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The Adequacy of Prenatal Care in Rural Kansas Related to Distance Traveled

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ABSTRACT

Introduction. Prenatal care is essential for optimizing the health of a woman and her baby. Multiple factors have created barriers in the access to prenatal care in rural Kansas. Over 120 rural hospitals in the United States have closed since 2010, 5 in Kansas. Seventy-seven of the 105 Kansas counties do not have maternity care services. This study investigated differences in prenatal care received by women in rural Kansas counties related to distance traveled. Differences in timing of initiation of care, number of visits, and services received were compared between two cohorts: those who drove < 19 miles and those who drove ≥ 20 miles for prenatal care.

Methods. A survey was distributed to women who had delivered a child in the last three years in rural Kansas at participating clinics. Measures of adequacy of prenatal care were determined with questions regarding timing of first prenatal visit, number of prenatal visits, and services received at visits. An index was created using these variables and compared between the two cohorts using two-tailed t-tests for continuous data and chi square analysis for categorical data.

Results. Women who traveled ≥ 20 miles for prenatal care received statistically significant less services, and had less prenatal care visits in the second trimester and overall in their pregnancy compared to women who traveled < 19 miles for prenatal care. Rurality did not impact adequacy of prenatal care.

Conclusions. Women traveling ≥ 20 miles to receive prenatal care had significantly fewer prenatal visits during their second trimester and overall in pregnancy and self-reported less prenatal care services. These results indicated the importance of lessening barriers to prenatal care in rural Kansas, such as transportation and financial barriers.

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INTRODUCTION

Early and regular maternal care is essential for optimizing the health of a woman and her fetus. According to the American College of Obstetricians and Gynecologists, perinatal care visits should be on a frequent enough basis to assess the health and well-being of the woman and fetus, provide ongoing education, complete recommended health screening studies and review results, and to detect chronic or new medical and psychosocial issues.[1] Maternity care includes prenatal care, as well as care received during childbirth and postpartum. Multiple factors have changed the landscape of healthcare in rural areas, creating barriers in access to maternity care, including the closure of rural hospitals and decreased number of physicians that deliver babies in rural counties.[2] More than 5 million women live in counties termed "maternity care deserts", where access to maternity health care services are limited or absent, either through a lack of services or due to barriers to a woman's ability to access care.[3] The Center for Medicaid and Medicare Services found that in the U.S. less than 50% of women who reside in rural areas have access to prenatal care within a 30-mile drive from their home and that more than 10% of rural women drive 100 miles for prenatal care.[2]

According to the University of Minnesota Rural Health Research Center, Kansas experienced a 5.8% drop in the percentage of hospitals with maternal services within the 86 non-urban counties in Kansas.[4] Many hospitals that have managed to stay open have stopped providing maternal care. A 2016-18 survey of physicians who provide maternity care services in Kansas revealed 32 of 89 rural counties offered maternity care services.[5] This study also predicted that maternity care deserts likely will expand by 2030 to only 24 rural counties with maternity care services. Historically, Family Medicine (FM) physicians have provided maternity care services in rural counties and most infants delivered in rural Kansas were being delivered by FM physicians; however, the number of FM physicians performing routine deliveries has decreased.[6]

The current study expanded on a 2018 study by Blythe et al.[7] suggesting there may be a correlation between the rural-urban commuting area (RUCA) code of the zip codes in which women reside and maternal satisfaction of the care they received. The specific aim was to investigate potential differences in prenatal care received by women who reside in rural counties in Kansas through a patient survey that quantified the relationship between distance traveled to receive medical care and adequacy of prenatal care received.

METHODS

Setting, Study Design and Participants. A multicenter, cross-sectional survey was used to collect data for this study. The survey was a retrospective recall that accounted for timing of initiation, total number of prenatal care visits, and services provided at prenatal care visits. The variables used were chosen based on their presence in other tools that have worked to expand use to assess adequacy of prenatal care, such as The Content and Timing of care in Pregnancy (CTP) tool[8] and the Adequacy of Prenatal Care Utilization (APNCU) Index.[9] Specific data points gathered were modified to adapt our survey to the maternal recall format.

Medical students administered the surveys to women presenting in clinics during their rural elective. Surveys were distributed to all women presenting to the clinics at which the students were assigned and who were pregnant or had been pregnant within the last three years. The time frame for data collection for this study was, June 22 - July 17, 2020. Inclusion criteria included any woman at least 18 years or older who sought medical care from clinics in Kansas within three years of their last child being born in rural Kansas. Exclusion criteria included women who delivered within the last three years in urban counties, counties outside of Kansas, mothers who were under the age of 18 at the time of survey collection, or who had multiple gestation pregnancy. Surveys were only available in English and Spanish. This study was approved by the Institutional Review Board at the University of Kansas Medical Center.

Tools to assess adequacy of prenatal care are critical to identifying disparities in prenatal care and to improving prenatal care accessibility and birth outcomes. In this study, a retrospective recall survey was developed that accounted for timing of initiation, total number of prenatal care visits, and services provided at prenatal care visits. The variables used were chosen based on their presence in other tools as mentioned above.[8,9] Some variables were simplified or excluded as it was not appropriate or attainable to retrieve those answers from all women when considering recall bias and the need to specify all variables to avoid medical jargon. Examples of excluded variables included head circumference at birth, weight gained during pregnancy, and blood pressure measurements throughout pregnancy.

Data Collection. Women who met the inclusion criteria were recruited by medical students to complete the survey when they presented for medical care. Study data were collected and managed using REDCap® electronic data capture tools hosted at the University of Kansas Medical Center.[10,11]

The variables collected for this project included:

1. Participant demographics (age, education level, income level)
2. When was prenatal care initiated?
3. How many prenatal care visits occurred during the first trimester?
4. How many prenatal care visits occurred during the second trimester?
5. How many prenatal care visits occurred during the third trimester?
6. Weight and length of the child?
7. Reported estimated gestational age (EGA) of the child?
8. Were the following prenatal care services received?
    a. Glucose Challenge Screening
    b. Group B Streptococcus
    c. Anomaly Ultrasound
    d. Tetanus, Diphtheria, Pertussis vaccine
    e. Dating Ultrasound
    f. Fetal Heart Rate
    g. Urine Test Screening

Data Analysis. The responses to the survey were examined as a function of the self-reported distance traveled by the patient. Distance traveled was reported by the participants in 20-mile increments and separated into two cohorts: those who had traveled < 19 miles for prenatal care and those who had traveled ≥ 20 miles for prenatal care. Participants also were separated into cohorts representing the relative rurality of the county where the mother received prenatal care. Zip code was used to identify the RUCA code and then rurality was simplified in a four-category RUCA of Urban, Large Rural, Small Rural and Isolated, as described by the University of Washington, Washington, Alaska, Montana, and Idaho Rural Health Research Center.[12,13] Using the collected variables above, distance traveled for prenatal care and rurality of the participant's residence was evaluated to determine effect on adequacy of prenatal care.

A Quantile-Quantile plot was utilized to determine if there was a normal distribution. This plot is a graphing method that compares two different data samples and determines if they are from the same population.[14] Responses to the following variables were distributed normally: timing of initiation of prenatal care, number of prenatal care visits in each trimester, number of total prenatal care visits. Comparison of the means between the two distance cohorts were accomplished using the 2-tailed t-test for continuous data and chi square analysis for categorical data. RUCA codes were compared for their influence in adequacy of prenatal care via the ANOVA test for continuous data and the chi square test for categorical data. The following variables were not normally distributed: EGA, weight at birth, and length at birth. They were analyzed utilizing a Mann-Whitney as they were continuous data sets.

RESULTS

A total of 101 participants from 27 of the 32 (84%) rural counties that provided maternity care consented and filled out the survey. Eighteen incomplete surveys were removed. Six other surveys were excluded based on exclusion criteria. Ultimately, 77 responses were utilized. These 77 participants were separated into cohorts, both based on the distance driven for prenatal care, as well as based on RUCA code (Table 1).

Table 1. Demographics and RUCA Code classification.

Demographic	Cohort 1 (< 19 miles): n = 49 (63%)	Cohort 2 (≥ 20 miles): n = 28 (37%)
Age of mother	29.9	28.4
White	41 (84%)	27 (97%)
Hispanic	5 (10%)	1 (4%)
American Indian	1 (2%)	0 (0%)
Black or African American	1 (2%)	0 (0%)
Asian	1 (2%)	0 (0%)
Married	40 (82%)	23 (83%)
Single, never married	9 (18%)	3 (11%)
Mean household income < $50,000	14 (18%)	11 (39%)
Mean household income > $50,000	35 (72%)	18 (42%)
Bachelor, Associates, or Graduate degree	33 (67%)	21 (75%)
High school diploma or equivalent	9 (18%)	3 (11%)
No high school diploma or equivalent	7 (15%)	5 (18%)
Currently pregnant	6 (12%)	4 (14%)
Mean number of children	2.7	1.89
RUCA Classification for Counties Where Participants *Received* Care		
Urban	0 (0%)	0 (0%)
Large Rural	26 (53%)	14 (50%)
Small Rural	8 (16%)	5 (18%)
Isolated	15 (31%)	9 (32%)

Table 1. Demographics and RUCA Code classification. *continued.*

Demographic	Cohort 1 (< 19 miles): n = 49 (63%)	Cohort 2 (≥ 20 miles): n = 28 (37%)
RUCA Classification for Counties Where Participants *Reside*		
Urban	1 (2%)	0 (0%)
Large Rural	24 (49%)	7 (24%)
Small Rural	8 (16%)	4 (14%)
Isolated	16 (33%)	18 (66%)

When comparing adequacy of prenatal care in relation to the distance traveled (Figure 1), cohort 1 (< 19 miles traveled) received statistically significantly more prenatal care visits in trimester two (p = 0.003) and overall (p = 0.045) compared to cohort 2 (≥ 20 miles traveled). Cohort 1 consistently received significantly more prenatal services than cohort 2 (p = 0.003). Sixty-four percent of cohort 1 had seven services versus 20% of cohort 2. Eighty-five pecent of cohort 1 had six or more services versus 62% of participants in cohort 2 (Figure 2). No statistically significant difference in number of prenatal care of visits was found for timing of initiation of care and number of prenatal care visits in the third trimester (p = 0.19 and p = 0.91). Distance was not found to affect number of prenatal care visits in the first trimester, as all participants met guidelines.

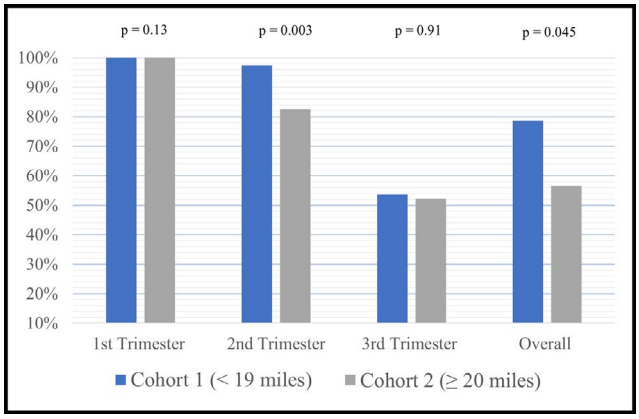

Figure 1. Percent of patients who received adequate prenatal care visits in each trimester and overall.

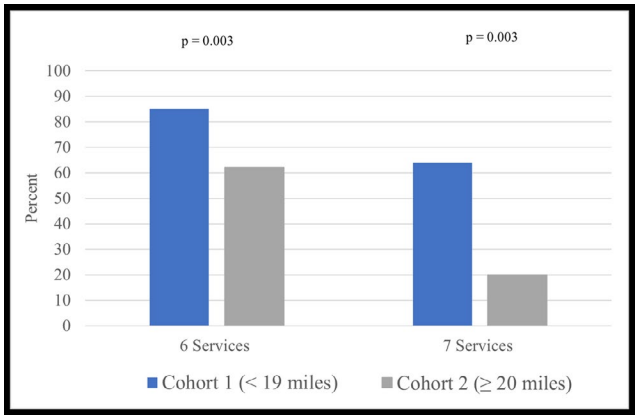

Figure 2. Percent of patients receiving six or seven prenatal care services.

By RUCA code classification, cohort 1 versus cohort 2 participants received their maternity care in Large Rural (53% vs. 50%), Small Rural (16% vs. 18%), and Isolated (31% vs. 32%). Cohort 1 and 2 participants resided in Large Rural (24% vs. 24%), Small Rural (16% vs. 14%), and Isolated (33% vs. 66%). Rurality of the county where the mother received maternal care was not found to impact adequacy of prenatal care. Utilizing ANOVA, no statistically significant differences in timing of initiation of prenatal care (p = 0.79), or total number of prenatal care visits the first trimester (p = 0.25), second trimester (p = 0.379), third trimester (p = 0.53), or overall (p = 0.141) were found. A chi square analysis revealed rurality of the county where the mother resided did not impact the number of services received (p = 0.827).

DISCUSSION

A statistically significant difference was found between the number of prenatal care visits in the second trimester and overall during the pregnancy between women who had to drive ≥ 20 miles for prenatal care relative to those who traveled < 19 miles. Although not statistically significant, women who had to drive ≥ 20 miles for prenatal care had less visits in the third trimester of their pregnancy. This result may be due to the increasing number of prenatal care visits necessary in the second and third trimesters. In the first trimester, women are instructed to seek prenatal care every 4 weeks until 28 weeks gestational age compared to every 2 weeks till 36 weeks, then weekly until delivery.[1] For some women, this can mean driving long distances every week for over a month which may be unattainable. These results indicated distance to travel for prenatal care was a barrier to care for many women in rural counties of Kansas. Additionally, rurality of the county where the woman received prenatal care did not show significant differences in number of prenatal care visits or adequacy of prenatal care. This finding may suggest that distance traveled for prenatal care was the barrier, rather than the rurality of the prenatal care facility.

Limitations of this project included the time frame of the study during the COVID-19 pandemic. Due to COVID-19 restrictions, the original time frame of data collection for this study was shortened from two months to one month as medical students could not participate in clinical rotations, and the number of participating clinics declined from 29 to 27. The survey methodology of this project allowed for potential recall bias, due to the differing understandings and memory of participants in what prenatal care they received and recalling events that occurred as long as three years ago. Another limitation included variables that were not collected, but would have given more insight on prenatal care received and birth outcomes, including blood pressure screening, offered genetic screening, and prenatal vitamin intake.

One strength of this study was that it retrieved information not found on birth certificates. Previous data that were based on birth certificate data looked at the county of delivery, not the county of residence.[15] Investigation of the relationship between distance and adequacy of prenatal care has not been studied adequately. According to the Kansas Pregnancy Risk Assessment Monitoring System (PRAMS) data from 2018, 12.3% of women indicated that lack of transportation was a barrier to prenatal care.[16] This barrier was not delineated to understand if distance to travel was included, however, in rural Kansas there is not access to the bus system or ride-share services, removing one option

to accessible transportation. Because distance traveled to prenatal care negatively impacted the number of prenatal visits during the second and third trimester, uncovering ways to improve the transportation barrier identified in PRAMS data would be prudent. In addition, identifying other health resources women are utilizing, if any, is necessary to understand the impact of this barrier on mothers and rural healthcare systems.

The increased usage of telemedicine during the COVID-19 pandemic may be a potential method for increasing access to prenatal care. In May of 2020, American College of Obstetricians and Gynecologists released guidance outlining when telehealth medicine could be utilized, minimizing potential COVID-19 exposure.[17] These guidelines included what prenatal care visits and services should be done in person versus those that could be done remotely with telehealth. There may be reason to incorporate these COVID-19 telehealth guidelines to make prenatal care more accessible for women who otherwise would miss the prenatal care visit entirely due to the travel distance for prenatal care visits.

CONCLUSIONS

Women traveling ≥ 20 miles to receive prenatal care had statistically significantly lower number of prenatal visits during their second trimester of pregnancy and overall. Women also self-reported less prenatal care services, indicating a possible decrease in the adequacy of prenatal care. Further study is required to understand if there are other impacts to mothers that were not captured by self-reported birth outcomes, such as financial stress, psychological stress, and socioeconomic stressors. This study demonstrated the need to further study distance traveled for maternity care and interventions to alleviate the barriers present for pregnant women in rural Kansas.

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