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RURALITY AND ITS EFFECTS ON PRENATAL CARE IN SOUTHCENTRAL
KENTUCKY

A Capstone Experience/Thesis Project Presented in Partial Fulfillment
of the Requirements for the Degree Bachelor of Science
with Mahurin Honors College Graduate Distinction
at Western Kentucky University

By

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May 2022

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ABSTRACT

Despite ongoing efforts to increase positive healthcare outcomes for prenatal care in rural Kentucky, there continues to be limited access to adequate and quality resources. Research questions for this research project explored the prenatal care resources for Allen, Barren, Butler, Edmonson, Hart, Logan, Metcalfe, Monroe, Simpson, and Warren counties, compared healthcare disparities that exist in those counties with other rural regions of Kentucky, and identified limitations of such prenatal care resources in successfully achieving positive care outcomes. In addition to evaluation of applicable online resources through organizations local to the region, some healthcare professional and representatives were interviewed to find out about available resources, and the amount of care received for prenatal recipients.

Keywords: healthcare, prenatal care, Kentucky

I dedicate this thesis to my family, Chad, Michelle, and Arika Eilers, who are a great inspiration to me. Also, I also dedicate this work to my fiancé, Drew Hamilton, who supported me continuously throughout this project.

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This project is based on research conducted on prenatal care resources in southcentral Kentucky as they are available in 2021-2022. I am grateful for mentors and colleagues in encouraging me to pursue this topic for my Mahurin Honors College CE/T experience. Without the constant confidence of my mentors in me during the difficult and trying times throughout this project, I may not have achieved my desire to present and defend this thesis.

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DISPROPORTIONATE HEALTHCARE OUTCOMES FOR RURAL AMERICA

Rural America faces many problems that influence the overall health and wellbeing of its citizens. Individual health behaviors, community characteristics, environmental factors, accessibility of quality healthcare services, and types of services offered are factors that contribute to disproportionate healthcare outcomes. Rural residents tend to face disparities due to restricted access to quality health care, insufficient health insurance coverage, lack of public transportation, low educational attainment, poverty, unemployment, and a lack of quality and sufficient healthcare professionals.

Women in rural America have increased risks of healthcare disparities due to the factors contributing to disproportionate outcomes associated with rural and minority populations. Rural women face geographic isolation, fragmentation of specialized services, gender biases and inequalities, educational limitations, and disproportionate poverty. Although both rural and urban women are likely to undergo role conflicts between familial responsibilities and engagement in extracurricular activities, even today, rural women are still more likely to fall into the typical and strongly enforced gender role—working at minimum wage, living with large families (Sherman et al., 2017). For the women that do have employment in rural communities, there continues to be a limited number of occupations, mostly within the service sector, for most of these women with statistically lower wages and little advancement, which is also contributing to the lack of quality health insurance necessary to encourage quality healthcare (Sherman et al., 2017).

A Closer Look into Rural Kentucky Women

To evaluate rural health disparities with a more specific focus, the impact of such factors on rural Kentucky women needs to be reviewed. In general, Kentucky ranks 28th out of the 50 states for clinical care access, preventative care, and quality of care, with one being the best care, and 50 being the worst care. However, the state ranks 50th in terms of health outcomes. Unfortunately, Kentucky ranks highest for drug deaths, frequent mental distress, illicit drug use, mortality rate, high blood pressure, high health status, multiple chronic conditions, and obesity (United Health Foundation, 2020).

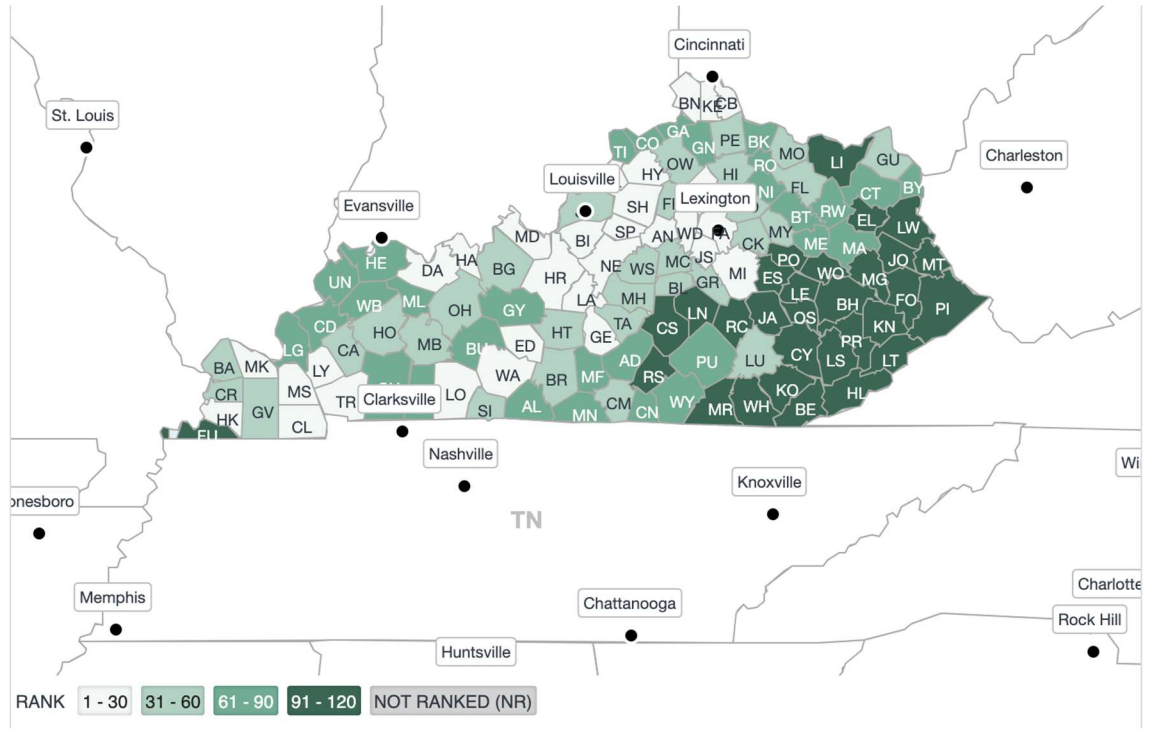
In a recent study, each Kentucky county was evaluated based on health outcomes and health factors. The category for health outcomes specifically studied the occurrence of premature death and low-birth weight infants. Health factors included in the study were access to healthcare providers, exercise, children living in poverty, violent crime, long commutes, and other environmental dimensions (Cross, 2017).

The southcentral Kentucky region of study steadily ranks below the 50th percentile of states in terms of overall health scoring, which is illustrated in Figure 1. The low ranking is also true for separation of health factors and health outcomes. For instance, the Barren River district ranked between 61-90 out of the 120 counties in health factors, with the exceptions of Barren, Simpson, and Warren as seen below in Figure 2. Barren, Simpson, and Warren Counties house some of the largest hospitals found in the region, which may account for their rankings to trend higher than the other counties found in the same regions. Other counties may also have regional hospitals; however, the area they service and the resources the hospital has may be limited. For example, Logan Memorial Hospital located in Logan County, Kentucky has a service area of approximately 45,000

people, but the facility holds 75 inpatient beds, including 6 ICU/CCU and 10 Swing beds (Triplett, 2022).

Figure 1

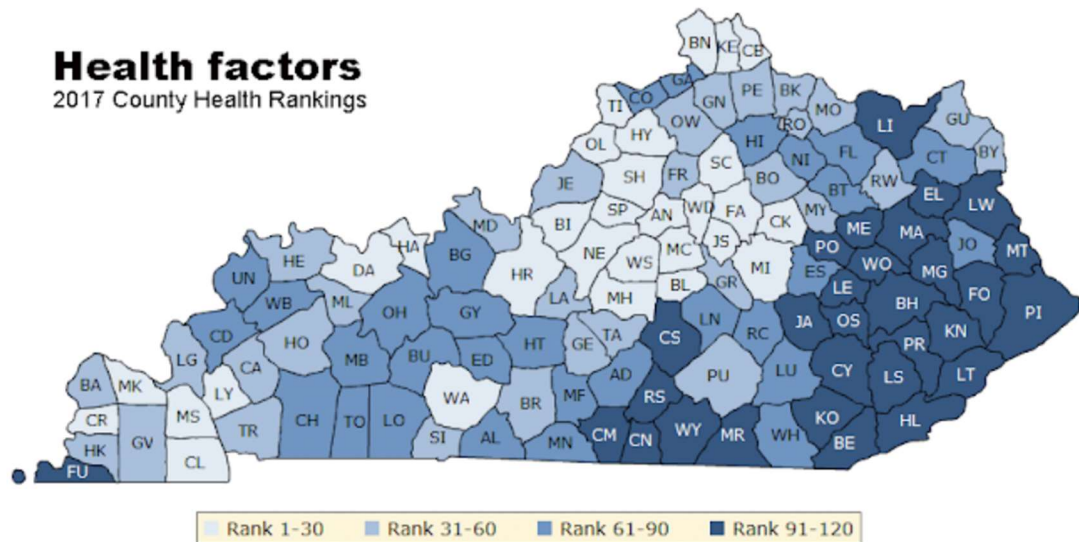
Kentucky counties ranking based upon overall health rank



Note: Adapted from *Kentucky Health Outcomes and Factors* by Kentucky Health News, 2017 (<https://ci.uky.edu/kentuckyhealthnews/2017/03/30/33/>). In the public domain.

Figure 2

Kentucky counties ranking based upon health factors



Note: Adapted from *Kentucky Health Outcomes and Factors* by Kentucky Health News, 2017 (<https://ci.uky.edu/kentuckyhealthnews/2017/03/30/33/>). In the public domain.

Several recent studies (Hansen, 2019; Nidey, 2019, United Health Foundations, 2020; National Women’s Law Center, 2022; Thompson et al., 2021) provide that rural Kentucky women are doing poorly regarding their health care access and the quality of health care available. In a study relating key findings of Appalachian Kentucky, infant mortality rate was shown to be 21% higher than the national average, and non-Appalachian Kentucky was still 10% higher than the national average. The same trend is true for low-birth weight incidence and the teen birth rate (Appalachian Regional Commission, 2020). Another factor increasing the difficulty of health care access is the growing poverty levels of female-headed households in Kentucky. According to National Women’s Law Center, 45.5% of female head-of-household in Kentucky live in poverty,

which is 11.7% higher than the national figure (National Women's Law Center, 2022). The health services available to this population need attention by medical providers, insurance agencies, and government officials to improve healthcare outcomes for the entire population.

PREGNANCY COMPLICATIONS AND RURAL IMPLICATIONS

Women's health, especially in rural regions, faces disproportionate access to the health services needed to be healthy and thriving. Women's health services include routine gynecological exams, female cancer screenings, mammography, hormone therapy, pregnancy, and childbirth, as well as sexual health. While all these services are important to generating a healthy female population, pregnancy and childbirth, specifically prenatal care, is of special interest to this study. Prenatal care is defined as the healthcare that a woman receives during pregnancy. Early and regular prenatal visits with a healthcare professional are important for the safety of both the mother and child throughout the pregnancy and delivery. Babies of mothers who do not receive adequate prenatal care are three times more likely to suffer from low-birth-weight incidence and five times more likely to die than those born to mothers that do partake in prenatal care throughout pregnancy (Schmitt, 2019).

Prenatal care visits include a physical exam, weight checks, urinalysis, blood tests, and imaging tests. These visits allow the provider and mother to discuss the mother's health, the fetus's health, and the importance of maintaining regular care. Prenatal care can help prevent complications and encourage important discussion about the insurance of a healthy and safe pregnancy.

With regular prenatal care, women can reduce the risk of pregnancy complications, reduce the fetus's and infant's risk for complication, ensure the education about medication during pregnancy, and encourage prenatal vitamins. Pregnancy complications can include high blood pressure, preeclampsia, gestational diabetes, preterm labor, miscarriage, anemia, and infections. By discussion with healthcare providers during prenatal visits, mothers can control preexisting conditions such as high blood pressure and diabetes as well as generate a plan to reduce exposure to harmful substances and maintain a healthy diet and weight.

Hypertension

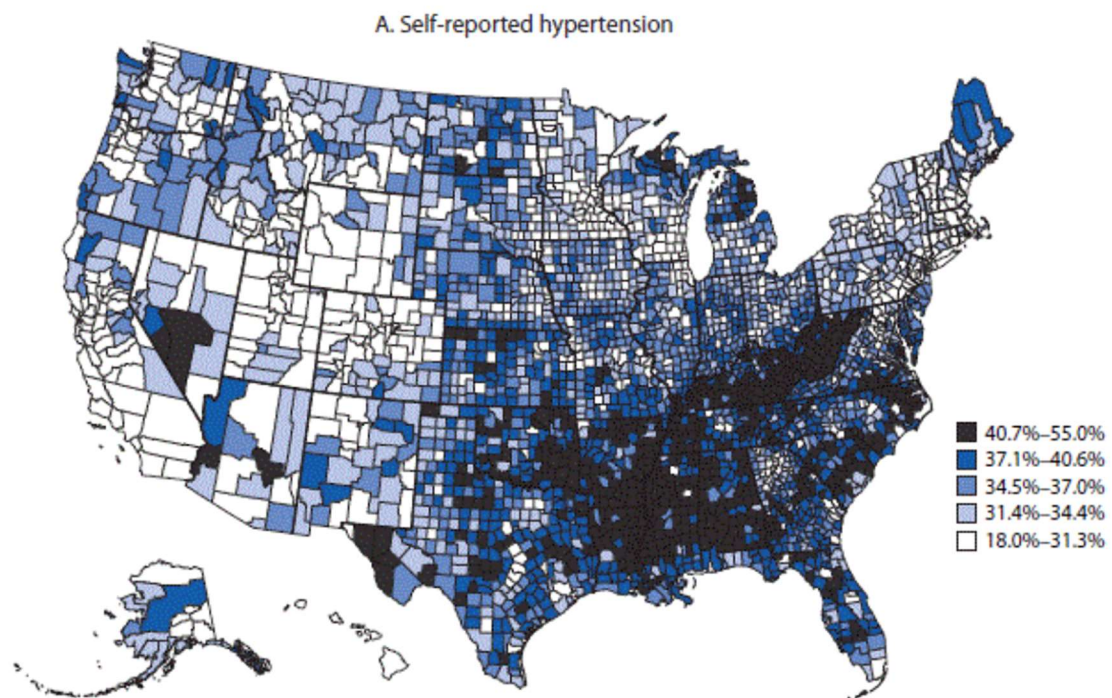
High blood pressure, or hypertension, is common in the United States. During pregnancy, hypertension can lead to problems during and following delivery. Pregnancy-related heart problems can occur with any woman, but the risk is higher for those that are older, minority, obese, use drugs, drink alcohol, smoke, or have a preexisting heart condition. According to the National Institute of Health, high blood pressure during pregnancy happens every 12 to 17 pregnancies for women aged 20 to 44 (U.S. Department of Health and Human Services [DHHS], 2022). Complications of hypertension may lead to preeclampsia, eclampsia, stroke, labor induction, or placental abruption for the mother and preterm delivery and low birth weight for the fetus (Center for Disease Control and Prevention [CDC], 2021a).

Of special interest to this study is the prevalence of hypertensive patients living in a rural region compared to their urban counterparts. In a CDC report, rural areas self-report a 40% prevalence of hypertension compared to 29.4% reported in urban areas (Samanic et al., 2017). Focusing more on the county level revealed that the highest rates of self-

report hypertension occurring in Appalachia and the Southeast, shown in Figure 3 below. Kentucky, including the southcentral counties of interest, consistently report over 40.7% hypertension rates. With the added risk of hypertension in rural areas, expecting mothers are at an increased risk for pregnancy complications due to this illness. With continuing healthcare disparities in these regions, adequately controlling high blood pressure is often very limited in these mothers.

Figure 3

Model-based prevalence of self-reported hypertension in the United States, by county



Note: Adapted from *Morbidity and Mortality Weekly Report*, by the Centers for Disease Control and Prevention, 2017 (<http://dx.doi.org/10.15585/mmwr.mm6918a1external> [icon](#)). In the public domain.

Preeclampsia/Eclampsia

Preeclampsia is the condition of sudden high blood pressure during pregnancy for a woman who previously had normal heart health. Protein in the urine is another sign of preeclampsia. In the United States, preeclampsia occurs in about 1 in 25 pregnancies (CDC, 2021a). If a woman with preeclampsia develops seizures, it is referred to as eclampsia and should be treated as a medical emergency to protect the mother and the child (CDC, 2021a). Discussion and regular visits with a healthcare provider is important as soon as a pregnancy is confirmed because some women show little to no signs of this condition and are usually diagnosed around 20 weeks of pregnancy. Another key reason prenatal visits are important is that some women are more at risk for developing preeclampsia/eclampsia than others, and it critical to understand the specific risk factors that contribute to this prevalence. First-time mothers, previous preeclampsia diagnosis, chronic hypertension, history of thrombophilia, obese mothers, age 40 or older are at an increased risk for this illness during pregnancy. Symptoms include lingering headache, changes in vision, pain in upper quadrants of stomach, nausea, swelling, sudden weight gain, and labored breathing (CDC, 2021a). Nausea and weight gain are common among healthy pregnant women, which reinforces the need for prenatal visits and management of heart health, which are critical for diagnosing and treating possible life-threatening complications.

Like preexisting hypertension, the occurrence of pre-pregnancy maternal hypertension, or preeclampsia, is increased within the rural regions of the United States. In a recent study designed to describe the trends in preeclampsia among rural and urban areas, the following overall trend occurred: women in rural areas had a higher prevalence

of preeclampsia compared to the urban women, but both rural and urban women showed an increase in this occurrence for the data set (Cameron, 2020). Therefore, according to Cameron (2020), the overall maternal and prenatal care resources regarding this illness are lacking throughout the country. While there is a slight narrowing of the urban and rural distinction, significant disparities persist in rural America across the reproductive life span, with a 20% higher preeclampsia rate among all women, regardless of age and ethnicity subgroups, which proves detrimental in the prenatal and maternal positive healthcare outcomes (Cameron, 2020).

Gestational Diabetes

Like preeclampsia, gestational diabetes is the occurrence of diabetes for the first-time during pregnancy. Gestational diabetes causes high blood glucose that can affect the long-term health of the mother and baby (The Mayo Clinic Staff, 2020). Usually, women will experience normal blood glucose following delivery; however, these women are at a greater risk for developing type 2 diabetes in the future. Gestational diabetes does not present with many symptoms that are particularly noticeable, as in preeclampsia and eclampsia, which makes it even more difficult to treat without regular prenatal care and urinalysis. According to The Mayo Clinic Staff (2020), women who are overweight, have polycystic ovarian syndrome, family history of diabetes, or are a minority may have a greater risk of developing gestational diabetes.

Complications of gestational diabetes include prolonged high blood sugar, which may result in cesarean section for delivery. The reason for cesarean section is that high blood glucose levels allow the baby to grow exceptionally large in utero, which can be problematic and even fatal for vaginal birth. Therefore, if the baby weighs more than 9

pounds, birth canal obstructions, birth injuries, and cesarean sections are more likely (The Mayo Clinic Staff, 2020). If the mother has gestational diabetes, the baby may be more susceptible not only to excessive birth weight, but to preterm birth, breathing difficulties, hypoglycemia (low blood glucose), obesity, type 2 diabetes, and stillbirth (The Mayo Clinic Staff, 2020). Complications are extremely important to understand and recognize should the mother develop high blood glucose. These complications can lead to illnesses and disorders—diabetes, respiratory distress syndrome, obesity—that may alter the quality of life for the infant and contribute to a poorer health outcome for the mother following delivery (The Mayo Clinic Staff, 2020).

Miscarriage

Miscarriage is defined as the spontaneous loss of pregnancy before the 20th week. According to The Mayo Clinic Staff (2021), approximately 10-20% of known pregnancies end in miscarriage. However, due to miscarriages happening early in pregnancy, this percentage is likely higher due to the unknown pregnancies. Although still common in the United States, miscarriages have mental and physical implications on the mother's health. Evaluating the risks and causes of miscarriage will help mothers learn to cope and future mothers to have the best chance at preventing miscarriage. Most miscarriages are associated with the poor development of the fetus at a particular milestone in utero. General causes are broken down into two categories: chromosomal irregularities and maternal health conditions. While chromosomal irregularities are important to understanding unpreventable miscarriages, this study will highlight maternal health conditions and added risks that could be modified. Uncontrolled diabetes, infections, hormonal imbalances, uterus or cervical disease, and thyroid illnesses have

been linked to possible causes for miscarriage (The Mayo Clinic Staff, 2021). Risk factors may also exacerbate the risk of miscarriage. Women who are 35 years of age or older, two or more consecutive miscarriages, chronic conditions, such as diabetes, incompetent cervix problems, smoking, illicit drug use, and heavy alcohol use, underweight and overweight, and invasive prenatal tests such as chorionic villus sampling and amniocentesis carry increased risk of miscarriage. In fact, women at age 35 have a 20% risk while this risk doubles with each additional five years of age (The Mayo Clinic, 2021). While oftentimes miscarriage is unpreventable, there are some care techniques that eliminate some risk. Seeking regular prenatal care, avoiding known risk factors, taking vitamins, and limiting caffeine intake are all good practices to providing the best environment for the baby to grow and flourish while keeping the mother safe.

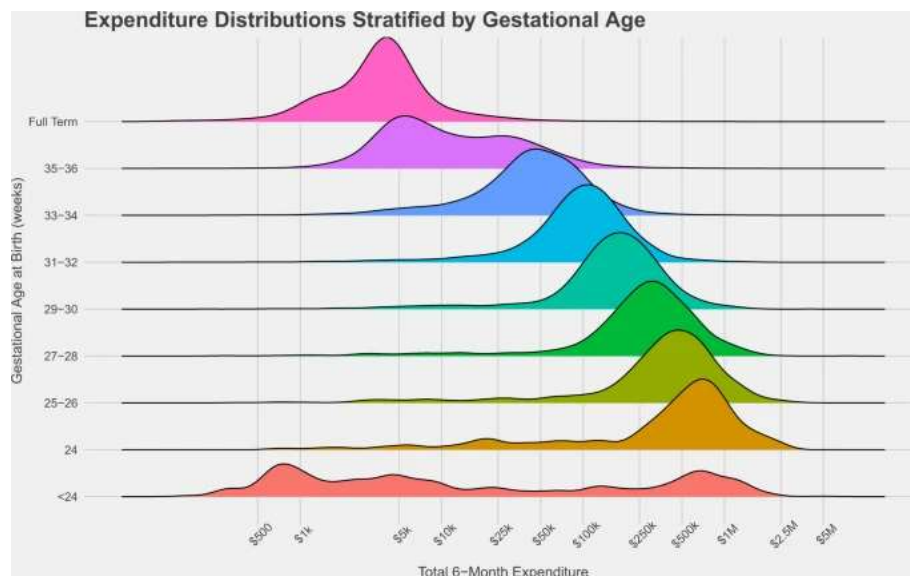
Preterm Births

To expand further, fetal and infant complications include birth defects, genetic problems, and growth problems. Preterm births and low-birth weight babies are of special interest to this study due to the link to several factors occurring during pregnancy that can be prevented with adequate prenatal care and conversations with physicians. Low-birth weight is the single most biological predictor of immediate and long-term developmental issues and can lead to neonatal morbidity and mortality (K C et al., 2020). Avoidance of tobacco smoke and alcohol use can limit the possibility of such fetal complications, especially sudden infant death syndrome and fetal alcohol spectrum disorders. Smoking while pregnant is associated with dangerous maternal and fetal outcomes. The magnitude of smoking while pregnant and the association of poor health outcomes with smoking is still unknown, there is, however, a clear association of greater intensity of smoking and

worse health outcomes—for both mother and child (Hansen, 2020). If the child is more premature, there may be increased financial strain on the mother as the cost of care for a preterm birth and low birth weight incidence increases exponentially. In a recent study to estimate healthcare spending for premature deliveries, Beam et al. (2020) found that the average 6-month cost for preterm infants was 76,153 USD while the 6-month cost for low-birthweight status was 114,437 USD. For comparison methods, the total 6-month cost for a full-term infant was closer to 5,000 USD. See Figure 3.

Figure 4

Six-month spending distributions, separated by gestational age



Note: Adapted from *Estimates of healthcare spending for preterm and low birth-weight infants in a commercially insured population: 2008-2016* by A. Beam, et al., 2020 (<https://doi.org/10.1038/s41372-020-0635-z>). In the public domain.

Throughout this study, rural communities in the United States have been highlighted as an increased risk for health disparities that contribute to higher negative

healthcare outcomes; tobacco smoking during pregnancy is another factor contributing to poor living and healthcare outcomes. Overall, the United States is observing a decreasing in smoking prevalence; however, this decline is occurring at a lower rate in the rural regions compared to the urban regions (Nighbor et al., 2018). This same trend is true for tobacco smoking while pregnant. Smoking while pregnant has obvious risks as previously stated and are highly represented among individuals who are economically disadvantaged. Furthermore, tobacco cessation is even more important regarding second-hand smoke exposure, which could increase such disparities with potential for “direct, multi-generational” adverse health outcomes (Nighbor et al., 2018).

Smoking while pregnant is not the only factor increasing health disparities for rural pregnant women who may not be attending prenatal care visits as recommended. It is also critical for expecting mothers to understand that medications such as acne treatments and herbal supplements may be harmful to the fetus during development (DHHS, 2017b). Without the consistent and open conversations with gynecologists or primary care providers, some expecting mothers may not understand the medical limitations they should employ while pregnant. Annual visits with primary care providers and/or gynecologists are also necessary for a similar reason. Women of childbearing age can discuss with their provider about the chances of getting pregnant and learn the limitations they have if they do conceive. Healthcare visits allow for additional information to be discussed that may not be easily accessible for rural women.

Another critical reason for prenatal visits is to ensure the access of adequate prenatal vitamins, such as folic acid, to promote a health pregnancy. Vitamin deficiencies increase during pregnancy due to increased energy and nutritional demands for both the

mother and the child (DHHS, 2017b). However, deficiencies can be reduced by adequate nutrient supplementation found in prenatal vitamins. With statistically lower education and almost non-existent sexual education, the necessity of prenatal vitamins and adequate vitamin supplementation for women of childbearing age may not be stressed. Healthcare visits will influence strategic planning and preparation for these rural women.

PRENATAL CARE HEALTH DISPARITIES

Without appropriate prenatal care and planning of pregnant women with healthcare providers, the above complications will lead to prenatal care disparities. As connected in the previous section, the complications discussed are abundant in rural communities due to lifestyle, inadequate care, or poor education. While entire rural populations continue to undergo the same fatal and risky complications, the prenatal health care disparities will continue to exist and continue to prove detrimental to both mother and child for generations to come. Maternal mortality and morbidity, birth risks and outcomes (natural versus cesarean births), teen births, and infant mortality will be highlighted in this study.

Maternal Mortality and Morbidity

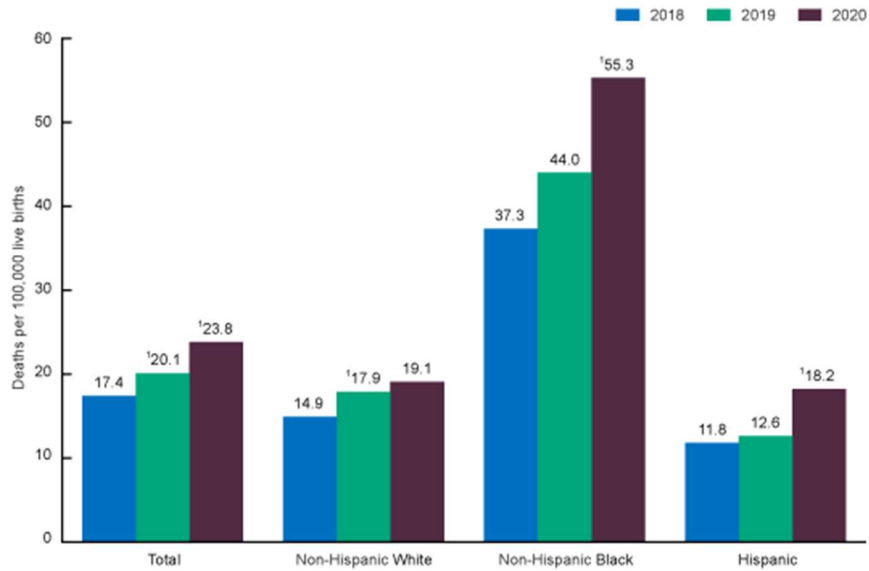
In the United States, stark disparities in maternal and infant health exist, especially regarding the rates of maternal mortality and morbidity. Maternal mortality is defined as the death of a woman while pregnant or within 42 days following pregnancy, disregarding the duration and site of pregnancy, from any cause related to or exacerbated by the pregnancy or its management, but not from accidental or incidental causes (Hoyert, 2022). Although continued advancements in medical care are being

implemented into healthcare facilities across the nation, maternal mortality rates continue to climb higher than any other large and wealthy country (Artiga et al, 2020; National Advisory Committee on Rural Health and Human Services, 2020; Hostetter and Klein, 2021). Worsening access to care through closing obstetric facilities or complete hospitals has only contributed to increases in maternal mortality for rural residents. Driving long distances for care has resulted in giving birth in ambulances and patients forgoing prenatal and postpartum services. A shortage of facilities is not just a rural America problem but has been exacerbated in rural counties where more than 50% of counties have no hospital-based obstetrical services and residents have a 9% greater probability of severe maternal morbidity and mortality (Hostetter and Klein, 2021).

To continue the increased disparity, people of color are at greater risk for poor maternal and fetal outcomes. According to publicly available data from the Centers for Disease Control and Prevention (CDC), the maternal mortality rate for 2020 was 23.8 deaths per 100,000 births compared to a rate of 20.1 in 2019, further illustrated that this disparity continues to climb despite medical advancements (Hoyert, 2022). Likewise, the mortality rate for non-Hispanic Black women was 55.3 deaths per 100,000 live births, which was approximately three times the rate for non-Hispanic White women at 19.1 deaths (Hoyert, 2022). Figure 5 illustrates this dramatic difference among women of color.

Figure 5

Maternal mortality rates with race and Hispanic origin distinctions: United States, 2018-2020



Note: Adapted from *Maternal Mortality Rates in the United States, 2020*, by the Centers for Disease Control and Prevention, 2020

[https://www.cdc.gov/nchs/data/hestat/maternal-mortality/2020/maternal-mortality-rates-2020.htm#:~:text=The%20maternal%20mortality%20rate%20for,20.1%20in%202019%20\(Table\)](https://www.cdc.gov/nchs/data/hestat/maternal-mortality/2020/maternal-mortality-rates-2020.htm#:~:text=The%20maternal%20mortality%20rate%20for,20.1%20in%202019%20(Table).). In the public domain.

Pregnancy-related deaths are most categorized as preventable. According to the CDC and the Hear Her campaign (2020), two in three pregnancy-related deaths are preventable. To learn more about the causes of pregnancy-related deaths and determine if the death was preventable, the Maternal Mortality Review was established and is completed statewide. In November 2020, the Kentucky Department for Public Health and the Division of Maternal and Child Health composed an annual maternal mortality report,

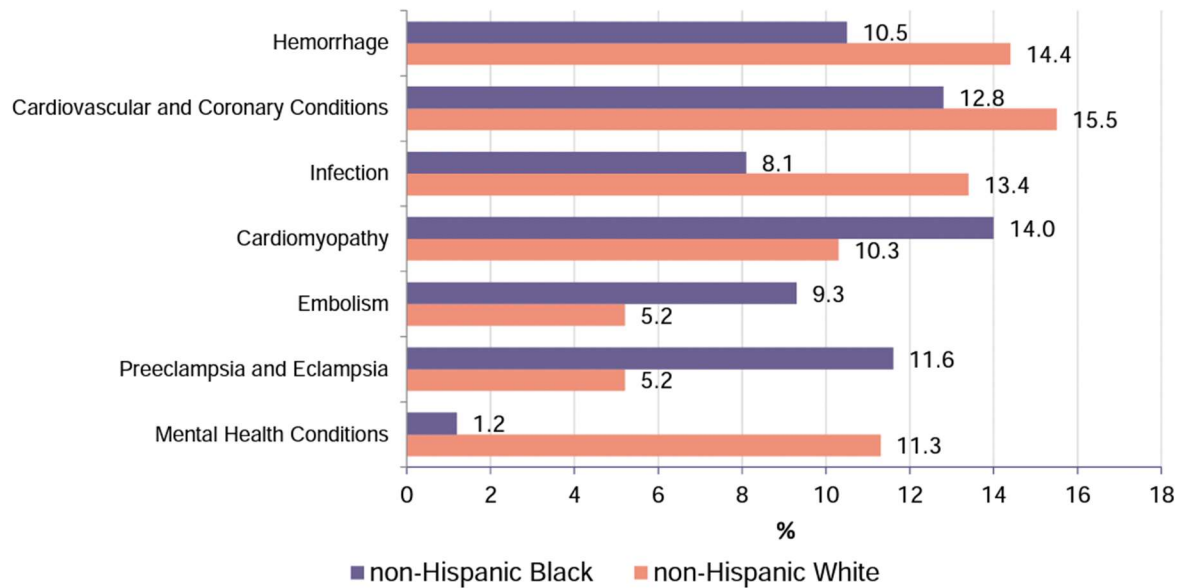
ranging from years 2013 to 2018. Key findings of this report included that 50% of maternal deaths were pregnancy-related, 46% of maternal mortality cases were linked to substance use disorder, and 78% of maternal mortality cases were categorized as preventable (*Maternal morality review 2020 Annual Report-Kentucky 2021*). The manner of death was also examined by both a medical examiner and the maternal mortality review committee, which is necessary due to the review committee's access to complete medical files to determine cause of death. In the 2013-2018 study, deaths were categorized as following: 137 natural deaths, 110 accidental deaths, 21 homicides, and 16 suicides (*Maternal morality review 2020 Annual Report-Kentucky 2021*). The evaluation from this report raises concerns for the rural population of Kentucky in increase psychosocial and environmental risk factors associated with maternal health conditions, like social inequality, lack of access, homelessness, chronic disease management, substance use, and food insecurity. Complete consideration of these risk factors in rural Kentucky is needed to completely understand the preventable maternal mortality that this population is at an exacerbated risk.

The leading causes of death, which can vary among race and ethnicity, often include hemorrhage, cardiovascular conditions, infection, cardiomyopathy, embolism, preeclampsia and eclampsia, and mental health conditions (Artiga et al., 2020; Zaharatos et al., 2018). Underlying causes of death vary among states. In the Maternal Morality Review, the leading causes of death in Kentucky in 2018 were hemorrhage, cardiovascular and coronary conditions, cardiomyopathy, or infection. Zaharatoas et al., (2018) explored race and ethnicity variations and revealed that there were major

discrepancies among non-Hispanic black and non-Hispanic white women, seen in Figure 6.

Figure 6

Leading causes of pregnancy-related deaths for non-Hispanic Black and non-Hispanic White women in the United States



Note: Adapted from *Building U.S. Capacity to Review and Prevent Maternal Deaths* by Zaharatos et al., 2018(<https://pubmed.ncbi.nlm.nih.gov/29240525/>). In the public domain.

The factors contributing to the worst health outcome for pregnant women—mortality—are common across the nation. However, like other prenatal disparities being explored in this thesis, rural residents and women of color are at an increased risk for these complications to arise during pregnancy up to one year post pregnancy. The biggest concern is that in Kentucky, the preventable pregnancy-related deaths were almost 10%

higher than the predicted average by the Center of Disease Control, at 79% in 2017 (*Maternal morality review 2020 Annual Report-Kentucky 2021*). Understanding the increased risk factors for this population is necessary to achieve greater healthcare outcomes and healthier women and children post-pregnancy.

Birth Risks and Outcomes

Birth risks and outcomes are another critical prenatal disparity that distinguishes rural Kentucky women from women throughout the United States. Birth risks and outcomes include low-birth rate incidence rates, preterm births, nature of birth, and birthing complications. Low birth weight is a preventable public health problem that has increased occurrence in rural regions. A baby is considered born at a low birthweight if weighing less than 5 pounds and 8 ounces (March of Dimes, 2021). Preterm birth and fetal growth restrictions are the two main reasons for a baby to have a low birthweight. Medical risk factors that may contribute to the low-birth weight incidence rates include preterm labor, comorbidity, prescription medications such as those used to treat hypertension, infection, inadequate weight care, history of preterm delivery, drug and alcohol abuse, exposure to pollution and toxins, and age (March of Dimes, 2021).

Additionally, populations that are an increased risk for health disparities (people of color, rural populations, etc.) experience risk factors that make pregnant women more likely to have babies with low birth weight. As mentioned in an earlier section, low birth weight can cause significant problems for the baby, such as breathing problems, hemorrhage, and infection. Although not all babies born at a low birthweight face these problems, they are more likely to than babies born at a normal average weight of 7 pounds 8 ounces (Allen et al., 2020). The occurrence of low birth weight also can contribute to the

development of certain disorders and illness into adulthood, such as obesity, hypertension, and diabetes, that may significantly alter the quality of life and cause further complications.

Other poor birth outcomes occur due to birthing complications. Birthing complications include untimely labor, perineal tears, umbilical cord problems, abnormal heart rate, water breaking too early, perinatal ataxia, shoulder dystocia, and excessive bleeding (DHHS, 2017a). These complications may result in cesarean delivery or emergency surgery to save the mother and child; therefore, labor occurring within the hospital—or at least within proximity—may have a better chance at monitoring for these complications and acting immediately if one of these complications does present itself, which may not be possible, or perhaps too late, for rural populations.

Cesarean sections pose risks due to being a major surgery. The risks for baby include breathing problems and surgical injuries, and risks for the mother include uterine infection, postpartum hemorrhage, anesthesia reactions, blood clots, wound infection, surgical injury, and increased risk for future pregnancies (The Mayo Clinic Staff, 2020). With birthing complications that risk the life of either the mother or infant, cesarean section is necessary to prevent this deadly outcome. However, without specific guidelines on when cesarean section is needed, many states, including Kentucky, are above the national average and recommendation for percentage of cesarean deliveries versus natural births. The overabundance of cesarean deliveries within the state of Kentucky may suggest poor quality of healthcare for pregnant women.

Teen Births

Teen births, often defined as a rate of births per 1,000 for 15–19-year-old females, persists in rural regions of the United States despite steadily declining rates over the last few decades for the nation. These geographical disparities are likely due to social determinants of health, like low education and low-income levels (CDC, 2021c). Teen pregnancy is important to understand as a prenatal disparity because substantial health and socioeconomic costs are associated with teenage childrearing. The importance of prevention is highlighted due to the negative implications of teenage pregnancy, such as decreased high school graduation rates, increased health problems, increased risk of incarceration during adolescence, and decreased employment during adulthood (CDC, 2021c). Access to quality reproductive health services, including contraception and sexually transmitted infection services may also play a role in the risk of teenage pregnancy in rural regions, where obstetrical services may not be offered within the same county of residence. Low-income families also face the risk of not having adequate finances to pay for health insurance or doctor visits for these services. The emergence of free contraceptive care through health departments and online services attempts to mitigate this factor as a disparity. The CDC has implemented prevention strategies such as promoting abstinence, the use of contraceptives and counseling, and federal and state policies to support access to family planning services and comprehensive sex educations in schools.

With support from national data, America’s Health Rankings illustrates the teen birth rate for Kentucky in 2019 was approximately 25%, which is almost 10% higher than the national average of 16.7%. Even more concerning is the further division among

race and ethnic groups in Kentucky: The Hispanic population has a teen pregnancy rate of 40.7%; Black population has a rate of 27.8%; White population has a rate of 23.9%; and the Asian/Pacific Islander population has a rate of 6.5% (United Health Foundation, 2021). The high occurrence of teenage pregnancy throughout all populations in rural Kentucky poses major maternal and neonatal health problems. In a retrospective analysis study, teen pregnancies were associated with increased incidence of maternal complications such as hypertensive disorders, eclampsia, preterm birth, blood transfusion, and sexually transmitted infections and neonatal complications such as congenital birth defects, low Apgar scores, sepsis, and assisted ventilation (Eliner et al., 2021). Many of these complications have been mentioned previously and are leading causes of poor prenatal health outcomes in this region of study, illustrating a definite need for prevention and policy.

Infant Mortality

Infant mortality, described as the death of an infant before one year following birth and described as a rate of infant deaths per every 1,000 live births, is another important health disparity to acknowledge and review. Along with maternal mortality, infant mortality is the worst prenatal health outcome. In 2018, 21,000 infants died in the United States and the leading causes of death were: birth defects, preterm birth and low-birth weight, injuries, sudden infant death syndrome, and maternal pregnancy complications (DHHS, 2021). In 2020, the infant mortality rate for Kentucky was 6.23 with 327 infant deaths per 1,000 live births, currently ranking 38 out of 50 states (CDC, 2021b).

While some cases of infant death may not be preventable, there are certain cases that can be avoided with access to prenatal care and education. According to the National

Institute of Child Health and Human Development (2021), birth defects are the current leading cause of infant death and may be prevented by adequate intake of folic acid before and during pregnancy, which allows for complete development of the neural tube. Preterm birth incidence currently is not preventable, but poor and inadequate nutrition and prenatal care by the mother may increase the chances of have a low-birth weight child or preterm birth. With early prenatal care, women at an increased risk for these factors may coordinate an action plan with their physician to ensure that their infant is born at a healthy weight. Perhaps the most unexplained reason for infant death is SIDS, which is the third-leading cause of infant mortality in the United States. After much research to explain why infants younger than one year of age suddenly die, creating a safe infant sleep environment seems to be the most helpful in preventing these kinds of infant deaths. There are certainly ways to reduce the risk of unexplained infant deaths, such as sleep-related causes and SIDS, which should be discussed with a healthcare professional during routine pregnancy checkups.

SOUTHCENTRAL KENTUCKY WOMEN: DISPARITIES EXIST HERE, TOO

For the purpose of this project, the health disparities of the southcentral Kentucky region are to be evaluated. Southcentral Kentucky involves the following ten counties: Allen, Barren, Butler, Edmonson, Hart, Logan, Metcalfe, Monroe, Simpson, and Warren. Although health disparities in Kentucky are well-known, most data published with specificity in location in Kentucky is limited to the Appalachian region. This project, with a focus on southcentral Kentucky, will reveal the disparities and limitations of this

region to improve access and quality care for women, allowing for the population of Kentucky to improve health disparities and determinant scores.

Prior to this section, the rural implications of pregnancy complications and rural implications for prenatal healthcare disparities have been generalized to the entire state of Kentucky. To highlight the needs of the southcentral region of the state, this section will evaluate the prevalence of these factors and care disparities within the 10 counties of interest. While not every topic will be reviewed in this specific criteria, the most prevalent health care outcomes and disparities will be reviewed with partnership of information from local health departments, healthcare professionals, healthcare program coordinators, and publicly available data for the counties in Kentucky. The Barren River District Health Department (BRDHD) services eight of the ten counties within this study: Barren, Butler, Edmonson, Hart, Logan, Metcalfe, Simpson, and Warren counties; therefore, the resources available through the main location of BRDHD in Warren County is available to residents in the other seven counties it services. Allen and Monroe counties have independent health departments. Healthcare professionals from Allen and Monroe counties were interviewed to bridge this information gap. Healthcare program coordinators, such as doula services and the WIC program, were interviewed to determine how many resources were available for pregnant women in this region. Online data from Kentucky specific data sets regarding active obstetricians/gynecologists, hospital rates, infant mortality rates, teen birth rates, cesarean section rates, and information regarding health department and federally funded medical clinics were obtained. In coordination with the extensive literature review, interviews, and data, the prenatal care resources were evaluated.

For the program coordinators and healthcare professionals, a questionnaire, refer to Appendix A, was presented before and during the interviews to discuss the available prenatal care options for participants and providers. For program coordinators, the questions were tailored to understand the reasons for developing such programs and to identify successes and possible adjustments to achieve maximum growth in encouraging positive healthcare outcomes. For healthcare professionals, the questions were tailored to explore the prenatal care given and approximate number of patients that adequately follow their prenatal care plan.

Available Resources in Southcentral Kentucky

Perhaps the most discouraging finding in this study regarding the available resources is the lack of hospital-based obstetrical services and obstetricians and gynecologists. Among a total population of 312,058 residents, according to the 2020 Census, there are two hospitals that offer labor and delivery units with complete obstetrical care: Med Center Health in Bowling Green, KY (Warren County) and TJ Samson Community Hospital in Glasgow, KY (Barren County). At Med Center Health, there are 11 labor, delivery, and recovery rooms, four triage rooms, and 22 private postpartum rooms (Med Center Health, 2020). The limitation of hospital resources for pregnant women of these counties presents many problems. For the more rural counties, the travel time to these hospitals may discourage women from receiving timely and adequate care. A nurse practitioner and owner of a private health clinic in Allen County believes that the impact of travel is a huge problem for her patients: “When Greenview [Regional Hospital in Bowling Green, KY] closed their labor and delivery unit, that was huge...and posed a problem for patients who didn’t want to go to Nashville, TN [for the

prenatal care and obstetrical services]” (K. Eilers, personal communication, March 31, 2022). In September of 2006, Tristar Greenview Regional Hospital stopped delivering babies to shift their focus to other areas of health care that officials thought needed more attention. Since then, patients, especially in the outer counties of the southcentral region, had to decide on the closest available care and how long to wait for services. For instance, patients in Allen County have had to wait until their second trimester before they could see an obstetrician or gynecologist. “There is a higher rate of miscarriage than what there has to be because of... these girls waiting.” Only having two hospitals in the region decreases the complete care that pregnant women receive.

The quality of care received for these patients is of concern to this study as well. For such a large population of women at the reproductive age and such limitation in the resources available to them, the quality of care that they are receiving must be evaluated. In 2019, the Med Center Health delivered 2602 babies and 842 of them were by way of cesarean section (32%), and TJ Samson delivered 997 babies with 348 of those births being cesarean deliveries (35%) (Hope’s Embrace, 2020). To reiterate the importance of these statistics, the World Health Organization (2020), recommends that the cesarean rate of births be between 10-15%, while the two hospitals in southcentral Kentucky consistently have rates above the recommendation. To better understand the increased rates of cesarean deliveries, the breakdown of which cesarean sections were emergency or elective cases would provide more accurate information of the quality of care received. Even within the emergent cesarean sections, the risk factors and care received could also be discussed to evaluate whether the surgery could or could not have been prevented.

Another service that is used to promote maternal health and wellbeing that is being affected by the limited hospital-based obstetrical services is doula and midwifery services. A doula is a woman who is employed to provide guidance and support to a pregnant woman leading up to and at labor and a midwife is a person (typically a woman) who is trained to assist women in childbirth (“doula,” 2022). For the purposes of this study, only certified and trained doulas and midwives are considered. Many registered and licensed doulas and midwiferies are in association with the hospital to provide joint services. For instance, a nonprofit community service program that provides maternal healthcare, mentoring, and birthing counseling, Hope’s Embrace, has been impacted by this shortage. Although doulas are not certified to give medical care, their prenatal care consists of two visits with the pregnant women during pregnancy and generating a birth plan. With independent contractors throughout the state of Kentucky, the doulas in the southcentral region of Kentucky have limited resources to offer due to only two hospitals to provide services. In addition to this shortage, during the COVID-19 pandemic, doulas were not allowed to visit the patient in the hospital—and some facilities continue this restriction. In these cases, the use of telemedicine is predominant to reach pregnant women who need these services or who may benefit from education on birthing or breastfeeding.

Outside of the limitation of hospital-based services, the in-clinic services within this region are also hugely limited. According to the Kentucky Board of Medical Licensure, there are three active and registered obstetricians/gynecologists in Barren County and 22 active and registered OBGYNs in Warren County. At the Med Center Health—Bowling Green, there are four certified nursing midwives (CNM); At TJ Samson Regional

Health—Glasgow, there is one CNM; and there is one CNM at Graves Gilbert Clinic—Bowling Green. Advanced practice registered nurses (APRNs) specializing in obstetrics and gynecology are also a part of the healthcare system in the region and can provide most care that physicians and CNMs can with the major exception of delivering babies. APRNs provide basic obstetric and gynecological care alongside primary care for women, and most women’s health specialists practice near the hospitals in southcentral Kentucky. For APRNs in the surrounding counties, such as Allen County, women needing prenatal services are often referred to other facilities after a prenatal vitamin regimen is established. “My protocol is to have patients come in for a urine or serum pregnancy test...and get them started on folic acid and a prenatal multivitamin...and then refer to the Fairview Clinic [in Bowling Green]” (Eilers, personal communication, March 31, 2022). The Fairview Community Health Center is a federally qualified health center point for healthcare, which means that the healthcare providers receive funds from the HRSA Health Center Program (Fairview Community Health Clinic, 2022) to provide primary care services in underserved areas. For most patients in the counties surrounding Warren County, they are referred to this clinic or clinics like receive prenatal services. Patients seen for a pregnancy test at the local health departments are given proof of a positive test and then referred to the Fairview Clinic or TJ Samson Regional Health Clinic, depending on the patient’s physical address.

Aside from the medical care the pregnant women receive in this region, the educational services provided by the local health departments and other organizations are also important to providing the women with the resources necessary to have a safe and healthy pregnancy. For the following eight counties: Barren, Butler, Edmonson, Hart,

Logan, Metcalfe, Simpson, and Warren, the BRDHD provides educational services for the residents. Allen and Monroe Counties have independent health departments that provide similar resources outside of the District Health Department. Online resources under “women’s health resources” for BRDHD includes links to the Hope Center for Pregnancy, Fairview Community Health Center, Community Action of Southern Kentucky, Lifeskills-Bowling Green, Hope House Ministries, and BRASS. The Hope Center for Pregnancy provides pregnancy tests, ultrasounds, consultation, and support, but providers at this organization must refer their patients externally if they wish to continue with pregnancy and receive prenatal care. Community Action of Southern Kentucky is a nonprofit corporation funded by government funding, private contributions, and user fees. Community services include emergency food and shelter, garden program, Kentucky Health Benefits Exchange, Low-income Home Energy Assistance, Refugee Employment Opportunities and is available in the entire 10-county region. Transportation services are also offered through CASOKY, but it is only available in Warren County through GO bg transit and CASOKY transit. Lifeskills aims to support people who experience mental illness, addiction, and intellectual disabilities, which can be extremely beneficial to pregnant women. Hope House Ministries is another nonprofit organization that aims to “alleviate physical and spiritual poverty through gospel restoration” (Hope House, 2018). Barren River Area Safe Space (BRASS) provides emergency shelter and support services to victims of domestic violence and their children. Although many of these links and resources presented by the BRDHD do not provide medical care, the resources they offer through education and counseling allow for

expectant mothers to have a safe space to make connections and receive recommendations for medical care.

Another important program offered through the health departments—BRDHD and Allen and Monroe Counties—is the Women, Infant, and Children Program (WIC). For women who come into the hospital to deliver a baby, one of the first questions asked is whether they are signed up for or are interested in the WIC program (K. Eilers, personal communication, March 15, 2022). The WIC program is a special supplemental nutrition program for women, infants, and children that is funded by the United States Department of Agriculture. The program serves pregnant, postpartum, and breastfeeding women, infants, and children from age one to five. To qualify for WIC, there must be a financial need and a nutritional need. Although WIC is designed to be a short-term intervention program to influence good nutritional choices and healthy behaviors, many participants continue to use the resources well after they are no longer technically qualified. Despite not providing prenatal medical care, the program incorporates breastfeeding education, nursing assessments, and frequent check-ins to reveal whether the participant has been following up with a physician for prenatal care. Many of their patients, especially at the home office in Warren County, are referred to the Fairview Clinic:

Fairview [Clinic] sees a lot of our southern count patients in Warren, Logan, Simpson, and Butler County and some patient from Metcalfe County go to Fairview but mostly those prenatal patients see a provider in Barren County. Edmonson County patients may go to Warren County, some go to Barren, and some go...outside the region” (K. Eilers, personal communication, March 15, 2022).

Again, an important factor in which patients receives the best and most through care is access to programs such as WIC. The 10-county region is “spread out geographically” and receiving WIC care or any prenatal services in the county of residence may be near impossible due to lack of access. Transportation to the other major counties may also pose a problem for these patients. Telemedicine services, established prior to the COVID-19 pandemic, helped mitigate this transportation disparity because they did not have to physical go into the office. “[Our patients] have trouble getting from point A to point B sometimes, and we don’t want that to be a barrier [to receiving adequate services]” (K. Eilers, personal communication, March 15, 2022).

For Allen County Department of Health, services for family planning include blood pressure screenings, glucose screenings, pap smears, sexually transmitted infection testing, immunizations, breast exams, HIV screening, pregnancy tests, Hgb testing, lipid profile referrals, and birth control options. For Monroe County Health Department, family planning resources are limited to birth control planning, examinations, lab screenings, immunizations, and counseling. These resources are available to minors without parental consent.

In conjunction with the health departments, there is another major program offered throughout the state of Kentucky, called the HANDS, Health Access Nurturing Development Services, program (Kentucky Cabinet for Health and Family Services, 2017). This program is a voluntary home visitation program for any new or expectant parents and supports families to build healthy, safe environments for optimal wellbeing of children. Services can begin during pregnancy or any time before a child is three months old. The program begins during the prenatal period by offering referrals

following family screening by a doctor, the health department, a church, friends, or family. A trained home visitor then will introduce the woman and family to parenting skills to recognize baby's needs and what to expect while the baby grows. However, due to the physical nature of the services offered, the in-home visits have been delayed due to the current COVID-19 pandemic. Some patients may not be received the most out of their resources due to this limiting factor.

In general, the access to registered, active physicians and providers as well as labor and delivery support in the hospital poses a major problem for the 10-county region of interest. Although programs and organizations and the health departments aim to provide education and resources to expecting mothers, the medical care is severely lacking for this region. Education is critical to achieving a safe and healthy pregnancy if the medical resources are also obtainable. Transportation to and from clinics that serve the medical care could be a problem for residents of the outer counties due to time, employment, or lack of means of transportation. For many of these residents, the drive to these clinics could be multiple hours in total, resulting in a loss of a workday. According to the Census Bureau, 17.4% of persons within the southcentral Kentucky region are below the poverty line, which is about 1.4 times the rate for the nation (Census Bureau, 2020). Missing a workday may not be possible for some residents. To increase positive maternal and fetal outcomes, the evaluation of the quality of care in coordination with the effect of access to this care should be thoroughly monitored and improved.

PRENATAL DISPARITIES IN SOUTHCENTRAL KENTUCKY

Maternal Mortality

Specific maternal mortality rates for southcentral Kentucky are not publicly available. To effectively estimate the mortality rates in this region of interest, the state-wide maternal mortality rates are evaluated. Key findings of the Kentucky Maternal Mortality Review report included that 50% of maternal deaths were pregnancy-related, 46% of maternal mortality cases were linked to substance use disorder and 78% of maternal mortality cases were categorized as preventable (Maternal Mortality Review, 2020). In 2018, there were 76 maternal deaths in Kentucky; however, these numbers are reported as preliminary and may change due to the nature of maternal deaths. As a rate of 100,000 live births, the rate of maternal deaths was 140.9 deaths in 2018. As mentioned in the primary maternal mortality section, discrepancies amongst races exists. This trend is also true in Kentucky as the rate of maternal deaths for Black women is 42.1 per 100,000 live births compared to the 17.2 rate of maternal deaths for White women (Maternal Mortality Review, 2020). Although this data cannot be applied directly to the southcentral region of Kentucky, one can acknowledge the other prenatal disparity rates in the region to effectively reason that southcentral Kentucky faces a similar increased risk of high maternal mortality rates.

Birth Risks and Outcomes

With information from latest issue of the Kentucky Public Health Division of Maternal and Child Health's Birth Fact Sheet, low weights, preterm births, prenatal care, and smoking during pregnancy rates for the southcentral region of Kentucky are evaluated (2018). In 2017, the percent of births less than 5.5 pounds in this region was

7.8%, compared to the 8.8% statewide rate. To evaluate this data even further, the percent of southcentral Kentucky births categorized as low-birth weight reveal that the largest percentage (35.6%) of those births occurred during 34-36 gestational weeks. For low-birth weight babies in this region, 26.9% were born to mothers between the ages 20 and 24 (Kentucky Cabinet for Health and Family Services, 2018).

For preterm births in 2017, the percentage in this region of interest was 10.1% compared to 11.1% across the state. The highest percentage of preterm birth for mothers of age 25 to 29 was observed. Compared to the state, the southcentral region of Kentucky had the second lowest percentage of preterm births for 2017. Among the risk factors for preterm birth, smoking while pregnant and gestational diabetes were the two highest for this region (Kentucky Cabinet for Health and Family Services, 2018). According to March of Dimes (2021), the rating for Warren County was a C (on a scale of A-F) with worsened rates from the year 2020.

Prenatal care in the region is broken down into three categories: early, late, or none. For early prenatal care, the care is initiated during the first trimester, which is the optimal course of action. Late prenatal care is initiated during the third trimester. Unlike low birth weight and preterm birth occurrence, the southcentral region scores the worst on the implementation of early prenatal care compared to the state. In 2017, 61.2% of births received early prenatal care in this region while the state average for this year was approximately 76% (Kentucky Cabinet for Health and Family Services, 2018), earning this region the lowest percentage statewide. To illustrate the important of early prenatal care for patients in this region, the effects of late or nonexistent prenatal care are explored. According to the Prenatal Care Fact Sheet (2017), 26% of Kentucky women

who had a preterm birth did not receive early prenatal care. To ensure the healthiest pregnancy, early prenatal care is imperative for both the mother and child's wellbeing.

Smoking while pregnant is a major risk factor that is present throughout the entire state of Kentucky with critical implications in healthcare outcomes. In 2017, one in four babies born in Kentucky with a low-birth weight were born to a woman who smoked while pregnant (Kentucky Cabinet for Health and Family Services, 2018). Kentucky continues to rank high for the incidence of smoking during pregnancy nationwide (Kentucky Cabinet for Health and Family Services, 2018). For this specific region of Kentucky, approximately 15% of pregnant women smoke during pregnancy, and within this percentage 74.3% of the women were between the ages 15 and 24 (Kentucky Cabinet for Health and Family Services, 2018). Smoking while pregnant continues to be linked to negative infant health outcomes, and early prenatal care or consultation with physicians may decrease the high percentage, allowing mothers and infants to have a greater chance of a healthy life.

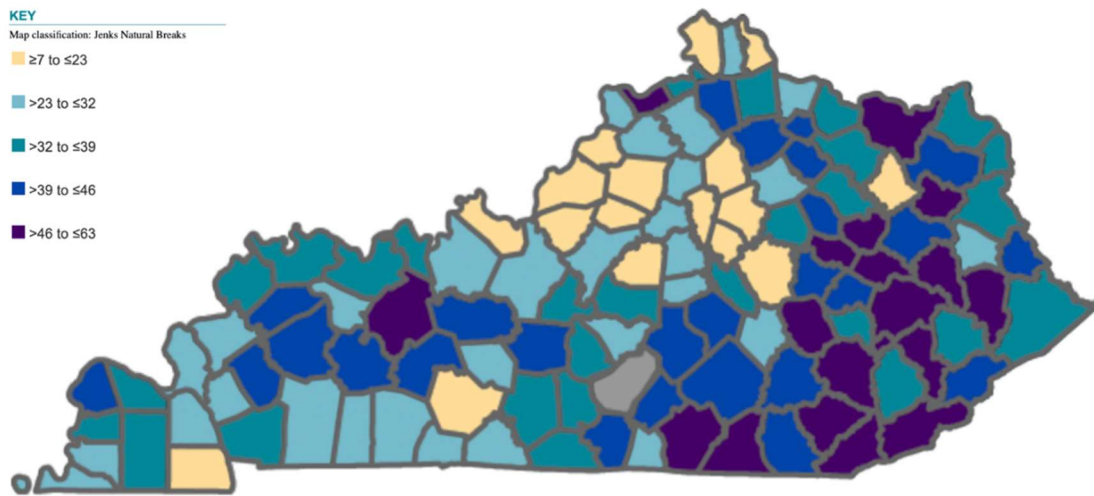
Teen Births

Although across the nation teenage births have continued to decline over the last decade, it is still important to implement strategies to continue lowering this percentage and preventing the incline from reoccurring. In 2017, the teenage birth rate for southcentral Kentucky was 8.1% compared to 7.3% for the state (Kentucky Cabinet for Health and Family Services, 2018). For teenage pregnant women, 8.8% delivered preterm babies, 7.2% received early prenatal care, and 8.7% delivered low-birth weight babies in 2017 (Kentucky Cabinet for Health and Family Services, 2018). The teen birth rate per 1,000 women ages 15-19 for each of the counties in Kentucky is shown in Figure 7.

Evaluating the risk factors for teenage births is necessary to continue this downward trend and reduce the complication risks.

Figure 7

Teenage birth rates for Kentucky counties



Note: Adapted from *Teen Births (rate per 1,000 women ages 15-19* by Foundation for a Healthy Kentucky, 2020 (<https://kentuckyhealthfacts.org/data/topic/map.aspx?ind=54>). In the public domain.

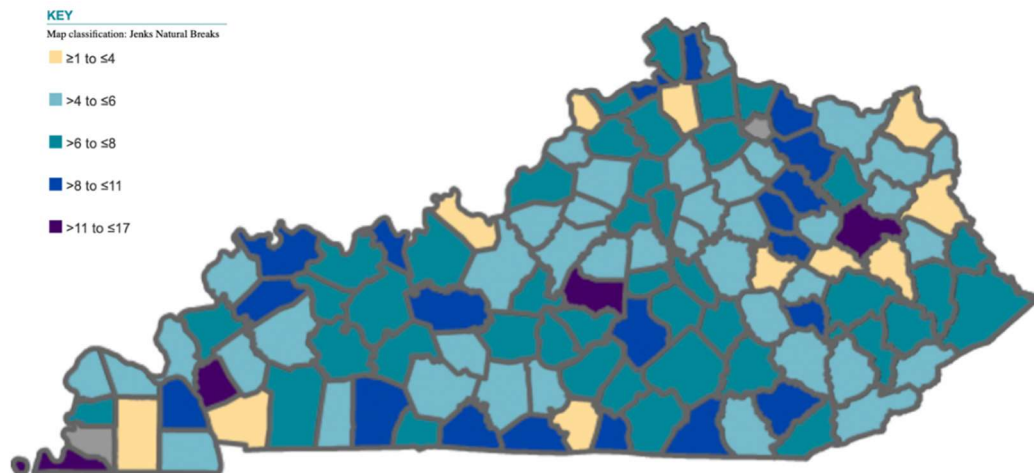
Infant Mortality

In 2017, Kentucky had more than 350 infant deaths, referring to the death of a child within their first year of life, with causes of sudden unexpected infant death (SUID), prematurity-related conditions, birth defects, perinatal conditions, and other causes (Kentucky Cabinet for Health and Family Services, 2018). Perhaps, the most critical of all the prenatal disparities to address is infant mortality as it is the worst prenatal healthcare outcomes in coordination with maternal mortality. The regional rate was 5.8% compared to the 6.7% state rate (Kentucky Cabinet for Health and Family Services,

2018). The infant mortality rate for each county in Kentucky is represented in Figure 8. Another core statistic to represent the minority disparity in prenatal care is the occurrence of early double the mortality of black infants to white infants (Kentucky Cabinet for Health and Family Services, 2018). Countermeasures to effectively limit the number of infant deaths would reveal the increasing quality prenatal care and pregnancy care, resulting in greater positive healthcare outcomes as desired.

Figure 8

The infant mortality rate per 1,000 births for Kentucky counties



Note: Adapted from *Infant Mortality (per 1,000 live births): 2015-2019*, by Foundation for a Healthy Kentucky, 2020

(<https://kentuckyhealthfacts.org/data/topic/map.aspx?ind=35>). In the public domain.

WHY IS THIS IMPORTANT?

The healthcare outcomes of women and children are of the most important because have specific and direct consequences on the health of the population and society.

Disparities affecting this population may affect generations to come. As prenatal care is the first line of care for pregnant women, the access to adequate and quality care is critical to preventing pregnancy complications and prenatal health disparities that may increase the women and her child to mortality. All forms of prenatal disparities act as a complication to both mother and child, ranging from minor complications to fatal complications. However, even a minor complication can ultimately lead to an increased risk of even larger complications. Prenatal care visits and consultation with medical providers allow for pregnant women to assess their current health and ways to prevent any increased risk. Pregnancy-related deaths are most often categorized as preventable, meaning that intervention prior to pregnancy, during pregnancy, and during birth could ultimately lead to a better health outcome. Low-birth weight and preterm birth may have consequences that affect the baby for his/her entire life and may increase further risks for future children. If the prenatal care resources are not meeting the needs of the entire population, the healthcare outcomes will continue to be poor. Resources and policy must be reviewed and revised to achieve greater positive outcomes, and thus, a healthier population and society.

Available Resources Are Not Enough

With the current availability of resources in the southcentral Kentucky area of interest, prenatal care and the decreasing of such prenatal disparities discussed will not be adequately observed. Throughout the data shown, Kentucky consistently ranks as one of the poorest states for maternal and infant health. The southcentral region of Kentucky shows some improvement and some worsening of prenatal health disparities when compared to the entire state. Through the evaluation of resources available to prenatal

care recipients, the needs of the residents are highlighted. Factors affecting morbidity, such as tobacco use, obesity, hypertension, socioeconomic disparities, depression, substance use disorder, increase the risk of mortality in Kentucky. While the main focus of this study evaluated the social determinants of health, such as transportation, access to care, and geographically rural region, the findings are suggesting that early preventative care to reduce risk and address morbidities is not routine for this region. Many women, especially in the more rural counties, face upwards of an hour or more drive for prenatal visits with a provider, birthing hospital, or obstetrical services. If those patients need specialty care, the distance traveled could be greater to access a major city like Louisville or Lexington, Kentucky or Nashville, Tennessee. Education surrounding morbidities and pregnancy is imperative for new mothers, which may be less likely in this region due to access issues.

However, some programs currently in place are making progress in reaching the target population and increasing positive healthcare outcomes. For example, the HANDS program shows success in improving maternal and child outcomes with data showing: 26% less premature births, 46% less low-birth weight births, 47% less child abuse and neglect, 14% more adequate prenatal care, 49% less pregnancy-induced hypertension, 40% less maternal complications during pregnancy (HRSA Maternal and Child Health, 2020). Another great resource is the WIC program. For the Barren River District Health Department, an important program was reimplemented in 2019 that allowed a nurse to go into the Med Center and speak to all the mothers and sign them up for WIC, if they were eligible (K. Eilers, personal communication, March 15, 2022). For this program, the mother did not have to come into the WIC clinic following their birth to sign up for WIC

because they had already signed up through that nurse. The exposure to the services was brought to the hospital so that these patients did not miss out on an opportunity for aid. However, currently the Med Center is the only hospital in the region to allow this service and Fairview Community Health Clinic is the only clinic to encourage these discussions for their patients (K. Eilers, personal communication, March 15, 2022). Sometimes women don't call the WIC office until later in their pregnancy, which limits the amount of time they receive the benefits. The problem is educating patients throughout the entire region on the availability of such resources for them to make use of them and benefit as much as they can.

What Can Be Done Now?

While some programs and organizations have sought to alleviate stressors for this population, access continues to be a problem. Adoption of policies and organizations can help improve health care. According to March of Dimes (2021), Medicaid extension to cover women beyond 60 days postpartum, establishment of perinatal quality collaborative to identify and improve maternal and infant issues, and passage of Medicaid coverage for doula care may aid in improvement. Advocacy for the needs of this population to representatives and government officials is imperative to bring attention to the disparities that exist. Recent improvement in overall physician access is seen by the University of Kentucky College of Medicine satellite campuses in Bowling Green, KY in the hope to educate and establish medical students in the region. Emphasis of obstetrical and gynecology services could also establish more providers in the region to bring more access. However, the shortage of birthing facilities is extremely limited and while bringing more specialty providers to the region increased some coverage, there remains a

limit on the number of hospital beds and labor and delivery units available to these patients and providers.

The focus of this study evaluated the access to prenatal care from a public health perspective with emphasis on how the social determinants affected this access. Future studies should explore medical evaluation of the prenatal care received and patient compliance with physician orders to truly determine if the prenatal care offered in the region is of sufficient quality. By doing evaluations, the poor prenatal care outcomes can be accurately accessed. The fundamental conclusion of this study is that the pregnant women in the southcentral region Kentucky, which includes Allen, Barren, Butler, Edmonson, Hart, Logan, Metcalfe, Monroe, Simpson, and Warren counties, are facing increased risks due to morbidities, lack of prenatal care access, poor education, which lead to poorer maternal and infant healthcare outcomes. Further evaluation is critical to help explain whether lack of adequate access to prenatal care, lack of available resources, patient noncompliance, or perhaps some of all, are leading to increased prenatal disparities and overall poorer healthcare outcomes in this region of Kentucky.

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[awareness/heart-truth/listen-to-your-heart/heart-health-and-pregnancy](https://www.nhlbi.nih.gov/health-topics/education-and-awareness/heart-truth/listen-to-your-heart/heart-health-and-pregnancy)

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APPENDIX A: INTERVIEW QUESTIONNAIRE

Professional Questions

1. What prenatal care options do you have available for your patients?
2. Approximately what percentages of patients are non-compliant with prenatal vitamin regimen? Regularly scheduled check-ups?
3. Do you believe patients in your area receive adequate prenatal care?
4. What problems do you see that discourage patients from following all guidelines for prenatal care?
5. Where do your patients go to give birth? If not within the same county, do you think travel is cause of concern?

Program Coordinator Questions

1. Introduce the program
2. What prenatal resources do you offer, if any? Where do you refer patients for prenatal care?
3. Can you explain what factors motivated the implementation of such program?
4. What factors (funding, participation requirements, etc.) contribute to the program's implementation?
5. What successes have been revealed since the program's implementation?
6. What adjustments could be made to make the program more effective?
7. Do you notice any other areas lacking public health initiatives that could use a specified program? If so, what would that program look like?
8. Overall, do you think the program has been effective in mitigating the health disparity(ies) that is targets?

APPENDIX B: INFORMED CONSENT

INFORMED CONSENT DOCUMENT



Project Title: Rurality and its Effects on Prenatal Care in Southcentral Kentucky
Investigator: Kylee Eilers, Department of Biology, kylee.eilers899@topper.wku.edu

You are being asked to participate in a project conducted through Western Kentucky University. The University requires that you give your signed agreement to participate in this project.

You must be 18 years old or older to participate in this research study.

The investigator will explain to you in detail the purpose of the project, the procedures to be used, and the potential benefits and possible risks of participation. You may ask any questions you have to help you understand the project. A basic explanation of the project is written below. Please read this explanation and discuss with the researcher any questions you may have. If you then decide to participate in the project, please sign this form in the presence of the person who explained the project to you. You should be given a copy of this form to keep.

- 1. Nature and Purpose of the Project:** The objective of this project is to expose the effect of rurality on access to prenatal care and infant outcomes in southcentral Kentucky, including the counties of Allen, Butler, Barren, Edmonson, Hart, Logan, Metcalfe, Monroe, Simpson, and Warren, by comparison of the resources available to other rural regions across the state and analysis of the productivity of such resources in increasing positive health outcomes. By exposing the adverse effects of rurality and the limitations of resources available, the necessities of this region can be identified, which is the first step in resolving the issue.
- 2. Explanation of Procedures:** My project will consist of data collection from online databases and analysis/connection of the data collected to the southcentral Kentucky region. The involvement of public healthcare professionals is to conduct interviews concerning the availability of prenatal and infant health services in the region. Interviews with public health professionals from the region will take approximately 1 hour of the participant's time.
- 3. Discomfort and Risks:** The discomfort and risks are low for the involvement in this project since my project is rooted in public information if you feel uncomfortable discussing any questions or conversation topics that arise, you may choose to omit portions of your answers or discussion or refuse to continue with the interview. Interviews will take approximately 1 hour to complete.
- 4. Benefits:** By contributing your knowledge of the successes and downfalls of initiatives implemented to combat prenatal disparities in the region, you will help expose the limitations facing women in rural communities, which will allow healthcare providers and politicians to understand the disparities present to enact ways to promote a more healthy, successful population that can contribute to society.
- 5. Confidentiality:** Your personal information (name, affiliation) will be kept confidential. Records will be viewed, stored, and maintained in private, secure files only accessible by the P.I. and advising faculty for three years following the study, after which time they will be destroyed.

WKU IRB# 22-070
Approved: 10/27/2021
End Date: 4/30/2022
EXPEDITED
Original: 10/27/2021

6. **Refusal/Withdrawal:** Refusal to participate in this study will have no effect on any future services you may be entitled to from the University. Anyone who agrees to participate in this study is free to withdraw from the study at any time with no penalty.

You understand also that it is not possible to identify all potential risks in an experimental procedure, and you believe that reasonable safeguards have been taken to minimize both the known and potential but unknown risks.

Signature of Participant

Date

Witness

Date

- I agree to the audio/video recording of the research. *(Initial here)* _____

THE DATED APPROVAL ON THIS CONSENT FORM INDICATES THAT
THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY
THE WESTERN KENTUCKY UNIVERSITY INSTITUTIONAL REVIEW BOARD
Robin Pyles, Human Protections Administrator
TELEPHONE: (270) 745-3360



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