

## Preventive Care Utilization among Rural versus Urban Women 12 Months Prior to Pregnancy

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### ABSTRACT

**Introduction.** Pregnancy-related mortality in the United States occurs in 32.3 per 100,000 live births. Rural maternal mortality rates were even higher, and these patients were less likely to receive routine care. The purpose of this cross-sectional study was to compare primary and prenatal care and health behaviors among perinatal mothers living in rural and urban Kansas.

**Methods.** Data were collected from 1,971 pregnant women who participated in Phase 8 Pregnancy Risk Assessment Monitoring System (PRAMS) for Kansas between 2016 and 2018. Respondent location (urban or rural based on NIH classification) was abstracted from birth certificates and frequencies of healthcare visits and secondary healthcare variables were compared.

**Results.** Most respondents (75.1%, n = 1,481) resided in an urban area. Most (84.4%, n = 1,664) women were Caucasian, and the largest category (31.1%, n = 613) was 25 to 29 years old. More urban women reported visiting an obstetrician/gynecologist within 12 months before pregnancy than rural women ( $p < 0.0001$ ). Urban women reported attending pre-pregnancy dental visits ( $p = 0.019$ ) and teeth cleanings ( $p = 0.004$ ) more than rural women. Of the 35.7% of respondents (n = 516) who reported receiving pre-pregnancy counseling on folic acid, prenatal vitamins, or multivitamins, 78.9% (n = 407) resided in an urban area.

**Conclusions.** Rural women reported fewer routine primary and prenatal care behaviors compared to their urban counterparts. Efforts are needed to improve access to obstetrician/gynecologist services, especially for women in rural areas. *Kans J Med* 2022;15:278-284

### INTRODUCTION

Pregnancy-related mortality in the U.S. occurred in 32.3 per 100,000 live births between 2003 and 2016.<sup>1</sup> The leading causes of pregnancy-related mortality within this timeframe have been documented as cardiovascular as the leading cause at 15.5% of all deaths, followed by pre-existing chronic illnesses (14.5%), infection (12.7%), hemorrhage (11.4%), and cardiomyopathy (11.0%).<sup>2</sup> The majority of these causes are considered preventable with routine primary and prenatal care.<sup>1,2</sup> The proportion of chronic disease states (e.g., heart disease, obesity, hypertension) causing pregnancy-related death have notably increased compared to traditional pregnancy-related mortality causes, such as

hemorrhage and thromboembolism.<sup>2</sup>

Women in rural areas with chronic conditions were more likely to have high-risk pregnancies and perinatal complications, and be less likely to receive vaccinations or take prenatal vitamins.<sup>3-11</sup> Women in rural areas also had higher rates of adolescent birth (49 vs. 27 per 1,000 live births) than their urban counterparts.<sup>4</sup> Moreover, rural patients were less likely to have “regular or routine” care in the 12 months leading up to conception compared to urban patients in one state, but other states have limited data on patient care uptake.<sup>3</sup> Despite a push in the 1980s to increase prenatal care focus, many women presented for prenatal care when most fetal organs have been formed and the interventions that can prevent adverse outcomes may be too late to benefit.<sup>12</sup>

There are limited U.S. data regarding rural maternal health outcomes and behaviors, and even fewer data in Kansas regarding rural and urban differences in perinatal utilization of primary and prenatal care. The purpose of this study was to compare the use of primary and prenatal care among perinatal mothers in rural and urban Kansas communities and determine the frequency of health behaviors (e.g., attending health visits, teeth cleanings before delivery, prenatal vitamin use, vaccinations, family planning) that could be impacted by primary and prenatal care.

### METHODS

**Participants.** This study utilized data from Phase 8 (2016 to 2018) of the Kansas Pregnancy Risk Assessment Monitoring System (PRAMS).<sup>12</sup> Kansas PRAMS identified and collected data from women who have had a delivery in the past two to six months based on state birth certificates.<sup>13,14</sup> Every month, Kansas PRAMS conducted stratified random sampling of 140 mothers from the Kansas Vital Statistics Birth Certificate File to complete the questionnaire.<sup>14</sup> The PRAMS questionnaire administered to patients are a series of questions of categorical variables that is completed based on patient recall of their care from prenatal to postnatal period. Infants born with weight less than 2,500 grams were over-sampled compared to normal birth weight to gain sufficient data on this sub-group. Mothers were mailed PRAMS questionnaires up to three times. If there was no response via mail, telephone interviewers attempted to reach them. Survey data were weighted by the U.S. Centers for Disease Control and Prevention (CDC) to adjust for sampling, nonresponse, and non-coverage.<sup>14</sup> The PRAMS report statistics were reported as weighted estimates to account for sampling rates. Some participants did not answer every question of the survey; blank items were excluded from the report. No exclusion criteria were identified.

**Instrument.** The PRAMS database was developed by the CDC and included approximately 83% of all births in the U.S.<sup>13</sup> PRAMS abstracted the independent variable, respondent location (e.g., rural, urban), from newborn birth certificates based on county of residence at the time of birth. The definition of rurality was based on the National Center for Health Statistics' 2013 Urban-Rural six-tiered classification scheme.<sup>15</sup> Kansas PRAMS grouped large fringe metropolitan (1 million or more), medium metropolitan (250,000-999,999), and small metropolitan (49,999-249,999) counties as “urban” while micropolitan and noncore (less than 49,000) counties were coded as “rural”.<sup>14</sup> The 10 outcome variables were centered around the use of primary

and perinatal healthcare visits [e.g., general healthcare, obstetrics and gynecology (OB/GYN), prenatal care visits, dental care visits, family planning visits, influenza vaccination counseling/receipt] as these variables have been reported as improving maternal outcomes.<sup>2-4,6-9</sup>

Additional variables included the coexistence and management of chronic conditions (e.g., diabetes, hypertension), substance use (e.g., tobacco, alcohol, illicit drugs), birth control use, sexually transmitted infection testing (e.g., HIV, hepatitis), potential abusers (e.g., partner, ex-partner, family member), and receipt of general counseling from a healthcare provider (e.g., recommendation for folic acid use, tobacco cessation). Breastfeeding duration and frequency also were analyzed in relation to the primary outcomes.

**Procedures.** This project was identified as “not human subjects” research by the local Human Research Protection Program. De-identified Phase 8 PRAMS data were requested from the CDC collected via self-assessment questionnaire or through telephone surveys. If no response was received, the state PRAMS team conducted a phone call to complete the questionnaire. Questionnaire responses were stored in an electronic database and made accessible to researchers via requests to the CDC.

**Statistical Analysis.** Data analyses were conducted with SAS 9.4 (SAS® Int. Inc., Cary, NC) using survey analysis procedures such as SURVEYFREQ, SURVEYMEANS, and SURVEYLOGISTIC to overcome complex survey structures, those rendering traditional procedures not useful for analysis. Descriptive statistics were presented as means and standard deviations for continuous variables (i.e., age), and proportions and frequencies for categorical variables (e.g., education level). Rao-Scott chi-square test, the Rao-Scott likelihood ratio test analyses were conducted to identify relationships associated with respondent characteristics and uptake of primary and prenatal care services. Multiple logistic regression analyses were used to analyze respondents’ characteristics across study groups. Taylor series (linearization) method was used to estimate the covariance matrix of the regression coefficients. All statistical tests were two sided, and p values ≤ 0.05 were considered statistically significant.

## RESULTS

**Demographics.** A total of 1,971 Kansas women completed the survey, most of whom (75.1%, n = 1,481) resided in an urban area. Most respondents were Caucasian (84.4%, n = 1,664), and the highest frequency of respondents, 31.1% (n = 613), were in the 25 to 29 years old age category (Table 1). The largest proportional difference in age between urban and rural women was in the 20 to 24-year category, with 24.1% (n = 118) of rural women reporting in this age range compared to 16.3% (n = 241) of urban women. Most women reported being married (67.4%, n = 1,329). More rural women acknowledged paternity of their child (84.5%, n = 147), compared to urban women (75.8%, n = 355; [ $\chi^2(1, N = 642) = 5.54$ ]; p = 0.0186).

**Table 1. Demographics of PRAMS survey respondents.**

Variable	Participants, n (%)			p Value
	Urban n (%) n = 1,481	Rural n (%) n = 490	Overall n (%) N = 1,971	
<b>Age</b>				< 0.0001
≤ 17 years	14 (0.9)	4 (0.8)	18 (0.9)	
18-19 years	57 (3.8)	29 (5.9)	86 (4.4)	
20-24 years	241 (16.3)	118 (24.1)	359 (18.2)	
25-29 years	453 (30.6)	160 (32.7)	613 (31.1)	
30-34 years	476 (32.1)	119 (24.3)	595 (30.2)	
35-39 years	200 (13.5)	53 (10.8)	253 (12.8)	
40+ years	40 (2.7)	7 (1.4)	47 (2.4)	
<b>Race</b>				< 0.0001
White	1161 (79.3)	456 (93.1)	1617 (84.0)	
Black	152 (10.4)	8 (1.6)	160 (8.3)	
Other	80 (5.5)	10 (2.0)	90 (4.7)	
Asian/Native Hawaiian American Indian/ Alaska Native	54 (3.7)	3 (0.6)	57 (3.0)	
<b>Marital Status</b>				0.1094
Married	1013 (68.4)	316 (64.5)	1329 (67.4)	
Other	468 (31.6)	174 (35.5)	642 (32.6)	
<b>Acknowledgement of Paternity*</b>				0.0186
Yes	355 (75.9)	147 (84.5)	502 (78.2)	
No	113 (24.1)	27 (15.5)	140 (21.8)	
<b>Place of Delivery</b>				0.976
Hospital	1458 (98.4)	481 (98.2)	1939 (98.4)	
Birth Center	15 (1.0)	6 (1.2)	21 (1.1)	
Other	5 (0.3)	2 (0.4)	7 (0.4)	
Residence	3 (0.2)	1 (0.2)	4 (0.2)	
<b>Income 12 months before pregnancy</b>				0.0008
\$0 to \$20,000	326 (27.5)	90 (35.4)	448 (31.1)	
\$20,001 to \$40,000	314 (26.5)	28 (11.0)	437 (30.4)	
\$40,001 to \$60,000	77 (6.5)	36 (14.2)	298 (20.7)	
\$60,001 to \$85,000	95 (8.0)	35 (13.8)	265 (18.4)	
More than \$85,000	373 (31.5)	65 (25.6)	438 (30.4)	

Data are presented as n (%). Totals may not add up to 100% due to missing values.

\*Variable only captured in P7 version of PRAMS.

**Primary Outcomes: Healthcare Visits.** A pre-pregnancy visit with an OB/GYN in the 12 months before pregnancy was more common in urban women (57.2%, n = 606) than rural women (44.1%, n = 149; [ $\chi^2(1, N = 1,398) = 17.7$ ]; p < 0.0001; Table 2). Urban women more commonly had pre-pregnancy dental visits (65.4%, n = 690) compared to rural women (58.3%, n = 198), and teeth cleanings (47.8%, n = 704) than their rural counterparts (40.4%, n = 196; [ $\chi^2(1, N = 1,394) = 5.4$ ]; p = 0.019 and [ $\chi^2(1, N = 1,959) = 7.9$ ]; p = 0.004, respectively). Urban mothers reported receiving an influenza vaccine before delivery (66.2%, n = 992) more than rural mothers (62.0%, n = 297; [ $\chi^2(1, N = 1,934) = 6.3$ ]; p = 0.042). More urban women participated in postpartum check-ups for themselves (91.5%, n = 1,340) than rural women (89.3%, n = 434; [ $\chi^2(1, 1,951) = 2.07$ ]; p = 0.15 (non-significant)), for an overall postpartum visit participation of 90.9% (n = 1,774).

**Table 2. Primary outcomes: Healthcare visits.\***

Variable	Urban Frequency n (%)	Rural Frequency n (%)	Overall Frequency n (%)	p Value
Pre-pregnancy OB/GYN visit	606 (57.2)	149 (44.1)	755 (54.0)	< 0.0001
Teeth cleaned during pregnancy	704 (47.8)	196 (40.4)	900 (45.9)	0.004
Pre-pregnancy visit with a dentist	690 (65.4)	198 (58.3)	888 (63.7)	0.019
Influenza vaccine received before delivery	992 (66.2)	297 (62.0)	1,289 (66.7)	0.042
Other pre-pregnancy healthcare visit	212 (20.1)	54 (3.9)	266 (19.1)	0.11
Postpartum check-up for self	1,340 (91.5)	434 (89.3)	1,774 (90.9)	0.149
Pre-pregnancy healthcare visit with a doctor	537 (50.2)	156 (46.0)	693 (49.2)	0.18
Pre-pregnancy healthcare visit	1,038 (52.9)	333 (16.9)	1,371 (69.9)	0.35
Pre-pregnancy healthcare visit for family planning/birth control	209 (19.8)	60 (17.9)	269 (19.4)	0.46

\*Data are presented as n (%). Some totals may not add up to 100% due to missing values.

**Mental Health, Abuse, and Health Behaviors.** During the pre-pregnancy visit interview, a minority of all women (45.9%, n = 664) reported being asked about emotional or physical abuse, with urban women reporting a higher frequency (50.7%, n = 540) than rural women (35.3%, n = 124; [ $\chi^2(1, N = 1,447) = 20.8$ ]; p < 0.0001; Table 3). A minority of women (48.1%, n = 695) reported being asked about feeling down or depressed before pregnancy; 50.3% (n = 551) of urban women were asked and 41.1% (n = 144) of rural women were asked ([ $\chi^2(1, 1,444) = 9.03$ ]; p = 0.0026). Women (35.7%, n = 516) reported counseling to take folic acid, prenatal vitamins, or multivitamins, with

37.1% (n = 407) of urban women reporting being counseled and 31.3% (n = 109) of rural women reporting receiving counsel on vitamin use. Depression and abuse reported during pregnancy were similar between demographics (Table 4).

**Table 3. Topics discussed during pre-pregnancy health visits.\***

Variable	Urban Frequency n (%)	Rural Frequency n (%)	Overall Frequency n (%)	p Value
Asked about emotional/physical abuse	540 (50.7)	124 (35.3)	664 (45.9)	< 0.0001
Asked if down/depressed	551 (50.3)	144 (41.1)	695 (48.1)	0.0026
Asked if smoking cigarettes	826 (75.3)	246 (69.7)	1072 (73.9)	0.0368
Folic acid counseling	407 (37.1)	109 (31.3)	516 (35.7)	0.0512
Tested for HIV	238 (22.2)	63 (18.1)	301 (21.2)	0.1009
Expressed desire to have children	487 (44.4)	143 (41.0)	630 (43.6)	0.2618
Birth control use to prevent pregnancy	381 (35.0)	111 (31.7)	492 (34.2)	0.2662
Asked about type of work	660 (60.4)	200 (57.3)	860 (59.6)	0.3076
Counseling to control medical conditions	131 (12.0)	45 (12.9)	176 (12.2)	0.6349
Recommendation to improve health before pregnancy	280 (25.7)	88 (24.9)	363 (25.5)	0.7829
Discussion about STIs	197 (18.1)	62 (17.8)	259 (18.0)	0.8907
Weight counseling	343 (31.3)	109 (31.1)	452 (31.2)	0.9323

\*Data are presented as n (%). Some totals may not add up to 100% due to missing values.

**Table 4. Health problems during pregnancy.\***

Variable	Urban Frequency n (%)	Rural Frequency n (%)	Overall Frequency n (%)	p Value
Depression	269 (18.4)	93 (19.3)	362 (18.6)	0.6663
Diabetes	141 (9.4)	48 (9.9)	189 (9.7)	0.8436
Hypertension	296 (20.1)	98 (20.2)	394 (20.1)	0.9682
Abuse by partner	25 (1.7)	11 (2.3)	36 (1.8)	0.4192
Abuse by ex-partner	17 (1.2)	7 (1.5)	24 (1.2)	0.6122
Abuse by another family member	10 (0.6)	6 (0.3)	16 (0.8)	0.2323

\*Data are presented as n (%). Some totals may not add up to 100% due to missing values.

Prenatal healthcare outcomes included 70.4% (n = 1,355) of women being asked if they were experiencing emotional or physical abuse during pregnancy, with urban women (73.2%, n = 1,060) being asked more than rural women (62.0%, n = 295; [ $\chi^2(1, N = 1,925) = 21.5$ ]; p < 0.0001; Table 5). Most respondents (87.5%, n = 1,705) were offered information on an influenza shot during pregnancy; more urban women (89.0%, n = 1,307) reported having been offered the vaccine compared to rural women (82.7%, n = 398),  $\chi^2(1, N = 1,949) = 13.08$ , p < 0.001. Most women (76.6%, n = 1,480) were asked if they were feeling down or depressed during pregnancy with more urban women (78.1%, n = 1,137) being asked compared to rural women (71.9%, n = 343), [ $\chi^2(1, N = 1,933) = 7.65$ ], p = 0.0057.

Table 5. Prenatal health characteristics and counseling.\*

Variable	Urban Frequency n (%)	Rural Frequency n (%)	Overall Frequency n (%)	p Value
Asked if emotionally/ physically abused	1,060 (73.2)	295 (62.0)	1,355 (70.4)	< 0.0001
Received influenza vaccine information	1,307 (89.0)	398 (82.7)	1,705 (87.5)	0.0003
Asked if feeling down/depressed	1,137 (78.1)	343 (71.9)	1,480 (76.6)	0.0057
Asked if drinking alcohol	1,386 (95.3)	451 (94.2)	1,837 (95.0)	0.3373
Asked if respondent wanted HIV test	736 (51.0)	232 (49.2)	968 (50.6)	0.4765
Asked if planning to use postpartum birth control	1,135 (78.1)	367 (76.5)	1,502 (77.6)	0.4804
Asked if planning to breastfeed	1,336 (91.8)	446 (92.7)	1,782 (92.0)	0.4988
Asked if using drugs	1,163 (80.2)	377 (78.9)	1,540 (79.9)	0.5273
Weight gain counseling	836 (43.3)	283 (14.7)	1,119 (58.0)	0.6269
Prenatal counseling - asked if smoking	1,403 (96.2)	460 (95.8)	1,863 (96.1)	0.7477
Prenatal counseling - prescription medications	1,428 (98.1)	470 (97.9)	1,898 (98.0)	0.8263
Intention to become pregnant				0.6867
Later	264 (18.1)	97 (20.4)	361 (18.7)	
Sooner	231 (15.9)	73 (15.3)	304 (15.7)	
Then	667 (45.8)	221 (46.4)	888 (46)	
Did not want then or any time	88 (6.10)	23 (4.83)	111 (5.8)	
Was not sure	205 (14.1)	62 (13.03)	267 (13.8)	
Prenatal vitamin use in last three months of pregnancy				0.2534
Every day of the week	542 (36.77)	167 (34.2)	709 (36.1)	
4-6 times/week	116 (7.9)	30 (6.1)	146 (7.4)	
1-3 times/week	101 (6.9)	31 (6.3)	132 (6.7)	
Didn't take any vitamin	715 (48.5)	261 (26.7)	976 (49.7)	

\*Data are presented as n (%). Some totals may not add up to 100% due to missing values.

Of postpartum visit variables (Table 6), 52.5% (n = 931) of women were asked about abuse, with urban women (55.0%, n = 739) reporting being asked more compared to rural women (44.8%, n = 192; [ $\chi^2(1, N = 1,772) = 13.76$ ]; p = 0.0002). Most women (83.9%, n = 1,487) reported being asked about depression at their postpartum visit, with urban women (85.0%, n = 1,142) being asked more compared to rural women (80.4%, n = 345; [ $\chi^2(1, N = 1,773) = 4.98$ ]; p = 0.026). A minority (25.4%, n = 498) of women reported smoking one or more cigarettes in the last two years, with more rural women (29.9%, n = 146) having smoked compared to urban women (23.7%, n = 352; [ $\chi^2(1, N = 1,947) = 7.09$ ]; p = 0.008).

Table 6. Topics discussed during postpartum health visits.\*

Variable	Urban Frequency n (%)	Rural Frequency n (%)	Overall Frequency n (%)	p Value
Asked about abuse	739 (55.0)	192 (44.8)	931 (52.5)	0.0002
Tested for diabetes	222 (16.6)	48 (11.3)	270 (15.3)	0.0084
Asked about depression	1,142 (85.0)	345 (80.4)	1,487 (83.9)	0.0257
IUD/Implant inserted	296 (22.2)	75 (17.6)	371 (21.1)	0.0414
Diet and exercise counseling	659 (49.1)	231 (53.7)	890 (50.3)	0.0985
Birth control methods counseling	1,159 (86.4)	358 (83.5)	1,517 (85.7)	0.1339
Asked about smoking cigarettes	758 (56.6)	230 (54.1)	988 (56.0)	0.3673
Birth control prescribed	537 (40.2)	178 (41.5)	715 (40.5)	0.626
Pregnancy spacing counseling	619 (46.2)	203 (47.3)	822 (46.4)	0.675
Birth control use already	1,191 (81.4)	388 (80.5)	1,579 (81.1)	0.6774
Folic acid counseling	764 (57.1)	240 (56.2)	1,004 (56.9)	0.7336

\*Data are presented as n (%). Some totals may not add up to 100% due to missing values.

**Breastfeeding and Birth Control.** At the time of this survey, 60.5% (n = 1,061) of women reported they currently were breastfeeding and fewer urban women (90.39%, n = 1,283) reported breastfeeding at any time than rural women (97.9%, n = 460; [ $\chi^2(1, N = 1,932) = 5.94$ ]; p = 0.0148; Table 7). A minority of women (21.1%, n = 371) reported having an intrauterine device inserted or birth control implant at their postpartum visit, with more urban women (22.2%, n = 296) reporting this compared to rural women (17.6%, n = 75; [ $\chi^2(1, N = 1,761) = 4.16$ ]; p = 0.0414). An overall of 40.5% (n = 715) of women were prescribed birth control at their postpartum visit, with 40.2% (n = 537) of urban women receiving prescription birth control compared to 41.5% (n = 178; [ $\chi^2(1, N = 1,766) = 0.24$ ]; p = 0.626) of rural women. Folic acid counseling was received by 56.9% (n = 1,004) of women, with 57.1% (n = 764) of urban women reporting receiving postpartum counseling compared to 56.2% (n = 240) of rural women ([ $\chi^2(1, N = 1,764) = 0.116$ ]; p = 0.734).

**Table 7. Postpartum health characteristics and outcomes.\***

Variable	Urban Frequency n (%)	Rural Frequency n (%)	Overall Frequency n (%)	p Value
Previous preterm births	55 (3.7)	29 (5.9)	84 (4.3)	0.036
Health problem - Diabetes	74 (5.0)	21 (4.3)	95 (4.9)	0.534
Health problem - Hypertension	111 (7.6)	34 (7.0)	145 (7.4)	0.694
Health problem - Depression	279 (18.9)	103 (21.1)	382 (19.4)	0.295
Health problem - Anxiety	400 (27.1)	138 (28.4)	538 (27.4)	0.57
Length of baby's hospital stay				0.0004
Not born in hospital	13 (0.9)	7 (1.5)	20 (1.0)	
<1 day	39 (2.7)	21 (4.4)	60 (3.1)	
1-2 days	580 (39.9)	241 (49.9)	821 (42.4)	
3-5 days	407 (28.0)	98 (20.3)	505 (26.1)	
6-14 days	153 (10.5)	45 (9.3)	198 (10.2)	
More than 14 days	243 (16.7)	68 (14.1)	311 (16.1)	
Infant living with mom	1,380 (98.2)	460 (97.9)	1,840 (98.1)	0.703
Breastfeeding - Ever	1,283 (90.3)	429 (90.7)	1,712 (90.4)	0.794
Breastfeeding - Still	802 (60.9)	259 (59.1)	1,061 (60.5)	0.502
Breastfeeding duration				0.918
Less than 1 week	62 (10.5)	18 (9.4)	80 (10.2)	
Weeks	256 (43.2)	83 (43.5)	339 (43.2)	
Months	275 (46.4)	90 (47.1)	365 (46.6)	
Depression level since birth of child				0.645
Never	468 (32.3)	146 (30.5)	614 (31.8)	
Rarely	500 (34.5)	176 (36.8)	676 (35.1)	
Sometimes	358 (24.7)	108 (22.6)	466 (24.2)	
Often/Almost Always	99 (6.8)	39 (8.2)	138 (7.2)	
Always	25 (1.7)	9 (1.9)	34 (1.7)	
Loss of interest/pleasure in things usually enjoyed since birth of child				0.826
Never	588 (40.1)	187 (38.5)	775 (39.7)	
Rarely	429 (29.2)	154 (31.8)	583 (29.8)	
Sometimes	303 (20.7)	93 (19.2)	396 (20.3)	
Often/Almost Always	103 (7.0)	35 (7.2)	138 (7.1)	
Always	44 (3.0)	16 (3.3)	60 (3.1)	

\*Data are presented as n (%). Some totals may not add up to 100% due to missing values.

## DISCUSSION

The current study's sample was representative of Kansas women.<sup>16</sup> Although the overall proportion of respondents and the proportion of urban respondents who reported seeing an OB/GYN in the 12 months before pregnancy was comparable to national data, the overall proportion of rural women who reporting seeing an OB/GYN was lower, suggesting rural women may be receiving inadequate care than is recommended for women of reproductive age in the American College of Obstetrics and Gynecology (ACOG) guidelines.<sup>17,18</sup> Additionally, despite a high proportion of reported general healthcare visits in our study, the proportion of visits with a doctor or OB/GYN was considerably lower among the rural population. Unfortunately, this disparity may explain rural respondents low reporting frequencies of being asked and counseled pre-pregnancy, prenatally, and postnatally about emotional or physical abuse, feeling down or depressed, and being asked about their smoking status.

Depression is a significant issue that poses a variety of problems which can impact pregnancy and infant outcomes.<sup>19</sup> Almost one-fifth of the respondents in our study reported depression during pregnancy. Depression before delivery and before pregnancy has been associated with preterm birth, low-birth weight, and postnatal emotional problems for the mother. Our study suggested women are asked about depression more frequently postnatally than before pregnancy or prenatally. Furthermore, rural women maintained significantly lower proportions of depression screening compared to urban women. Although the frequency of reported depression during pregnancy was similar between rural and urban women, it was unclear if patients would be aware of the nuances of possible depression without having had any screening. However, our study demonstrated not only the continued need for depression screening prenatally, but furthermore, rural women continued to report less preventive screening than their urban counterparts.

Despite high rates of influenza vaccination before delivery, the rural cohort had a significantly lower proportion reporting vaccination. Influenza virus is a significant threat to the pregnant mother and her fetus,<sup>6</sup> and influenza vaccination confers protection against complications. Multiple studies have sought to determine why vaccination uptake among pregnant women has remained low; the most common reason appeared to be the lack of vaccine being mentioned or recommended by physicians.<sup>7-9,18</sup> Our study suggested most women in Kansas reported receiving information about influenza vaccinations prenatally, but still report lower vaccination uptake. More information may be needed to discover why rural patients were not receiving information or vaccinations as often as their urban counterparts. Given the wide availability and acceptance of influenza vaccination, it is worth improving vaccination efforts in rural areas, and Kansas providers serving rural communities may provide insight into better rural vaccination strategies.

Despite obvious differences in preventive care and counseling between urban and rural women, there were some similarities and opportunities to improve care for both demographics of women. A history of emotional and physical abuse coincided with being low income and having an unwanted pregnancy and multiple health problems during pregnancy.<sup>20,21</sup> While similar proportions of rural and urban women reported abuse during pregnancy, fewer than half

reported being asked prior to their pregnancies, and, more concerning, the frequency of women being asked about abuse was even lower during the postpartum visit. This indicated a particular need to focus on abuse screening, especially before and after pregnancy. Additionally, few women reported being counseled about taking folic acid, multivitamins, or prenatal vitamins before and after their pregnancies despite the need and recommendation by ACOG for folic acid supplementation for all women of reproductive age. Adequate intake gave significant risk reduction of fetal neural tube defects, such as spina bifida and anencephaly, the latter of which is often fatal to the child.<sup>5,18</sup> Similarly, prenatal vitamin use also was associated with lower miscarriage rates.<sup>18</sup> Nearly half of respondents reported not taking any folic acid, prenatal vitamin, or multivitamin supplement during the last three months of their pregnancy indicating a significant area of risk for complications during pregnancy and for the infant postnatally. Further effort by providers to assess and promote nutritional status perinatally must be encouraged.

In this study, 38% reported they did not want to be pregnant at the time they were or were unsure if they wanted to be pregnant, which was lower than the national unintended pregnancy proportion of 45%.<sup>18</sup> However, fewer rural women reported discussing birth control or family planning during pre-pregnancy, and even fewer were asked about birth control methods or were prescribed birth control postpartum. Given that unintended pregnancy and closely spaced pregnancy can increase risk for pregnancy complications and mortality, and was associated with a high rate of abortion, providers must dedicate more time to address family planning, birth control, and pregnancy spacing with their patients.<sup>17,22</sup> Our study findings showing a discrepancy between rural and urban women in terms of postpartum family planning indicated there are opportunities for providers to discuss and assist rural women with family planning and future care during postpartum visits.

While most of women visited a dentist in the 12 months before pregnancy, fewer than half received teeth cleaning during their pregnancy. Rural women visited the dentist and received teeth cleanings significantly less than urban mothers. Poor dental health has been associated with negative outcomes during pregnancy, and the physiologic changes experienced by mothers leave them susceptible to poor dental health, which can have a negative impact on their own well-being after pregnancy.<sup>23</sup> The most common barrier to dental care was cost, and with more rural women reporting an income of less than \$16,000 per year, it may be more apparent that cost would be a barrier. Supporting the need to prioritize dental care also falls on healthcare providers. While it has been cited that physicians appear to be well-informed about the importance of dental care perinatally, their practice of referring newly pregnant patients to receive dental care has been poor.<sup>24</sup>

This study's findings were limited by the nature of survey-collected data with recall biases being possible, as respondents answered questions regarding healthcare visits occurring as far as 27 months prior. Phase 8 PRAMS did not collect in-depth information regarding rural-urban factors such as access to healthcare (e.g., distance traveled for care, appointment availability, provider types in area), which prevented researchers from speculating further causes outside of the healthcare practices that may result in disparity of care, such as social determinants of health. Additionally, rurality was determined by residence at

time of delivery, though respondents could have moved between rural and urban locations during the data collection window which might confound the results.

While this study utilized PRAMS data specific to Kansas, the disparities between rural and urban populations in some state-to-state and national reviews seemed to support the trends found in Kansas.<sup>3-4,7</sup> Future studies should attempt to use the PRAMS database in multi-state analyses to ascertain if the same outcomes remain when applied to larger populations.

## CONCLUSIONS

Rural women reported fewer routine primary and prenatal care behaviors compared to their urban counterparts. Efforts are needed to encourage rural women to partake in preventive health behaviors, access OB/GYN and physician services, and help narrow the gap between care disparities between urban and rural populations. Further information must be explored to determine if access to healthcare is playing a substantial role in lower proportions of healthcare and health behavior uptake in Kansas, or if characteristics of rural populations like distance to healthcare services, play a unique role in preventive health behaviors. The method in which PRAMS asked respondents about the care visits gave the ability to evaluate the care that was being received by urban and rural women and determine their effectiveness.

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