONAL FLYERS.....	113
APPENDIX H: NDNPA INFORMATIONAL SHEET	115
APPENDIX I: PERMISSION TO UTILIZE PRE-POST QUESTIONNAIRE	116
APPENDIX J: EXECUTIVE SUMMARY	117

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Educational Module Demographic Data and Objective Evaluation Questions	46
2. Participant Demographics: Attendance, Age, Distance from Clinic, and Race.....	53
3. History of Pregnancy and Utilization of PCC and Prenatal Care	54
4. Comparison of Pre- and Post-Intervention Knowledge Questions and Responses.	58
5. Perceived Attitude Toward PCC Questionnaire Results.	60
6. Perceived Attitude Toward Prenatal Care Questionnaire Results.	60

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Logic Model.....	50
2. Plans for Pregnancy	55
3. Participant Intentions to Seek PCC Prior to Pregnancy	62
4. Participant Intentions to Seek Prenatal Care During Pregnancy	63
5. Perceived Barriers to Receiving PCC Prior to Pregnancy—Pre-education, Selecting One Answer.....	65
6. Perceived Barriers to Receiving PCC Prior to Pregnancy—Post-education, Selecting All That Apply	65
7. Perceived Barriers to Receiving Prenatal Care During Pregnancy—Pre-education, Selecting One Answer.....	67
8. Perceived Barriers to Receiving Prenatal Care During Pregnancy—Post- education, Selecting All That Apply.....	67
9. Participant Perceived Impact on Future Health.	68

LIST OF ABBREVIATIONS

ACOG	American College of Obstetricians and Gynecologists.
AAP.....	American Academy of Pediatrics.
BMI.....	Body Mass Index.
CDC	Centers for Disease Control and Prevention.
CINAHL	Current Index to Nursing and Allied Health Literature.
CS.....	Cesarian Section.
EDD	Estimated Due Date.
GDM	Gestational Diabetes Mellitus.
HPM.....	Health Promotion Model.
IRB	Institutional Review Board.
MN	Minnesota.
ND.....	North Dakota.
NDNPA.....	North Dakota Nurse Practitioner Association.
NDSU.....	North Dakota State University.
NICHD	National Institutes of Child Health and Human Development.
NTDs.....	Neural Tube Defects.
ODPHP	Office of Disease Prevention and Health Promotion.
PCP	Preconception Care.
PIP.....	Practice Improvement Project.
QR.....	Quick Response.
STIs.....	Sexually Transmitted Infections.
T2DM.....	Type 2 Diabetes Mellitus.

U.S.United States.

WHOWorld Health Organization.

INTRODUCTION

Background and Significance

The United States (U.S.) had higher rates of maternal and infant morbidity and mortality in 2020 when compared to 12 other developed, high-income countries (Gunja et al., 2023).

Preconception care (PCC) and early and routine prenatal care are essential in ensuring optimal health for a woman, fetus, mother, and child after birth. Therefore, for women to ensure optimal health for themselves and their fetus(es) during or following pregnancy or childbirth, it is crucial to receive PCC care and attend early and routine prenatal care visits. Although pregnancy-related care is an integral aspect of care for women of childbearing age, there remain barriers and a lack of knowledge that prevent some women from receiving PCC and prenatal care (Gunja et al., 2023).

Since many women worldwide do not have access to or adequate knowledge about PCC and prenatal care, they are not receiving adequate care. The World Health Organization ([WHO], 2023a; WHO, 2023b) found that in 2020, 287,000 women died during and following pregnancy and childbirth. The leading direct causes of maternal morbidity and mortality are uterine hemorrhage, infection, hypertension, unsafe abortion practices, and obstructed labor. Lack of PCC and prenatal care adversely affects women and their children. Worldwide neonatal mortality rates were 2.4 million in 2020 (WHO, 2022). Worldwide maternal and infant mortalities show that not receiving care puts women, fetus(es), and children at higher risk for detrimental outcomes. Multiple causes of maternal and infant injury and death can be addressed and treated with PCC and early and routine prenatal care visits.

Infant mortality is one factor impacting society's overall health. According to the Centers for Disease Control and Prevention [CDC] (2022), nearly 20,000 infant deaths occurred in the

U.S. in 2020. The five most common causes were congenital anomalies, preterm birth and low birth weight, sudden infant death syndrome, injuries, and maternal pregnancy complications. In the U.S., 861 women died in 2020 due to maternal complications, an increase from 754 deaths in 2019 (Hoyert & National Center for Health Statistics, 2022). Despite efforts to increase healthcare spending, women and children in the U.S. still suffer the consequences of inadequate healthcare, which is evident by infant and maternal mortality rates. Gunja et al. (2023) found that maternal and infant mortality rates in 2020 were highest in the U.S. compared to 12 other developed, high-income countries. Maternal morbidity was 14 deaths higher per 100,000 live births than the average among developed countries, and neonatal mortality was 5.4 deaths per 1,000 live births, which is 3.8 deaths per 1,000 live births higher than the country with the lowest deaths. Gunja et al. suggested that the U.S. infant and maternal mortality rates are increased due to rising levels of cesarean section procedures, insufficient prenatal care, and economic disparities, which are factors that play a role in the development of obesity, diabetes, and heart disease.

Despite efforts in the U.S. to increase healthcare spending, goals to lower maternal and infant mortality rates are not being met. According to a report published by the Centers for Disease Control and Prevention ([CDC], 2018), roughly 700 U.S. deaths annually are related to or result from pregnancy. The same report found that more than 60% of deaths resulting from pregnancy could have been avoided. In many cases, the patient and/or family members could be instrumental in preventing these fatalities that occur, often due to a lack of understanding regarding warning signs and the importance of seeking prompt medical attention. The lack of understanding further demonstrates that monitoring and counseling are essential in providing effective PCC and prenatal care to women of childbearing age. Barriers and lack of adequate

knowledge related to receiving PCC and prenatal care are detrimental to the health of women in the U.S. and worldwide.

Implementing interventions to combat higher-than-acceptable maternal and neonatal mortality in the U.S. is essential. One strategy to do this is to help women strive for optimal health before becoming pregnant, which is difficult to achieve when 45% of pregnancies are unintended (CDC, 2023c). Even higher maternal and neonatal mortality rates are seen among women ages 18-24 who are low income, did not complete high school, are African American or non-Hispanic black, and who are cohabitated but not married, which further demonstrates the need for increased access to quality PCC and prenatal care for all women.

When a woman becomes pregnant unintentionally, the mother and neonate are at risk for adverse health outcomes due to receiving unoptimized PCC health, unhealthy habits, and lack of or late prenatal care (Nelson et al., 2022; Tolossa et al., 2020). According to the CDC (2022), potential interventions to decrease maternal mortality are to eliminate racial and ethnic disparities in maternal mortality, invest in and partner with communities, ensure access to care for all pregnant and postpartum persons, ensure quality care for all pregnant and postpartum persons, and strengthen maternal mortality data. Interventions to decrease infant mortality include preventing congenital anomalies, addressing preterm birth, low birth weight, and their outcomes, getting pre-pregnancy and prenatal care, creating a safe infant sleep environment, and using newborn screening to detect hidden conditions (National Institutes of Child Health and Human Development [NICHD], 2021a). These factors stress the importance for women of childbearing age to receive PCC care and early and routine prenatal care to better identify detectable and preventable causes of maternal and infant morbidity and mortality through proper monitoring, education, and counseling.

The Current Delivery and Barriers of Preconception and Prenatal Care

According to *Healthy People 2030* (Office of Disease Prevention and Health Promotion [ODPHP], 2020), 74.7% of U.S. women received early and routine prenatal care, meaning 25.3% did not receive early and routine prenatal care in 2020, let alone PCC care. Low PCC and prenatal care utilization rates are concerning due to the potential for adverse health outcomes. PCC care has been shown to increase knowledge and improve behaviors before women become pregnant (Dorney & Black, 2018). PCC care has been linked to the increased intake of folic acid prior to becoming pregnant and a reduction of alcohol consumption (Sjipkens et al., 2020). Use of PCC and prenatal care have also been linked to lower rates of tobacco use prior to and during pregnancy, promotion of physical activity and weight loss, reduction in preterm births and infant deaths, and increased maternal vaccines prior to pregnancy (Sjipkens et al., 2020; Toivonen et al., 2017). A woman's health, environment, and experiences before and during pregnancy will affect how the fetus develops and the pregnancy progresses. Women who do not receive PCC care, as well as early and routine prenatal care, are at risk for adverse health outcomes that affect their children due to a lack of monitoring, education, and guidance from knowledgeable healthcare professionals.

Inadequate availability of PCC services has made implementation before pregnancy unattainable for some, leaving women unable to identify modifiable behaviors, health conditions or concerns, and risk factors until it is too late and adverse outcomes have already occurred (Atrash & Jack, 2020). Inadequate participation in PCC care is linked to reduced knowledge of health outcomes if you become pregnant while in suboptimal health. Insufficient knowledge of PCC care and a lack of understanding of its benefits are the most significant barriers to women receiving PCC care (Dorney & Black, 2018; Teshome et al., 2020). It is essential to educate all

women with the potential to become pregnant, intended or not, about the risks associated with entering pregnancy in suboptimal health and the benefits of PCC and early and routine prenatal care.

Women must be educated on the benefits of increasing PCC and prenatal care utilization. Women who received PCC care have increased knowledge and improved behaviors before becoming pregnant (Dorney & Black, 2018). During PCC and routine health visits, counseling about safe practices during pregnancy and when to initiate prenatal care can also be reviewed to decrease the risk of maternal and fetal complications. Therefore, healthcare providers must ask all women of childbearing age about their intentions of becoming pregnant in the future or their lifetime, which can potentially increase the uptake of PCC and early and routine prenatal care. Since some women are not actively seeking any health care, education regarding PCC and early and routine prenatal care should be provided within community settings to reach this population.

Problem Statement

The rates of maternal and fetal morbidity and mortality continue to be unacceptably high in the U.S. The state of a woman's health prior to and during pregnancy significantly affects maternal and neonatal health outcomes. Therefore, PCC and early and routine prenatal care can reduce adverse health events before pregnancy, during pregnancy, and during and after delivery for women and their children. The rates of PCC remain low, and not all women receive early and routine prenatal care, which leaves gaps in care that may be pivotal in improving health outcomes. There are multiple barriers to receiving PCC and early and routine prenatal care. Two significant factors are a lack of patient and provider resources and patient and family knowledge regarding the benefits of receiving care and risks associated with unintended or complicated pregnancies. Therefore, this educational intervention and practice improvement project (PIP)

aims to educate women of childbearing age and providers on the importance of PCC and early and routine prenatal care and assess knowledge, attitudes, and intentions to seek care after providing the education.

Purpose

This educational intervention and PIP aim to educate women of childbearing age on the importance of PCC and early and routine prenatal care. Knowledge, attitudes, and intentions to seek PCC and early and routine prenatal care after receiving educational information were assessed. Information was also distributed to healthcare providers to enhance awareness of knowledge, attitudes, and intentions related to PCC and prenatal care among women of childbearing age within the communities served by the health professionals.

Objectives

The following objectives guided this practice improvement project:

1. Increase PCC and prenatal care knowledge in women of childbearing age by the end of the educational module.
2. Assess change in attitudes towards PCC and prenatal care in women of childbearing age by the end of the educational module.
3. Increase intent to seek PCC and prenatal care in women of childbearing age during the PCC period by the end of the educational module.
4. Increase provider awareness by disseminating a 1-page informational document to members of the North Dakota Nurse Practitioner Association (NDNPA) focused on the attitudes, intentions, and barriers to receiving PCC and early and routine prenatal care in women of childbearing age who participated in the project.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Chapter two will include the list of definitions, theoretical framework, and review of the literature used in the PIP, discussing the importance of PCC and prenatal care. The literature (prenatal care, optimizing pregnancy health, and barriers to accessing care.

List of Definitions

Preconception care refers to visits related to pre-pregnancy checkups that help plan a healthy pregnancy. PCC aims to find things that could affect pregnancy. Identifying these things is essential because major fetal organs develop within the first eight weeks of pregnancy (American College of Obstetricians and Gynecologists [ACOG], 2020).

Preconception health refers to the health of people during their childbearing years. It focuses on promoting health in parents to protect the health of a fetus if they choose to become pregnant sometime in the future (CDC, 2023a).

Prenatal care is the health care provided to pregnant women, including medical services, education, and counseling. Early initiation of prenatal care is associated with improved outcomes for both mother and baby (ACOG, 2022).

Childbearing age, as defined by the ACOG (2022), includes women ages 15-44 years old, and by the WHO (2023), as women ages 15-49.

Infant mortality refers to the death of an infant between one day and one year of age (NICHD, 2021b).

Maternal mortality is a woman's death resulting from pregnancy or childbirth complications that occur during or within six weeks after the pregnancy ends (NICHD, 2021c).

Maternal morbidity describes any short- or long-term health problems resulting from pregnancy and birth (NICHD, 2021c).

Theoretical Framework

Receiving PCC and prenatal care is pertinent when promoting optimal health before and during pregnancy. It decreases the likelihood of adverse health events before pregnancy, during pregnancy, labor, and after delivery for the woman and neonate. The Health Promotion Model (HPM) is an instrumental model for the PIP. Dr. Nola Pender (2011) created the model to help nurses understand how to promote healthy behaviors, and the model was first noted in nursing literature in 1982. The HPM has eight beliefs that revolve around collaborating with women to change behaviors that negatively impact their health into behaviors that promote a healthy lifestyle. These eight beliefs are perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, situational influences, commitment to a plan of action, and immediate competing demands and preferences (Pender, 2011). Pender's model further identifies how previous individual characteristics, behaviors, and experiences shape a person's decisions. The model will help guide this PI, as one goal is to promote optimal health in women of childbearing age.

Perceived Benefits of Action

Education was provided to increase women's perceived benefit of PCC and prenatal care and their intent to seek care. The education discussed the importance of PCC and prenatal care. The material focused on current PCC and prenatal care recommendations and adverse health outcomes if recommendations are not followed and routine care is not received. The perceived benefit was to prevent harm to the participant and her fetus or child.

Perceived Barriers to Action

Understanding the perceived barriers to receiving PCC and prenatal care is also beneficial in making a positive behavioral change or implementing an action. In the PIP, participants were asked to fill out pre- and post-questionnaires with a question about perceived barriers to receiving care. Kazemi et al. (2021) used the HPM to improve healthy behavior in overweight and obese women. They found that the perceived barriers decreased after the training intervention that provided participants with knowledge and practice skills to promote a positive behavior change. Increased awareness of perceived barriers and interventions to reduce perceived barriers may encourage participants to seek PCC and early and routine prenatal care.

Perceived Self-efficacy

By providing the participants with education and tools to recognize benefits and perceived barriers, they will be more apt to have the self-efficacy to make the needed change to participate in PCC and early and routine prenatal care. According to Carey and Forsyth (2009), the degree of self-efficacy represents the level of assurance one has in their ability to control their motivation, behavior, and social environment. Providing knowledge about the benefits and barriers of PCC and prenatal care was completed to increase the motivation and self-efficacy of the participants, as well as their intent to seek care.

Activity-related Affect

Self-efficacy and activity-related affect directly correlate with one another (Petiprin, 2023). The subjective positive or negative emotions that arise from the intrinsic properties of the behavior itself are activity-related affect. These emotions can impact self-efficacy, as a positive affective response tends to enhance feelings of efficacy (Pender, 2011). The education was

provided to help participants feel confident and enhance self-efficacy, which may increase the likelihood of participating in PCC and early and routine prenatal care.

Interpersonal Influences

People's relationships significantly impact their decisions, including positive and negative ones (Owen et al., 2013). When discussing decisions in terms of health-promoting behavior, healthcare professionals can positively influence the participant's health. Building rapport and providing education and knowledge to participants can help them make health-promoting changes in their lives (Pender, 2011). The PIP aimed to ensure that women of childbearing age have the resources to make educated decisions about their health. To make this happen, healthcare providers must assess the need for education and consider barriers that may impact a woman's ability to receive care. Important questions must be asked to recognize a participant's need for education, such as asking a woman of childbearing age about pregnancy and intentions to become pregnant. These questions were asked during this PIP to enable healthcare professionals to provide necessary PCC and prenatal care education and resources.

Situational Influences

Situational influences and surrounding environments influence commitment to health-promoting behavior changes (Pender, 2011). For example, an individual living in poverty may not prioritize ensuring they receive optimal PCC or prenatal health. Instead, they may be thinking about how they will get their next meal and get to work because they have no car, leaving them to go to work or a healthcare appointment. If they choose their healthcare appointment, they may not have enough money for food. Many women in the U.S. face situations like this daily. This further justifies the need to address barriers to care and educate women and providers on the importance of PCC and early and routine prenatal care.

Commitment to a Plan of Action

According to Pender (2011), commitment to a plan of action refers to the likelihood that someone will commit to changing current behaviors to desired ones because current demands are more attractive and preferred over the target behavior. When applying this concept to the PIP, it is important to relate it to not only the health of the mother but also the fetus. A woman is more likely to make health-promoting changes to her life if she is aware of the consequences of not following current evidence-based recommendations. An example would be reducing the risk of neural tube defects (NTDs) in a fetus during pregnancy. Evidence has shown that folic acid intake before and during the first trimester of pregnancy is critical in reducing the risk of NTDs (AAP & ACOG, 2017; CDC, 2022c). Women who are aware of recommendations are more likely to commit to participating in this health-promoting behavior and recommendation. This PIP included educating women and providers on the current evidence-based guidelines related to PCC and prenatal care to help them identify and commit to specific actions to optimize health for themselves and their children.

Immediate Competing Demands and Preferences

Competing demands are alternative behaviors individuals have limited control over due to external factors like work or family responsibilities. Conversely, competing preferences are alternative behaviors that individuals have relatively more control over, such as choosing what snack to eat (Pender, 2011). Immediate demands and preferences may take priority over receiving PCC and prenatal care. Examples of this would be anxiety related to receiving health care and addiction. If participants are nervous about receiving healthcare due to negative past experiences, they will be less likely to attend PCC and prenatal care visits. When individuals with addiction issues consider seeking medical care, they may worry more about how healthcare

providers will perceive them due to their risky behavior than about taking steps to safeguard their health. Attending PCC and prenatal appointments can help women gain insight into the adverse consequences of substance abuse on themselves and their unborn children.

Application to Practice Improvement Project

The eight beliefs of the HPM (Pender, 2011) were incorporated into the PIP to increase intent to seek PCC and prenatal care in women of childbearing age. First, providing education and resources highlighted the perceived benefits of receiving care. Women of childbearing age were educated on potential barriers to receiving care and how they can be addressed by providing resources and support. Through education and resources, women may be more likely to have the self-efficacy to make the needed changes to ensure participation in care. Activity-related affect may increase if the woman feels positive and confident in the information and resources provided, increasing the decision to receive care and follow current guidelines. Interpersonal influences broadly impact a person's decisions. Providers are generally well-trusted and can positively influence decisions to promote health by providing education and the needed resources to women. Situational influences significantly impact the choices made regarding health-promoting behavior. Providing education and resources can positively influence these decisions and place a sense of importance on receiving adequate care. Committing to receiving care and following current health-promoting recommendations can be made a priority when women are educated on the importance of care. Recognizing immediate competing demands and preferences can help identify resources that must be provided to women. Educating them on the importance of care may increase the likelihood of making a health-promoting change.

The health needs of women of childbearing age are continually changing, making it essential to receive regular care and counseling to optimize health-promoting behaviors. The HPM fits well with the PIP's goals because it considers all aspects of positively impacting women's health. Assessing lifestyle behaviors holistically can assist healthcare providers in optimizing health before and during pregnancy.

Literature Review

Multiple databases were used to search for relevant articles for this literature review. The databases used include the Current Index to Nursing and Allied Health Literature (CINAHL) Complete, Cochrane Library, and PubMed Central. These databases were accessed through the North Dakota State University Library. First, a search was completed using broad terms, including *preconception, prenatal, pregnancy, and antenatal*. Then, limiters were used to refine the results, combine words and phrases within the same search, and include *health and care*. Filters were applied and included *English, published in the last five years, and research completed on human subjects*. This provided the most relevant literature on the topic and could be appraised for use in the PIP.

The American Academy of Pediatrics (AAP) and ACOG's *Guidelines for Perinatal Care* (2017) are considered the gold standard for obstetricians and pediatricians when providing pre-pregnancy, prenatal, and post-delivery care for women and children in the U.S. They will be referenced frequently throughout this literature review.

Pregnancy Intention

Knowing a woman's intent to become pregnant is essential when providing optimal care to women of childbearing age and their future children (CDC, 2023c). Critical questions that can guide this discussion are, "Would you like to become pregnant in the next year?" and "Could

you currently be pregnant?” Responses to these questions will guide the provider in creating an individualized care plan for the woman, pregnant or not. PCC education should be provided if the woman intends to become pregnant within the following year. If the woman is already pregnant, she should be advised to establish prenatal care, and prenatal education should be incorporated into her visit.

The most recent data shows that approximately 37.5% of pregnancies in the U.S. were unwanted, mistimed, or unsure if they wanted in 2021 (CDC, 2023b; CDC, 2023c). According to the World Health Organization (2021), “Six out of 10 of all unintended pregnancies end in an induced abortion.” An unintended pregnancy is a mistimed or unwanted pregnancy, with most occurring due to the absence or misuse of contraceptive methods (CDC, 2023b). Knowing a woman’s pregnancy intent or if she could currently be pregnant can help provide appropriate PCC counseling and education that promotes health. Increased rates of maternal depression during pregnancy and postpartum, interpersonal violence, preterm birth, and infant low birth weight are all associated with unintended pregnancies (Nelson et al., 2022). Other adverse maternal and infant health outcomes that result from unintended pregnancies include low birth weight, shorter length of breastfeeding, increased risk for postpartum depression and parental stress, physical or psychological abuse, and higher rates of public insurance program usage (America's Health Rankings, United Health Foundation, 2020). Historically, women who are poor and cohabitate are at the highest risk for unintended pregnancies (Finer & Zolna, 2016). It has also been shown that unintended pregnancies are associated with a higher incidence of cigarette and alcohol consumption among women before and during pregnancy (Yu et al., 2021). According to the *ACOG Committee on Health Care for Underserved Women* (2016), contributing factors to unintended pregnancies include lack of reproductive life planning, limited

access to contraception, and inconsistent use of contraceptive methods. Additionally, addressing barriers to PCC and prenatal care is pertinent to increasing participation and decreasing unintended pregnancy rates. Closing the gap to accessing quality pregnancy-related health care by increasing access to educational resources and disseminating data to identify groups most at risk for unintended pregnancy can help improve maternal and fetal health outcomes (CDC, 2023c).

Preconception Health Promotion

PCC care helps reduce adverse outcomes related to pregnancy, such as low birth weight, premature birth, and infant mortality (CDC, 2023a). According to The American AAP and ACOG (2017) *Guidelines for Perinatal Care*, PCC care, also known as pre-pregnancy care, provides knowledge related to overall health. PCC care ensures optimal health for all women and fetuses, including mothers and children, by providing guidance before and during pregnancy and after birth. Attending PCC care visits allows health care professionals to provide education and identify and intervene when health care concerns exist or arise.

PCC care differs from other preventative care or well-woman exams. Suppose a woman plans to become pregnant in the following year. In that case, there are specific interventions that the AAP and ACOG (2017) recommend the provider do as part of an overall health assessment, including providing education on different factors that can affect pregnancy and identifying and reducing a woman's pregnancy risk profile before becoming pregnant. These factors include family planning, immunizations, STIs, substance use, violence, health history, medications, family history, health status, and teratogenic exposures (APP & ACOG, 2017). Women's health and pregnancy care aims to identify and modify biomedical, behavioral, and social risks through prevention and management (CDC, 2023a).

Many aspects are similar, but a few areas are quite different. First, pregnancy intentions should be identified so that women can be guided and discuss achieving pregnancy or contraceptive methods. Women planning to become pregnant should ensure that they are caught up on vaccines they may not be able to get once pregnant. This would include the MMR and varicella vaccines since they are live vaccines and cannot be given during pregnancy (APP & ACOG, 2017). Additionally, education can be provided on STI prevention and how STIs can affect pregnancy. Adverse health outcomes that can occur due to STI infections during pregnancy include preterm or early preterm labor, which is the number one cause of infant death and can lead to life-long developmental and health problems in children. Women can also experience uterine infections after delivery (Office on Women's Health, 2021a; Office on Women's Health, 2021b). Healthcare providers need to promote risk reduction by offering prevention counseling. The most effective means of preventing the spread of STIs is to abstain from oral, vaginal, and anal sex, or to engage in sexual activity only within a long-term, mutually monogamous relationship with a partner who has tested negative for STIs (CDC, 2023d). Providing education and substance cessation techniques is critical in the preconception period. According to Pereira et al. (2018), around 17% of women reported using illicit drugs while pregnant. Among those who used such drugs, approximately 64% also consumed alcohol, 58% smoked tobacco, 9% used cocaine/crack, and 4.6% used marijuana. Counseling women of childbearing age on substance abuse can help prevent further harm to the patient or their future children. Additionally, discussing current health conditions and medication usage can further help identify risk factors during pregnancy that may cause harm to the mother or fetus, such as medications or environmental exposures. An example of environmental factors that may affect pregnancy is the Zika virus. The virus can be found in sperm for up to 3 months, so patients

should be educated on this risk prior to attempting conception (CDC, 2021). Another critical aspect of care is a family history of health conditions that may be genetic, which can help guide the need for genetic counseling prior to or once a pregnancy does occur. Ensuring women live in a safe environment can also help prevent future harm to her or her child. Preconception is a critical time when crucial resources can be implemented for women with little or no support system to have an optimally healthy pregnancy.

Prenatal Care

According to the AAP and ACOG (2017), *Guidelines for Perinatal Care*, a woman with an uncomplicated pregnancy should attend prenatal care visits every four weeks until they reach a gestation of 28 weeks, then every two weeks until they reach 36 weeks, and then weekly visits until birth or if complications arise. With that being said, the number of prenatal care visits that each woman will need is individualized to her medical history, complications of past or current pregnancies, the number of pregnancies being carried, and if there was the use of infertility treatments. Frequent visits are crucial and provide opportunities for assessing the well-being of the woman and fetus, providing timely, relevant, and ongoing education, completing recommended health screenings, reviewing results, detecting medical and psychosocial issues, providing appropriate interventions, and reassuring the women (AAP & ACOG, 2017). Due to the gap in early and routine prenatal care attendance, there is an increased need to provide education and access to prenatal care.

First Visit

An essential aspect of receiving early and routine prenatal care is establishing an accurate estimated due date (EDD). This will be established at the first prenatal care visit. According to AAP and ACOG (2017), *Guidelines for Perinatal Care*, ultrasonography during the first

trimester (up to 13 weeks 6/7 days gestation) is the most accurate way to confirm an EDD. Often, dating from the last menstrual period is compared with an embryonic or fetal ultrasound to confirm dating further. Establishing an EDD helps ensure that appropriate monitoring and testing are scheduled and received at optimal stages throughout pregnancy to ensure proper fetal growth and implementation of interventions to prevent adverse pregnancy outcomes.

A risk assessment and education are initiated during the first prenatal care visit, which would have already been completed if the patient had received PCC care. ACOG (2017) recommends discussing specific information during the first visit, including care that will be provided, necessary labs and the purpose, the expected course of pregnancy, signs and symptoms that need to be reported to a health care provider, roles of the different health care team, anticipated visit schedule, provider coverage of labor and delivery, insurance and coverage of prenatal care and delivery, health promotion maintenance, risk counseling, psychosocial topics during and after pregnancy, and a review of family history and genetic testing options.

Complications of Pregnancy

Complications that can arise during pregnancy are monitored for and treated while receiving prenatal care (AAP & ACOG, 2017; CDC, 2023a). Women and their fetus(es) who do not attend early and routine prenatal are at risk for complications that could be addressed if adequately monitored and educated on, such as gestational diabetes, pre-eclampsia or eclampsia, preterm birth, sexually transmitted infections, and poor mental health.

In addition to monitoring and counseling, early and routine prenatal care allows healthcare professionals to have pertinent medical history relating to pregnancy, including gestational age, number of fetuses, and maternal and fetal risk factors (AAP & ACOG, 2017; CDC, 2023a; Office on Women's Health, 2021a). Moreover, it allows them to provide quality,

effective care to patients. In emergency circumstances, it is essential to have attended prenatal care visits so the facility providing care during labor and delivery knows the patient's health history, including prenatal care and risk factors that have affected pregnancy and the neonate. Because access may be limited, providing supplemental education to women of childbearing age is vital in increasing health promotion and intentions to receive PCC and early and routine prenatal care. Women who attended prenatal care visits intermittently or had late prenatal care had higher rates of sexually transmitted infections and substance use disorders (AAP & ACOG, 2017). The ACOG Committee Opinion No. 731: Group Prenatal Care (2018) found that group or shared prenatal care visits are associated with positive health outcomes such as improved preparation for childbirth, reduced preterm deliveries, and increased breastfeeding initiation.

Optimizing Pregnancy Health

One barrier to receiving pregnancy-related care is a lack of understanding of the benefits of PCC and prenatal care (Lemma et al., 2022). The *ODPHP (2020)* found that 25.3% of women did not attend early and routine prenatal care, meaning even more did not receive PCC care. As previously stated, nearly 700 deaths yearly in the U.S. are related to or result from pregnancy, and 60% of those were preventable (Review to Action, CDC Foundation, 2018). According to the CDC (2023), WHO (2023), and Healthy People 2030 (2020), ensuring access to and utilization of PCC and early and routine prenatal care for all women can help decrease maternal and fetal morbidity and mortality. All women of childbearing age need to be educated on the importance of attending PCC and early and routine prenatal care to have health-promoting attitudes and behaviors regarding PCC and prenatal care.

Critical interventions addressed during PCC and prenatal care visits include taking folic acid, maintaining a healthy diet and weight, participating in regular physical activity, quitting

tobacco use, refraining from excessive alcohol intake, abstaining from alcohol if pregnant or planning to become pregnant, taking only medications that are prescribed by a provider, receiving screening for and management of chronic diseases, discussing health risks associated with age and pregnancy, and utilization of effective contraception methods (CDC, 2023b). Women must be educated on the importance of PCC and early and routine prenatal care to increase intentions to receive care and optimize health outcomes for themselves and their children. If all providers do not ask women about their intentions to become pregnant or if they could be pregnant, pivotal interventions and care may be missed. Therefore, providers at routine healthcare visits should inquire about women's desires to improve their health status before pregnancy and their thoughts on contraceptives (AAP & ACOG, 2017). Once it is known whether the woman plans to become pregnant in her lifetime or within the next year, appropriate education and counseling can be provided. To further positively impact rural and underserved populations, women must be educated on the importance of receiving PCC and early, routine prenatal care, specifically within community settings (Kneller et al., 2023).

Folic Acid Intake

NTDs are a significant adverse congenital anomaly in neonates (Isaković et al., 2022). NTDs are the incomplete closure of the neural tube, which forms the early brain and spinal cord (CDC, 2022c). Folic acid supplementation has been found to decrease rates of NTDs. Intake of at least 400 mcg supplementation daily, in addition to consuming foods high in folate, has been proven to decrease the incidence of NTDs, such as the incomplete formation of the brain and skull or closure of the spinal cord (CDC, 2022c). The total daily intake of folate during pregnancy should be 600 mcg, according to the APP and ACOG *Guidelines for Perinatal Care* (2017).

The CDC (2022) recommends starting this supplementation at least one month before pregnancy. In addition, the APP and ACOG (2017) recommend that women on an anticonvulsant or who have had a previous baby with an NTD start taking four mg per day of folic acid before pregnancy and through the first trimester to prevent NTDs. Recent findings suggest that folic acid should be taken sooner than one month before becoming pregnant (Skoracka et al., 2021). In fact, van Gool et al. (2018) suggest taking folic acid five to six months before pregnancy, as it was found that it takes roughly 20 weeks for adequate levels to build up in the bloodstream.

Folic acid supplementation can reduce the incidence of pregnancy-related adverse outcomes, such as preeclampsia. Multiple studies have found that lower levels of folic acid were associated with the development of preeclampsia, and taking a folic acid supplement can significantly lower preeclampsia risk (Liu et al., 2018; Rahat et al., 2022).

Glycemic Control

All women are screened for gestational diabetes mellitus (GDM) between 24-28 weeks gestation using blood glucose levels after ingestion of glucose and then checking blood sugar levels after 1 hour (APP & ACOG, 2017). If the blood glucose level is too high, the woman will undergo the same process but with a higher glucose concentration, rechecking blood sugar levels after 3 hours. Two elevated blood glucose readings result in the diagnosis of GDM (APP & ACOG, 2017). Women diagnosed with GDM are at higher risk of developing postnatal type 2 diabetes mellitus (T2DM), with the risk increasing by 9.6% every year following their diagnosis of GDM (Li et al., 2020). Women with a BMI > 25 or who are Hispanic, African American, Native American, Asian, and Pacific Islander have the highest rates of GDM (APP & ACOG, 2017).

Maternal glycemic control directly impacts the fetus, and when the mother's glycemic control is suboptimal, the fetus's pancreas will produce insulin based on the mother's blood glucose level (CDC, 2018). The placental barrier allows endogenous and exogenous material, including glucose, to be passed from maternal blood to fetal blood flow (Blundell et al., 2016). Children exposed to diabetes during their mother's pregnancy are at increased risk for developing metabolic disorders. Failure to treat maternal hyperglycemia can increase adiposity and glucose metabolism disorders in offspring during puberty (Bianco & Josefson, 2019). These factors can lead to adverse events during pregnancy, delivery, and throughout the rest of the mother and child's life. Screening for and treating GDM is essential in care. Treating GDM correctly is associated with decreased maternal morbidity rates, cesarean deliveries, shoulder dystocia, macrosomia, and neonatal hypoglycemia (AAP & ACOG, 2017). Ultimately, women who have diabetes with poor glycemic control are at increased risk for fetal demise, demonstrating the importance of screening and treatment.

To decrease the risk of developing GDM, optimizing pre-pregnancy health is recommended. This can be done through regular physical activity, achieving a healthy body mass index (BMI), and eating a well-rounded and healthy diet (AAP & ACOG, 2017). For women diagnosed with poor glycemic control, it is recommended to check blood glucose levels four times per day, including fasting blood sugar in the morning, followed by readings one to two hours after meals throughout the day (AAP & ACOG, 2017). If lifestyle interventions are ineffective, pharmacologic interventions may be utilized to optimize health prior to pregnancy.

Optimal Weight

The number of pregnant women who are overweight or obese before pregnancy has increased in recent decades. It has reached over 50% in the U.S., putting women at risk for

GDM, hypertensive disorders, and cardiovascular disease (Paredes et al., 2021). Creanga et al. (2022) found that obesity is the most common problem among women of childbearing age and identified risk factors for women during the prenatal period, including subfertility, miscarriage, GDM, depression, and anxiety. Fetal conditions associated with maternal obesity include congenital anomalies, macrosomia or large for gestational age, congenital disabilities, and stillbirth. The *Guidelines for Perinatal Care* published by the APP and ACOG (2017) also found that stillbirth and childhood obesity have been associated with maternal obesity during pregnancy. Other maternal and child risks associated with maternal obesity during labor, delivery, and postpartum include severe maternal morbidity, preterm birth, labor and delivery complications, cesarean delivery, postpartum hemorrhage, infection, venous thromboembolism, and breastfeeding cessation (Creanga et al., 2022). Optimizing weight before and during pregnancy can help decrease the rates of these adverse health risks.

In the U.S., the Institute of Medicines' *Weight Gain Recommendations in Pregnancy* (2009) is used by practitioners to guide healthy weight gain during pregnancy. The guideline takes the woman's BMI during their initial prenatal visit and helps them create a care plan that outlines healthy weight gain for the patient. Optimizing weight also includes ensuring appropriate weight gain during pregnancy. A study by Goldstein et al. (2017) and the CDC (2022) showed that roughly 47-48% of women gained more weight than recommended, placing them at risk for adverse health outcomes for themselves and their children.

Eating a well-balanced diet high in whole grains, vegetables, fruits, low-fat dairy, and lean protein is recommended to optimize weight before and during pregnancy and limit the intake of foods high in added sugar and solid fats (CDC, 2022a). Optimizing pre-pregnancy and pregnancy weight can decrease maternal, fetal, infant, and childhood morbidity and mortality.

Depression and Anxiety (Mental Health)

Adverse infantile outcomes have been associated with maternal depression and anxiety. A study done by Björkstedt et al. (2022) found that women with severe mental disorders more often belonged to lower socioeconomic groups. Low socioeconomic groups face many struggles that impact day-to-day living, which can lead to significant financial and social stress. Van den Bergh et al. (2020) found that uterine exposure to maternal stress, anxiety, and depression may have long-term effects on the behaviors and mental health of the infant.

Although other studies have found no correlation between maternal rates of mental illness and neonatal well-being (Björkstedt et al., 2022; Li et al., 2021), there is a need to ensure maternal well-being, as the mother's body will be providing nourishment to the fetus until delivery and most frequently, will be one of the primary caregivers for the infant and shape them into who they develop into as an adult. If left untreated, mental illness threatens maternal, fetal, infant, and child well-being and has been associated with substance use, inadequate prenatal care, preterm birth, and low birth weights (Zhuk, 2022). Sakowicz et al. (2023) found that improved antenatal depression symptoms from previously worse symptoms are associated with decreased odds of preterm birth in pregnant women referred for mental health care.

It is important to screen women for mood disorders at PCC and prenatal care visits at least once, then as needed (APP & ACOG, 2017). When placing a woman of childbearing age on medication to treat a mental health disorder, it should be considered that she may become pregnant when choosing the medication and dose.

Substance Use

The CDC and *Guidelines for Perinatal Care* published by the APP and ACOG (2017) advise discussing substance use and abuse with all patients to ensure adequate counseling and

education regarding adverse health effects. One study found that roughly 17% of women used illicit drugs during pregnancy; among those who used illicit drugs, roughly 64% used alcohol, 58% used tobacco, 9% used cocaine/crack, and 4.6% used marijuana (Pereira et al., 2018). High rates of substance use during pregnancy demonstrate the need for all women of childbearing age and perinatal women to be screened by healthcare professionals regarding substance use and abuse.

Tobacco Cessation

Although rates of maternal tobacco use have declined (Martin et al., 2023), the outcomes of maternal and fetal smoke exposure undeniably cause adverse health events for women and their children. There is an increased risk of sudden infant death syndrome, preterm birth, low birth weight, and congenital anomalies of the mouth and lip in infants born to mothers who used tobacco during and after pregnancy (APP & ACOG, 2017; CDC, 2022e). Avşar et al. (2021) and Quelhas et al. (2018) also found an increased risk for sudden infant death syndrome and other health conditions such as asthma, small size, length, and head circumference at birth, and impaired child growth and development among infants exposed to tobacco smoke in utero.

Alcohol

Exposure to alcohol in utero is one of the most important preventable causes of cognitive impairment worldwide (Oei, 2020). This is why it is a pivotal part of PCC and prenatal care that needs to be addressed at each visit. During pregnancy, there is no known safe time or amount of alcohol consumption (CDC, 2022f). Binge drinking has been proven to be the most harmful to the fetus and is defined as having more than four drinks in two hours (Oei, 2020). There are numerous adverse health outcomes associated with alcohol consumption. Fetal alcohol exposure may result in facial feature abnormalities, small head size, short height, low birth weight, poor

coordination, hyperactive behavior, inattentive behavior, poor memory, difficulty in school (especially math), learning disabilities, speech and language delays, low IQ or intellectual disability, poor judgment and reasoning, sleep and sucking problems, vision or hearing problems, and problems with the heart, kidneys, and bones (CDC, 2022f).

Cannabis and Cannabidiol

Understanding the motivations behind women's use of cannabis or CBD during pregnancy can be categorized into three main areas: seeking enjoyment, managing chronic diseases and pregnancy-related symptoms, and coping with challenging life events (Vanstone et al., 2021). These substances are frequently turned to during pregnancy to alleviate common discomforts such as nausea, insomnia, and anxiety. However, it is crucial to recognize that in-utero exposure to cannabis has been linked to potentially enduring neurodevelopmental effects, underscoring its significance in preconception care and prenatal management (Badowski & Smith, 2020). Furthermore, research has shown that prenatal cannabis exposure significantly correlates with adverse birth outcomes, notably impacting birth weight and increasing the risk of preterm birth, which in turn can influence long-term health and developmental trajectories (Bailey et al., 2020).

Approximately 19% of pregnant women rely on cannabis, a rate notably higher than the 13% reported among non-pregnant women (Alshaarawy & Anthony, 2019). This prevalence aligns with a growing perception that cannabis and CBD use pose no health risks during pregnancy, a misconception fueled by the increasing availability and accessibility of these substances. As it continues to be legalized in more states, more women seeking preconception and prenatal care will likely present with cannabis or CBD use (Polcaro, 2020). While more

research is needed to understand the long-term effects of cannabis and CBD fully, existing data point towards potential risks.

To mitigate these risks, healthcare providers must engage in informed discussions with patients, offering evidence-based recommendations and exploring alternative symptom management strategies during pregnancy. By prioritizing patient education and providing comprehensive care, providers can play a vital role in safeguarding maternal and fetal health (Polcaro, 2020).

Teratogens

Teratogenic medications or alcohol exposure during fetal development are responsible for roughly 15% of congenital anomalies (Frayne et al., 2016). Ensuring women receive PCC and prenatal care can ensure proper counseling on avoiding teratogens. According to Frayne et al. (2016), many women of reproductive age require treatment for chronic conditions like diabetes, hypertension, chronic pain, depression, hypercoagulable states, and seizure disorders. The higher the incidence of chronic diseases during pregnancy, the greater the requirement for medications to address these health conditions (Atrash & Jack, 2020). A thorough medication review is necessary at all prenatal care visits to ensure that teratogenic medications are not being used.

In addition, exposure to other teratogens can occur at work, in food or beverages, or the environment. A few specific teratogens that can affect pregnancy are mercury, toxoplasmosis, and the Zika virus. Mercury can potentially harm various body parts, such as the lungs, kidneys, and nervous system, encompassing the brain, spinal cord, and nerves. Additionally, mercury exposure may lead to hearing and vision complications. The severity of the damage largely depends on the amount of mercury you are exposed to (March of Dimes, 2014). When exposed to toxoplasmosis, most infants infected at birth do not show symptoms initially, and they may

experience severe complications later in life, such as cognitive impairment or vision loss (CDC, 2022g). If infected with the Zika virus during pregnancy, it can cause congenital anomalies called microcephaly and other severe fetal brain defects (CDC, 2021). Many additional risk factors can cause teratogenic exposure during pregnancy. Discussing social and medical history with women of childbearing age is essential, whether in the preconception period or during pregnancy.

Medication Counseling

Birth rates among women ages 35-39 increased by 5%, and ages 40-44 increased by 2% in 2021 when compared to rates in 2020 (Osterman et al., 2023). Increasing rates of pregnancy and birth among women who are having children later in life have increased the prevalence of recognizing and managing chronic medical conditions prior to and during pregnancy (Atrash & Jack, 2020). Chronic medical conditions warrant close monitoring prior to and during pregnancy to optimize maternal and fetal health outcomes. Diabetes, thyroid disease, and maternal phenylketonuria are chronic medical conditions that should be controlled before seeking pregnancy to decrease the risk of spontaneous abortion and birth defects (APP & ACOG, 2017). Often, these conditions will need medications to help manage and control symptoms.

Certain medications are not safe to continue during pregnancy as they increase the risk of birth defects, spontaneous abortion, preterm delivery, infant death, or developmental disabilities (CDC, 2022e). Additionally, teratogenic medications can lead to oligohydramnios, fetal growth restriction, congenital malformations, miscarriage, developmental delays, and infant mortality (Buschur & Polsky, 2020). Roughly 15% of congenital anomalies were caused by fetal exposure to teratogenic medications or alcohol exposure (Frayne et al., 2016). More than one out of 16 pregnancies have a history of exposure to teratogenic drugs (Sarayani et al., 2022). Mitigating

exposures and preventing adverse maternal and fetal health outcomes can be achieved by enhancing the utilization of preconception and prenatal care among women of childbearing age, providing the opportunity for counseling and interventions.

According to the APP and ACOG (2017), counseling and interventions related to current medication use, prescription and nonprescription, are crucial aspects of preconception and prenatal care. Medications with known teratogenic effects on the fetus should be avoided and addressed, including but not limited to warfarin, valproic acid, carbamazepine, isotretinoin, and angiotensin-converting enzyme inhibitors. Additionally, it is recommended that the lowest effective dose of medications considered safe to continue during conception and pregnancy are utilized. Lastly, considering benefits and risks is essential when deciding if women should continue the medications they are on for chronic disease management. As mentioned previously, uncontrolled mental illness increases maternal and fetal adverse health outcomes. Weighing the benefits and risks of keeping the mother on certain medications to control her chronic disease is essential when considering maternal and fetal health outcomes.

Sexual Health

Sexually transmitted infections are linked to increased adverse maternal and child outcomes. According to APP and ACOG (2017), chlamydia and gonorrhea have been linked to increased rates of ectopic pregnancy, infertility, and chronic pelvic pain. It is recommended that women less than 25 and women who have new or multiple sexual partners be screened yearly (APP & ACOG, 2017). If women test positive for any sexually transmitted infections, following the CDC treatment guidelines is recommended. Other sexually transmitted infections can also cause detrimental maternal and child outcomes. It is the gold standard to check all newly pregnant women for human immunodeficiency virus, Hepatitis B, syphilis, chlamydia,

gonorrhea, tuberculosis, blood type and screen, diabetes, and group B streptococcal disease (AAP & ACOG, 2017). This is done at specific intervals throughout pregnancy. A woman not attending prenatal care visits will not be adequately screened for these conditions, putting her and her baby at risk for adverse health outcomes. Women who attended prenatal care visits intermittently or had late prenatal care had higher rates of sexually transmitted infections and substance use disorders (AAP & ACOG, 2017). Providing education and adequate counseling on the importance of limiting the number of sexual partners, using protection, and practicing abstinence can help decrease the transmission of sexually transmitted infections, decreasing adverse pregnancy outcomes.

Barriers and Access to Care

Many women in the U.S. face inadequate access to PCC and prenatal care (Latham, 2020). In fact, 25.3% of women in the U.S. did not have early and routine prenatal care, let alone attend PCC care visits (ODPHP, 2020). Women need access to these types of care to provide adequate PCC and prenatal care. Shah et al. (2018) found that common barriers to PCC and prenatal care included inadequate transportation and childcare, lack of education due to poor health literacy, scheduling conflicts relating to career commitments, cultural/language barriers, and inadequate access to pregnancy tests. Without access to these services, pertinent educational information cannot be provided, and necessary monitoring and testing cannot be completed.

The women who do not receive adequate care may face long-term consequences detrimental to the health of themselves and their children, including death. A study that included 9,488 women found that 326 did not receive prenatal care and had significantly increased rates of substance use, preterm birth, and longer newborn hospital stays, putting them and their babies at risk for adverse pregnancy outcomes (Holcomb et al., 2021). The same study also showed that

women who did not receive early and routine prenatal care lived in areas with high public transportation demands, making it hard to find timely, affordable transportation.

Women living in rural areas may face additional barriers to the utilization of early and adequate prenatal care. Wendling et al. (2021) found that women in rural areas were not given a choice to have a trial of labor after having a cesarian section; instead, they were told they had to have a repeat caesarian section (CS). This is pertinent because maternal death and illness are more common following a CS than vaginal birth. CS is linked to a higher likelihood of uterine rupture, abnormal placentation, ectopic pregnancy, stillbirth, and preterm delivery, with the risk increasing with the number of CS undergone (Sandall et al., 2018). The study showed that women living in rural communities do not have access to the same pregnancy-related care as those who live in larger cities with more readily available resources.

Those living in poverty are also at higher risk for maternal and infant death. White women had three to four times lower maternal mortality than their non-Hispanic black counterparts, which was also evident in other areas of maternal and infant outcomes (CDC, 2018). The proportion of Caucasian women who received early and routine prenatal care in the U.S. in 2019 was 81.8%, while American Indian and Alaska Native women were only 61.8%, according to Healthy People 2030 (2020).

Additionally, a barrier associated with not receiving early and routine prenatal care, much less PCC care, is food insecurity, which may be further compounded by additional socioeconomic barriers. These barriers include financial limitations, lacking transportation to get to the clinic or doctor's office, not being able to get time off work, not having a Medicaid card, having too many other things going on, and having no one to take care of children (Testa &

Jackson, 2021). Ensuring socioeconomic factors are discussed and any concerns are addressed may help increase PCC and prenatal care utilization.

If access to these services is not available in conventional ways, we must develop ways to provide PCC and prenatal education and care in new ways. Therefore, educating community members and healthcare providers can help improve women's overall health regarding PCC and prenatal outcomes. For example, PCC care and prenatal care visits are pivotal for monitoring, diagnosing, and treating conditions like gestational diabetes, hypertension, and sexually transmitted infections. If not monitored, women with these conditions can develop more severe health concerns that may harm their and their children's health. Providing greater access to these services will promote healthy habits that will decrease adverse outcomes for women of childbearing age and their children.

Summary

The literature review for the PIP covered pregnancy intentions, preconception health promotion, prenatal care, optimizing pregnancy health, and barriers to accessing care. Each component discussed in this literature directly impacts women's health before and during pregnancy. Identifying a woman's pregnancy intentions can provide her with appropriate interventions to ensure an appropriately timed pregnancy while optimizing the woman's health for future pregnancies, if desired. Providing women with the resources to optimize their health before pregnancy includes educating them on the importance of early entry to prenatal care. Healthcare providers must take advantage of the preconception and prenatal periods to optimize pregnancy health and should take advantage of this. Women may face barriers to accessing care, which can prevent them from receiving the necessary care and support to achieve a healthy pregnancy. These can include factors such as lack of access to healthcare services, financial

barriers, lack of social support, and cultural and linguistic barriers. Enhancing healthcare providers' knowledge of barriers to care, as well as women's attitudes toward preconception and prenatal care, has the potential to improve the quality of care provided and enhance health outcomes.

METHODS

Overall Project Design

This plan was a PIP. The overall design of this project was a quasi-experimental, quantitative educational intervention with pre- and post-education questionnaires. The PIP included an online educational module and series of questions in pre- and post-intervention questionnaires completed by women of childbearing age in three rural and underserved communities in north-central Minnesota and mid-eastern North Dakota. The data obtained was analyzed in aggregate form using descriptive statistics. To meet this project's objectives, the co-investigator created an online educational module with embedded pre- and post-questionnaires available via quick response (QR) code and weblink posted on promotional flyers throughout the three communities. The project focused on educating women of childbearing age on the importance of receiving PCC and early and routine prenatal care through an online educational module. The education provided was based on the APP and ACOG's *Guidelines for Perinatal Care* (2017), CDC recommendations, and literature review findings.

The pre- and post-intervention questionnaires included questions assessing changes in knowledge, attitudes, and intentions related to PCC and prenatal care to further assess if the educational module was effective. After completion of the educational module, an analysis was conducted to determine if there was a change in women's knowledge, attitudes, and intentions about PCC and prenatal care. After the results from implementation had been analyzed, a one-page informational sheet was created and disseminated via the NDNPA website to share the findings of this project.

Objectives

The following objectives guided this project.

- 1.) Increase PCC and prenatal care knowledge in women of childbearing age by the end of the educational module.
- 2.) Assess change in attitudes towards PCC and prenatal care in women of childbearing age by the end of the educational module.
- 3.) Increase intent to seek PCC and prenatal care in women of childbearing age during the PCC period by the end of the educational module.
- 4.) Increase provider awareness by disseminating a 1-page informational document to members of the NDNPA focused on the attitudes, intentions, and barriers to receiving PCC and early and routine prenatal care in women of childbearing age who participated in the project.

Implementation Plan

Evidence-based Practice Model or Logic Model

The Iowa Model Revised was used to create and implement this project. The model is centered around guiding evidence-based practice implementation for practitioners and organizations (Iowa Model Collaborative, 2017). Permission was granted via email by the University of Iowa Hospitals and Clinics to use *The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care* (Appendix C). There are seven steps included in this model. They are as follows: 1) identify triggering issues or opportunities, 2) state the question or purpose, 3) form a team, 4) assemble, appraise, and synthesize body of evidence, 5) design and pilot the practice change, 6) integrate and sustain the practice change, and 7)

disseminating results (Iowa Model Collaborative, 2017). The Iowa Model Revised that was created for this project can be found in Appendix D.

Step 1: Identify a Triggering Issue or Opportunity

Women must receive PCC care and attend prenatal visits regularly to promote optimal health for both the mother and child (APP & ACOG, 2017). However, not all women can access these essential services due to a lack of knowledge or systemic barriers. Neglecting health issues impacts the mother and her baby during and after pregnancy (Myerson et al., 2020). Increasing awareness and education on the importance of PCC and prenatal care for both patients and providers may result in increased intentions to seek care and lead to increased rates of attendance and improved health outcomes for mothers and babies.

Step 2: State the Question or Purpose

Stating the purpose of the PIP helps guide the team members toward a clear goal and establish boundaries, which can be done by creating a PICOT question that contains key elements of a research question (Melnyk & Fineout-Overholt, 2019). The parts of a PICOT question include P: patient/population/problem, I: Intervention/Exposure, C: Comparison, O: Outcome, and T: Time frame. In the PIP, the population was women of childbearing age, the intervention included the provision of education, the comparison assessed knowledge before and after providing education, and the intended outcome was to increase awareness, positive attitudes, and intention to seek PCC and early and routine prenatal care. Therefore, this project aimed to increase awareness of the importance of early and routine prenatal care by increasing knowledge and enhancing positive attitudes and intentions to receive PCC and early and routine prenatal care.

Step 3: Forming a Team

The third step in the Iowa Model Revised was creating a team that served as the supervisory committee for this PIP (Melnyk & Fineout-Overholt, 2019). Supervisory committee members were chosen based on professional experience and passion for positively influencing and guiding the PIP, which is essential to the success of the intervention (Iowa Model Collaborative et al., 2017). North Dakota State University (NDSU) graduate school criteria were followed when creating the supervisory committee for the PIP. Five members comprise the team facilitating the PIP's development, implementation, and evaluation: the coinvestigator, the chair, two committee members, and a graduate appointee. The coinvestigator is a graduate student in the Doctor of Nursing Practice program at NDSU. The supervisory committee members include Allison Peltier, DNP, APRN, FNP-BC, as chair, Mykell Barnacle, DNP, APRN, FNP-BC, and Kelly Buettner-Schmidt, PhD, RN, FAAN from the NDSU School of Nursing, and Mary Larson, PhD, MPH, RD, CDE, CHES serving as the Graduate Appointee.

Step 4: Assemble, Appraise, and Synthesize Body of Evidence

After forming a team, it is imperative to assemble, appraise, and synthesize a body of evidence when following the Iowa Model Revised for implementing evidence-based practice projects (Melnyk & Fineout-Overholt, 2019). The first step of this process is identifying and gathering pertinent evidence. A thorough literature review was completed using electronic databases. The literature review discussed PCC and prenatal care in detail and was completed before creating the PIP's methodology section. Findings include increased adverse maternal and fetal outcomes and decreased PCC and prenatal care utilization (Dorney & Black, 2018; Teshome et al., 2020). If women are educated on the importance of care, they may be more inclined to receive care. Healthcare providers should provide relevant education and counseling

to increase perceived benefits and promote health behavior changes to increase the uptake of PCC and prenatal care. In the setting where a woman is not receiving routine medical care, this education should be provided in the community setting to increase accessibility (Kneller et al., 2023).

Step 5: Design and Pilot the Practice Change

Following assembly, appraisal, and synthesis of a body of evidence, the next step in the Iowa Model Revised is piloting a practice change (Melnyk & Fineout-Overholt, 2019). An issue that is needed in practice must first be identified. Once the issue is identified, the project can be designed and implemented to help facilitate the desired outcome or practice change. This entails detailed planning and coordination. Project evaluation must be completed prior to implementation and after. Pre- and post-pilot data must be compared to determine the success of the PIP.

The design of the PIP was created due to the need for knowledge and access to PCC and early and routine prenatal care, especially in rural and underserved populations. The PIP aimed to create a positive practice change by addressing knowledge gaps, positively affecting attitudes, and increasing intentions to seek care to positively impact women's and children's health. The coinvestigator implemented this project upon receiving approval from the supervisory committee members and NDSU's Institutional Review Board (IRB). Data analysis was completed once implementation was complete, and the literature review was reviewed to investigate further what it would take to integrate and sustain a practice change.

Step 6: Integrate and Sustain the Practice Change

The Iowa Model Revised identifies the integration and sustainability of practice change, the subsequent step to designing and piloting a practice change (Melnyk & Fineout-Overholt,

2019). After implementing the PIP, the co-investigator conducted an evaluation and comparative analysis of data obtained from the pre- and post-intervention questionnaires. When comparing participant responses to the pre-post-intervention questionnaires, changes in knowledge, attitudes, and intentions to seek PCC and prenatal care were assessed. Once data analysis was completed, the results of this project were disseminated to committee members during the project's final defense and to community members and providers to increase awareness and promote the importance and utilization of PCC and prenatal care. The primary aim was to decrease adverse health outcomes related to pregnancy and birth among women and children.

Step 7: Dissemination

Dissemination of results is the final step in the Iowa Model Revised (Melnyk & Fineout-Overholt, 2019). This step includes sharing the results of the PIP with relevant parties. Multiple avenues were used to disseminate findings, including a final defense presentation with the committee members. The findings of the PIP were also disseminated via poster presentation at the NDNPA conference in 2023. Results of the PIP were also shared on the NDNPA website to increase provider awareness of barriers to PCC and prenatal care attendance and what can be done to increase uptake. Additionally, the PIP was published externally to ProQuest through NDSU for future access and research requirements.

Setting

The settings for implementing the PIP were three different communities within North Dakota (ND) and Minnesota (MN): the first was in Fargo, ND, Cass County, USA, where care is provided to rural and underserved populations. The second community was in Otter Tail County, MN, USA, a rural and underserved area with a significant Hispanic and Somali population in mid-eastern MN. The third community was a rural area located in Beltrami County, MN, USA,

in mid-northern MN, with limited access to healthcare services and a high proportion of Native American residents. Women of childbearing age (18-34) were recruited. Since these communities are rural and underserved, a flyer with a QR code and weblink to participate in the PIP was used, as it was more accessible than attending an in-person educational session.

Sample/Sample Size/Recruitment

Women of childbearing age in three rural and underserved Minnesota and North Dakota communities were recruited with promotional flyers hung within these three communities. Roughly 20-40 flyers were posted in each community at various public places on bulletin boards, walls, and bathroom stalls in high-traffic locations such as gas stations, grocery stores, food pantries, apartment buildings, low-income housing, public health centers, and health care centers. The flyers were posted for two months, or roughly 60 days, and the educational module was open and accessible during these 60 days. The flyers displayed PCC and prenatal care graphics, a chance to win one of two \$50 Amazon gift cards, and a QR code and weblink to access the online module. Participation in the PIP included the completion of an online educational module.

Inclusion criteria consisted of females between the ages of 18 and 34. According to ACOG (2022), the definition of childbearing age is 15-44, but because women under the age of 18 are minors, they were excluded. Individuals who did not meet the age criteria of 18 to 34 were excluded from participating in the PIP. Other exclusion criteria will include participants who cannot read English, Spanish, or Somali, do not have access to the Internet, and do not have access to one of the three communities recruited. Participants who did not complete the pre-intervention questionnaire in their entirety, educational module, and post-intervention questionnaire were not included in the sample size using Qualtrics technology.

Consent

After accessing the QR code or weblink and before starting the pre-intervention survey, a consent waiver was presented as the first part of the online educational module. The consent stated that the participants' results would remain anonymous and that there was minimal risk in participating in this project. Participants who provided consent and continued to the pre-intervention survey, willingly agreed to participate in the educational module. Participants were free to cease completing the module at any point without negative consequences.

Incentive

To incentivize women of childbearing age to participate in the PIP, upon completing the pre-intervention questionnaire, educational module, and post-intervention questionnaires, a chance to win one of two \$50 Amazon gift cards was available via an optional questionnaire that asked participants to submit their contact information into the drawing. Upon completion of the post-intervention questionnaire, participants completed an extra survey if they wished to be entered into the drawing for the gift cards. The extra survey asked for their e-mail address. The pre- and post-intervention surveys remained confidential and separate from the incentive survey. The drawing for the winners of the gift cards was completed at the end of the two-month implementation period.

Institutional Review Board

IRB approval is needed in all human research studies to protect the rights of participants and ensure that studies are conducted ethically. The PIP's IRB approval was completed through North Dakota State University IRB submission, and approval was completed after the committee members approved the PIP. All participant responses to the pre-intervention and post-

intervention questionnaires were anonymous. Since the PIP carried minimal risk to participants, it met exempt criteria. Please see Appendix A for the IRB Approval Letter.

Evidence-based Project Interventions/Activities

Participants were asked to complete an online educational module with embedded pre- and post-intervention questionnaires. The questions utilized in both questionnaires were created by the co-investigator of the PIP and inspired by a previous dissertation by N. Schuldt (2023) on *Preconception care: assessing and influencing knowledge, attitudes, and intentions in women of reproductive age*. The utilization of some pre- and post-intervention questions from the project were adopted for this PIP with permission, and the co-investigator of this PIP created additional questions to help attain the project objectives. Please see Appendix I for the email granting permission.

Activities for NDNPA

Once results from the pre- and post-intervention questionnaires were analyzed, a one-page informational sheet was created to share via the NDNPA Facebook page. The informational sheet included findings from the PIP on the change in knowledge, attitudes, and intentions related to PCC and prenatal care once education was provided. The one-page informational sheet also listed perceived barriers to PCC and prenatal care utilization among participants.

Resources

Five critical resources were needed for the completion of this project. 1.) Flyers were created and utilized to recruit community members to participate and complete the educational module. The flyers were printed at the UPS store and cost \$79.94. The flyers were posted in three rural and underserved communities in Minnesota and one rural and underserved community on the mid-eastern border of North Dakota. Items used to hang the flyers were

purchased for roughly five dollars or less. 2.) The pre- and post-intervention questionnaires were distributed to participants completing the online educational module. The associated online educational module was developed via the NDSU Qualtrics Survey Service, free of cost. The pre- and post-intervention questionnaires were embedded in the online educational module. The online educational module with embedded questionnaires had an associated QR code and weblink posted on the promotional flyers. 3.) The NDSU IT department and College of Statistics offer statistical counseling services to NDSU students at no cost, which was essential in interpreting the data gathered during this project. 4.) To ensure that a broad range of healthcare providers were able to access the one-page educational resource, it was disseminated via the NDNPA website. Once the NDNPA approved the educational page to be posted on their website, it was available to healthcare providers free of charge. 5.) Lastly, the co-investigator drove to each community to post the flyers. The co-investigator lives in Fargo, ND. One of the locations where the flyers were posted was a community clinic providing care to underserved populations. From Fargo, ND, the other two communities are situated approximately 48 miles away and 129 miles away and provide care to rural and underserved populations. The cost of gas was roughly \$50 to travel to each outside community to post the flyers.

Evaluation/Outcomes/Data Analysis

A Logic Model was utilized to evaluate the components needed to complete this project. The components of a logic model include 1.) inputs: funding, personnel, and equipment; 2.) activities; 3.) outputs; 4.) short-term outcomes; and 5.) medium/long-term outcomes. Creating this logic model helped plan, implement, and evaluate the PIP. The completed logic model on the PIP can be found in Figure 1. The specific evaluation of each objective of the PIP is discussed in detail in the next section.

Objective Evaluation

Objective one: Increase PCC and prenatal care knowledge in women of childbearing age by the end of the educational module.

An online educational module on PCC and prenatal care was created using Qualtrics. The module was designed for women of childbearing age and advertised in rural and underserved communities. The module provided education on the critical components of PCC and prenatal care and why it is crucial to receive care before and during pregnancy. The module had pre- and post-intervention questionnaires to help gather information regarding knowledge gained from participation. Questions focusing on knowledge in the pre-intervention and post-intervention questionnaires are listed in Table 1. The goal was to have participants score higher on the post-intervention questionnaire than on the pre-intervention questionnaire.

Objective two: Assess change in attitudes towards PCC and prenatal care in women of childbearing age by the end of the educational module.

A module was created to educate women of childbearing age on the importance of PCC and prenatal care. Embedded in the module were pre- and post-intervention questionnaires with questions assessing attitudes regarding PCC and prenatal care. Pre- and post-intervention questions that assessed attitudes are listed in Table 1.

Objective three: Increase intent to seek PCC and prenatal care in women of childbearing age during the PCC period by the end of the educational module.

Educating women of childbearing age through this PIP aimed to increase their knowledge and attitudes about PCC and prenatal care and increase their intention to seek care. Through education, more women of childbearing age may participate in PCC and early and routine prenatal care. This objective was evaluated by pre- and post-intervention questionnaires. The

questions evaluating intentions to seek PPC and prenatal care are listed in Table 1. The goal was for participants' scores to increase after completion of the educational module.

Objective four: Increase provider awareness of attitudes, intentions, and barriers to receiving PCC and early and routine prenatal care in women of childbearing age by creating a one-page information document and sharing it with members of the NDNPA.

The co-investigator created a one-page informational document using this project's findings regarding the attitudes, intentions, and barriers to receiving PCC and early and routine prenatal care in women of childbearing age who participated. The informational document also reviewed the importance of addressing pregnancy intentions with women of childbearing age to increase patient awareness and uptake of PCC and early and routine prenatal care. The one-page informational document was disseminated to the NDNPA Facebook page to help increase provider awareness of knowledge, attitudes, and intentions related to PCC and prenatal care. The informational document also listed perceived barriers to receiving PCC and prenatal care in women of childbearing age who participated.

Table 1*Educational Module Demographic Data and Objective Evaluation Questions*

Questions	Response Options
Demographics	
How did you hear about this educational module?	a. Flyer in Bemidji, MN b. Flyer in Pelican Rapids, MN c. Flyer in Fargo, ND d. Someone told me about it
Today, I am:	a. 18-20 years old b. 21-24 years old c. 25-30 years old d. 31-34 years old
I currently live within ___ of a clinic:	a. 5-10 minutes b. 10-20 minutes c. 20-40 minutes d. 40-60 minutes e. Greater than 60 minutes
Which of the following best describes you?	a. African American b. Asian or Pacific Islander c. Caucasian d. Hispanic or Latino e. Native American or Alaskan Native f. A race/ethnicity not listed above: (Please list here) _____
I have been pregnant before:	a. Yes b. No
I received medical care related to pregnancy before becoming pregnant:	a. Yes b. No c. Does not apply to me (I have never been pregnant)
I received medical care related to pregnancy within the first 14 weeks of pregnancy:	a. Yes b. No c. Does not apply to me (I have never been pregnant)
I am planning to become pregnant in the next:	a. Less than one year b. 1-2 years c. 3-4 years d. 5+ years

Table 1*Educational Module Demographic Data and Objective Evaluation Questions (continued)*

Objective 1: Increase PCC and prenatal care knowledge in women of childbearing age by the end of the educational module	
What is the recommended daily folic acid intake women of childbearing age should consume?	<ul style="list-style-type: none"> a. 100 mcg b. 400 mcg c. 1 mg d. 4 mg
Which answer is true regarding sexually transmitted infections (STIs):	<ul style="list-style-type: none"> a. Can affect ability to become pregnant b. Can be passed on to the infant during pregnancy or birth c. May not have noticeable symptoms d. All of the above
Which of the following can be hazardous during pregnancy? (Select all that apply)	<ul style="list-style-type: none"> a. Smoking tobacco products b. E-cigarettes (Vape pens, Juul, etc.) c. Secondhand smoke exposure d. Marijuana or CBD use
Being overweight during pregnancy can increase the risk for: (Select all that apply)	<ul style="list-style-type: none"> a. Difficulty becoming pregnant b. Gestational diabetes c. Difficult delivery d. Maternal death
It is recommended that women receive medical care during pregnancy care within the first ____ of pregnancy.	<ul style="list-style-type: none"> a. 14 days b. 14 weeks c. 20 days d. 20 weeks
Receiving medical care before and during pregnancy can result in which of the following outcomes: (Select all that apply)	<ul style="list-style-type: none"> a. Decreases the number of babies born with low birth weight b. Decreases the number of babies born prematurely c. Promotes earlier entry into care during pregnancy d. Increases folic acid intake before becoming pregnant

Table 1*Educational Module Demographic Data and Objective Evaluation Questions (continued)*

Objective 2: Assess change in attitudes towards preconception and prenatal care in women of childbearing age by the end of the educational module.	
What is your attitude towards receiving medical care before planning for pregnancy?	<ul style="list-style-type: none"> a. 1 = Not important at all b. 2 = Slightly important c. 3 = Moderately important d. 4 = Very important e. 5 = Extremely important
How important is it to receive medical care for your pregnancy within the first 14 weeks of pregnancy?	<ul style="list-style-type: none"> a. 1 = Not important at all b. 2 = Slightly important c. 3 = Moderately important d. 4 = Very important e. 5 = Extremely important
Objective 3: Increase intent to seek preconception and prenatal care in women of reproductive age during the preconception period by the end of the educational module.	
How likely are you to seek medical care related to pregnancy before becoming pregnant?	<ul style="list-style-type: none"> a. 1 = Extremely unlikely b. 2 = Somewhat unlikely c. 3 = Neither likely nor unlikely d. 4 = Somewhat likely e. 5 = Extremely likely
How likely are you to seek medical care for your pregnancy within the first 14 weeks of pregnancy?	<ul style="list-style-type: none"> a. 1 = Extremely unlikely b. 2 = Somewhat unlikely c. 3 = Neither likely nor unlikely d. 4 = Somewhat likely e. 5 = Extremely likely
What barriers do you anticipate to receiving pregnancy-related medical care before becoming pregnant?	<ul style="list-style-type: none"> a. Lack of time b. Lack of transportation c. Cost of healthcare services d. Not interested in receiving pregnancy-related care before becoming pregnant. e. No barriers f. Other (please comment) _____
What barriers do you anticipate to receiving pregnancy-related medical care during pregnancy?	<ul style="list-style-type: none"> a. Lack of time b. Lack of transportation c. Cost of healthcare services d. Not interested in pregnancy-related care during pregnancy e. No barriers f. Other (please comment)

Conclusion

This study aimed to educate women of childbearing age and providers on the importance of receiving PCC and early and routine prenatal care. Educating women on the importance of care aims to increase attitudes and intentions to participate in PCC and early and routine prenatal care. This was done using an online educational module. The PIP was promoted in three communities via flyers with a QR code and weblink to the educational module. Results of the pre- and post-intervention questionnaires were analyzed in aggregate form.

Figure 1

Logic Model

Project Goals: Educate women of childbearing age on the importance of preconception and prenatal care; assess knowledge, attitudes, and intentions to seek care. Objective One: Increase preconception and prenatal care knowledge in women of childbearing age by the end of the educational module. Objective Two: Assess change in attitudes towards preconception and prenatal care in women of childbearing age by the end of the educational module. Objective Three: Increase intent to seek preconception and prenatal care in women of childbearing age during the preconception period by the end of the educational module. Objective Four: Increase provider awareness by disseminating a 1-page informational document to members of the NDNPA focused on the attitudes, intentions, and barriers to receiving PCC and early and routine prenatal care in women of childbearing age who participated in the project.					
Inputs	Activities	Outputs	Outcomes		
			Short	Medium	Long
<ul style="list-style-type: none"> ▪ Collaboration with rural and underserved communities. ▪ Use Qualtrics to create questionnaires and online educational module. ▪ NDSU Faculty (Project committee and content experts) ▪ Gather content for an online educational module. ▪ Create a promotional flyer to promote the educational module. ▪ Obtain IRB approval. ▪ NDSU support staff 	<ul style="list-style-type: none"> ▪ Development of the educational module with embedded pre/post survey. ▪ Development of promotional flyers. ▪ Create a QR code with a link to the educational module. ▪ Hang promotional flyers within targeted communities. ▪ Collect, track, and report pre/post-survey results. 	<ul style="list-style-type: none"> ▪ Completion of educational sessions with pre/post surveys completed. ▪ Completion of the educational module with completion of pre/post surveys. ▪ Information provided to NDNPA members. ▪ Reports created as required. ▪ Posters, presentations, and publications. 	<ul style="list-style-type: none"> ▪ Increase knowledge of preconception and prenatal care in targeted communities. ▪ Increase participants' knowledge regarding preconception and prenatal care. ▪ Increase participants' attitudes regarding preconception and prenatal care. ▪ Increase participants' intent to seek preconception care and prenatal care. ▪ Increase intent to seek preconception care in women of childbearing age. ▪ Increase intent to seek prenatal care in women of childbearing age. 	<ul style="list-style-type: none"> ▪ Increase behaviors regarding preconception and prenatal care among women of childbearing age and providers. ▪ Increase provider awareness of the importance of preconception care among NDNPA members. ▪ Increase provider knowledge of barriers to preconception and prenatal care among NDNPA members. 	<ul style="list-style-type: none"> ▪ Reduce maternal and fetal morbidity and mortality.

RESULTS

Following the implementation of the PIP, the results were analyzed to determine the outcomes. The following sections will assess the project findings using pre- and post-intervention questionnaires. These questionnaires assessed participants' demographic information, knowledge, attitudes, and intentions regarding PCC and prenatal care.

Participants

The flyers utilized to disseminate the project had an accessible QR code and were posted and available in the three target communities for eight weeks. During this time, 30 participants accessed the online educational module via the QR code, with 56% (n=17) of participants starting the module but not finishing all three sections and 43% (n=13) completing all sections of the module. Completion of the entire module included the pre-intervention questionnaire, educational video, and post-intervention questionnaire. The results from the 43% (n=13) of participants who completed the module will be utilized when assessing the project outcomes.

Demographics

Questions one through eight of the pre-intervention questionnaire focused on gathering crucial demographic information from participants. Approximately 69% (n=9) of the participants learned about the module from a flyer in Bemidji, MN, while an additional 23% (n=3) learned from the flyer in Fargo, ND. One participant (7.7%) learned of the module by someone telling them about it. Notably, there were no participants from the Pelican Rapids, MN community.

When examining the age distribution of the 13 participants, 15% (n=2) fell within the 18-20 age range, 30.7% (n=4) were between 21-24, 23% (n=3) were 25-30, and 30.7% (n=4) were 31-34. Of the participants surveyed, the majority (92%; n=12) resided within a 5–10 minute geographical proximity of a clinic, with 7.7% (n=1) who lived within the range of 10-20 minutes

from a clinic. Regarding ethnicity, over half of the participants (69%; n=9) identified as Caucasian, 15% (n=2) as Native American or Alaskan Native, 7.7% (n=1) as Hispanic or Latino, and 7.7% (n=1) identified as African American and Caucasian.

In examining the participants' reproductive history, 38% (n=5) had previously experienced pregnancy, while 61.5% (n=8) had not. Additionally, 30.7% (n=4) had received preconception care (PCC) before, while 38% (n=5) had not sought such care. There were also 30.7% (n=4) participants who selected “Does not apply to me (I have never been pregnant).” Notably, all participants who had previously been pregnant received prenatal care within the first 14 weeks of pregnancy, accounting for 38% (n=5) of participants. There were 23% (n=3) participants who selected “Does not apply to me (I have never been pregnant).” Notably, the number of participants who reported receiving prenatal care is incongruent with the number who had reported a previous pregnancy. Future pregnancy plans among participants include 23% (n=3) intending to conceive within the next year, 15% (n=2) aiming for pregnancy in 1-2 years, 7.7% (n=1) anticipating conception within 3-4 years, and the majority (54%; n=7) planning for pregnancy in 5 or more years.

Table 2*Participant Demographics: Attendance, Age, Distance from Clinic, and Race*

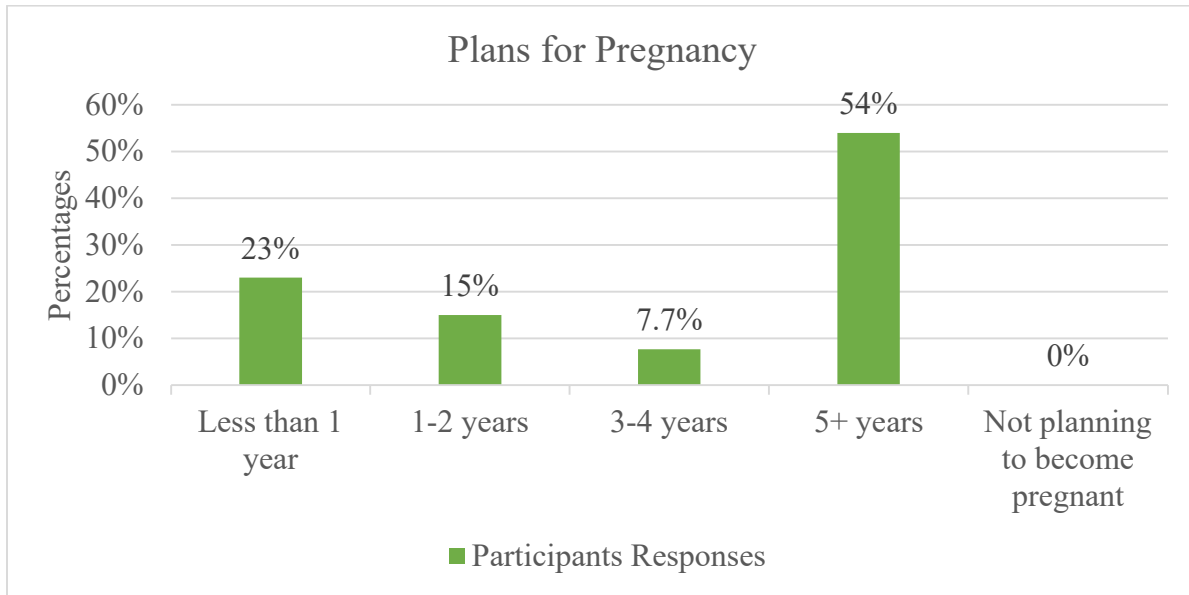
Question	Response	%
Participation		
Flyer in Bemidji, MN	9	69%
Flyer in Pelican Rapids, MN	0	0%
Flyer in Fargo, ND	3	23%
Someone told me	1	7.7%
Age		
18-20	2	15%
21-24	4	30.7%
25-30	3	23%
31-34	4	30.7%
Distance from Clinic		
5-10 mins	12	92%
10-20 mins	1	7.7%
20-40 mins	0	0%
40-60 mins	0	0%
Greater than 60 mins	0	0%
Race		
African American	0	0%
Asian or Pacific Islander	0	0%
Caucasian	9	69%
Hispanic or Latino	1	7.7%
Native American or Alaskan Native	2	15%
A race/ethnicity not listed above	0	0%
African American & Caucasian	1	7.7%

Table 3*History of Pregnancy and Utilization of PCC and Prenatal Care*

Question	Response	%
Previous Pregnancy		
Yes	5	38%
No	8	61.5%
History of PCC		
Yes	4	30.7%
No	5	38%
Does not apply to me (I have never been pregnant)	4	30.7%
History of Prenatal Care		
Yes	8	61.5%
No	2	15%
Does not apply to me (I have never been pregnant)	3	23%

Figure 2

Plans for Pregnancy



Objective One

The first objective of the PIP was to increase PCC and prenatal care knowledge in women of childbearing age. This objective was met because the results of the online educational module showed increased participant knowledge.

Pre- and Post-Intervention Results

The pre-intervention questionnaire contained seven questions that assessed women’s knowledge of folic acid intake, sexually transmitted diseases, teratogens/substance use, healthy body weight, and early, routine prenatal care. The first question required the participant to choose the recommended daily folic acid intake that women of childbearing age should consume. Of the 13 participants, 69% (n=9) answered correctly on the pre-intervention questionnaire, choosing “400 mcg.” On the post-intervention questionnaire, 85% (n=11) answered correctly.

The second question required the participant to choose true statements regarding the effects of sexually transmitted infections, including that sexually transmitted infections can affect

fertility, passed to infant during pregnancy or birth, and may not have noticeable symptoms. On the pre-intervention questionnaire, 85% (n=11) of participants answered the question correctly by selecting “all of the above.” On the post-intervention questionnaire, 92% (n=12) answered this question correctly.

Question three prompted participants to select the substances that have teratogenic effects during pregnancy. In the pre-intervention questionnaire, 92% (n=12) of participants chose all correct answers by choosing “smoking tobacco products, E-cigarettes (Vape pens, Juul, etc.), Secondhand smoke exposure, and Marijuana or CBD use.” In contrast, 7.7% (n=1) chose three out of the four correct answers. In the post-intervention questionnaire, 100% (n=13) chose all four correct answers.

The next question inquired about the effects of being overweight while pregnant and the associated risk factors. Participants had to select all true statements regarding the risks associated with being overweight during pregnancy, all of which were correct. When looking at the statement “Difficulty becoming pregnant,” 69% (n=9) people answered correctly by choosing this answer on the pre-intervention questionnaire, and 85% (n=11) chose this answer on the post-intervention questionnaire. “Gestational diabetes” was chosen by 100% of participants on the pre- and post-intervention questionnaire. “Difficult delivery” was chosen by 85% (n=11) of the participants on the pre-intervention questionnaire, while 100% (n=13) chose it correctly on the post-intervention questionnaire. “Maternal death” was chosen by 69% (n=9) of participants on the pre-intervention questionnaire and by 77% (n=10) in the post-intervention questionnaire.

Question five asked when it is recommended for women to receive medical care during pregnancy. Of the 13 participants, 7.7% (n=1) chose “14 days,” 77% (n=10) chose the correct answer of “14 weeks,” 15% (n=2) chose “20 days,” and there were no participants who chose

“20 weeks.” On the post-intervention questionnaire, 69% (n=9) of the participants chose the correct answer of “14 weeks.”

The last question was about the positive outcomes of receiving PCC and prenatal care, which was only listed in the pre-intervention questionnaire. This question employed a “select all that apply” format, with all response options being correct. There were 69% (n=9) of participants who chose the statement "Decreases the number of babies born with low birth weight," while 77% (n=10) chose the option "Decreases the number of babies born prematurely." Additionally, 85% (n=11) of participants selected the response "Promotes earlier entry into care during pregnancy," and an equal percentage (85%, n=11) chose the response "Increases folic acid intake before becoming pregnant." Since this question was not posed in the post-intervention questionnaire, there are no results to analyze. See Table 4 for detailed results of objective one.

Table 4*Comparison of Pre- and Post-Intervention Knowledge Questions and Responses.*

Question	Response to pre- questionnaire (n=13)	%	Response to post- questionnaire (n=13)	%
What is the recommended daily folic acid intake women of childbearing age should consume?				
100 mcg	0	0%	0	0%
<i>400 mcg</i>	9	69%	11	85%
1 mg	4	30.7%	2	15%
4 mg	0	0%	0	0%
Which answer is true regarding sexually transmitted infections (STIs):				
Can affect ability to become pregnant.	0	0%	0	0%
Can be passed on to the infant during pregnancy or birth.	2	15%	1	7.7%
May not have noticeable symptoms.	0	0%	0	0%
<i>All of the above</i>	11	85%	12	92%
Which of the following can be hazardous during pregnancy? (Select all that apply)				
<i>Smoking tobacco products</i>	13	100%	13	100%
<i>E-cigarettes (Vape pens, Juul, etc.)</i>	13	100%	13	100%
<i>Secondhand smoke exposure</i>	13	100%	13	100%
<i>Marijuana or CBD use</i>	12	92%	13	100%
Being overweight during pregnancy can increase the risk for: (Select all that apply)				
<i>Difficulty becoming pregnant</i>				
<i>Gestational diabetes</i>	9	69%	11	85%
<i>Difficult delivery</i>	13	100%	13	100%
<i>Maternal death</i>	11	85%	13	100%
	9	69%	10	77%
It is recommended that women receive medical care during pregnancy care within the first ___ of pregnancy.				
14 days	1	7.7%	1	7.7%
<i>14 weeks</i>	10	77%	9	69%
20 days	2	15%	3	23%
20 weeks	0	0%	0	0%

Note. Correct responses are listed in italics.

Objective Two

The second objective of the PIP was to understand and assess the attitudes of PCC and prenatal care in women of childbearing age. The objective was met because the results of the online educational module showed an increase in participant attitudes towards PCC and prenatal care.

Pre- and Post-Intervention Results

Two questions on the pre- and post-intervention questionnaires were utilized to evaluate women's attitudes regarding preconception and prenatal care. The first question related to this objective inquired about the participant's attitudes towards receiving PCC. On the pre-intervention questionnaire, 30.7% (n=4) of participants reported they felt PCC is "Extremely Important," while 30.7% (n=4) chose "Very Important," 30.7% (n=4) selected "Moderately Important," and 7.7% (n=1) selected "Slightly Important." No participants chose "Not Important at All." The responses in the post-intervention questionnaire showed that 54% (n=7) selected PCC as "Extremely Important," 38% (n=5) chose "Very Important," and 7.7% (n=1) selected "Moderately Important." No participants chose "Slightly Important" or "Not Important at All." See Table 5 for a visual interpretation of this data.

Table 5*Perceived Attitude Toward PCC Questionnaire Results.*

Question		(5) Extremely Important	(4) Very Important	(3) Moderately Important	(2) Slightly Important	(1) Not Important at All	Mean Score
What is your attitude towards receiving medical care before planning for pregnancy?	Pre (n=13)	4	4	4	1	0	3.85
	Post (n=13)	7	5	1	0	0	4.46

The second question was related to prenatal care and assessed participant attitudes.

Participant responses on the pre-intervention questionnaire consisted of 54% (n=7) reporting that prenatal care is “Extremely Important,” while 38% (n=5) chose “Very Important,” and 7.7% (n=1) selected “Moderately Important.” No participants chose “Slightly Important” or “Not Important at All.” Responses on the post-intervention questionnaire consisted of 85% (n=11) of participants selecting “Extremely Important,” 7.7% (n=1) choosing “Very Important,” and 7.7% (n=1) responding “Moderately Important.” No participants selected that prenatal care is “Slightly Important” or “Not Important at All.” See Table 6 for a visual interpretation of this data.

Table 6*Perceived Attitude Toward Prenatal Care Questionnaire Results.*

Question		(5) Extremely Important	(4) Very Important	(3) Moderately Important	(2) Slightly Important	(1) Not Important at All	Mean Score
How important is it to receive medical care for your pregnancy within the first 14 weeks of pregnancy?	Pre (n=13)	7	5	1	0	0	4.46
	Post (n=13)	11	1	1	0	0	4.77

Objective Three

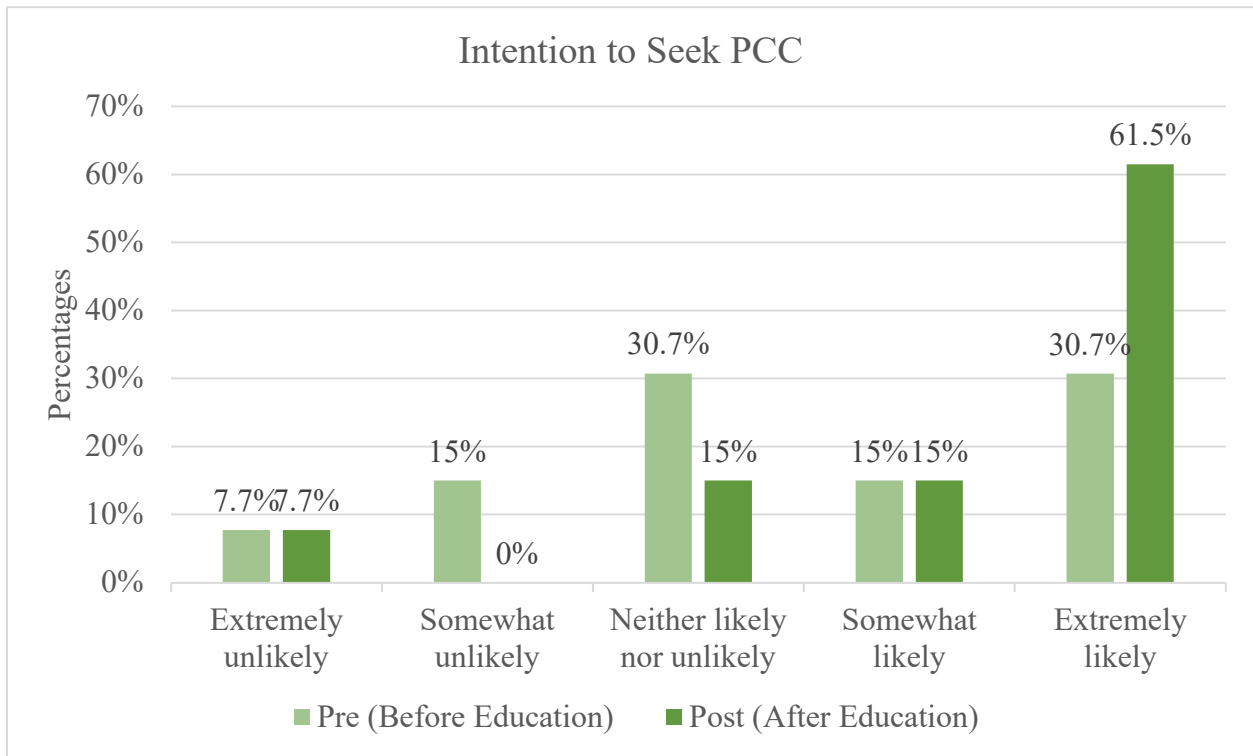
The third objective of the PIP aimed to increase intention to seek PCC during the preconception period and prenatal care during pregnancy in women of childbearing age, including recognition of participants' anticipated barriers to receiving PCC and prenatal care. To meet this objective, four questions were posed to participants. Two questions addressed intentions to seek PCC and prenatal care, while the other two questions addressed anticipated barriers to receiving PCC and prenatal care.

Pre- and Post-Intervention Results

One question asked participants to rate how likely they were to seek PCC before becoming pregnant. The question was stated as follows in the pre-intervention questionnaire, "How likely are you to seek medical care related to pregnancy before becoming pregnant?" Approximately 7.7% (n=1) participant responded that they were "Extremely unlikely" to receive PCC before becoming pregnant, 15% (n=2) responded that they were "Somewhat unlikely," 30.7% (n=4) selected "Neither likely nor unlikely," 15% (n=2) chose they were "Somewhat likely," and 30.7% (n=4) selected that they were "Extremely likely." The question was posed as follows in the post-intervention questionnaire, "After receiving education today, how likely are you to seek medical care related to pregnancy before planning for pregnancy?" The 13 participants who completed the post-intervention questionnaire answered as follows: 7.7% (n=1) responded that they were "Extremely unlikely" to seek PCC prior to planning for pregnancy, no one selected they were "Somewhat unlikely," 15% (n=2) chose "Neither likely nor unlikely," 15% (n=2) chose "Somewhat likely," and 61.5% (n=8) participants selected that they were "Extremely likely." Please refer to Figure 3.

Figure 3

Participant Intentions to Seek PCC Prior to Pregnancy

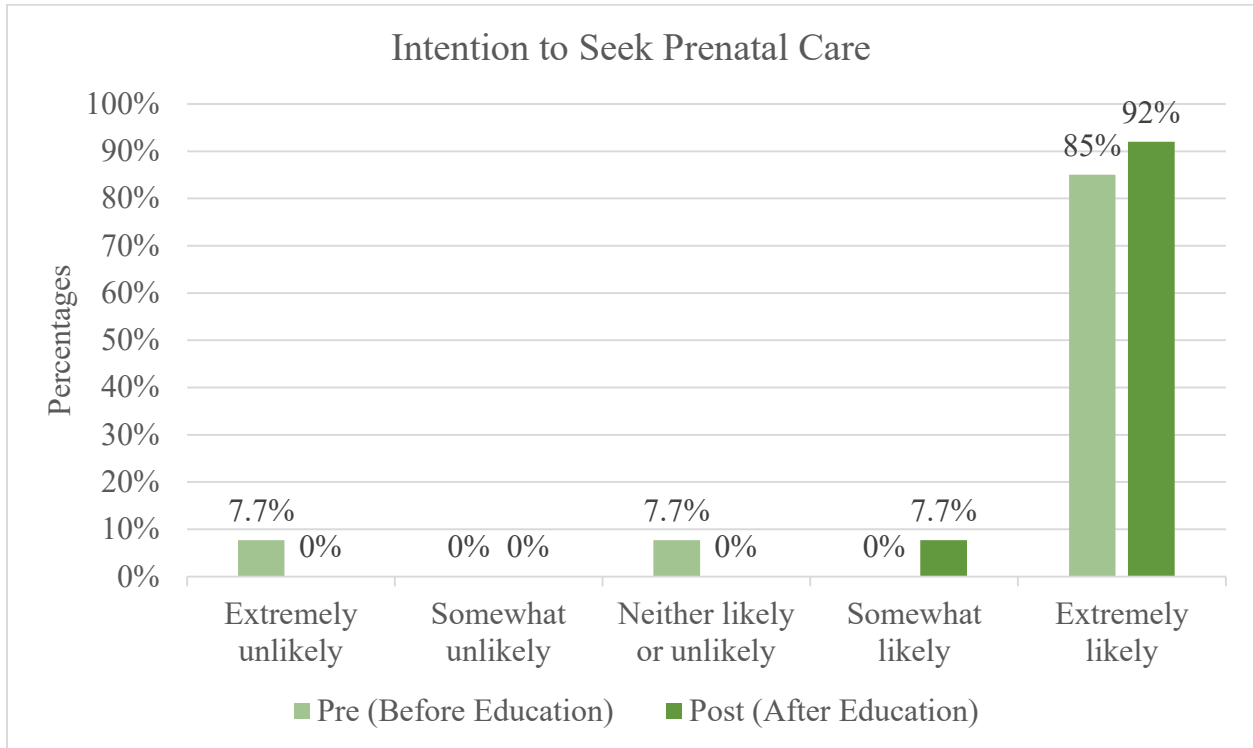


The next question inquired about participants' likelihood of seeking early and routine prenatal care. In the pre-intervention questionnaire, the question was posed as follows: "How likely are you to seek medical care for your pregnancy within the first 14 weeks of pregnancy?" One participant (7.7%) (n=1) reported they were "Extremely unlikely" to seek early and routine prenatal care during pregnancy, no participants selected "Somewhat unlikely," 7.7% (n=1) chose "Neither likely nor unlikely," no participants chose "Somewhat likely," and 85% (n=11) of the participants chose they were "Extremely likely" to receive prenatal care. The post-intervention questionnaire asked, "After receiving education today, how likely are you to seek medical care during pregnancy within the first 14 weeks?" No participants selected "Extremely unlikely," "Somewhat unlikely," or "Neither likely or unlikely," while 7.7% (n=1) chose "Somewhat

likely,” and 92% (n=12) selected they were “Extremely likely” to seek early and routine prenatal care. For specific details, please see Figure 4.

Figure 4

Participant Intentions to Seek Prenatal Care During Pregnancy



Barriers

Two additional questions focused on participants' perceived barriers to receiving PCC and prenatal care in a select-all-that-apply format, allowing participants to select multiple responses.

Participants were asked about perceived barriers to receiving PCC with the following question: “What barriers do you anticipate to receiving pregnancy-related medical care before becoming pregnant?” In the pre-intervention questionnaire, participants could only select one of the answers. The 13 participants answered as follows: 7.7% (n=1) participant selected “Lack of time,” no participants selected “Lack of transportation,” 23% (n=3) participants selected “Cost of

healthcare services,” 7.7% (n=1) participant chose “Not interested in receiving pregnancy-related care before becoming pregnant,” 54% (n=7) chose “No barriers,” and 7.7% (n=1) participant selected “Other (please comment)” and commented, “Already pregnant – surprise pregnancy.” In the post-intervention questionnaire, participants could have more than one barrier as it was a “select all that apply.” There were 30.8% (n=4) participants selected “Lack of time,” 30.8% (n=4) chose “Lack of transportation,” 46% (n=6) selected “Cost of healthcare services,” 23% (n=3) selected they were “Not interested in receiving pregnancy-related care before becoming pregnant,” 46% (n=6) participants chose “No barriers.” No one selected “Other (please comment).” See Figures 5a and 5b for details.

Figure 5

Perceived Barriers to Receiving PCC Prior to Pregnancy—Pre-education, Selecting One Answer.

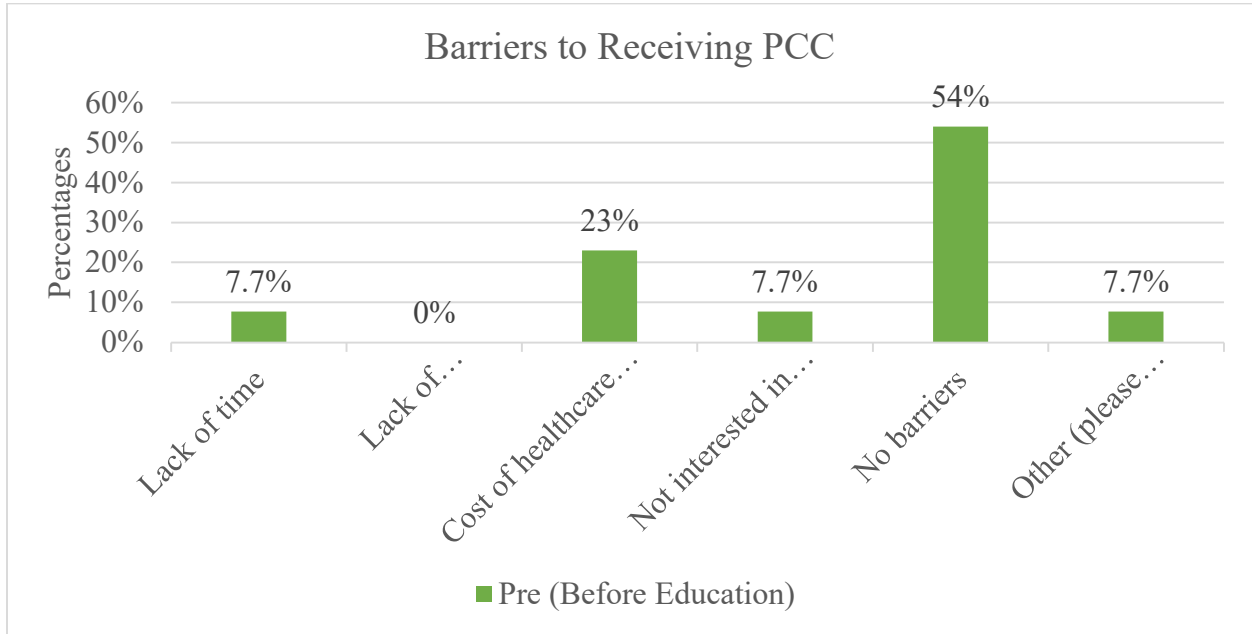
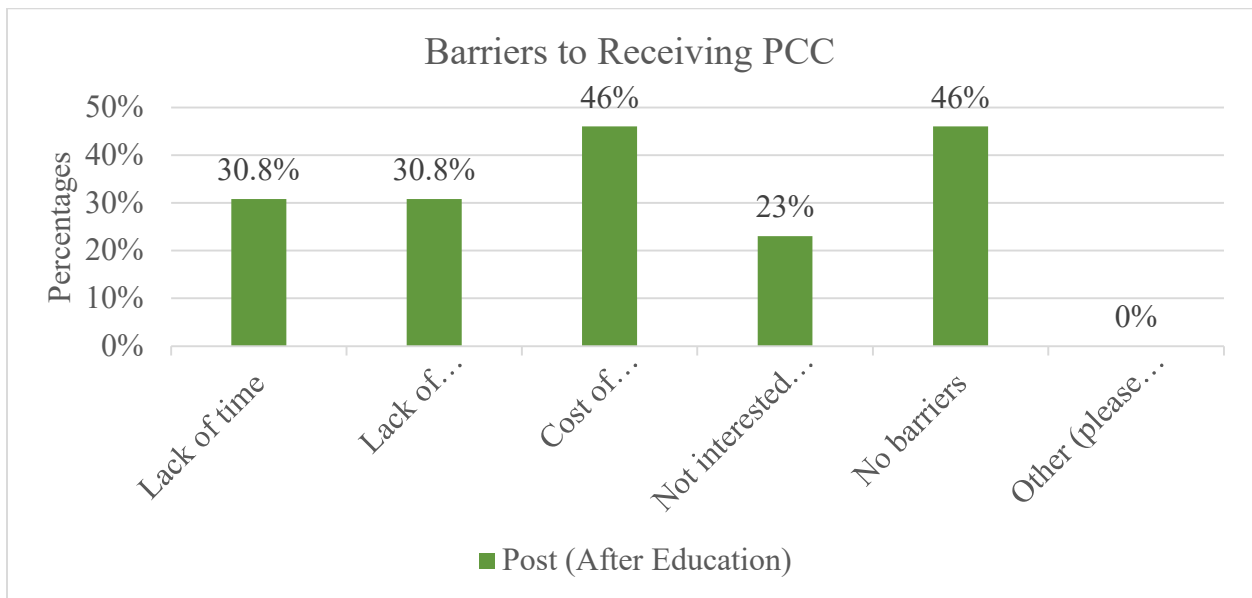


Figure 6

Perceived Barriers to Receiving PCC Prior to Pregnancy—Post-education, Selecting All That Apply.



Participants were then asked about perceived barriers to receiving prenatal care during pregnancy. In the pre-intervention questionnaire, participants were asked, “What barriers do you anticipate to receiving pregnancy-related medical care during pregnancy?” Among the 13 participants, 15.4% (n=2) participants selected “Lack of time,” no one selected “Lack of transportation,” 30.8% (n=4) chose “Cost of healthcare services,” no one selected “Not interested in receiving pregnancy-related care during pregnancy,” 53.8% (n=7) selected “No barriers.” No one selected “Other (please comment).” In the post-intervention questionnaire, participants were asked, “What barriers would affect your ability to seek pregnancy-related medical care within the first 14 weeks of pregnancy?” Participants selected the following responses as perceived barriers to receiving prenatal care: 30.8% (n=4) selected “Lack of time,” 30.8% (n=4) chose “Lack of transportation,” 30.8% (n=4) put “Cost of healthcare services,” 15.4% (n=2) selected “Not interested in receiving pregnancy-related care during pregnancy,” 53.8% (n=7) selected “No barriers.” No one selected “Other (please comment).” See Figures 6a and 6b for details.

Figure 7

Perceived Barriers to Receiving Prenatal Care During Pregnancy—Pre-education, Selecting One Answer.

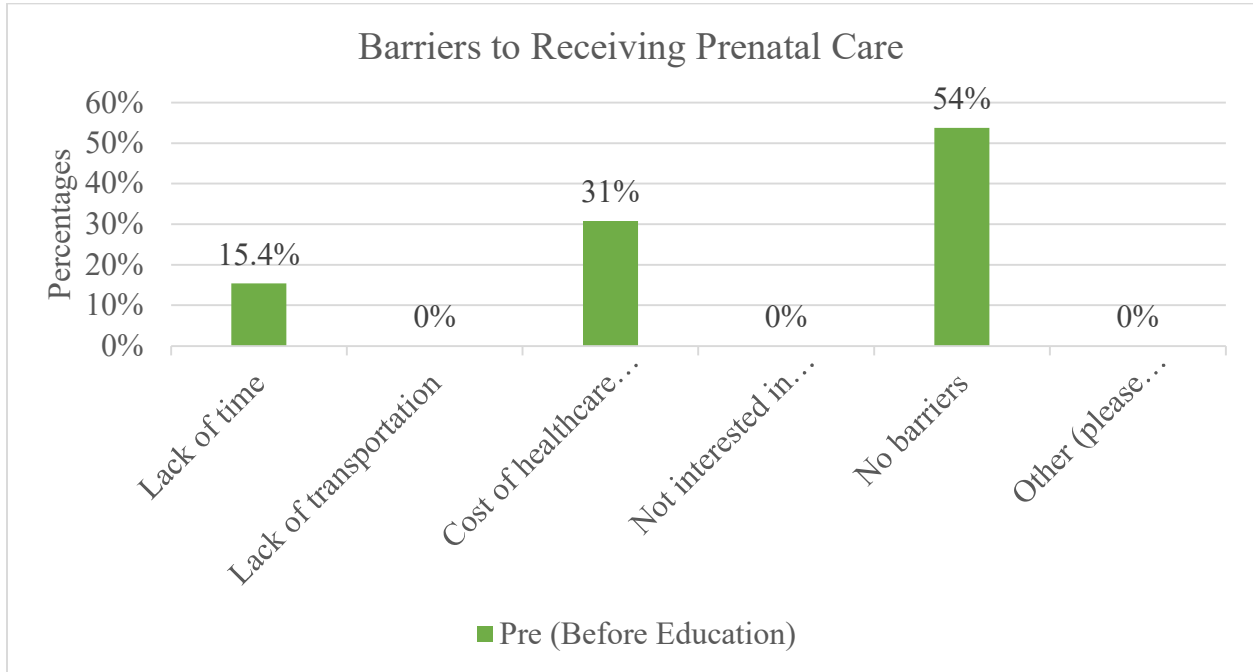
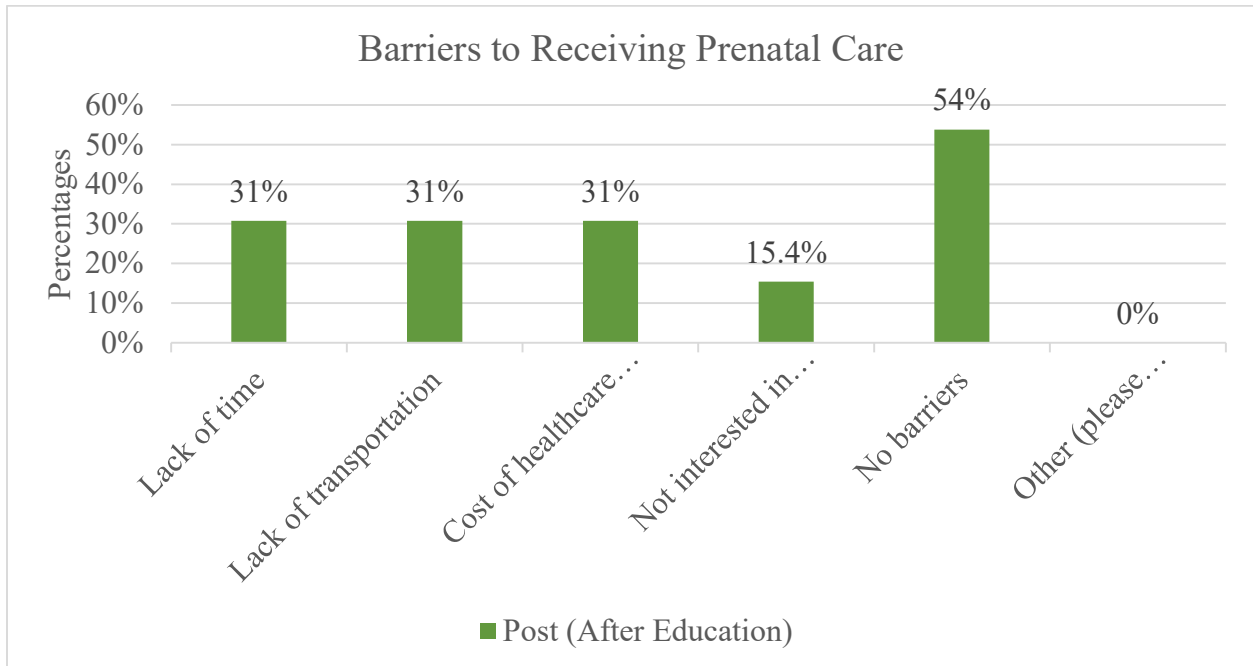


Figure 8

Perceived Barriers to Receiving Prenatal Care During Pregnancy—Post-education, Selecting All That Apply.

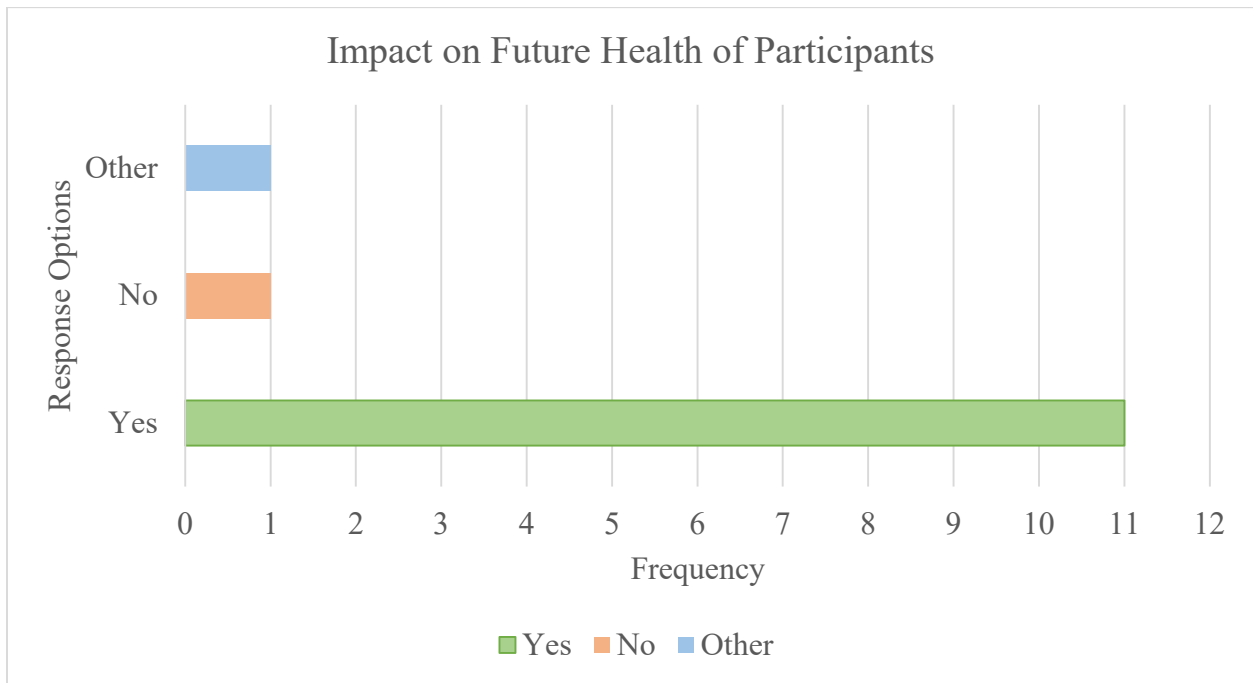


Post-Intervention Questionnaire Evaluation

At the end of the post-intervention questionnaire, the following question was posed: “Do you feel that the education you received today will impact your health in the future?” There were 84% (n=11) of participants who selected “Yes,” 7.7% (n=1) participant selected “No,” and 7.7% (n=1) participant selected “Other (please comment below)” and commented as follows: “It was great information! I did not feel that it was new information for me personally.”

Figure 9

Participant Perceived Impact on Future Health.



Objective 4

The last objective of the PIP was to disseminate a one-page informational document to increase provider awareness of attitudes, intentions, and barriers to receiving PCC and prenatal care in women of childbearing age. To meet this objective, a one-page informational document was developed summarizing this project’s findings on the attitudes, intentions, and barriers to receiving PCC and early and routine prenatal care among women of childbearing age who

participated in the study. The one-page informational document was distributed to nurse practitioners across North Dakota through the NDNPA Facebook page. The informational document included the coinvestigator's contact information to allow for any questions or comments from NDNPA members. The informational document was posted on January 9th, 2024; the post reached 565 people, receiving 28 reactions and two shares. Refer to Appendix H for the one-page informational document.

DISCUSSION AND RECOMMENDATIONS

In summary, this section will include the critical discussion and recommendations emerging from the PIP, focusing on the need for education and awareness about the importance of preconception and prenatal care. Therefore, the PIP used quantitative methods to understand knowledge, attitudes, and intentions related to PCC and prenatal care in women of childbearing age in three rural and underserved communities in ND and MN.

Key findings of the PIP include a notable increase in knowledge, a positive shift in attitudes, and enhanced intentions to seek PCC and prenatal care after participants received targeted education. In addition, the participants identified perceived barriers to receiving care. Participants reported that the education provided in the online module would positively impact their future health. The outcomes of this project affirm that educating women of childbearing age is an effective strategy, positively influencing knowledge, attitudes, and intentions regarding PCC and early, routine prenatal care. Increased awareness of the benefits of PCC and prenatal care has the potential to result in enhanced maternal and neonatal health outcomes (Holcomb et al., 2021).

Discussion

Objective One

Objective one of the PIP focused on increasing PCC and prenatal care knowledge in women of childbearing age by implementing an online educational module. Women who do not have adequate knowledge or awareness of what PCC and prenatal care encompass are less likely to receive these services, acting as a barrier to receiving care and negatively affecting the health of mothers and their children (Poels et al., 2016; Zaçe et al., 2022a). An essential aspect of health promotion is increasing knowledge to positively impact maternal health decisions.

The objective was successfully achieved by disseminating the educational module to the target communities over eight weeks, utilizing flyers and QR codes to facilitate accessibility. The pre-intervention questionnaire assessed participants' knowledge of PCC and prenatal care aspects. The post-intervention results revealed notable knowledge improvements following the completion of the educational module.

Knowledge of folic acid intake recommendations increased from 69% in the pre-intervention questionnaire to 85% in the post-intervention questionnaire. The increase in correct responses indicates improved awareness regarding the recommended daily folic acid intake for women of childbearing age. Folic acid intake in early pregnancy is important because maternal folic acid intake is the most common preventable risk factor for NTD and plays a role in healthy fetal and placental development, especially during neural tube formation in early pregnancy when pregnancy is not known (Kancherla, 2023; van Otterdijk et al., 2022). These facts further stress the importance of folic acid uptake. One study showed that increased uptake of PCC care contributed to initiating folic acid supplementation in women who intended to become pregnant (Sijpkens et al., 2020). Increasing folic acid intake during the PCC period would help the women enter prenatal care with optimal health practices, promoting a healthy pregnancy.

Participant knowledge of the effects of sexually transmitted infections was improved due to the education, with 85% answering correctly before and 92% answering correctly after the education. A heightened understanding of the effects of sexually transmitted infections is important because of their impact on sexual and reproductive health, as STIs are associated with stigmatization, infertility, cancers, and pregnancy complications and can increase the risk of HIV (WHO, 2023c).

The teratogenic effects of substances were well known among participants, with 92% answering this question correctly before receiving education. However, 100% of participants correctly identified the teratogenic effects of substances. These results demonstrate that the educational module effectively enhanced participants' knowledge of substances with teratogenic effects during pregnancy. Women and communities, in general, must be educated on the importance of avoiding known teratogens, which must start early or prior to conception and is essential in preventing congenital disabilities (Kaleelullah & Garugula, 2021).

Knowledge of participants related to the risks associated with being overweight during pregnancy showed that risks such as difficulty becoming pregnant, gestational diabetes, difficult delivery, and maternal death were correctly identified. Post-intervention, there was an improvement in correct responses, indicating increased knowledge about the risks associated with being overweight during pregnancy. Kazemi et al. (2021) showed that counseling, specifically with the health belief model, effectively promoted positive nutritional behaviors in pregnant women with high body mass index.

Knowledge of the recommended time frame to receive prenatal care showed that most participants recognized that care should be received in the first trimester. Results showed that 77% of participants correctly chose "14 weeks," demonstrating a reasonable baseline understanding. These results also show a need for further education on this topic, as 30.8% of participants answered incorrectly on the post-intervention questionnaire. It is important to provide earlier prenatal care and implement prenatal counseling to address and treat risk factors that may cause adverse pregnancy health outcomes. Addressing barriers to care for the patient, the provider, and at a systemic level is important, particularly in rural and underserved women (Krukowski et al., 2021). As statistics have shown, women receive prenatal care more regularly

than PCC, which may be why there is an increase in baseline knowledge of early, routine prenatal care (CDC, 2023a). Although there is room for improvement in prenatal care knowledge, it is important to provide education and counseling on the importance of receiving PCC and early, routine prenatal care to increase awareness of its benefits (Zace et al., 2022a).

Participants had varying levels of awareness of the positive outcomes of PCC and prenatal care, with 69-85% choosing correct responses. These varying levels of awareness likely contribute to the lack of participation in PCC and early, routine prenatal care among some women (Zace et al., 2022a).

Objective one successfully aimed to increase PCC and prenatal care knowledge in women of childbearing age. As evidenced by the pre- and post-intervention questionnaire results, the positive shifts in knowledge help identify the importance of accessible and targeted educational initiatives in promoting informed decision-making and improving reproductive health knowledge among rural and underserved women (Zace et al., 2022a). By identifying gaps in knowledge, healthcare professionals can address gaps by providing education to enhance participation in PCC and early prenatal care (McDonnell et al., 2023). The outcome of this objective emphasizes the pivotal role of education in enhancing women's understanding and knowledge of PCC and prenatal care.

Objective Two

Objective two aimed to assess the change in attitudes towards PCC and prenatal care in women of childbearing age. Although many women know that PCC can positively affect maternal and infant health outcomes, Daly et al. (2022) found that women may be slightly or not aware of risk factors that may lead to adverse outcomes during pregnancy. The results of the PIP demonstrated a substantial positive shift in participants' perceived attitudes towards receiving

PCC when comparing pre- to post-intervention questionnaires. Before the educational intervention, a diverse range of responses was observed, with participants indicating varying degrees of importance regarding PCC. However, a notable change occurred following the intervention, with a significant proportion of participants expressing that PCC was "Extremely Important." There was a 16% positive increase in the mean score when looking at perceived attitudes related to PCC when comparing pre- and post-questionnaire responses. This shift in attitudes suggests that the educational module positively impacted increasing participants' beliefs regarding the significance of PCC in reproductive healthcare. These findings are similar to a study by Daly et al. (2022) that showed a need for increased awareness of pregnancy-related care and risk factors, especially in young, nulligravid, low-income women, to promote positive health changes and prevent adverse outcomes for women, the fetus, and children.

Similarly, a positive shift was identified in participants' attitudes towards prenatal care. The pre-intervention phase revealed a predominant inclination towards receiving prenatal care as "Extremely Important," which was further strengthened in responses to the post-intervention questionnaire. A significant majority of participants maintained or increased the level of importance assigned to prenatal care. Data from 2021 shows that roughly 60% of women attended a healthcare visit within the year before becoming pregnant, and 80% received early, routine prenatal care (CDC, 2023b). The increase of 7% in the mean score of positive attitudes toward prenatal care indicates a positive impact of the educational module on reinforcing the value of early and routine prenatal care.

A successful change in attitudes towards PCC and prenatal care in women of childbearing age was observed following the completion of the educational module. The significant positive shifts in participant attitudes underscore the potential impact of targeted

educational interventions in influencing perceptions and fostering a proactive approach to reproductive healthcare. Further evaluation and exploration of attitudes, along with addressing potential barriers, has the potential to enhance the number of women engaging in PCC and early, routine prenatal care, which can positively impact maternal and neonatal health outcomes (Daly et al., 2022; Zace et al., 2022a).

Objective Three

Objective three of the PIP aimed to enhance the intention among women of childbearing age to seek PCC and early, routine prenatal care. Participant responses using a Likert scale revealed noteworthy shifts in intentions to seek PCC. Prior to the educational video, responses varied in distribution across likelihood categories. After the educational video, a considerable positive change was observed, with a 30.8% difference and a two-fold increase in participants expressing an "Extremely likely" inclination to seek PCC before planning for pregnancy. The overall mean increase in participant intentions to seek PCC was 22%. These results are pertinent because women who are at higher risk for not attending early, routine prenatal care can be identified if they are screened correctly at healthcare visits regarding pregnancy intentions and intent to seek PCC (Blondel et al., 2023). This shift underscores the potential impact of educational interventions in influencing participants' awareness and intentions regarding the importance of seeking PCC prior to conception.

Although rates of women receiving prenatal care are higher than that of PCC, there remains room for improvement in prenatal care attendance. The CDC's (2023) Maternal and Child Health Indicator demonstrates that 89.1% of women in the U.S. in 2021 received prenatal care within the first 14 weeks of pregnancy; this means that 4,233 women did not. The results of the PIP also identified a positive trend in participants' intentions regarding early, routine prenatal

care. Prior to the intervention, 85% of participants already exhibited a high likelihood of seeking prenatal care within the first 14 weeks of pregnancy. Post-intervention, the likelihood of seeking care further strengthened, with 92% of participants expressing an "Extremely likely" stance, showing an 8% overall increase in the likelihood of receiving early, routine prenatal care.

Literature has shown that women's intentions to seek pregnancy-related care improved with educational interventions, further allowing the opportunity to improve knowledge and attitudes for women and their children, further decreasing adverse health outcomes related to pregnancy (Zace et al., 2022a; Zace et al., 2022b) These positive outcomes underscore the potential of targeted educational efforts to increase women's intentions regarding reproductive healthcare.

Additionally, participants identified perceived barriers to receiving PCC and early, routine prenatal care as lack of time, lack of transportation, cost of healthcare services, and not being interested in receiving PCC or prenatal care. Other studies have also shown that women face at least one of the following barriers related to social determinants of health when seeking PCC and prenatal care, including difficulty with appointment scheduling, far distance to care/lack of access to transportation, financial limitations, difficulty getting time off work, lack of medical insurance, no one to take care of children, and time constraints with other things going on in their life (Testa & Jackson, 2021; Woo et al., 2023). There is a need for more significant consideration regarding alternative ways of getting educational information to women of childbearing age, given that many women, especially younger women in particular, reported never having contact with most healthcare provider groups (Daly et al., 2022). As future research progresses on this topic, addressing barriers and assessing the long-term impact of increased intentions on actual healthcare-seeking behavior will be crucial for evaluation and making a sustained practice change to impact healthcare practice positively. Additionally, studies have

shown that making care accessible in rural communities has been effective in increasing uptake and providing education related to PCC and early, routine prenatal care by opening rural hospitals or clinics and offering group pregnancy-related care (ACOG, 2018; Francis et al., 2019; Ruiz, 2024).

Objective Four

Objective four of this PIP aimed to disseminate a one-page informational sheet to the members of the NDNPA to increase provider awareness regarding women's knowledge, attitudes, intentions, and barriers to receiving PCC and prenatal care. The final objective was accomplished by creating and disseminating an informational sheet on the NDNPA Facebook page on January 9th, 2024. The informational sheet emphasizes the importance of collaborative efforts among healthcare providers, communities, policymakers, and individuals in prioritizing effective PCC and prenatal care (Khekade et al., 2023).

Dissemination of the project results aligns with addressing the critical challenge of healthcare providers' need for more awareness and knowledge in implementing effective PCC. Healthcare professionals may need more training to prioritize PCC as an essential component of reproductive healthcare. Consequently, there needs to be more knowledge regarding integrating and delivering preconception care, resulting in missed opportunities for crucial patient guidance and interventions. Disseminating these findings to nurse practitioners raises awareness of the existing barriers to receiving care. Welshman et al. (2023) showed that cultural, individual, social, and psychological factors must be assessed and addressed to positively change behavior and increase PCC and prenatal care utilization.

Effectiveness of the Theoretical Framework

Dr. Nola Pender's Health Promotion Model (Pender, 2011) served as the guiding framework for the project, influencing its design and theoretical underpinnings. The PIP utilized the model to advocate for optimal health among women of childbearing age. Pender's model recognizes how individual characteristics, behaviors, and experiences shape decision-making. The core focus of this framework is to encourage health-promoting behaviors, comprising eight beliefs that shaped the objectives of this project. The specific objectives addressed in the PIP within the health promotion model were to increase knowledge, promote positive attitudes, and enhance intentions regarding PCC and prenatal care. The framework comprehensively considers all factors in an individual's life contributing to overall well-being and motivation for positive changes. Given the target population of rural and underserved women, the literature suggests these women may experience a more significant number of barriers hindering them from receiving timely PCC and prenatal care (Ruiz, 2024; Wendling et al., 2021). The PIP demonstrated increased knowledge, attitudes, and intentions to seek care by providing educational information and allowing participants to apply that knowledge. The successful application of the model positively impacted women's knowledge, which has the potential to impact the health of their future children positively.

The Iowa Model Revised was an essential framework for implementing and completing this PIP (Iowa Model Collaborative, 2017). Key steps from the model were employed, including identifying an issue or opportunity, collecting and evaluating evidence, designing a practice change, sustaining the change, and disseminating results. These steps were instrumental in achieving the project objectives. The Iowa Model Revised facilitated adaptability through feedback loops, allowing for adjustments when necessary. The flexibility of this model ensured

that changes could be tailored to the project's specific needs, contributing to its overall success. Utilizing both theoretical frameworks, including Dr. Nola Pender's Health Promotion Model and The Iowa Model Revised, played a crucial role in completing the PIP, enhancing its comprehensiveness and effectiveness.

Recommendations

After receiving targeted education, participant responses showed a notable increase in knowledge, a positive shift in attitudes, and enhanced intentions to seek PCC and prenatal care. Notably, the PIP results showed a knowledge gap among participants regarding adequate folic acid intake and healthy weight before and during pregnancy. In addition, a known barrier to women receiving PCC and prenatal care is a lack of knowledge and the value of receiving care, reiterating that inadequate awareness is a barrier preventing women from accessing care (Allen-Meares et al., 2020).

The convergence of the PIP findings shows both a gap in knowledge and a favorable response post-education, suggesting that all women of childbearing age should have access to comprehensive and easily accessible educational information on PCC and prenatal care (Kurniawati et al., 2023). While healthcare visits are a primary location for women to receive such information and knowledge, the project findings emphasize the need for further community-based education. The education must focus on the benefits of receiving PCC and prenatal care and reach more women.

Implications for Practice

Despite significant efforts to improve maternal and infant morbidity, the persistently high global rates of neonatal death remained at 2.4 million annually, and almost 800 maternal deaths occurred daily in 2020, calling for urgent action and enhanced healthcare strategies (WHO,

2022; WHO, 2023d). To reduce these tragic numbers, women need to be counseled and educated on the importance of receiving PCC and prenatal care, and this is pivotal in reducing adverse health outcomes for both mothers and children.

Although studies have shown the benefits of PCC on improved maternal and infant pregnancy outcomes, many patients still do not receive adequate care (Atrash & Jack, 2020). Barriers to receiving PCC and prenatal care extend beyond social factors such as time or financial constraints. A significant challenge for women outside healthcare settings is the lack of accessible resources regarding PCC and prenatal care. The results of the PIP were met by providing educational information, showing a notable increase in knowledge, a positive shift in attitudes, and enhanced intentions to seek PCC and prenatal care. Women who are not actively seeking healthcare need access to reliable resources to provide them with information highlighting the importance of PCC and prenatal care.

The CDC (2023) PRAM data from 2021 showed that roughly 60% of women had a healthcare visit within the year before becoming pregnant, and 80% of women began prenatal care within the first 14 weeks of pregnancy. Bridging this gap by making resources and education available to women in diverse settings, especially those rural and underserved, is important to positively impact their health and that of their children. Additionally, seeking collaboration with more community programs and organizations would further maximize the reach and effectiveness of these educational interventions. Studies have shown that educating women can instill increased knowledge and confidence, encouraging them to actively participate in their health and healthcare practices, decreasing inequalities, and improving health (Chen et al., 2015; Zaçe et al., 2022a). Further educating women, especially those who are rural and

underserved, allows them to make informed decisions regarding their health, contributing to decreasing adverse health outcomes.

The findings of the PIP show a positive shift in awareness of essential aspects of PCC and prenatal care by providing education. The increased intention to seek care aligns with promoting maternal and fetal well-being through timely and comprehensive healthcare practices. Additionally, healthcare providers can help identify gaps in knowledge and areas requiring increased need for education and medical interventions. By counseling women of childbearing age during preconception, healthcare providers can help identify women at risk for not receiving early and routine prenatal care (Blondel et al., 2023). The findings of the PIP suggest that further dissemination of crucial educational information related to PCC and prenatal care is imperative. All health care providers should be counseling and educating all women of reproductive age with important evidence-based aspects of PCC and prenatal care, as well as assessing pregnancy intentions.

Implications for Future Practice Improvement Projects

To increase participation rates, a recommendation for future projects would be to recruit participants and provide educational modules in multiple languages. Doing so may increase participant responses to the pre- and post-intervention questionnaires. In addition, collaboration with clinics and other resource centers that provide services to rural and underserved populations would potentially increase this targeted population's participation rates. Lastly, participation rates were highest in the community where the co-investigator connected with individuals in the locations where the promotional flyers were being hung. The co-investigator connected with community members by informing them of the incentive and telling them to inform their friends and family about the opportunity, which seemed impactful and reflected in participation rates.

A second recommendation would be to consider increasing the length of the project recruitment period, the number of recruitment locations, and the number of flyers hung in each community. The co-investigator of the PIP hung flyers in three rural and underserved communities, and they were posted for eight weeks. Initially, only 20 flyers were posted in each community, half recruiting women of childbearing age and the other half recruiting pregnant women. Increasing the duration, locations, and number of flyers may also increase participation and completed responses. Another recommended recruitment strategy would be to verbally promote the educational module to community members and ask women to participate. The community in which the co-investigator spent the most time prompting women about the flyers was the community that had the highest number of participants. Lastly, offering an in-person or group educational session, including information on the importance of PCC and prenatal care, may also increase participation rates and positive outcomes and allow women to ask additional questions.

Dissemination

Dissemination aims to enhance understanding and practical application by incorporating project findings into clinical practice (Melnik & Fineout-Overholt, 2019). To encourage clinical application to practice, the results of the PIP were analyzed and disseminated to nurse practitioners in ND through the NDNPA. First, the project information was distributed at the NDNPA conference in the fall of 2023. Then, a one-page informational sheet included the project title, objective, methodology, outcomes, and findings. The informational sheet was created to increase nurse practitioner's awareness of the knowledge, attitudes, intentions, and perceived barriers to seeking care among participants. Additionally, the completed dissertation

project will also be published in ProQuest. It will be accessible through the NDSU Library website, allowing for further dissemination to those who desire to review it in the future.

Strengths

There are several strengths of this PIP to allow all objectives to be met. First, the online educational module was promoted via QR code on flyers to increase flexibility in participation and accessibility. To recruit participants, those who completed the entire module were entered in a drawing for two \$50 Amazon gift cards. The incentive was intended to increase the likelihood of the target population participating in the PIP, further increasing their knowledge of essential aspects of preconception and prenatal care. Qualtrics technology was also utilized to help increase module completion rates. Qualtrics allowed for hard stops on each question and section of the module, not allowing participants to move on to the next question until the completion of the current question. A hard stop was also placed on the educational video to encourage participants to watch the whole video and complete the module to increase participant knowledge further. Throughout the module, there were prompts to inform participants that they would only be eligible for the incentive if they completed each section of the educational module. These prompts were utilized to encourage participants to complete the entire module, allowing for accurate data analysis and increased quality of data obtained.

Lastly, other strengths include the specific questions utilized to assess each objective of the PIP and the communities in which the PIP was promoted may provide feedback to help make necessary practice changes in the current delivery of PCC and prenatal care. Additionally, all objectives of the PIP were met with the utilization of the online educational module. Participants who completed the entire module showed increased knowledge from their pre-intervention responses to post-intervention responses. An increase in attitude toward and intentions to seek

preconception and prenatal care was also seen. Additionally, perceived barriers to receiving care were identified and reported by participants. Lastly, information was provided to healthcare providers on the importance of educating women of childbearing age to increase knowledge, attitudes, and intentions to seek care.

Limitations

The PIP has multiple limitations. The first is the small sample size. There are several areas where this project could have been improved when considering participation. The goal sample size for the PIP was at least 30 participants to allow for increased representation of the target population. While 30 participants started the module, the completion rate for the entire module was 43.3% (n=13). Inferential statistics were not completed due to the small sample size.

The second limitation is related to recruitment. Although recruitment was completed in the same manner in all three communities, there were no participants from one of the communities. Flyers were posted in English in each community. The community with no participation is one in which many members speak Somali and Spanish. The language barrier may have contributed to the lack of participation.

The third limitation was a lack of monitoring ability. There was a need for more contact between the co-investigator and participants. Since the QR code and weblink were promoted openly to the public, participants may not fit the inclusion criteria for the PIP but may complete the module anyway. The incentive to participate may cause people outside the inclusion criteria to provide inaccurate information when answering pre- and post-intervention questionnaires. To prevent participants from providing inaccurate information, Qualtrics technology was used, and participants could not continue to the subsequent questions without answering the current question. Due to the module being online and the co-investigator not being present when

participants accessed the module, there is a possibility that participants who did not meet inclusion criteria completed the module either to gain knowledge or to be entered into the drawing because of the monetary incentive. Although the promotional flyers used pictures and verbiage to recruit women, there is no way to know if there were participants who did not meet the inclusion criteria. If there were individuals who did not meet inclusion criteria but still chose to participate, such as outside of the age range or of a different gender, the project results may not be accurate.

Another project limitation included discrepancies between the pre- and post-intervention questionnaires. The first was an accidental omission of one question on the post-intervention questionnaire. One of the questions assessing objective one of this project, assessing knowledge, was asked in the pre-intervention questionnaire and not in the post-intervention questionnaire. The question was, “Receiving medical care before and during pregnancy can result in which of the following outcomes?” Because this question was not asked in the post-intervention questionnaire, there is no data to compare participant responses. Since descriptive statistics were used to analyze participant responses, this question was not utilized to assess a change in knowledge. Since five other questions assessed knowledge, this objective was still met.

The second discrepancy between the pre-intervention and post-intervention questionnaires was the questions that assessed participants' perceived barriers to receiving PCC and prenatal care. The pre-intervention questionnaire only allowed participants to select one response, while the post-intervention questionnaire allowed participants to “select all that apply.” However, on both the pre- and post-intervention questionnaires, questions that targeted “perceived barriers to receiving care” allowed for the response “Other (please comment)” and a blank space to leave a comment. Participant insight on perceived barriers was still obtained, and

many participants chose multiple responses on the post-questionnaire, indicating they felt they experienced multiple barriers to receiving care.

Conclusion

In conclusion, the persistently high rates of maternal and fetal morbidity and mortality in the U.S. underscore the urgent need for improved maternal healthcare. This PIP emphasizes the critical role of PCC and early, routine prenatal care in mitigating adverse health events for women and their children. Despite their proven effectiveness, PCC and prenatal care participation remains low, creating significant gaps in care. Addressing barriers such as limited resources and inadequate knowledge about the benefits and risks is crucial in enhancing maternal and neonatal health outcomes.

Despite these barriers, the completion of the PIP brings into focus the transformative impact of educating women on the importance of receiving PCC and early and routine prenatal care. By applying Pender's Health Promotion Model and the Iowa Model, the project demonstrated that educating women can improve knowledge, attitudes, and intentions to seek preconception and prenatal care. If more women begin to seek care, adverse maternal and neonatal health outcomes will decrease. The project also helped identify and recognize common barriers that women perceive as preventing them from accessing or receiving PCC and early, routine prenatal care. Efforts must be intensified to promote widespread access to PCC and routine prenatal care, which can positively and significantly improve the health of mothers, infants, and society as a whole.

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APPENDIX A: IRB APPROVAL



09/08/2023

Dr. Allison Evelyn Peltier
Nursing, Sanford Bismarck

Re: IRB Determination of Exempt Human Subjects Research:
Protocol #IRB0004910, "Preconception and Prenatal Care: Assessing and Influencing Knowledge, Attitudes, and Intentions in Women of Childbearing Age"

NDSU Co-investigator(s) and research team:

- Allison Evelyn Peltier
- Anna Leigh Stibral

Approval Date: 09/08/2023

Expiration Date: 09/07/2024

Study site(s): - Fargo, ND - Pelican Rapids, MN - Bemidji, MN

Funding Source:

The above referenced human subjects research project has been determined exempt (category 2) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, *Protection of Human Subjects*).

Please also note the following:

- The study must be conducted as described in the approved protocol.
- Changes to this protocol must be approved prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.
- Promptly report adverse events, unanticipated problems involving risks to subjects or others, or protocol deviations related to this project.

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.

NDSU has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.

APPENDIX B: PERMISSION TO USE THE IOWA MODEL REVISED



Kimberly Jordan - University of Iowa Hospitals and Clinics <survey-bounce@survey.uiowa.edu>



To: Stibral, Anna

Thu 4/13/2023 1:50 PM

You have permission, as requested today, to review and/or reproduce *The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care*. Click the link below to open.

[Iowa Model - 2015.pdf](#)

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Reference: Iowa Model Collaborative. (2017). Iowa model of evidence-based practice: Revisions and validation. *Worldviews on Evidence-Based Nursing*, 14(3), 175-182. doi:10.1111/wvn.12223

In written material, please add the following statement:

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Please contact UIHCNursingResearchandEBP@uiowa.edu or 319-384-9098 with questions.

Reply

Forward

APPENDIX C: THE IOWA MODEL REVISED: PRECONCEPTION CARE

Identifying Triggering Issues or Opportunities

In the U.S., 861 women died in 2020 due to maternal causes, an increase from 2019 of 754 deaths (Hoyert & National Center for Health Statistics (U.S.), 2022). According to the Centers for Disease Control and Prevention [CDC] (2022), nearly 20,000 infant deaths occurred in the U.S. in 2020. PCC and early and routine prenatal care ensure optimal health for a woman, fetus, mother, and child after birth. Therefore, for women to ensure optimal health for themselves and their fetus(es), during pregnancy and after birth, it is pertinent to receive PCC care and attend early and routine prenatal care visits. Although many women know this care is essential, there remain barriers and a lack of knowledge that prevent some women from receiving PCC and prenatal care, causing significant health outcomes for them and their children.

State the Question or Purpose

Problem Statement: In women of childbearing age (18-34), will providing education on the importance of PCC and prenatal care increase knowledge, attitudes, and health intentions to seek PCC and early and routine prenatal care by the end of the educational module?

Purpose: (a) increase PCC and prenatal care awareness in women of childbearing age and (b) determine if receiving education impacts knowledge, attitudes, and intentions to receive PCC and early and routine prenatal care.

Is this topic a priority? → YES

Form a Team

Name	Role
Anna Stibral	Coinvestigator
Allison Peltier	Chair
Mykell Barnacle	Committee Member
Kelly Buettner-Schmidt	Committee Member
Mary Larson	Graduate Appointee

Assemble, Appraise, and Synthesize Body of Evidence

A thorough literature review was completed between May 2022 and March 2023 to identify factors affecting participation in PCC and prenatal care services and interventions that may promote increased participation. Current literature suggests multiple factors contribute to the lack of participation, including adequate awareness of the negative consequences of not receiving PCC and prenatal care. Literature supports the need to educate women on the importance of PCC and prenatal care, increase awareness and knowledge in women of childbearing age, and increase intentions to seek PCC and prenatal care.

Is there sufficient evidence? → YES

Design and Pilot the Practice Change

A free online educational module to engage women of childbearing age will be promoted within rural and underserved communities via flyers. The flyers will include brief facts about PCC and prenatal care and a QR code and weblink the educational module. The module will focus on the purpose, components, and benefits of receiving PCC and prenatal care. Pre- and post-intervention questionnaires will be embedded in the module for participants to complete to evaluate the module's effectiveness.

Is change appropriate for adoption in practice? → YES

Integrate and Sustain the Practice Change

Data collected will be evaluated once participants complete the online educational module, including pre- and post-intervention questionnaires. This project aims to see an increase in knowledge, attitudes, and intentions to participate in PCC and prenatal care. Outcomes found during data analysis will then be reported to the community, providers, and stakeholders to promote further knowledge regarding PCC and prenatal care.

Disseminate Results

The results of this project will be disseminated to the stakeholders during the final defense of the project. The results will also be disseminated as a poster presentation at NDSU's Student Research Day and through ProQuest to be accessed in the future. A one-page sheet including the education provided to participants will be shared with the NDNPA to inform providers of the findings.

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APPENDIX D: CONSENT

NDSU **North Dakota State University**
Department of Nursing
Campus Address
NDSU Dept. 2670
PO Box 6050
Fargo, ND 58108-6050
701.231.7395

Preconception and Prenatal Care: Assessing and Influencing Knowledge, Attitudes, and Intentions in Women of Childbearing Age

Dear Participant,

My name is Anna S. I am a graduate student in the nursing department at North Dakota State University. I am conducting a research project to educate women on the importance of preconception (before-pregnancy) and prenatal (during-pregnancy care).

Because you are a female between 18-34, you are invited to participate in this research project. If you are younger than 18 or older than 34, please do not participate. Your participation is entirely your choice, and you may change your mind or quit participating at any time without penalty.

Identifying all potential risks in research procedures is impossible, but we have taken reasonable safeguards to minimize any known risks. These known risks include emotional or psychological distress.

By participating in this research, you may benefit from increased knowledge. However, you may not get any benefit from being in this study. Benefits to participants are likely to include advancement of knowledge, attitudes, and intentions to seek care.

It should take about 10 minutes to complete the educational module we ask you to participate in for this study. Upon completion, you will be prompted to enter a drawing for one of two Amazon gift cards for \$50. The goal is 30 participants, so 1 in 15 participants will win.

This study is anonymous. That means that no one, not even members of the research team, will know that the information you give comes from you.

If you have any questions about this project, please contact me at anna.fogarty@ndsu.edu.

You have rights as a research participant. If you have questions about your rights or complaints about this research, you may talk to the researcher or contact the NDSU Human Research Protection Program at 701.231.8995, toll-free at 1-855-800-6717, or by email at ndsu.irb@ndsu.edu.

Thank you for taking part in this research.

APPENDIX E: PRE-INTERVENTION QUESTIONNAIRE

1. How did you hear about this educational module?
 - a. Flyer in Bemidji, MN
 - b. Flyer in Pelican Rapids, MN
 - c. Flyer in Fargo, ND
 - d. Someone told me about it

2. Today, I am:
 - a. 18-20 years old
 - b. 21-24 years old
 - c. 25-30 years old
 - d. 31-34 years old

3. I currently live within ___ of a clinic:
 - a. 5-10 minutes
 - b. 10-20 minutes
 - c. 20-40 minutes
 - d. 40-60 minutes
 - e. Greater than 60 minutes

4. Which of the following best describes you?
 - a. African American
 - b. Asian or Pacific Islander
 - c. Caucasian
 - d. Hispanic or Latino
 - e. Native American or Alaskan Native
 - f. A race/ethnicity not listed above: (Please list here) _____

5. I have been pregnant before:
 - a. Yes
 - b. No

6. I received medical care regarding pregnancy before becoming pregnant:
 - a. Yes
 - b. No
 - c. Does not apply to me (I have never been pregnant)

7. When I was pregnant, I received care during pregnancy within the first 14 weeks of pregnancy:
 - a. Yes
 - b. No
 - c. Does not apply to me (I have never been pregnant)

8. I am planning to become pregnant in the next:

- a. Less than one year
 - b. 1-2 years
 - c. 3-4 years
 - d. 5+ years
9. What is your attitude towards receiving medical care before planning for pregnancy?
- a. 1 = Not important at all
 - b. 2 = Slightly important
 - c. 3 = Moderately important
 - d. 4 = Very important
 - e. 5 = Extremely important
10. How important is it to receive medical care for your pregnancy within the first 14 weeks of pregnancy?
- a. 1 = Not important at all
 - b. 2 = Slightly important
 - c. 3 = Moderately important
 - d. 4 = Very important
 - e. 5 = Extremely important
11. How likely are you to seek medical care related to pregnancy before becoming pregnant?
- a. 1 = Extremely unlikely
 - b. 2 = Somewhat unlikely
 - c. 3 = Neither likely nor unlikely
 - d. 4 = Somewhat likely
 - e. 5 = Extremely likely
12. How likely are you to seek medical care for your pregnancy within the first 14 weeks of pregnancy?
- a. 1 = Extremely unlikely
 - b. 2 = Somewhat unlikely
 - c. 3 = Neither likely nor unlikely
 - d. 4 = Somewhat likely
 - e. 5 = Extremely likely
13. What is the recommended daily folic acid intake women of childbearing age should consume?
- a. 100 mcg
 - b. 400 mcg
 - c. 1 mg
 - d. 4 mg
14. Which answer is true regarding sexually transmitted infections (STIs):
- a. Can affect ability to become pregnant
 - b. Can be passed on to the infant during pregnancy or birth
 - c. May not have noticeable symptoms

- d. All of the above
15. Which of the following can be hazardous to pregnancy? (Select all that apply)
- a. Smoking tobacco products
 - b. E-cigarettes (Vape pens, Juul, etc.)
 - c. Secondhand smoke exposure
 - d. Marijuana or CBD use
16. Being overweight during pregnancy can increase the risk for: (Select all that apply)
- a. Difficulty becoming pregnant
 - b. Gestational diabetes
 - c. Difficult delivery
 - d. Maternal death
17. It is recommended that women receive medical care during pregnancy within the first ____ of pregnancy.
- a. 14 days
 - b. 14 weeks
 - c. 20 days
 - d. 20 weeks
18. Receiving medical care before and during pregnancy can result in which of the following outcomes? (select all that apply)
- a. Decreases the number of babies born with low birth weight
 - b. Decreases the number of babies born prematurely
 - c. Promotes earlier entry into care during pregnancy
 - d. Increases folic acid intake before becoming pregnant
19. What barriers do you anticipate to receiving pregnancy-related medical care before becoming pregnant?
- a. Lack of time
 - b. Lack of transportation
 - c. Cost of healthcare services
 - d. Not interested in receiving pregnancy-related care before becoming pregnant
 - e. No barriers
 - f. Other (please comment) _____
20. What barriers do you anticipate to receiving pregnancy-related care during pregnancy?
- a. Lack of time
 - b. Lack of transportation
 - c. Cost of healthcare services
 - d. Not interested in pregnancy-related care during pregnancy
 - e. No barriers
 - f. Other (please comment) _____

APPENDIX F: POST-INTERVENTION QUESTIONNAIRE

1. After receiving education today, what is your attitude towards receiving medical care before planning for pregnancy:
 - a. 1 = Not important at all
 - b. 2 = Slightly important
 - c. 3 = Moderately important
 - d. 4 = Very important
 - e. 5 = Extremely important

2. After receiving education today, how likely are you to seek medical care related to pregnancy before planning for pregnancy:
 - a. 1 = Extremely unlikely
 - b. 2 = Somewhat unlikely
 - c. 3 = Neither likely nor unlikely
 - d. 4 = Somewhat likely
 - e. 5 = Extremely likely

3. After receiving education today, what is your attitude towards receiving medical care during pregnancy within the first 14 weeks:
 - a. 1 = Not important at all
 - b. 2 = Slightly important
 - c. 3 = Moderately important
 - d. 4 = Very important
 - e. 5 = Extremely important

4. After receiving education today, how likely are you to seek medical care during pregnancy within the first 14 weeks:
 - a. 1 = Extremely unlikely
 - b. 2 = Somewhat unlikely
 - c. 3 = Neither likely nor unlikely
 - d. 4 = Somewhat likely
 - e. 5 = Extremely likely

5. What is the recommended daily folic acid intake a woman of childbearing age should consume?
 - a. 100 mcg
 - b. 400 mcg**
 - c. 1 mg
 - d. 4 mg

6. Which answer is true regarding sexually transmitted infections (STIs):
 - a. Can affect ability to become pregnant
 - b. Can be passed on to the infant during pregnancy or birth
 - c. May not have noticeable symptoms
 - d. All of the above**

7. Which of the following can be hazardous during pregnancy? (Select all that apply)
- a. **Smoking tobacco products**
 - b. **E-cigarettes (Vape pens, Juul, etc.)**
 - c. **Secondhand smoke exposure**
 - d. **Marijuana or CBD**
8. Being overweight before or during pregnancy can increase the risk for: (select all that apply)
- a. **Difficulty becoming pregnant**
 - b. **Gestational diabetes**
 - c. **Difficult deliveries**
 - d. **Maternal death**
9. It is recommended that women receive medical care during pregnancy within the first _____ of pregnancy.
- a. 14 days
 - b. **14 weeks**
 - c. 20 days
 - d. 20 weeks
10. What barriers would affect your ability to seek pregnancy-related medical care before becoming pregnant? (Select all that apply)
- a. Lack of time
 - b. Lack of transportation
 - c. Cost of healthcare services
 - d. Not interested in preconception care components
 - e. No barriers
 - f. Other (please comment) _____
11. What barriers would affect your ability to seek pregnancy-related medical care within the first 14 weeks of pregnancy? (Select all that apply)
- a. Lack of time
 - b. Lack of transportation
 - c. Cost of healthcare services
 - d. Not interested in preconception care components
 - e. No barriers
 - f. Other (please comment) _____
12. Do you feel that the education you received today will impact your health in the future?
- a. Yes
 - b. No
 - c. Other (please comment) _____
-

APPENDIX G: PROMOTIONAL FLYERS

Are you a pregnant
woman between the
ages of 18 and 34?

SCAN THE CODE TO COMPLETE A
SHORT ONLINE MODULE AND WIN!!!



Link to Module:
https://ndstate.co1.qualtrics.com/jfe/form/SV_es8b3i2pigYFu5w

PARTICIPANTS WILL HAVE A CHANCE
TO WIN 1 OF 2

\$50 AMAZON GIFT CARDS

Are you a woman between the ages of 18 and 34?

Participants
will have a
chance to
win 1 of 2
\$50
AMAZON
GIFT CARDS



Scan the
code to
complete a
short online
module and
WIN!!!



Link to Module:
[https://ndstate.col.qualtrics.com/jfe/
form/SV_es8b3i2pigYFu5w](https://ndstate.col.qualtrics.com/jfe/form/SV_es8b3i2pigYFu5w)

APPENDIX H: NDNPA INFORMATIONAL SHEET

Preconception and Prenatal Care:

Assessing and Influencing Knowledge, Attitudes, and Intentions
in Women of Childbearing Age

Objective:

Educate women of childbearing age on the importance of early and routine preconception and prenatal care.

Methodology:

- ❖ An online educational module was accessible via QR code on flyers posted in three rural and underserved communities in north-central MN and mid-eastern ND.
- ❖ 13 women participated and completed the module. The module consisted of a pre-test, a short educational video, and a post-test.

Knowledge



- ❖ Overall knowledge of crucial preconception and prenatal care aspects increased by 8.9%.

Attitudes



- ❖ Perceived attitudes toward preconception care positively increased by a mean growth score of 16% and 7% for prenatal care.

Intentions



- ❖ Intentions to seek preconception care increased by 22%, and intentions to seek prenatal care increased by 8%.

Identified barriers to receiving care:

- Lack of time
- Lack of transportation
- Cost of healthcare services
- Not interested in receiving preconception or prenatal care

Why is this important?

Providing education increases knowledge, attitudes, and intentions to seek preconception and prenatal care. Early and routine care positively impacts maternal and infant health outcomes. Recommendations call for strategies to increase awareness, access, and quality of care for healthcare improvement.

Anna Stibril BSN, RN

Doctor of Nursing Practice Student
North Dakota State University

APPENDIX I: PERMISSION TO UTILIZE PRE-POST QUESTIONNAIRE

Re: Pre/Post-Questionnaire Permisson

Schuldt, Naomi <naomi.e.meier@ndsu.edu>

Thu 5/4/2023 8:22 PM

To: Stibral, Anna <anna.fogarty@ndsu.edu>

Hi Anna,

Yes, you may use the pre and post intervention questionnaires from my project. Good luck with your upcoming proposal!

Thank you for reaching out,

Naomi

APPENDIX J: EXECUTIVE SUMMARY

Preconception and Prenatal Care: Assessing and Influencing Knowledge, Attitudes, and Intentions in Women of Childbearing Age

EXECUTIVE SUMMARY

Overview – Preconception and Prenatal Care in the U.S.

In 2020, the U.S. experienced higher rates of maternal and infant morbidity and mortality compared to other developed countries, underscoring the importance of preconception and prenatal care. Despite their critical role in ensuring optimal health outcomes, barriers, and lack of awareness hinder access to these services. Nearly 20,000 infant deaths occurred in the U.S. in 2020, with maternal deaths reaching 861. Despite increased healthcare spending, goals to lower maternal and infant mortality rates remain unmet. Interventions are needed to address disparities and promote access to quality care for all women, emphasizing the significance of preconception and prenatal care in reducing preventable maternal and infant deaths.

The Problem

Maternal and fetal morbidity and mortality rates remain high in the U.S., underscoring the importance of preconception care (PCC) and early prenatal care. Despite their potential to mitigate adverse health events, PCC rates are low, leaving gaps in care due to barriers such as limited resources and lack of awareness. To address this, the educational intervention targets women of childbearing age and healthcare providers to promote the significance of PCC and early prenatal care, aiming to enhance knowledge and intentions to seek care.

The Solution

Educate women of childbearing age on the importance of early and routine preconception and prenatal care with the use of an online educational module. Accessible via QR code on flyers posted in three rural and underserved communities in north-central MN and mid-eastern ND.

Objectives:

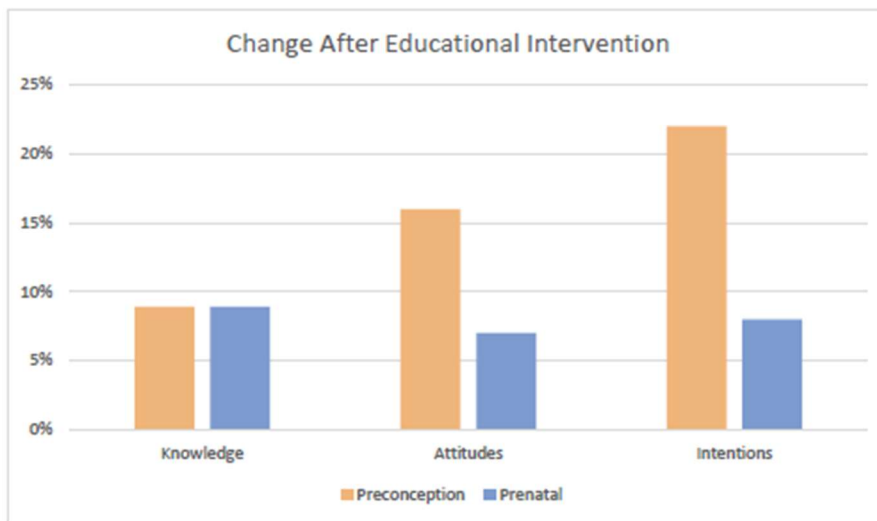
- Increase PCC and prenatal care knowledge in women of childbearing age by the end of the educational module.
- Assess change in attitudes towards PCC and prenatal care in women of childbearing age by the end of the educational module.
- Increase intent to seek PCC and prenatal care in women of childbearing age during the PCC period by the end of the educational module.
- Increase provider awareness by disseminating a 1-page informational document to members of the NDNPA focused on the attitudes, intentions, and barriers to receiving PCC and early and routine prenatal care in women of childbearing age who participated in the project.

Significant Findings

After receiving educational intervention:

- Overall knowledge of crucial preconception and prenatal care aspects increased by 8.9%.
- Perceived attitudes toward preconception care positively increased by a mean growth score of 16% and 7% for prenatal care.
- Intentions to seek preconception care increased by 22% and by 8% for prenatal care.

Anna Stibral BSN, RN
Doctor of Nursing Practice Student
North Dakota State University – School of Nursing



Identified barriers to receiving care:

- Lack of time
- Lack of transportation
- Cost of healthcare services
- Not interested in receiving preconception or prenatal care

Recommendations

Providing targeted education resulted in participants demonstrating increased knowledge, positive attitudes, and intentions to seek preconception care (PCC) and prenatal care. However, a notable knowledge gap persisted regarding folic acid intake and healthy weight maintenance during pregnancy. Lack of awareness remains a significant barrier, underscoring the need for comprehensive educational initiatives accessible to all women of childbearing age. While healthcare visits play a crucial role, community-based education is essential for reaching a broader audience and emphasizing the benefits of PCC and prenatal care. Recommendations advocate for strategies to enhance awareness, access, and quality of care to improve healthcare outcomes.

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- Hoyert, D. L., Ph.D., & National Center for Health Statistics (U.S.). (2022, February 23). *Maternal mortality rates in the united states, 2020*. CDC Stacks. <https://stacks.cdc.gov/view/cdc/113967>How will investors be repaid?

Anna Stibral BSN, RN
 Doctor of Nursing Practice Student
 North Dakota State University – School of Nursing