> DATA BRIEF

LAWRENCE-DOUGLAS COUNTY PUBLIC HEALTH

The effect of COVID-19 on the leading causes of death in Douglas County, KS

Key Findings

What is known about the topic?
In 2020 COVID-19 was the 3rd leading cause of death in the U.S and Kansas.; the first year it was included as cause of death. Overall age-adjusted death rates in the U.S. and Kansas increased between 2019 and 2020.

What is added by this report?
Like in the U.S. and the State of Kansas, COVID-19 was the 3rd leading cause of death in Douglas County in 2020, but the percent of deaths accounted for by COVID-19 was less in Douglas County than in the U.S. and Kansas.

What are implications for public health practice?
The COVID-19 pandemic illustrated that mitigating morbidity and mortality required a multifaceted approach including:

- **Interrupting community disease transmission** e.g., detection of disease and containment of clusters, as well as issuing public health orders and providing prevention recommendations.
- **Developing consistent community messaging and responses** through strong partnerships between public health, health care, and emergency management.
- **Eliciting community support for public health recommendations** by consistent communication with the public through a variety communication channels.
- **Providing the community with COVID-19 metrics** so that individuals could make their own risk assessments.
- **Addressing disparities in vulnerable populations** by embracing Equity Impact Advisors, a stand-alone branch of Unified Command, into planning activities; and developing community health approaches, such as a RADx-UP initiative that implemented innovative ideas for testing and vaccination for marginalized populations.[8,11,12]

Introduction

Ranking causes of death is an important first step to identifying diseases or conditions that are of public health significance and can show how a specific cause relative to other causes may change over time.[1] These findings illustrate the relative burden of cause-specific mortality among the list of diseases that are eligible to be ranked and show the most frequently occurring causes of death.

In 2020, COVID-19 was added to the standard list of rankable causes of death. Chronic diseases and injuries have dominated the leading causes of death in the 21st century, and until COVID-19, only one infectious disease category (influenza and pneumonia) has been in the top ten causes of death for all ages.

This brief will **1)** compare the 2019 and 2020 leading causes of death for Douglas County, **2)** compare the 2020 leading causes of death in Douglas County with the 2020 leading causes of death in the U.S. and Kansas, **3)** examine how COVID-19 may have directly or indirectly affected trends in overall mortality in Douglas County, **4)** show when Douglas County COVID-19 deaths occurred in 2020 and examine the relationship of these COVID-19 deaths with new COVID-19 cases and hospitalizations and, **5)** discuss the public health implications of these findings.

Methods

The National Center for Health Statistics (NCHS) uses a ranking standard to provide consistent groupings for ranking causes of death among states and localities. Causes of death are based on the underlying cause on the death certificate and represent the disease or injury that initiated the events leading directly to death. The 52 specific causes of death that are ranked today are broad groupings of all the causes in the list of 113 selected causes of death. In 2020 COVID-19 was added to the list. [2] A complete list of these 52 causes of death and the associated ICD-10 codes (International Statistical Classification of Diseases and Related Health Problems, 10th Revision) that were used to determine the top 10 causes of death in Douglas County can be found in the technical notes for this brief[17].

The KDHE research mortality files for Douglas County were analyzed for this data brief. Causes of death are defined by the code listed in the underlying causes of death according to the procedures that the NCHS uses for ranking causes [3] (See technical notes for details)[17]. SAS 9.4 was used to examine frequencies and other descriptive statistics of COVID-19 deaths.

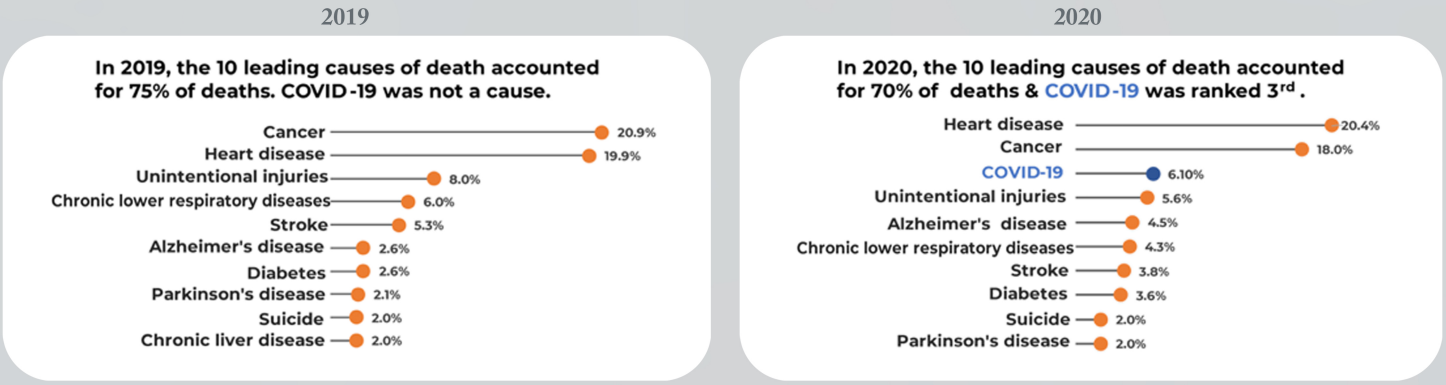
Deidentified information on hospital census during 2020 was obtained from the one county hospital. SAS 9.4 was used to calculate the hospital census for a particular date based on patient admission and discharge date. COVID-19 cases for Douglas County residents were obtained from Lawrence-Douglas County Public Health, representing people that disease investigators classified as a resident of Douglas County and met the COVID-19 case definition.
All mortality rates were obtained from Kansas Information for Communities (KIC).[7]

Results

Leading causes of Death: Douglas County Kansas, The United States, and the State of Kansas

Figure 1 (below) shows that in 2020, heart disease replaced cancer as the number one cause of death in Douglas County. COVID-19 was the third leading cause of death. Except for COVID-19 and chronic liver disease, the leading causes of death for 2019 and 2020 were similar; however, the rank order for these causes of death changed from 2019 to 2020.

Figure 1: Top 10 leading causes of death in Douglas County, Kansas



Data source: KDHE Bureau of Epidemiology and Public Health Informatics

Table 1 (below) shows that in 2020 Douglas County has many of the same causes of death, including the ranking of COVID-19 as the third leading cause of death, as the United States and Kansas. However, the percentage of deaths accounted for by COVID-19 was lower in Douglas County than the U.S. or Kansas (6.3% versus 10.4% and 10.3% respectively). Unlike the U.S. and Kansas, kidney disease is not a leading cause of death in Douglas County. Influenza and pneumonia is a leading cause of death in the U.S., but not in Kansas or Douglas County. Unlike Douglas County, the U.S. and Kansas did not have Parkinson's Disease as a leading cause of death. Finally, suicide was a 2020 leading cause of death in Douglas County and Kansas, but not in the U.S.

Table 1. Comparison of 2020 top 10 leading causes of death for the U.S., State of Kansas, & Douglas County.

Rank	U.S. *(Top 10 account for 74.1% of deaths)*		Kansas *(Top 10 account for 71.7% of deaths)*		Douglas County *(Top 10 account for 70% of deaths)*	
1	Heart Disease	20.6%	Heart Disease	19.6%	Heart Disease	20.4%
2	Cancer	17.8%	Cancer	17.3%	Cancer	18.0%
3	COVID-19	10.4%	COVID-19	10.3%	COVID-19	6.1%
4	Unintentional Injury	5.9%	Unintentional Injury	5.5%	Unintentional Injury	5.6%
5	Stroke	4.7%	CLRD	5.1%	Alzheimer's	4.5%
6	CLRD*	4.5%	Stroke	4.3%	CLRD	4.3%
7	Alzheimer's	4.0%	Diabetes	3.3%	Stroke	3.8%
8	Diabetes	3.0%	Alzheimer's	3.1%	Diabetes	3.6%
9	Flu/Pneumonia	1.6%	Suicide	1.7%	Suicide	2.0%
10	Kidney Disease	1.6%	Kidney Disease	1.7%	Parkinson's	2.0%

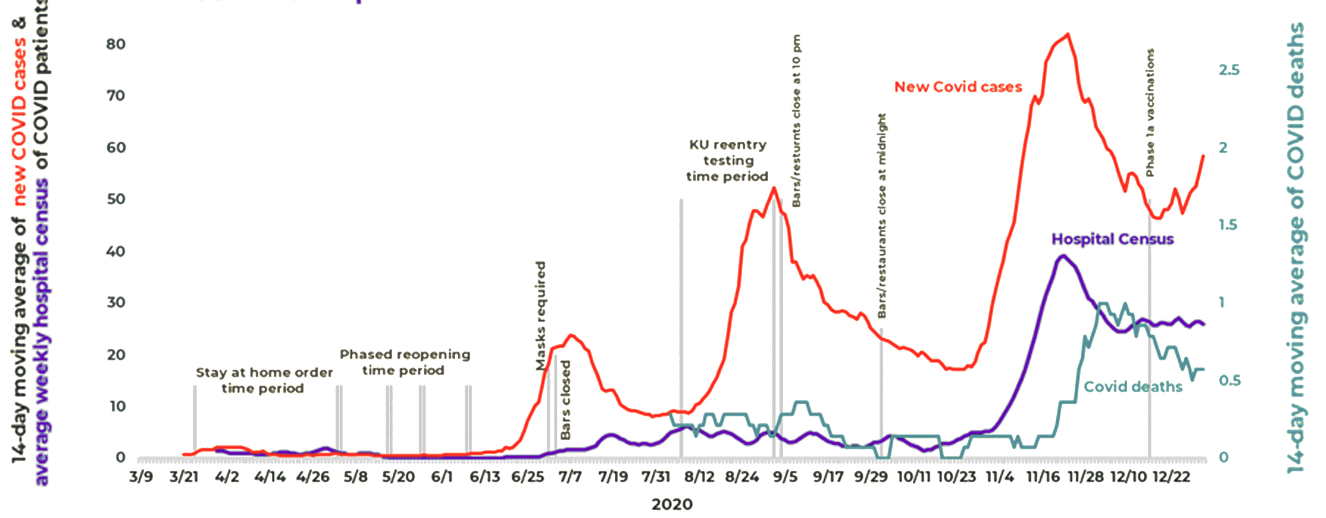
*Chronic Lower Respiratory Disease (CLDR) - *Data Sources: KDHE Bureau of Epidemiology and Public Health Informatics et. al.* [14,15,16]

Comparison of COVID-19 cases, COVID-19 hospitalizations, and COVID-19 deaths: Douglas County 2020

In July 2020, the first Douglas County resident died of COVID-19. Most (90.6%) of the Douglas County residents who had COVID-19 listed as the underlying cause of death in 2020 were 65 years old or older. Of the 53 people with an underlying cause of death of COVID-19, most (84.9%) were White, non-Hispanic. Fewer than five Native American or Black residents died of COVID-19 in 2020, but COVID-19 was the second leading cause of death for Native Americans. For Black residents, COVID-19 tied with diabetes and hypertension as the third leading cause of death.

Figure 2 (below) shows the 14-day moving average of new COVID-19 cases, COVID-19 deaths, and the weekly moving average of hospitalized COVID-19 patients. Not surprisingly the temporal pattern of Douglas County COVID-19 deaths tended to mirror the pattern seen in the hospital census of COVID-19 patients, but tended to occur a few weeks after surges in hospitalizations. Figure 2 also shows that most of the deaths occurred in November and December. In fact, half of the 2020 COVID-19 deaths occurred between November 26 and December 31.

Figure 2. COVID-19 deaths tend to lag behind large surges of new Covid Cases and the COVID-19 hospital census: March - December 2020.



Data sources: LDCPH, LMH-Health, KDHE Bureau of Epidemiology and Public Health Informatics

Multiple mitigation strategies were implemented in 2020 to reduce the number of infections, hospitalizations, and deaths from COVID-19. For example, Lawrence-Douglas County Public Health issued a stay-at-home order in late March-April 2020, and masks were first required in public indoor spaces in June 2020. Establishments or schools where outbreaks occurred were temporarily closed, indoor dining was temporarily restricted, the public was urged to avoid large gatherings and to social distance, and people with active infections were contacted by Public Health to determine possible outbreaks and to offer suggestions regarding isolation and treatment. In December 2020, the first COVID-19 vaccines were administered, but due to limited availability, only select groups such as health care workers and some essential workers were vaccinated.

How COVID-19 affected overall mortality in Douglas County Kansas

Table 2 shows that more deaths occurred in Douglas County in 2020 than in the previous five years. Compared to 2019, (75%) of the increase in deaths in 2020 was due to COVID, heart disease, Alzheimer's disease, and diabetes.

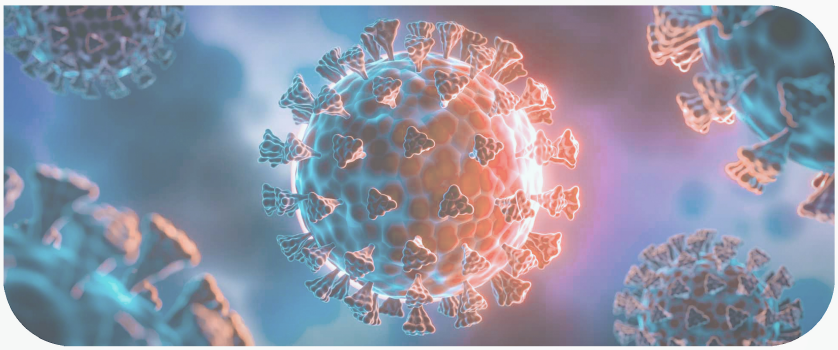
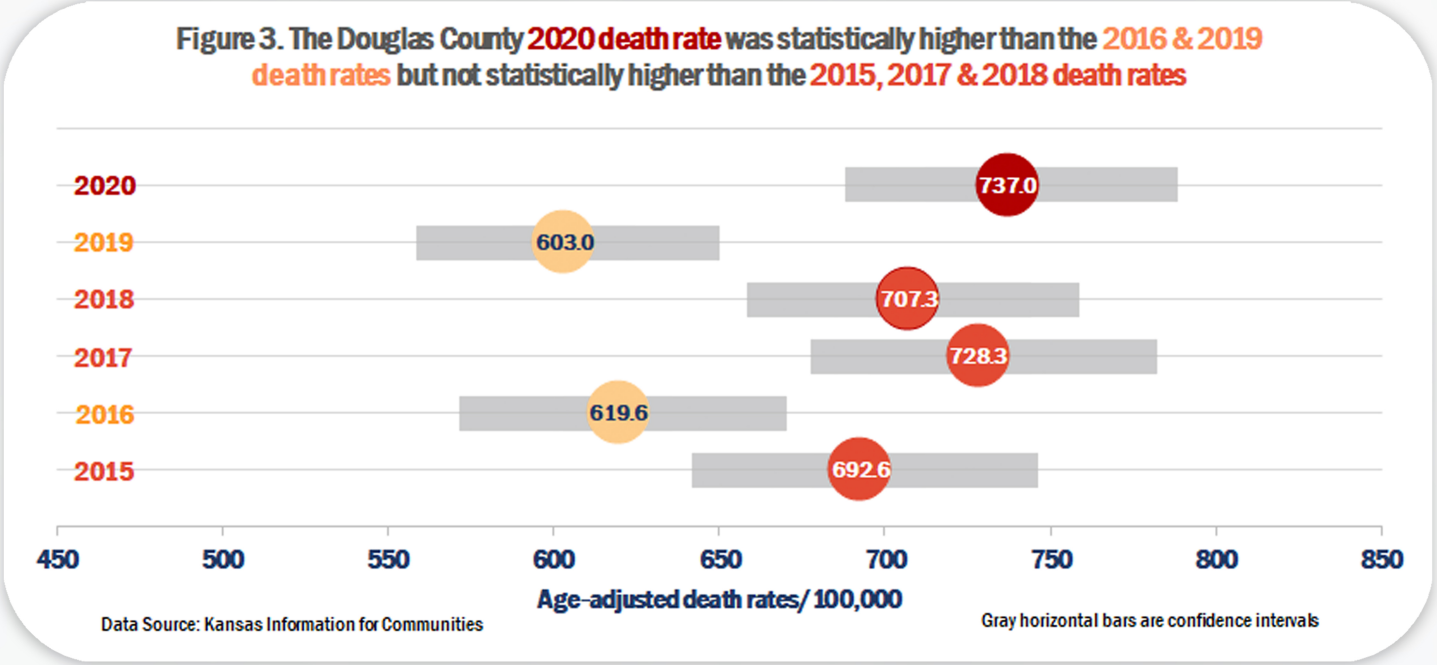


Table 2: Total number of deaths from all causes by year: Douglas County, Kansas

Year	Number of Deaths
2015	723
2016	650
2017	792
2018	804
2019	704
2020	869

Data Source: Kansas Information for Communities

Figure 3 (see page 4) shows the overall age-adjusted mortality rates for Douglas County from 2015-2020. Although the age-adjusted mortality rate for 2020 (737.0 per 100,000) is higher than any year since 2015, the confidence intervals (light grey bars) show that the mortality rate in 2020 is not statistically higher from the rates in 2015, 2017 and 2018, but is statistically higher than those in 2016 and 2019. Consequently, while COVID may have influenced overall mortality in Douglas County, the 2020 Douglas County mortality rate was not abnormally high for the county.



Discussion and Conclusions

Although ranking deaths has broad appeal and acceptance by the public and public health community, this method has a few limitations. First, the proportion of total deaths from the top ten causes of death may change over time. For example, for Douglas County in 2019, the top ten causes of death accounted for 75% of deaths while in 2020 they accounted for 70% of the deaths. Likewise, the specific ranking of a death may not correspond to the proportion of deaths attributable to that cause. As Figure 1 shows in Douglas County, diabetes was ranked 7 in 2019 and accounted for 2.6% of deaths, but in 2020, diabetes was ranked 8 and accounted for 3.6% of deaths. And finally, the cause-specific mortality rates of ranked causes of death may not be statistically different.

A specific limitation of this report is that single years were compared. Usually at the county level, multiple years are used to rank causes of death because of the relatively small number of deaths that occur in a single year. A single year analysis was chosen for this report, because 2020 was the first year of that COVID-19 was included as a rankable cause of death by the National Center for Health Statistics. The relatively small number of deaths by cause of death creates large margins in error that make statistical comparisons between causes difficult and sub-group comparisons (age, sex, race) unreliable. Although the effects of COVID-19 persisted through 2021 and 2022, the 2021-2022 death records were not available to be analyzed at the time this report was written

Despite these limitations, this brief illustrates the impact COVID-19 had in 2020 in Douglas County and the U.S. Not since 1937 has an infectious disease been ranked as 3rd or higher in the U.S.[9,10] In 2020, more people than usual died in Douglas County which resulted in a relatively high mortality rate. COVID-19 accounted for 6.3% of deaths in Douglas County, but this percentage was lower than the 10.3% and 10.4% of deaths accounted for by COVID-19 in Kansas and the U.S. Even though the age distribution of the U.S. and Douglas County are different with Douglas County skewing younger, the U.S. and Kansas age-adjusted rate for COVID-19 (85.0 and 88.5 per 100,000 respectively) was statistically higher than Douglas County (45.5 per 100,000) suggesting that age distribution differences do not fully explain the disparity.[4,6,13]

The relatively lower proportion of deaths attributable to COVID-19 in Douglas County may explain why the overall 2020 mortality rate in Douglas County was not statistically higher than the mortality rates in 2015, 2017 and 2018 – years when there were relatively higher numbers of deaths. Moreover, many of the mitigation measures, such as mask mandates (Figure 2) put in place during 2020, kept the death rate in Douglas County lower than it could have been. This assumption is borne out by a study of Kansas counties that shows that counties with no mask mandates had death rates 1.8 times higher than counties with them.[7] During 2020, almost all residents in Douglas County were not vaccinated, because vaccines were limited. In fact, it was only in December when health care workers and some essential workers were eligible to be vaccinated. Therefore, this mitigation strategy was not in place during the time frame of this analysis.Before vaccines were available and when personal protective equipment (PPE) was in short supply, public health distributed gloves, masks, and face shields to essential workers from the supply that was shipped from the Strategic National Stockpile. This strategy helped to protect patients and vulnerable seniors in these facilities.

Other successful responses to COVID-19 in Douglas County during this time included strong collaboration between the county, health care, public health and emergency management that allowed for a coordinated response to COVID-19 with consistent messaging. There was frequent communication with the public using multiple channels regarding public health recommendations as well as the public health orders that were issued. Although there were limited COVID-19 tests early in 2020, there was more testing and identification of cases later. Investigation of these cases, including contact tracing, led to containment of outbreaks and slowed the rate of community spread. COVID-19 metrics were publicized, which allowed businesses and individuals to make their own risk assessments and decisions regarding prevention activities. And finally, a concerted effort was made to include diverse voices in the planning of mitigation efforts. A health equity impact team was formed to help address any equity issues in testing or treatment. Innovative community health approaches such as a RADx-UP (Rapid Acceleration of Diagnostics) were implemented to provide testing and encourage vaccination to vulnerable populations in underserved communities in 2021.[8,11,12]

The approaches used during the pandemic in Douglas County demonstrate that to effectively address any public health issue requires coordination with community partners, prevention recommendations, consistent messaging around severity levels, public engagement, and mitigation measures, as well as intentional activities to address equity issues.

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17. this brief can be found at **www.ldchealth.org/databriefs** and technical notes can be found at **www.ldchealth.org/codtn**