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The role of the Kansas Early Detection Works Program in Closing the Disparity Gap in Female Breast Cancer Screening Rates

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Background

It has been shown that screening using regular mammogram is crucial in reducing death from breast cancer [1] and associated with higher survival rates [2]. Sociodemographic characteristics e.g., race/ethnicity minorities, low socioeconomic status, residing in rural communities were found to be linked to worse cancer survival outcomes [3]. For example, higher breast cancer mortality rates among Hispanic and African American women were related to cancer diagnosis in late stage [4]. In addition, women living in rural communities experienced lower screening rates which may be attributed to lack of access to screening services and travel for longer distances to get health care services [5].

The baseline data before implementing the DP17-1701 Cooperative Agreement for cancer prevention and control in Kansas showed lower breast cancer screening rates among Hispanic, rural, uninsured, lower income, and less educated women compared to Non-Hispanic, urban, insured, more educated, and higher income women; respectively [6]. The aim of the current work was to evaluate the impact of implementing various types of Evidence-Based Interventions (EBIs) by the Kansas Early Detection Works (EDW) program on these disparities.

Methods

The Kansas Behavioral Risk Factor Surveillance System (BRFSS) 2016, 2018, and 2020 surveys, EDW management System (Catalyst[®]), and EDW evaluation reports were used to extract data to examine the progress in closing disparity gaps in breast cancer screening rates in Kansas as guided by the KS EDW program. BRFSS is a random digit-dial population-based survey of non-institutionalized adults 18 years and older living in private residences or college housing with landline and/or cell phone service in Kansas. The survey includes questions to collect information about breast cancer screening among Kansas women in the even years as core modules.

Catalyst[®] is a secure cloud-based public health management software product. It includes information on women enrolled in, and/or having received breast and cervical cancer screening and diagnostic services since the early 1990s. The program has the capacity to generate reports that track the numbers of these women weekly, monthly, quarterly, and annually or as needed. It also helps to identify women

by their race/ethnicity, geographical residence, insurance, income, and other socioeconomic characteristics.

Data from the annual EDW reports submitted to CDC regarding the implementation of EBIs in the clinics and providers contracted with EDW program were also obtained to assess the efforts by KDHE Cancer programs to narrow the gaps in breast cancer screening rates. CDC recommends implementation of four EBIs i.e., provider reminder, client reminder, provider assessment and feedback, and reducing structural barriers for that purpose. The progress in implementing these EBIs is followed up over the last funding cycle (2017-2021) to examine its effect on disparities in breast cancer screening.

SAS 9.4 complex survey procedures were used to calculate the screening rates by the different sociodemographic groups. The numbers of women who received breast cancer screening through EDW program were summarized from Catalyst[®], while progress in implementing the program strategies were obtained from EDW evaluation reports.

Results and Discussion

A) Strategies implemented to address disparities

Table 1 shows that EDW program staff implemented various environmental and community changes that promote breast cancer screening in workplaces and in the community in general across the four years of reporting. This included partnerships with Great Plains, providing technical assistance in the form of employer education, arranging worksite wellness screening events, promoting cancer prevention workplace policy changes, and sending employer screening reminders.

In 2020, the program completed a Work Against Cancer toolkit that put together a plan to educate employees, send reminder, arrange screening events, and propose policy changes. The program also arranged several events in 2021 that helped to increase breast cancer screening rates in the state. The State Employee Health Plan (SEHP) included cancer screening education and reminders in the employee newsletter for 60,000 employees, providing SEHP incentivized breast cancer screening via lower premiums. Great Plains continued their mobile event at their worksite in the Central region. Kansas Business Group for Health committed to include cancer screening reminder graphics in their information for 24 employers. Furthermore, Great Plains EDW staff presented to a coalition of employers at the Work Well Lawrence meetings in Douglas County. Western Kansas staff did staff education for the staff at the Big Brothers Big Sisters.

The program established several activities to strengthen the ties between the community members and various types of health care providers to increase breast cancer screening rates (Table 2). In 2018, EDW partnered with the Shawnee County Jail to arrange quarterly education sessions with short-term incarcerated women. Surveys showed changes in screening intentions but indicated that women need to be connected to services. EDW shared results with the jail staff, who allowed EDW to begin on-site enrollments of short-term inmates. From there, EDW enhanced the strategy by advocating for on-site enrollment, linking clients to the Community Health Worker at Grace Med Health Clinic. EDW staff in Western Kansas worked with partners to make HPV vaccinations available at the local back-to-school vaccination drive. Northeast EDW staff also held a homeless shelter screening event at the Shawnee County hospital, collaborating with a team of non-traditional partners, including transportation

providers, homeless shelters, and food pantries, to create a Saturday event with a meal and transportation for clients at helping agencies.

Table 1. Environmental strategies

2018	2019	2020	2021
<p><u>Outreach to KS employers began:</u></p> <p>South Central KS EDW Outreach Worker formed partnership with Great Plains Venture</p>	<p><u>Technical Assistance and Activities Included:</u></p> <ul style="list-style-type: none"> • Employer Education (Jackson County Chamber, Crawford County Chamber, Boys and Girls Club) • Worksite wellness screening events (Great Plains, Machinist Union) • Cancer prevention workplace policy changes (State Employee Health Program) • Screening reminders (SEHP newsletter) 	<p><u>Work Against Cancer Toolkit Launched for EDW Staff, with Training on the 4 Strategies:</u></p> <ul style="list-style-type: none"> • Employee education (Chambers of Commerce) • Screening reminders • Screening events (Great Plains) • Policy changes <p>Employer outreach continued. Barriers identified due to COVID.</p>	<ul style="list-style-type: none"> • Presenting at employer groups: Chamber of Commerce (CoC) meetings, and WorkWell Lawrence, and Kansas Business Group for Health • SEHP newsletter cancer screening reminders (~60K employees). • SEHP incentivized breast screening via lower premiums • Mobile Events with employers in Central and North East regions (Great Plains and City of Gardner) • Screening reminders at Meritrust Union Bank.

Table 2. Community Clinical Linkages

2018	2019	2020	2021
<ul style="list-style-type: none"> • NE: partners Shawnee County Jail: Quarterly education sessions • First Black for Pink health equity provider education forum • NE: homeless shelter screening event at SN Co hospital 	<ul style="list-style-type: none"> • NE: Jail partnership expanded to include Grace Med CHW linkage to care. • Second Black for Pink community education event • All for Pink health equity provider education forum • West: HPV education with Big Broth./Big Sis. 	<p>NE: Jail partnership expanded to include on-site EDW enrollment.</p> <p>October Social Media campaign:</p> <ul style="list-style-type: none"> • 1,495,343 Impressions • Messaging engaged 7,079 times 	<p>Mammogram events at:</p> <ul style="list-style-type: none"> • Guadalupe Clinic mobile • Rural LHD, breast cancer screening at a flu shot clinic • Women’s Project of Kansas, Mother’s Day mobile • El Centro, with bilingual health navigator

The All for Pink health equity provider education series started in 2018 and continued throughout the period. The goal was to support providers with the tools to remedy disparities among their patient base, with follow-up surveys to evaluate the number of providers who implemented strategies. Content was informed by the success stories of locally implemented EBIs and also CHW experiences with patients, so that CHWs get involved with both downstream and upstream initiatives to improve health equity. In 2019, EDW staff in Western Kansas completed education events with Big Brothers/Big Sisters. In October 2020, the program arranged a social media campaign that yielded 1,495,343 impressions and their messages were engaged 7,079 times. The team’s dedication to improving HPV vaccination rates came to fruition when the EDW staff in Western Kansas worked to get HPV vaccinations included in back-to-school vaccination drives.

In 2021, the program also held a Saturday mobile screening event at the Guadalupe Clinic, to connect patients to convenient on-site mammograms, and to connect patients seeking mammograms to a medical home and a primary provider. Kansas North East (NE) region staff created a team with a local health department and the local hospital to provide screening opportunities in tandem with a flu shot clinic. In addition, EDW trained and authorized four certified CHW health navigators at El Centro in Kansas City to directly enroll mobile mammogram clients into EDW for their own screening events.

Table 3 shows how the number of EDW Patient Navigation programs (PN) grew through the four years of reporting, increasing from one PN in 2018 to six PNs in 2021. It started with an African American PN at Wyandotte County Health Department, which then expanded to five other clinics: Health Partnership Clinic of Johnson County, Health Care Clinic in Wichita, Crawford County clinic, and Genesis Health System. The Women’s Project of Kansas was added as a non-provider pilot site due to their collaboration with EDW on mobile mammogram events and a need to navigate women with abnormal mobile screening results to local diagnostic providers.

Table 3. Patient Navigation (PN)

2018	2019	2020	2021
EDW African American PN program at Wyandotte County Health Department	3 PN: <ul style="list-style-type: none"> • Wyandotte Co • Crawford Co • Genesis 	5 PN: <ul style="list-style-type: none"> • Wyandotte Co • Crawford Co • Genesis • Health Partnership Clinic of Johnson County, large Hispanic Population • Health Core Clinic, Wichita 	6 PN: <ul style="list-style-type: none"> • Wyandotte Co • Crawford Co • Genesis • Health Partnership Clinic of Johnson County, large Hispanic Population • Health Core Clinic, Wichita • PN Women’s Project Wichita

The Wyandotte County Patient Navigator started the All for Pink provider webinar series with EDW staff as a way to take the experience of working directly with patients for years to inform upstream strategies with providers, educating them to transform their practices to improve health equity outcomes.

Table 4 shows that 3 clinics conducted provider assessment and feedback in 2018. The number of clinics implementing EBIs in the following years reflects the number of the new clinics recruited by the program. Also, the number of clinics that implemented provider and patient reminders increased over time, which indicates more outreach by the program. The highest number of clinics implemented the Reducing Structural Barriers EBI in 2019.

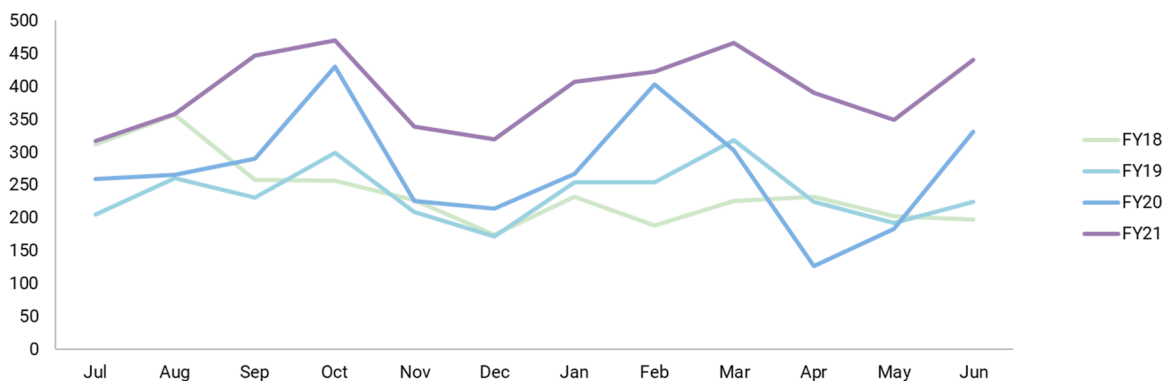
Table 4. Progress in implementing EBIs

EBIs	2018	2019	2020	2021
Provider assessment and feedback	3	2	1	1
Provider reminders	0	1	2	3
Patient reminders	0	1	3	8
Reducing structural barriers	0	5	3	1

B) Enrollment of women by sociodemographic characteristics in EDW program

Figure 1 shows that the number of Hispanic women enrolled in the KS EDW program consistently increased from year to year with the highest numbers in 2021. A similar pattern for African American women was indicated, whereas there was no specific pattern for women residing in rural counties (data not shown).

Figure 1. Enrollment of Hispanic women in the KS EDW program, 2018-2021



C) Progress in Closing the Disparity Gap in Breast Cancer Screening Rates, KS BRFSS 2016-2018

To examine the changes in breast cancer screening rates from the baseline in 20016, analysis of the 2016, 2018, and 2020 KS BRFSS data indicates that disparities for breast cancer screening rates disappeared after 2016 for Hispanic women and returned for rural women in 2020 after disappearing in

2018 (Table 5). African American women did not show disparities in the three years of analysis. Results also indicated that less education, lower income, and lack of insurance were associated with disparities in breast cancer screening rates across years.

Table 5. Disparities present in breast cancer screening rates by selected demographic measures, KS BRFSS 2016, 2018, 2020

	2016	2018	2020
Hispanic Vs. Non-Hispanic	√		
African American Vs. White			
Rural Vs. Urban	√		√
Uninsured Vs. Insured	√	√	√
≤ high School Vs. College Graduate	√	√	√
< \$15,000 Vs. ≥ \$50,000	√	√	√

A check mark (√) indicates a significant difference.

Conclusions

The data extracted from various resources demonstrate that the outreach activities of the KS EDW program i.e., patient navigation, employer education, and environmental strategies to increase breast cancer screening rates in the state assisted in closing the disparity gap for Hispanic women. The COVID-19 pandemic may have hindered these efforts for rural women. There is a real need to reach out to women of lower socioeconomic levels and provide more resources for better life-style options, including regular breast cancer screening.

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Kansas Trends in Suicide by Urbanization Levels, 2011-2021

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Introduction

Data reported by the Centers for Disease Control and Prevention (CDC) suggest that across rural regions of the country and when comparing rural to urban counties (particularly among males), rates of suicide are higher [1-3]. These analyses had not yet been completed on state-level data for Kansas. It's important to monitor these trends in Kansas since the state is made up primarily of more rural counties. Of the 105 counties, over 65% of Kansas counties are designated as "Frontier" (n = 37, 35.2%) or "Rural" (n = 32, 30.5%) [4].

Prevention efforts often rely on timely population-specific data and this report contributes to the evidence that suicide prevention efforts in the more rural parts of the state are vital. Data on suicide deaths that occurred between 2011 and 2021 were analyzed to monitor trends in suicide by urbanization level.

Methods

Data for this analysis came from Kansas Office of Vital Statistics death records from years 2011 to 2021. Suicide deaths are determined by *International Classification of Diseases, 10th Revision* (ICD-10) underlying cause of death codes X60–X84, Y87.0, and U03.

Counties are classified by KDHE into one of 5 peer county groups by population density: "Frontier" counties have fewer than 6.0 persons per square mile (ppsm), "Rural" counties have between 6.0 and 19.9 ppsm, "Densely-Settled Rural" counties have between 20.0 and 39.9 ppsm, "Semi-Urban" counties have between 40.0 and 149.9 ppsm, and "Urban" counties have 150.0 or greater ppsm [4].

The statistical analyses in this report include age-adjusted rates with 95% confidence intervals (95% CIs) using the direct method and the 2000 US standard population. Statistical significance is defined by non-overlapping confidence intervals. Calculations were completed using SAS version 9.4. Rates where counts are less than 20 were suppressed because small counts lead to fluctuations.

Results

Table 1 shows the frequency (N), percent (%), and age-adjusted rate of suicide deaths by urbanization level. Between the years 2011 and 2021, Urban counties experienced over half of all suicide deaths in the state (n = 2,980). However, Frontier counties (those with the lowest population density) had the highest suicide rate of all peer county groups at 26.0 per 100,000 residents, (95% CI: 22.6, 29.4), and was significantly higher than the Densely-Settled Rural, Semi-Urban, and Urban counties (Figure 1 and Table 1).

Figure 2 shows the trends in suicide rates broken out by each of the five urbanization levels. For the Frontier counties, the rate was suppressed due to low counts for 2019 (<20 deaths occurred) causing the line graph to be disjointed. The Rural classified counties not only had the highest suicide rate of any

urbanization level for any year (in 2021 at 28.9 per 100,000; 95% CI: 20.8, 37.1), but this group also saw the greatest increase in rate over this time frame (191.5% increase in rate).

Table 1. Frequency and Rate of Suicide Deaths by Urbanization Level, Kansas, 2011-2021

Peer County Group	N	%	Rate* (95% CI)
Frontier	256	4.9	26.0 (22.6, 29.4)
Rural	472	8.6	22.4 (20.3, 24.5)
Densely-Settled Rural	889	16.3	20.4 (19.1, 21.8)
Semi-Urban	864	15.8	20.1 (18.7, 21.5)
Urban	2,980	54.6	19.3 (18.6, 20.0)

*Rate per 100,000 residents

Figure 1. Map of Urbanization Levels and Suicide Rate (per 100,000 Residents), Kansas, 2011-2021

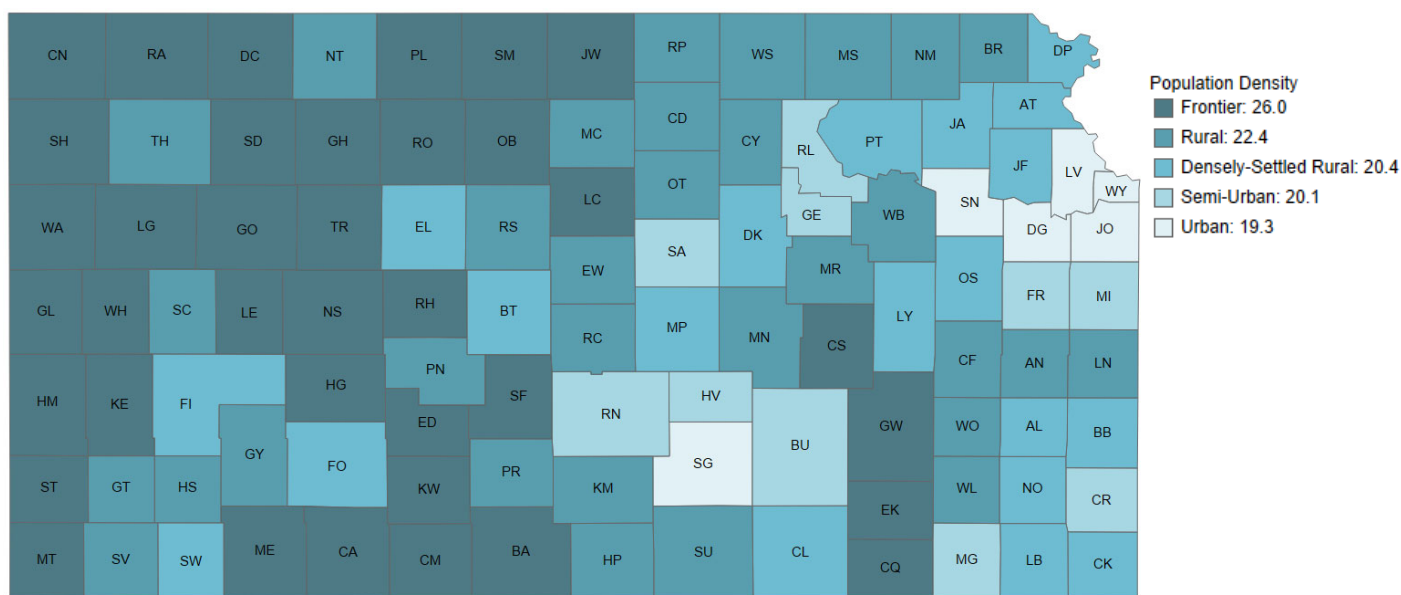


Figure 3 displays the rate data presented in Table 2. The bars correlate to the age-adjusted rate per 100,000 residents and the error bars correlate to the 95% confidence intervals. Males in Frontier counties had the highest rate of suicide of any urbanization level between either sex (45.1 per 100,000 residents; 95% CI: 36.0, 51.5) and this rate is significantly higher than Semi-Urban or Urban counties. For females, rates across all urbanization levels were comparable.

Table 2 also shows the frequency (N) and percent (%) of each sex broken down by urbanization level. For Rural counties, males had higher percentages compared to females: Frontier, 5.3% vs 2.5%; Rural, 9.1% vs 7.0%; and Densely-Settled Rural, 17.3% vs 12.4%. While for Urban counties, females had a higher percentage compared to males, 62.2% vs 52.6%

Figure 2. Trends of Suicide Rates by Urbanization Level, 2011-2021

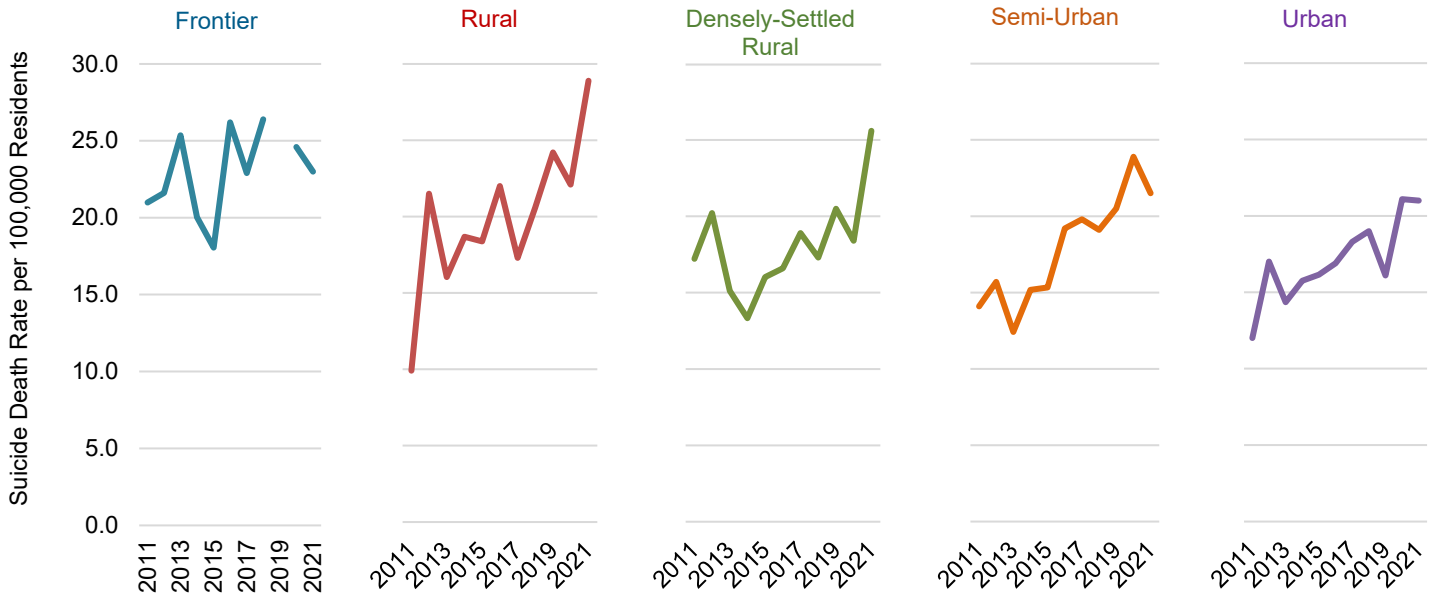


Figure 3. Rates of Suicide Deaths by Urbanization Level and Sex, 2011-2021

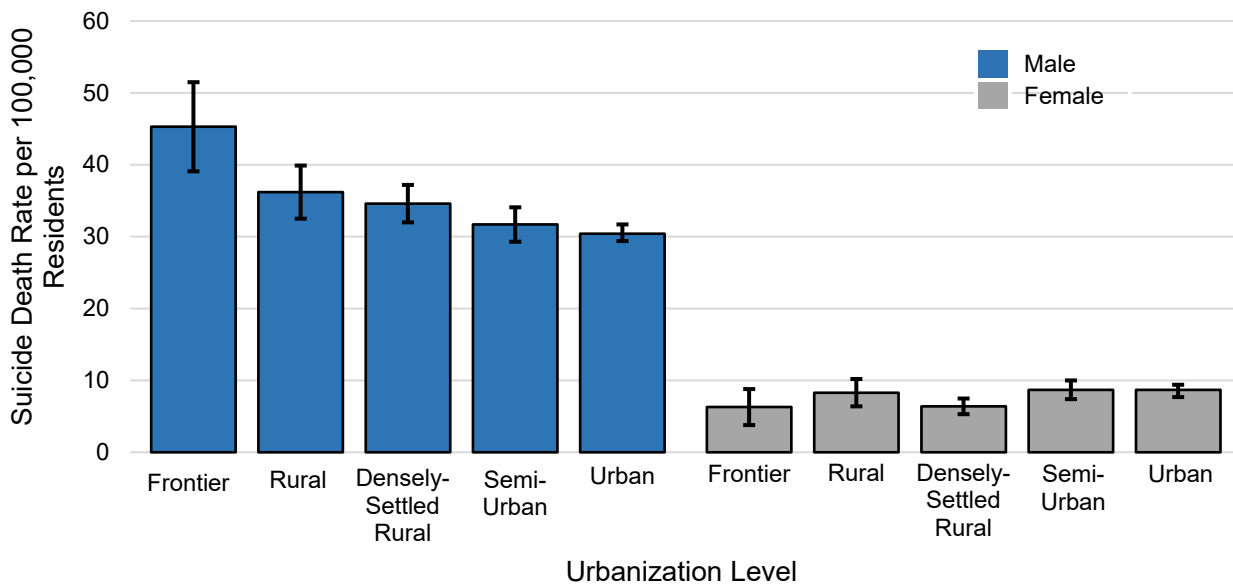


Table 2. Frequency and Rate of Suicides by Urbanization Level and Sex, 2011-2021

Peer County Group	Male			Female		
	N	%	Rate* (95% CI)	N	%	Rate* (95% CI)
Frontier	229	5.3	45.3 (36.0, 51.5)	27	2.5	6.3 (3.8, 8.8)
Rural	395	9.1	36.2 (32.5, 39.9)	77	7.0	8.2 (6.4, 10.2)
Densely-Settled Rural	753	17.3	34.6 (32.1, 37.2)	136	12.4	6.4 (5.3, 7.5)
Semi-Urban	689	15.8	31.7 (29.2, 34.1)	175	15.9	8.7 (7.3, 10.0)
Urban	2,296	52.6	30.1 (29.2, 31.7)	684	62.2	8.7 (8.0, 9.4)
Total	4,362		32.6 (31.3, 33.2)	1,099		8.2 (7.7, 8.7)

*Rate per 100,000 residents

Discussion

These analyses show that the more rural parts of the state, and especially males in these rural regions, are disproportionately affected by suicide in the state of Kansas, which matches the trends on the national level.

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5. My comment about the table frequency and percent wasn't about the table but the leading paragraph. In one case you didn't mention what to expect in the upcoming table and in one case you did. Either way is fine, as long as it's consistent.
6. As far as columns aligning in tables, they just look prettier when the center space (between the count and percent) aligns. The only suggestion I have for making them line up is to put each in a separate column. Of course, that is easier said than done and may be too much work.

Tracking COPD in Kansas Emergency Departments, Kansas 2011-2020

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Kansas Environmental Public Health Tracking Program*

Introduction

Chronic obstructive pulmonary disease (COPD) is one of the most common and costly respiratory diseases in the United States. COPD is a group of illnesses that affect the respiratory system by causing airflow blockage and other breathing problems. It includes some cases of asthma, emphysema, and chronic bronchitis. Some of the symptoms include wheezing, shortness of breath, coughing, fatigue, and tightness in the chest. It is estimated that affects 16 million people in the US [1] have the disease but this is likely an undercount since million more may have it and have not been diagnosed yet. Smoking has been identified as the most important risk factor [2]. In the US, COPD is more prevalent in the Southeast and in the Midwest [3].

The following is an update on a series of 10-year rolling descriptive statistics on COPD-related emergency department (ED) visits in Kansas. It covers the most recent 10 years of available data. While COPD is one of the leading causes of hospitalization and death in the country [4], this analysis will focus on ED visits in an attempt to give insight into some severe outcomes of the disease.

Methods

For this analysis, the data was provided by the Kansas Hospital Association (KHA) and included de-identified ED visit records from 2011 to 2020. COPD was defined as ED visits with ICD-9-CM 490-492, 496 as the primary diagnosis or 493.2 as a primary diagnosis when 490-492, 496 is present in any other diagnosis codes; or after October 1, 2015, ICD-10-CM codes J40-J44 as primary diagnosis. Non-Kansas residents were excluded but transfers were not.

In addition to the ED data, in-patient records were also searched to identify patients admitted from the ED who were not accounted for in the ED data set. RStudio Version 1.3.959 and R version 4.0.2 were used to calculate the summary statistics and create the graphs. All age adjustments were made using the 2000 US population.

Results

From 2011 to 2020, there were a total of 136,782 COPD-related ED visits in the state. As noted in our previous reports, the data show that the number of visits was significantly lower in the summer and higher in the fall and the spring.

Monthly visits were significantly lower during the summer months (June, July, and August) than during the cold months (November, December, January, February and March). This trend may coincide with incidence of other respiratory diseases such as influenza.

Women were at higher risk of visiting the ED for COPD than men. The data also show a significant decrease of the total number of ED visits due to COPD in 2020 compared with previous years.

Figure 1. Distribution of COPD-related ED Visits by Month, Kansas 2011-2020

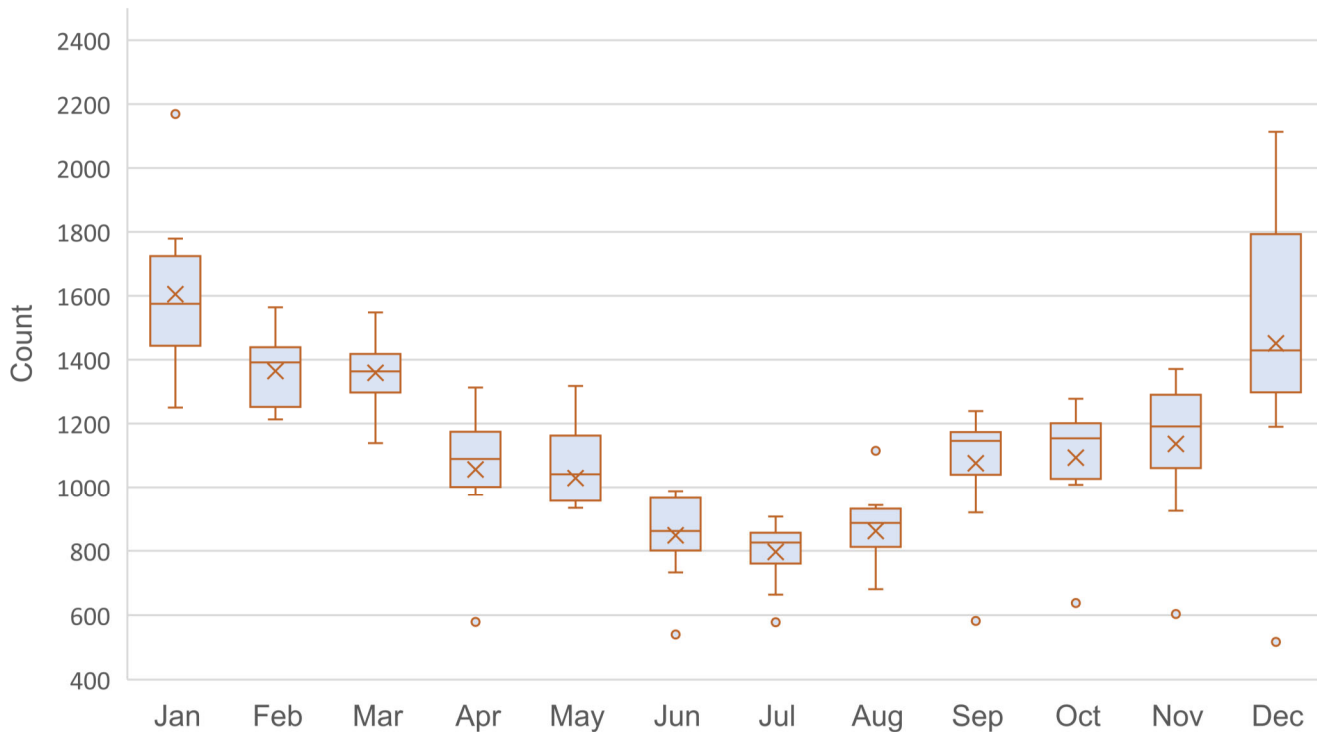


Figure 2. COPD-related ED Visits, Kansas 2011-2020, Age-adjusted rates per 10,000 Visits, by Year and Sex

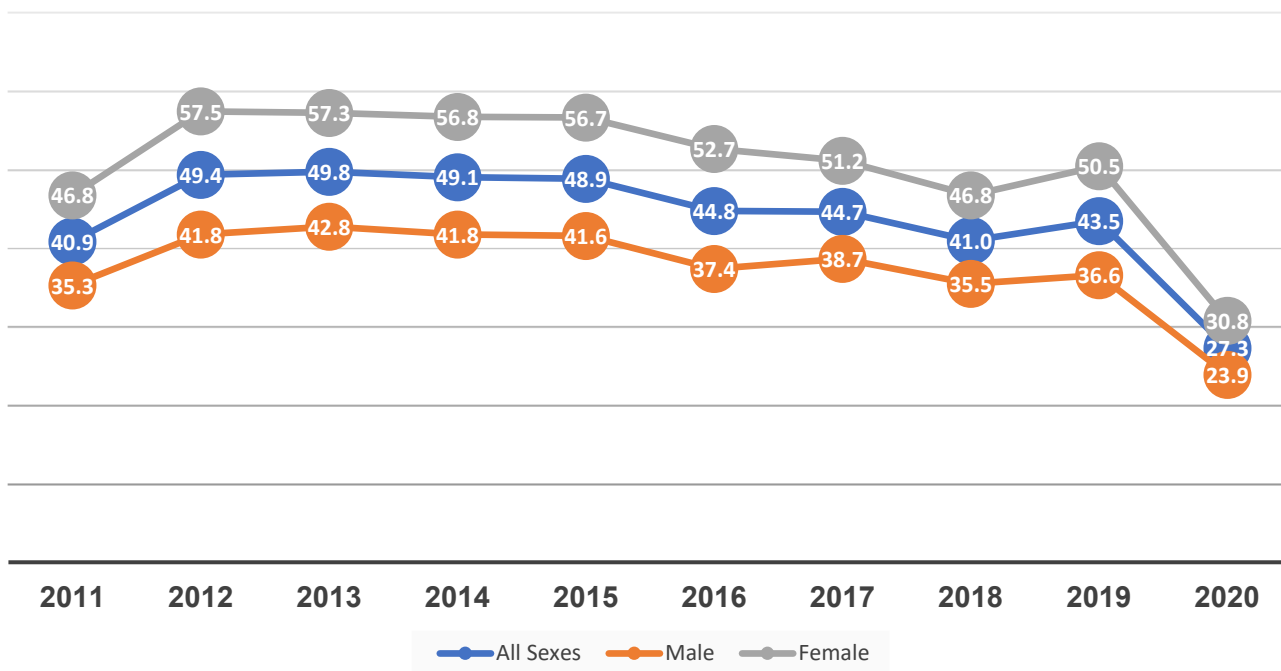
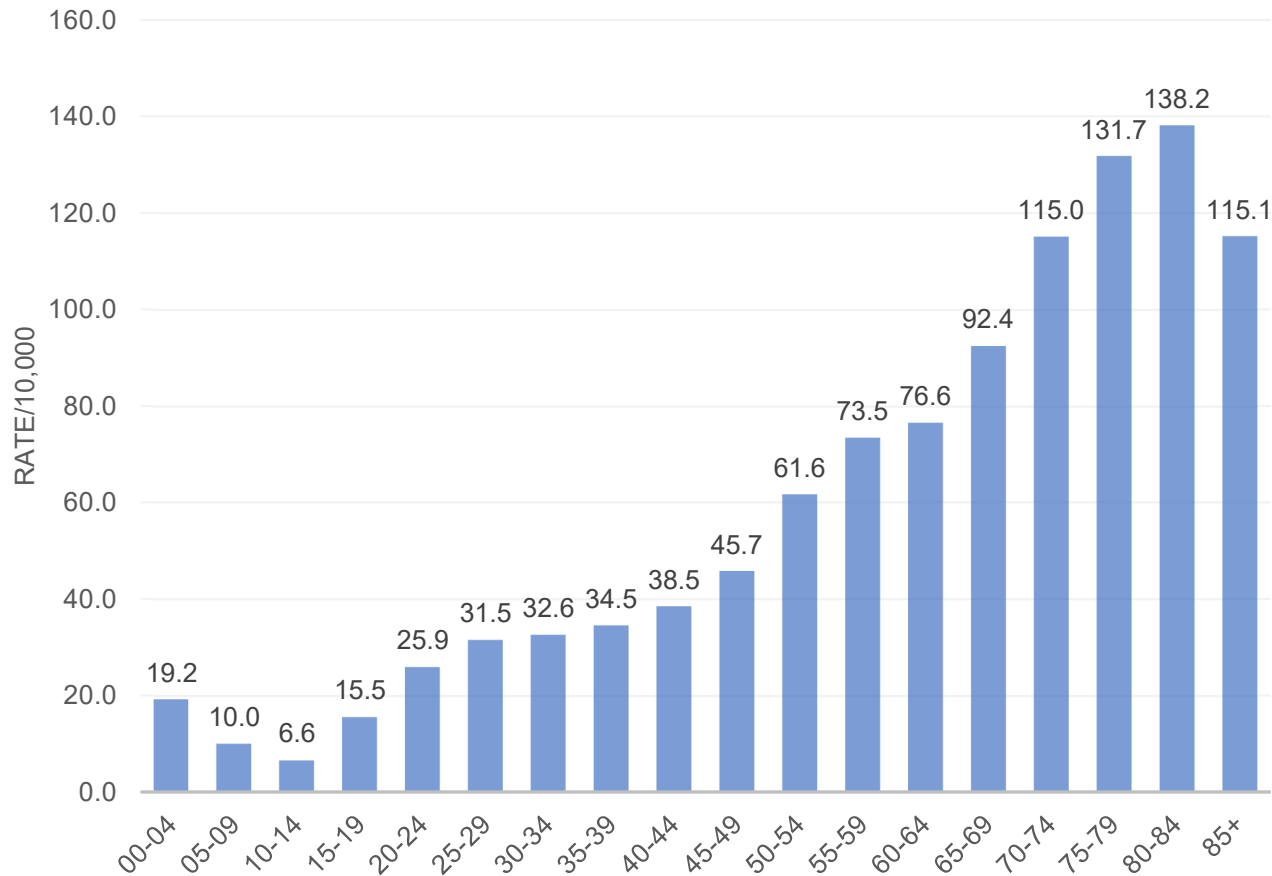


Figure 3. COPD-related ED Visits in Kansas: Crude rates/10,000 visits, by age group, 2011-2022



The data show that the rate of ED visits for COPD increased with age in Kansas. The rate was higher among those aged 80 to 84 years (138.2/10,000 visits) and the lowest for those 10 to 14 years old (6.6/10,000 visits). People ages 50 years and older were at greater risk than younger individuals.

In 2020, the age-adjusted rate of COPD-related ED visits for Hispanics was 21.0/10,000 visits and for Non-Hispanic it was 45.8/10,000 visits. The difference was statistically significant. During the same year, Blacks/African Americans had the highest age-adjusted ED visit rate for the disease (80.0/10,000), followed by whites (41.6/10,000) and Kansans of other races (42.5/10,000) visits. The rates among whites and Blacks/African Americans were statistically different.

When stratified by county, the 2020 data show that the top five counties with highest age-adjusted rates per 10,000 visits were Ellsworth (61.7), Sherman (61.1), Hamilton (58.0), Franklin (57.3), Anderson (53.9). The five counties with lowest age-adjusted rate of ED visits were Pratt (0.6), Riley (2.5), Norton (5.1), Wichita (7.1), and Stanton (7.8) based on the patient’s county of residence. The overall Kansas age-adjusted rate was 44.0 visits per 10,000 visits in 2020.

Limitations

- Reporting of emergency department visits is not required in Kansas. Therefore, we assume that the data may not be complete. However, analysis for data consistency did not identify any significant data gap. The male and female ratio for ED visits has been consistent over the years. In addition, more than 96% (101/105) of the counties had 2 or less annual number of visits below of what is expected. The ratio male to female was consistent (range=0.68-0.74). The observed annual numbers of ED visits by age group were all within the 95% confidence limits for proportion (Wald method).
- ICD-10 CM was introduced in October of 2015 and replaced ICD-9 CM for record coding. This has the potential to impact the case counts. A data review by several Environmental Public Health Tracking (EPHT) grantees, including Kansas, has observed a net decrease in the age-adjusted rates for COPD hospitalization from the years before the 2015 transition compared to the years that followed the transition (2016 to 2020) [5]. However, more data points are needed to reach a definitive conclusion on the impact of the transition, especially in Kansas where the most important drop occurred from 2019 to 2020. As recommended by the EPHT's Hospitalization Data Team [5], Kansas will continue to monitor the COPD trends for potential impacts of the ICD-9 to ICD-10 coding change. To indicate the potential effects of the transition on the data and to facilitate interpretation, a break will be included for the year 2015 in future trend analyses of COPD for Kansas.
- Numbers may be too small in rural areas to calculate stable rates.
- Institutionalized populations and data from the Veterans' Affairs are not included in these statistics. Therefore, some statistics may be underestimated.
- To our knowledge, the accuracy of patients' race and ethnicity information reporting has not been validated. Caution should be used when interpreting race and ethnicity statistics from Kansas ED data.
- Another source for the under estimation of the number of COPD cases is the fact that not all COPD patients are treated in hospital settings and therefore those cases will not be included in the ED portion of the hospital discharge data.
- The ED visits patterns may have been affected by the COVID-19 pandemic. The reader should use caution when comparing 2020 data with previous years.

Conclusion

According to the 2020 Behavioral Risk Factor Surveillance System, 6.2% of adults in the U.S. have been diagnosed with COPD [6]. It is considered as an important source of morbidity and mortality. In Kansas, there are approximately 4 out of 1,000 ED visits that are related to COPD. Similar to national statistics, COPD affects disproportionately, female, and the elderly. COPD-related visits are more common when the outdoors temperature is low. One should note that a significant drop in COPD-related ED visits occurred in 2020 compared to 2019. This may be due to the concurring COVID-19 pandemic. The cause for this drop warrants further investigations. This epidemiological analysis may serve as baseline for health interventions, administrative purposes and policy development. Since smoking has been identified as one of the risk factors for COPD, it would be interesting to compare trends in ED visits and smoking rates in the population. In addition, this analysis may be complemented by similar analyses of the Kansas inpatient data and mortality data and taken together that may improve our knowledge of this common and preventable health condition.

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Kansas Severe Maternal Morbidity and Maternal Mortality, 2016-2020

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The Kansas Department of Health and Environment, Bureau of Family Health will release the *2016-2020 Kansas Maternal Mortality Report, Including Severe Maternal Morbidity* in January 2023. To view the full report, please visit <https://kmmrc.org/>.

Executive Summary

The issue of maternal morbidity and mortality is complex. Severe maternal morbidity (SMM) occurs nearly 100 times more frequently than maternal death, the “tip of the iceberg” for adverse maternal outcomes.¹ Death certificates do not include all the information needed to evaluate the proximate and contributory causes of maternal mortality, whether the deaths were actually related to the pregnancy, and whether the deaths were preventable. Nationally, the Centers for Disease Control and Prevention (CDC), Pregnancy Mortality Surveillance System (PMSS) indicates the pregnancy-related mortality ratios have been relatively stagnant in the past decade², which underscores the need for more work in optimizing maternal health. The Kansas Department of Health and Environment (KDHE) identifies all pregnancy-associated deaths, or deaths occurring while a woman is pregnant or within a year of pregnancy, to collect data on maternal mortality. KDHE has worked with the Kansas Maternal Mortality Review Committee (KMMRC) to review cases of pregnancy-associated death that occurred in Kansas from 2016 to 2020. KMMRC is a multi-disciplinary committee that convenes at the state level to comprehensively review deaths of women during or within a year of pregnancy. KMMRCs have access

to clinical and non-clinical information (e.g., vital records, medical records, social service records) to more fully understand the causes and circumstances surrounding each death, and to develop statewide recommendations for action to prevent future maternal deaths, as well as determine whether the deaths were pregnancy-related (occurring due to a pregnancy complication) and whether they were preventable.³

Key Findings

Severe Maternal Morbidity: Using the Kansas hospital discharge data and International Classification of Diseases (ICD), 10th Revision, Clinical Modification/Procedure Coding System (ICD-10-CM/PCS) following the CDC-developed definition of SMM⁴, from 2016 to 2020, of the 164,049 delivery hospitalizations of Kansas residents, 1,019 deliveries with one or more severe maternal morbidities were identified, representing a rate of 62.1 per 10,000 delivery hospitalizations. This implies that approximately **1 in 161 women who delivered a baby experienced SMM**. The SMM rate steadily significantly increased from 56.1 in 2016 to 71.0 per 10,000 delivery hospitalizations in 2020, with an annual percent change (APC) of 6.4%.

- The top five most common indicators of SMM were disseminated intravascular coagulation, acute renal failure, adult respiratory distress syndrome, sepsis, and hysterectomy (13.1, 10.7, 10.3, 10.1, 8.5 per 10,000 delivery hospitalizations, respectively).
- Some conditions often involved procedural intervention. In 2016-2020, 27.3% of deliveries with shock had a hysterectomy.
- SMM was **highest among women aged 40+ years** and lowest for those aged 25-29 years (155.3 and 48.1 per 10,000 delivery hospitalizations, respectively).
- Despite the downward trend in the SMM rate of non-Hispanic Black women from 2016 to 2020, the overall rate of SMM per 10,000 delivery hospitalizations for non-Hispanic Black women was 103.5: 83.5% higher than the rate among non-Hispanic White women (56.4), 52.7% higher than the rate among non-Hispanic Asian/Pacific Islanders (67.8), and 42.2% higher than the rate among Hispanics (72.8). The SMM rate for **non-Hispanic Blacks was significantly higher than any other race and ethnicity**.
- Compared with other deliveries, **women who were enrolled in Medicaid or from low-income ZIP Codes were more likely to experience SMM**.

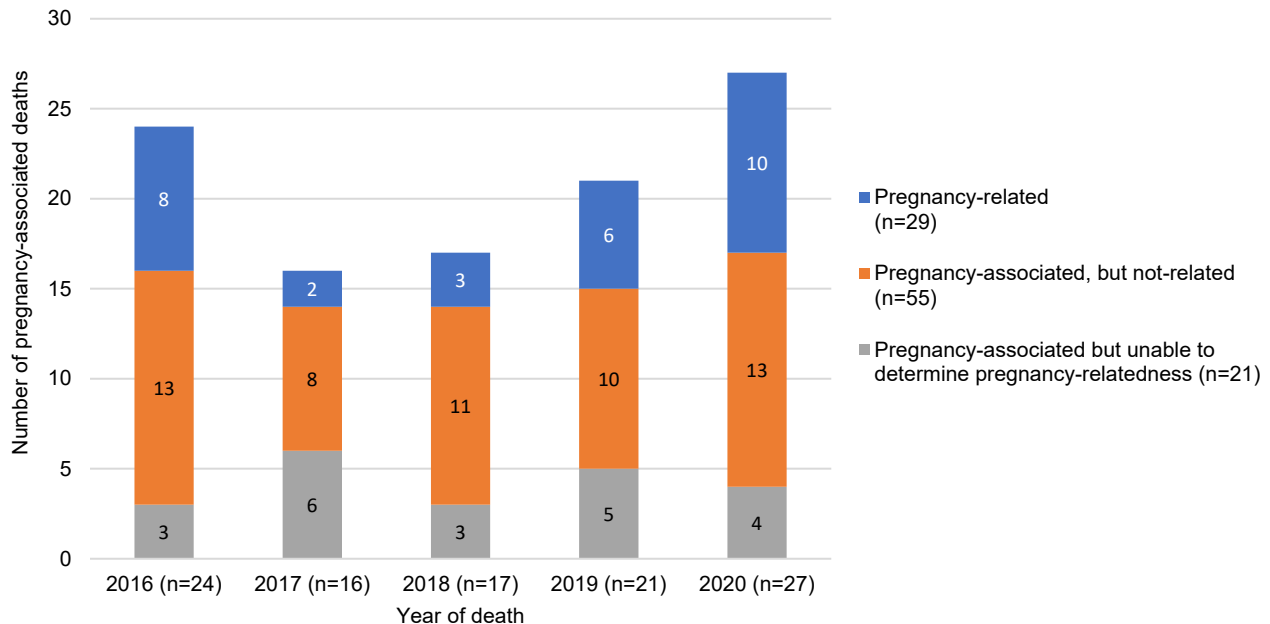
Maternal Mortality: Analyzing the KMMRC data, of the 132 identified deaths that occurred in Kansas (regardless of residency) in 2016-2020, the KMMRC determined that 105 deaths were pregnancy-associated.

- A pregnancy-associated death is defined as the death of a woman during or within one year of pregnancy, regardless of the cause.⁵
- A pregnancy-related death is defined as the death of a woman during or within one year of pregnancy, from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.⁵
- A pregnancy-associated, but not related death is defined as the death of a woman during or within one year of pregnancy, from a cause that is not related to pregnancy.⁵
- Pregnancy-associated deaths make up the universe of maternal mortality; within that universe are pregnancy-related deaths and pregnancy-associated, but not related deaths.⁵

Of the 105 pregnancy-associated deaths reviewed, the KMMRC determined (Figure 1):

- 29 deaths (27.6%) were pregnancy-related
- 55 deaths (52.4%) were pregnancy-associated, but not-related, and
- 21 deaths (20.0%) were pregnancy-associated but unable to determine pregnancy-relatedness.

Figure 1. Number of pregnancy-associated deaths by pregnancy-relatedness, Kansas, 2016-2020



Source: Kansas Maternal Mortality Review Committee

From 2016 to 2020, there were **105 pregnancy-associated deaths**. This translated to a pregnancy-associated mortality ratio (PAMR) of **56 deaths per every 100,000 live births that occurred in Kansas**. The PAMRs appeared to be trending upward from 61.0 in 2016 to 75.3 per 100,000 live births in 2020, with an APC of 7.1%. However, the upward trend was not statistically significant.

- Timing of death:
 - 30 deaths (28.6%) occurred during pregnancy.
 - 20 deaths (19.0%) occurred within 42 days of the end of pregnancy.
 - 55 deaths (**52.4%**) **occurred 43 days to one year** after the end of pregnancy.
- The leading causes of death were motor vehicle crash, followed by cardiovascular conditions, and homicide.
- KMMRC determinations on circumstances surrounding death were:
 - **Substance use disorder contributed to one in four** (28 deaths, 26.7%) of pregnancy-associated deaths.
 - **Obesity contributed to approximately one in four** (25 deaths, 23.8%).
 - **Mental health conditions contributed to nearly one in four** (24 deaths, 22.9%).

From 2016 to 2020, **29 deaths** (27.6%) were **pregnancy-related**. This translated to a pregnancy-related mortality ratio (PRMR) of **15 deaths per every 100,000 live births that occurred in Kansas**. Based on the three-year rolling average, the PRMRs appeared to be trending upward from 11.3 in 2016-2018 to 17.2 per 100,000 live births in 2018-2020, with an APC of 25.5%. However, the upward trend was not statistically significant.

- Timing of death:
 - 10 deaths (34.5%) occurred during pregnancy.
 - 13 deaths (**44.8%**) **occurred within 42 days** of the end of pregnancy.
 - 6 deaths (20.7%) occurred 43 days to one year after the end of pregnancy.
- The leading causes of death were cardiovascular conditions, followed by embolism-thrombotic (non-cerebral), hypertensive disorder, and infection.
- Committee determinations on circumstances surrounding death were:
 - **Obesity contributed to two in three** (18 deaths, including 1 probably contributed, 62.1%) of the pregnancy-related deaths.
 - **Substance use disorder contributed to one in four** (8 deaths, 27.6%).
 - **Discrimination contributed to approximately one in four** (4 deaths that were determined as 'probably contributed', 23.5%), among all 17 pregnancy-related deaths reviewed after May 29, 2020, when the CDC added a discrimination field to the Committee Decisions Form.
- 23 (**79.3%**) of the 29 deaths **were preventable*** with 13 deaths (44.8%) showing a good chance of prevention and 10 deaths (34.5%) showing some chance. *A death is considered preventable if there was at least some chance of the death being prevented by one or more reasonable changes to patient, family, provider, facility, system, and/or community factors. This definition is used by MMRCs to determine if a death they review is preventable.⁵
- **Racial and ethnic minorities were disproportionately affected.** Approximately two-thirds (18 deaths, 62.1%) of women were racial and ethnic minorities and 11 (37.9%) were non-Hispanic White women.
- **Most deaths** (24 deaths, 82.8%) **occurred between the ages of 25 and 39 years.**
- More than half (16 deaths, 55.2 %) of the women had **either completed high school or general educational development (GED), or had less education than high school.**
- Just over a third (11 deaths, 37.9 %) of the women had private insurance, **while the other 62.1% had Medicaid, no insurance or unknown insurance status.**

During 2016-2020, **55 deaths** (52.4%) were **pregnancy-associated, but not-related**. Based on the three-year rolling average, the death rates of pregnancy-associated, but not-related appeared to be trending upward from 27.8 in 2016-2018 to 30.7 per 100,000 live births in 2018-2020, with an APC of 5.2%. However, the upward trend was not statistically significant.

- Timing of death:
 - 15 deaths (27.3%) occurred during pregnancy.
 - 3 deaths (5.5%) occurred within 42 days of the end of pregnancy.
 - 37 deaths (**67.3%**) **occurred 43 days to one year** after the end of pregnancy.
- The leading causes of death were motor vehicle crash, followed by homicide and malignancies.
- Committee determinations on circumstances surrounding death were:
 - **Substance use disorder and/or mental health contributed to a quarter** (14 deaths, 25.5%).

- **More than two-thirds** (9 deaths, 69.2%) **of deaths that noted substance use disorder** as a contributing factor (13 deaths) **also had co-occurring mental health conditions** as a contributing factor.
- **One-third** (19 deaths, 34.5%) were the result of a **motor vehicle crash**.

During 2016-2020, **21 deaths** (20.0%) were **pregnancy-associated but unable to determine pregnancy-relatedness**. Based on the three-year rolling average, the death rates of pregnancy-associated but unable to determine pregnancy-relatedness appeared to be trending slightly upward from 10.4 in 2016-2018 to 10.8 per 100,000 live births in 2018-2020, with an APC of 2.0%. However, the slight upward trend was not statistically significant.

- Timing of death:
 - 5 deaths (23.8%) occurred during pregnancy.
 - 4 deaths (19.0%) occurred within 42 days of the end of pregnancy.
 - 12 deaths (**57.1%**) **occurred 43 days to one year** after the end of pregnancy.
- The leading causes of death were suicides and motor vehicle crashes.

Key KMMRC recommendations for action for pregnancy-related deaths

The key KMMRC recommendations based on 23 preventable pregnancy-related deaths are as follows:

- **Screen, provide brief intervention, and referrals** for:
 - Comorbidities and chronic illness
 - Intimate partner violence
 - Pregnancy intention
 - Mental health conditions (including postpartum anxiety and depression)
 - Substance use disorder
- **Better communication and multi-disciplinary collaboration** between providers, including referrals
- **Patient education and empowerment**

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Announcements

Item 1. The Kansas Annual Summary of Vital Statistics, 2021 has been posted at www.kdhe.ks.gov/DocumentCenter/View/25772/2021-Annual-Summary-Full-Report.

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