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Epidemiologic Patterns of Type 2 Diabetes Using Public Health Surveillance Data

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Abstract:

- ***Background:***

Type 2 diabetes remains a major public health concern in the United States, with disproportionate burden among racially minoritized and socioeconomically disadvantaged populations. In Kentucky, and particularly in Jefferson County, diabetes prevalence exceeds national benchmarks and reflects persistent inequities shaped by social, behavioral, and structural determinants. Despite extensive national literature on diabetes risk factors, fewer studies have synthesized population-level indicators to describe how contextual barriers influence diabetes care access in mid-sized urban settings.

- ***Methods:***

A descriptive cross-sectional community health needs assessment was conducted using publicly available secondary data from national, state, and local sources, including the Centers for Disease Control and Prevention, U.S. Census Bureau, Kentucky Cabinet for Health and Family Services, and community health reports. Descriptive analyses were used to characterize diabetes prevalence, demographic patterns, socioeconomic conditions, behavioral risk indicators, and structural access barriers in Jefferson County. The Theory of Planned Behavior was applied as a conceptual framework to guide interpretation without causal inference.

- ***Results:***

In 2022, the crude prevalence of diagnosed diabetes in Jefferson County was approximately 13.5%, exceeding the national prevalence of 12.0%, while age-adjusted prevalence remained higher than the national estimate (12.0% vs. 10.4%). Diabetes burden was disproportionately higher among Black residents and in economically disadvantaged neighborhoods, particularly in West Louisville, where prevalence approached 20%, compared with 10–12% in more affluent areas. Socioeconomic vulnerability was substantial, with 14% of residents living below the federal poverty level, 10% of households receiving SNAP benefits, and 43% of renters experiencing housing cost burden. Behavioral and environmental risk factors were prevalent, including adult obesity (24%), smoking (22%), and limited access to healthy food, affecting nearly 93,000 residents living in food deserts.

- ***Conclusion:***

Publicly available data reveal a persistent and inequitable diabetes burden in Jefferson County driven by intersecting demographic, socioeconomic, behavioral, and structural factors. These findings underscore the need for equity-focused, community-informed strategies that address both behavioral determinants and systemic barriers to improve diabetes care access and outcomes in underserved urban populations.

Keywords: *Type 2 Diabetes; Health Disparities; Access to Care; Social Determinants of Health; Community Health Assessment, United States.*

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I. INTRODUCTION

Type 2 diabetes mellitus remains a major public health concern in the United States, with its burden falling disproportionately on populations shaped by structural disadvantage, racial inequity, and economic insecurity. Beyond its clinical consequences, diabetes contributes to widening health disparities, increased healthcare utilization, and escalating costs across public health systems. These challenges are particularly evident in Kentucky, where diabetes consistently ranks among the most prevalent chronic conditions, and in Jefferson County, where social, economic, and environmental conditions interact to produce marked inequities in disease burden and access to care (Yedjou et al., 2024). A growing body of evidence indicates that these inequities are driven by a combination of behavioral, socioeconomic, and structural factors, including limited access to preventive healthcare, food insecurity, housing instability, reduced opportunities for physical activity, and higher prevalence of obesity and tobacco use in disadvantaged communities. These upstream determinants increase the risk of diabetes onset, complicate disease management, and contribute to higher rates of preventable complications, hospitalizations, and premature mortality (Hassmiller, S.B. and Wakefield, M.K., 2022). As a result, type 2 diabetes not only reflects individual metabolic vulnerability but also serves as an indicator of broader social and environmental inequities that continue to shape population health outcomes in urban communities.

Jefferson County is Kentucky's most populous and demographically diverse metropolitan area, with an estimated population of approximately 772,000 residents (United States Census Bureau, 2023). Following the 2003 consolidation of the Louisville city government and Jefferson County into the Louisville Metro Government, the region has operated under a unified administrative structure intended to facilitate coordinated governance, service delivery, and countywide public health planning (Louisville Metro Government, n.d.). This consolidation has enabled more comprehensive community health assessments and improved alignment of public health initiatives across jurisdictions. At the same time, the unified structure has highlighted enduring geographic, racial, and socioeconomic disparities in health outcomes across neighborhoods, reflecting historical patterns of residential segregation, economic inequality, and uneven access to resources. Marked differences in chronic disease burden, life expectancy, and access to healthcare and healthy environments persist between areas of concentrated affluence and communities facing long-standing disinvestment. These contextual conditions make Jefferson County a particularly relevant setting for examining how structural factors intersect with population health and healthcare access, especially for chronic conditions such as type 2 diabetes that are strongly influenced by social and environmental determinants (Benavidez, G. A., Boswell, E., Hung, P., & Crouch, E.,2025).

Despite the presence of extensive healthcare infrastructure, Jefferson County continues to face substantial and persistent public health challenges. Reports from the Louisville Metro Department of Public Health and Wellness identify chronic illness and health inequities as central concerns, with heart disease, cancer, unintentional injury, respiratory disease, and stroke remaining the leading causes of death (Government, 2024). These conditions disproportionately affect Black residents, who experience higher mortality rates from heart disease and cancer compared with White residents, reflecting long-standing racial inequities in health outcomes (Louisville News, 2024). In addition, life expectancy varies markedly across the county, with residents of West Louisville living several years fewer on average than those in more affluent eastern neighborhoods, highlighting the influence of geographic and socioeconomic factors on health. These disparities are closely linked to differences in access to preventive services, quality healthcare, healthy food, safe housing, and environmental conditions, as well as to broader patterns of residential segregation and economic inequality. Collectively, these findings underscore that the distribution of disease and mortality in Jefferson County is shaped not only by clinical care availability but also by upstream social and structural determinants that continue to drive unequal health outcomes across communities (Centers for Disease Control and Prevention, 2024).

Within this broader public health context, type 2 diabetes emerges as a particularly consequential chronic condition contributing substantially to premature morbidity, mortality, and reduced quality of life. Local surveillance data reveal pronounced racial and geographic inequities in diabetes prevalence across Jefferson County, with estimates approaching 20% in predominantly African American neighborhoods in West Louisville compared with approximately 10–12% in more affluent, predominantly White communities in the eastern portion of the county (Curnutte et al., 2022). These disparities reflect long-standing patterns of social and economic disadvantage, differential access to healthcare and preventive services, and neighborhood-level environmental constraints. Consistent with these findings, Community Health Needs Assessments repeatedly identify diabetes as a priority health concern linked to functional limitations, comorbid conditions, and declining quality of life among county residents (APHA report, 2022). Accurately characterizing the full burden of diabetes remains challenging, as a substantial proportion of adults remain undiagnosed or lack awareness of diagnostic criteria, leading to underestimation in surveillance data and delayed engagement in care. Together, these factors underscore the significance of diabetes as both a clinical and population health issue in Jefferson County and highlight the need for equity-focused strategies that address early detection, prevention, and sustained management within historically underserved communities.

A range of individual and contextual factors contribute to elevated diabetes risk in the county. Obesity, which affects nearly one-quarter of adults in Louisville, is a key biological driver of insulin resistance and dysregulated glucose metabolism (Metro United Way & KSDC, 2022; Klein et al., 2023). Tobacco use also remains prevalent, with

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approximately 22% of adults reporting current smoking, nearly double the national average, which further compounds metabolic risk (Maddatu et al., 2018; American Lung Association, 2024). Age-related vulnerability is notable, as diabetes risk increases after age 35, a demographic that constitutes a substantial proportion of the county's population (National Institute of Diabetes and Digestive and Kidney Diseases, 2022). Racial and ethnic minority populations, including African American, Hispanic or Latino, Asian American, American Indian, and Pacific Islander communities, experience higher diabetes prevalence, reflecting long-standing inequities in access to preventive services, healthcare, and treatment (Meng et al., 2016).

Socioeconomic conditions further shape diabetes risk and care access. The median household income in Jefferson County ($58,196) is substantially lower than the national median, with 14% of residents living below the federal poverty line and 10% of households relying on Supplemental Nutrition Assistance Program benefits (Metro United Way & KSDC, 2022; Guzman & Kollar, 2024). Housing cost burden affects a significant proportion of residents, limiting financial flexibility for medications, healthcare visits, and healthy food choices. Structural food access barriers are also prominent, with 36 census tracts classified as food deserts and nearly 93,000 residents lacking reliable access to affordable, nutritious foods—conditions associated with poorer dietary adherence and diabetes management (Gucciardi et al., 2014; Metro United Way & KSDC, 2022). Environmental stressors, including limited recreational space and exposure to pollutants, further constrain opportunities for health-promoting behaviors (Dendup et al., 2018; Maroko et al., 2009). Clinical complexity is further compounded by emerging challenges such as antimicrobial resistance among diabetes-related infections, particularly in high-acuity care settings, where resistant pathogens are associated with 20–40% longer hospital stays and higher treatment failure rates among patients with diabetes (Hasan et al., 2025). Additionally, use of marijuana and other psychoactive substances among adults has been associated with approximately 25–45% higher likelihood of poor glycemic control and non-adherence to diabetes medications, which can further hinder timely access to care and exacerbate disparities in diabetes management (Zeeshan & Hasan, 2025; Hasan, Rahman & Haque., 2025).

Although policy initiatives and healthcare programs have expanded the availability of diabetes-related services, meaningful gaps in utilization and equitable access persist. At the federal level, efforts led by the Centers for Medicare and Medicaid Services have enhanced diabetes screening, expanded telehealth coverage, and promoted the integration of social determinants of health into care delivery and reimbursement models (CMS, 2024). At the state level, Kentucky agencies support Diabetes Self-Management Education and Support programs and coordinated care strategies through the Kentucky Diabetes Prevention and Control Program, aiming to improve self-management, reduce complications, and enhance quality of life among individuals with diabetes (Kentucky Diabetes Prevention, 2025). Despite these efforts, evidence indicates that such programs do not consistently reach populations experiencing compounded barriers, including limited financial resources, transportation challenges, food insecurity, and competing daily demands. As a result, the benefits of expanded services remain unevenly distributed, underscoring the need for implementation strategies that better align policy initiatives with the lived realities of individuals in underserved communities and address the structural conditions that constrain effective access to diabetes care.

While a substantial body of literature has documented the biological, behavioral, and social determinants of type 2 diabetes, much of this work has focused on individual risk factors, clinical outcomes, or large-scale national trends, with comparatively limited attention to how these determinants interact within specific local contexts (Beckles & Chou, 2016; Klein et al., 2023). Fewer studies have descriptively examined how adults living in mid-sized urban communities, such as Louisville, Kentucky experience and navigate barriers to diabetes care within the realities of their local healthcare systems, neighborhoods, and socioeconomic environments. Existing urban diabetes research has largely concentrated on major metropolitan areas or rural settings, leaving an important gap in understanding how structural inequities, resource distribution, and community context influence access to care in mid-sized cities.

In addition, although behavioral frameworks such as the Theory of Planned Behavior have been widely applied in diabetes self-management and health behavior research, their use has largely centered on individual attitudes, intentions, and knowledge related to disease management. Far less attention has been given to how perceived behavioral control and social influences interact with structural conditions such as affordability of care, transportation limitations, food access constraints, and challenges navigating complex healthcare systems in real-world community settings (Tucker et al., 2014). As a result, much of the existing literature treats behavioral determinants and structural barriers as separate domains, offering limited insight into how these factors jointly shape diabetes care access, particularly among populations facing socioeconomic disadvantage and racial inequities. This gap is especially evident in mid-sized urban communities, where healthcare resources may be available but unevenly accessible due to contextual and systemic constraints. Addressing this limitation is critical for developing diabetes education, care navigation, and support strategies that are not only behaviorally informed but also responsive to the structural realities that influence individuals' ability to translate intentions into effective diabetes care.

This study addresses these gaps by presenting a descriptive, community-focused assessment of diabetes burden and access-related challenges in Jefferson County, Kentucky, using publicly available secondary data and a behavioral framework to guide interpretation. By situating population-level indicators of diabetes prevalence, socioeconomic vulnerability, and structural barriers within

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the Theory of Planned Behavior, the study offers a theory-informed, non-causal examination of how perceptions, social influences, and environmental conditions coexist to shape access to diabetes care. In doing so, the findings contribute locally grounded evidence to support the development of contextually responsive diabetes education, care navigation, and support strategies that align with equity-focused approaches to chronic disease management (Rodriguez et al., 2022).

Accordingly, this descriptive cross-sectional study was conducted as a community health needs assessment to characterize perceived barriers and facilitators to diabetes care among adults living with type 2 diabetes in Jefferson County, Kentucky. Guided by the Theory of Planned Behavior as a conceptual framework, the assessment focused on describing participants' attitudes, perceived social support, and perceived behavioral control related to accessing diabetes care, rather than testing causal relationships or predictive models. Specifically, the study aimed to describe: (1) perceptions of control and accessibility related to diabetes treatment among adults with type 2 diabetes living in Louisville, Kentucky; and (2) context-specific barriers influencing individuals' ability to obtain diabetes care. Findings are intended to provide community-grounded, descriptive insights to support Certified Diabetes Care and Education Specialists and local healthcare providers in tailoring patient-centered, contextually appropriate diabetes care strategies (Rodriguez et al., 2022).

II. METHODS

- *Study Design*

This study employed a descriptive, cross-sectional design to examine the burden of type 2 diabetes and access-to-care conditions in Jefferson County, Kentucky. The analysis relied exclusively on publicly available secondary data sources and was conducted as part of a community health needs assessment intended to inform population-level understanding of chronic disease patterns. The study was observational and descriptive in scope, focusing on the characterization of prevalence, demographic distributions, and access-related indicators at a single point in time.

Consistent with its descriptive purpose, the study did not involve hypothesis testing, causal inference, prediction modeling, or the collection of primary data. Instead, the design emphasized synthesis and comparison of aggregated data across national, state, and local surveillance systems to contextualize local conditions within broader public health trends. This approach supports policy-relevant interpretation of diabetes-related inequities while acknowledging the inherent limitations of cross-sectional, secondary data analyses.

- *Data Sources, Data Collection, and Sampling Strategy*

Data for this community health needs assessment were obtained exclusively from publicly available national, state, and local secondary data sources that provide routinely collected, population-level health and demographic information. At the national level, surveillance data were drawn primarily from the Centers for Disease Control and Prevention (CDC), including the Behavioral Risk Factor Surveillance System (BRFSS) and the PLACES Project, which generate county-level estimates of diagnosed type 2 diabetes prevalence and related behavioral and health indicators. Demographic and socioeconomic characteristics were derived from the U.S. Census Bureau, including the American Community Survey, to describe population size, age distribution, racial and ethnic composition, income, poverty status, and housing characteristics within Jefferson County.

State- and local-level data were obtained from reports published by the Kentucky Cabinet for Health and Family Services, the Kentucky Diabetes Prevention and Control Program, Metro United Way, the Kentucky State Data Center, and community health profiles released by Louisville Metro Public Health and Wellness. These sources provided information on diabetes prevalence, mortality patterns, geographic and racial disparities, food access, insurance coverage, and other social determinants of health relevant to diabetes prevention, access to care, and management. All datasets used in this study were previously collected by the respective agencies using standardized surveillance and administrative procedures and were made publicly accessible for research, monitoring, and public health planning purposes.

The sampling strategy for this study was population-based and non-probabilistic, relying on aggregated county-level estimates rather than individual-level observations. Jefferson County served as the unit of analysis, with data representing the total resident population or defined subpopulations as reported by each source. No primary sampling, recruitment, or data collection was conducted by the authors. No individual-level identifiers were accessed or analyzed, and all data were used in accordance with the terms of public availability and ethical standards for secondary data analysis.

- *Variables and Measurements*

This study examined a set of predefined variables to descriptively characterize diabetes burden, population characteristics, and access-related conditions at the county level using publicly available secondary data. Primary outcome variables included the prevalence of diagnosed type 2 diabetes, age-adjusted diabetes prevalence, and diabetes-related mortality indicators. Covariates describing population composition included age distribution, sex, race and ethnicity, median household income, poverty status, health insurance coverage, and geographic location within Jefferson County. Additional contextual variables reflected behavioral and social determinants associated with diabetes risk and management, including adult obesity prevalence, tobacco use prevalence, physical activity indicators, food insecurity, housing cost burden, and neighborhood-level socioeconomic conditions. Structural access variables included food desert classification, availability of healthcare services, and indicators of access to preventive and chronic care resources.

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Measurements were based on standardized surveillance definitions and reporting methods used by national, state, and local data systems to ensure comparability across sources. Diabetes prevalence and mortality measures were derived from population-based surveillance estimates, with age-adjusted rates reported according to standard population adjustment procedures used by the data source agencies. Clinical indicators commonly used to assess diabetes control, such as hemoglobin A1c (HbA1c), were referenced descriptively when available in aggregated reports to contextualize glycemic control at the population level, recognizing that individual-level clinical data were not analyzed. Behavioral risk factors, including obesity and smoking prevalence, were defined using established surveillance criteria, while food access was measured using census-based food desert classifications. Housing cost burden was operationalized as household expenditures exceeding 30 percent of income. All measures were selected based on epidemiologic relevance to diabetes prevention, care access, and self-management, as well as consistency and availability across multiple secondary data sources.

- *Analytical Approach*

Data were analyzed using a descriptive analytical approach to characterize patterns, distributions, and disparities in diabetes burden and access-related indicators within Jefferson County. County-level estimates were summarized using frequencies, proportions, percentages, and summary measures as reported in the original surveillance and administrative data sources. Where available, age-adjusted estimates were used to allow meaningful comparison across populations with differing age structures.

To contextualize local findings, Jefferson County indicators were descriptively compared with corresponding state-level and national benchmarks drawn from the same or comparable data systems. These comparisons were intended to highlight relative differences in prevalence, demographic patterns, and access-related conditions rather than to test statistical associations. No inferential statistical analyses, hypothesis testing, or modeling procedures were conducted, consistent with the descriptive purpose of the study and the use of aggregated secondary data.

Data synthesis focused on identifying consistent patterns across multiple sources and examining how demographic, socioeconomic, behavioral, and structural indicators co-occur with diabetes prevalence and access to care at the population level. Findings are presented narratively and, where applicable, through summary tables and figures to support interpretation. This analytic strategy was designed to provide a comprehensive, policy-relevant overview of diabetes-related inequities in Jefferson County without implying causation or individual-level relationships.

- *Health Needs Prioritization*

Health needs were identified and prioritized through a descriptive synthesis of findings across multiple secondary data sources, with emphasis on indicators reflecting diabetes burden, access to care, and underlying social and structural determinants. Population-level patterns observed in Jefferson County were systematically interpreted in relation to objectives established by the Kentucky Diabetes Prevention and Control Program, which prioritize improved glycemic management, strengthened diabetes self-management capacity, increased access to healthy foods, promotion of physical activity, and enhancement of overall quality of life.

This prioritization process involved assessing the magnitude of diabetes prevalence, the presence of racial, geographic, and socioeconomic disparities, and the co-occurrence of behavioral and environmental risk factors that influence diabetes outcomes. Needs were prioritized when indicators demonstrated both elevated burden and alignment with state public health goals, thereby ensuring that identified priorities reflected community-level conditions while remaining consistent with existing prevention and control strategies. This approach supported the identification of actionable areas for intervention and policy planning that are grounded in surveillance data and responsive to state-level diabetes objectives.

- *Conceptual Framework*

The Theory of Planned Behavior was applied as a conceptual lens to guide the organization and interpretation of findings related to diabetes care access. Rather than testing behavioral relationships or making causal inferences, the framework was used to contextualize how attitudes toward diabetes management, perceived social norms, and perceived behavioral control may coexist with structural and contextual barriers identified through secondary data sources. This approach allowed for a theory-informed interpretation of access-related challenges while explicitly recognizing the influence of social, economic, and environmental constraints beyond individual behavior. By using the Theory of Planned Behavior in this descriptive manner, the study provides a structured framework for understanding diabetes care access without implying prediction, causation, or individual-level behavioral measurement.

- *Ethical Considerations*

This study relied exclusively on publicly available, de-identified secondary data and did not involve human subjects' interaction, intervention, or the collection of private or identifiable information. As such, the study met criteria for non–human subjects research and did not require institutional review board oversight. The analysis was conducted in accordance with ethical principles for public health surveillance and secondary data analysis.

III. RESULTS

- *Demographic Characteristics of Jefferson County, Kentucky*

Jefferson County, Kentucky, is the most populous and demographically diverse county in the state, with an estimated population of approximately 772,000 residents, as summarized in Table 1 (United States Census Bureau, 2023). The county's age structure reflects a population at

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elevated risk for chronic disease, with approximately 62% of residents aged 18–64 years and an additional 16% aged 65 years or older. Females comprise slightly more than half of the population (52%), while males account for 48%. Racial and ethnic composition demonstrates substantial diversity, with approximately 66% of residents identifying as non-Hispanic White, 22% as Black or African American, 6% as Hispanic or Latino, 3% as Asian, and 3% identifying as multiracial or other racial groups (Metro United Way & Kentucky State Data Center, 2022). Socioeconomic indicators further highlight structural vulnerability within the county. The median household income is estimated at $58,196, which is considerably lower than the national median, and approximately 14% of residents live below the federal poverty level. Economic strain is also reflected in food assistance utilization, with 10% of households receiving Supplemental Nutrition Assistance Program benefits. Housing affordability remains a significant challenge, as 43% of renters and more than 20% of homeowners with mortgages spend over 30% of their income on housing costs. Collectively, these demographic and socioeconomic characteristics provide critical context for interpreting patterns of type 2 diabetes prevalence, access to care, and health inequities observed across Jefferson County, as detailed in Table 1.

Table 1 Demographic Characteristics of Jefferson County, Kentucky (Publicly Available Secondary Data)

Characteristic	Estimate (%) or Value	Data Source
Total Population	~772,000	U.S. Census Bureau (2023)
Age Distribution		
18–64 years	62%	U.S. Census Bureau (ACS, 2023)
≥65 years	16%	U.S. Census Bureau (ACS, 2023)
Sex		
Male	48%	U.S. Census Bureau (ACS, 2023)
Female	52%	U.S. Census Bureau (ACS, 2023)
Race / Ethnicity		
White (Non-Hispanic)	66%	Metro United Way & KSDC (2022)
Black / African American	22%	Metro United Way & KSDC (2022)
Hispanic / Latino (any race)	6%	Metro United Way & KSDC (2022)
Asian	3%	Metro United Way & KSDC (2022)
Multiracial / Other	3%	Metro United Way & KSDC (2022)
Socioeconomic Indicators		
Median Household Income	$58,196	U.S. Census Bureau (2023)
Population Below Federal Poverty Level	14%	Metro United Way & KSDC (2022)
SNAP Participation (Households)	10%	Metro United Way & KSDC (2022)
Health-Related Indicators		
Adults with Obesity	24%	Metro United Way & KSDC (2022)
Adult Smoking Prevalence	22%	American Lung Association (2024)
Structural Determinants		
Residents Living in Food Deserts	~93,000	Metro United Way & KSDC (2022)
Renters with Housing Cost Burden (>30%)	43%	Metro United Way & KSDC (2022)
Homeowners with Mortgage Cost Burden (>30%)	21%	Metro United Way & KSDC (2022)

- Abbreviations: ACS = American Community Survey; KSDC = Kentucky State Data Center; SNAP = Supplemental Nutrition Assistance Program.

- Note: All estimates are derived from publicly available national, state, and local data sources and reflect population-level characteristics of Jefferson County, Kentucky. Percentages may not total 100% due to rounding.

➢ *Overview of Diabetes Burden in Jefferson County*

Publicly available surveillance data indicate that type 2 diabetes remains a substantial chronic disease burden in Jefferson County, Kentucky. In 2022, the crude prevalence of diagnosed diabetes among adults in Jefferson County was estimated at 13.5%, exceeding the national prevalence of 12.0% reported for the same year (Centers for Disease Control and Prevention, 2024). When age-adjusted, diabetes prevalence in Jefferson County remained elevated at approximately 12.0%, compared with a national age-adjusted prevalence of 10.4% (Centers for Disease Control and Prevention, 2024). These findings place Jefferson County above national benchmarks and underscore the continued significance of diabetes as a public health concern within the region.

Data from the 2023 Kentucky State Health Assessment show minimal year-to-year variation in statewide diabetes prevalence between 2022 and 2023; however, persistent disparities remain evident across demographic subgroups. At both the state and county levels, diabetes prevalence is disproportionately higher among Black adults compared with White adults, reflecting longstanding racial inequities in chronic disease burden. County-level estimates indicate that these racial patterns observed statewide are also present within Jefferson County.

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Table 2 Diabetes Burden and Access-Related Indicators in Jefferson County, Kentucky

Indicator	Jefferson County	Kentucky (State)	United States	Primary Source
Crude prevalence of diagnosed diabetes (adults)	13.5%	12.9%	12.0%	CDC PLACES / BRFSS (2024)
Age-adjusted diabetes prevalence	12.0%	—	10.4%	CDC PLACES (2024)
Diabetes prevalence – Black adults	Higher than White adults	Higher than White adults	Higher than White adults	Kentucky SHA (2023); CDC (2024)
Adults with obesity	24%	36%	33%	Metro United Way & KSDC (2022); CDC
Adult smoking prevalence	22%	21%	11.6%	American Lung Association (2024)
Residents living in food deserts	~93,000	—	—	Metro United Way & KSDC (2022)
Population below federal poverty level	14%	16%	11%	U.S. Census Bureau (2023)
Renters with housing cost burden (>30%)	43%	—	—	Metro United Way & KSDC (2022)

- Note: BRFSS = Behavioral Risk Factor Surveillance System; CDC = Centers for Disease Control and Prevention; KSDC = Kentucky State Data Center; SHA = State Health Assessment.

Table 2 summarizes key publicly available indicators related to diabetes burden and access-related risk factors in Jefferson County, Kentucky, in comparison with state and national benchmarks. County-level surveillance data indicate that both crude and age-adjusted diabetes prevalence in Jefferson County exceed national estimates, underscoring the sustained burden of type 2 diabetes within the region (Centers for Disease Control and Prevention, 2024). Consistent with statewide and national patterns, diabetes prevalence is disproportionately higher among Black adults than White adults, reflecting persistent racial inequities documented across multiple data sources. Behavioral and socioeconomic indicators further contextualize these disparities, including elevated rates of obesity and smoking, substantial poverty prevalence, widespread housing cost burden, and limited access to healthy food options affecting nearly 93,000 residents. Together, these indicators highlight the convergence of behavioral, economic, and structural factors that shape diabetes risk and access to care in Jefferson County.

➢ *Racial and Geographic Disparities*

Secondary data consistently demonstrate pronounced racial and geographic disparities in diabetes prevalence within Jefferson County. Neighborhood-level estimates reveal substantially higher diabetes prevalence in western areas of the county, which are predominantly African American and experience higher levels of socioeconomic disadvantage, compared with eastern areas that are generally more affluent and predominantly White. Estimates suggest that diabetes prevalence in West Louisville approaches 20%, whereas prevalence in eastern neighborhoods ranges from approximately 10% to 12% (Curnutte et al., 2022).

These geographic disparities mirror broader patterns of residential segregation, differential access to healthcare resources, and unequal exposure to social and environmental risk factors. The concentration of diabetes burden in historically marginalized neighborhoods highlights the intersection of race, place, and chronic disease risk in Jefferson County.

➢ *Age Distribution and Demographic Context*

Age distribution data from the U.S. Census Bureau indicate that Jefferson County has a substantial proportion of residents in age groups at elevated risk for type 2 diabetes. Approximately 62% of the county's population falls within the 18–64 age range, with an additional 16% aged 65 years or older. Given that diabetes risk increases significantly after age 35, the county's demographic profile reflects a population structure conducive to sustained diabetes prevalence (National Institute of Diabetes and Digestive and Kidney Diseases, 2022).

Racial and ethnic composition further contextualizes diabetes risk within the county. Jefferson County's population is estimated to be approximately 22% Black, 6% Hispanic/Latino, 3% Asian, and 3% multiracial (Metro United Way & KSDC, 2022). National and state-level data indicate higher diabetes prevalence among African American, Hispanic/Latino, Asian American, American Indian, and Pacific Islander populations, patterns that are consistent with the demographic composition and observed disparities within Jefferson County.

➢ *Socioeconomic and Behavioral Risk Indicators*

Secondary data highlight multiple socioeconomic and behavioral factors associated with diabetes risk and management in Jefferson County. Obesity, a major contributor to insulin resistance and type 2 diabetes, affects nearly 24% of adults in Louisville (Metro United Way & KSDC, 2022). Tobacco use is also prevalent, with approximately 22% of adults reporting current smoking—nearly double the national average—further compounding

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metabolic risk and chronic disease burden (American Lung Association, 2024; Maddatu et al., 2018).

Socioeconomic indicators reveal substantial financial strain among many residents. The median household income in Jefferson County is $58,196, significantly lower than the national median of $80,610, and approximately 14% of residents live below the federal poverty line (Guzman & Kollar, 2024; Metro United Way & KSDC, 2022). Additionally, 10% of households rely on Supplemental Nutrition Assistance Program benefits, reflecting ongoing food insecurity and economic vulnerability.

Housing cost burden further constrains health-related spending, with 43% of renters and more than 20% of homeowners with mortgages spending over 30% of their income on housing (Metro United Way & KSDC, 2022). These financial pressures limit the capacity of many households to afford medications, transportation, and other diabetes-related care needs.

➢ *Structural Barriers to Diabetes Management*

Secondary data consistently indicate that structural conditions related to food access and neighborhood resources present substantial barriers to diabetes management in Jefferson County. The county contains 36 census tracts classified as food deserts, affecting approximately 93,000 residents, or nearly 12% of the total population, who lack reliable access to affordable and nutritious food (Metro United Way & KSDC, 2022). These food deserts are disproportionately concentrated in areas with higher poverty rates and higher proportions of Black residents, overlapping with neighborhoods that report diabetes prevalence approaching 20%, compared with 10–12% in more affluent areas. Food insecurity is strongly associated with diabetes outcomes, as individuals facing limited food access are more likely to rely on calorie-dense, nutrient-poor foods, contributing to poorer glycemic control, increased obesity prevalence, and higher rates of diabetes-related complications (Gucciardi et al., 2014).

Environmental and built environment indicators further underscore structural constraints on diabetes prevention and management. Neighborhoods with higher diabetes prevalence exhibit lower walkability scores, fewer safe recreational spaces, and reduced access to green infrastructure, limiting opportunities for regular physical activity (Dendup et al., 2018). In Jefferson County, physical inactivity affects nearly 30% of adults, a level that exceeds national benchmarks and is more pronounced in high-poverty census tracts. In addition, several high-burden neighborhoods are located closer to industrial sites and areas with elevated air pollution, which has been associated with a 20–40% increased risk of respiratory tract infections and inflammation-related metabolic dysregulation that can worsen diabetes outcomes (Maroko et al., 2009; Hasan, M.R., 2022). Collectively, these data demonstrate that diabetes management in Jefferson County is shaped by place-based structural conditions that constrain healthy behaviors and exacerbate disease burden at the population level.

➢ *Health System Context and Access Indicators*

Despite the presence of multiple healthcare systems and diabetes-related services in Jefferson County, secondary data suggest uneven access and utilization across populations. Insurance coverage alone does not guarantee effective access to care, particularly when affordability of medications, transportation to appointments, and time constraints are considered. State and federal initiatives, including expanded diabetes screening, telehealth services, and Diabetes Self-Management Education and Support programs, have improved service availability; however, disparities in uptake and impact persist (Centers for Medicare & Medicaid Services, 2024; Services, 2023).

Emerging clinical challenges also complicate diabetes care. Antimicrobial resistance among patients with diabetes-related infections has been identified as an increasing concern, particularly in hospital and intensive care settings, potentially affecting treatment outcomes and healthcare utilization (Hasan et al., 2025). These findings underscore the complexity of diabetes management within the broader health system.

Table 3 Application of the Theory of Planned Behavior to the Interpretation of Diabetes Care Access Using Secondary Data

TPB Construct	Conceptual Definition	Publicly Available Indicators Used in This Study	Key Descriptive Findings in Jefferson County
Attitudes toward diabetes care	Perceived importance and value of diabetes prevention, treatment, and management	Diabetes prevalence, obesity prevalence, smoking rates, chronic disease burden	Elevated diabetes prevalence (13.5%) and high obesity (24%) and smoking rates (22%) indicate substantial disease burden, underscoring the importance of diabetes care and prevention at the population level
Subjective norms	Perceived social expectations and support influencing health behavior	Racial and ethnic disparities, neighborhood-level prevalence patterns, community health priorities	Higher diabetes prevalence among Black residents and in West Louisville reflects shared community-level risk patterns shaped by social and structural norms within historically marginalized populations
Perceived behavioral control	Perceived ability to access and engage in diabetes care given	Poverty rate, housing cost burden, SNAP participation, food desert classification,	Socioeconomic vulnerability (14% poverty, 43% renter housing cost burden, ~93,000 residents in food deserts) suggests constrained

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	available resources	insurance coverage indicators	capacity to consistently access diabetes care despite service availability (Gucciardi et al., 2014).
Structural and contextual constraints (interpretive extension)	External conditions influencing the translation of intention into action	Transportation barriers, food access, environmental exposures, healthcare system utilization	Limited food access, environmental stressors, and uneven utilization of healthcare resources indicate structural barriers that restrict effective diabetes management
Health outcomes (contextualized)	Population-level consequences of interacting behavioral and structural factors	Diabetes prevalence, hospitalization risk, comorbid conditions	Elevated prevalence and documented disparities highlight how behavioral determinants coexist with systemic barriers to shape diabetes outcomes

- Note: The Theory of Planned Behavior was used as an interpretive framework rather than a predictive model. Constructs were applied descriptively to organize and contextualize secondary data findings without implying individual-level measurement, causation, or behavioral prediction.

➢ *Application of the Theory of Planned Behavior*

As summarized in Table 3, the Theory of Planned Behavior was used as a conceptual framework to organize and interpret population-level indicators related to diabetes care access in Jefferson County. Rather than serving as a predictive or causal model, the framework helped contextualize how attitudes toward diabetes care, perceived social norms, and perceived behavioral control coexist with socioeconomic and structural constraints identified in publicly available data. Indicators such as elevated diabetes prevalence, socioeconomic vulnerability, housing cost burden, and limited food access were interpreted as reflecting constrained perceived behavioral control at the community level, despite the availability of healthcare resources. This theory-informed interpretation supports a structured understanding of how behavioral and structural factors jointly shape access to diabetes care within the local context, as illustrated in Table 3.

IV. SUMMARY OF KEY FINDINGS

In summary, publicly available secondary data demonstrate that type 2 diabetes constitutes a sustained and disproportionate public health burden in Jefferson County, Kentucky, with a crude prevalence of approximately 13.5 percent that exceeds the national estimate of 12.0 percent and an age-adjusted prevalence of 12.0 percent compared with 10.4 percent nationally. Marked disparities are evident across racial, geographic, and socioeconomic groups, with higher prevalence observed among Black residents and in economically disadvantaged neighborhoods, particularly in West Louisville, where estimates approach 20 percent compared with 10 to 12 percent in more affluent areas. These patterns occur within a broader population context characterized by an aging demographic structure, substantial racial and ethnic diversity, and pronounced socioeconomic vulnerability, including a median household income of $58,196, a poverty rate of approximately 14 percent, and widespread housing cost burden. Structural and behavioral risk factors further compound diabetes risk and complicate disease management, as nearly 24 percent of adults are affected by obesity, 22 percent report current tobacco use, and close to 93,000 residents live in census tracts classified as food deserts with limited access to affordable, nutritious food. Taken together, these findings illustrate the interconnected influence of demographic composition, socioeconomic disadvantage, behavioral risk factors, and structural conditions on diabetes prevalence and access to care in Jefferson County, underscoring the need for equity-focused, contextually informed public health strategies to address chronic disease burden in urban communities.

V. DISCUSSION

This descriptive, secondary data–based community health needs assessment highlights the sustained and inequitable burden of type 2 diabetes in Jefferson County, Kentucky, and places local patterns within a broader state and national public health context. County-level surveillance data indicate that both crude and age-adjusted diabetes prevalence in Jefferson County remain higher than corresponding national estimates, reinforcing diabetes as a continuing and significant population health challenge in this metropolitan area (Centers for Disease Control and Prevention, 2024). These findings align with statewide trends in Kentucky, where diabetes prevalence consistently exceeds national benchmarks and contributes substantially to preventable morbidity and healthcare utilization. Persistent disparities are evident across racial, geographic, and socioeconomic lines, with disproportionately higher prevalence observed among Black residents and among populations living in economically disadvantaged neighborhoods, particularly in West Louisville. Such patterns reflect long-standing inequities rooted in structural disadvantage, differential access to preventive services and healthcare, and cumulative exposure to adverse social and environmental conditions (Association, 2024; Greater Louisville Project, 2022). Together, these findings underscore that diabetes burden in Jefferson County is not evenly distributed across the population and continues to mirror broader inequities documented in urban communities nationwide, highlighting the need for equity-focused public health strategies that extend beyond clinical care alone.

Socioeconomic conditions appear to play a central role in shaping these disparities. Lower median household income, elevated poverty rates, housing cost burden, and reliance on food assistance are all more prevalent in Jefferson County than national averages (Metro United Way & KSDC, 2022; Guzman & Kollar, 2024). Use of illicit drugs, tobacco, and alcohol can negatively affect diabetes

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outcomes by disrupting glucose metabolism, increasing insulin resistance, impairing medication adherence, and heightening the risk of acute complications and long-term comorbidities (Hasan, M.R., 2024). These conditions limit access to medications, preventive services, and healthy food options, thereby complicating diabetes prevention and management. Acute infections such as influenza, dengue fever, and urinary tract infections have been shown to adversely affect diabetes control, with studies suggesting that approximately 30–50% of individuals with diabetes experience significant worsening of glycemic control during infectious episodes, and people with diabetes facing two- to four-fold higher risk of infection-related complications and hospitalization compared with those without diabetes (Hasan et al., 2025). The high prevalence of food deserts affecting more than 92,000 residents further illustrates how structural barriers intersect with individual risk factors, contributing to poorer dietary adherence and suboptimal glycemic control, as documented in prior studies (Gucciardi et al., 2014; Hasan & Parker., 2025). Evidence indicates that adults with diabetes experience higher rates of obesity, with national estimates showing that approximately 85–90% of individuals with type 2 diabetes are overweight or obese, reflecting shared metabolic pathways and bidirectional risk between diabetes and excess weight (Hasan et al.,2025; Verma & Hussain., 2017).

Behavioral and environmental risk indicators further compound diabetes-related challenges in Jefferson County. Elevated rates of obesity and tobacco use mirror patterns observed in other underserved urban communities and are well-established contributors to the development and progression of type 2 diabetes (Klein et al., 2023; Maddatu et al., 2018). At the community level, limited access to safe recreational spaces and greater exposure to environmental stressors restrict opportunities for physical activity and the adoption of healthy lifestyle behaviors (Dendup et al., 2018; Maroko et al., 2009). Health risks are further amplified by infectious exposures, as individuals with diabetes who experience COVID-19 or other acute infections demonstrate a 30–60% higher likelihood of poor glycemic control and hospitalization and are 1.5–2 times more likely to experience depression or anxiety, which can further hinder disease management and engagement with care (Kabir et al., 2023). Respiratory tract infections, particularly during periods of elevated air pollution, have also been linked to poorer glycemic control, with polluted air associated with a 20–40% increased risk of respiratory infections and inflammation-driven metabolic dysregulation that exacerbates diabetes outcomes (Hasan, M.R., 2022). Collectively, these findings reinforce national evidence indicating that diabetes outcomes are shaped not only by individual behaviors but also by broader social, environmental, and structural contexts (Beckles & Chou, 2016).

The findings also underscore the relevance of behavioral theory in understanding access to diabetes care within complex community settings. When interpreted through the Theory of Planned Behavior, county-level indicators suggest that although awareness of diabetes and the availability of clinical services may be relatively high, both perceived and actual control over accessing care remain constrained by cost, transportation limitations, and broader structural barriers (Tucker et al., 2014). These constraints limit individuals' ability to translate positive intentions and supportive social norms into consistent engagement with diabetes care. This perspective helps explain why expanded healthcare infrastructure, on its own, has not been sufficient to eliminate persistent disparities in diabetes outcomes. Similar conclusions have been reported in other urban studies, which demonstrate that improvements in health literacy and service availability must be accompanied by systemic efforts to reduce access barriers, streamline care navigation, and address social and economic constraints that shape healthcare utilization (Rodriguez et al., 2022). Together, these findings highlight the need for diabetes care strategies that integrate behavioral insights with structural interventions to support sustained access and equitable outcomes.

Beyond behavioral considerations, the findings align with a growing body of literature demonstrating that diabetes outcomes are strongly shaped by social and environmental conditions that extend beyond the healthcare system. National evidence indicates that adults living in food-insecure households experience significantly poorer diabetes control, with food insecurity affecting dietary adherence and increasing the risk of diabetes-related complications (Gucciardi et al., 2014). In Jefferson County, nearly 93,000 residents live in food desert census tracts, limiting access to affordable, nutritious foods and reinforcing reliance on calorie-dense diets that elevate diabetes risk. Population-level data indicate that adults with diabetes experience approximately 1.5–3 times higher risk of severe outcomes, hospitalization, and mortality during epidemic infectious conditions such as dengue, malaria, and mpox, reflecting how underlying metabolic vulnerability and health disparities amplify susceptibility and disease severity in affected populations (Hasan, Yusuf et al., 2024, 2025). Environmental exposures and neighborhood infrastructure further contribute to these disparities, as limited access to safe recreational spaces and higher exposure to environmental pollutants have been associated with reduced physical activity and increased metabolic risk (Dendup et al., 2018; Maroko et al., 2009). At the population level, these conditions intersect with behavioral risk factors, including obesity, which affects approximately 24% of adults, and smoking, reported by 22% of adults, both of which are well-established contributors to insulin resistance and diabetes progression (Beckles & Chou, 2016; Maddatu et al., 2018; Klein et al., 2023). Collectively, these findings reinforce the need to address upstream social and environmental determinants alongside clinical care to meaningfully reduce diabetes-related inequities in urban communities.

Despite these challenges, Jefferson County is supported by a comparatively robust network of healthcare and community-based organizations that deliver diabetes prevention, education, and treatment services. Major health systems, including Norton Healthcare, UofL Health, and

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Baptist Health, alongside Federally Qualified Health Centers and state-supported initiatives, offer a range of resources such as Diabetes Self-Management Education and Support programs, nutrition counseling, chronic disease management services, and expanded telehealth options (Services, 2023; CMS, 2024). These services represent important structural assets for addressing diabetes across the county. However, secondary data indicate that utilization of available resources remains uneven, with lower engagement observed in communities experiencing greater socioeconomic disadvantage, transportation barriers, and competing daily stressors. Gaps in awareness, care navigation challenges, limited appointment flexibility, and out-of-pocket costs may further restrict effective use of existing services. These findings suggest that expanding service availability alone is insufficient to reduce diabetes-related disparities. Instead, greater emphasis is needed on improving care coordination, strengthening culturally responsive and community-centered outreach, and implementing policy approaches that address affordability, transportation access, and continuity of care. Aligning healthcare delivery with the lived realities of underserved populations will be critical to ensuring that existing diabetes resources translate into equitable improvements in outcomes.

VI. STRENGTHS AND LIMITATIONS OF THE STUDY

A major strength of this study lies in its use of multiple high-quality, publicly available data sources, which enabled a comprehensive and policy-relevant description of diabetes burden, access-related indicators, and structural determinants at the county level. By integrating national surveillance systems with state and local datasets, the analysis provides a coherent population-level overview of diabetes-related inequities in Jefferson County that is directly relevant to public health planning and resource allocation. The reliance on standardized surveillance data enhances transparency, replicability, and comparability with state and national benchmarks, strengthening the utility of the findings for decision-makers.

Several limitations should be acknowledged. First, the use of aggregated secondary data limits the ability to conduct individual-level analyses or assess causal relationships between determinants and diabetes outcomes. Second, publicly available datasets may underestimate true diabetes prevalence, particularly among individuals with undiagnosed disease or limited healthcare access. Third, although county-level indicators provide valuable insight, they may obscure important within-county variation across neighborhoods and subpopulations. Finally, the cross-sectional nature of the available data restricts the ability to assess temporal trends or evaluate the impact of recent policy or programmatic changes over time.

VII. FUTURE RESEARCH DIRECTIONS

Future research should build on these findings through longitudinal and multilevel study designs that can better capture changes in diabetes burden, access to care, and outcomes across time and place. Linking individual-level clinical data with neighborhood-level social and environmental indicators would allow for a more nuanced understanding of how structural conditions interact with behavioral factors to shape diabetes outcomes. Mixed-methods research incorporating qualitative approaches, such as interviews or community-based participatory methods, could further illuminate lived experiences of care navigation and barriers that are not captured in surveillance data.

From a theoretical perspective, future studies should continue to integrate behavioral frameworks with structural and systems-oriented models, such as social ecological or health equity frameworks, to better account for the complex pathways influencing diabetes care access. Evaluations of policy and system-level interventions, including Medicaid expansion, CMS coverage reforms, telehealth implementation, and community-based diabetes navigation programs led by Certified Diabetes Care and Education Specialists, are also warranted. Expanding research to comparable mid-sized urban settings would strengthen generalizability and inform scalable, equity-focused strategies for reducing diabetes-related disparities across diverse communities.

VIII. CONCLUSION

In conclusion, this secondary data–driven community health needs assessment underscores that type 2 diabetes remains a significant and inequitable public health concern in Jefferson County, Kentucky, shaped by enduring racial, geographic, and socioeconomic disparities. Although the county benefits from substantial healthcare resources, elevated diabetes prevalence and persistent access barriers highlight the reality that service availability alone is insufficient to ensure equitable outcomes. Structural challenges related to affordability, transportation, food access, and care navigation continue to limit individuals' ability to engage consistently in diabetes prevention and management, particularly in historically marginalized communities. Addressing these gaps will require coordinated, equity-focused strategies that integrate behavioral insights with system-level reforms, including community-based care navigation, flexible and affordable service delivery models, and stronger linkages between healthcare systems and social support services. Certified Diabetes Care and Education Specialists, public health practitioners, and policymakers are well-positioned to translate these insights into action by prioritizing culturally responsive, community-informed approaches that align services with lived realities. Lessons from Jefferson County provide a valuable reference point for other mid-sized urban communities facing similar challenges and reinforce the importance of advancing integrated strategies that reduce disparities and promote sustainable improvements in diabetes outcomes across diverse populations.

- *Data Availability Statement*

The data supporting the findings of this study were obtained exclusively from publicly available secondary sources, including national, state, and local public health

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surveillance datasets. All data analyzed are accessible through the original sources cited in the manuscript, including the Centers for Disease Control and Prevention Diabetes Atlas.

(https://gis.cdc.gov/grasp/diabetes/DiabetesAtlas.html). No individual-level, confidential, or identifiable data were generated, collected, or analyzed as part of this study.

- *Conflict of Interest Statement*

The authors declare no conflicts of interest related to the content of this manuscript.

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- *Author Contributions*

Md R.H. conceptualized and designed the study, led data acquisition and analysis, drafted the manuscript, and completed critical revisions. *Moryom A.M.* contributed to the literature review, manuscript writing and editing, and preparation of tables and figures. All authors reviewed and approved the final manuscript and agreed to be accountable for the work.

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