

Interprofessional Collaboration and Smartphone Use as Promising Strategies to Improve Prenatal Oral Health Care Utilization among US Underserved Women – Results from a Qualitative Study

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Abstract

Objectives: Data on barriers and facilitators to prenatal oral health care among low-income US women are lacking. The objective of this study was to understand barriers/facilitators and patient-centered mitigation strategies related to use of prenatal oral health care among underserved US women.

Methods: We used community-based participatory research to conduct two focus groups with eight pregnant/parenting women; ten individual in-depth interviews with medical providers, dental providers and community/social workers; and one community engagement studio with five representative community stakeholders in 2018-2019. Using an interpretive description research design, we conducted semi-structured interviews and focus groups, which were audio-recorded, transcribed, and analyzed for thematic content.

Results: We identified individual and systemic barriers/facilitators to utilization of prenatal oral health care by underserved US women. Strategies reported to improve utilization included healthcare system-wide change to promote inter-professional collaborations, innovative educational programs to improve dissemination and implementation of prenatal oral health care guidelines, and specialized dental facilities providing prenatal oral health care to underserved groups. Furthermore, use of smartphones offers an innovative entry point to promote utilization of prenatal oral care at the individual level.

Conclusions for practice: Low-income women face multiple, addressable barriers to receipt of oral health care during pregnancy. Inter-professional collaboration holds strong promise for improving prenatal oral health care utilization.

Introduction

Despite the well-documented association between poor maternal oral health and both preterm/low-birth-weight deliveries [1, 2] and increased tooth decay in children after birth [3], many mothers-to-be do not receive timely oral health care [4]. Although recommendations for prenatal oral care have been widely disseminated in the US at both the state [5] and national level [6], utilization remains low. While 76% of expectant women reported oral health problems during pregnancy, 43% of US pregnant women have not had a dental checkup [7]. Dental care utilization during pregnancy is even lower among African American women [8], ethnic minorities [9], and women with socioeconomic impediments [10]. Thus, prenatal oral health represents an important, but often-neglected health disparity [11, 12]. Understanding factors that enable or hinder the use of prenatal dental care is crucial to identify effective strategies to promote oral health in pregnant women.

At the patient level, demographic, socioeconomic, psychological, and behavioral factors affect utilization of prenatal dental care. Among women living in California, a population-based research study found that the primary reason for non-receipt of dental care was lack of perceived need, followed by financial barriers [4]. A survey among 625 women (a predominantly Caucasian population of relatively high socioeconomic status) living in Johnson County, Iowa, revealed that increased prenatal dental visits were

associated with being married, having more frequent dentist visits when not pregnant, having dental insurance, and knowledge of the possible connection between oral health and pregnancy outcomes [13]. Similar effects have been reported globally: Australian [14, 15] and Iranian pregnant women [16] reported that the barriers to utilization of prenatal dental care utilization included lack of knowledge, false beliefs, cost, fear, the limited number of dentists providing care to pregnant women, and inadequate recommendations from health professionals.

At the clinician level, recommending prenatal oral healthcare utilization is not routinely practiced by maternity providers [17, 18]. A national survey [19] among 366 US primary care physicians (PCPs) showed that 37% of PCPs rarely/never provide oral health counseling to their pregnant patients. Being a female PCP, receipt of continuing education on oral health-related topics, perceived preparedness to provide oral health counseling, and counseling adults with other health conditions contribute to increased prenatal oral health counseling [19]. Moreover, the midwives in Australia reported their reluctance to discuss oral health with pregnant women being unawareness of the possible impact of poor oral health on maternal and child health, and lack of appropriate referral pathways to Public Dental Services [20].

Similar data on barriers and facilitators to prenatal oral health care among low-income US women are lacking. Given differences in cultural beliefs, social environments, and health care systems, it is challenging to generalize findings from other populations to women receiving care in underserved settings in the US. To address this gap, we used community-based participatory research (CBPR) [21] to assess perceptions, barriers and facilitators, and patient-centered mitigation strategies related to use of prenatal oral health care by underserved US women and a cohort of medical/dental providers and community/social workers. Qualitative analysis of data used an interpretive description research design with triangulation across multiple data sources.

Methods And Materials

Study Design

We used the Interpretive Description [22] research design, which is best suited to research problems that are rooted in clinical practice. We examined a clinical phenomenon (limited utilization of prenatal oral health care) to identify themes and patterns related to reported perceptions of oral health care among underserved women, medical/dental providers and community/social workers. This design is useful for research to develop a coherent professional narrative that informs clinical practice and promotes the practice or policy change. Throughout the study, we applied the principle of respectreflexivity to build a trustful relationship between study participants and study personnel, based on the strategies of Paterson . This study was approved by the institutional IRB (RSRB72596). We included all points in a checklist of COREQ guidelines [24] for reporting focus groups and interviews.

Research Settings and Procedure

Study Site

This study was conducted in 2018-2019 in Rochester, NY. Rochester is the third most populous city in New York State, with a population of 208,046 residents. We collaborated with two local organizations (University of Rochester and Healthy Baby Network) during development of the study design, participant recruitment, and data collection and interpretation. The University of Rochester is one of the major medical entities in Rochester that provide obstetric services to more than 4,000 pregnant women per year (approximately 40% African American, 40% Caucasian, and 20% others). Three-quarters of these pregnant women benefit from state-supported medical insurance that is provided to low-income groups. The Healthy Baby Network is a Rochester based non-profit social service organization dedicated to improving the health and well-being of mothers and babies by addressing the systemic barriers that cause racial health disparities and prevent healthy births. The Healthy Baby Network provides outreach services to over 200 low-income pregnant women per year.

Eligibility and Recruitment

To be eligible, all study participants needed be to 18 years of age or older. Five types of informants were included. The pregnant or parenting women who participated needed to be pregnant or have at least one child <2 years of age, and be eligible for state-supported insurance (e.g. Medicaid, Blue Choice, MVP Option). The medical providers, dental providers and community/social workers who participated were required to be currently practicing. The fifth group of informants were community stakeholders purposefully selected by the community studio organizer (see below).

Subjects who had decisional impairment or were incapable of making an informed decision about participation in the study were excluded. Recruitment was conducted by face-to-face study introduction by two trained research coordinators, supplemented by word-of-mouth communication. Study participants were purposefully identified and given a consent form to review and ask questions about, prior to the beginning of study activities. Community stakeholders did not require formal consent, in accordance with standard community studio practice.

Focus Group Discussion

Two 2-hour focus groups were conducted among eight pregnant or parenting women, using a semi-structured interview guide (Appendix 1). We asked the women about their experiences and perceptions of obtaining oral health care during pregnancy, and perceptions about promoting women's oral health. The focus group discussions were conducted in private rooms, at locations convenient for participants. A research assistant took notes and audio recorded all focus groups.

Individual Interview

Ten 60-minute semi-structured individual interviews were conducted by a trained facilitator and included four community/social workers, three medical providers and three dental providers. Using a semi-structured interview guide (Appendix 1), we asked questions that addressed perceptions about barriers and facilitators that are associated with utilization of prenatal oral health care, and perceptions about

promoting women's oral health. The interviews were conducted in private rooms, as were done for the focus groups, with a research assistant taking notes and making audio recordings.

Community Engagement Studio

Following the completion of focus groups, individual interviews, and initial data analysis, we conducted a 2-hour Community Studio among five representative community stakeholders to gather their opinions on our initial summary of barriers and facilitators to prenatal utilization of oral health care. The Community Studio method, developed at Vanderbilt, assembles community representatives to provide input into research [25]. Community stakeholders' suggestions were elicited and incorporated into the final data analysis.

Data Analysis

Audio recordings were initially transcribed by the Temi (USA) transcription service, and further verified by two trained research personnel. Transcribed data were stored and analyzed using MAXQDA software (VERBI GmbH, Berlin, Germany). The data were coded with predetermined and later modified open codes using a codebook (Appendix 2). Thematic content was further analyzed using categorizing and contextualizing strategies to understand the factors associated with utilization of prenatal oral health care among underserved women.

Results

Sample

The focus group of pregnant and parenting women were 27 to 32 years of age, with a mean age of 28.4 years. The individual interviews were completed with four social workers, three medical providers (one PCP and two OBGYN), and three dental providers (one hygienist and two community dentists). All participants were female, 34 to 63 years of age, with a mean age of 47.9 years. We reached data saturation by the end of study, when we were no longer receiving new information from additional interviewees.

Women's Experiences of Oral Health Problems During Pregnancy

The focus group of pregnant and parenting women repeatedly reported experiencing dental problems during pregnancy. Many reported not knowing the importance of maintaining good oral health during pregnancy and described seeking dental care during pregnancy as "frustrating" and "did not know it's needed".

Parenting woman: "I had issues with my gums, probably at mid pregnancy, it started swelling, bleed and hurt. But I didn't go to the dentist. I just kind of dealt with it."

Barriers and Facilitators

Comments from all five types of informants were categorized as barriers, facilitators, and strategies or implications for policy-making. Table 1 illustrates the representative quotations. Table 2 summarizes the themes from our analysis of participant comments, separated into identified individual and system-level factors.

Individual-level barrier theme 1 - Socioeconomic hardships and competing interests

A commonly recognized barrier to medical care utilization, socioeconomic hardships, and competing interests, also represents a barrier to utilization of prenatal oral health care. Pregnant/parenting women reported that they could not get to their dental appointments due to lack of babysitting, lack of transportation, and priority of other life events.

Individual-level barrier theme 2 - Lack of awareness of benefits and importance

Another barrier is unawareness of the benefits and importance of prenatal oral health care among pregnant women. Many pregnant/parenting women reported rarely knew the association between poor oral health and adverse birth outcomes, and the importance of maintaining oral health during pregnancy.

Individual-level barrier theme 3 - Lack of awareness of dental coverage from medical insurance

A unique barrier identified is unawareness of dental coverage from medical insurance. A majority of the medical providers, community/social workers, and pregnant/parenting women did not know about the dental coverage by the Medicaid insurance. In addition, they were not familiar with the source of dental clinics that accept Medicaid insurance.

System-level barrier theme 1 - Inadequate inter-professional collaboration

Intriguingly, all participating medical providers, dental providers, community/social workers, and pregnant/parenting women recognized insufficient inter-professional collaboration in promoting prenatal oral health. A majority of the informants acknowledged that the initial introduction of the importance of prenatal oral health should come from medical providers.

System-level barrier theme 2 - Lack of awareness of prenatal oral health guidelines

We identified another system-level barrier as unawareness of the latest practice guidelines among medical, dental providers, and community/social workers. Although some of them knew certain types of prenatal oral health guidelines, none of them were aware of the latest practice guidelines and the recommendations from professional organizations, such as the American College of Obstetricians and Gynecologists or the American Dental Association, both of which clearly state that conditions that require immediate treatment, such as examinations, extractions, root canals, and restorations are important and safe to perform at any time of the pregnancy [26]. Some OBGYNs said they continue receiving requests from dental providers of their pregnant patients for medical clearance to initiate dental treatment. This unfamiliarity of the guideline was echoed by other participating dentists, who reported avoiding providing

dental treatment to women during their 1st trimester, for which the ACOG and ADA recommend as a safe period for receiving dental care.

System-level barrier theme 3 - Insufficient dentists providing treatment to underserved pregnant women

Both medical providers and community/social workers reported that they had referred patients for dental care, but unfortunately, some of their patients were denied dental care due to the pregnancy. Furthermore, the pregnant/parenting women expressed that limited dental clinics accepting their insurance and the long waiting lists exacerbated their unwillingness to visit a dentist during pregnancy.

Facilitators

Individual-level facilitator theme 1 - Constant reminders

A critical facilitator that pregnant/parenting women proposed was “constant reminders.” Participating women stressed the importance of these reminders, which should be introduced by their maternal doctors as early as their first pregnancy visit, and repeated at their follow-up pregnancy appointments.

Individual-level facilitator theme 2 - Raise community awareness via mass media

Pregnant/parenting women suggested raising community awareness via mass media as an essential facilitator to improve the use of prenatal oral care. They recommended the use of commercials, campaigns, bus stop advertisements, health fairs, and community events.

System-level facilitator theme 1 - Strengthen interprofessional collaboration

Strengthening interprofessional collaboration was proposed as a strong facilitator to promote the use of prenatal oral health care. The medical, dental providers and community/social workers specifically commented on several pivotal points that are crucial to a sustainable interprofessional collaboration, including merging the medical and dental electronic record systems, shortening physical distance between prenatal medical and dental offices, creating billable prenatal oral health counseling services, and enhancing collaborations with social service groups.

Innovative Entry Points for Prenatal Oral Health Care Promotion

Through this study, we furthered mapped the elements of real and virtual community with which women interact during pregnancy, demonstrated in Figure 1. The map reveals the potential entry points through which we can promote prenatal oral health to the majority of the underserved pregnant women. These include traditional medical contacts through maternal providers; traditional social circles such as community groups, family and friends; social benefit support groups; children’s community circles (e.g. daycare), and social workers. What stands out as an innovative entry point is the virtual community, through which social media and smartphone apps can spread information.

Parenting woman: "Nowadays, most people will use smartphones. Smartphone will be a good way for patient to get oral health information. For example, if they are pregnant or breastfeeding, they can download an app with professional dental knowledge plugin at every different stage. When they are reviewing pregnancy or breastfeeding related information, noticeable pictures and videos will provide better oral health education, not only for moms, but also for young children."

Parenting woman: "It should be a commercial somewhere, whether it's Facebook and it could be played between a popular show that everyone is watching."

OBGYN: "Many of our moms are members of online support groups. I think Text-for-Baby is one that connects moms with knowledge they need to know during pregnancy."

Discussion

In recent years, federal agencies and professional organizations have mounted a large effort to address an increasingly recognized public health problem, poor prenatal oral health, which has serious implications for maternal and child health. Yet, prenatal oral health care is significantly underutilized in the US (and worldwide), especially among the underserved group.

This study used underserved pregnant women and clarified barriers and facilitators to their use of prenatal oral health care. We applied the principle of respectreflexivity to build a trustful relationship between study participants and study personnel. , we used rigorous qualitative methods to promote validity, in particular triangulation across different data collection methods and different stakeholders. Finally, we identified barriers and facilitators that led to the identification of several innovative strategies and indications for potential policy-making regarding prenatal utilization of oral health care in the community.

Based on our study, we share below four recommendations that have potential to improve prenatal oral health care utilization in underserved US women.

1. Create healthcare system-wide change to promote inter-professional collaborations

Incorporate dental care into the medical care setting. To address the historical problem of inadequate communication between medical and dental providers, collaborations could be facilitated through a shared facilities and particularly electronic record systems. Referrals, reminders, and feedback that could be easily communicated on a shared platform would significantly improve the rate of follow-through for recommended prenatal oral health care.

Promote prenatal oral health counseling by non-MDs. Within the scope of prenatal oral health, the professionals who could make significant impact changes include non-MD providers, e.g., midwives [27], nurse practitioners, the Centering Pregnancy Prenatal Care group [28] and medical technicians. To maintain sustainability, billable prenatal oral health counseling services provided by non-dental providers should be developed.

Improve collaborations with social benefit programs, e.g., Women, Infant and Children (WIC). Use innovative mediators to promote prenatal oral health, such as community/social workers, peer counselors and doulas.

2. Introduce innovative educational programs to improve dissemination and implementation of prenatal oral health care guidelines

A majority of the medical/dental providers and community social worker participants were unaware of the current prenatal oral health care guidelines, so the first step should be to increase the awareness of guidelines. Lee et al investigated to what extent dentists adopted perinatal care practice guidelines [29] and found that correct knowledge about the appropriateness of routine services and emergency procedures for pregnant patients is essential for adherence to practice guidelines [29]. The second step is to identify guidelines implementation strategies to change practice patterns. As Bahrami et al noted, no one implementation strategy is a panacea and few studies have investigated their effectiveness in dentistry [30]. Innovative continuing education programs are critically needed to address this gap.

3. Develop specialized dental facilities to provide prenatal oral health care to underserved groups.

Use a Hub-Spoke model, highly specialized dental facilities that are dedicated to underserved pregnant women could serve as the hub to meet regional patients' needs and educate staff at satellite facilities. The Eastman Institute for Oral Health (EIOH) at the University of Rochester has robust clinical services with a strong community orientation. The most significant recent change to the current prenatal oral care services in Rochester has been the new EIOH Pregnancy and Infant Dental clinic, which is dedicated to underserved pregnant women and their infants.

4. Use social media and smartphones to promote prenatal oral health education and oral health care utilization.

Smartphone health care products have been successfully applied in managing individual behaviors and health conditions [31], such as smoking cessation, weight loss, medication adherence, and Parkinson's disease progression monitoring [31, 32] to name a few. With 77% of Americans owning a smartphone [33], a smartphone app offers a potentially high impact way to provide prenatal oral health interventions. Although there are a plethora of apps available to help expectant mothers anticipate and manage the physical and mental effects of pregnancy, none are available that specifically address pregnancy and oral health. Such an app has substantial potential to help educate pregnant mothers and engage them in the management of their own oral health and hygiene, as well as providing a critically needed source of information on available dental clinics and insurance.

Despite the strengths of this study, our findings need to be cautiously interpreted. First, all study participants in the cohort of medical, dental providers and community/social workers were female, which precludes the generalization of our findings to male clinicians or community/social workers. Second, the study was conducted in only one city. In the US, despite the extended Medicaid health insurance coverage

for pregnant women through public programs, adult dental benefits are optional for states to offer among Medicaid services. As of 2014, seven states provided no dental benefits and only 17 states provided comprehensive adult dental benefits, including New York State [34]. Although insurance coverage was not identified as a barrier in our study, for states where low-income pregnant women lack dental insurance, this represents a major barrier to prenatal utilization of oral health care for disadvantaged women and their infants.

Conclusions

Low-income women face multiple, addressable barriers to receipt of oral health care during pregnancy. Inter-professional collaboration holds strong promise for improving prenatal oral health utilization. System-wide policy changes to improve such inter-professional collaboration should include explicit recommendations for prenatal oral health care from obstetrical/medical providers, effective mediation by community/social workers, and universal practice of guideline implementation by community dental providers. Furthermore, use of smartphones and social media offers an innovative entry point to promote prenatal oral care utilization at the individual level. We plan to test the effectiveness of these innovative strategies in our future studies.

Abbreviations

PCP Primary care physicians

CBPR Community-based participatory research

IRB Institutional Review Board

OBGYN Obstetrician and gynecologist

Declarations

Ethics approval and consent to participate

The study protocols (RSRB72596) were approved by the University of Rochester Research subject review board. All participants were informed of the study objectives and protocols, and gave written consent prior to study activities.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available due to individual privacy but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Author contributions

LW, KF, SB and JX contributed to the conception, design, data acquisition, analysis, and interpretation, drafting and critically revising the manuscript; MS, ELL, EE, MM, DTK and RJB contributed to the conception, design, data interpretation, and critically reviewing the manuscript; JR contributed to data acquisition, analysis, and interpretation, drafting and critically revising the manuscript; RR and MT contributed to data acquisition, data interpretation and critically reviewing the manuscript. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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Tables

Table 1: Illustrative Quotations from Study Informants: Barriers and Facilitators to Prenatal Oral Health Care Utilization		
Barriers	Informants	Illustrative Quotations
Socioeconomic hardships and competing interests	Parenting woman	"I'm not so pressured to figure out dental care for myself, at least not when I have other things going on that's more important than dental care."
Lack of awareness of benefits and importance	Parenting woman	"I wish I knew more about that my dental health has something to do with my baby's health."
Lack of awareness of dental coverage from medical insurance	Social worker	"The population we serve has Medicaid insurance which is comprehensive. But I'm not sure that it's clear to the patients that it includes dental coverage."
Inadequate inter-professional collaboration	Parenting woman	"My provider never told me that was a problem. I started having bleeding gums and then I looked it up online. That's how I know about it."
	Parenting woman	"It would be good if the OB would address this. Have you seen your dentist? That would be one way to make pregnant women go see the dentist."
Lack of awareness of prenatal oral health guidelines	DDS/DMD	"Some patients worry about dental treatment during pregnancy. Currently, we just give patient verbal education, no handouts, we just tell patient due to the hormone change, you need to have better oral hygiene. If there is a guideline that we can show them, it is better."
	OBGYN	"In medical school, we didn't have classes for oral health. None."
Insufficient dentists providing treatment to underserved pregnant women	Parenting woman	"The worst thing of being pregnant is you have toothache. So I'm just going to be honest with you. I had a bad tooth, I was in a lot of pain, but they (dentists) would not pull it because I was pregnant. I had to go to another doctor, acted like I wasn't pregnant and they pulled the tooth out."
	OBGYN	"Oftentimes what comes into play is no one (dentists) will see them (pregnant women). They (patients) told me, they are in too much pain, but the dentists won't do anything, they will ask me can you do something?"
Facilitators	Informants	Illustrative Quotations
Constant reminders	Parenting woman	"I need constant reminders by my OB. When I find out I'm pregnant, that could be a good time to be asked, hey, do you know this will cause problem to your baby? Then, when I go to my next appointment, they ask me, hey, here's some more information about this, the germs in your mouth could be passed to your baby. When I go to my next appointment, I will be asked again, hey, I don't know if you took a look at that paperwork? A constant reminder goes a long way."
Raise community awareness via mass media	Parenting woman	"It (prenatal oral health education) has to be interesting, I would say more of a commercial on TV. Whether I'm eating, or I'm talking on the phone, my eyes are still on TV. I can read what's on the TV, that's going to be in my mind. Even if I don't hear nothing about what they're saying, I'm, at least, going to remember something from that commercial."
Strengthen interprofessional collaboration	OBGYN	"Adding an additional task to an already packed prenatal schedule for medical providers can be challenging. But I think our midwifery colleagues are a bit flexible and they often do some more holistic family care. For example, they make home visits in the neonatal period. Introducing the idea of oral health in that community might be reinforcing."
	PCP	

	OBGYN	<p>“The system for EPIC, I do not think is yet to set up having special health maintenance tabs for pregnancy. But if there was, you could have a health maintenance checklist that says, dental care is overdue or is unsatisfied at this time. That would be a reasonable thing to consider for all pregnant patients.”</p>
	DDS/DMD	<p>“OBGYN, family doctors or pediatricians giving oral health education, potentially, depends on what is involved to satisfy that billing code.”</p>
	OBGYN	<p>“The social workers are also very important for spreading correct oral health knowledge for pregnant women. They can work as a bridge to help mothers getting sufficient dental education and dental care in community.”</p>
		<p>“There is a push currently to offer doula services to a broader range of patients. I think expand Medicaid coverage to cover doulas for lower income populations, who are oftentimes going out to the community to support. So that would be another place to introduce oral health education during pregnancy.”</p>

Table 2. Summary of Barriers, Facilitators, Strategies and Implacations for Policy-Making

Factors	Barriers	Facilitators	Strategies and implications for policy-making
Individual level	Socioeconomic hardships	Receive “constant” reminders [actual reminders from health care navigators and virtual reminders from mobile phone device (e.g., texting, smartphone app)	Use social media and smartphone device to promote prenatal oral health education and oral health care utilization.
	1. lack of babysitting		
	2. lack of transportation	Receive prenatal oral health education and dental resources information on clinic resources and insurance coverage through smartphone device (social media, app)	
	Competing interest		
	Lack of awarens of benefits & importance	Community-wide dissemination via mass media (e.g.,TV commercials) of the benefits & importance of prenatal oral health and dental insurance coverage,	
	Lack of awarens of dental coverage from state-supported medical insurance		
System level	Inadequate inter-professional collaboration	Advocacy by medical providers & social/community workers about the importance of prenatal oral health	Create healthcare system-wide change to promote interprofessional collaborations - Incorporate dental care into the medical care setting: shared physical location & shared electronic record system - Promote prenatal oral health counseling by non-MDs, e.g., nurse practitioners, midwives, medical technicians, and social workers. Billable prenatal oral health counseling service provided by medical providers & staff. - Improve collaborations with social benefit programs (e.g., WIC), use innovative mediators to promote prenatal oral health, e.g., Doula, peer councilors
	Lack of awarens of latest prenatal oral health guidelines		Introduce innovative educational program to improve prenatal oral health care guidelines dissemination and implementation among medical/dental providers and community/social workers
	Insufficient dentists providing treatment to underserved pregnant women		Develop specialized dental facilities providing prenatal oral health care to underserved groups, Hub-Spoke model

Figures



Figure 1

Entry point for promoting prenatal oral health care *WIC, Women, Infants and Children, is a federal assistance program of the Food and Nutrition Service (FNS) of the United States Department of Agriculture (USDA) for healthcare and nutrition of low-income pregnant women, breastfeeding women, and children under the age of five.

Supplementary Files

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- [Appendix1and2.docx](#)