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Experience Implementing a Public Health Surveillance System Designed for Fathers of Infants on a South Dakota American **Indian Reservation**

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Experience Implementing a Public Health Surveillance System Designed for Fathers of Infants on a South Dakota American Indian Reservation

Sara DeCoteau; Maggie Minett, PhD; Teresa Binkley, PhD; Tianna Beare; and Bonny Specker, PhD

Abstract

Introduction: Paternal behaviors and attitudes during pregnancy are not known. A health survey for fathers of recently born infants was developed to be administered concurrently with a maternal survey to assess parental behaviors and attitudes before, during and after pregnancy.

Methods: Participants were parents of 149 American Indian infants born from April 1 and Dec. 31, 2015 who were recruited prospectively from data of all births in prespecified reservation counties representing Sisseton Wahpeton Oyate of the Lake Traverse Reservation. Data collection was via hard-copy or online survey.

Results: Response rate among mothers was 62 percent (n=92). Of 149 births, 126 listed a father on the birth certificate and 51 percent (n=64) of these completed surveys on average 4.7 months post-birth. Healthwise, 90 percent of fathers reported being overweight or obese, but a small percent visited a health care worker in the previous year to be checked for diabetes (11 percent) or hypertension (14 percent). Among fathers who smoked in the last two years (73 percent), 77 percent of the mothers also smoked compared to 20 percent of mothers smoking if the father did not smoke (p<0.001). Nearly three-fourths of fathers were supportive of breastfeeding (70 percent), and mothers whose partners were supportive were more likely to breastfeed than those with unsupportive partners (91 percent vs. 50 percent, respectively; p<0.001). The majority of fathers attended prenatal visits (57 percent), the delivery (88 percent), and some or all well-baby checks (73 percent) with the main barrier stated as not being able to take time off work.

Conclusion: Conducting a health survey with both fathers and mothers in a reservation setting is feasible and the father's attitudes and behaviors related to breastfeeding and smoking were associated with maternal health behaviors. Most fathers attended health care visits with the mother, but they were not being screened for health conditions despite a large proportion being overweight and smokers. Prenatal and antenatal visits may provide an opportune time to engage fathers and address paternal health issues.

Introduction

Since a father's involvement in the time before, during and after pregnancy affects the child's health, ¹⁻³ paternal involvement also may be associated with improved maternal pregnancy behaviors and outcomes. Much of the research only considers the couple's marital or cohabitation status as a basis for paternal involvement. However, emphasis on the father's attitudes and behaviors during pregnancy, and how these attitudes align with the mother's own behaviors, may provide valuable information on the father's engagement during the antenatal period and the effects on pregnancy outcomes.

Fathers play a supportive role in reproductive health and

pregnancy, yet there has been little focus on how the father's health and behaviors can affect the pregnancy and how prenatal events may affect the fathers' health, especially among American Indian populations. Despite the limited research indicating that positive paternal involvement is associated with positive maternal behaviors such as early and adequate prenatal care, attending childbirth classes, breastfeeding and better health after delivery, there is a lack of paternal data on attitudes and behaviors around pregnancy and the association with maternal attitudes and behaviors. Paternal stress during pregnancy, especially in younger fathers, can lead to negative behaviors which can influence maternal behaviors, yet no studies have investigated prenatal stressors that may exist for fathers of American Indian infants. Thus,

strategies need to be developed to study the father's attitudes and behaviors during reproductive periods and how they are associated with the mother's attitudes and behaviors, and determine whether these methods are acceptable among an American Indian population.

One promising approach to studying the fathers' attitudes and behaviors would be to leverage the existing Pregnancy Risk Assessment Monitoring System (PRAMS) survey. PRAMS, developed by the Centers for Disease Control and Prevention (CDC) in 1987, provides state-specific and population-based information for recent mothers of a live birth that ask about attitudes, behaviors, and experiences before, during and shortly after pregnancy. While mothers are asked limited questions regarding fathers, a survey targeted to fathers would provide first-hand knowledge of their thoughts and experiences.⁷ The information gathered from this type of survey could increase knowledge and awareness of the distinct issues experienced by fathers during the reproductive period and their level of support for positive maternal health behaviors. Historically the response rate in the PRAMS among mothers of American Indian infants has been low, primarily due to a low contact rate rather than a low participation rate.8 However, no studies have been done that have determined the response rate to surveys regarding pregnancy among fathers of American Indian infants.

The objective of this project was to develop a paternal PRAMS-like survey and administer it concurrently with a maternal PRAMS-like survey to assess parental behaviors and attitudes among an American Indian population in rural South Dakota. The development of the survey instrument for fathers was designed to mirror the mothers' survey. The methodology used and response rates are described as well as key results.

Methods

All mothers who gave birth to an American Indian infant between April 1 to Dec. 31 of 2015 and resided in a Sisseton Wahpeton Oyate (SWO) of a Lake Traverse Reservation county (Roberts, Marshall, Day or Codington) in eastern South Dakota were included. A data use agreement was established between South Dakota State University (SDSU), which was responsible for data collection and analyses, and the South Dakota Department of Health, and birth certificate data were downloaded monthly.

Parents' names were obtained from birth certificates, and all correspondence was through the mother. Fathers whose names were on the birth certificate were eligible to be contacted via the mother or directly if the father's address was provided by the mother. For fathers whose names were not on the birth certificate, the mother was asked by the Tribal Health coordinator for the father's information, and he was contacted by the mother or directly if the mother consented. Fathers that heard about the study who came forward to complete the survey were eligible.

Data collection was conducted via survey (hard copy or online) and occurred between two to six months postpartum. Initial attempts to contact parents were by letter followed by the mailing of the survey following similar procedures as the CDC PRAMS protocol (www.cdc.gov/ prams/methodology.htm). A Tribal Health coordinator was responsible for locating participants and encouraging the parents to complete the surveys. A phone contact was attempted if the mailed survey was not returned within two weeks, and a repeat mailing or a home visit was offered. The coordinator did not ask questions or fill in the survey for the participant; rather, they handed the parent the survey booklet or provided a computer/instruction for the participants to complete the survey online. Completed survey booklets were placed in a pre-paid envelope by the participant and mailed directly to SDSU. Participant identification numbers were assigned allowing the mother's and father's surveys to be linked. Participants received a \$20 gift card to Dakota Connection, a Tribal gas station and convenience store, for survey completion. Attempts were made to complete the survey until six months postpartum although surveys received after were used.

The mothers' survey had 101 questions including CDC PRAMS (Phase 6) core questions and supplemental questions. Topics addressed included prenatal care, alcohol and cigarette use, substance abuse, domestic abuse, contraception, maternal stress, depression, health insurance, infant sleep practices, economic status, and adverse childhood experience (ACE) questions.

The father's survey had 66 questions, and topics were similar to the mother's survey with additional questions specifically for the father such as: barriers to attending prenatal visits and delivery, anxiety about labor and delivery, barriers to taking time off after the birth, and attitudes regarding breastfeeding. Anxiety questions were taken from the PRAQ-R2, questions about the attitudes and beliefs concerning breastfeeding were based on a published survey, and depression scores were calculated using the PRAMS-3D¹⁰ that is based on questions related to feeling hopeless, slowed down, and down, depressed or sad. Question completion ranged from

Journal

78 percent to 100 percent (average=98 percent). In general, response options were adequate and skip patterns were followed appropriately, in part, due to the majority of surveys being completed online which automates skip patterns. One question had two responses that differed between men who completed by mail vs. online, and these responses related

to reasons that prevented the father from going to prenatal visits. These differences may reflect differences in socioeconomic status in both the response to the question and the method of survey completion, as parents responding via computer are likely higher socioeconomic status.

Prevalence rates with 95 percent confidence intervals are given for rates of fathers' health, health-related activities, attendance at health care visits, depression, anxiety, tobacco use and mothers' health and health-related activities. Chi-square analyses were used to determine the associations between demographic characteristics (age, education) and survey completion, and odds ratio for fathers' attitudes toward breastfeeding and breastfeeding rates. Kappa statistics were used to assess agreement between the fathers and mothers with regard to intendedness of pregnancy and contraceptive use, fathers' perception of maternal depression and symptoms of depression as reported by the mother, and reported tobacco use among the father and mother. The study protocol was approved by the SDSU Institutional Review Board, SWO Local Research Review Board, and the Indian Health Service Great Plains Institutional Review Board. The SWO Local Research Review Board reviewed and approved the manuscript.

Results

Of the 149 births during the study period, 92 mothers (62 percent) and 64 of the 126 fathers (51 percent) listed on the birth certificate completed the survey (62 motherfather pairs). Demographic characteristics and method of survey completion for fathers and mothers are shown in Table 1. A greater percent of known fathers who

completed the survey were older than 25 years compared to known fathers who did not complete (80 percent vs 56 percent, p<0.01). There were no differences in demographic characteristics between mothers who completed and those who did not (data not shown).

Father's Health and Health-related Actions: Ninety percent of

	Fathers (n=64)	Mothers (n=92)
Response rate	51% (64/126*)	62% (92/149)
Mode of survey completion		
Hard copy (mailed or delivered)	38% (24)	40% (37)
Online	59% (38)	52% (48)
Phone	3% (2)	8% (7)
Reason for non-completion		
Time expired	92% (57)	95% (54)
Could not locate, refused, language barrier	8% (5)	5% (3)
Parental age (years)		
Less than 25	20.3% (13)	48.9% (45)
25 and older	79.7% (51)	51.1% (47)
Parental education*		
Less than high school	25.4% (16)	30.4% (28)
High school	39.7% (25)	34.8% (32)
Greater than high school	34.9% (22)	34.8% (32)
Parental race		
American Indian	92.2% (59)	95.7% (88)
Other or unknown	7.8% (5)	4.3% (4)

^{* 126} of the 149 births had a father listed on the birth certificate; educational level was not reported in one father.

Table 2. Percent of fathers and mothers of American Indian infants by body mass index categories, health-related actions, and pregnancy intention, 2015.

	Fathers (n=64)	Mothers (n=92)
Health & health-related actions		
Body mass index (kg/m2)		
Overweight/obese (25 or greater)	90.2% (80.2-95.4)	53.8% (43.7-63.7)
Normal weight/underweight (less than 25)	9.8% (4.6-19.8)	46.2% (36.3-56.3)
At any time during the 12 months before the mother became pregnar	nt:	
Checked or treated for diabetes	10.9% (5.4-20.9)	20.7% (13.5-30.4)
Checked or treated for high blood pressure	14.1% (7.6-24.6)	19.1% (12.3-28.5)
Checked or treated depression or anxiety	6.3% (2.5-15.0)	21.3% (14.1-31.0)
Talked to health care worker about family history	12.5% (6.5-22.8)	22.5% (15.0-32.2)
Had teeth cleaned by dentist/dental hygienist	18.8% (11.1-30.0)	45.6% (35.7-55.8)
Exercised 3+ days/week	29.7% (19.9-41.8)	28.4% (20.0-38.6)
Changed eating habits to lose weight	12.7% (6.6-23.1)	15.7% (9.6-24.7)
Pregnancy Intention		
Just before the pregnancy, how did parent feel about the mother		
becoming pregnant		
Wanted then or sooner	56.3% (44.1-67.7)	41.8% (32.2-52.0)
Wanted later	26.6% (17.3-38.5)	20.9% (13.8-30.3)
Did not want then or later	17.2% (9.9-28.2)	8.8% (4.5-16.4)
Not sure	Not an option	28.6% (20.3-38.6)
How parent felt when they found out the mother was pregnant:		
Very happy or happy	68.8% (56.6-78.81)	71.9% (62.2-79.9)
Unhappy or very unhappy	6.3% (2.5-15.0)	5.2% (2.2-11.6)
Not sure	25.0% (16.0-36.8)	22.9% (15.6-32.3)

Journal

responding fathers were overweight or obese compared to 54 percent of mothers. When fathers were asked about health-related actions the year before the mother became pregnant less than 15 percent reported a health care visit to be checked or treated for diabetes, high blood pressure, or depression or anxiety or talked to a health care worker about their family medical history (Table 2). Additionally, 19 percent had their teeth cleaned by a dentist/dental hygienist compared to 46 percent of mothers. The most frequent health-related behavior reported was exercising three or more days per week (30 percent) and 13 percent were changing their eating habits to lose weight. In contrast, 28 percent of SWO mothers reported exercising three or more days a week, while 16 percent reported changing eating habits to lose weight.

Pregnancy Intention and Family Planning: When asked how they felt about the timing of the pregnancy, over half of the fathers stated they wanted the mother to be pregnant then or sooner compared to about 42 percent of the mothers (Table 2). Mothers were asked how the father felt about her being pregnant with an additional response that she did not know how the father felt. Among the mother-father pairs, 79 percent of the mothers stated they knew how the fathers felt about the pregnancy, and among these mothers, there was agreement with the fathers (92 percent, κ =0.827, very good agreement). Both the father and mother were asked how they felt when they found out about the pregnancy. The majority of fathers and mothers were very happy or happy (Table 2) and almost three-quarters of the father-mother pairs agreed on how they felt about the pregnancy (74 percent, κ =0.341, fair agreement).

There was good agreement among father-mother pairs on whether birth control was being used at the time the mother became pregnant (83 percent, κ =0.647). Fathers were asked whether the mother was currently using birth control. A few fathers (6 percent) stated they did not know, and 86 percent of the fathers who thought they knew agreed with what the mother stated (κ =0.639,good agreement).

Health Care Visits: One-third of fathers reported attending a health care visit with the mother before she was pregnant where a health care provider talked about how to prepare for a healthy pregnancy (Figure 1). Eighty percent of fathers attended some of the prenatal visits and almost 90 percent attended the delivery. Among fathers who did not attend all prenatal visits, the main reasons for not attending were: the father could not take time off work or school (60 percent), there was no one to take care of other children (41 percent), and there were too many other things going on (26 percent).

More than three-fourths of fathers (77 percent) either took time off from work after the birth or were unemployed or not working at that time. Among those who did not take time off, the stated reasons were that they were too busy at work (50 percent), they could not afford it (50 percent), or the mother had others to help her (44 percent).

Anxiety and Depression: Information on the father's anxiety regarding the pregnancy indicated that the majority of fathers (≥90 percent) were not anxious about the health of the infant, but 80 percent of the fathers indicated that they were anxious about the delivery. Of the fathers, 11 percent scored within the depressed range based on the PRAMS-3D depression scale, compared to 21 percent of the mothers. Fathers were also asked whether the mother experienced feelings consistent with being depressed (feeling down, depressed or sad, hopeless, and slowed down); 16 percent of the fathers thought the mother was depressed. About 76 percent of the time the father's perception of the mother being depressed agreed with what the mother reported based on the depression scale (κ =0.173,poor agreement). More than half of the mothers who had symptoms of depression were not thought to be depressed according to the father.

Breastfeeding: The majority of fathers (70 percent) were

Figure 1. Percentage of fathers attending some or all health care visits with mother with 95 percent confidence intervals.

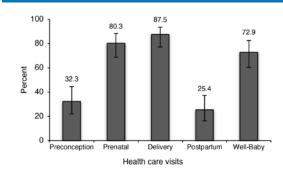
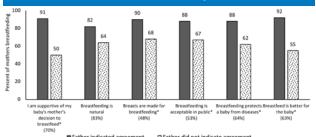


Figure 2. Percentage of mothers who breastfed by father's attitudes towards breastfeeding.



*Indicates significant difference between percentage of mothers who breastfed by how the father felt about breastfeeding. Percentages in parentheses are the percent of father who agreed with the statement.

supportive of the mother's decision to breastfeed, thought that breasts were made for breastfeeding, and that breastfeeding was natural, acceptable in public, better for the baby, and protects the baby from diseases (Figure 2). Among father-mother pairs, of those fathers who were supportive of breastfeeding, 91 percent of the mothers breastfed compared to 50 percent of the mothers for whom fathers did not state they were supportive of breastfeeding (OR=9.8[2.4-38.9]). Figure 2 shows the percentage of mothers who breastfed relative to the father's attitudes towards breastfeeding.

Substance Use: Seventy-three percent of fathers smoked cigarettes in the past two years, and of those, 22 percent quit before they found out the mother was pregnant, 22 percent quit smoking around the mother, and 24 percent cut back during the mother's pregnancy. Most fathers (77 percent) reported that they never smoked around the mother while she was pregnant, 97 percent stated that no one was allowed to smoke inside the baby's home, and 90 percent stated that the baby was never in the same room or vehicle with someone who is smoking. Maternal and paternal smoking were associated (κ =0.496,p<0.001); among fathers who had smoked in the last two years, 77 percent of the mothers also smoked compared to 20 percent of mothers smoking if the father did not smoke.

Discussion

The adequate response rates among mothers and fathers of American Indian infants illustrates the feasibility of conducting paired maternal and paternal surveys in a rural minority population that has traditionally been considered hard to survey. The development of a survey aimed at questions designed specifically for fathers such as his health and health-related activities, support of breastfeeding, anxiety about the labor and delivery, and barriers to paternity leave were able to provide important public health information. Additionally, many of the questions were similar for the father and mother which allowed us to evaluate paternal-maternal agreement with regard to pregnancy intention, birth control use, and the father's ability to detect depression among the mother.

Greater engagement of the father is beneficial in mothers seeking early prenatal care¹, obtaining adequate prenatal care, satisfaction with care, having positive labor and delivery experiences³, and better postnatal health.³ Fathers frequently attended health visits and were present for the delivery if they could get time off from work and childcare was available for other children. Health care visits are important opportunities to engage the father's participation in his own health as well

as the health of the mother and baby. The main barriers for fathers not attending prenatal care visits or staying home after the birth were work-related. This seems consistent across studies and may be related to traditional parental role expectations and socioeconomic status. 12,13 Fathers of low income families may feel more pressure to provide financially and thus, less likely to take time from work especially when paid paternity leave is scarcely provided.¹³ Not only does the father miss early quality engagement with the baby, but mothers with multiple children are more likely to suffer from postpartum depression when the father is not present.¹³ Overall, similar to other studies, fathers report positive experiences when they feel that they are receiving similar care as the mother and are included in health care discussions. 12 There are opportunities for screening and interventions to address father's health care needs when he accompanies the mother and baby to the clinic using innovative and familyfriendly approaches. Fathers may be more open to discuss personal health issues during the transition period into fatherhood or shortly after the birth of a child. 13 For example, fathers who are not being seen for their own well-care visits could be screened for diabetes, cardiovascular disease, oral health, and behavioral health conditions. The current study provides dramatic evidence for this considering 90 percent of the fathers self-reported being overweight or obese; however, less than 15 percent had been recently screened for diabetes, cardiovascular disease, and behavioral health conditions and less than 30 percent were active or changing their eating habits. Incorporating the father into health care visits can also provide key interactions with providers to educate the fathers on the importance of breastfeeding and to assess the father's mental health. Mothers were more likely to breastfeed when the fathers were supportive. Father's attitudes toward the pregnancy and involvement in the antenatal period have been shown to affect whether the mother initiates breastfeeding and length of time breastfeeding.^{3,5} New fathers also experience higher rates of depression which can lead to adverse outcomes related to maternal and child health. 12-15 Depressed fathers are more likely to have depressed partners, less likely to read to their children, more likely to use corporal punishment, and more likely to have children that experience anxiety. 14,15

Screening for maternal depression can occur via the father; however, the father's perception of the mother's depressive symptoms may not be accurate as shown in the present study. More than half of the mothers who were depressed were not perceived so by the father. Therefore, health care visits provide opportunities to communicate early with both

Journal

parents and intervene, if necessary. Information regarding stressors such as labor and delivery might be discussed with both parents during prenatal visits. Additionally, there may be contributing reasons for the anxiety and depression that can be addressed including lifestyle changes, role adjustments and preparedness for labor and delivery. The father's mental health and stress can lead to adverse behaviors which can negatively affect maternal health and behaviors. There was a stark contrast in smoking rates between mothers with fathers who did or did not smoke (77 percent vs. 20 percent, respectively). Targeting couples who smoke may be an effective way to reduce smoking among pregnant mothers.

There are several limitations to these data. The majority of questions were not validated specifically in fathers but were modified for paternal use based on CDC PRAMS questions validated for use in mothers. Based on CDC recommended strategies for ongoing evaluation of specific questions (question completion rates, whether skip patterns were followed appropriately, responses of specific question by mode of survey administration, written comments provided) we found that the fathers did not have problems completing this survey. The status of the mother-father relationship is unknown; therefore, we cannot deduce the involvement of the father and/or his behaviors in relation to the status of the parental relationship. Presumably, approaching fathers through the mothers will miss the non-cohabitating and less involved fathers (as well as not contacting fathers not listed on the birth certificate) which may be a higher risk population. Missing data also may be a concern, but question completion rates ranged from 78 percent to 100 percent. In addition, the survey was based on self-report so recall bias or reporting bias are possible. This is particularly relevant to behaviors and attitudes during the year prior to the pregnancy.

In conclusion, having both the mother and father complete a survey related to attitudes and behaviors before, during and after pregnancy is feasible and provides important public health information. Our results indicate that health care visits around the time of pregnancy provide a crucial time to not only address health issues and provide education to the mother but reach the father as well. The father's attitudes, behaviors and experiences regarding pregnancy can provide valuable information on the extent that fatherhood can influence the father's personal health and improve pregnancy, maternal and child outcomes.

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