

## Breastfeeding Interventions in Kansas: An Evaluation of Mothers' Breastfeeding Practices and Perspectives

### Background

The health benefits of breastfeeding for mother and infant are well documented [1, 2, 3]. The American Academy of Pediatrics [1, 2] and the World Health Organization [4] recommend exclusive breastfeeding for the first six months of life.

Despite the known benefits of breastfeeding, breastfeeding rates remain low. Although three quarters of women in the United States start breastfeeding soon after birth, less than half report continuing to breastfeed their infant at six months of age [5]. In Kansas, about 73 percent of women start breastfeeding their infant after birth and about 42 and 27 percent report continuing to breastfeed at six and 12 months respectively [6].

During the last few years, evaluation of breastfeeding programs examining the effectiveness of promotional strategies has rapidly developed [7, 8]. Across the state of Kansas, several health departments received funding from the United Methodist Health Ministry Fund to promote breastfeeding through a breastfeeding support program.

The objective of this research study was to examine the influence of breastfeeding programs through the exploration of the social determinants of breastfeeding, breastfeeding practices, mothers' views of breastfeeding, and mothers' perceived barriers toward breastfeeding. The long-term goal of this project was (1) to increase breastfeeding rates in Kansas communities, and (2) to enhance breastfeeding support services and their delivery.

### Methods

Participants were mothers who received breastfeeding services through a breastfeeding program delivered by a public health department that received funding for the time period January 1, 2011, through December 31, 2011. Fifteen health departments across the state of Kansas participated in this study (14 of the 15 health departments were located in rural areas). Mothers who received breastfeeding services were in the intervention group and mothers who did not receive breastfeeding services were in the comparison group. Participants in the intervention group were randomly

#### Inside

Breastfeeding Interventions in Kansas: An Evaluation of Mothers' Breastfeeding Practices and Perspectives	1
Current Cigarette Smoking Among Kansas: Adults With Mental Illness	6
Prevalence of Low Health Literacy and Its Relationship with Chronic Diseases, 2012 Kansas Assessment of Perinatal Hepatitis B Prevention Policies and Practices 2011	9
Trends in Out-of-Hospital Births in Kansas, 2005-2012	13
Kansas All-Terrain Vehicle Related Mortality and Morbidity 2001-2012	21
Bureau of Health Promotion Research Featured	27
2012 Infant Mortality Report Released	27
2012 Teen Pregnancy Report Issued	28
Health Disparities in Natality by Population Groups Report Released	28

selected from a list provided by each participating health department. Surveys were collected between July 1, 2011, and June 30, 2012. Participants in the comparison group were matched from a list provided by the Bureau of Epidemiology and Public Health Informatics of the Kansas Department of Health and Environment through propensity scoring methods using the following criteria: (1) residence in one of the 15 participating counties, and (2) infant was born during the same month as infants from mothers in the intervention group. Surveys were collected between July 1, 2012, and November 30, 2012. This study was approved by the Institutional Review Boards at the University of Kansas School of Medicine-Wichita, Wichita State University, and the Kansas Department of Health and Environment.

The survey instrument included items from the Pregnancy Risk Assessment Monitoring System (PRAMS) and additional items to assess program impact. Survey items measured maternal demographics, breastfeeding practices, mothers' views, and mothers' perceived barriers (Table 1). Survey items were forced answer questions with open ended options embedded within each survey item. Participants in the intervention group completed the survey via the telephone and participants in the comparison group completed it on-line. Length of time to answer survey questions was between 10 and 15 minutes. The survey was administered six to twelve months after birth.

Table 1. Breastfeeding Initiative Evaluation Survey Items

Breastfeeding Practices	Mothers' Views of Breastfeeding	Mothers' Perceived Barriers	Maternal Demographics
<ul style="list-style-type: none"> <li>• Initiation</li> <li>• Duration</li> <li>• Current breastfeeding</li> <li>• Introduction of other liquids</li> <li>• Introduction of solid foods</li> <li>• Type of services used</li> <li>• Provider of services</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge – Reason to breastfeed</li> <li>• Knowledge – Identify most valuable service when starting to breastfeed</li> <li>• Knowledge – Identify most valuable service when continuing to breastfeed</li> <li>• Beliefs</li> <li>• Attitudes</li> </ul>	<ul style="list-style-type: none"> <li>• Infant's stay in hospital</li> <li>• Reasons for stopping breastfeeding</li> <li>• Reasons for not starting breastfeeding</li> <li>• Return to work/school</li> <li>• Follow-up services</li> <li>• Timing of follow-up care</li> </ul>	<ul style="list-style-type: none"> <li>• Race</li> <li>• Age</li> <li>• Household</li> <li>• Composition</li> <li>• WIC status</li> <li>• Level of education</li> <li>• Household income</li> </ul>

Descriptive analyses were conducted to examine demographic characteristics, breastfeeding practices, and mothers' perspectives. Summary characteristics were frequencies, percentages, and chi-square tests of association. Responses to open-ended questions were analyzed for common themes and patterns. The primary analysis was multiple regressions to assess the strongest predictors of the length of breastfeeding. A P-value of  $\leq .05$  was considered statistically significant. Survey data were analyzed using IBM SPSS Version 20.

## Results

The intervention group consisted of 192 total potential participants, of which 81 agreed to participate (42.2 %). The comparison group consisted of 1,017 total potential

participants, of which 42 agreed to participate (4.1 %). The total number of respondents was 123. The majority were non-Hispanic white, between 26 and 35 years old, and an education beyond high school (Table 2). More than one third of all respondents received WIC benefits and more than half had a household income of less than \$50,000/year. The intervention and comparison groups did not vary on maternal race/ethnicity, but varied significantly on maternal age, level of education, WIC status, and income. This was primarily due to the way the data was collected (telephone versus Internet). Therefore, rather than focusing on differences between these groups, this study evaluated the whole group and paid particular attention to women who were in the intervention group.

Table 2. Maternal Demographic Characteristics

Variable	Total (n = 123)	Total (in %)	Intervention (n = 81)	Intervention (in %)	Comparison (n = 42)	Comparison (in %)
Age						
Less than 18	2	1.6	2	2.5	0	0.0
18 to 25	32	26.0	27	33.3	5	11.9
26 to 35	75	61.0	46	56.8	29	69.1
36 to 45	14	11.4	6	7.4	8	19.1
Education Level						
Some high school	3	2.4	3	3.7	0	0
Graduated HS	13	10.6	9	11.1	4	9.5
Voc/tech school	9	7.3	8	9.9	1	2.4
Commy/jr college	28	22.8	24	29.6	4	9.5
Four-year college	44	35.8	23	28.4	21	50.0
Advanced degree	24	19.5	12	14.8	12	28.6
Other	2	1.6	2	2.5	0	0.0
WIC Status						
Yes	46	37.4	42	51.9	4	9.5
No	77	62.6	39	48.1	38	90.5
Household Income						
Less than \$24,999	36	29.3	31	38.3	5	11.9
\$25,000-\$49,999	33	26.8	23	28.4	10	23.8
\$50,000-\$74,999	25	20.3	15	18.5	10	23.8
\$75,000 or more	29	23.6	12	14.8	17	40.5

More than 95 percent of all participants initiated breastfeeding after delivery and continued breastfeeding at an average of 6.5 months. Participants in the intervention group breastfed an average of 5.5 months and most indicated that they were still breastfeeding at the time of survey completion. Participants reported that the types of services they frequently used were the services of a breastfeeding support educator followed by educational materials and breast pumps.

The outcome of multiple regression analyses showed that maternal age, level of education, household income, and timing of introduction to other liquids and solid foods significantly influenced the continuation of breastfeeding ( $F(5, 122) = 30.41, p < 0.01, R^2 = 0.59$ ). Specifically, the longer the delay in introducing food other than breast milk, the longer the duration of breastfeeding. Additionally, breastfeeding services - including educational materials, education classes, a breastfeeding educator, peer support,

breastfeeding resources, and employer support - significantly contributed to the duration of breastfeeding ( $F(6,77) = 6.82, p < 0.01, R^2 = 0.37$ ).

Mothers who had positive views of breastfeeding were more likely to breastfeed (Table 3). Mothers viewed family and peer support as well as support from health care professionals as important contributors to their decision to breastfeed. Further, mothers perceived employers as barriers to breastfeeding. Several mothers reported that breastfeeding was stressful due to care for other children, multiple births, or returning to work.

Table 3. Mothers' Views and Perceived Barriers of Breastfeeding

<p>Knowledge</p> <ul style="list-style-type: none"> <li>Main reason to breastfeed: Nutritional and health benefits for infant</li> <li>Most valuable service: One-on-one services from breastfeeding educator</li> </ul> <p>Beliefs</p> <ul style="list-style-type: none"> <li>Majority of participants knew they would breastfeed</li> </ul> <p>Attitudes</p> <ul style="list-style-type: none"> <li>There was <u>strong agreement</u> on the following statements:</li> <li>Breastfeeding increases mother/infant bonding</li> <li>Infants who are fed breast milk are healthier</li> <li>Breast milk is the ideal food for baby</li> </ul> <p>Perceived Barrier: Workplace or School</p> <ul style="list-style-type: none"> <li>Need for employers' flexibility toward breastfeeding mothers</li> <li>Need for a private space to breastfeed/express breast milk</li> </ul> <p>A large proportion of mothers who received breastfeeding services thought that:</p> <ul style="list-style-type: none"> <li>They did not produce adequate milk</li> <li>Breast milk alone did not satisfy their baby</li> </ul> <p>Common themes when participants reported their reasons for discontinuing breastfeeding:</p> <ul style="list-style-type: none"> <li>Ease of bottle feeding</li> <li>Natural weaning (initiated by infant or mother)</li> <li>Stress reduction for mother</li> </ul>
--

## Discussion

There are many factors that influence breastfeeding. With this study's outcome, it appears that breastfeeding interventions make a difference, particularly among low-income women residing in rural Kansas. Socio-economic status plays a key role in a mother's decision to start and continue breastfeeding. Consistent with previous research findings [9, 10], this study reports that women who are older, more educated, and earn higher wages are more likely to breastfeed.

Also, most women in this study lived in rural areas where access and availability of health care services is limited. It may be concluded that women who are of lower socio-economic status and who live in rural areas are less likely to breastfeed than women of higher socio-economic status living in more urban areas. Nevertheless, the women who volunteered to participate in this study initiated breastfeeding at rates above the national average and continued breastfeeding beyond one month.

Furthermore, this study shows the importance and influence of context within which a breastfeeding mother resides. Support of one's own mother, spouse, and employer was

particularly important in women's efforts to continue breastfeeding. Employers continued to be viewed as barriers to breastfeeding. This emphasizes the need to continue working with employers to make their places of work breastfeeding-friendly. There also appears to be room for additional education on mothers' perceptions of breastfeeding and techniques to reduce stress for the breastfeeding mother.

There were several threats to internal validity, making the intervention and comparison groups less comparable. First, data for each group were collected over a different time period. Second, the survey was administered via the telephone for the intervention group versus via the Internet for the comparison group. Further, volunteer selection of participants, a low response rate and small sample size somewhat limit this study's generalizability. Women who breastfed may have been more likely to participate in this study and this may have influenced its results. Additional research is needed to assess the specific impact of program components on breastfeeding initiation and duration. Specifically, follow-up observational studies and/or the use of focus groups may assist in finding out what breastfeeding mothers need and want in their efforts to continue breastfeeding.

This study's outcome has implications for breastfeeding interventions in Kansas. The following recommendations can be incorporated into breastfeeding interventions to enhance program services and delivery:

- Focus on one-on-one services provided by the breastfeeding support educator.
- Adopt a strategy to delay the introduction of other liquids and solid foods.
- Focus on establishing peer support groups.
- Incorporate a mother's social network when providing breastfeeding services.
- Focus on collaboration with a local hospital when providing services.
- Incorporate an educational component that focuses on women's perceptions of breastfeeding.
- Focus on strategies to reduce stress for the breastfeeding mother.
- Work with employers in establishing a breastfeeding-friendly environment.

Lisette T. Jacobson, PhD, MPA, MA  
Department of Preventive Medicine and Public Health  
University of Kansas School of Medicine-Wichita

## References

1. American Academy of Pediatrics. Breastfeeding and the use of human milk. *Pediatrics*. 2012(129): e827-841.
2. Gartner LM, Morton J, Lawrence RA, Naylor AJ, O'Hare D, Schanler RJ, et al. Breastfeeding and the use of human milk. *Pediatrics*. 2005(115):496-506.
3. Horta BL, Bahl R, Martines JC, Victora CG. *Evidence on the long-term effects of breastfeeding – Systematic reviews and meta-analyses*. Geneva, Switzerland: World Health Organization; 2007.
4. World Health Organization. *Global Strategy for Infant and Young Child Feeding*. Geneva, Switzerland: World Health Organization; 2003.
5. Centers for Disease Control and Prevention. Division of Nutrition, Physical Activity, and Obesity. *Breastfeeding Report Card - United States, 2013*.
6. <http://www.cdc.gov/breastfeeding/data/reportcard.htm>. Accessed September 30, 2013.

7. Centers for Disease Control and Prevention. Division of Nutrition, Physical Activity, and Obesity. *Breastfeeding Report Card - United States, 2012*. <http://www.cdc.gov/breastfeeding/data/reportcard.htm>. Accessed June 15, 2013.
8. Imdad A, Yawar Yakoob M, Bhutta ZA. Effect of breastfeeding promotion interventions on breastfeeding rates, with special focus on developing countries. *BMC Public Health*. 2011(11): S24.
9. Britton C, McCormick FM, Renfrew MJ, Wade A, King SE. Support for breastfeeding mothers (Review). The Cochrane Library website. <http://thecochranelibrary.com>. Accessed May 24, 2013.
10. Dubois L, Girard M. Social determinants of initiation, duration and exclusivity of breastfeeding at the population level. *Canadian Journal of Public Health*. 2003(94): 300-305.
11. Flacking R, Nyqvist KH, Ewald U. Effects of socioeconomic status on breastfeeding duration in mothers of preterm and term infants. *European Journal of Public Health*. 2007(17):579-584.

## Current Cigarette Smoking Among Kansas Adults with Mental Illness – 2012 Behavioral Risk Factor Surveillance System (BRFSS)

### Background

Tobacco use is one of the most preventable causes of morbidity and mortality. Smoking causes many types of cancer, including lung cancer, coronary heart disease, stroke, peripheral vascular disease, emphysema, bronchitis, and chronic airway obstruction. Cigarette smoking also has many adverse reproductive and early childhood effects, including increased risk for infertility, stillbirth, and low birth weight. Each year approximately 480,000 deaths in the U.S. are attributed to cigarette smoking [1]. Although there has been a decrease in smoking prevalence over the years, higher prevalence persists among certain subpopulations, including adults with mental illness [2]. Addressing tobacco use across high risk subpopulations is essential to meet the Healthy People 2020 target of reducing cigarette smoking among adults to  $\leq 12$  percent [3].

### Objective

To examine prevalence and disparities of current cigarette smoking among adults with mental illness in Kansas.

### Methods

The 2012 Kansas BRFSS data were used for this report. Kansas BRFSS is an ongoing, annual, population-based, random, digit-dial survey of non-institutionalized adults ages 18 years and older living in a private residence with landline or cell phone service in Kansas. Data were used to calculate estimates of cigarette smoking among Kansas adults aged 18 years and older who had serious psychological distress (SPD) and frequent mental distress (FMD) in the past 12 months and those who ever were diagnosed with depressive disorder. Current cigarette smokers were defined as respondents who had smoked  $\geq 100$  cigarettes during their lifetime and responded "every day" or "some days" to the question, "Do you now smoke cigarettes every day, some days, or not at all?" SPD is a nonspecific measure of psychological distress that has been psychometrically validated and shown to be able to distinguish cases from non-cases. SPD is determined using the Kessler 6 (K6) scale that is widely used nationally and internationally in epidemiological studies and surveys assessing mental illness [4].



The 2012 Kansas BRFSS module on Mental Health and Stigma included a total of 10 questions. The first 6 questions, also referred as the K6 scale, asked respondents how often they felt ‘nervous’, ‘restless’, ‘hopeless’, ‘worthless’, ‘depressed’, or that ‘everything was an effort’ during the past 30 days. Each response was scored from 0 (none of time) to 4 (all the time) and all responses were summed to produce a total score (0 to 24). SPD was defined as a score of 13 or greater. Another measure of mental illness is FMD. FMD is defined as 14 or more days of poor mental health in the past 30 days.

Diagnosed depression was defined as a positive response to the question, “Has a doctor, nurse or other health professional EVER told you that you have a depressive disorder, including depression, major depression, dysthymia, or minor depression?” Current cigarette smoking among adults who were ever diagnosed with a depressive disorder was examined in various population subgroups. Prevalence estimates and 95 percent confidence intervals (CI) were calculated. Data were weighted using the new raking method [5]. SAS 9.3 software was used for analysis.

**Results**

In 2012, an estimated 19.4 percent of Kansas adults were current smokers, about 3.5 percent had SPD and 10.2 percent had FMD. Among those with SPD, 45.7 percent were current smokers, compared with 17.4 percent among adults with no SPD. Similarly, among those with FMD, 37.8 percent were current smokers, compared with 17.3 percent among adults with no FMD. Also, about 16.5 percent of Kansas adults had ever been diagnosed with depression. Among those with depression, 35.3 percent were current smokers, compared with 16.2 percent among adults with no depression (Figure 1).

Figure 1. Prevalence of Current Cigarette Smoking among adults with SPD, FMD, and Ever Diagnosed with Depressive Disorder, Kansas 2012 BRFSS

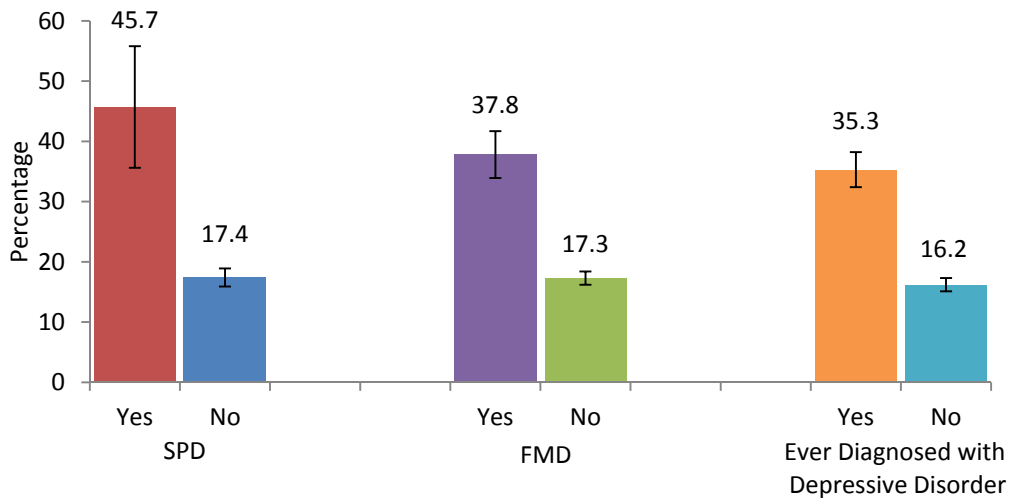


Table 1. Prevalence of current smoking among adults who were ever diagnosed with a depressive disorder and Confidence Interval (CI), by sociodemographic characteristics, Kansas BRFSS 2012

Sociodemographic Characteristics			
	Unweighted Frequency	Wt %	95% CI
Total	542	35.3	32.4-38.3
Age groups			
18 - 24 years	40	43.9	33.0-54.8
25 - 34 years	95	50.8	43.1-58.5
35 - 44 years	86	37.3	30.0-44.6
45 - 54 years	143	36.8	31.0-42.6
55 - 64 years	126	25.1	20.4-29.8
65 years and older	52	11.6	7.8-15.4
Gender			
Male	170	40.6	35.1-46.1
Female	372	32.2	28.9-35.6
Race			
White Only	483	35.7	32.7-38.8
Black or African American only	25	36.4	21.3-51.5
Other Race Only	*	*	*
More than one race	*	*	*
Ethnicity			
Hispanic	*	*	*
Non-Hispanic	528	36.9	33.9-39.9
Annual Household Income			
Less than \$15,000	140	45.8	38.4-53.1
\$15,000 - \$24,999	137	40.0	33.3-46.7
\$25,000 - \$34,999	59	43.1	33.4-52.8
\$35,000 - \$49,999	58	30.5	22.5-38.5
\$50,000 or higher	85	20.7	15.8-25.6
Education			
Less than high school	82	56.7	46.5-66.8
High school graduate or G.E.D	184	39.5	34.0-45.0
Some college	187	34.7	29.7-39.7
College graduate	89	16.7	12.6-20.7

Source: 2012 Kansas Behavioral Risk Factor Surveillance System, Bureau of Health Promotion, KDHE.

Smoking prevalence among those with depression was highest among men, adults aged less than 55 years, and those with low annual household income; smoking prevalence among those with depression was lowest among college graduates (Table 1).

## Conclusions

Smoking among Kansas adults with mental illness, including SPD, FMD and diagnosed depression, was significantly higher than those without mental illness. Disparities in smoking prevalence among those ever diagnosed with a depressive disorder were also seen with respect to various socio-demographic sub groups. These findings indicate the



need for public health strategies to address smoking among adults with mental illness in Kansas.

Pratik Pandya, MPH  
Ericka Welsh, PhD  
Bureau of Health Promotion

## References

1. CDC. Smoking and Tobacco Use. Available at: [http://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/index.htm](http://www.cdc.gov/tobacco/data_statistics/fact_sheets/index.htm). Accessed on March 15, 2014.
2. US Department of Health and Human Services. The health consequences of smoking: a report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, CDC; 2004. Available at [http://www.cdc.gov/tobacco/data\\_statistics/sgr/sgr\\_2004/index.htm](http://www.cdc.gov/tobacco/data_statistics/sgr/sgr_2004/index.htm). Accessed on March 15, 2014.
3. U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. Healthy People 2020. Washington, DC. Available at [http://healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=41]. Accessed on March 15, 2014.
4. Harvard Medical School. Department of Health Care Policy. National Comorbidity Survey. K10 and K6 Scales. Available at [http://www.hcp.med.harvard.edu/ncs/k6\\_scales.php](http://www.hcp.med.harvard.edu/ncs/k6_scales.php) on. Accessed on April 4, 2014
5. CDC. Methodologic changes in the Behavioral Risk Factor Surveillance System in 2011 and potential effects on prevalence estimates. MMWR 2012;61:410–3.

## Prevalence of Low Health Literacy and its Relationship with Chronic Diseases, 2012 Kansas BRFSS

### Background

The leading causes of morbidity and mortality in the United States are chronic diseases such as heart disease, stroke, cancer, and diabetes. [1] Fortunately, chronic diseases are largely preventable by engaging in healthy behaviors and accessing preventive health care services [1]. Health literacy, as defined by the U.S. Department of Health and Human Services, is the “capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.” [2] Research has demonstrated that individuals with low health literacy receive fewer preventive services [3, 4], do not follow medication instructions adequately [5] and have worse health effects [6-8]. Most people will experience some sort of health issue in their lifetime. Thus, it is important for everyone to have adequate health literacy to understand how to communicate with their physician, read drug labels, provide informed consent, describe patient history, and understand their diagnosis.

### Objective

The goals of this study are to estimate the prevalence of low health literacy and describe its relationship to chronic diseases among Kansas adults.

### Method

In 2012, the Kansas Behavioral Risk Factor Surveillance System (BRFSS) implemented a state-added module comprised of three validated questions to assess the prevalence of low health literacy of Kansas adults. Kansas BRFSS is an ongoing, annual, population-based random-digit-dial survey of non-institutionalized adults ages 18 years and older living in a

private residence or college housing with landline or cell phone service in Kansas. Kansas BRFSS uses a split questionnaire design which consists of a core section and an optional module/state-added module section. Questions in the core section are asked of all respondents. Following the core section, the survey splits into two versions (versions A and B) which each include different questions asked of approximately half of all respondents. A total of 5,829 respondents were randomly assigned to questionnaire version A of the survey, which included the state-added health literacy module. The health literacy state-added module was comprised of three validated questions: (1) How confident are you in filling out medical forms by yourself? (2) How often do you have problems learning about your health condition because of difficulty in understanding written information? And (3) how often do you have someone help you read medical materials? Each question was scored on a 5-point scale with higher scores indicating lower health literacy. A total summary score greater than 10 was defined as low health literacy while a total score of 10 or lower was defined as adequate health literacy.

Adults were also asked if they had ever been told by a doctor, nurse, or healthcare professional that they had diabetes, arthritis, coronary heart disease, heart attack, cancer (excluding skin), skin cancer, stroke, chronic obstructive pulmonary disease (COPD), kidney disease, depression, trouble seeing, or asthma. Those who indicated that they had been diagnosed with asthma were then asked if they currently had asthma.

Complex survey procedures were implemented in SAS 9.3 and SAS Callable SUDAAN 10.1 to estimate overall and subpopulation prevalence of low health literacy among Kansas adults. Logistic regression models were fit with chronic diseases as the dependent variables and health literacy as the independent variable. Crude and adjusted prevalence rate ratios (PRR) were computed to examine the association between low health literacy and chronic diseases overall and after adjusting for annual household income, education, race/ethnicity, and age.

Results

Table 1: Percentage of Adults 18 Years and Older with Low Health Literacy and Confidence Interval (CI), by Demographic Characteristics, Kansas, BRFSS 2012

Category	Wt %	95% CI
Overall	5.7	4.8-6.7
Gender		
Male	6.4	5.0-7.8
Female	5.1	3.9-6.2
Age Groups		
18-24 years	7.0	3.5-10.5
25-34 years	4.4	2.3-6.5
35-44 years	3.8	1.6-6.0
45-54 years	6.1	3.8-8.4
55-64 years	5.7	3.8-7.7
65+ years	7.4	5.9-8.8
Race/Ethnicity*		
White, NH	4.4	3.6-5.2
Black, NH	10.8	5.4-16.1
Other/Multi-Race, NH	8.0	3.5-12.6
Hispanic	10.5	4.5-16.4
Education		
Less than high school	17.7	12.4-23.0
High school graduate or G.E.D.	8.0	6.1-9.8
Some college	4.2	2.8-5.6
College graduate	0.9	0.5-1.3
Annual Household Income		
Less than \$15,000	18.0	12.6-23.4
\$15,000-\$24,999	7.9	5.4-10.4
\$25,000-\$34,999	4.0	2.3-5.8
\$35,000-\$49,999	2.7	1.1-4.2
\$50,000 or more	1.8	1.1-2.6
Employment		
Employed for wages/Self-employed	3.1	2.2-4.1
Homemaker/Student	6.1	2.5-9.7
Out of work	7.4	2.8-12.0
Retired	7.0	5.4-8.5
Unable to work	23.7	17.1-30.3
Marital Status		
Divorced/Separated	5.7	3.5-7.8
Married/Member of Unmarried Couple	4.7	3.6-5.7
Never married	7.3	4.6-9.9
Widowed	10.6	7.3-13.9
Population Density		
Urban	5.6	4.3-7.0
Semi-urban	6.2	3.9-8.4
Densely-settled rural	6.1	4.1-8.1
Rural	5.1	2.5-7.6
Frontier	5.4	2.2-8.5
Health Insurance		
No	7.8	4.8-10.9
Yes	5.3	4.4-6.2
Disability Status		
Living with a disability	12.3	9.9-14.7
Living without a disability	3.9	2.9-4.8

\*Prevalence estimates for race and ethnicity were age-adjusted to the U.S. 2000 Standard population

The prevalence of low health literacy among Kansas adults 18 years and older was 5.7 percent (95% CI: 4.8% to 6.7%) in 2012. Table 1 shows the percentage of Kansas adults with low health literacy by selected demographic characteristics. The prevalence of adults with low health literacy was highest among non-Hispanic blacks compared to non-Hispanic whites; those with lower education compared to those in higher education groups; those with lower annual household income compared to those in higher annual household income groups; those who were unable to work compared to other employment subgroups; those who were widowed compared to those who were married or a member of an unmarried couple; and those who were living with a disability compared to those not living with a disability. The prevalence of low health literacy was not significantly different across gender, age, population density, or health insurance status subgroups.

Table 2 shows the crude and adjusted prevalence rate ratios for chronic diseases among Kansas adults with low compared to adequate health literacy. The prevalence of current asthma and ever having diabetes, arthritis, heart attack, coronary heart disease, stroke, cancer, COPD, depression, kidney disease or trouble seeing were significantly higher among adults with low as compared to adequate health literacy. After adjusting for age, education, race, and annual household income, the prevalence of current asthma (PRR: 1.72), and ever having arthritis (PRR: 1.31), coronary heart disease (PRR: 1.71), and stroke (PRR: 2.42) remained significantly higher among those with low as compared to those with adequate health literacy.

Table 2: Crude and Adjusted\*\* Prevalence Rate Ratios for Chronic Diseases among Adults with Low vs. Adequate Health Literacy, Kansas, BRFSS 2012

Disease	Crude		Adjusted**	
	PRR	95% CI	PRR	95% CI
Stroke	<i>4.03</i>	<i>2.67-6.11</i>	<i>2.42</i>	<i>1.44-4.05</i>
Heart Attack	<i>2.42</i>	<i>1.57-3.75</i>	1.46	0.86-2.47
Kidney Disease	<i>2.38</i>	<i>1.18-4.83</i>	1.55	0.75-3.20
Coronary Heart Disease	<i>2.17</i>	<i>1.41-3.35</i>	<i>1.71</i>	<i>1.06-2.78</i>
Current Asthma	<i>2.05</i>	<i>1.39-3.03</i>	<i>1.72</i>	<i>1.11-2.68</i>
COPD	<i>2.02</i>	<i>1.34-3.03</i>	1.3	0.81-2.10
Trouble Seeing	<i>1.96</i>	<i>1.48-2.59</i>	1.33	0.96-1.86
Diabetes	<i>1.87</i>	<i>1.34-2.61</i>	1.21	0.83-1.76
Depression	<i>1.61</i>	<i>1.24-2.09</i>	1.31	0.96-1.79
Arthritis	<i>1.56</i>	<i>1.27-1.92</i>	<i>1.31</i>	<i>1.03-1.66</i>
Cancer (excluding skin)	<i>1.43</i>	<i>0.93-2.19</i>	1.31	0.81-2.11
Skin Cancer	0.87	0.57-134	0.82	0.56-1.19

\*\* Adjusted for annual household income, education, age, and race/ ethnicity  
 Italicized PPR and 95% CI denote statistically significant associations.

## Discussion

Although the prevalence of low health literacy was relatively low in Kansas, there were significant disparities among several demographic characteristic subgroups. Specifically, the prevalence of low health literacy was significantly higher among non-Hispanic Blacks, those with less than a high school education, those whose annual household income was less than \$15,000, those who were unable to work, those who were widowed, and those living with a disability.

In addition, this study demonstrates significant positive associations between low health literacy and chronic health conditions even after adjustment for social demographic factors. These associations may have several implications for chronic disease self-management, patient-clinician interaction, and adherence to medication regimens.

The definition of health literacy is widely debated. Developing a standard measure of health literacy will support public health efforts that aim to increase the level of awareness of the potential implications of low health literacy.

There are a few limitations to this study. BRFSS is a telephone survey whose sample does not include those who reside on military bases or within institutions. The BRFSS is not able to sample those without a telephone. Additionally, it is possible that this is an underestimate of low health literacy since those who self-selected to complete the health telephone survey may have higher levels of health literacy compared to the general population.

Jeanie Santaularia, MPH  
Ericka Welsh, PhD  
Bureau of Health Promotion

## References

1. Centers for Disease Control and Prevention. Chronic Diseases and Health Promotion. Available at: <http://www.cdc.gov/chronicdisease/overview/index.htm>. Accessed March 19, 2014.
2. U.S. Department of Health and Human Services. Quick Guide to Health Literacy. <http://www.health.gov/communication/literacy/quickguide/factsbasic.htm>. Accessed March 19, 2014.
3. Lindau ST, Tomori C, Lyons T, Langseth L, Bennett CL, Garcia P. The association of health literacy with cervical cancer prevention
4. knowledge and health behaviors in a multiethnic cohort of women. *Am J Obstet Gynecol*. 2002;186:938 – 943.
5. Scott TL, Gazmararian JA, Williams MA, Baker DW. Health literacy and preventive health care use among Medicare enrollees in a managed care organization. *Med Care*. 2002;40:395– 404.
6. Andrus MR, Roth MT. Health literacy: a review. *Pharmacotherapy*. 2002;22:282–302.
7. Baker DW, Gazmararian JA, Williams MW, et al. Functional health literacy and the risk of hospital admission among Medicare managed care enrollees. *Am J Public Health*. 2002;92:1278 –1283.
8. Fortenberry JD, McFarlane MM, Hennessy M, et al. Relation of health literacy to gonorrhoea related care. *Sex Transm Infect*. 2001;77:206– 211.
9. Schillinger D, Grumbach K, Piette J, et al. Association of health literacy with diabetes outcomes. *JAMA*. 2002;288:475– 482.

## Assessment of Perinatal Hepatitis B Prevention Policies and Practices, 2011

### Introduction

Hepatitis B virus (HBV) is transmitted via infected blood and other body fluids (saliva and semen), and vertical transmission (mother to child) during the perinatal period is one of the most efficient means of transmission. Up to 90 percent of infants who are infected via perinatal transmission develop chronic HBV infection, and of these 25 percent die prematurely of cirrhosis or liver cancer [1]. The Advisory Committee on Immunization Practices (ACIP) has published guidelines that address testing, treatment, and documentation of HBV-positive women and their infants [1], and many of these policies are

to be implemented at birthing hospitals. A policy survey was conducted to assess the presence of policies in Kansas in 2007 aimed at preventing perinatal hepatitis B infections, and a subsequent medical record abstraction was performed to determine adherence to these policies. Several policy gaps were identified, including less than 75 percent of hospitals having a policy to review women's hepatitis B laboratory results upon admission to the labor and delivery unit. In order to prevent perinatal hepatitis B transmission, education needs to be provided and policies need to be implemented at hospitals throughout the state.

## Background

Individuals who are chronically infected with hepatitis B are at an increased risk for cirrhosis of the liver and hepatocellular carcinoma (HCC). When an HBV-positive woman gives birth, there is up to a 90 percent chance of transmitting the virus to her infant [1], which can result in significant infant morbidity and mortality. However, proper chemoprophylaxis has been shown to be 85-95 percent effective in preventing an infant from becoming a chronic carrier of HBV [2] [3] [4].

To prevent perinatal transmission of HBV, policies should be implemented at birthing hospitals; these policies include ensuring that all women either have been tested prenatally or are tested upon admission for hepatitis B surface antigen (HBsAg, a marker for HBV infection), and the administration of post-exposure prophylaxis [consisting of the hepatitis B vaccine (HepB) and hepatitis B immune globulin (HBIG)] to infants born to HBV-positive mothers within 12 hours of birth [1].

## Methods

The survey was created to assess the policies and procedures concerning prevention of perinatal hepatitis B transmission at birthing hospitals in Kansas. Questions were asked to determine the existence of standing orders and written policies regarding infants born to hepatitis B positive mothers and mothers with unknown hepatitis B status. The surveys were mailed to the directors of all labor and delivery units at hospitals in Kansas as of 2007 (n = 78). Hospitals with more than 150 births per year were included in the study (n = 39), accounting for 94.5 percent of Kansas births.

Hospital characteristics, such as ownership (investor, for-profit/government/nongovernmental, not-for-profit), location (urban/rural) were obtained from the Kansas Hospital Association.

The medical record sample size for each hospital was calculated individually based on the size of the hospital's birth cohort and either the estimate of birth dose coverage or prenatal HBsAg screening. The first dose of hepatitis B vaccine is recorded on the birth certificate, so the birth dose coverage was estimated based on electronic birth certificate reporting. Prenatal maternal HBsAg testing was estimated to be 80 percent, based on a previous Kansas study [5]. The smaller of these two numbers was used to calculate a sample size with a margin of error of +/-8 percent.

Maternal characteristics collected included month and year of birth, race, ethnicity, insurance type, attending provider type, prenatal or admissions testing of HBsAg, documentation of test results, and date and time of admission. Infant characteristics collected were date and time of birth, birth weight, administration of the birth dose and



HBIG, and documentation of maternal HBsAg test result in the infant’s medical record.

Medical record abstraction was performed by trained state health department staff.

Records from the medical record abstraction were linked with records from the Kansas birth registry. Data were linked on the following variables: hospital, maternal month of birth, maternal year of birth, infant date of birth, and infant time of birth. Maternal characteristics obtained from the birth certificate included prenatal care, marital status, and education.

Analyses of maternal-infant records were performed using the hospitals as primary sampling units and weighting results according to the inverse probability of record selection. Analyses were conducted using SAS®9.2 utilizing procedures to account for the complex survey design. Chi-square tests were performed to determine significance at alpha  $\leq 0.05$ .

**Results**

Of the 39 hospitals sampled, 36 (92.3%) participated in the medical record abstraction. This accounted for 90.1 percent of 2007 Kansas births. Abstractions were completed for 3,077 maternal and infant pairs for infants who were born between January 1, 2007, and December 31, 2007. Of the 36 participating hospitals, 32 (88.8%) completed the policy survey.

The prevalence of ACIP-recommended policies at birthing hospitals ranged from 53.1 – 84.4 percent (Table 1). The majority of the responding hospitals reported having a policy to administer hepatitis B vaccine to infants born to HBV-positive women (84.4%), and 75.0 percent of hospitals reported having a policy to administer HBIG to infants born to HBV-positive women. Approximately half (53.1%) of the hospitals reported documenting the mother’s HBV lab results in the infant’s medical record, and 68.8 percent of hospitals reported a policy to administer hepatitis B vaccine to infants born to HBV-unknown women.

Table 1: Prevalence of Hospital Policies Pertaining to Prevention of Perinatal Hepatitis B Transmission (n = 32)

Policy	# with Policy	%
Administer hepatitis B vaccine (HepB) to infants born to HBsAg-positive women within 12 hours	27	84.4
Administer HepB to all infants before discharge	26	81.3
Administer HBIG to infants born to HBsAg-positive women within 12 hours	24	75.0
Review HBsAg status on admission	23	71.9
Administer HBsAg test when not already documented in medical record	23	71.9
Administer HepB to infants born to women with unknown HBsAg status within 12 h	22	68.8
Document mother's hepatitis B results in infant's medical record	17	53.1

The majority of the women in this study were white, non-Hispanic, between the ages of 18 and 25 years old (Table 2). Nearly one-third had a college degree, and most were married, had private insurance, and obtained prenatal care. Overall, 92.6 percent (95% confidence interval (95% CI): 91.2%-93.9%) of women were tested prenatally for hepatitis B, with little variation by demographic characteristic. HBsAg test results were documented in the mother’s medical record with a copy of the laboratory report for 28.3 percent (95%

CI: 25.6%-31.0%) of women, with the rest being documented through clinical transcription. Of the women who were not tested prenatally for HBsAg, 58.4 percent (95% CI: 33.6% – 83.3%) were tested on admission; overall, 94.9 percent (95% CI: 93.9% – 96.0%) had a documented HBsAg test result.

Table 2: Characteristics of Sampled Mothers and Proportion Screened Prenatally for HBsAg by Demographic Characteristic

Maternal Characteristic	Sample			Documented prenatal HBsAg test		
	n	Wt %	95% CI	n	Wt %	95% CI
Race*						
White	2546	82.9	81.1-84.7	2379	98.6	97.8-99.3
Black	189	7.3	8.9-8.7	165	96.4	91.1-100.0
Other	337	9.8	8.5-11.1	307	99.0	98.0-99.9
Ethnicity*						
Non-Hispanic	2571	83.7	81.9-85.5	2397	98.6	97.9-99.4
Hispanic	491	16.3	14.5-18.1	445	97.5	95.0-99.9
Maternal age, y						
<18	120	3.7	2.7-4.7	107	93.7	84.1-100.0
18-25	1262	36.7	34.4-39.1	1162	98.0	96.7-99.3
26-30	926	31.4	29.1-33.8	875	99.0	98.2-99.8
>30	769	28.1	25.8-30.4	712	99.0	97.6-100.0
Insurance						
Public	956	23.3	21.4-25.2	873	96.9	94.8-98.9
Private	1663	59.9	57.4-62.3	1580	99.3	98.6-100.0
Self-Pay	240	7.1	5.7-8.4	205	94.5	88.9-100.0
Other	218	9.7	8.0-11.5	198	99.8	99.6-100.0
Married						
Yes	1945	95.3	94.2-96.5	1827	98.8	97.9-99.7
No	119	4.7	3.5-5.8	112	98.9	97.2-100.0
Education*						
< HS	582	18.8	16.8-20.8	517	95.9	92.8-99.1
HS	776	22.2	20.2-24.2	712	98.6	96.9-100.0
Some College	877	26.4	24.2-28.6	820	98.3	97.1-99.4
College degree or higher	828	32.6	30.2-35.1	796	99.8	99.6-100.0
Prenatal Care						
Yes	3037	98.8	98.4-99.3	2845	98.9	98.3-99.6
No	40	1.2	0.7-1.6	11	43.0	16.1-69.8

\*Records with missing or "unknown" values are excluded

The estimated prevalence of HBsAg positive women was 0.4 percent (95% CI: 0.2% – 0.7%), based on test results for 94.9 percent of the women; all HBsAg positive women were tested prenatally.

Of the infants born to HBV-positive women, 2.7% (95% CI: 0.0%-8.7%) did not receive the hepatitis B vaccination (Table 3). Of the infants who did receive the hepatitis B vaccine, the majority received it within 12 hours of birth (71.4% [95% CI: 42.5% – 100%]), and 19% (95% CI: 0% – 44.4%) of the infants received it more than 12 hours after birth; 7% (95% CI: 0% – 22.2%) of the infants received the hepatitis B vaccine, but the time is unknown. Approximately 40% (95% CI: 4.3% – 75.1%) received both the hepatitis B vaccine and HBIG within 12 hours of birth, and 60.3% (95% CI: 24.9% – 95.7%) did not receive HBIG prior to discharge.

The majority of infants (68% [95% CI: 60.1 – 75.9]) born to mothers with unknown HBV status received the hepatitis B vaccine within 12 hours of birth, and 4.8% (95% CI: 2.5 – 7.0) did not receive the vaccine prior to discharge. Of the infants weighing less than 2,000 grams born to mothers with an unknown HBV status, none received HBIG prior to discharge.

Table 3: Management of Infants Born to HBV-Positive Mothers or Mothers with Unknown HBV Status

Parameter	Total	No Administration			<= 12 h			> 12 h			Administration, unknown time		
		n	Wt%	95% CI	n	Wt%	95% CI	n	Wt%	95% CI	n	Wt%	95% CI
Hepatitis B vaccine administration													
Mother HBV-positive	15	1*	2.7	0.0-8.7	10	71.4	42.5-100	3	19.0	0-44.4	1	7.0	0-22.2
Mother unknown HBV status	220	27	4.8	2.5-7.0	110	68.0	60.1-75.9	53	18.0	11.6-24.5	30	9.2	5.1-13.3
HBIG administration													
Mother HBV-positive	15	9	60.3	24.9-95.7	6	48.2	8.8-87.6	0			0		
Mother unknown HBV status, infant <2000 g	6	6	100.0	100.0-100.0	0			0			0		

\*Infant was transferred to another hospital

The majority of infants received the hepatitis B birth dose vaccination (92.2% [95% CI: 91.0-93.4]) prior to discharge. Factors that were most strongly correlated with infants receiving the birth dose of hepatitis B vaccine were a policy to immunize all infants prior to discharge, having an obstetrician as the birth attendant, and the mother having less than a high school education (Table 4). Other significant factors included the mother being of Hispanic origin and the hospital being investor-owned, for-profit. Additionally, insurance type was also significantly associated with receipt of the birth dose.

Table 4 Factors Associated with Hepatitis B Birth Dose Administration

Characteristic	Hepatitis B Birth Dose Administration			p Value
	n/N <sup>a</sup>	Wt %	95% CI	
Race				0.08
White	2213/2546	91.6	90.3-93.0	
Black	172/189	96.0	93.1-99.0	
Other	313/337	94.3	91.0-97.6	
Ethnicity				0.009
Non-Hispanic	2127/2571	91.5	90.1-92.9	
Hispanic	459/491	95.7	93.6-97.9	
Maternal age, y				0.055
<18	110/120	94.3	89.1-99.5	
18-25	1127/1262	93.6	92.1-95.2	
26-30	819/926	92.5	90.4-94.6	
>30	646/769	89.7	86.9-92.4	
Insurance				0.02
Public	868/956	93.0	90.9-95.1	
Private	1429/1663	91.0	89.3-92.7	
Self-Pay	201/240	94.6	92.2-97.0	
Other	204/218	96.0	93.2-98.9	
Married				0.052
Yes	1660/1945	90.8	89.2-92.4	
No	112/119	96.2	92.7-99.7	
Education				<0.001
< HS	552/582	97.8	96.6-99.0	
HS	681/776	91.8	89.5-94.2	
Some College	748/877	90.6	88.1-93.1	
College +	708/828	90.4	88.0-92.9	
Prenatal Care				0.5
Yes	2665/3037	92.2	91.0-93.4	
No	37/40	95.1	88.9-100.0	
Policy to vaccinate all infants				<0.001
Yes	2100/2248	76.4	73.9-78.8	
No	140/499	50.1	41.4-58.8	
Location				0.2
Rural	1460/1646	91.3	89.8-92.7	
Urban	1242/1431	92.6	91.0-94.1	
Number of births				0.08
<1250	1735/2029	90.2	88.8-91.5	
1250 - 3000	705/762	93.0	91.1-95.0	
> 3000	262/286	93.5	90.8-96.2	
Ownership				<0.001
Investor-owned, for-profit	342/358	96.0	93.7-98.3	
Government owned	624/662	94.3	92.4-96.3	
Other Non-Government, not-for-profit	1736/1974	90.2	88.6-91.9	
Provider Type				<0.001
Obstetrician	2003/2169	93.1	91-8-94.5	
Family Practitioner	594/718	88.6	85.7-91.5	
Other	10/92	35.4	18.6-52.2	

## Discussion

A survey and subsequent medical record abstractions were conducted for birthing hospitals throughout the state of Kansas to assess policies and practices aimed at preventing perinatal hepatitis B transmission. Thirty-nine hospitals were included in the sample, which accounted for more than 90 percent of 2007 Kansas births. Numerous policy gaps were identified from this survey. Less than 75 percent of the hospitals had policies in place to check the HBsAg status of mothers admitted to labor and delivery, and the same number of hospitals had a policy in place to test women with no documented HBsAg test result. Approximately two-thirds of the hospitals surveyed had a policy in place to administer the hepatitis B vaccine within 12 hours to infants born to mothers of unknown HBV status. These policies are key components of the 2005 ACIP recommendations to prevent transmission of hepatitis B from mother to infant [1]. In order to ensure that infants born to HBsAg-positive mothers receive the proper follow up, an additional policy recommendation is to document the maternal HBsAg result in the infant's chart; only 53 percent of hospitals had this policy in place.

The chart review of approximately 3,100 paired maternal and infant charts revealed that approximately 92 percent of women had a documented prenatal HBsAg test result; however, this was documented with a copy of the lab report only 28 percent of the time. The recommendation of including a copy of the laboratory report, as opposed to clinical transcription, is aimed at reducing the chances of clinical error during transcription as well as documenting that the proper test was performed. Several instances of medical errors have been documented due to incorrect clinical transcription of HBV laboratory results [6].

Of the women tested prenatally for HBsAg, little difference was observed across various maternal characteristics. According to Wasley, et al., national estimates of HBV prevalence in females is 0.19 percent; in our study 0.4 percent were positive for hepatitis B [7]. For the infants born to the HBV-positive mothers, less than half received the recommended HBIG and hepatitis B vaccination within 12 hours of birth. The remaining infants did not receive HBIG prior to discharge. All infants, except one (who was transferred to another hospital) received the hepatitis B vaccination prior to discharge, and the majority of these infants received the hepatitis B vaccination within 12 hours of birth. For the 5.1 percent of mothers with an unknown HBV status, nearly 70 percent of their infants received the hepatitis B vaccination prior to discharge; however, of the infants weighing less than 2,000 grams born to mothers whose HBV status was unknown, none received the recommended HBIG prior to discharge.

Overall, more than 90 percent of infants in our survey received the hepatitis B vaccination prior to discharge from the hospital. There were several factors, both maternal and hospital, that were associated with the receipt of the vaccine. Hospital characteristics that were significantly associated with infant receipt of the vaccine included hospital ownership, infants born at investor-owned, for-profit hospitals, and having a policy in place to vaccinate all infants prior to discharge. Maternal factors included Hispanic ethnicity and lower education level. Similarly, O'Leary, et al. found that higher education and no universal hepatitis B immunization policy were negatively associated with receipt of the hepatitis B vaccine [8].

There were limitations to this study. First, personnel who conducted the medical record abstraction varied; while all individuals were employed and trained by the health department, discrepancies in the abstraction may have existed. Second, this study included more than 90 percent of the infants in Kansas; however, hospitals with less than 150 births were not included, and therefore the data may not be representative of smaller hospitals. Finally, test results and vaccination administration may not have always been included in the medical record, and therefore data may be incomplete.

In this study, several gaps were found, from chemoprophylaxis of infants born to hepatitis B positive women to a lack of perinatal hepatitis B prevention policies in place. With the existence of highly effective interventions (HBIG and hepatitis B vaccination), perinatal transmission of hepatitis B virus can almost always be prevented. In order to prevent HBV transmission to infants, hospitals need to ensure that policies regarding review of maternal HBsAg results, testing of women without a HBsAg test result, and administering HBIG and hepatitis B vaccine to all infants born to HBsAg-positive mothers within 12 hours of birth are in place. Additionally, policies should be instated for prenatal care providers to include a copy of the HBsAg test, not just a transcription of the test result, in both the mother's and infant's charts; this will help ensure clinicians are aware of the mother's HBV status, thus allowing for a greater likelihood that infants will receive the proper chemoprophylaxis. By following these recommendations, nearly all perinatal transmission of HBV can be prevented.

Elizabeth Lawlor, MS, Suparna Bagchi, MSPH, DrPH

## References

- Centers for Disease Control and Prevention. Recommendations of the Advisory Committee on Immunization Practices (ACIP). A Comprehensive Immunization Strategy to Eliminate Transmission of Hepatitis B Virus Infection in the United States: Immunization of Infants, Children, and Adolescents. *MMWR Recomm Rep*. 2005; 54 (RR16): 1-23
- Stevens C, Toy P, Tong M, Taylor P, Vyas G, Nair P, Gudavalli M, Krugman S. Perinatal hepatitis B virus transmission in the United States. Prevention by passive-active immunization. *JAMA*. 1985. 253(12):1740-5.
- Beasley RP, Chin-Yun Lee G, Roan CH, Hwang LY, Lan CC, Huang FY, Chen CL. Prevention of Perinatally Transmitted Hepatitis B Virus Infections with Hepatitis B Immune Globulin and Hepatitis B Vaccine. *The Lancet*. 1983. 332(8359): 1099-1102.
- Center for Disease Control and Prevention. Recommendations of the Immunization Practices Advisory Committee Prevention of Perinatal Transmission of Hepatitis B Virus: Prenatal Screening of all Pregnant Women for Hepatitis B Surface Antigen. *MMWR Morb Mortal Wkly Rep*. 1988. 37(22): 341-6,351.
- Burd L, Chiang M, Rutherford G, Banaie A, Dutta S, Faruqi M, Ho C, Richman A, Riester K, Rohr C, Yusuf H, Roome A, Hadler J, Carlson R, Craft W, Keeling C, Phillips L, Satzler C, Schmid J, Ummel M, Pelletier A. Epidemiologic Notes and Reports Maternal Hepatitis B Screening Practices -- California, Connecticut, Kansas, and United States, 1992-1993. *MMWR Morb Mortal Wkly Rep*. 1994. 43(17): 311,317-320
- Anderson TA, Wexler DL. States Report Hundreds of Medical Errors in Perinatal Hepatitis B Prevention [Internet]. Immunization Action Coalition. 2012 [cited 2013 Nov 5]; Available from [www.immunize.org/catg.d/p2062.pdf](http://www.immunize.org/catg.d/p2062.pdf).
- Wasley A, Druszon-Moran D, Kuhnert W, Simard E, Finelli L, McQuillan G, Bell B. The Prevalence of Hepatitis B Virus Infection in the United States in the Era of Vaccination. *J Infect Dis*. 2010. 202(2): 192-201.
- O'Leary S, Nelson C, Duran J. Maternal Characteristics and Hospital Policies as Risk Factors for Nonreceipt of Hepatitis B Vaccine in the Newborn Nursery. *Pediatr Infect Dis J*. 2012. 31(1):1-4.



## Trends in Out-of-Hospital Births in Kansas, 2005-2012

Errata: 'Conclusions' in this article have been corrected to include birthing centers in the group of settings considered safest for births by the American College of Obstetricians and Gynecologists.

### Background

There was a time when most babies in the United States were born at home. As access to hospitals improved and doctors became less available to deliver babies at home, the trend shifted to almost all infants being born in hospitals. However, there have remained in each time period a small percentage of births occurring outside of hospitals, whether from parents' choice or from situations which prevented timely arrival at a hospital.

In 1930, over 75 percent of Kansas residents were born in locations other than hospitals. By 1940, the rate had dropped to 48 percent, and by 1950, to less than five percent. The percentage of out-of-hospital births continued to decline into the 1970's but has been gradually increasing since then.

### Methods

Historical information for birth location (hospital or other) from 1930 to 1970 was found in Table 4 of the 1970 Kansas Annual Summary of Vital Statistics [1]. Numbers for 1980, 1990, and 2000 were from annual tables archived at the Kansas Department of Health and Environment, Bureau of Epidemiology and Public Health Informatics. Record-level data in the Kansas Vital Statistics historical files were analyzed for years from 2005 forward.

The current paper examines data from Kansas birth history files from 2005 to 2012 to identify trends in out-of-hospital deliveries, which occurred primarily at a residence or in a free-standing birthing center, with a few occurring each year in a doctor's office or clinic. The year 2005 was chosen as a starting point for the analysis for consistency in birth certificate information and because that was the year when Kansas birth certificates first contained information about whether a home birth was planned.

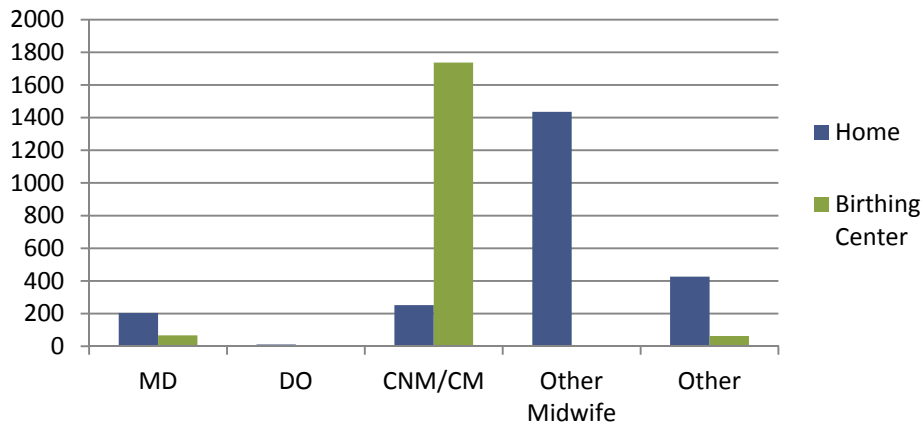
### Results

In 2005, there were 409 out-of-hospital births in Kansas, including 191 home births (145 planned) and 188 births occurring in a freestanding birthing center. By 2012, the number of out-of-hospital births had increased by 88 percent (to 742), the number of home births had increased by 120 percent (to 421), and the number of birthing-center births had increased by 64 percent (to 309). Additionally, the percent of home births which were planned increased from 76 percent in 2005 to 86 percent in 2012.

In the years 2005 to 2012, the rate of home births per 1,000 live births was greatest among older mothers: 13.4 for mothers 35 years of age and older, compared to 9.1 for mothers aged 30-34, 7.3 for mothers aged 25-29, and 4.6 for mothers aged 20-24. Eighty-two percent of home births occurred to mothers who had experienced previous deliveries. The highest rate of birthing center births by age group was also among mothers aged 35 and above, at 7.2 per 1,000 live births; and 68 percent of birthing center births were to mothers who had experienced previous deliveries.

Almost all births in birthing centers were attended by certified nurse midwives (CNM) or by certified midwives (CM). The majority of home deliveries were attended by midwives other than CNM/CMs (Figure 1).

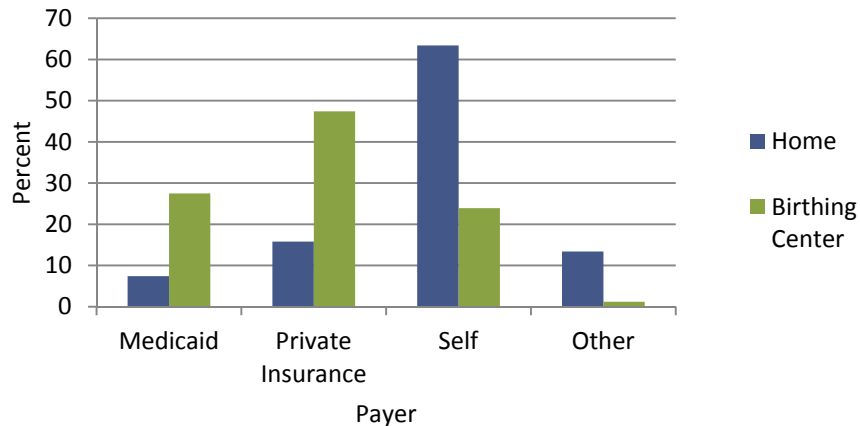
Figure 1. Number of Home and Birthing Center Deliveries by Attendant Kansas, 2005-2012



The rate of home births was statistically significantly lower in the Urban peer group of counties (those with population of 150 or more persons per square mile) than in the Frontier group (those with population density of less than 6 persons per square mile). The rate of birthing center births was significantly lower in the Frontier group than in any other peer group.

Nearly three-fourths (74.9%) of births occurring in birthing centers from 2005 to 2012 were paid for by either private insurance or Medicaid. The majority (63.4%) of home births for the same period were self-pay; and the percentage of home births which were self pay increased from 2005 to 2012, reaching almost 70 percent (69.4) in 2012 (Figure 2).

Figure 2. Percent of Home Births and Birthing Center Births by Payer, Kansas, 2005-2012



## Discussion

Mothers who chose to give birth at home or in a birthing center were more likely to be older and to have had previous deliveries. Women in frontier counties were less likely to choose to give birth at a birthing center than women in more populous counties. Women who gave birth at home were more likely to be paying for the delivery out of pocket (self pay).

Almost all births in birthing centers were attended by a certified nurse midwife or certified midwife. Other midwives, including certified professional midwives and lay midwives, attended the majority of home births.

## Conclusions

Women choose to give birth outside of hospitals for a variety of reasons. They may wish for a personalized experience, a comfortable setting, or minimal medical intervention [2]. Such births have been increasing in Kansas over the past eight years, largely by plan. While the American College of Obstetricians and Gynecologists (ACOG) considers hospitals and birthing centers to be the safest places for delivering infants, it “respects the right of a woman to make a medically informed decision about delivery”. ACOG said as long as pregnant patients do not exhibit risk factors such as hypertension or diabetes; have a singleton fetus in cephalic presentation; do not go into labor prematurely; and make an informed decision, considering risks and benefits, they should be free to choose the medical setting for giving birth [3].

Joy Crevoiserat, BA  
Public Health Informatics

## References

1. The Annual Summary of Vital Statistics, Kansas, 1970. Kansas State Board of Health, Registration and Health Statistics Services, p. 11.
2. Boucher D, Bennett C, McFarlin B and Freeze R, (March – April 2009). “Staying Home to Give Birth: Why Women in the United States Choose Home Birth”. *Journal of Midwifery & Women’s Health* 54 (2): 119:126.
3. Planned home birth. Committee Opinion No. 476. American College of Obstetricians and Gynecologists. *Obstet Gynecol* 2011; 117:425-8. Available at: [http://www.acog.org/Resources\\_And\\_Publications/Committee\\_Opinions/Committee\\_on\\_Obstetric\\_Practice/Planned\\_Home\\_Birth](http://www.acog.org/Resources_And_Publications/Committee_Opinions/Committee_on_Obstetric_Practice/Planned_Home_Birth) Accessed: 11/12/2013

## Kansas All-Terrain Vehicle Related Mortality and Morbidity 2001-2012

### Introduction

Several years ago, the increasing popularity of All-Terrain Vehicles (ATVs) led to concern over injury and death rates associated with ATV crashes, especially among younger users. The Consumer Product Safety Commission (CPSC) established a website to present ATV crash statistics and ATV safety recommendations to the public. [1] Similar information is presented at the website of the consumer advocacy group Concerned Families for ATV Safety. [2] The ATV manufacturers’ association created the ATV Safety Institute to provide safety training materials and to defend the reputation of the industry and its product. [3]

Since 2009, CPSC has produced provisional annual reports on ATV crashes, the latest of which, covering 2011, was released in February 2013. [4] CPSC estimates nationwide ATV-

related emergency-room (ER) treated injuries decreased by almost 29 percent from 2007 to 2011 (150,900 to 107,500). ER treated pediatric (under 16 years of age) ATV-related injuries have declined by almost 28 percent from 40,000 in 2007 to 29,000 in 2011. Using incomplete mortality data, CPSC estimates that ATV-related mortality has also declined.

This article expands the analysis presented in an earlier *KHSR* article on ATV crashes in Kansas from 2005 to 2008 [5] to cover data both prior to and subsequent to that period and incorporates findings based on analysis of hospital discharge data.

## Method

Kansas ATV crash-related mortality and morbidity information comes from death certificates collected by the Kansas Department of Health and Environment’s (KDHE) Office of Vital Statistics; and Hospital Discharge data provided to the KDHE Division of Health Care Finance by the Kansas Hospital Association.

ICD-10 code V86 was used to indicate ATV and snowmobile deaths. In most cases it was the underlying cause of death, but in a few cases it was only a contributing cause. ICD-10 codes V86.0–V86.3 indicate ATV traffic fatalities, while codes V86.5–V86.9 indicate ATV non-traffic fatalities. Analysis of locus of injury, based on ICD-10 codes beginning with “S” or “T”, was also performed.

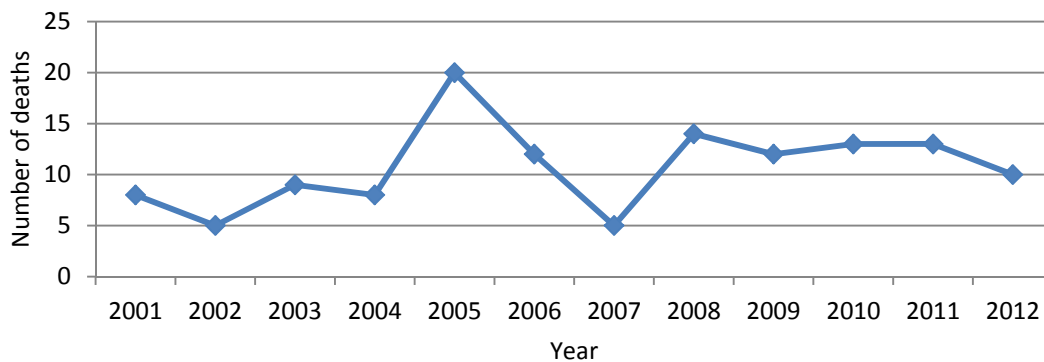
In Hospital Discharge data ICD-9CM codes E820 and E821, respectively, to indicate hospitalizations following snowmobile crashes and non-traffic ATV crashes. Locus of injury categories are those established by the Centers for Disease Control and Prevention’s Barell Matrix. [6]

Only events occurring to Kansas residents were analyzed. Locus of injury analyses used methods demised for each data set.

## Results

From 2001 to 2012, 129 Kansas residents died in ATV and snowmobile crashes. Death certificate narrative information indicated that all but six of involved All-Terrain Vehicles. The six exceptions included three dune buggies, one snowmobile, one golf cart, and one riding lawnmower. It is not always possible to distinguish whether an ATV was a “3-wheeler” or a “4-wheeler.”

Figure 1. ATV Accident Mortality  
Kansas Residents, 2001-2012



ATV-related deaths peaked at 20 in 2005, but have remained below 15 since that year. The relatively small number of annual deaths makes it impossible to identify a trend (Figure 1). Counts This is consistent with the national pattern reported in the latest CPSC report on ATV deaths and injuries.[4] Trends at the annual level are not clear, other than a distinct peak in 2005 (20 deaths) followed by a slow return toward the levels seen in the early 2000s

The age-adjusted death rates were 2.7 ATV deaths per 1,000,000 population for 2001-2004, 4.6 ATV deaths per 1,000,000 population for 2005-2009 (the period covered in the November 2009 KHSR article), and 4.2 ATV deaths per 100,000 population for 2009–2012. The differences are not statistically significant.

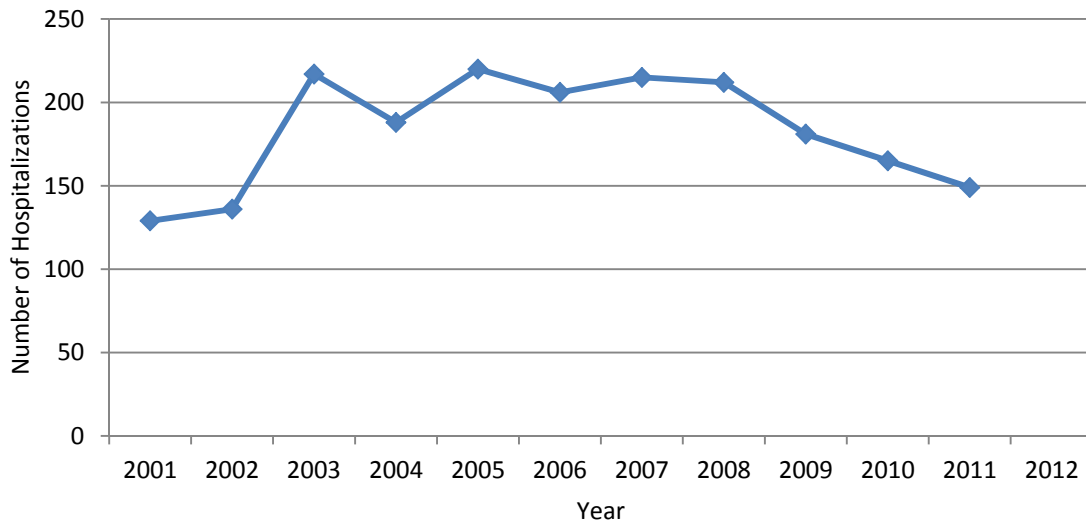
Of the 129 Kansas residents who died in ATV crashes during the period most were White non-Hispanic (125, 96.9%), male (104, 80.6%), and a resident of a rural county (81, 62.8%: in Frontier, Rural, and Densely Settled Rural peer group counties). Most died due to an injury to the head or neck (68, 52.7%), and most died either in or en-route to a hospital (76, 58.9%). Alcohol was listed as a contributing factor in 13 deaths (10.1%).

The age distribution of decedents has shifted since the November 2009 KHSR article that covered 2005–2008, when almost half (25 of 51) were under 25 years of age. In the 2009–2012 period, only 25 percent (12 of 48) were under 25 years of age. However, the change is not statistically significant.

Hospitalization data

From 2001 to 2011, 2,018 Kansas residents were hospitalized due to ATV crashes. It was not possible to determine the type of ATV involved.

Figure 2. ATV Accident Hospitalizations  
Kansas Residents, 2001-2011



Hospitalizations for ATV increased beginning in 2003. Hospitalizations remained at a higher level until starting to decline in 2009. The changes have been statistically significant. Hospitalization rates for 2010 and 2011 continued to decline. Rates for 2010 and 2011 are statistically indistinguishable from those in 2001 and 2002 (Figure 2).

The age-adjusted hospitalization rates were 6.01 ATV-related hospitalizations per 100,000 population for 2001-2004, 7.6 ATV-related hospitalizations per 100,000 population for 2005-2008 (the period covered in the November 2009 KHSR article), and 5.8 ATV-related hospitalizations per 100,000 population for 2009–2011. The rate for 2005-2008 was statistically higher than for 2001-2004 and 2009-2011, but the rates for the latter two periods were not statistically different from one another.

Of the 2,018 Kansas residents who were hospitalized after ATV crashes between 2001 and 2011, 1,762, or 87.3% were White non-Hispanic. Most were male (1,667, or 82.6%), Slightly more of the hospitalizations (1,034, 51.2%) involved residents of urban and semi-urban counties with 974 or 48.3% of patients being residents of counties in frontier, rural, and densely settled rural peer groups. County of residence could not be established for 10 hospitalizations.

Youth and young adults (under age 25) made up roughly the same proportion of ATV-related hospitalizations in the 2009-2011 period (201, 41.0%) as in the 2005-2008 period (381, 44.7%).

Half of those hospitalized following an ATV accident had injuries to the head or neck (1,009 or 50.0%), while 801 (39.7%) had injuries to the lower extremities, 726 (36.0%) had injuries to the torso, 658 (32.6%) had injuries to the upper extremities, and 372 (18.4%) had injuries to the spinal cord or vertebral column, or both. The injury locus count added to more than the number of victims, since some patients had injuries to multiple loci. Alcohol was noted as a contributing factor in 137 cases (6.8%).

Most individuals hospitalized after an ATV-related crash were released to home (1,668, 82.7%), while 281 (13.9%) were transferred to another medical facility, and 29 (1.4%) died in the hospital.

## Discussion

Kansas data indicates ATV-related mortality and morbidity have declined since peaking in 2005. While direct comparison with CPSC statistics was not possible, Kansas' trend was similar to the national level.

This report has at least four limitations.

- Hospital discharge data and mortality data are coded by two different revisions of the International Classification of Diseases,
- Hospital discharge data does not include information on patients seen in the ER,
- Hospital discharge data lacked narrative information, available in mortality data and used to clarify cause of death detail, and
- Locus of injury information mortality and hospital discharge data can't be compared because of different mapping approaches for each dataset.

David Oakley, MA  
Bureau of Epidemiology and Public Health Informatics

## References

1. Consumer Product Safety Commission (CPSC). Available at <http://www.cpsc.gov/en/Safety-Education/Safety-Education-Centers/ATV-Safety-Information-Center/>. Accessed February 36, 2014.
2. Concerned Families for ATV Safety. Available at <http://www.atvsafetynet.org>. Accessed February 36, 2014.
3. ATV Safety Institute, at <http://www.atvsafety.org>. Accessed February 36, 2014.
4. Garland S, 2011 Annual Report of ATV-Related Deaths and Injuries. Consumer Products Safety Commission, February 2013.



5. Oakley D, Kansas Mortality and Morbidity Resulting from All-Terrain Vehicle (ATV) Accidents 2005-2008. Kansas Health Statistics Review, Number 43 (November 2009).
6. Barell Matrix. U.S. Centers for Disease Control and Prevention. Available at: [http://www.cdc.gov/nchs/injury/ice/barell\\_matrix.htm](http://www.cdc.gov/nchs/injury/ice/barell_matrix.htm). Accessed February 36, 2

## Bureau of Health Promotion Research Featured

The February/March issue of the Journal of Public Health Management and Practice features an article prepared by staff from the Bureau of Health Promotion (BHP) of the Kansas Department of Health and Environment. Sodium Reduction in Communities, Shawnee County Survey 2011: Methods and Baseline Key Findings was authored by Ericka Welsh, Ericka Ghazala Perveen, Ghazala and Clayton, Paula of BHP and Robert Hedberg with the Shawnee County Health Agency.

Current nationally recommended strategies to reduce sodium intake include increasing public awareness about the amount of sodium added to processed and packaged foods and the health outcomes of a high-sodium diet.

The article reports on an assessment of knowledge and behaviors related to sodium consumption among Shawnee County, Kansas, adults. Hypertension is a major risk factor for cardiovascular disease and contributes to nearly half of all cardiovascular disease-related deaths in the United States. Even small reductions in sodium intake may lower blood pressure, help prevent the onset of hypertension, or help control blood pressure among hypertensive adults.

Eighty-three percent of adults strongly agreed or agreed that most of the sodium we eat comes from packaged, processed, store-bought, and restaurant foods, and 93.0% thought that a high-salt diet could cause hypertension. Adults ate slightly more than 3 meals prepared outside the home per week, on average, and 1 in 4 adults added salt very often in cooking or preparing meals. Mean sodium intake among Shawnee County adults was 3508 mg per day.

The authors concluded that despite extensive knowledge regarding food sources of sodium and the link between sodium intake and high blood pressure, mean sodium intake among Shawnee County adults exceeds current recommendations. The Shawnee County Sodium Reduction in Communities Program is currently implementing interventions that support access to and availability of lower-sodium options in Shawnee County.

The article is available free online, [http://journals.lww.com/jphmp/Fulltext/2014/01001/Sodium\\_Reduction\\_in\\_Communities\\_Shawnee\\_County.3.aspx](http://journals.lww.com/jphmp/Fulltext/2014/01001/Sodium_Reduction_in_Communities_Shawnee_County.3.aspx)

## Infant Mortality Report Released

The Kansas Department of Health and Environment's Bureau of Epidemiology and Public Health Informatics has released *Selected Special Statistics, Stillbirths and Infant Deaths, 2012*. The report presents findings on long term trends on infant mortality and stillbirths, in addition to statistics based on linked birth certificate and infant death certificates. Infant mortality is an important indicator of community health, associated with a variety of factors such as economic development, rates of chronic illness, general living conditions, and environmental quality.

The report can be found at <http://www.kdheks.gov/phi/index.htm>. For further inquiry about additional data needs call (785) 296-8627.

Bureau of Epidemiology and Public Health Informatics

## **Adolescent and Teenage Pregnancy Report Issued**

The Kansas Department of Health and Environment's Bureau of Epidemiology and Public Health Informatics has released Adolescent and Teenage Pregnancy Report, Kansas, 2012. Teen pregnancy accounts for a sizable burden on society. However, according to the Centers for Disease Control and Prevention (CDC), it is a "winnable battle." The full report is available at <http://www.kdheks.gov/hci/teenpreg.html>. For further inquiry about additional data needs call (785) 296-8627.

Bureau of Epidemiology and Public Health Informatics

## **Nativity Report by Racial and Ethnic Population Groups Issued**

The Kansas Department of Health and Environment's Bureau of Epidemiology and Public Health Informatics has released *Nativity Report by Racial and Ethnic Population Groups, Kansas, 2012*.

Recent research has indicated birth outcome disparities among racial and ethnic population groups. The report presents 2012 Kansas birth frequency and percentage data by maternal population group showing differences in prenatal risks, prenatal care, WIC service utilization, mother's education level, mother's age and birth outcomes. The full report is available at <http://www.kdheks.gov/bphi/index.html>. For further inquiry about additional data needs call (785) 296-8627.

Bureau of Epidemiology and Public Health Informatics



## Kansas Health Statistics Report

The Public Health Informatics Unit (PHI) of the Kansas Department of Health and Environment's Bureau of Epidemiology and Public Health Informatics produces *Kansas Health Statistics Report* to inform the public about availability and uses of health data. Material in this publication may be reproduced without permission; citation as to source, however, is appreciated. Send comments, questions, address changes and articles on health data intended for publication to: PHI, 1000 SW Jackson, Suite 130 Topeka, KS, 66612-1354, [Kansas.Health.Statistics@kdheks.gov](mailto:Kansas.Health.Statistics@kdheks.gov), or 785-296-8627. Robert Moser, MD, Secretary KDHE; D. Charles Hunt, MPH, State Epidemiologist and Director, BEPHI; Elizabeth W. Saadi, PhD, State Registrar, Deputy Director, BEPHI; Greg Crawford, Editor.

PRST STD  
US Postage  
Paid  
Topeka, KS  
Permit No. 157

264-39  
Bureau of Epidemiology and Public Health Informatics  
Kansas Dept of Health & Environment  
1000 SW Jackson, Suite 130  
Topeka, KS 66612-1354