2020

SCHOOL OF MEDICINE
Department of Pediatrics
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

Prevention Research Center for Family and Child Health

Nurse-Family Partnership
Helping First-Time Parents Succeed®

FORMATIVE DEVELOPMENT OF NURSE-FAMILY PARTNERSHIP FOR WOMEN WITH PREVIOUS LIVE BIRTHS

SUMMARY OF METHODS, FINDINGS, AND LESSONS LEARNED

MANDY ALLISON MD MSPH, GREG TUNG PHD MPH, VENICE WILLIAMS PHD MPH, WENDY MAZZUCA BSN MPH, MICHAEL KNUDTSON MS, CAROL FRANCO MA, CONNIE LOPEZ BSN MA, BEN JUTSON MA, ELLY YOST PNP, DAVID OLDS PHD

INTRODUCTION

BY DR. DAVID OLDS

Pregnant women with few resources to cope with living in poverty are at increased risk for bearing children with difficulties regulating their behavior and succeeding in school. These difficulties can be traced to higher prenatal exposures to substances and stress and subsequent compromised caregiving. [1-2] The women themselves are at increased risk for experiencing challenges with gaining economic self-sufficiency and health risks, including premature mortality. [1-4] Nurse-Family Partnership (NFP) is a program of prenatal and infant/toddler home visiting by nurses for low-income mothers bearing first children tested in a series of randomized clinical trials over the past four decades. [5] It has been found to produce replicated effects on maternal and child health and development, [6-19] and in one trial reductions in child mortality for preventable causes and maternal mortality for external causes over a two-decade period following birth of the first child. [20]

Over the past 40 years, NFP has focused on low-income families given that poverty increases the likelihood that mothers and children will have compromised health and development. The needs and benefits are greatest among those experiencing multiple adversities.[5-19] In addition, NFP has focused on women bearing first children for two fundamental reasons:

First, primiparas are going through a major life transition in their roles in life.[5] This transition to parenthood represents one of the most fundamental changes women experience over the life-course, which brings new expectations, fears, and aspirations, all of which, theoretically, make primiparas more open to offers of help from nurses – professionals with widely recognized skills to help women address their needs at this phase in the lifecycle. What will labor and delivery be like? What does this back pain mean? How do I care for a crying newborn? What will postpartum recovery be like? Will I be a good mother? Moreover, to the extent that nurses are able to help women plan the timing of subsequent pregnancies, they are able to help women gain traction in the workforce and become more economically self-sufficient. [21]

Second, we now know that women going through pregnancy, delivery, and care of their first child are experiencing extensive changes in their neuroendocrine systems, changes designed to help them accomplish their evolutionarily programmed mandate to protect and care for their offspring. [22] This rewiring of the brain and endocrine systems represents a deeper biological basis for creating a caregiving system designed to optimize maternal adaptive functioning organized around protecting and promoting the health and development of the child.

Most home-visiting programs for parents serve women irrespective of women's parity. The NFP is one of the few early intervention programs that has focused exclusively on women with no previous live births. In general, trials that claim to have produced effects on women irrespective of parity have not met the highest evidentiary standards. [23] One multi-site trial of Healthy Families New York, a home-visiting program delivered by paraprofessional visitors, concluded that the program was most effective when focused on women with no previous live births who registered during pregnancy and who had higher rates of psychosocial vulnerabilities. [24] It's important to recall that the Denver trial of the NFP

found that nurses produced effects that were twice as large and more enduring than paraprofessional visitors. [17-19]

Low-resource pregnant women living in adverse contexts who have already experienced labor, delivery, and care of a child sometimes have established maladaptive patterns of behavior that may be challenging to re-direct. This may be part of the explanation for the conditional effects observed in the HFNY trial, in which there were no discernible effects for women with previous live births. Moreover, it is important to note that a randomized trial of a home visiting program delivered by nurses was unsuccessful in reducing the recurrence of child maltreatment in a sample of parents already indicated for child abuse or neglect. [25]

In spite of the earlier difficulties found in serving high-risk women with previous live births, we believe we have a responsibility to make a serious effort in developing a version of the NFP that may help these highly vulnerable families - given their substantial needs. We have begun the development and evaluation of a version of the NFP – NFPX - that addresses the unique challenges posed by low-resource pregnant women with previous live births. This work, in keeping with our commitment to developing a strong evidentiary foundation for the NFP, is pointed toward testing this new version of the NFP in a multi-site randomized clinical trial. First, however, we need to make sure that the program is well developed clinically and programmatically. We especially need to address parental motivation for engaging in the program.

Some of the natural concerns and motivations experienced by pregnant women with no previous live births do not apply to this population, making it more difficult to engage them. Having delivered a child already may reduce some mothers' natural and productive anxiety about pregnancy and childbirth; having already experienced care of a child may reduce some of the natural apprehensions about whether they can manage this. This may reduce some multiparous women's motivations to enroll in home visiting programs.

Given these questions and potential challenges, we entered into this work with a sober appreciation of the clinical and programmatic challenges involved in serving this population well and with a deep appreciation for determining with good evidence whether the program can reach and make a difference in maternal and child health for this very high-risk segment of the population. The key questions that have guided our work are posed here:

- To what degree will multiparous women want to participate?
- To what degree can we establish effective referral pathways that ensure NFPX's connection with those in need?
- What are the unique challenges involved in serving multiparous women well?
- Can the NFP be adapted to address these challenges?
- To what degree can primary care providers and community resources be marshalled to effectively to serve low-resource multiparous mothers?
- To what extent does this adapted version of the program make a difference in outcomes of clear public health importance?

The current report summarizes the formative qualitative and empirical research our team has conducted so far to help ensure that NFPX is well developed to serve effectively this vulnerable population.

LEARNINGS

Referrals of Women with Previous Live Births

- Receiving referrals for women with previous live births, multiparous (multip) women, was feasible for NFP sites participating in the formative study.
- Collecting data regarding maternal risk factors for poor birth, maternal life course, and child development outcomes *at the time of referral* is challenging with less than half of referrals including information about risk factors.
- There is a need for initial and ongoing education of referral sources (with existing and new partnerships) to identify eligible multip women. This could be developed in the form of case conferencing for shared clients, in-services or visiting partners with NFP brochures, providing partners with NFP videos that prospective clients would watch, and pairing NFP nurses with specific partners.
- Referral partners' messaging about NFP to potential clients should include NFP as a support service and resource that helps mothers become the best parent they can be.
- Mothers' initial learning of NFP should come from a trusted source like a nurse midwife or primary care physician; some mothers are afraid of social workers. Often, mothers are offered a multitude of resources at initial OB intake and can be overwhelmed. NFP should be re-offered at subsequent prenatal visits.
- Identify an easy, specific process for partners to make and NFP to receive referrals as they do with first-time mothers, primiparous (primip) women.
- Use warm hand-offs where mothers know they are being referred to NFP and that a nurse will be calling them. In sites that share physical space or are co-located, consider having an NFP nurse visit with the prospective client when the referral is being made.
- Best practices for referring mothers to NFP include calling mothers from a landline affiliated with the NFP site, emphasizing the support and connection to resources that NFP can offer, appealing to individual needs and existing strengths of mothers' abilities/parenting knowledge, letting mothers know who referred them, being open and nonjudgmental in initial interactions, offering to meet at a neutral location (rather than the mom's home), and reducing distrust by explaining the role of the nurse in the home (e.g. not a "spy" for Child Protective Services - CPS)

Enrollment and Engagement

- Serving multip clients does not appear to affect retention of nurse home visitors in NFP, although across sites multip clients were assigned to more experienced nurses.
- Enrolling multip women in NFP is feasible with multip women enrolling at similar rates to primip women. Multip clients appear to have similar or better retention in NFP compared to primip clients.
- Develop trust and the nurse-client relationship by truly connecting mothers to access resources (not just making a referral).
- Help clients advocate for themselves (be it in accessing resources or making educated decisions about health care).

- Use text messages to maintain connections between visits and adapting visit schedule to mothers' needs (such as reducing the number of in-person visits).
- Conduct joint visits with other care and community providers.
- Coordinate with other visiting services or parenting programs to complement (rather than duplicate) services.
- Case management is an additional service that many multip clients need. This can take place in the form of a dedicated professional hired by NFP and embedded within the team (e.g. a social worker) or coordinating care with case management professionals working for health care systems.
- A robust education module needs to be developed and made available to all nurses serving multip clients. This module would include background for serving multip clients and lessons learned during the formative study as well as best practices for serving multip clients.
- Multip formative study sites shared the need for ongoing support from the PRC nurse consultant and the importance of the community of practice allowing all multip site nurses to share challenges, successes and best practices.

Collaboration with Providers and Community Resources

- NFP nurse home visitors make more referrals for multip clients compared to primiparous (primip) clients.
- While nurses identify their clients' primary care providers, there is room for improvement in increasing meaningful communication between nurses and these providers. Since there is variation between nurses within sites, nursing supervisors could be supported to use quality improvement practices to achieve more consistency among nurses in terms of collaborating with primary care providers.
- Request specific signed consents with clients to allow for communication with identified care providers.
- Consider integrated electronic medical records with health care systems to share notes, send messages and/or make back-and-forth referrals.
- Increase co-location or badge access with health care providers and clinics which help to legitimize NFP nurses in the minds of patients.
- Identify key healthcare champions who can help other care providers understand the value of NFP and facilitate collaboration efforts.
- Community services/providers who share goals with NFP and are mission-aligned in terms of serving families with few resources and being strengths-based and family-centered are more likely to collaborate with NFP.

Mothers with Substance-Use Disorder

- Multip clients have greater tobacco use based on self-report and risks based on the Strengths and Risks (STAR) framework compared to primip clients.
- NFP nurses can help mothers who use substances advocate for their health and encourage the disclosure of substance use history to their providers
- Health care providers and NFP nurses can create a safe environment free of judgement.
- NFP nurses can provide a support system for substance using mothers that can help guide them to treatment when they are ready.

Mental Health

- Nurses perceive that only about half of their clients with mental health issues can access mental health services and only about a third of those with housing needs can access housing resources. Nurses also stated that increased collaboration with community service providers could help improve clients' access to these services. .
- As a result of the mental health survey findings, a guide has been developed to support sites with hiring a mental health consultant.

GOALS AND OBJECTIVES

Research Team Objectives

1. Determine the feasibility and learn ways of improving the implementation of NFP with multiparous women at high risk for poor birth, parenting, and child development outcomes. Risk factors include previous pre-term births, previous low birth weight infant, homelessness, mental illness, substance use, previous or current involvement with child welfare, less than high school education or GED, history of IPV, medical complications, developmental disability, and adolescent age group (19 years and younger).
2. Evaluate existing criteria, referral sources and process for defining and recruiting the target population of multiparous women.
3. Within the context of serving multiparous women, assess and enhance collaboration and coordination of care between the NFP and primary care providers (Pediatrics, Family Medicine, OB/GYN), child welfare services, mental health and substance use treatment providers, and other community stakeholders; identify key elements for successful collaboration; and create a rubric for evaluating collaboration.
4. Learn from NFP nurse home visitors', supervisors', and administrators' experiences serving multiparous women and multiparous women's experiences in the NFP program to identify and strengthen program elements that are critical to serving this population.
5. Identify successful practices for serving multiparous women to inform the creation of program elements and educational materials.

Participating NFP Site Objectives

1. Implement the NFP program with multiparous women at high risk for poor birth, parenting, and child development outcomes. Risk factors include previous pre-term births, previous low birth weight infant, homelessness, mental illness, substance use, previous or current involvement with child protective services, less than high school education or GED, current or history of IPV, and adolescent age group (19 years and younger).
2. Provide qualitative and quantitative information to the research team to inform our understanding of serving multiparous women.
3. Develop and strengthen relationships with primary care providers (pediatrics, family medicine, OB/GYN), child welfare services, mental health and substance use treatment providers, and other community stakeholders with the purpose of providing NFP multiparous clients with collaborative care across systems.

4. Identify and share lessons learned from serving multiparous women to determine NFP program elements that are critical to serving this population.

SITES

Multip sites had to meet certain criteria to be eligible to participate in the formative study. Those criteria include:

- Secure funding for length of pilot
- Commitment from all staff and no conflicting projects
- Commitment to collaborate with primary care and child protective services
- Ability to enroll (room on caseload and no waiting list)
- Mixed caseload of primips and multips
- STAR proficiency and a willingness to enter into DCS
- Minimum of 3 full time NHVs (or part time equivalents)
- Agree to meet with PRC consultants monthly
- Agree to participate in qualitative data gathering

Sites entered the study in two waves. Wave 1 sites completed orientation and began enrolling multip clients in September 2017. Wave 2 completed orientation began enrolling in January 2018. Six additional teams joined Wave 2 between February and April of 2019. A total of 35 teams in 28 sites are serving multips in 15 States. One team discontinued taking multip referrals in June 2019 because they had a waitlist of approximately 100 women, which included multips and primips. The participating sites are listed in Table 1.

Table 1. Multip Formative Study Participating Agencies

AL:	Birmingham NFP
AR:	ADH Delta Region
CT:	NFP of Eastern Connecticut (VNA)
CA:	SPAs 1,2,3,4,6,7 and 8
CA:	NPF of San Francisco
IL:	Carle-Premier
IN:	Goodwill
MN:	MVNA
MO:	Building Blocks of Southeast Missouri (SEMO)
NC:	Buncombe County
	Care Ring
OH:	Help Me Grow Brighter Futures – Premier
OR:	Early Childhood Services – Multnomah County
	Jackson
PA:	Allegheny County Health Department
	Berks County
	Erie County Department of Health
	The Foundation for Delaware County (formerly Crozer-Keystone)

	Maternal and Family Health Services
	Pinnacle Health
	NFP of Bethlehem (St. Lukes) - no longer taking multip referrals
	Wyoming County
MT:	Butte & Billings (AKA Riverstone)
	Tri-County
WA:	Clark County
	Spokane
	Thurston County
WI:	Eau Claire
	Kenosha

An initial orientation was provided to all multip sites before they could begin enrolling and included the following:

- Background on serving multips in formative work
- Goals and objectives for multip formative work
- Criteria for site selection
- Risk factors for multip eligibility
- Timeline for Pilot (Wave 1 and 2)
- Expectations for sites, NSO and PRC
- Data collection requirements
- Marketing materials
- Multip facilitator development

DATA COLLECTION

Qualitative Research

The qualitative research team consists of the lead mixed methods specialist, Greg Tung, and three professional research assistants. We conducted a series of interviews from selected sites to understand nurse home visitors', nurse supervisors', and other staff members' experience in serving multip clients. Additionally, we interviewed multip women who were referred to the NFP program and refused to enroll or enrolled in the program and dropped out. Our goal in conducting these mother/client interviews was to learn about their experiences in being referred to the program and their decisions to enroll or disengage. We used an adapted grounded theory approach to conduct multiple waves of qualitative data collection. Interviews were recorded, transcribed, de-identified, and formally coded in Nvivo 11 (qualitative research software). Coding comparison Kappa statistics were used to guide coding meetings and ensure consistency. Coding queries were used to aggregate data by domains and themes and then synthesized into memos that described and summarized individual themes. Memos were then shared with an expert advisory committee.

Multip Site Interviews. The goal of the multip site interviews was to understand the challenges, barriers, and opportunities faced by NFP in the implementation of the formative study at participating

NFP sites. We wanted to evaluate the introduction of the NFP innovation to expand the program to multip women and determine its feasibility and to identify challenges and barriers to collaboration with key organizational partners, such as primary care providers, as a foundation for developing approaches to addressing these challenges.

Study participants for multip site interviews consisted of employees and administrators associated with NFP and employees of key organizational partners what were involved with or had knowledge about the aspects of the formative study. The qualitative research team constructed an interview guide with major themes that included: recruitment and outreach, referral practices, enrollment strategies, collaboration with health care, and challenges with serving multips. Three sites in Phase 1 and three sites in Phase 2 were selected to participate in interviews. Sites were chosen by variation in geographical location, urban or rural setting, and degree of collaboration under the advisement of the project team and research team leadership which includes experts on health care integration, program experts, and nurse consultants.

Phase 1 consisted of 33 interviews and were conducted between October and December 2017.

Table 2. Phase 1 Interviews Participant Summary

Participants	Goodwill IN	MVNA MN	Buncombe NC	**Total**
Nurse Home Visitors	3	8	6	**17**
Nurse Supervisors	1	3	1	**5**
Other NFP Staff	1	0	2	**3**
Health care provider	4	0	3	**7**
Non-Health care provider	0	0	1	**1**
Total for Site	**9**	**11**	**13**	**33**

Our second phase of interviews were conducted between May 2018 and March 2019. The team completed 43 interviews in Wave 2.

Table 3. Phase 2 Interviews Participant Summary

Participants	Erie County PA	Carle IL	Riverstone MT	**Total**
Nurse Home Visitors	3	8	3	**14**
Nurse Supervisors	1	2	1	**4**
Other NFP Staff	1	3	1	**5**
Health care provider	2	2	0	**4**
Non-Health care provider	4	3	3	**10**
NSO staff/PRC consultant	3	2	1	**6**
Total for Site	**14**	**20**	**9**	**43**

Interviews were transcribed, validated, and coded by the qualitative research team. Memos were written to synthesize data across sites (see Appendix 1).

Client and Mother Interviews. The qualitative research team conducted interviews with multip women who were referred to NFP but did not enroll in the program or were enrolled in NFP but later

disenrolled. The purpose of the interviews was to understand the experiences, challenges, barriers, and opportunities faced by clients and potential clients of NFP. Our goal was to understand two specific phenomena: 1) the first is how clients who participate in NFP experience the program and what important factors shape their perspectives and what they value in the program, what they do not value in the program, and how these factors influence their retention; 2) the second is why multip women choose not to participate in NFP after being referred, examining variation in non-participation by institutional partners such a primary care doctors and human services agencies. We were specifically interested in clients with risk factors for poor pregnancy and life-course outcomes who referring agencies believed would benefit from the NFP program but who ultimately declined to participate or were a challenge to retain in the program. Participants were asked to share their perspectives and experiences related to their participation in NFP. Potential clients who had declined to participate in NFP were asked about their decisions to decline participation and to offer their perspectives on what can be done to improve the likelihood of enrollment.

The interviews were conducted between August 2019 and March 2019. In consultation with the larger project team, we selected three sites to obtain contact information from clients who met the following criteria: a) refused services, b) enrolled and later dropped out of the program (i.e. disenrolled, which includes clients who voluntarily left the program), or c) were terminated from the program (terminated includes being discharged by nurses for any reason, such as canceling appointments or moving outside of the service area). The qualitative team attempted to call 288 mothers/clients whose names were provided by the 3 selected NFP sites serving multip clients. We completed a total of 23 interviews from the 3 NFP sites.

Table 4. Client/Mom Interviews Reason for not Participating in the NFP

Reason. N=288	**Goodwill**		**Buncombe**		**Thurston**		**All Sites**	
	Count	Percent	Count	Percent	Count	Percent	TOTAL	TOTAL %
Unable to Locate	94	50%	20	35%	8	19%	122	42.4%
Refused Participation	71	38%	12	21%	17	40%	100	34.7%
Other	8	4%	21	37%	0	0%	29	10.0%
Terminated	9	5%	0	0%	1	2%	10	3.5%
Disenrolled	6	3%	4	7%	4	9%	14	4.9%
Unknown	0	0%	0	0%	13	30%	13	4.5%
TOTAL	**188**	**100%**	**57**	**100%**	**43**	**100%**	**288**	**100**

Interviews were conducted by phone and recorded with the participant's consent. Recordings were transcribed by a contracted transcriptionist and validated by the research team. Validated transcripts were coded, and memos were written to synthesize data across providers (See Appendix 2 for list of memos).

Health Care Provider Interviews. The qualitative research team conducted interviews with health care providers regarding their collaboration with NFP nurses. The goal of the interviews was to understand how health care providers such as family medicine, obstetric and pediatric care providers perceive NFP, what their interactions with NFP looked like as well as to identify examples of care coordination and

recommendations for improving collaborative activities to best serve NFP mothers and their families. The rationale for this work was driven by early qualitative findings that multip clients have complex overlapping risks that require care coordination with various community services including primary care to best meet their needs.

We interviewed 21 health care providers between April and September 2019 from one study site (Clark County NFP that serves two counties). We initially interviewed the nursing supervisor for this site. From there, through snowball sampling, we identified health care providers from collaborating health systems in the two counties.

Table 5. Provider Interviews Participant Summary

Participants	Clark County NFP
NFP Nurse Supervisor	1
Family Medicine Physicians	3
OB Physicians	2
Pediatric Physicians	2
Nurse or Nurse Midwife	3
Social Worker/Patient Navigator	8
Hospital Executive	2
Total for Site	**21**

Interviews were conducted by phone and recorded with the participant's consent. Recordings were transcribed by a contracted transcriptionist and validated by the research team. Validated transcripts were coded, and memos were written to synthesize data across providers.

Note: Funding from the NSO did not cover the expenses for this work but allowed us to receive additional funding from the University of Colorado, School of Medicine's Frankenburg-Camp Project funds to support complimentary and additional interviews with health care providers as summarized in Table 5.

Interviews of Mothers with Substance Use Disorder (SUD). The qualitative research team conducted interviews with women currently receiving treatment from a substance use treatment center and who were currently pregnant or within one year postpartum. The goal of the interviews was to understand the experience of women with opioid use disorder (OUD) and other substance use disorders (SUD) with the health care system and community health providers during pregnancy, childbirth, and the first year of their infants' lives. We also wanted to understand how their pregnancy and delivery were impacted by OUD and SUD, how they managed pain during pregnancy and delivery, and any factors that made their experience easier or harder. Our intent is to use the information we gain from this study to identify potential additions or changes to NFP to better serve women with OUD and SUD. In addition, this study will provide insight into the perspectives and experience of women with OUD and SUD during pregnancy, childbirth, and early parenting and will give these women 'a voice' as we pursue our goal of understanding whether and how NFP can adapted to improve outcomes for this population.

We conducted a total of 24 interviews between June and October 2019. Women were recruited from partnering substance use treatment centers located in the Denver, CO Metro area: Aspen Center, Denver Health, and ARTS (Addiction Research and Treatment Services).

Quantitative Research

The quantitative research team included Mandy Allison, David Olds, Venice Ng Williams, Mike Knudtson, Wendy Gehring, and Wendy Mazzuca. The team gathered quantitative data from multiple sources including ETO data, referral spreadsheets, and surveys. Our goal was to understand the characteristics of multip referrals and clients, NFP sites' collaboration with health care providers, and differences in multip clients versus primiparous clients.

ETO Data Elements. The data operations team used data from ETO to produce monthly reports describing referral sources, the multip population referred to NFP, features of the multip population including enrollment and retention rates, risk factors identified by validated screening tools and the Strength and Risks (STAR) Framework, and referrals to community resources. This information was used to understand the characteristics of multip clients engaging in the NFP and how they compare to traditional primip clients of the NFP (See Appendix 3 for ETO Data Analysis Plan).

Multip Referral Data Spreadsheet. A spreadsheet was developed to capture details on multip referrals. We used the referral sheet data to understand risk factors, reasons for refusal, and the types of referral sources (see Appendix 4 for referral spreadsheet). All sites submit the referral spreadsheet at the end of each month and data are compiled by PRC research staff.

Coordination of Care Survey. To understand how and when NFP staff engaged with health care providers, community resources, and social services, we conducted a series of surveys using REDCap online data collection and administered online surveys to all nurses and supervisors in the 31 multip sites. The survey was developed by study team at the PRC and was sent to the Innovations Advisory Committee (IAC) teams for pre-testing. Non-multip serving NFP sites were invited to 1) complete the survey and 2) participate in a phone call de-brief on survey length, question flow, answer options and whether the questions made sense. The survey was pre-tested with nurses and/or nursing supervisors from 2 NFP sites. The goal of the survey was to identify whether NFP nurses and supervisors communicated with their clients' health care providers, such as OBGYN or pediatricians; to understand the depth of communication, to compare differences in communication for multip versus primip clients and to measure differences in communication over time. We administered three surveys to Wave 1 sites: a) baseline, b) 6-months follow-up, and c) 15-month follow-up and three surveys to Wave 2 sites: a) baseline survey, b) 9-month follow-up, and c) 15-month follow-up (December 2019).

Health Care Provider Collaboration Survey and Program Analyses. NFP nurses must coordinate with other community services to be most effective, but no studies have assessed the degree to which NFP nurses collaborate with community providers and the effect of collaboration on program outcomes. Dr. Venice Ng Williams' PhD dissertation used qualitative findings from the formative study to develop a survey and measure collaboration across NFP sites in the United States. For the survey, she integrated and adapted validated survey measures of collaboration (relational coordination and shared resources including physical space and policies). Collaboration was measured for nine provider types: four health care (obstetrics, pediatrics, mental health, substance use treatment) and five social services (WIC, Child Protective Services, parenting programs, housing resources, Early Intervention) The survey was pretested with NSO representatives and piloted with nurses from the Innovations Advisory Committee.

The survey was revised based on pretest and pilot feedback. It was officially implemented in October 2018 over six weeks via Qualtrics to all NFP nursing supervisors in active NFP agencies in the United States. No incentives were offered. She sent reminder emails and included a blurb in the monthly NSO communications to improve response rates.

She then merged survey data with national NFP Implementation Data to examine the relationship between collaboration and program outcomes using a random effects model, controlling for client-, nurse, and agency-level characteristics. The three major outcomes examined were 1) client retention (at child's birth, 6 months postpartum, 12 months postpartum, 18 months postpartum and 22 months postpartum), 2) client smoking cessation (prenatally, postpartum and both prenatally and postpartum) and 3) childhood injury/ingestion (as measured through reports of emergency-room encounters and hospitalizations). Client-level covariates included race, ethnicity, age, high school completion, marital status, mastery, whether their nurse left the program prior to child's birth, and health (co-occurring substance use if tobacco user, high blood pressure, diabetes, mental health). Nurse-level covariates included nurse tenure in NFP and their highest nursing education level. Agency-level covariates were agency type, years implementing NFP, rurality (based on Rural-Urban Continuum Codes) and whether the agency serves multiple counties. Predictors of interest were measures from the Collaboration Survey: 1) relational coordination defined as high-quality communication reinforced by high-quality relationships and 2) structural integration defined as shared facility space, information/data, policies/contracts and funding. Collaboration with nine provider types were included in the models along with covariates identified above and a nurse-level random effect to control for nested data.

Informal Information Gathering

Multip Monthly Consultation Calls. Initially, calls were held each month with all participating multip sites to discuss implementation. These calls were scheduled for one hour and included the PRC nurse consultant (Wendy Mazzuca or Elly Yost), nurse supervisor and nurse home visitors serving multip clients. On these calls, updates were provided regarding the formative study and nurse home visitors were encouraged to share experiences in serving multip clients and to share recommendations for additional resources and adaptations. The consultant also assessed referral and enrollment status and discussed strategies for collaborating with referral partners.

Monthly consultation calls continue for all sites who have requested this support. In addition to individual site calls as needed, two calls are held each month where all sites can join. These calls give the nurses and supervisors an opportunity to connect and share lessons learned, including successes and challenges with serving multip clients. These calls are held on the 3rd Tuesday at 10MT and the 4th Friday at 10MT. Notes from these calls are disseminated after the 2nd call. (Can include a sample agenda).

Sites visits have been conducted and serve as a way for the teams to meet the PRC Nurse Consultant (NC) and for the PRC NC to learn about the communities being served in the Formative study, to meet with leaders in the community, and to learn about additional support needed.

Multip site visits have been conducted in the following States:

- North Carolina
- Montana
- Oregon
- Wisconsin

- Pennsylvania
- Alabama
- Washington
- Ohio
- California
- Indiana
- Illinois

Site visits are scheduled in the following States to be conducted late 2019 – 2020:

- California
- Oregon
- Washington
- Connecticut
- Arkansas
- Indiana
- Missouri
- Minnesota
- Illinois

Mental Health. As part of the Mental Health Innovations Advisory Committee (IAC) Subcommittee, a mental health survey was conducted in 2018 to assess the percentage of NFP sites that currently have a mental health provider serving as a resource to the NFP team. For those sites that have this resource, we were able to identify the credentials of this provider, ways in which the provider supports the NFP team and clients, opportunities for funding and benefits seen by the NFP nurse and client for having this resource. In 2019, the subcommittee began developing a Mental Health Toolkit to be shared with all sites. This toolkit addresses the most common considerations NFP teams will experience when adding a MHP to the team. Topics include funding, types of mental health professionals, home visit considerations, supervision, working area and logistics, MHP education about the NFP model, and other considerations, including crisis intervention.

IAC Multip Subcommittee Calls (now called Multip Site Check-in Calls). Calls are held twice monthly and all multip teams, including tribal implementation teams, are invited and encouraged to attend. Content discussed during these calls includes PRC updates, data collection, data sharing, new facilitator development, and successes and challenges with serving multip clients. These calls give teams an opportunity to connect with others serving multip clients.

Research and Practice Integration

From the beginning of the formative study, we intentionally have embedded both quantitative and qualitative research and evaluation components to maximize our learning and to inform ongoing efforts to adapt the NFP program to more effectively serve multip clients. On the quantitative side, we have monitored program implementation measures such as referrals, enrollment, and retention statistics. We also have administered a longitudinal survey to assess collaborative relationships between the local NFP study sites and key institutional partners such as primary care, human services, and child welfare. On the qualitative side we have conducted a large grounded theory-based study to learn from the experiences of NFP nurses and supervisors directly involved in the formative study. Updates and findings from all embedded research and evaluation efforts were presented to the broader study team at weekly

meetings to validate findings, adjust research and evaluation approaches to best meet the needs of study sites, and to inform ongoing program innovations to more effectively serve multip clients.

SUMMARY OF FINDINGS

Qualitative Interviews

Enrolling and Engaging Multiparous Clients

We found that multip women tend to be more complex than primiparous women in terms of their life circumstances, risk factors, and needs, including, of course, the usual presence of other children in the household. This added layer of complexity with multip women was portrayed as having implications for NFP guideline content and delivery, including how nurses enroll and engage multip women. Multip clients are more likely to have high acuity and overlapping risk factors such as substance use, child abuse or neglect, and housing insecurity among others. The increased likelihood of these risk factors coupled with their previous birth experience shifts the needs of multip mothers away from the traditional pre- and postnatal health focus of NFP and toward addressing the immediate needs dictated by acute risks and the needs of older children in the home. While both multip clients and primiparous clients need access to community resources such as mental health, behavioral health and housing, the added complexity of additional children creates a new set of services needed as well as more challenges for multip mothers in using those services. Having additional children in the home has presented a new set of challenges for NFP nurses to address that their pregnant primiparous clients usually do not face. We found that some nurses limited knowledge of available resources for multip clients and their children, and how to navigate these resources to ensure proper guidance.

Nurses from all six sites stated that multip women, due in part to their having more children, tend to be more complex than primiparous women in terms of their life circumstances, risk factors, and needs. This added layer of complexity with multip women was portrayed as having implications for the NFP program including how NFP nurses enroll and engage multip women. Nurses and supervisors from many sites stated that multip clients were more likely to have high acuity and overlapping risk factors such as substance use, child abuse or neglect, and housing insecurity among others. The increased likelihood of these risk factors coupled with their previous birth experience shifts the needs of multip mothers away from the traditional pre- and postnatal health focus of NFP and toward addressing the immediate needs dictated by given risk factors and also the needs of older children already in the home.

A nurse from one site described multip clients as “heavy” while several nurses from a few sites explained that because their stressors are multiplied it requires more time and more referrals to resources for the client and the family. Several nurses across multiple sites described a lack of trust from multip clients due to previous negative experiences with health care, Child Protective Services or various other resources. Several nurses from all sites also explained that the immediate needs of high-risk multip clients and the other competing demands these clients have in their lives also decrease their ability to participate in NFP. Again, several nurses from all sites shared that they have quite a few clients that cannot focus on their pregnancy because they are managing other psychosocial, economic, or parenting issues, such as housing, substance abuse, or trying to ensure that their other (older) children

are taken care of. Address clients' immediate psychosocial and economic needs rather than focusing on completing NFP forms on initial visits (i.e. getting on Medicaid and WIC, identifying their prenatal provider, addressing housing/nutrition/transportation/substance use/mental health).

Collaboration

We found that collaboration with community service providers varied along a spectrum from little to no interaction to highly integrated systems. This variation occurred within sites by the type of provider, such that many sites had strong levels of collaboration with at least one provider type. Despite this variation, collaboration was particularly important when serving clients with complex risk factors from physical and behavioral health to support service needs like housing, WIC and early intervention. We found that leadership commitment, mission congruence and perceptions of mutual trust and shared value facilitated collaboration. Policies and structural integration also helped to create channels for communication through data-sharing, messaging systems and physical access to clinics which helped facilitate back-and-forth referrals for services. Ongoing relationship maintenance was necessary for continued awareness of NFP and to facilitate service referrals. Although the degree of collaboration varied by provider type and community context, NFP nurses identified collaboration as necessary and integrated within their practice.

Among all sites, many NFP nurses and staff along with community partners (including health care providers and hospital leadership) referenced collaborative efforts between the NFP and the health care sector. They discussed collaboration within the context of outreach and engagement, factors that contributed to successful collaboration, and detailed instances of care coordination and data sharing to better serve multip clients with complex risks. Outreach relates to initial and ongoing engagement, developing and maintaining referral partnerships and communication with providers. Aspects of successful collaboration were described as: community perceptions of trust and value, leadership commitment and champions, mission alignment, and structural integration, including shared space, data, and policies that facilitate care coordination and collaborative efforts.

Many nurses and nurse supervisors from all sites highlighted significant engagement and outreach with health care providers in their communities. Although most staff from all sites discussed significant outreach efforts, the nature of their engagement and individuals responsible for engagement varied across sites. In one site, several NFP staff explained that a specific outreach nurse helps to raise the awareness of NFP with community providers. In a different site, all nurses shared that a community outreach manager facilitates community engagement through meetings and attending the OB registration days/resource fairs at a local partnering clinic; though NFP nurses also attend the OB resource fairs on rotation. In other sites, NFP staff talked about shared responsibilities in outreaching to health care partners among nurses, the nurse supervisor, administrators, the NFP social worker or central intake worker affiliated with the program. Outreach could take the form of visiting other health care organizations, bringing in their staff to in-service or team meetings, and attending vendor or health fairs. In particular, an NFP social worker explained that he participated in ongoing outreach for the NFP program at the local Federally Qualified Health Center, other clinics, in addition to their hospital's meetings.

Collaboration with other community support services was shared by almost all nurses from all sites. The types of community support services described included housing, services for young mothers include schools, transportation and childcare, programs that address trauma and violence, criminal justice and

legal aid, immigrant/refugee needs, and jobs training. The degree of collaboration with these various services varied by the type of service offered both within and between sites. Strong collaboration with all community support services within the same site was never observed. Indeed, collaboration was expressed to ebb and flow over time and dependent on the willingness of the support service staff/individuals to work together.

Almost all nurses from all sites discussed a range of activities in outreaching to community support services in their community. Community support services were highlighted to include housing resources (described as a major need among multiple sites); transportation and child-related services; programs for young mothers; trauma and legal aid; immigrant-related resources; and job training. Interestingly, connecting mothers to state or governmental benefits like Medicaid were discussed less across all sites except within the context of having a social worker assist in connecting mothers and their babies to such services. The activities that nurses and NFP staff described were: attending community meetings where other resources are present, having referral partners attend an in-service, attending partner staff meetings to explain NFP services or visiting partners at their facilities with brochures, and having partner representatives from various sectors on the site's Community Advisory Board (CAB). These efforts were described to be necessary to ensure that referral partners have the materials they need but to also keep the NFP program in their minds.

Referrals

Across most sites, nurses and supervisors shared that referrals for multip clients originated primarily from referral partners that were established prior to the start of the formative study. At one site, NFP was initiated at the start of the formative study. Therefore, it did not have previous referral partnerships. This site received nearly all referrals from internal sources (such as nurse midwives) within the health system. Many nurses and supervisors from all sites shared that established partnerships with referral sources have been a primary source for their multip client referrals, providing some ease to the process of receiving referrals from a new client population. In addition, some nurses and supervisors from two sites shared that they have increased their efforts to inform community service providers about the NFP program and that they are now accepting multip clients with hopes of establishing new referral partnerships. Some nurses and supervisors from two sites noted that their communication and collaboration has increased as a result of their participation in the study and in serving multip clients.

Some nurses and supervisors from most sites found that more direct communication is occurring between the NFP and referral partners regarding multip clients; and this was not something that often occurred with primiparous clients. Many nurses and supervisors from all sites, however, were surprised to receive fewer referrals from existing partners than expected thus far. Some nurses, supervisors, and community partners from all sites described challenges that contribute to this lower number of multip referrals into the NFP program. Practices and communication with referral partners regarding prioritization of referrals were also described which varied by site.

Referrals: Policy and Structure. Policies and structures connected to the referral process vary among the multip sites including referral criteria and practices regarding referrals to other home visiting programs, risk screening procedures, practices in establishing referral partnerships, referral procedures, practices among programs embedded into health systems, and referral relationships with other entities. Challenges in establishing reliable referral sources and procedures were also wide-ranging and are influenced by their practices.

Sending and Receiving Referrals. Practices of receiving and processing referrals range widely across sites. Within sites, the process of submitting a referral to NFP also varies by the referral partner and the specific practices within their agencies. Practices and policies related to receiving referrals varied by whether the site was embedded or integrated into a health care system whereby embedded sites have a streamlined process in which referrals are submitted to the NFP within an electronic system. NFP sites that are not embedded within a health care system relied on a variety of different practices in receiving referrals, including staffing clinics and being present to meet potential clients during their prenatal appointments, being present at resource fairs, or receiving a list of referred clients through fax.

Referral Source. The primary source of referrals come from health care systems, and public and social service networks with which they have an established relationship or partners within the same system in which the agency is embedded. Other sources include WIC, schools, CPS, substance use treatment programs, and self-referrals. Referrals for multip clients originate primarily from referral partnerships that were established prior to when the site began participating in the formative study

Referral Criteria. All sites use criteria to either determine which women should be referred to home visiting or, once referred, which women should be considered for NFP versus another program. Many sites filter and assign referrals to home visiting programs based on the needs of the client and the criteria of each program. Patient risk profiles are used in determining whether mothers should be referred to NFP or to other home visiting programs, however, the ways in which risks are identified and scored varied across sites. Some sites use risk screening tools to determine a client's risks and use this information to determine which program is best for the client. Most sites prioritize multip clients with several risk factors over mothers with fewer risk factors. In most cases, referral partners typically refer multip patients that present with risks for negative pregnancy and infant outcomes into the NFP program, just as they do with their primip patients.

Perspectives of Referred Mothers who Chose Not to Enroll or Clients Who Dropped Out

The multip mothers interviewed presented a range of overlapping risk factors ranging from physical and behavioral health to child welfare involvement, housing insecurity to criminal histories. The majority of mothers interviewed were of lower risk (n=11, 48%) followed by medium risk (n=9, 39%) and higher risk (n=3, 13%). We learned about referral and outreach processes that were integral to reaching these women, including barriers like being overwhelmed by the number of services offered, their physical health and social factors as hindrances and not trusting the referral source. Opportunities to improve these experiences were to educate referral sources on creating warm handoffs such that women knew they were being referred to NFP and learned the benefits of participating in the program; nurses offering to meet in safe locations and at times that met client needs; and use of technology like texting. Former clients explained that they had enrolled in the program because they needed the nursing support, while women who did not enroll explained that they did not perceive value in the program (often because they were unsure of what the program could offer), that they had adequate support and/or because of unstable living situations. Women who enrolled but dropped out early spoke about no longer needing NFP and nurse turnover as major reasons for disengaging early.

Health Care Provider Perspectives

Our analysis for this work is ongoing. Early findings suggest that social workers within the primary care setting facilitate referrals and coordination efforts between NFP nurses and primary care providers. Most interviewed providers valued the NFP program but could recall few instances of actual coordination when serving mutual patients. A handful of providers have worked closely with NFP nurses to address identified health and/or social issues such as mental health, substance use and infant feeding challenges. When providers have had interactions with NFP nurses, they were reported as positive and beneficial; for example, nurse knowledge of the mother's home environment helped to provide a holistic assessment of the patient's health. Overall, providers want more collaboration with NFP nurses, including identifying which of their patients are enrolled in the program and the patient's assigned NFP nurse, sharing medical notes/records and streamlining referral processes.

Perspectives of Mothers with Substance Use Disorder (SUD)

Our analysis is ongoing, but preliminary results indicate that participants had a history of using alcohol, prescription opiates, heroin, methamphetamines, and in some cases, participants used a combination of these substances before going into treatment for SUD. Many women began using substances when introduced to them by family, friends, or romantic partners including their child(ren)'s father. Most women learned about substance use treatment programs from health care providers, friends or family members. Most women stated that their decision to cease using substances was influenced by their becoming pregnant and/or a desire to be a better parent to their child(ren). Mixed experiences with the health care system were reported among participants, ranging from feeling judged or stigmatized for their drug use, to feeling supported and cared for by their providers. Many participants reported feeling a sense of guilt for having used substances during pregnancy, and some mothers who were prescribed medically assisted treatment during pregnancy viewed it as a safer alternative to using opiates or heroin while also feeling guilt for potentially causing harm to their babies. Most mothers encouraged telling their providers of their history of substance use in order to receive specialized care for them and their babies. Many mothers also recommended that providers treat mothers with respect and understanding when they reveal their substance use history. Formal analysis of findings is still ongoing.

Preliminary learnings suggest that many women have a desire to seek substance use treatment and disclose their substance use history to their health care providers in the context of pregnancy to ensure the safety of their babies. Mixed results in treatment of mothers by health care providers showed that many women receive care that is sensitive to their needs and providers provide care in a non-judgmental manner, making participants feel safe in disclosing details about their substance use and being open to treatment. On the other hand, some women reported feeling judged and stigmatized, making them feel uncomfortable in discussing their substance use to their providers. Participants recommend that other substance using mothers disclose their substance use history to their health care providers to ensure they are given appropriate care and resources.; Mothers also recommended that health care professionals create a safe and non-judgmental environment for mothers to feel open to discussing their history.

Quantitative Data

Referral and ETO Data

Referrals. As of mid-November, 4,280 pregnant multip women (women with previous live births) had been referred to NFP at one of the 31 sites participating in formative study. The top referral sources

were obstetrical health providers (28%), the Women, Infants, and Children (WIC) program (19%), pregnancy testing/family planning clinic (8%), outreach worker (7%), hospital (5%), and self-advertising/marketing/outreach (5%) with several other sources contributing 4% or less of referrals. Referred mothers could have more than one risk factor—54% had 0 or unknown risk factors, 27% had 1 risk factor, 13% had 2 risk factors, and 6% had 3 or more risk factors. Among the 46% of referred mothers (n = 1962) for whom data regarding risk factors were available, 39% had a risk listed as 'other' (we are still categorizing these 'other' risks), 28% had mental illness, 24% had medical complexity, 17% had a history of substance use, 10% had CPS involvement, 10% had a previous preterm birth, 9% were homeless, 8% had a history of intimate partner violence, and 8% had less than high school education.

Enrollment. Among the 4,280 women referred by mid-November 2019, 37.6% (1,358) enrolled in NFP. Among the women who did not enroll, 73% had a known reason for not enrolling. Reasons were: nurse unable to locate or unable to contact (47%), client not interested (18%), client thinks she won't benefit because she has already been pregnant and/or has children (6%), other (6%), and does not meet local criteria (4%).

Characteristics of Enrolled Multiparous Women Compared to Primiparous Women. We compared enrolled multip women to primiparous women enrolled at the same sites over the same time period (i.e. we started 'counting' primip women for each multip site when they enrolled their first multip woman). Figure 1 shows that multip NFP clients were more likely to be married, slightly less likely to be in school, and similar in terms of race and ethnicity compared to primip NFP clients. Multip clients were older with a mean age of 27.8 years compared to 22.8 years for primip clients. Multips were enrolled in NFP when they were an average of 22.2 weeks pregnant in comparison to primips at 19.7 weeks. Multip and primip mothers were similar in terms of their sense of mastery (Mastery Score 3.1 for multips and 3.2 for primips). Multip clients more commonly reported using tobacco compared to primips clients but their reported marijuana use was similar as shown in Figure 2. Figure 3 shows the percentage of multip and primip clients who ever scored positive on depression or anxiety screen with similar but high rates of depression (more than 60%) for both groups.

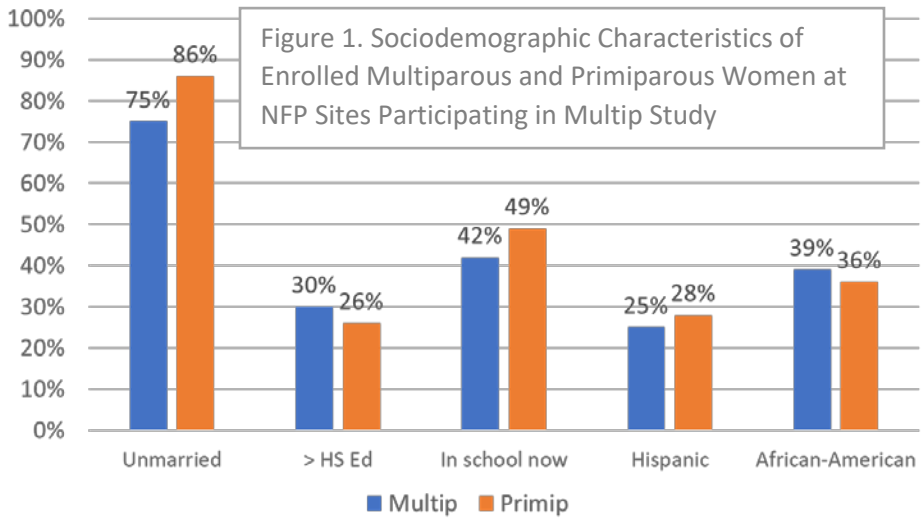
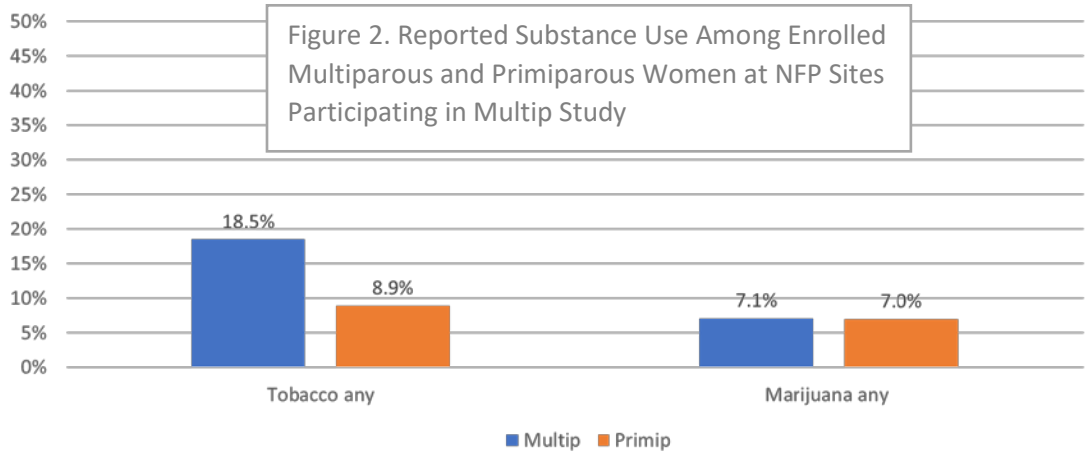


Figure 1. Sociodemographic Characteristics of Enrolled Multiparous and Primiparous Women at NFP Sites Participating in Multip Study



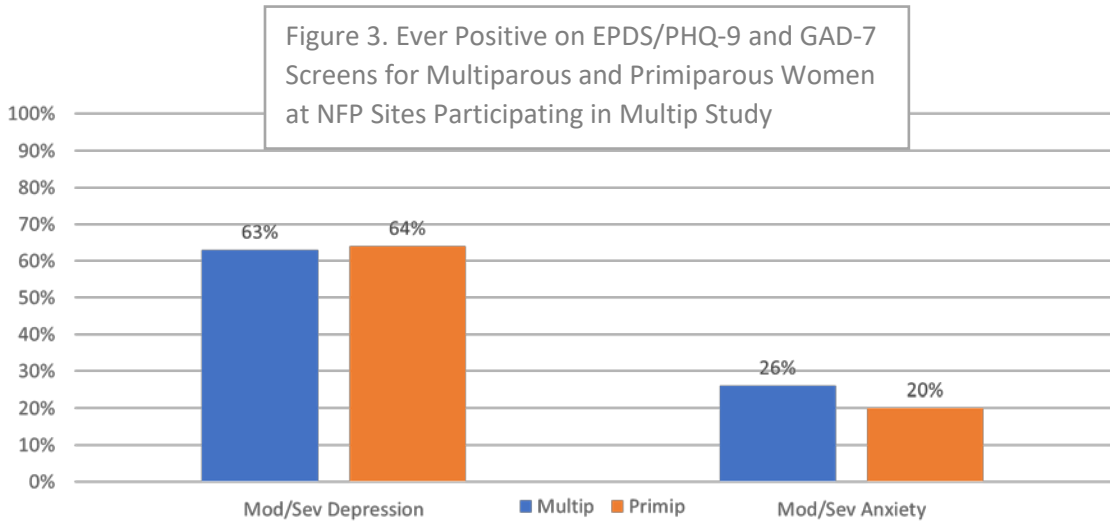
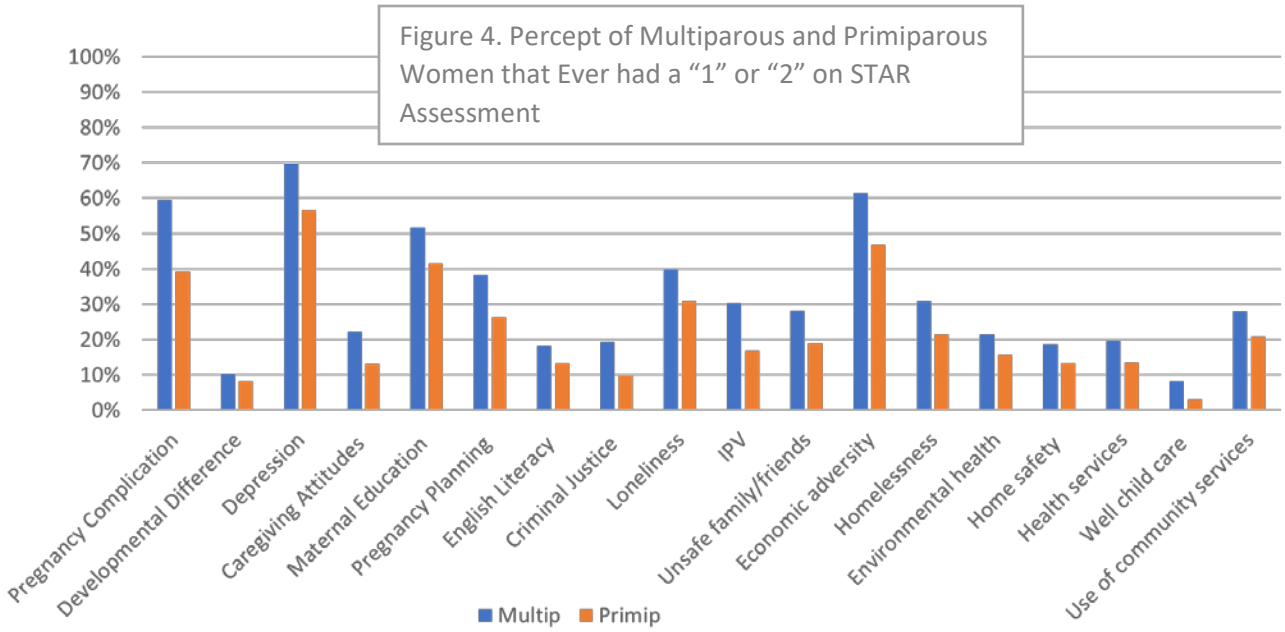
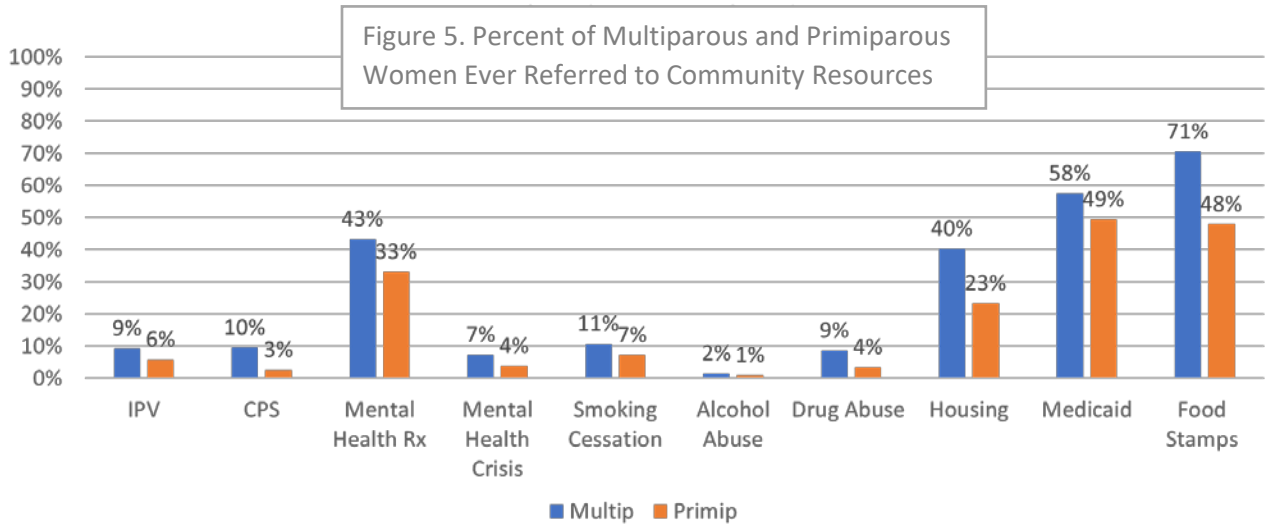


Figure 4 shows that more multip clients ever had a '1' or '2' for each category of the Strengths and Risks (STAR) Framework compared to primip clients.

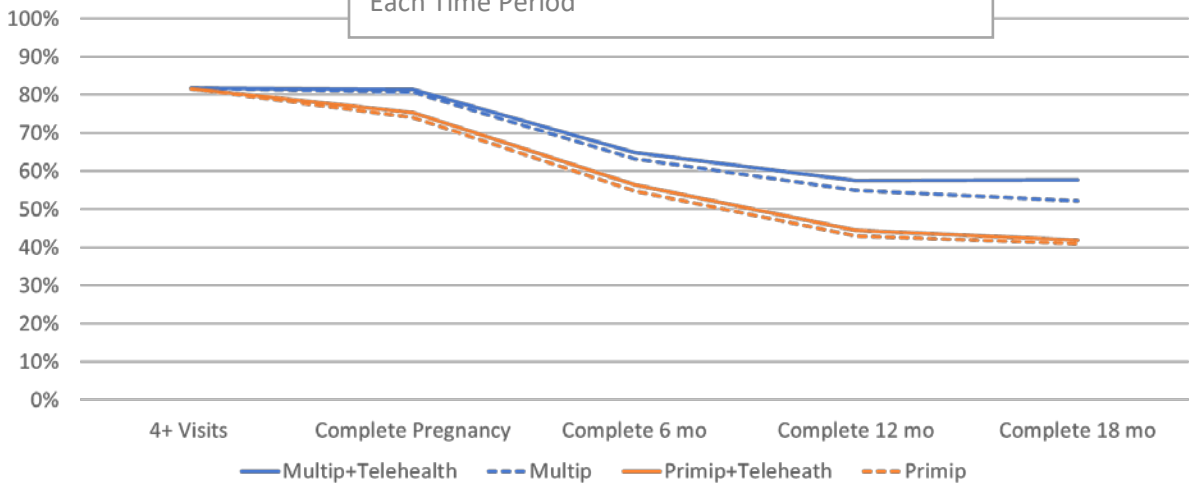


Referrals. Not surprisingly based on their increased risks identified on the STAR Framework, multip clients received more referrals to community services compared to primip clients as shown in Figure 5.



Client Retention in NFP. For this analysis, retention was determined based on whether the client had a visit after pregnancy and after the child turned 6 months, 12 months, and 18 months. To get into the denominator for each outcome, the child must be at least two months past the age when the retention outcome is determined (i.e. 8 months old for the 6 months outcome). Figure 6 shows that, so far, multip clients appear to have better retention than primip clients.

Figure 6. Proportion of Multiparous and Primiparous Mother-Child Dyad Retained Through Each Time Period



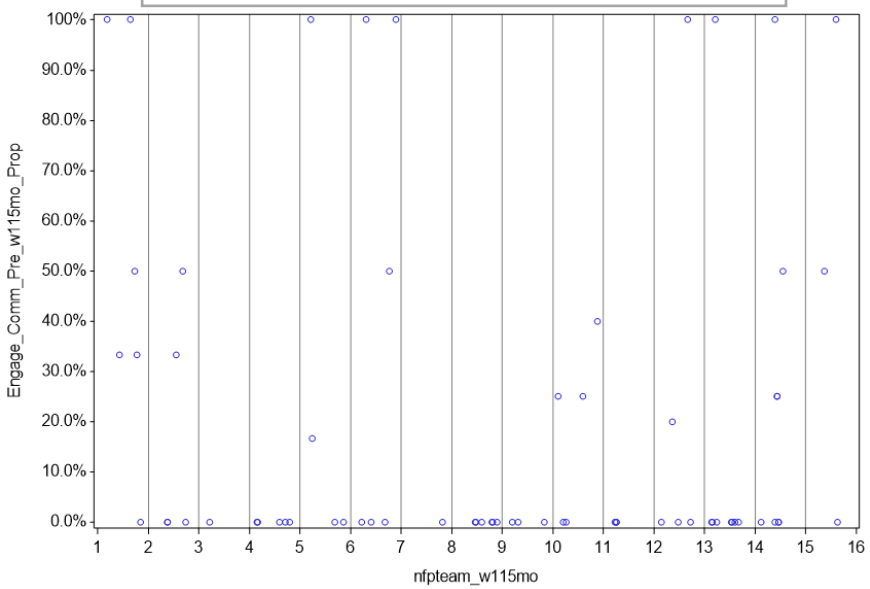
NFP Nurse Retention. To ensure that serving multip clients did not have an adverse effect on nurse retention, we compared nurses who served at least one multip client to nurses who served only primip clients at the 31 sites participating in the formative study. The 244 nurses serving multip clients had an average of 62 months of experience as NFP nurse home visitors, while the 202 nurses serving only primp clients had an average of 45 months of experience. These findings were expected since nursing supervisors were advised to only have nurses with previous experience serve multip clients. Among the nurses serving multip clients, 91% (193 nurses) were retained 18 months after starting the study. Among the nurses serving only primip clients, 71% were retained 18 months after the study began.

Coordination of Care Survey

To measure change over time nurse home visitors and nursing supervisors from Wave 1 sites completed three surveys regarding coordination of care for multip and primip clients in October 2017 (response rate, RR, 93%), May 2018 (RR 78%), and January 2019 (RR 84%). Nurses and supervisors from Wave 2 sites completed two surveys in May 2018 (RR 86%) and January 2019 (RR 83%) with a third survey being administered in December 2019. As expected, the number of nurses with at least one multip client increased over time. For the majority of their multip clients, nurses had identified the prenatal care provider (>=96%) and had discussing sharing information with the prenatal care provider (>=83%). However, nurses had some type of back-and-forth communication with the prenatal care provider for only 24 to 37% of their multip clients. After the birth of the child, nurses had identified the client's primary care provider for a smaller proportion of their clients (58 to 80%) compared to prenatal care providers and had discussed sharing information with the primary care provider for 50 to 85% with the proportions increasing over time. Nurses had some type of back-and-forth communication with the primary care provider for only 12 to 25% of their multip clients. Nurses had identified the child's pediatric care provider for 74 to 84% of their multip clients and had discussed sharing information with the pediatrician for 51 to 84% of these clients with the proportion increasing over time. Nurses had some type of back-and-forth communication with the pediatric care provider for 18 to 26% of their clients' children.

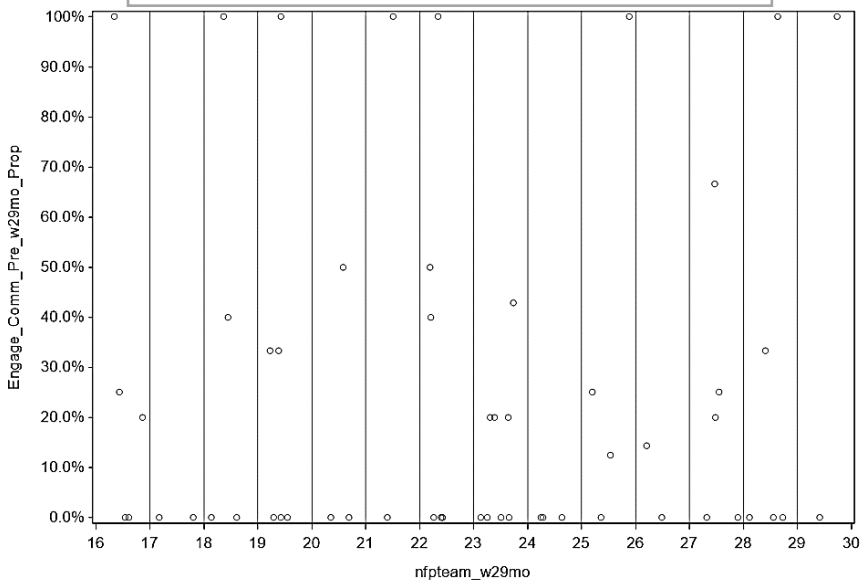
For each of the types of coordination we asked about, variation occurred within and between sites. Figures 7 and 8 show this variation in graphic form for one of the types of coordination—back-and-forth communication with the prenatal care provider.

Figure 7. Engagement with Prenatal Care Wave 1 Sites 15-Month Follow-Up



In these figures, each column represents one site and each circle represents a nurse who responded to the survey at that site. The location of the circle on the y-axis indicates the proportion of clients for whom each nurse reported having had back-and-forth communication with the prenatal care provider. The variation in location of circles within a column represents within site variation and the variation in location of circles across columns indicates the between site variation.

Figure 8. Engagement with Prenatal Care Wave 2 Sites 9-Month Follow-Up



Nurses were asked to what extent they agreed or disagreed with statements about their clients' ability to access a variety of community services. The table shows the proportion of Wave 1 and Wave 2 sites who agreed that their clients could access each of the community services listed.

Table 6. Accessed Community Services by Sites

Community Service	Wave 1 Sites	Wave 2 Sites
Food insecurity resources	80%	85%
Job training and employment	73%	77%
Domestic violence resources	69%	80%
Opioid/heroin use treatment	67%	67%
Other substance use treatment	67%	63%
Mental health treatment	55%	53%
Housing resources	30%	41%

We are currently conducting additional analyses to describe change in collaboration with primary care providers over time, characterize variation within and between sites, and compare nurses' reported levels of collaboration with primary care providers for multip versus primip clients.

Community Provider Collaboration Survey and Program Analyses

In October 2018, 257 NFP nursing supervisors representing 199 Network Partners in 39 states completed the survey (response rate of 71%). Almost all nursing supervisors believed collaboration to be important (99%) and that organizations in their community have a history of working together (88%) and a willingness to collaborate (92%). Most supervisors reported having a champion in health care (83%) as well as in social services (83%). Relational coordination was strongest with WIC, early intervention, and obstetrics; and lowest with housing services and substance use treatment providers. The strongest rated relational coordination dimensions across provider types were shared goals and mutual respect, while frequency of communication and timely communication could be improved. The greatest sharing of resources was with WIC, mental health providers, and obstetrics; and least with housing and substance use treatment providers. Across provider types, joint activities were the strongest rated and shared funding the lowest.

Random effect models examined the effect of collaboration on client retention, client smoking cessation and childhood injury/ingestion. Younger (OR: 1.036; $p<0.001$), unmarried (OR: 0.740; $p<0.001$), or African-American women (OR: 0.926; $p<0.05$) and those visited by nurses who ceased employment prior to the client's child's birth (OR: 0.416; $p<0.001$) were more likely to drop out of the program; while Hispanic women (OR: 1.12; $p<0.01$) and high school graduates (OR: 1.164; $p<0.001$) were more likely to remain in the program. Agency-level factors like agency type, greater nurse coordination with substance use treatment providers ($p<0.001$) and with parenting programs ($p<0.01$) may help to retain clients, even after adjusting for client characteristics. This work suggests that cross-sector collaboration in NFP may improve client retention, but more research is needed to understand the role of collaboration on maternal behaviors like prenatal smoking cessation and accessing the emergency room for their children's injury.

Informal Information Gathering—Monthly Calls with Sites

We conducted routine monthly calls with sites and information from these calls was documented in monthly meeting notes. All multip study sites have at least one representative to attend the monthly call. Nurses are given the option to attend one or both monthly calls. Common topics of discussion on the calls include the following:

- Conducting a visit with multiple children and many distractions during the visit
- Case management needs and how to meet those needs
- Making referrals and documentation for services for other children
- Accounting for time spent in domains
- Completion of data collection forms for multip clients
- Facilitator topics necessary for multip clients
- Process for when a multip client transferred from a site participating in the formative study to a site that was not serving multip clients/participating in the study
- Need for flexibility of visit frequency, length and location
- Guidelines for working with Child Protective Services
- Caseload management for nurses serving multips

MULTIP CLIENT MATERIALS

Facilitators

Twelve facilitators have been developed so far to support nurses with serving multip clients. Topics for facilitators were determined by nurse home visitors and content was developed in work groups which included nurse home visitors and supervisors and other content experts. Multip facilitator topics include:

a. A new baby is coming
b. Breastfeeding while pregnant
c. Every birth is different
d. Introducing a new baby to existing children
e. Keeping new baby healthy
f. Parenting styles
g. Past experiences with breastfeeding
h. Planning for a c-section
i. Planning for more permanent birth control
j. Preparing for an emergency
k. Vaginal birth after c-section

l. What's new with labor and delivery

These facilitators are available to all multip sites and will soon be posted on the NFP Community site for easier access by study sites. A choice sheet has also been developed for multip facilitator topics and is available to all multip sites.

NEXT STEPS

Continued Support of Sites Serving Multiparous Women

Our continued support of sites serving multip women will include: 1) developing best practices guidelines for identifying and reaching multip women most likely to benefit from NFP and for collaboration with other community service providers, 2) providing direct consultation to existing multip sites, 3) developing education for nurses serving multip clients, 4) developing facilitators for multip clients, 5) ensuring that accurate data are captured from the multip sites.

Determine the Effectiveness of NFP for Multiparous Women and Their Children Using Secondary Data Sources

We plan to conduct a rigorous mixed-methods study (sequential explanatory) to quantitatively estimate program impacts and qualitatively explore mechanisms of action that explain those estimated program impacts. For the quantitative portion we will utilize a quasi-experimental approach that will leverage our partnerships with several large health systems that are participating in the formative study of NFP among multiparous women. We will use the integrated electronic medical records (EMR) of these large health systems to identify and construct a comparison group in order to estimate NFP program impacts on birth weight and smoking cessation. For the qualitative portion of the study, we will conduct case studies at study sites that will allow us to better understand the specific mechanisms of action that explain the estimated program effects on birth weight and smoking cessation.

Our specific aims are as follows:

Aim 1: Use the EMR systems of several of the large integrated health systems participating in the formative study to construct a comparison group to women who are enrolled in NFP at those sites. We will identify potential control group women through propensity score weighting or matching based on a range of risk and demographic factors available through the EMRs of participating health systems. The control groups will be constructed for each site/health system that is participating. The comparability of the control groups with the multip treatment group pre and post propensity score matching/weighting will be assessed using risk and demographic factors available through the local health system EMR.

Aim 2: Use the constructed comparison groups to estimate local NFP effects on birth weight, smoking cessation, and possibly child hospitalizations for injury and timing of subsequent pregnancies among multips women. We will use propensity score matched/weighted control groups to estimate the local program impacts on difference in birth weight in kilograms and on smoking cessation as odds ratios of cessation for treatment vs control group. We will then use local estimated program impacts and estimate global program impacts for birth weight and smoking cessation using a random-effects meta-analysis approach. We will explore the feasibility of conducting similar analyses on hospitalizations for injury and short subsequent pregnancy intervals.

Aim 3: Conduct case studies of study sites to explore potential mechanisms of action that explain estimated program effects. We will use multiple qualitative inquiries within a case study framework to better understand how estimated program effects were achieved. These inquiries include qualitative interviews with NFP nurses, institutional collaborators, and mothers that participated in the NFP program.

Aim 4: Explore enrollment, engagement and retention measures among different risk categories and validate NFP's strengths and risk framework (STAR) at study sites. We will generate risk categories/profiles from the EMRs of participating health systems and in combination with NFP program data, will examine enrollment, engagement, and retention measures. This will give us an indication of what enrollment, engagement, and retention measures looks like across different risk profiles. Merging EMR data with NFP data will give us a more complete picture of enrollment uptake across different risk profiles. In addition, we will compare and validate NFP's STAR framework against the EMR risk profile of NFP clients. Findings from Aim 4 will be interpreted within the context of site case studies.

Collectively, these aims will provide estimated impacts of the NFP program with multip mothers along with insights into mechanisms of action and the enrollment and engagement profile of study sites. These findings taken together will guide the NSO and PRC to make informed decisions on whether to expand the NFP program to multip mothers and how to advise individual NFP sites on how best to serve the needs to multip mothers. Note that currently approximately 300 multip women are enrolled at 4 sites that are associated with specific health plans (Goodwill IN, Care Ring, Brighter Futures Dayton OH, and SEMO in MO).

Future Grants

The work described in this report has already led to the development and submission of 3 grant proposals, and we plan to submit at least 2 additional proposals in the next year. The table below shows submitted and planned proposals.

Table 7. List of Future Grants

Opportunity	Innovation Description	Submission Date(s)	Review Date/Score	Additional Information
HEAL Proposal NIDA UG/UH	OUD prevention	March 2019	50	Opportunity does not allow for resubmissions
NINR R34	Multip trial planning grant	June 2019	52	Reviewers suggested we're ready for a trial and don't need a planning grant
RWJF Systems of Care	Collaboration between NFP and other community service providers	November 2019	January 2020	
NINR R01	RCT of effectiveness of NFP for serving multiparous women	June and October 2020		Will use feedback from NINR R34 as we craft R01 proposal
NIDA/NIAAA R34 (PAR 18-223)	Multi-site pilot of system-level implementation of SUD Rx during perinatal period	July and November 2020		Opportunity for partnership with Dissemination and Implementation Core (Dr. Russ Glasgow and team) at ACCORDS
Josiah Macy Jr. Foundation	Integration and nurse capacity-building for trauma-informed care, mental health, and SUD	Open/rolling	2 months post submission	$35K/1 year

Dissemination

The Multip research team at the PRC has presented on learnings at multiple local and national conferences. Our goal is to publish findings to inform the public health community, NFP sites, and implementing agencies.

Table 8. List of Conference Presentations and Publications

Type	Primary Project Topic/Title	Lead author, other authors	Status
Abstract to conference	**Multips** Expanding the Nurse-Family Partnership to Multiparous Women: Early Lessons Learned from a Pilot Study	**Venice Williams, PhD MPH**, Carol Franco MA, Connie Lopez, RN MA, Mandy Allison, MD MSPH, Gregory Tung, MPH PhD and David Olds, PhD	Complete – Oral Presentation Academy Health 2018
Abstract to conference	**Multips** Collaboration in Serving Multiparous Women: Emerging Data from a Nurse-Family Partnership Pilot Study	**Carol Y. Franco, MA**, Venice N. Williams PhD MPH, Connie Lopez RN MA, Mandy Allison MD MSPH, Greg J. Tung PhD MPH, David L. Olds PhD	Complete – Oral Presentation Public Health in the Rockies 2018
Mixed methods paper	**Multips** Overarching Multip Concept Paper	**Greg Tung**	TBD
Abstract to conference	**Client Interviews** Engaging Clients and Home Visiting: Opportunities for Success	**Connie Lopez RN BSN MA**, Venice Williams PhD MPH, Carol Franco MA, Mandy Allison MD MSPH, David Olds PhD and Gregory Tung PhD MPH	Complete – Oral Presentation APHA 2019
Abstract to conference	**Multips** Client Engagement in Home Visiting – What Matters and How Do We Do It Right?	**Venice Williams PhD MPH,** Eleanor Yost MSN PNP, Mandy Allison MD MSPH, Gregory Tung PhD MPH and David Olds PhD	Complete – Oral Presentation APHA 2019
Abstract to conference	**Venice Dissertation** Cross-Sector Collaboration in the Nurse-Family Partnership	**Venice Williams** lead	Complete – Poster Presentation Academy Health 2019
Qualitative Paper	**Client Interviews** Client engagement and Retention	**Venice Williams** lead	Outline drafted
Mixed methods paper	**Multips and Coordination of Care** Enrollment and engagement primip v multip	TBD	TBD
Quantitative Paper	**Coordination of Care** Title TBD	**Mandy Allison** lead	Brain storming
Mixed methods paper	**Provider Interviews and Coordination of Care** Provider collaboration	**Venice Williams** lead	Brain storming
Qualitative Paper	**Multips/Venice Dissertation** Cross-Sector Collaboration in Prevention Programs: A Qualitative Investigation	**Williams, Venice Ng**, McManus, Beth, Franco, Carol, Lopez, Connie, Allison, Mandy, Olds, David & Tung, Gregory	Draft paper completed – Social Science & Medicine

Qualitative Paper	**Multips** Multips coordination of care examples	**Venice Williams** lead	Brain storming
Qualitative Paper	**Multips** Multips referrals	**Carol Franco** lead	Brain storming
Qualitative Paper	**Multips** Multips enrollment & engagement	**Connie Lopez** lead	Brain storming
Qualitative Paper	**Multips** Provider collaboration	**Venice Williams** lead	Brain storming
Qualitative Paper	**OUD Mom Interviews** Substance Using and Recovering Pregnant and Postpartum Women's Experience with the Health Care System	**Mandy Allison** lead	Brain storming
Qualitative Paper	**OUD Mom Interviews** Onset of Substance Use/History of SUD	**Angela Lee-Win** lead	Brain storming
Quantitative Paper	**Venice Dissertation** Measuring Cross-Sector Collaboration in the Home-visiting Setting	**Williams, Venice Ng**, Brooks-Russell, Ashley, McManus, Beth, Yost, Elly, Olds, David & Tung, Gregory	Draft paper completed
Quantitative Paper	**Venice Dissertation** The relationship between collaboration and program outcomes in a national nurse-home visiting program using a random effects approach	**Williams, Venice Ng**, McManus, Beth, Olds, David, Brooks-Russell, Ashley, & Tung, Gregory	Draft in progress
Mixed methods paper	**Multips** Retention	**Greg Tung, Mandy Allison**	Brain storming

REFERENCES

1. Shonkoff JP, Boyce WT, McEwen BS. Neuroscience, molecular biology, and the childhood roots of health disparities building a new framework for health promotion and disease prevention. *JAMA.* 2009;301(21):2252–2259.

2. Garner AS, Shonkoff JP, Siegel BS, et al. Early childhood adversity, toxic stress, and the role of the pediatrician: Translating developmental science into lifelong health. *Pediatrics*. 2012;129(1):e224-31.

3. Kisella MT, Monk C. Impact of maternal stress, depression, and anxiety on fetal neurobehavrioal development. *Clin Obstet Gynecol*. 2009;52(3):425-440.

4. Rauh VA, Margolis AE. Research review: Environmental exposures, neurodevelopment and child mental health – new paradigms for the study of brain and behavioral effects. *J Child Psychol Psychiatry*. 2016;57(7): 775-793.

5. Olds DL. Prenatal and infancy home visiting by nurses: From randomized trials to community replication. *Prev Sci*. 2002;3(3):153-172.

6. Olds DL, Henderson CR Jr, Tatelbaum R, Chamberlin R. Improving the delivery of prenatal care and outcomes of pregnancy: A randomized trial of nurse home visitation. *Pediatrics*. 1986;77(1):16-28.

7. Olds D, Henderson CR Jr, Tatelbaum R, Chamberlin R. Preventing child abuse and neglect: A randomized trial of nurse home visitation. *Pediatrics*. 1986;78(1):65-78.

8. Olds DL, Eckenrode J, Henderson CR Jr, et al. Long-term effects of home visitation on maternal life course and child abuse and neglect: Fifteen-year follow-up of a randomized trial. *JAMA*. 1997;278(8):637-643.

9. Olds D, Henderson CR Jr, Cole R, et al. Long-term effects of nurse home visitation on children's criminal and antisocial behavior: 15-year follow-up of a randomized trial. *JAMA*. 1998;280(14):1238-1244.

10. Eckenrode J, Campa M, Luckey DW, et al. Long-term effects of prenatal and infancy home visitation on the life-course of youths: 19-year follow-up of a randomized trial. *Arch Pediatr Adolesc Med*. 2010;164(1):9-15.

11. Kitzman H, Olds DL, Henderson CR Jr, et al. Effect of prenatal and infancy home visitation by nurses on pregnancy outcomes, childhood injuries, and repeated childbearing: A randomized controlled trial. *JAMA*. 1997;278(8):644-652.

12. Kitzman H, Olds DL, Sidora K, et al. Enduring effects of nurse home visitation on maternal life course: A 3-year follow-up of a randomized trial. *JAMA*. 2000;283(15):1983-1989.

13. Olds DL, Kitzman H, Cole R, et al. Effects of nurse home visiting on maternal life-course and child development: Age-six follow-up of a randomized trial. *Pediatrics*. 2004;114(6):1550-1559.

14. Olds DL, Kitzman H, Hanks C, et al. Effects of nurse home visiting on maternal and child functioning: Age-9 follow-up of a randomized trial. *Pediatrics*. 2007;120(4):e832-845.

15. Kitzman H, Olds DL, Cole RE, et al. Enduring effects of prenatal and infancy home visiting by nurses on children: Age-12 follow-up of a randomized trial. *Arch Pediatr Adolesc Med*. 2010;164(5):412-418.

16. Olds DL, Kitzman H, Cole R, et al. Enduring effects of prenatal and infancy home visiting by nurses on maternal life-course and government spending: Age-12 follow-up of a randomized trial. *Arch Pediatr Adolesc Med*. 2010;164(5):419-424.

17. Olds DL, Robinson J, O'Brien R, et al. Home visiting by nurses and by paraprofessionals: A randomized controlled trial. *Pediatrics.* 2002;110(3):486-496.

18. Olds DL, Robinson J, Pettitt L, et al. Effects of home visits by paraprofessionals and by nurses: Age-four follow-up of a randomized trial. *Pediatrics*. 2004;114(6):1560-1568.

19. Olds DL, Holmberg JR, Donelan-McCall N, Luckey DW, Knudtson MD, Robinson J. Effects of home visits by paraprofessional and by nurses on children: Follow-up of a randomized trial ages 6 and 9 years. *JAMA Pediatr*. 2014;168(2):114-121.

20. Olds DL, Kitzman H, Knudtson MD, Anson E, Smith JA, Cole R. Effect of home visiting by nurses on maternal and child mortality: Results of a 2-decade follow-up of a randomized clinical trial. *JAMA Pediatr.* 2014;168(9):800-6.

21. Olds DL, Kitzman H, Anson E, et al. Prenatal and infancy nurse home visiting effects on mothers: 18-year follow-up of a randomized trial. *Pediatrics* ; 2019; 144(6): e20183889.

22. Bridges R. Neuroendrocrine regulation of maternal behavior. *Frontiers in Neuroendocrinology.* 36 (2015) 178-196.

23. www.evidencebasedprograms.org

24. Dumont K, Mitchell-Herzfeld S, Greene R, et al., Healthy Families New York (HFNY) randomized trial: Effects on early child abuse and neglect. *Child Abuse & Neglect* 32 (2008) 295-315.

25. MacMillan H, Thomas BH, Walsch CA et al. Effectiveness of home visitation by public health nurses in prevention of the recurrence of child physical abuse and neglect: a randomized controlled trial. Lancet 2005; 365: 1786-93.

APPENDIX

Appendix 1

Multip Site Interviews
Memos Table of Contents

- Other care coordinating entities (who NFP may coordinate with)
- Examples of effective coordination
- Challenges

8. Data Sharing with Health Care
   - Read-only access
   - Documentation and charting
   - Communication
   - Successful coordination using shared data
   - Challenges and opportunities
9. Collaboration with Health-Related Community Resources
   - Broad-based services
   - Obstetric or pregnancy needs
   - Maternal substance use
   - Maternal mental health
   - Child mental health and development
10. Parenting and Child Protection
    - Challenges
    - Opportunity for collaboration
    - Collaboration with Child Protective Services (CPS)
      - *Organizational Perceptions*
      - *Nurse Perceptions of CPS*
    - Client perceptions of CPS
    - CPS perceptions of NFP
      - Aspects to Collaboration
        - *Communication with CPS*
        - *Prevention Services*
        - *Ongoing cases/treatment*
        - *Specific Collaborations for Multiparous Women*
        - *Other Collaboration with CPS*
11. Collaboration with Home Visiting Agencies
    - A Changing Market
    - Organizational Alignment
    - Common Purpose Contributing to Competition
    - Systemic Barriers
12. Collaboration with Other Community Support Services
    - Shelters and Housing Services
      - *Needs Specific Housing*
    - Transportation and Childcare
    - Programs for Young Mothers
    - Programs that Address Intimate Partner Violence, Trauma and Intergenerational Poverty
    - Criminal Justice and Legal Aid
    - Immigrant/Refugee Needs
    - Jobs Training
13. Multiparous Risk Factors
    - Behavioral Health
      - *Substance Use*
      - *Mental Health*
      - *Trauma*
    - Housing and Environment
    - Child Welfare
    - Immigrant
    - Physical Health
    - Intimate Partner Violence

Criminal Involvement
Developmental Delays or Disabilities
Food Insecurity
Young Age
Transportation

Appendix 2

Client/Mom Interviews
Memos Table of Contents

Appendix 3

Monthly/Quarterly Reports from ETO

Data Description	Source	Format
# referred who didn't enroll	Referral form AND Multip form 1 (to identify who is a multip)	Denominator = # of referral forms received that month for MULTIP clients only Numerator = Disposition code is NOT '1' on enrollment form
Reasons for not enrolling	Referral form	Denominator = # of multips not enrolled (numerator from previous row) Numerator = # for each specific disposition code
Client demographics at INTAKE	Demographics Intake form	(1)Age (in years); (2)Race; (3)Ethnicity; (4)Marital status; (5)Education --currently enrolled --highest completed (< high school, high school grad, GED, vocational or partial college, college degree or higher) (6)Living situation (Q3; use 5 main categories) Denominator = # multips enrolled
# completed visits per client	Encounter form	(1) # in-person visits/multip client/month (2)# text message visits/multip client/month (3)# telephone visit/multip client/month (4)# 'other alternative' visit/multip client/month
Visit duration	Encounter form	Median and range for all visits that occurred over that month (1) in-person (2) text (3) phone (4) other
% time spent on each domain (My Health, My Home, My Life, My Child, My Family and Friends)	Encounter form	Summary (mean) of % of time in each domain of all visits that occurred over that month by phase (make sure format matches what is done for primips) Denominator = visits
Referrals to government services	--Referrals to Services form has specific services	Denominator = client Grouped by category Incidence of referrals that were made that month Xx new referrals/xx clients/month
Maternal substance use	Health Habits form	Ever used (if they ever answered 'yes' re use in past 14 days/48 hours) each substance/all clients enrolled/month Prevalence
Exposure to IPV	Clinical IPV Assessment form	Prevalence for each client—did they ever have any IPV assessment form that indicated risk (similar to our approach for substance use)
Depression	PHQ-9	Prevalence for each client—did they have any depression screen that indicated risk
Anxiety	GAD-7	Prevalence for each client—did they have any anxiety screen that indicated risk
CPS involvement	1) Referrals to services 2) Use of services form 3) Infant health care form	ANY CPS involvement—counts as 'yes' if there is any type of note of CPS involvement on any of the 4 forms; denominator is all multip mom/clients

	4) Referral to program	
'All risks in STAR'	STAR form includes 21 risks ranked as low/moderate/high/not assessed	EVER moderate or high based on all completed STAR forms for that client/all multip clients for each of the 21 risks (so like a prevalence) Also a count of risk factors that are moderate or high—so would report mean/median and SD/range—SEPARATED BY PROXIMAL AND DISTAL RFS (BASED ON STAR GUIDANCE)
Client retention		Mike's algorithm
Nurse retention/attrition	Staff profile update form	Number of nurses who leave NFP ONLY among nurses who are serving multips
Previous enrollment in NFP	Multip form 1	
Currently enrolled with another child	Multip form 1	

Appendix 4

Multips Referral Spreadsheet

Multips Referral Spreadsheet
Client (please black out before sending to PRC)
Referral Date
Date referral received
Referral Source (dropdown) Referral Sources Dropdown Options: Adult healthcare provider or clinic (NOT obstetrical care) Billboard Broadcast (TV/radio) Care/case manager or coordinator (including OB case manager) Child Welfare Services Family Practice Food Stamps Health plan (NOT Medicaid) Hospital Judicial System Managed care organization Medicaid Mental health provider News media article or show NFP client (current or past) Obstetrical healthcare provider or clinic Online Other - Describe Other home visiting program Other NFP program or NFP nurse Outreach worker Pediatric healthcare provider or clinic Pregnancy testing/family planning clinic Public sign School Self: advertising/marketing/outreach Substance use treatment provider or clinic TANF Unknown WIC
Other -- If "Other" selected for *Referral Source*, please describe:
Date of contact (up to 4 possible entries) (MM/DD/YYYY)
Contact Person Role (dropdown) Contact Role Dropdown Options: Administrative assistant NFP nurse home visitor NFP supervisor Other - Describe
Other -- If "Other" selected for *Contact Person*, please describe:
Contact approach (up to 4 possible entries) (dropdown) Contact Approach Dropdown Options:

Email Facebook or other social media Letter Other - Describe Phone Site visit Text
Other -- If "Other" selected for *Contact Approach*, please describe:
Contact Result (up to 4 possible entries) (dropdown) Contact Result Dropdown Options: Cannot locate Left message Other - Describe Reached client Unable to reach client
Other -- If "Other" selected for *Contact Results*, please describe:
Status of referral (dropdown) Status of Referral Dropdown Options: Enrolled Refused participation Open Closed
Date of enrollment (MM/DD/YYYY)
Date of dismissal (MM/DD/YYYY)
Was client aware of referral? (dropdown) Was client aware of the referral? Dropdown Options: Yes No Unknown
Risk factors (dropdown, select all that apply) Risk Factors Dropdown Options: Adolescent age group (19 or younger) Developmental disability History of or current IPV Homeless Less than high school education or GED Medically complex Mental illness Other - Describe Previous low birth weight infant Previous or current involvement with child protective services Previous pre-term birth Substance use
Other Risk Factors (describe risk factors not listed)
Reason for Refusal (dropdown) Reason for Refusal Dropdown Options: Client declines due to having already been pregnant and/or has children and states does not need a nurse Client does not have risk factors Client no longer eligible (for multips, this may mean they delivered or the site as chosen not to enroll after 28 weeks)

Client not interested in program offerings Client receiving services from another home visitation program Did not meet local/site criteria Did not meet NFP multip pilot criteria Excessive missed appointments/attempted visits prior to enrollment Miscarried Moved out of service area Other - Describe Pressure from family not to enroll Program is full Too busy Unable to contact Unable to locate Unable to serve due to language barrier
Other Reason for Refusal (describe reasons for refusal not listed)
# of Multips on a Wait List