Nebraska Hospital Emergency Department (ED) Use for Non-Traumatic Dental Conditions (NTDCs), 2019-2023

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LIST OF ABBREVIATIONS

ACA	Affordable Care Act
ASTDD	Association of State and Territorial Dental Directors
BSS	Basic Screening Survey
CUSoD	Creighton University School of Dentistry
DHHS	Department of Health and Human Services
ED	Emergency Department
EMTALA	Emergency Medical Treatment and Labor Act
FAR	Frontier and Remote
FORHP	Federal Office of Rural Health Policy
FQHC	Federally Qualified Health Center
GIS	Geographic Information System
HDD	Hospital Discharge Data
HPSA	Health professionals Shortage Area
HPTS	Health Professionals Tracking Services
HRSA	Health Resources and Services Administration
ICD	International Classification of Diseases
IRB	Institutional Review Board
MCO	Managed Care Organization
MSA	Metropolitan Statistical Area
NDA	Nebraska Dental Association
NHA	Nebraska Hospital Association
NIDCR	National Institute of Dental and Craniofacial Research
NTDC	Non-Traumatic Dental Conditions
OMB	Office of Management and Budget

OOHD	Office of Oral Health and Dentistry
ROI	Return on Investment
UHC	UnitedHealthcare
UNMC	University of Nebraska Medical Center

1. INTRODUCTION

Non-traumatic dental conditions (NTDCs), including untreated dental decay, acute pulpitis, periapical abscesses, cellulitis, and other non-injury-related conditions, remain a substantial cause of avoidable hospital emergency department (ED) utilization in the United States (Choi et al., 2025; Kelekar et al., 2025; Nagarajan et al., 2022; Chalmers et al., 2016). Although these conditions can be definitively treated in an outpatient dental setting, lack of insurance, limited access to dentists (e.g., in underserved rural and frontier areas), and the scarcity of affordable dental care services are among the many reasons individuals seek care at hospital EDs for NTDC (Wall et al., 2012; Chalmers et al., 2016). Under the federal Emergency Medical Treatment and Labor Act (EMTALA), EDs cannot refuse necessary emergency treatment even if, as in the case of NTDCs, care is typically limited to temporary measures (e.g., analgesics, anti-inflammatories, and antibiotics) rather than definitive restorative or surgical treatment. Hospital EDs are designed for medical issues, are not staffed with dental personnel, and are typically not appropriately equipped to provide dental care. As a result, ED visits for NTDCs contribute to recurrent utilization, persistent morbidity, and a disproportionate financial burden for patients and the healthcare system. Currently in the US, NTDC accounts for millions of ED visits annually, with more than 95% managed on a treat-and-release basis rather than addressing the underlying cause of the problem (Wall & Vujicic, 2015). A 2022 analysis by the CareQuest Institute for Oral Health estimated that these visits generated approximately $3.9 billion in hospital charges, underscoring the fiscal inefficiency of delivering palliative care in emergency settings (CareQuest Institute for Oral Health, 2023). Despite the preventable nature of these conditions, national estimates suggest that many patients will often return to the ED multiple times within weeks or months of their initial visit when their symptoms recur (Okunseri et al., 2012; Chalmers et al., 2016; Nagarajan et al., 2022; Choi et al., 2025; Kelekar et al., 2025). Recent national data (CareQuest Institute for Oral Health, 2023) indicate that ED dental visits are starting to decline. However, hospital costs continue to rise. A similar trend has been documented in the State of Nebraska, as discussed in this report.

Patterns of ED use for NTDC also reveal stark inequities. As demonstrated in previous studies, including data from the Nebraska Department of Health and Human Services

(DHHS), Office of Oral Health (Wani & Craft, 2019), adults aged 18 - 44, individuals from lower-income communities, and Hispanic and Black communities experience disproportionately higher rates of NTDC ED visits (Okunseri et al., 2011; 2012; Allareddy et al., 2014; Sun et al., 2015; Wall & Vujicic, 2015; Rampa et al., 2018). Insurance coverage is a critical determinant of oral health (Wall & Vujicic, 2015; Vujicic et al., 2016; Manski & Rohde, 2017; Sun et al., 2015; National Institute of Dental and Craniofacial Research, 2021). While Medicaid beneficiaries account for many of these visits, most involve uninsured individuals, reflecting the patchwork nature of adult dental benefits across the country (Wall & Vujicic, 2015; Vujicic et al., 2016; Manski & Rohde, 2017; Sun et al., 2015; National Institute of Dental and Craniofacial Research, 2021; Wani & Craft, 2019; Wallace et al., 2021). Where states have expanded child and adult Medicaid dental coverage, reductions in dental ED use have been observed (Choi, 2011; Singhal et al., 2017; Semprini & Samuelson, 2023; Choi et al., 2025), suggesting that strengthening access to preventive and definitive oral health services is an actionable policy lever. However, the reliance on EDs for management of NTDCs highlights a critical misalignment between the organization of dental and medical care in the US. Unlike most other conditions presented in emergency settings, NTDCs are largely preventable and treatable in outpatient environments at a fraction of the cost. Their persistence in EDs signals unmet dental care needs, inadequate access to dental care, and the consequences of fragmented benefit design. Addressing this problem is therefore not only a question of efficiency but also of equity, fair treatment, and population-focused systemic health.

1.1 THE 2019 NEBRASKA HOSPITAL ED USE FOR NTDC REPORT

In 2019, the Nebraska DHHS, Office of Oral Health, released the State of Oral Health for Hospital ED Use for NTDC (Wani & Craft, 2019). This study analyzed International Classification of Diseases (ICD) diagnosis data from the Nebraska Hospital Association (NHA) to monitor dental conditions across hospitals in the state (**Appendix 1**). According to that report, visits to local EDs between 2009 and 2014 steadily increased, with peak cumulative growth of 29.8% for patients and 27.4% for visits. Although the number of patients and visits declined by the end of data collection, the overall cumulative increase in patients remained 3.5% higher than in 2009, and the number of visits was 6.1% above baseline (Wani & Craft, 2019). Furthermore, the 2019 report showed that most people

visiting Nebraska's EDs for NTDCs were working-age adults (26 - 45 years old), mostly White, female, enrolled in Medicaid or uninsured, and living in urban areas, pointing out key demographic and coverage patterns in ED use for preventable dental conditions. Between the 2009-2016 period, the payer distribution for NTDC ED visits shifted substantially. While the proportion of uninsured patients declined from 28.1% to 9.1% over time, Medicaid increased from 25.4% to 34.5%, becoming the dominant payor by 2016. Medicare also rose steadily from 9.3% to 13.7%. These findings suggested a transition from uninsured to publicly insured populations over time, potentially reflecting broader insurance expansion policies and eligibility changes resulting from the implementation of the Affordable Care Act (ACA) in 2010 (Sommers et al., 2015; Wherry et al., 2016; Courtemanche et al., 2017; National Institute of Dental and Craniofacial Research, 2021). Based on the 2019 report, the total annual ED charges for NTDCs increased by approximately 110%, rising from $4.77 (2009) million to over $10 million (2016). Over the same period, the mean charge per visit increased by 97.9%. The slightly greater increase in total annual charges reflects the combined effect of escalating per-visit costs and modest growth in visit volume. Taken together, these findings suggest that rising ED expenditures during that period were driven primarily by increases in per-encounter charges rather than by substantial increases in ED utilization.

1.2. WHERE ARE WE NOW?

Recent challenges in healthcare access and financing continue to place significant strain on hospital systems, particularly in rural areas where financial instability and workforce shortages limit access to timely, preventive care. In Nebraska, nearly half of rural hospitals operate at a financial loss, with Medicaid reimbursement rates covering only a portion of the cost of care, contributing to ongoing system pressures (Hospitals decry Medicaid cuts, 2025). According to an article in the Lincoln Journal Star in June 2025, the average cost of care at Nebraska hospitals surged by nearly 33% between July 1, 2020, and June 30, 2024, driven by higher labor, supply, and pharmaceutical costs (Hospitals decry Medicaid cuts, 2025). These structural challenges disproportionately affect underserved populations, who often face barriers to accessing routine dental services, including limited provider availability, lack of insurance coverage, and transportation constraints. As a result, EDs increasingly serve as a point of care for NTDCs, despite being ill-equipped to provide

definitive treatment. This reliance reflects broader gaps in preventive and community-based oral healthcare, contributing to higher costs and the inefficient use of healthcare resources. More broadly, limited access to preventive services and poor care coordination within a fragmented healthcare system further exacerbate treatment delays and increase avoidable ED utilization (We need to fix our health care system, 2025). Understanding patterns of ED utilization for NTDC is therefore critical to identifying disparities in access, informing targeted interventions, and supporting policies that strengthen the oral health safety net and reduce avoidable emergency care.

NTDCs are largely preventable; however, many patients continue to face significant barriers to accessing preventive dental care. Evidence from the 2021–2022 Nebraska Oral Health Basic Screening Survey (BSS) of young children demonstrates that community-based outreach dental disease prevention programs can effectively improve oral health outcomes in rural populations (Craft & Ball, 2024). Expanding similar approaches to underserved adult populations will be essential to reducing the frequency of NTDC-related ED visits and their associated costs. Improving access to and utilization of routine dental services is critical for promoting overall health and preventing disease progression. National estimates from Healthy People 2030 indicate that only about 43.2% of children, adolescents, and adults received a dental exam or used the oral health care system within the past year(s) (U.S. Department of Health and Human Services, Healthy People 2030, 2020), underscoring persistent gaps in preventive care utilization. Individuals without regular access to dental care are less likely to receive early intervention, increasing the likelihood that conditions progress to more severe stages requiring emergency care.

2. OBJECTIVES

The present study builds upon the 2019 Nebraska report on hospital ED utilization for NTDCs by conducting a population-based analysis of NTDC-related ED visits in Nebraska from January 2019 through December 2023. Consistent with the Association of State and Territorial Dental Directors (ASTDD) guidance for assessing ED data for NTDCs (ASTDD, 2017), this study aims to describe the burden and distribution of NTDC-related ED utilization using standardized indicators.

Specific Objectives Are To:

1. Quantify the magnitude of NTDC-related ED utilization, including the number and rate of visits over time.
2. Describe patient and visit characteristics, including demographic factors, payor type, and geographic distribution (e.g., urban/rural residence).
3. Assess associated healthcare utilization and costs, including total and per-visit charges.
4. Examine trends over time in NTDC-related ED visits in the context of relevant policy, system-level, and access-to-care factors.

Findings are intended to inform state and local oral health surveillance efforts, support program planning and evaluation, and guide policy and system-level strategies to reduce preventable ED utilization and improve access to comprehensive, preventive dental care.

3. METHODS

3.1. DATA SOURCES AND STUDY DESIGN

This study was approved by the Creighton University Institutional Review Board (IRB# 2004486-01). We conducted a retrospective, observational study of ED utilization for NTDCs, covering the period from January 2019 through December 2023. The 5-year analysis was based on statewide hospital discharge data (HDD) obtained from the NHA, which includes encounter-level information such as patient demographics (e.g., age, sex, ethnicity, residential address), insurance coverage, disposition status, hospital location, and hospital charges. Dentist practice locations were identified from the Health Professionals Tracking Services (HPTS) at the University of Nebraska Medical Center (UNMC) College of Public Health, and emergency facility sites were obtained from the Office of Rural Health, Nebraska DHHS, to enable geographic mapping of utilization patterns. NTDC visits were identified using primary, secondary, and tertiary diagnosis codes specified by the ASTDD guidance on ED surveillance. The ICD-10 codes (**Appendix 1**) were applied as previously described by Wani and Craft (2019). All ED encounters meeting the NTDC definition were included. An individual ED visit was used as the unit of analysis, and descriptive statistics were used to summarize the data.

3.2. STATISTICAL ANALYSIS

To remain consistent with the previous 2019 report published by the Nebraska Office of Oral Health (Wani & Craft, 2019), most methodological procedures in this study followed the ASTDD Guidance on Assessing Emergency Department Data for Non-Traumatic Dental Conditions (ASTDD, 2020). Descriptive statistics were generated to characterize ED visits and patients over time. Frequencies, proportions, means, and medians were reported, stratified by demographic and payor characteristics. To characterize repeat ED utilization, we calculated an annual utilization intensity measure as the ratio of total NTDC-related ED visits to the number of unique patients presenting each year of the study period (**Figure 1**). This measure reflects the average number of ED encounters per patient and was used to assess the extent of repeated ED use for dental conditions over time.

$$\textit{Visit per Patient Ratio} = \frac{\text{Visits}}{\text{Patients}}$$

Figure 1. *ED Utilization Equation. Values closer to 1.0 indicate that most patients presented for a single visit in any given year, whereas higher values suggest more frequent repeat ED utilization.*

We used the most recent population estimates from the U.S. Census Bureau for Nebraska, along with county geometries. The annual rate of NTDC visits per 10,000 population was calculated. Patient characteristics (age, sex, residence, and primary payor), total and median hospital charges, and geographic distribution of visits by county. Hospital charges reflect the amounts hospitals bill and do not represent the actual cost of care or the reimbursement received from potential primary payors' insurance. All data cleaning, statistical analyses, creation of derived variables (e.g., rates per 10,000 population), and figure generation were performed in R (version 4.5.1; R Foundation for Statistical Computing, Vienna, Austria) on a Windows x64 platform. County-level rates were calculated and joined to Nebraska county boundary data for visualization. Geographic information

system (GIS) mapping was used to visualize the distribution of dental-related ED visits across counties relative to dentist practice locations and emergency facilities. Analyses were descriptive in nature and not intended to evaluate causal relationships.

3.3. GEOGRAPHICAL ANALYSIS

To assess geographic variation in ED utilization for NTDCs, county-level population-based rates were calculated for the period 2019–2023. The total number of ED visits for NTDCs was aggregated by county of patient residence and normalized using county population estimates, with rates expressed as visits per 10,000 population. Population denominators were derived from census-based estimates corresponding to the study period. Rates were categorized into five groups (<10, 11–25, 26–50, 51–100, and >100 visits per 10,000 population) to enhance interpretability and support visual comparison. County-level data were spatially linked to a Nebraska county boundary shapefile, and choropleth maps were generated using R (version 4.5.0). Next, we combined that information with the availability of emergency facilities and the number of practicing dentists in each county. Data on practicing dentists per county were acquired from the Health Professions Tracking Service within the Department of Health Services Research and Administration, UNMC College of Public Health. Hospital charges used in our analysis refer to the charges hospitals levied on patients, not the cost of care provided or the amount of reimbursement for services rendered.

3.3.1. GEOGRAPHIC RATE CALCULATIONS AND DATA COMPLETENESS

County-level population-based rates were selected to facilitate geographic comparisons of community burden rather than hospital workload. However, interpretation of these rates requires consideration of data source boundaries. The NHA database captures participating in-state hospital ED encounters but does not include visits to out-of-state hospitals or encounters occurring at facilities outside the reporting system, including the tribal hospital located in Thurston County. As a result, NTDC-related ED utilization information may be underestimated in counties where residents commonly seek emergency care across state lines or at non-reporting facilities. This limitation is particularly relevant for border counties and areas surrounding Thurston County, where observed rates may reflect incomplete

capture of utilization rather than truly lower demand for emergency dental care. Accordingly, county-level geographic patterns, particularly in border and tribal regions, should be interpreted with caution.

4. RESULTS

4.1. PATIENT AND SERVICE UTILIZATION CHARACTERISTICS

Appendix 1 presents descriptive statistics and annual data on the number of visits, patient counts, basic demographic characteristics, service costs, and payor distribution for ED visits to NTDC at Nebraska hospitals from 2019 to 2023.

4.2. RATE OF ED UTILIZATION FOR NTDC BETWEEN 2019 AND 2023

Between 2019 and 2023, there were 35,697 visits to Nebraska's ED for NTDC, representing 31,323 patients (**Appendix 1**). Overall, ED utilization for NTDC declined during the study period. Total visits decreased from 8,227 in 2019 to 6,668 in 2023, representing a 19% reduction, while the number of unique patients declined from 7,037 to 6,046, a 14% decrease. The largest decline occurred between 2019 and 2020, when both visits and patients dropped by approximately 25%, likely reflecting the impact of the COVID-19 pandemic on healthcare utilization. Although visits partially rebounded in 2021 and 2022, utilization remained below pre-pandemic levels by 2023. To further evaluate ED utilization intensity during that period, we estimate the ratio of patient visits over time (**Table 1**). During that same period, visits per patient decreased modestly from 1.17 to 1.10 (an absolute change of -0.07 or -6%), indicating a slight decrease in repeated ED visits among individuals presenting with NTDCs over time. Taken together, these findings indicate that the observed decline in total ED revisits was driven primarily by a decrease in the number of individuals seeking hospital care for NTDC and likely receiving treatment elsewhere, which in turn led to a substantial decrease in repeat utilization patterns over time (**Figure 2**).

Table 1. ED Utilization in Nebraska between 2019 and 2023.

Year	Visits per Patient Ratio*
2019	1.17
2020	1.16
2021	1.14
2022	1.13
2023	1.10

*Values closer to 1.0 indicate that most patients presented for a single visit in any given year, whereas higher values suggest more frequent repeat ED utilization.

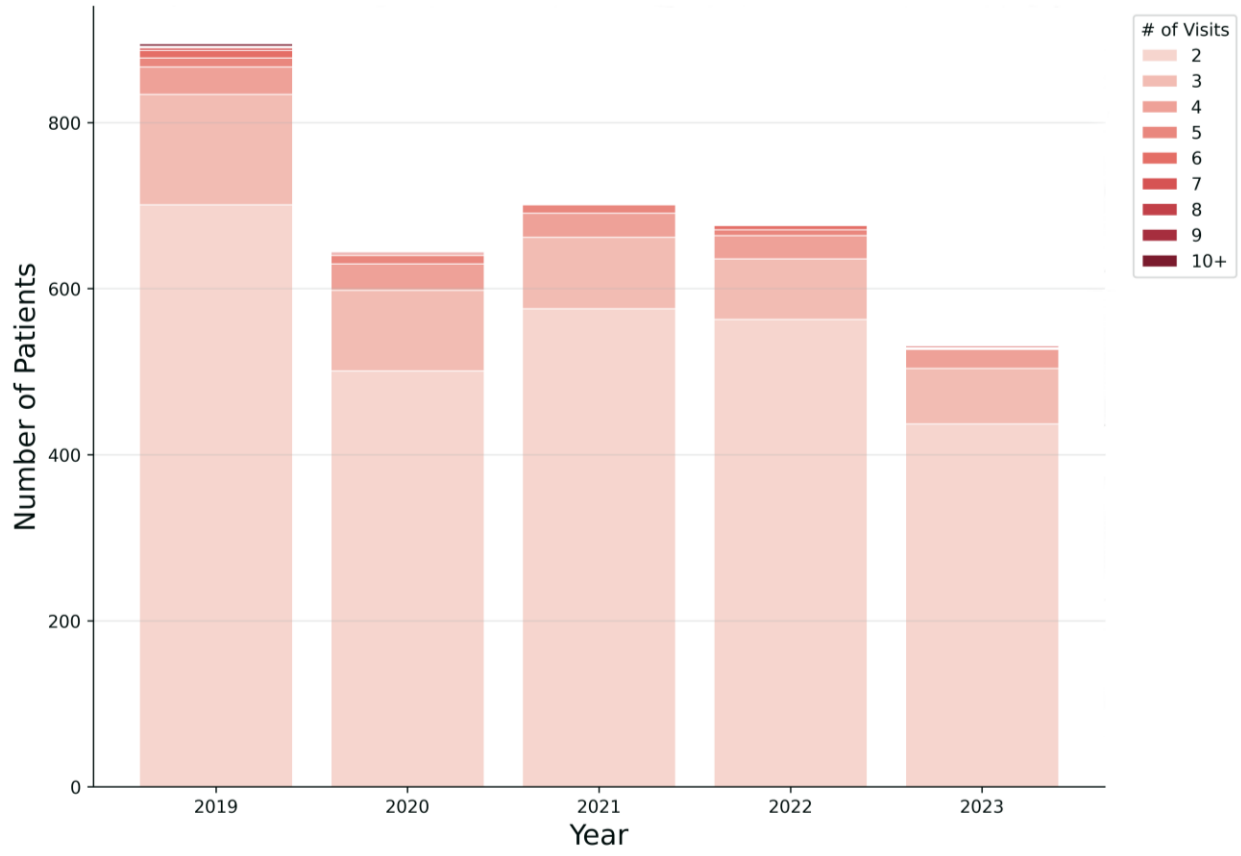
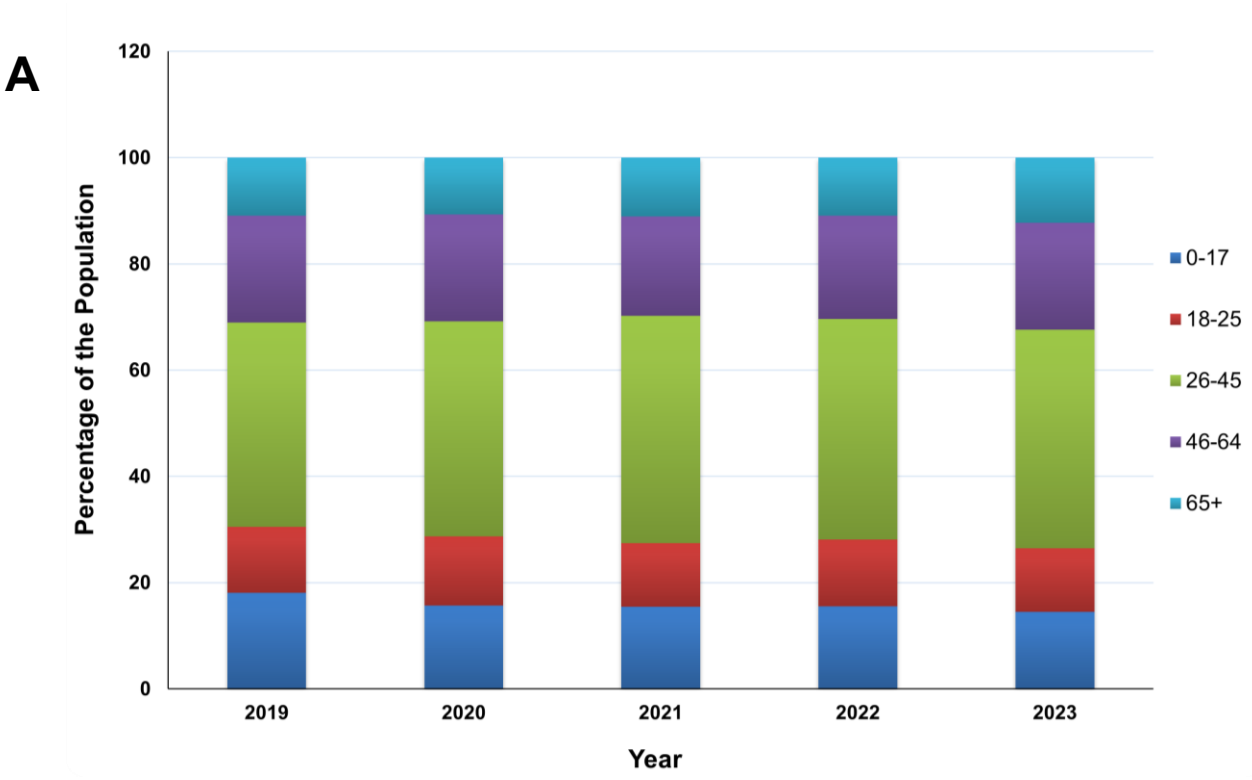


Figure 2. *Distribution of Repeated ED Visits for NTDC between 2019 and 2023. Most repeat ED visits involved patients with 2 visits per year. Higher-frequency repeat visits (≥4*

visits) were rare and decreased steadily over the study period, indicating that most repeat ED use was limited to a few patients returning for the same reason, rather than ongoing high-frequency visits.

4.3. AGE GROUPS

Across the study period, adults aged 26–45 (average age 37) consistently represented the largest proportion of ED visits for NTDCs, accounting for approximately 38%–43% of visits each year (**Appendix 1**). Adults aged 46–64 represented the second-largest group, contributing approximately 19%–20% of visits. In contrast, pediatric patients aged 0–17 demonstrated a gradual decline from 18.1% of visits in the first year to 14.4% in the final year (**Figure 3A**). The proportion of older adults aged 65 years and older increased modestly over time. Consistent with these shifts, both the mean and median age of patients increased slightly during the study period, suggesting a gradual aging of the population seeking emergency care for dental conditions (**Figure 3B**).



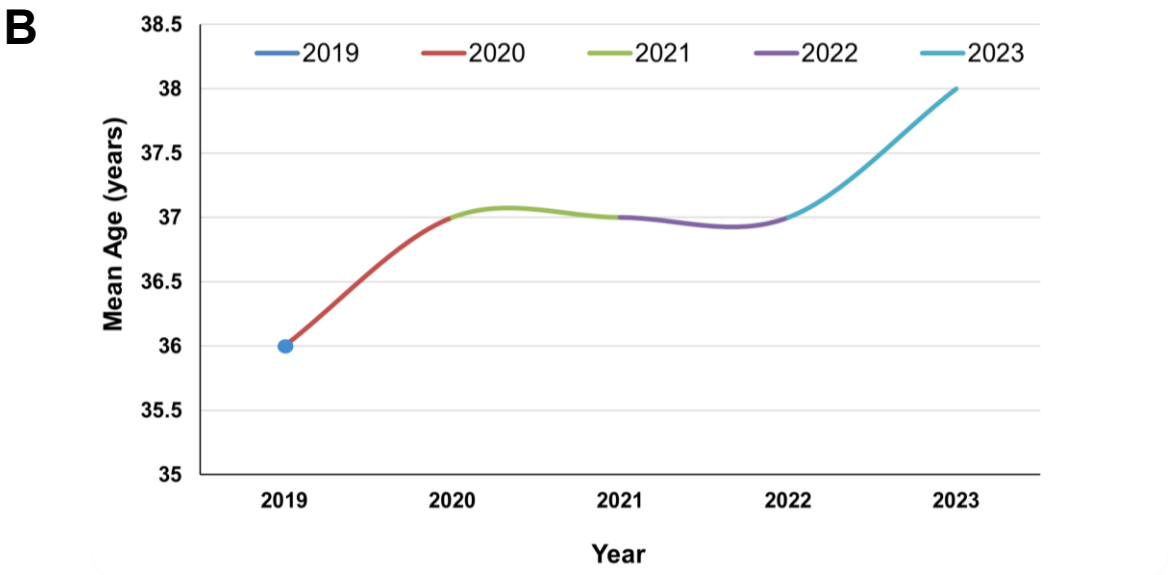


Figure 3. *Age Distribution of Patients Visiting Nebraska's ED for NTDC between 2019 and 2023*. **A**. *Age distribution of ED visits by year highlights a higher concentration among working-class adults. Individuals aged 26–45 consistently represent the largest proportion of patients, accounting for approximately 38-43% of visits across the study period. When combined with adults aged 46–64, working-age individuals comprise roughly 60% of all ED visits for dental conditions.* **B.** *The trend in mean age over time shows that most visits happened among adults in their prime working years. It also demonstrated how the average age of patients has risen over the years. Altogether, this finding indicates that untreated dental disease mainly impacts working-age individuals, potentially leading to lost productivity, missed workdays, and broader economic impact linked to preventable oral health issues.*

4.4. GENDER

Sex-related ED utilization was remarkably similar to the reported pattern in the 2019 report (Wani & Craft, 2019). Women consistently made up a slightly larger share of ED visits for NTDC throughout the study period (**Figure 4; Appendix 1**). Overall, females represented a slight majority of the population (54%), compared with males (46%). The percentage of female patients ranged from 51.8% to 54.5%, while male patients accounted for about 45.5% to 48.3% of visits each year. This pattern remained fairly steady over time, although the gap between the sexes decreased slightly in 2023. Altogether, these results show a small but steady tendency for more women to seek emergency care for dental issues. The

higher proportion of female patients aligns with broader healthcare use patterns, where women are generally more likely than men to seek medical care (Vaidya & Kamakar, 2012; Bertakis et al., 2000).

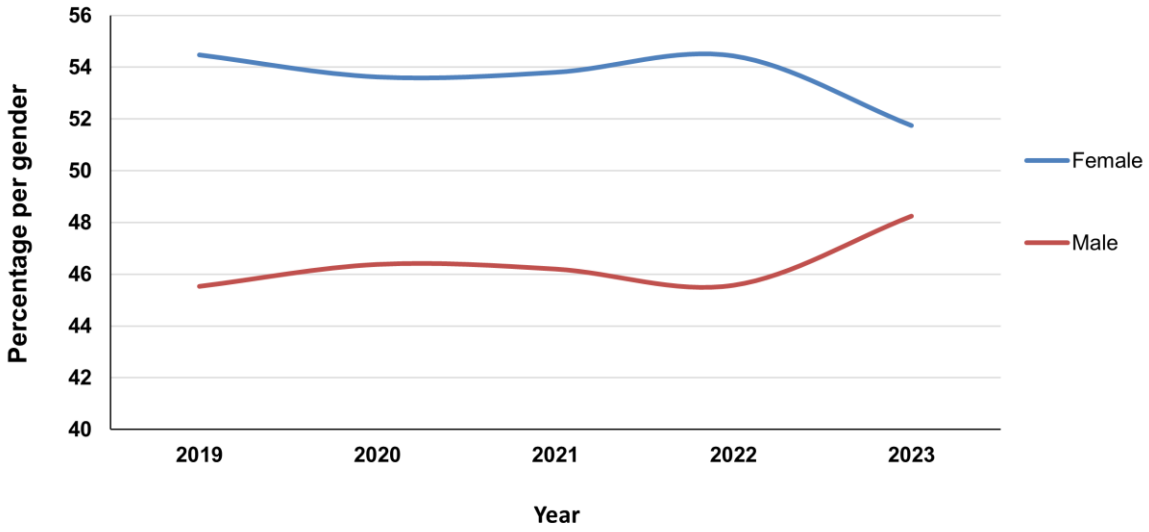


Figure 4. *Sex Distribution of ED Visits for NTDC between 2019 and 2023. Females consistently represented a slightly greater proportion of ED visits for NTDC throughout the study period. Female patients accounted for approximately 52–54% of visits annually, while males represented 46–48%. This distribution remained relatively stable over time, although the difference between sexes narrowed slightly in 2023, indicating a modest shift toward a more balanced sex distribution.*

4.5 PAYOR TYPE

The distribution of ED visits for NTDC varied substantially by primary payor (**Figure 5; Appendix 1**). For most of the data analysis period, Medicaid consistently accounted for the largest share of visits, rising from 29% in 2019 to over 40% in 2023. In contrast, the proportion of visits covered by private insurance declined steadily over time from 36% in 2019 to 27% in 2023. The proportion of uninsured patients (Self-Pay and No-Pay categories combined) remained relatively stable, fluctuating between 15% and 17% across the study period. While No-Pay visits declined dramatically, suggesting improvements in insurance

coverage or changes in billing practices, they were largely offset by Self-Pay visits, resulting in a stable overall uninsured population and indicating persistent financial barriers to routine dental care. Medicare coverage declined modestly (from 16% to 11%); however, when considered alongside Medicaid's growing share, the combined trend underscores the ED dental burden on publicly insured patients. The managed care organization (MCO) category appeared at the end of 2023 and accounted for 3.75% of the payments (**Figure 5**). However, since 2023, MCOs in Nebraska have played a central role in providing dental care for Medicaid beneficiaries, so this change likely reflects changes in payor classification rather than new utilization patterns. Overall, these findings suggest that ED dental utilization for NTDC is concentrated among publicly insured and uninsured populations, highlighting persistent barriers to accessing preventive and routine dental care outside hospital settings.

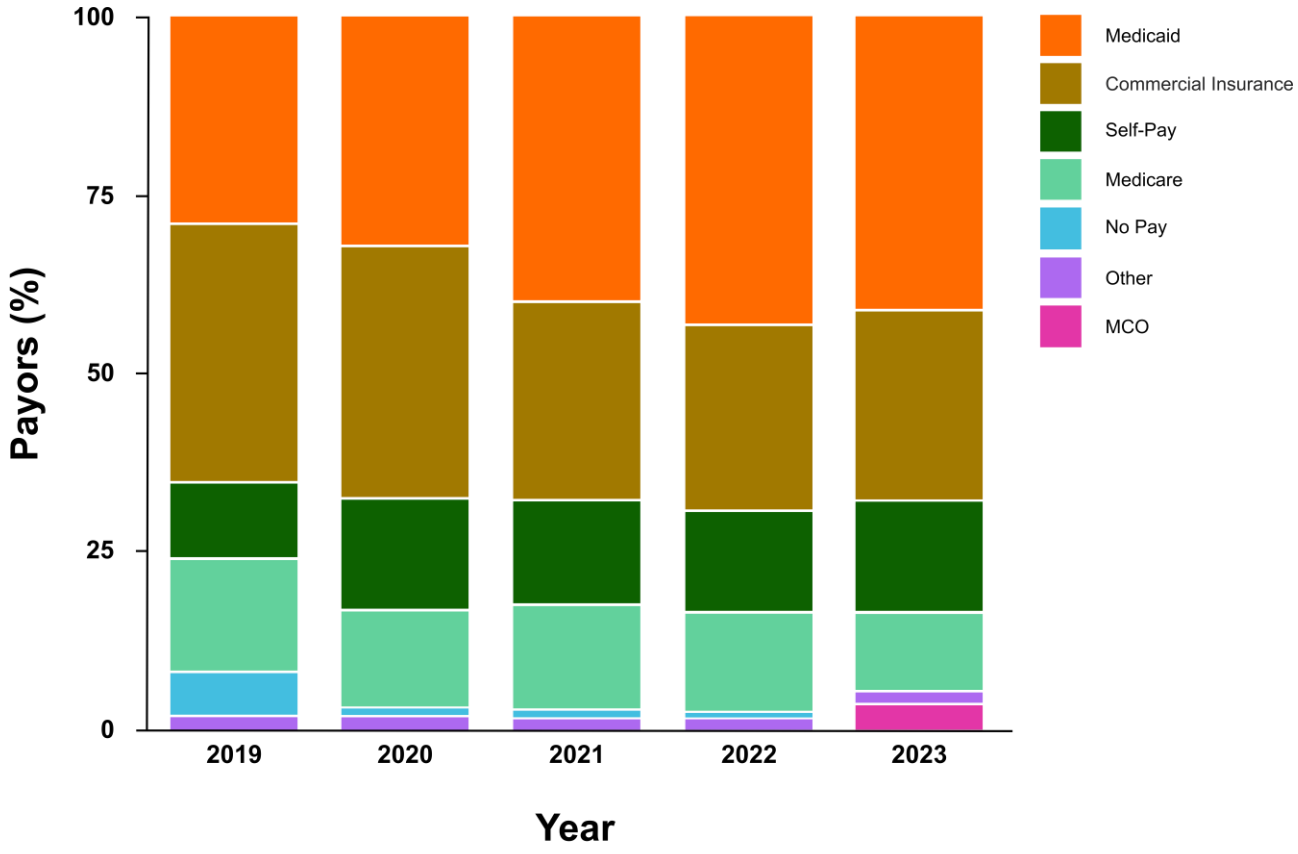
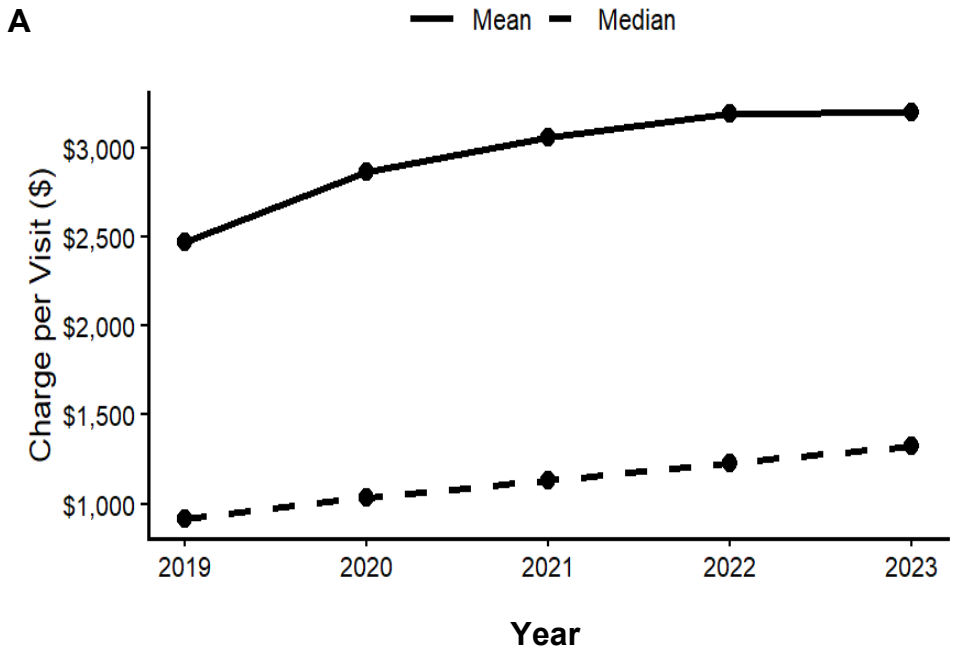


Figure 5. *Primary payor distribution for ED visits related to NTDCs between 2019 and 2023. Medicaid accounted for the largest share of visits throughout the study period and increased substantially over time, from 28.9% in 2019 to 40.9% in 2023, peaking at 43.0% in 2022. In contrast, private insurance declined from 23.3% to 16.7% over the same period. Uninsured patients remained a consistent proportion of visits, at approximately 15% to 17% annually.*

Medicare declined modestly, while ACA-covered visits remained comparatively stable. MCOs appeared only in 2023, likely reflecting a change in payor classification. Altogether, the payer distribution underscores persistent barriers to accessing routine dental care outside hospital settings.

4.6. ED CHARGES OVER TIME

The cost of ED visits for NTDCs increased substantially over the study period, totaling $104,362,939 (**Appendix 1**). Mean charges per visit rose from $2,468 (2019) to $3,198 (2023), representing a 29.6% increase and underscoring the rising cost per ED visit. On the other hand, median charges increased from $918 to $1,323 (44.1%) (**Figure 6A-C**). The consistent rise in median values, even higher than the mean, suggests that rising costs were not driven solely by high-cost outliers but reflect broader increases in typical visit charges. Despite these increases, total annual charges fluctuated between $17.6 million in 2020, when there were fewer ED visits than in other years, and $24.4 million in 2022, with no consistent upward trend. Of note, the wide range between minimum and maximum charges across all years indicates substantial variability in ED billing for dental conditions and suggests that the total cost may have been driven by both price and volume rather than purely utilization-driven.



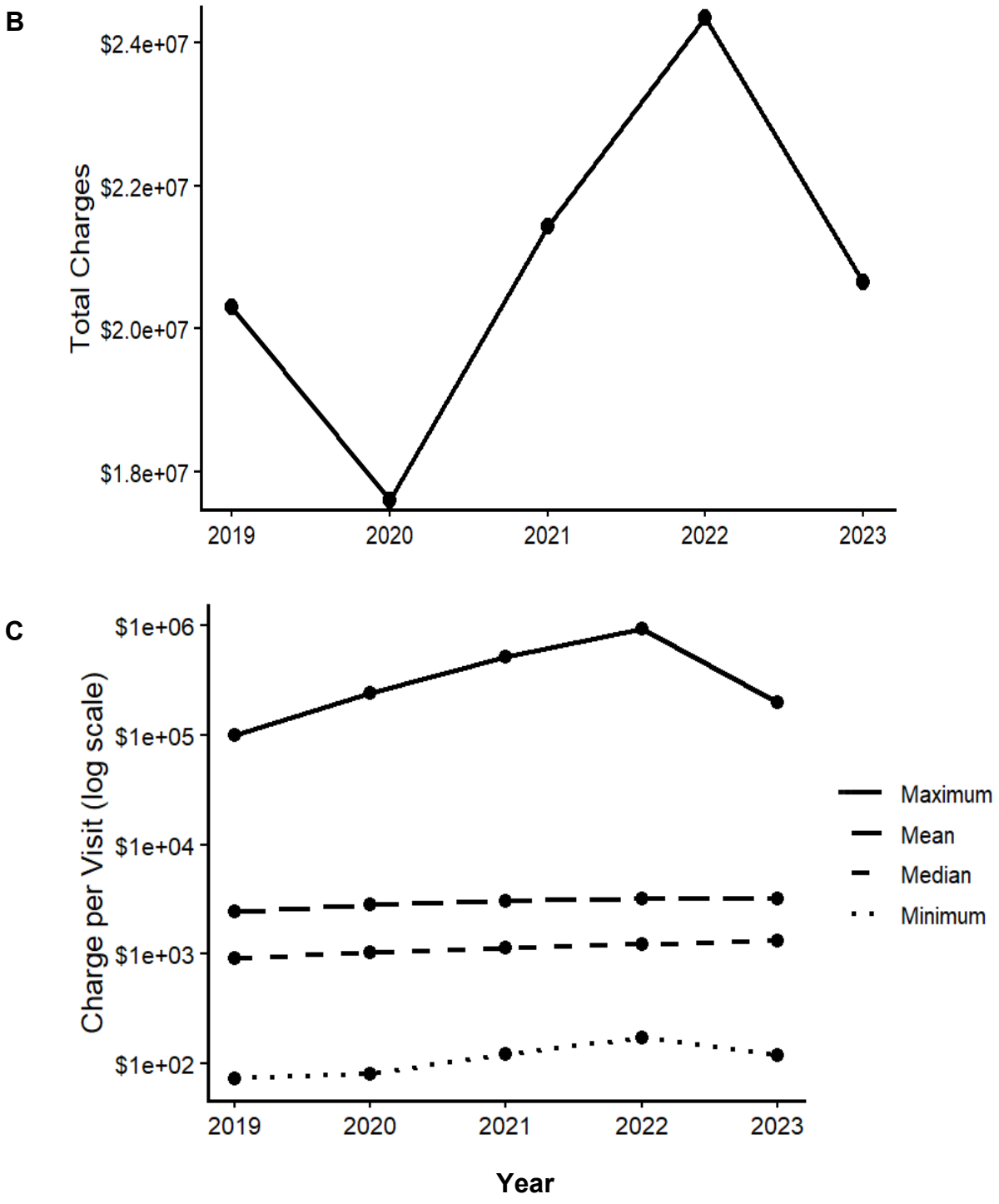


Figure 6. *Trends in mean and median charges per ED visit for NTDCs between 2019 and 2023.* **A.** *Mean charges increased from $2,468 in 2019 to $3,198 in 2023, while median charges rose from $918 to $1,323 over the same period. The widening gap between the mean and median values reflects a right-skewed cost distribution (persistent variability in*

billing) and the influence of high-cost outliers. Overall, both measures indicate a substantial increase in the cost of care over time. **B.** *Total annual charges fluctuated across the study period, ranging from $17.6 million to $24.4 million and peaking in 2022. Despite year-to-year variation, the overall financial burden remained substantial throughout the study period.* **C.** *Mean, median, minimum, and maximum charges are displayed on a logarithmic scale to illustrate the wide dispersion in visit-level costs. The large separation between the minimum and maximum values across all years demonstrates substantial variability in billing, while the persistent gap between the mean and median values illustrates substantial variability and a right-skew in the distribution of charges.*

4.7. GEOGRAPHICAL ANALYSIS

Geographic classifications in this study followed definitions commonly used by the U.S. DHHS. *Urban* areas are defined as counties within Metropolitan Statistical Areas (MSAs), characterized by an urbanized core population of at least 50,000 and strong economic and commuting ties to surrounding counties, as delineated by the Office of Management and Budget (OMB). *Rural* areas, on the other hand, encompass all populations and territories outside those metropolitan regions, including micropolitan and non-core counties, consistent with the Federal Office of Rural Health Policy (FORHP) definition used by the Health Resources and Services Administration (HRSA). Additionally, some of the rural areas analyzed in this study qualified as *Frontier* areas, which represent the most geographically isolated rural settings in the state as identified using HRSA's Frontier and Remote (FAR) Area Codes, which classify areas based on very low population density and extended travel times (often 60 minutes or more) to urban centers providing essential services. These standardized definitions facilitate consistent assessment of geographic disparities in healthcare access (Health Resources and Services Administration, 2012; 2022; OMB, 2023). For this study, we followed the NHA guideline, which identifies Douglas, Sarpy, and Lancaster as the three urban counties in Nebraska.

Across the study period, the geographic distribution of patients presenting to the ED for NTDCs was relatively balanced between urban and rural (including frontier) residents, with a slight predominance of urban patients in most years. Urban residents accounted for approximately 54–56% of visits in 2019, 2021, 2022, and 2023, while rural residents

consistently represented about 44–46% during those same years (**Figure 7; Appendix 1**). Notably, 2020 deviated from this pattern, with rural residents accounting for most visits (56%) compared to 44% among urban residents, likely reflecting disruptions in access to routine and emergency dental care during the COVID-19 pandemic. Despite the overall balance observed across years, the substantial and persistent representation of rural patients highlights ongoing gaps in access to preventive and timely oral health services in non-urban areas of the state, which were exacerbated during the pandemic. The subsequent return to pre-pandemic patterns suggests that this shift was temporary; however, it also underscores the heightened vulnerability of rural populations to system-level disruptions. These patterns reflect broader structural limitations in rural oral health infrastructure, including workforce shortages, geographic barriers, and limited availability of comprehensive dental services. In many rural communities in Nebraska, the ED reluctantly serves as a safety net for emergency dental care, despite its inability to provide definitive treatment. Collectively, these findings emphasize that ED utilization for dental conditions among rural populations is driven not only by acute need but also by constrained access to preventive and ongoing care. Addressing these disparities will require targeted strategies to expand access in rural areas, including workforce development, integration of teledentistry, and community-based care models, with the goal of reducing avoidable ED use and improving overall oral health outcomes.

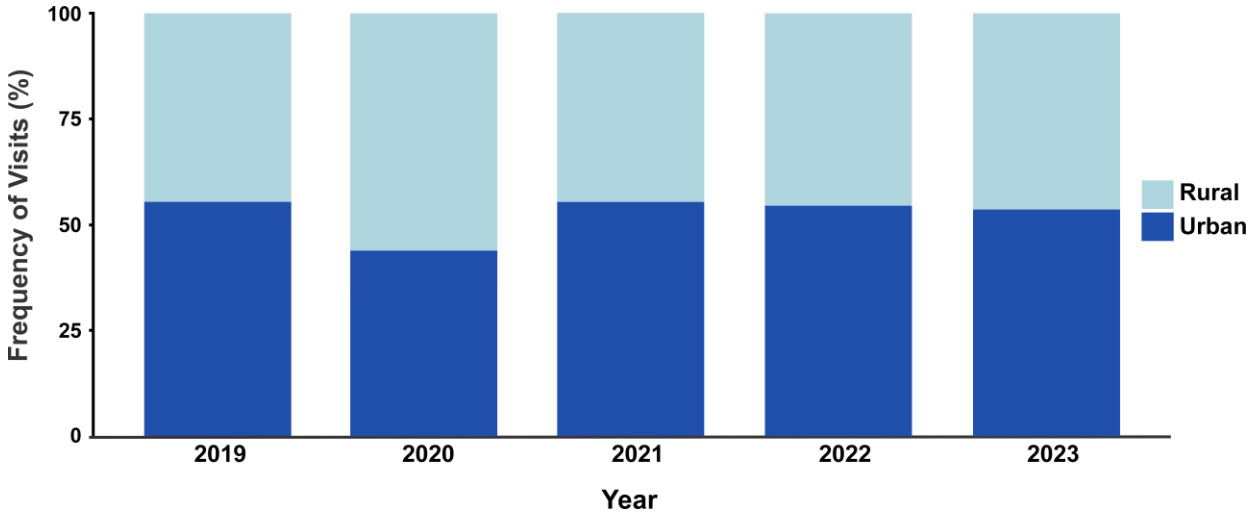


Figure 7. *Distribution of ED visits for NTDC by patient residence between 2019 and 2023*. Urban residents accounted for a slight majority of visits in most years. In 2020, rural patients *accounted for a substantially higher proportion of visits, likely reflecting pandemic-related disruptions to access to routine dental care.*

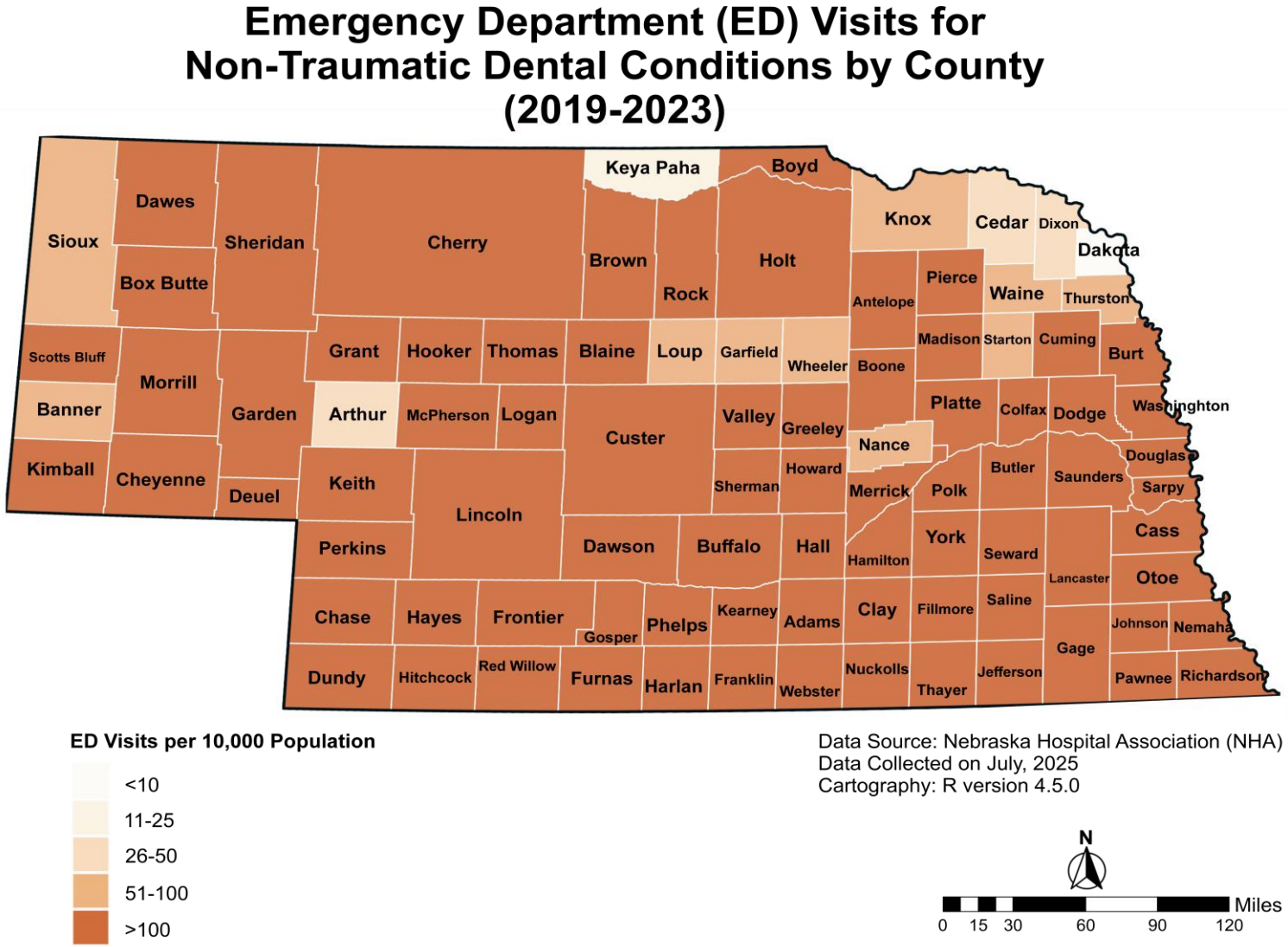


Figure 8. *County-level rates of ED visits for NTDC in Nebraska, 2019–2023. Rates are expressed per 10,000 population and categorized into five groups. High utilization rates are observed across most counties, many of which are rural, highlighting the widespread burden of ED reliance for dental conditions and underlying disparities in access to care.*

Approximately 83% of Nebraska counties experienced rates exceeding 100 ED visits per 10,000 population, indicating that high utilization was widespread across the state (**Figure 8**). However, consistent with geographic disparities in access to routine dental care, counties with the highest rates of utilization (>100 visits per 10,000 population) were predominantly located in rural regions of the state, including several counties in the western and central areas, such as Cherry, Sheridan, Box Butte, Scotts Bluff, and portions of the south-central region (e.g., Dawson, Lincoln, and Buffalo counties). A second tier of counties exhibited moderately elevated rates (51–100 visits per 10,000), distributed across both rural and semi-urban areas, including counties in the north-central and eastern regions. In contrast, counties with the lowest rates (<50 visits per 10,000 population) were few and primarily concentrated in the northeastern part of the state (e.g., Cedar, Dixon, Dakota, Stanton) and a few other counties dispersed across different parts of the state, including Nance, Arthur, Loup, and Keya Paha, among a few others. Despite the absence of a clear urban–rural gradient, due to the widespread distribution of high utilization rates across the majority of the rural counties, including those within and surrounding the Omaha and Lincoln metropolitan areas (e.g., Douglas, Sarpy, and Lancaster), the burden is likely borne disproportionately by rural communities, reflecting the compounded effects of limited dental workforce availability, geographic barriers, and reduced access to preventive care in these regions.

To assess the relationship between the availability of emergency medical services and access to dental care in Nebraska, we overlaid the locations of ED facilities and practicing dentists with the geographic distribution of ED visits for NTDC across the state (**Figure 9**). While ED facilities were fairly spread across the state, cities with practicing dentists were more densely located in eastern and urban areas, especially in and around Douglas, Sarpy, and Lancaster counties. In contrast, many western and central counties with elevated ED visit rates had comparatively fewer cities with practicing dentists, indicating limited local access to routine dental care. In several of these areas, the presence of ED facilities alongside a sparse dental workforce suggests that EDs may serve as a primary point of care for dental conditions. This geographic imbalance in the distribution of oral health providers across the state underscores structural inequities in oral health infrastructure and reinforces the need for targeted strategies to expand dental workforce capacity and improve access to preventive and definitive dental care in underserved areas.

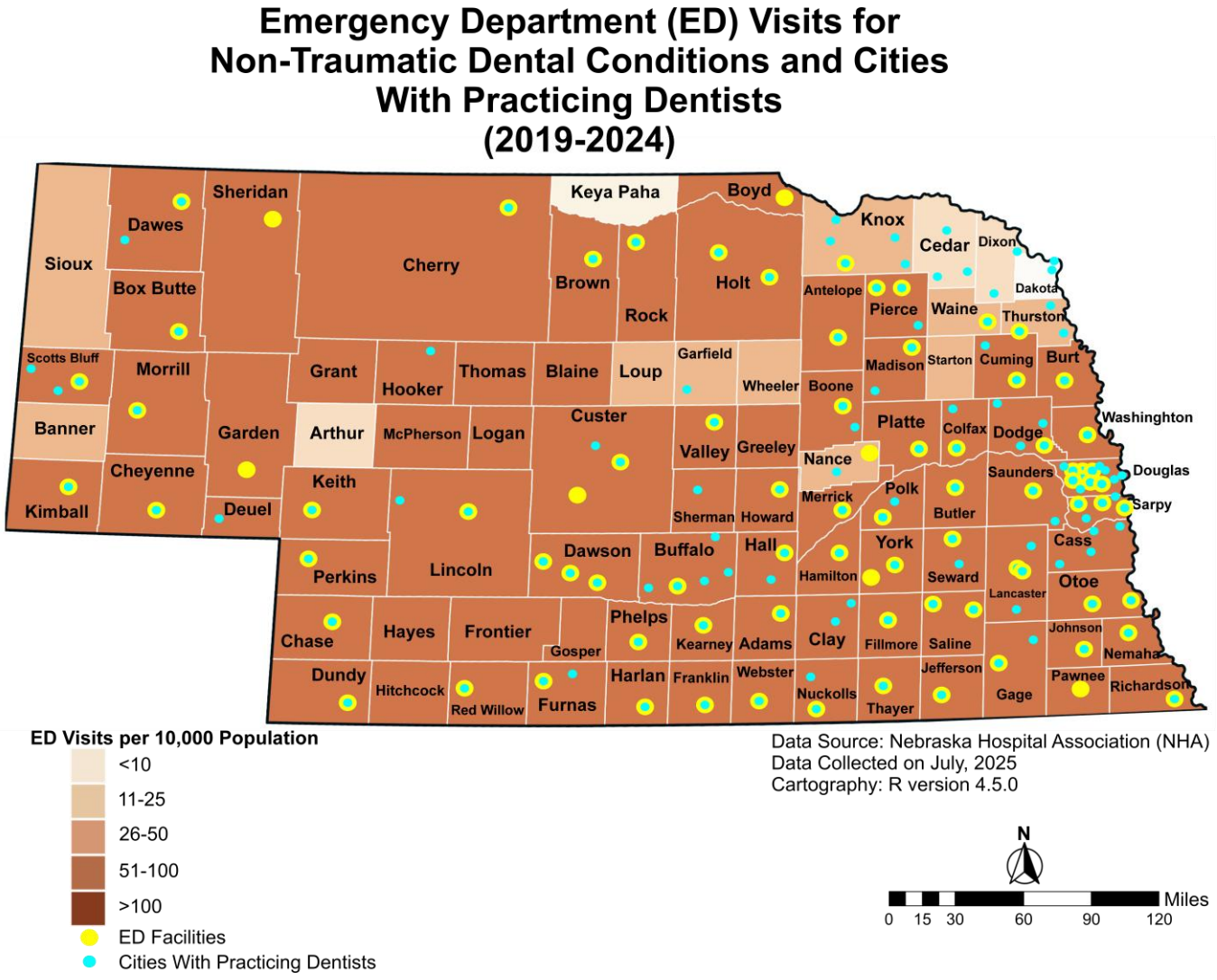


Figure 9. *Geographic distribution of ED facilities and practicing dentists in the State of Nebraska. Counties with high ED utilization for dental conditions often coincide with areas with limited access to practicing dentists, despite the presence of ED facilities, highlighting disparities in access to routine dental care.*

The combination of high ED use and a low number of dental providers across most of the state prompted us to examine the shortage of general dentists in Nebraska, using the Nebraska DHHS' criterion of fewer than one dentist per 3,000 people (**Figure 10**). Based on that criterion, nearly half of the state's counties (49.5%) qualified as dental shortage areas, further underscoring significant limitations in the oral health workforce's capacity. Consistent with our previous analysis, these shortage areas were predominantly located in rural regions of the state, particularly in western and central Nebraska, whereas counties without shortages were more frequently concentrated near or within eastern urbanized areas. When **figures 8-10** are considered alongside **Appendix 1**, a clear pattern emerges: counties with designated dental workforce shortages often correspond to areas with elevated ED utilization for NTDCs and fewer cities with practicing dentists. This geographic overlap reinforces the association between limited dental workforce availability and increased reliance on EDs for dental care, highlighting structural disparities in access to preventive and routine oral health services across the state.

5. DISCUSSION

ED utilization for NTDCs in Nebraska remains a persistent and largely preventable source of healthcare use, consistent with national trends. Despite a modest decline in visit volume over the study period, the overall burden remains substantial, with rising per-visit costs and increasing total expenditures. These findings align with prior research demonstrating that EDs are an inefficient and costly setting for the management of dental conditions, which are more appropriately treated in outpatient dental environments (Wall & Vujicic, 2015; Singhal et al., 2017; Okunseri et al., 2012).

The geographic distribution of ED utilization suggests a systemic issue rather than a localized phenomenon. With 83% of Nebraska counties exceeding 100 visits per 10,000 population, high utilization is widespread across the state. Although a clear urban–rural gradient is not evident, due to a nearly 50:50 distribution between urban and rural patients, the burden is likely amplified in rural and frontier areas, where access to dental providers is limited. This is consistent with national evidence linking higher ED utilization for dental

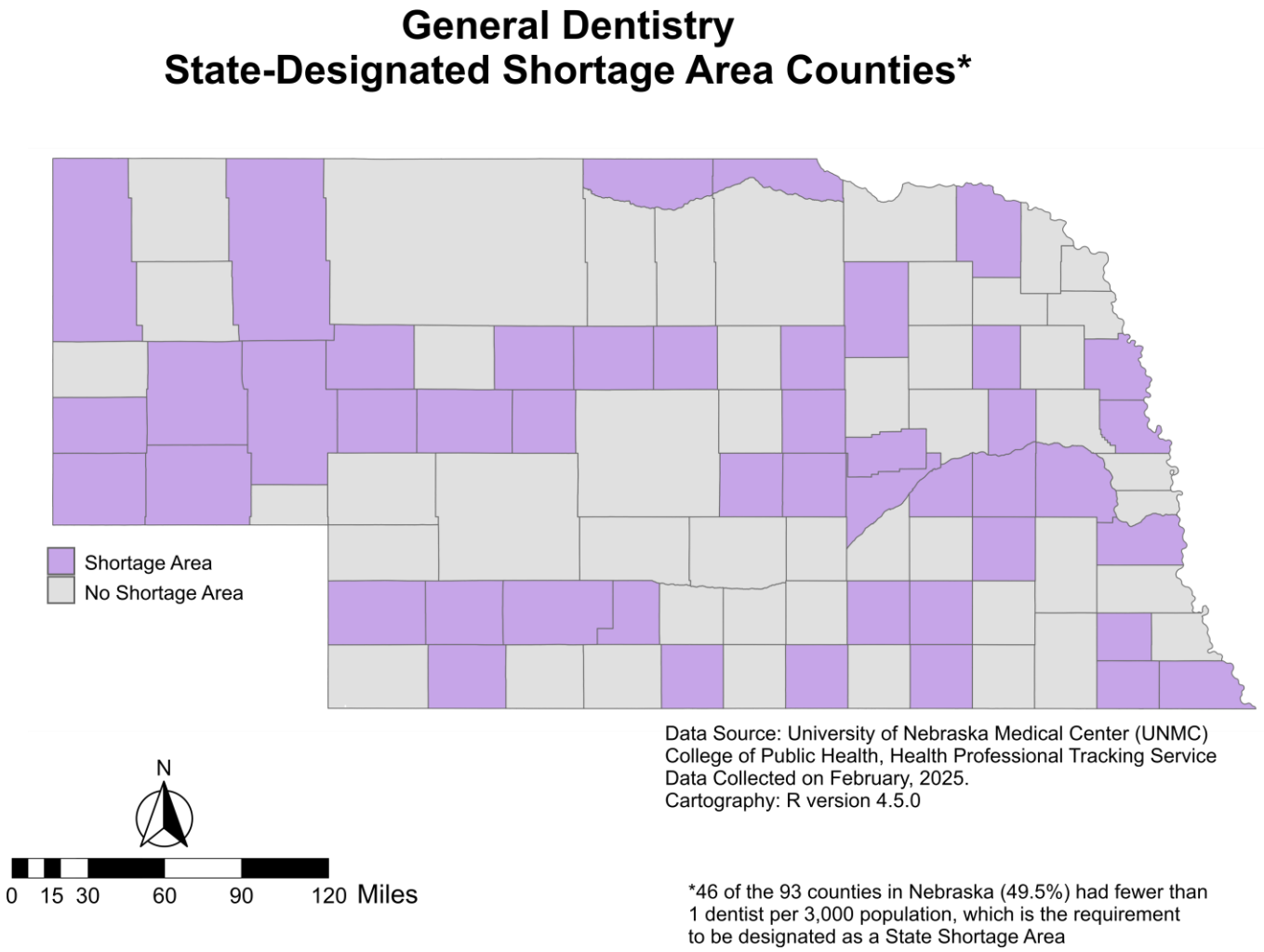


Figure 10. *Distribution of state-designated general dentistry shortage areas across Nebraska. Nearly half of Nebraska's counties qualify as dental workforce shortage areas, which closely coincide with regions of high ED utilization and limited access to dentists, emphasizing ongoing disparities in care. These findings strongly support the need for targeted workforce expansion, teledentistry programs, and community-based initiatives to decrease preventable ED visits in shortage areas.*

conditions to provider shortages, geographic isolation, and transportation barriers (Skillman et al., 2010; Parmar et al., 2025). The observed overlap between high ED utilization and dental Health Professional Shortage Areas (HPSAs) in Nebraska further reinforces the role of workforce distribution in shaping patterns of care. Consequently, when patients develop urgent dental symptoms, it is often difficult to quickly find a dental provider. This is especially true for Medicaid patients, who represented the largest share (40%) of hospital ED visits in 2023.

Public Insurance is designed to assist patients with low income or disabilities with health care payments. However, dentists are often reluctant to see Medicaid patients due to low reimbursement rates, excessive documentation, or the risk of chart audits. Indeed, according to recent national data from the American Dental Association (ADA), dental participation in Medicaid is limited, with estimates indicating that approximately one-third to two-fifths (33%–41%) of US dentists treat Medicaid patients (American Dental Association Health Policy Institute, 2023). In 2023, there were approximately 1,295 practicing dentists in Nebraska, but from 2012 until 2023, the number of dentists who filed at least one Medicaid dental claim decreased by 35%, from 1,089 to 844 (Doza, 2024). Recent efforts by a state collaborative group, led by the Nebraska Dental Association (NDA) and the MCO dental plan companies, have added providers, but additional incentives are still needed. However, as the future of Medicaid programs and oral health funding becomes uncertain, funding cuts to state Medicaid programs may be on the way, creating additional barriers for underserved populations in the coming years.

The payor mix observed in this study, characterized by a disproportionate representation of Medicaid beneficiaries and uninsured individuals, reflects persistent inequities in access to oral healthcare. Similar patterns have been documented nationally, where publicly insured and low-income populations are significantly more likely to rely on EDs for dental care (Allareddy et al., 2014; Chalmers et al., 2016). These disparities are closely tied to structural barriers, including low provider participation in Medicaid, administrative burden, and reimbursement limitations. Notably, the decline in Medicaid-participating dentists in Nebraska mirrors national concerns regarding access to care for vulnerable populations (Parmar et al., 2025). The increasing cost per ED visit, now exceeding $3,000, parallels broader increases in hospital care costs and further highlights

the inefficiency of ED-based dental care. Prior studies estimate that the majority of ED dental visits result in palliative management (e.g., antibiotics and analgesics) rather than definitive treatment, leading to recurrent utilization and increased long-term costs (Wall & Vujicic, 2015; Lee et al., 2012). The findings of this study support this characterization and underscore the need for system-level interventions that prioritize definitive, timely care.

Collectively, these results reinforce the conceptualization of ED utilization for NTDCs as a marker of unmet dental need and systemic gaps in access to preventive and routine care. Addressing this issue will require coordinated strategies that integrate workforce expansion, policy reform, and innovative care delivery models.

5.1. ECONOMIC IMPACT OF SAFETY NET PROGRAMS

Data analyzed in this report support the premise that the overall trend in NTDC patient visits is starting to decline; yet, ED hospital costs continue to rise. The expansion of Nebraska's oral health safety net, including free and charitable clinics, Federally Qualified Health Centers (FQHCs), and dental school urgent care models, such as the CUSoD After-Hours Clinic, demonstrates a high-value approach to reducing ED utilization. These programs provide definitive dental treatment at substantially lower cost while improving access and continuity of care.

The CUSoD After-Hours Clinic exemplifies this approach. Operating under a sliding fee scale and providing care regardless of ability to pay, the clinic offers timely, definitive treatment for urgent dental conditions. Based on an average ED visit cost of $3,198 and 2,555 patients treated by March of 2026, the estimated hospital cost avoidance is nearly $8.2 million. This estimate is consistent with prior economic analyses demonstrating that diversion of dental patients from EDs to community-based settings yields significant cost savings for taxpayers (Wall et al., 2012; Parmar et al., 2025).

At a broader level, Nebraska's safety net system, including the Creighton University Emergency Room Diversion Program, the UNMC College of Dentistry's Urgent Care clinic, FQHCs, and additional free clinics, has collectively diverted thousands of patients from EDs, generating substantial total cost savings and reducing strain on hospital systems. Similar models in other states, including to some extent the Nebraska Teeth Forever Program (Nebraska Department of Health and Human Services, 2023), have demonstrated that

expanding access to community-based services and urgent dental care can significantly reduce avoidable ED visits (Pew Charitable Trusts, 2012; ASTDD, 2017). These findings highlight the economic and clinical value of investing in alternative care delivery systems that provide less costly, more accessible, and timely dental care outside hospital settings. Free and charitable dental clinics have been established within Lincoln and Omaha. The Clinic with a Heart, People's City Mission, and the Heart Ministry Center have been operating with volunteer staff for several years. According to the DHHS Office of Oral Health and Dentistry (OOHD) (OOHD, personal communication), between 2019 and 2024, free and charitable clinics in Nebraska treated approximately 8,500 emergency dental patients, providing an estimated $2.5 million in free dental treatment (assuming a dental care value of $300 per patient), while potentially saving up to $27 million in hospital ED cost. Likewise, the OOHD reports that in 2023 alone, the seven FQHCs in Nebraska saw approximately 3,250 emergency patients and provided over $980K in free dental care, potentially saving the hospital system over $10 million in avoidable ED visits for NTDC (OOHD, personal communication).

6. RECOMMENDATIONS

Consistent with ASTDD guidance and national best practices, the following strategies are recommended:

1. *Sustain and Expand Dental Safety Net Programs*: Continued investment in After-Hours Clinics, FQHCs, and free/charitable clinics across the State is essential. These programs provide cost-effective, definitive care and have demonstrated measurable reductions in ED utilization. Together, the two dental schools' urgent care/ED diversion programs have treated thousands of patients between 2019 and 2024 and provided millions of dollars in reduced-fee or free dental care. This care, if delivered in the emergency room setting as palliative only, would have cost the healthcare system several million dollars.

2. *Strengthen the Dental Workforce in Underserved Areas*: Targeted workforce strategies, including loan repayment programs, rural training pathways, retention bonus programs, dental and hygiene student rural rotation, and incentives for Medicaid provider participation, are critical to improving access in shortage areas.

3. *Improve Medicaid Participation and Reimbursement Structures*: Policy reforms aimed at further increasing reimbursement rates and reducing administrative burden may enhance provider participation and improve access for low-income populations. In 2024, Nebraska Medicaid implemented key policy changes to improve access to dental care, including a 12.5% increase in provider reimbursement rates and the elimination of the adult dental benefit cap (Nebraska Department of Health and Human Services, 2024; American Dental Association, 2024; Dimensions of Dental Hygiene, 2024). In parallel, collaborative efforts among the Nebraska Dental Association (NDA), MCOs, and Medicaid stakeholders have aimed to strengthen provider enrollment and increase utilization of available benefits.

4. *Implement ED Diversion and Care Coordination Models*: Integration of community dental referral networks within the local health departments and hospital systems and expansion of teledentistry for triage and referral have shown promise in reducing inappropriate ED use (ASTDD, 2017).

5. *Invest in Community-Based Dental Disease Prevention Programs*: Increasing evidence-based preventive interventions, particularly in high-risk and rural populations, including HPSAs, can reduce disease burden and downstream emergency care utilization (Griffin et al., 2016; Boachie et al., 2023).

6. *Align Policy with Value-Based Care Principles*: Redirecting resources toward quality care settings that emphasize prevention and definitive treatment offers a sustainable approach to improving outcomes while reducing costs.

7. CONCLUSION

ED utilization for NTDCs in Nebraska reflects broader systemic challenges in access to oral healthcare. The persistence of high utilization rates, combined with rising costs, underscores the need for comprehensive, multi-level interventions. The demonstrated success of Nebraska's safety-net system provides a scalable, economically sound model for reducing reliance on EDs while improving access to care. Strategic investment in these approaches will be essential to advancing oral health equity and optimizing healthcare system performance.

ED utilization for NTDCs in Nebraska remains a substantial and largely avoidable burden on the healthcare system. Despite some year-to-year variation, ED visits for dental conditions remain high, with costs per visit increasing significantly and total expenditures rising substantially over time. These trends underscore the fiscal inefficiency of relying on ED settings for conditions that are best managed through regular, preventive, and definitive dental care.

Geographic analyses reveal that high rates of ED utilization are widespread across the state, with 83% of counties exceeding 100 visits per 10,000 population. Although the pattern observed in this report limits the identification of a clear urban–rural gradient, the burden is likely experienced most acutely in rural communities, where structural barriers to care are more pronounced. Spatial analyses further demonstrate a consistent overlap between high ED utilization, limited availability of practicing dentists, and state-designated dental workforce shortage areas. Nearly half of Nebraska counties meet the criteria for a general dental provider shortage, reinforcing the role of workforce limitations and geographic barriers in shaping patterns of urgent dental care utilization.

The payor mix highlights that ED visits for dental conditions are disproportionately concentrated among Medicaid beneficiaries and uninsured individuals, reflecting broader inequities in access to oral healthcare. At the same time, the rising cost per visit and the wide variability in charges point to inefficiencies in care delivery and the financial impact of delayed treatment.

Collectively, these findings indicate that ED utilization for dental conditions is not merely a function of acute need but rather reflects systemic gaps in access to preventive and routine dental services. Addressing this issue will require coordinated, multi-level strategies, including expanding the dental workforce in underserved areas, integrating teledentistry and care coordination models, strengthening community-based preventive services, and continuing investment in ED diversion programs. Reducing reliance on EDs for dental care represents a critical opportunity to improve oral health outcomes, enhance system efficiency, and advance health equity across Nebraska.

8. EXECUTIVE SUMMARY

8.1. THE CHALLENGE

Emergency Department (ED) visits for Non-Traumatic Dental Conditions (NTDCs) remain a costly and inefficient use of healthcare resources in Nebraska. Between 2019 and 2023:

- Hospital EDs across Nebraska served 35,697 patients presenting with NTDC
- ED costs for dental conditions increased by ~30%
- Total expenditures reached nearly $105 million, contrasting with $34 million in the 2019 report.
- Current average cost per visit exceeded $3,198

At the same time, many of these visits represent preventable conditions that can be treated more effectively in proper dental settings.

8.2. A SYSTEM-LEVEL INTERVENTION: NEBRASKA'S DENTAL SAFETY NET

Over the past several years, Nebraska has developed a high-impact safety-net system that diverts patients from EDs to appropriate dental care settings. This system includes:

- Academic urgent care clinics such as the CUSoD **(Figure 11)** and the UNMC College of Dentistry.

- Free and Charitable clinics across the State (e.g., Nebraska Veterans Mission of Mercy, Clinic with a Heart, Heart Ministry)
- FQHCs across the State (e.g., OneWorld Community Health Centers, Charles Drew Health Center, Community Action Partnership of Western Nebraska, Heartland Health Center, Good Neighbor Community Health Center, Midtown Health Center, People's Health Center, and Bluestern Health).

Local Health Department Dental Clinics (e.g., Lincoln Lancaster County Health Department).

These programs provide definitive treatment (e.g., preventive, restorative, pharmacologic, and surgical treatments as appropriate), not just temporary relief on a reduced- or no-fee schedule. Future approaches that aim to accurately quantify the NTDC strain on the hospital care system should extend beyond emergency department (ED) visits to include emergency cases treated in Nebraska's dental safety net system.

8.3. IMPACT AT A GLANCE (2019–2024)

The information below is not based on formally tracked or systematically collected data but is an estimate derived from personal communication with key stakeholders at various Nebraska free clinics and FQHCs. Data from the CUSoD After-Hours Clinic is not included in this estimate but is presented in the next section. Cost estimates were based on a conservative average care cost of $300 per patient (direct dental care delivered) or on the average cost per ED visit (estimated ED cost avoided) for 2023:

- *Patients diverted from EDs*: ~10,500
- *Value of direct dental care delivered*: ~$3.3 million in services
- *Average ED cost per visit (**Appendix 1**)*: $3,198
- *Estimated ED costs avoided:* ~$34 million
- *Net taxpayer savings*: ~$31 million

Figure 11. *The CUSoD After-Hours Clinic. In July 2023, the CUSOD launched the After-Hours Clinic, an ED diversion initiative aimed at improving access to urgent dental care exclusively for uninsured, Medicaid, and Medicaid-eligible patients who might otherwise rely on hospital EDs for NTDC. Operating on Tuesdays and Thursdays from 5:30 p.m. to 8:00 p.m., the clinic accepts walk-ins and offers telephone scheduling. Sixteen dental operatories are available for the After-Hours Clinic. Care is delivered through a collaborative model involving urgent care and primary care clinicians, as well as fourth-year dental students. Bilingual (English and Spanish) outreach materials, such as the ones shown here, are distributed to local EDs and community partners to promote referrals.*

8.4. SPOTLIGHT: AFTER-HOURS CLINIC RETURN ON INVESTMENT (ROI)

The CUSoD's After-Hours Clinic demonstrates exceptional ROI. The clinic operates on a modest sliding-fee model designed to offset material costs, with charges of $100 for the first extraction and $30 for subsequent extractions. Importantly, services are provided regardless of a patient's ability to pay. From its opening in July 2023 through March 2026, the mean cost per patient per visit was estimated at approximately $150, which was used in the calculations for direct dental care delivered. To estimate ED cost avoided, we used the average cost per ED visit for 2023 (**Appendix 1**).

- *Patients diverted from ED (by end of March 2026):* 2,555
- *Direct dental care delivered:* $383,250 in services
- *Average ED cost per visit (**Appendix 1**):* $3,198
- *Estimated ED cost avoided:* $8.2 million
- *Net taxpayer savings*: $7.82 million

8.5. WHY THIS MATTERS

- *More appropriate care*: Patients receive definitive treatment, not temporary relief
- *Lower costs*: Care delivered at a fraction of ED expenses
- *Reduced system strain*: Frees ED capacity for true medical emergencies
- *Improved equity*: Expands access for Medicaid and uninsured populations
- *Rural impact*: Addresses access gaps in underserved areas

8.6. REMAINING GAPS

- Improve Medicaid provider participation
- Decrease rural dental workforce shortages
- Decrease structural barriers (reimbursement, administrative burden)
- Reduce continued reliance on hospital EDs to treat avoidable conditions
- Improve access to statewide urgent dental safety net clinics.

8.7. POLICY OPPORTUNITY

Reducing Nebraska hospital ED use for NTDC will require unique interventions to decrease the existing healthcare cost-of-impact. Strategic investment priorities should include:

- Expansion of urgent dental care access statewide
- Strengthening Medicaid provider participation incentives
- Supporting workforce development in rural areas
- Develop ED diversion and urgent care coordination models
- Increase the integration of dental care services into the medical care system.

Redirecting care from EDs to dental settings is not only clinically appropriate, but it also delivers substantial, measurable cost savings and improves population health outcomes.

The Nebraska Rural Health Transformation Program provides a strategic funding mechanism to address key barriers identified in this report, including supporting in the oral health safety net, workforce shortages, and gaps in preventive and community-based care. Emphasis is placed on expanding rural prevention programs, incentivizing provider recruitment and retention, and strengthening workforce pipelines through student rotations in underserved settings. The program also prioritizes improving access to care for vulnerable populations, including older adults and individuals with intellectual and developmental disabilities, consistent with statewide efforts to reduce disparities and improve oral health equity (Nebraska Department of Health and Human Services, 2024b).

9. REFERENCES

1. American Dental Association Health Policy Institute. (2023). *Dentists who participate in Medicaid: Who they are, where they locate, how they practice.* American Dental Association. https://www.ada.org/resources/research/health-policy-institute/dentists-who-participate-in-medicaid.
2. American Dental Association. (2024). *States experience Medicaid wins.* https://adanews.ada.org/ada-news/2024/july/states-experience-medicaid-wins/
3. Allareddy V, Rampa S, Lee MK, Allareddy V, Nalliah RP. (2014). Hospital-based emergency department visits involving dental conditions: profile and predictors of poor outcomes and resource utilization.
4. *ASTDD. (2017). Guidance on assessing emergency department data for non-traumatic dental conditions (NTDCs).* https://www.astdd.org/docs/guidance-on-assessing-ed-data-for-ntdc.pdf.
5. Association of State and Territorial Dental Directors. (2020). *Emergency department referral programs for non-traumatic dental conditions* (Best Practice Approach Report). https://www.astdd.org/bestpractices/bpa-emergency-department-referral-programs-for-non-traumatic-dental-conditions.pdf.
6. Bertakis, K. D., Azari, R., Helms, L. J., Callahan, E. J., & Robbins, J. A. (2000). Gender differences in the utilization of health care services. *Journal of Family Practice, 49*(2), 147–152.
7. Boachie MK, Molete M, Hofman K, Thsehla E. Cost-effectiveness of dental caries prevention strategies in South African schools. BMC Oral Health. (2023). 23(1):814.
8. CareQuest Institute for Oral Health. (2023). *Emergency department visits for dental conditions: A growing and costly problem*. Boston, MA: CareQuest Institute for Oral Health.
9. Chalmers N, Grover J, Compton R. After Medicaid Expansion in Kentucky, Use of Hospital Emergency Departments for Dental Conditions Increased. Health Aff (Millwood). (2016) 35(12):2268-2276.

10. Choi SE, Fayyad R, Nolte D, Riedy C, Normand SL. (2025). Predicting emergency department visits for non-traumatic dental-related conditions among Medicaid beneficiaries. Sci Rep., 15(1):19872.
11. Choi MK. The impact of Medicaid insurance coverage on dental service use. (2011). J Health Econ., 30(5):1020-31.
12. Courtemanche Ch, Marton J, Ukert B, Yelowitz A, Zapata D. Early Impacts of the Affordable Care Act on Health Insurance Coverage in Medicaid Expansion and Non-Expansion States. (2017). J Policy Anal Manage. 36(1):178-210.
13. Craft CF; Ball, JO. (2024). 2024 Nebraska Public Health Hygienist Authorization Dental Service & Evaluation Report. Nebraska Department of Health and Human Services, Division of Public Health, Office of Oral Health and Dentistry.
14. Dimensions of Dental Hygiene. (2024). Nebraska strives to improve dental care delivery for Medicaid beneficiaries. https://dimensionsofdentalhygiene.com/nebraska-strives-to-improve-dental-care-delivery-for-medicaid-beneficiaries/
15. Doza, S. (2024). Nebraska State of Oral Health. S*urveillance system report, 2011–2023*. Nebraska Department of Health and Human Services, Office of Oral Health and Dentistry. (2024). https://dhhs.ne.gov/Reports/Oral%20Health%20Surveillance%20System%20Report%20-%202011-2023.pdf.
16. Griffin S, Naavaal S, Scherrer C, Griffin PM, Harris K, Chattopadhyay S. School-Based Dental Sealant Programs Prevent Cavities and Are Cost-Effective. (2016). Health Aff (Millwood), 35(12):2233-2240.
17. Health Resources and Services Administration. (2022). Defining rural population. U.S. Department of Health and Human Services. https://www.hrsa.gov/rural-health/about-us/definition.
18. Health Resources and Services Administration. (2012). Frontier and remote (FAR) area codes: Methodology and results. U.S. Department of Health and Human Services. https://www.hrsa.gov/rural-health/about-us/frontier.
19. *Hospitals decry Medicaid cuts*. (2025, June 18). *Lincoln Journal Star*.
20. Lee HH, Lewis CW, Saltzman B, Starks H. Visiting the emergency department for dental problems: trends in utilization, 2001 to 2008. (2012). Am J Public Health, 102(11):e77-83.

21. Kelekar U., Naavaal S., Turner S.C. (2025). Role of distance in the utilization of emergency departments for non-traumatic dental conditions in Maryland, USA, 2017-2021. BMC Health Serv Res. 14;25(1):1363.
22. Manski, R. J., & Rohde, F. (2017). Dental services: Use, expenses, source of payment, coverage, and procedure type, 1996–2015. Agency for Healthcare Research and Quality (AHRQ). https://meps.ahrq.gov.
23. Nagarajan R, Panny A, Berg R, Acharya A, Nycz G. (2022). Variations in temporal trends in non-traumatic dental condition-related emergencies. J Public Health Dent., 82(3):289-294.
24. Nebraska Department of Health and Human Services. (2023). *Oral health survey of young children report: 2021–2022*. https://dhhs.ne.gov/Reports.
25. Nebraska Department of Health and Human Services. (2024a). Medicaid public notices. https://dhhs.ne.gov/Pages/Medicaid-Public-Notices.aspx.
26. Nebraska Department of Health and Human Services. (2024b). Rural Health Transformation Program. https://dhhs.ne.gov/Pages/Rural-Health-Transformation.aspx
27. Office of Management and Budget. (2023). Revised delineations of metropolitan statistical areas, micropolitan statistical areas, and combined statistical areas. Executive Office of the President. https://www.whitehouse.gov/omb/information-for-agencies/bulletins/
28. Okunseri C, Pajewski NM, Jackson S, Szabo A. (2011). Wisconsin Medicaid enrollees' recurrent use of emergency departments and physicians' offices for treatment of nontraumatic dental conditions. J Am Dent Assoc., 142(5):540-50.
29. Okunseri C., Okunseri E., Thorpe JM, Xiang Q, Szabo A. Medications prescribed in emergency departments for nontraumatic dental condition visits in the United States (2012). Med Care, 50(6):508-12.
30. Parmar D, Sailo JL, Sakhamuri S, Dalapati C, Dutta SD, Arya S, Dixit H. Assessment of Oral Health Disparities and Barriers to Care among Underserved Populations in Urban and Rural Settings. (2025). J Pharm Bioallied Sci., 17(Suppl 1):S445-S447.
31. National Institute of Dental and Craniofacial Research (NIDCR). (2021). Oral health in America: Advances and challenges—Executive summary. National Institutes of

Health. https://www.nidcr.nih.gov/sites/default/files/2021-12/Oral-Health-in-America-Executive-Summary.pdf

32. The Pew Charitable Trusts. (2012). A costly dental destination: Hospital care means states pay dearly. https://www.pew.org/en/research-and-analysis/reports/2012/02/28/a-costly-dental-destination.
33. Rampa S, Wilson FA, Wang H, Wehbi NK, Smith L, Allareddy V. Hospital-Based Emergency Department Visits With Dental Conditions: Impact of the Medicaid Reimbursement Fee for Dental Services in New York State, 2009-2013. (2018). J Evid Based Dent Pract., 18(2):119-129.
34. Semprini J, Samuelson R. Synthesizing 30-years of Adult Medicaid Dental Policy Research: A Scoping Review to Identify Gaps and Opportunities (2023). Heliyon, 9(2):e13703.
35. Singhal S, McLaren L, Quinonez C. Trends in emergency department visits for non-traumatic dental conditions in Ontario from 2006 to 2014. (2017). Can J Public Health, 108(3):e246-e250.
36. Skillman SM, Doescher MP, Mouradian WE, Brunson DK. The challenge to delivering oral health services in rural America. (2010). J Public Health Dent. 70 Suppl 1:S49-57.
37. Sommers BD, Gunja MZ, Finegold K, Musco T. Changes in Self-reported Insurance Coverage, Access to Care, and Health Under the Affordable Care Act. (2015). JAMA, 314(4):366-74.
38. Sun BC, Chi DL, Schwarz E, Milgrom P, Yagapen A, Malveau S, Chen Z, Chan B, Danner S, Owen E, Morton V, Lowe RA. Emergency department visits for nontraumatic dental problems: a mixed-methods study. (2015). Am J Public Health., 105(5):947-55.
39. Vaidya, V., Partha, G., & Karmakar, M. (2012). Gender differences in utilization of preventive care services in the United States. Journal of Women's Health, *21*(2), 140–145.
40. Vujicic M, Buchmueller T, Klein R. (2016). Dental Care Presents the Highest Level of Financial Barriers, Compared to Other Types of Health Care Services. Health Aff (Millwood). Health Aff (Millwood), 35(12):2176-2182.

41. U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion. (n.d.).Social determinants of health. Healthy People 2030. U.S. Department of Health and Human Services. https://odphp.health.gov/healthypeople/priority-areas/social-determinants-health.
42. Wall TP, Vujicic M, Nasseh K. (2012). Recent trends in the utilization of dental care in the United States. J Dent Educ.,76(8):1020-7.
43. Wall, T., & Vujicic, M. (2015). American Dental Association, Health Policy Institute. (2018). Emergency department visits for dental conditions: A snapshot. https://mediad.publicbroadcasting.net/p/wusf/files/201802/ADA.pdf
44. Wani, RJ; Craft, CF. (2019). Nebraska Department of Health and Human Services, Office of Oral Health and Dentistry. Hospital emergency department use for non-traumatic dental conditions in Nebraska, 2009–2016. https://govdocs.nebraska.gov/epubs/H8200/B035-2019.pdf
45. *We need to fix our health care system*. (2025, December 7). Lincoln Journal Star
46. Wherry LR, Miller S. Early Coverage, Access, Utilization, and Health Effects Associated with the Affordable Care Act Medicaid Expansions: A Quasi-experimental Study. (2016). Ann Intern Med., 164(12):795-803.

APPENDICES

Appendix 1. The ICD-10 Codes for Defining NTDC

ICD 10 Code	ICD 10 Description
K000	Anodontia
K001	Supernumerary teeth
K002	Abnormalities of size and form of teeth
K003	Mottled teeth
K004	Disturbances of tooth formation
K005	Hereditary disturbances in tooth structure, not elsewhere classified
K006	Disturbances in tooth eruption
K010	Embedded teeth
K011	Impacted teeth
K007	Teething syndrome
K008	Other specified disorders of tooth development
K009	Disorder of tooth development, unspecified
K029	Dental caries, unspecified
K0261	Dental caries on smooth surface limited to enamel
K0262	Dental caries on smooth surface penetrating into dentine
K0263	Dental caries on smooth surface penetrating into pulp
K023	Arrested dental caries
K0389	Other specified diseases of hard tissues of teeth
K0251	Dental caries pit and fissure surface limited to enamel
K0261	Dental caries on smooth surface limited to enamel
K0262	Dental caries on smooth surface penetrating into dentine
K0263	Dental caries on smooth surface penetrating into pulp
K027	Dental root caries
K029	Dental caries, unspecified
K030	Excessive attrition of teeth

K030	Excessive attrition of teeth
K030	Excessive attrition of teeth
K030	Excessive attrition of teeth
K030	Excessive attrition of teeth
K030	Excessive attrition of teeth
K031	Abrasion of teeth
K031	Abrasion of teeth
K031	Abrasion of teeth
K031	Abrasion of teeth
K031	Abrasion of teeth
K031	Abrasion of teeth
K032	Erosion of teeth
K032	Erosion of teeth
K032	Erosion of teeth
K032	Erosion of teeth
K032	Erosion of teeth
K032	Erosion of teeth
K033	Pathological resorption of teeth
K033	Pathological resorption of teeth
K033	Pathological resorption of teeth
K033	Pathological resorption of teeth
K034	Hypercementosis
K035	Ankylosis of teeth
K037	Intrinsic posteruptive color changes of hard tissues of teeth
K0381	Cracked tooth
K0389	Other specific diseases of hard tissues of teeth
K039	Disease of hard tissues of teeth, unspecified
K040	Pulpitis

K041	Necrosis of the pulp
K042	Pulp degeneration
K043	Abnormal hard tissue formation in pulp
K044	Acute apical periodontitis of pulpal origin
K047	Periapical abscess without sinus
K045	Chronic apical periodontitis
K046	Periapical abscess with sinus
K048	Radicular cyst
K0490	Unspecified diseases of pulp and periapical tissues
K0499	Other diseases of pulp and periapical tissues
K0500	Acute gingivitis, plaque induced
K0501	Acute gingivitis, non-plaque induced
K0510	Chronic gingivitis, plaque induced
K0511	Chronic gingivitis, non-plaque induced
K060	Gingival recession
K060	Gingival recession
K060	Gingival recession
K060	Gingival recession
K060	Gingival recession
K060	Gingival recession
K0520	Aggressive periodontitis, unspecified
K0521	Aggressive periodontitis, localized
K0522	Aggressive periodontitis, generalized
K0520	Acute periodontitis
K0530	Chronic periodontitis, unspecified
K0531	Chronic periodontitis, localized
K0532	Chronic periodontitis, generalized
K0540	Periodontosis

K036	Deposits (accretions) on teeth
K055	Other periodontal diseases
K061	Gingival enlargement
K056	Periodontal disease, unspecified
M2600	Unspecified anomaly of jaw size
M2601	Maxillary hyperplasia
M2603	Mandibular hyperplasia
M2602	Maxillary hypoplasia
M2604	Mandibular hypoplasia
M2605	Macrogenia
M2606	Microgenia
M2607	Excessive tuberosity of jaw
M2609	Other specified anomalies of jaw size
M2610	Unspecified anomaly of relationship of jaw-cranial base relationship
M2611	Maxillary asymmetry
M2612	Other jaw asymmetry
M2619	Other specified anomalies of jawcranial base relationship
M2620	Unspecified anomaly of dental arch relationship
M26211	Malocclusion, Angle's class I
M26212	Malocclusion, Angle's class II
M26213	Malocclusion, Angle's class III
M26220	Open anterior occlusal relationship
M26221	Open posterior occlusal relationship
M2623	Excessive horizontal overlap
M2624	Reverse articulation
M2625	Anomalies of interarch distance
M2629	Other anomalies of dental arch relationship
M2630	Unspecified anomaly of tooth position of fully erupted tooth or teeth

M2631	Crowding of fully erupted teeth
M2632	Excessive spacing of fully erupted teeth
M2633	Horizontal displacement of fully erupted tooth or teeth
M2634	Vertical displacement of fully erupted tooth or teeth
M2635	Rotation of fully erupted tooth or teeth
M2636	Insufficient interocclusal distance of fully erupted teeth (ridge)
M2637	Excessive interocclusal distance of fully erupted teeth
M2639	Other anomalies of tooth position of fully erupted tooth or teeth
M264	Malocclusion, unspecified
M2650	Dentofacial functional abnormalities, unspecified
M2651	Abnormal jaw closure
M2652	Limited mandibular range of motion
M2653	Deviation in opening and closing of the mandible
M2654	Insufficient anterior guidance
M2655	Centric occlusion maximum intercuspation discrepancy
M2656	Non-working side interference
M2657	Lack of posterior occlusal support
M2659	Other dentofacial functional abnormalities
M2660	Temporomandibular joint disorder, unspecified
M2669	Other specified disorders of temporomandibular joint
M2661	Adhesions and ankylosis of temporomandibular joint
M2662	Arthralgia of temporomandibular joint
M2663	Articular disc disorder of temporomandibular joint
M2669	Other specified disorders of temporomandibular joint
M2669	Other specified disorders of temporomandibular joint
M2670	Unspecified alveolar anomaly
M2671	Alveolar maxillary hyperplasia
M2672	Alveolar mandibular hyperplasia

M2673	Alveolar maxillary hypoplasia
M2674	Alveolar mandibular hypoplasia
M2679	Other specified alveolar anomaly
M2679	Other specified alveolar anomaly
M2679	Other specified alveolar anomaly
M2681	Anterior soft tissue impingement
M2682	Posterior soft tissue impingement
M264	Malocclusion, unspecified
M2689	Other dentofacial anomalies
M269	Dentofacial anomaly, unspecified
K080	Exfoliation of teeth due to systemic causes
K08109	Complete loss of teeth, unspecified cause, unspecified class
K08429	Partial loss of teeth due to periodontal diseases, unspecified class
K08439	Partial loss of teeth due to caries unspecified class
K08499	Partial loss of teeth due to other unspecified cause, unspecified class
K0820	Unspecified atrophy of edentulous alveolar ridge
K0821	Minimal atrophy of the mandible
K0822	Moderate atrophy of the mandible
K0823	Severe atrophy of the mandible
K0824	Minimal atrophy of the maxilla
K0825	Moderate atrophy of the maxilla
K0826	Severe atrophy of the maxilla
K083	Retained dental root
K08109	Complete loss of teeth, unspecified cause, unspecified class
K08101	Complete loss of teeth, unspecified cause, class I
K08102	Complete loss of teeth, unspecified cause, class II
K08103	Complete loss of teeth, unspecified cause, class III
K08104	Complete loss of teeth, unspecified cause, class IV

K08409	Partial loss of teeth, unspecified cause, unspecified class
K08401	Partial loss of teeth, unspecified cause, class I
K08402	Partial loss of teeth, unspecified cause, class II
K08403	Partial loss of teeth, unspecified cause, class III
K08404	Partial loss of teeth, unspecified cause, class IV
K0850	Unsatisfactory restoration of tooth, unspecified
K0851	Open restoration margins of tooth
K0852	Unrepairable overhanging of dental restorative materials
K08530	Fractured dental restorative material without loss of material
K08531	Fractured dental restorative material with loss of material
K0854	Contour of existing restoration of tooth biologically incompatible with oral health
K0855	Allergy to existing dental restorative material
K0856	Poor aesthetic of existing restoration of tooth
K0859	Other unsatisfactory restoration of tooth
M2761	Osseointegration failure of dental implant
M2762	Post-osseointegration biological failure of dental implant
M2763	Post-osseointegration mechanical failure of dental implant
M2769	Other endosseous dental implant failure
K088	Other specified disorders of teeth and supporting structures
M2679	Other specified alveolar anomalies
K089	Disorder of teeth and supporting structures, unspecified
K090	Developmental odontogenic cysts
K091	Developmental (nonodotogenic) cysts of oral region
M2749	Other cysts of jaws
M271	Giant cell granuloma, central
M272	Inflammatory conditions of jaw
M273	Alveolitis of jaw
M2751	Perforation of root canal space due to endodontic treatment

M2752	Endodontic overfill
M2753	Endodontic underfill
M2759	Other periradicular pathology associated with previous endodontic treatment
M278	Other specified diseases of jaws
M278	Other specified diseases of jaws
M279	Disease of the jaws, unspecified
K110	Atrophy of salivary gland
K111	Hypertrophy of salivary gland
K1120	Sialoadenitis, unspecified
K113	Abscess of salivary gland
K114	Fistula of salivary gland
K115	Sialolithiasis
K116	Mucocele of salivary gland
K117	Disturbances of salivary secretion
R682	Dry mouth, unspecified
K118	Other diseases of salivary glands
K119	Disease of the salivary glands, unspecified
K122	Cellulitis and abscess of mouth
K1230	Oral mucositis (ulcerative), unspecified
K1231	Oral mucositis (ulcerative) due to antineoplastic therapy
K1233	Oral mucositis (ulcerative) due to radiation
K1232	Oral mucositis (ulcerative) due to other drugs
K121	Other forms of stomatitis
K1239	Other oral mucositis (ulcerative)
A690	Necrotizing ulcerative stomatitis
K120	Recurrent oral aphthae
K122	Cellulitis and abscess of mouth
K098	Other cysts of oral region, not elsewhere classified

K130	Diseases of lips
K1321	Leukoplakia of oral mucosa, including tongue
K1322	Minimal keratinized residual ridge mucosa
K1323	Excessive keratinized residual ridge mucosa
K1329	Other disturbances of oral epithelium, including tongue
K135	Oral submucosal fibrosis
K1370	Unspecified lesions of oral mucosa
K1379	Other lesions of oral mucosa
K140	Glossitis
K141	Geographic tongue
K142	Median rhomboid glossitis
K143	Hypertrophy of tongue papillae
K144	Atrophy of tongue papillae
K145	Plicated tongue
K146	Glossodynia
K148	Other diseases of the tongue
K149	Disease of tongue, unspecified
R6884	Jaw pain
R859	Unspecified abnormal finding in specimens from digestive organs and abdominal cavity
Z463	Encounter for fitting and adjustment of dental prosthetic device
Z464	Encounter for fitting and adjustment of orthodontic device
Z464	Encounter for fitting and adjustment of orthodontic device
Z0120	Encounter for dental examination and cleaning without abnormal findings
Z0121	Encounter for dental examination and cleaning with abnormal findings

Appendix 2. Non-traumatic dental-related ED visits in Nebraska, stratified by patient characteristics, 2019-2023.

Year	2019	2020	2021	2022	2023
# of Visits	8227	6155	7017	7630	6668
# of Patients	7037	5300	6173	6767	6046
Age, Years N(%)					
0-17	1273 (18.09)	830 (15.66)	952 (15.42)	1048 (15.49)	873 (14.44)
18-25	873 (12.41)	690 (13.02)	739 (11.97)	852 (12.59)	727 (12.02)
26-45	2708 (38.48)	2147 (40.51)	2642 (42.80)	2813 (41.57)	2489 (41.17)
46-64	1413 (20.08)	1065 (20.09)	1155 (18.71)	1313 (19.4)	1213 920.06)
65+	770 (10.94)	568 (10.72)	685 (11.10)	741 (10.95)	744 (12.31)
Mean	36	37	37	37	38
Median	34	35	35	35	36
Gender					
Female	3833 (54.47)	2842 (53.62)	3321 (53.8)	3683 (54.43)	3129 (51.75)
Male	3204 (45.53)	2458 (46.38)	2852 (46.2)	3084 (45.57)	2917 (48.25)
Charges of Visits					
Mean	$2,468.00	$2,861.00	$3,055.00	$3,192.00	$3,198.00
(Min, Max)	74.09-99218.06	81.36-240839.5	123.76-512791	173.5-927515.1	120-196225.3
Median	$918	$1,034.60	$1,132.00	$1,230.15	$1,322.68
Total	$20,304,863.00	$17,607,597.00	$21,438,039.00	24,354.738.00	20,657,702.00
Residency					
Urban (%)	4574 (56)	2682 (44)	3900 (56)	4204 (55)	3625 (54)
Rural (%)	3653 (44)	3473 (56)	3117 (44)	3426 (45)	3043 (46)
Primary Payor N(%)					
Medicaid	2376 (28.88)	1967 (31.96)	2800 (39.9)	3277 (42.95)	2726 (40.88)
Medicare	1314 (15.97)	847 (13.76)	1044 (14.88)	1079 (14.14)	737 (11.05)
Commercial Insurance	2992 (36.37)	2186 (35.52)	1962 (27.95)	2002 (26.24)	1793 (26.9)
Self-Pay	889 (10.81)	968 (15.73)	1027 (14.64)	1095 (14.35)	1052 (15.78)
No Pay	508 (6.17)	71 (1.15)	79 (1.13)	58 (0.76)	9 (0.13)
VA Administration	148 (1.8)	116 (1.88)	105 (1.5)	118 (1.55)	101 (1.51)
Federal Employee Health Benefit	0	0	0	1 (0.01)	0
MCO	0	0	0	0	250 (3.75)

Emergency Department Use in Nebraska for Non-Traumatic Dental Conditions, 2019–2023

Creighton University School of Dentistry

Nebraska DHHS Office of Oral Health & Dentistry

Overall Utilization Snapshot

Total ED Visits: **35,697**

Avg ED Visits/Year: **7,139**

Avg Revisits/Year: **875**

Trend: The decline in visits from **2016** to **2023** Suggests impact of:

- ED diversion programs like the one at Creighton University School of Dentistry
- Community nonprofit clinics offering free/sliding-scale care

EDs are not designed to deliver definitive dental care. These visits represent preventable, high-cost care that could be redirected to community-based dental homes.

Financial Impact

Total ED Costs: **$105 Million**

2023 Alone: **Over $20 Million**

Double the $10 million reported in 2016[1]

$105 Million spent on preventable dental ED visits for NTDC in 5 years.

Together, **Medicare** and **Medicaid** covered **over 50%** of the costs for ED visits for NTDC.

Rural Impact

Rural Patients (2019–2023)

- **49.8%** of total NTDC visits overall
- **3,522 average visits/year**

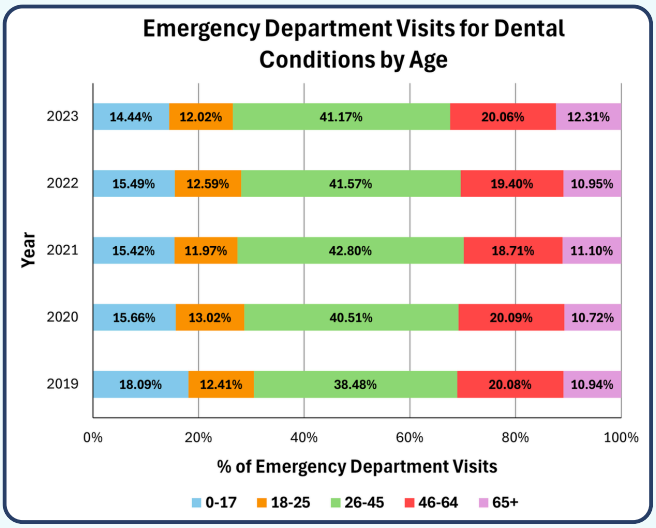
Pandemic Spike: Rural patients accounted for **65%** of all NTDC ED visits in 2020

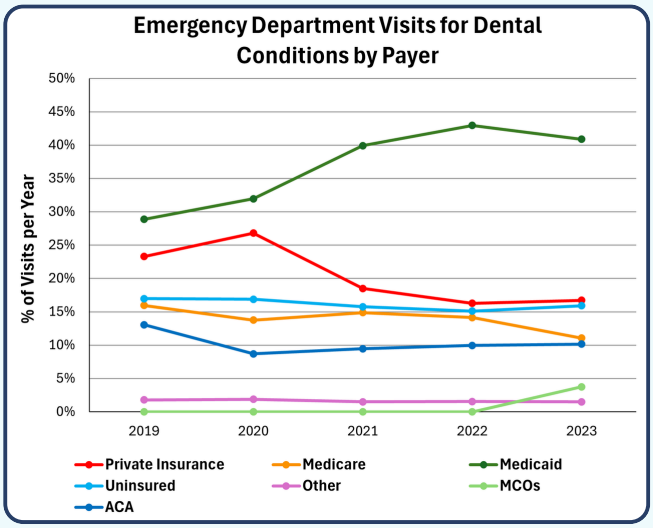
Access challenges to adequate oral health personnel in rural health professional shortage areas (HPSAs) in Nebraska remain a serious barrier.

Year	Avg Cost per ED Visit
2016	$1,375
2023	$3,198

132% Increase in Cost per Visit

Even with slightly declining visits, the financial burden continues to escalate.





54% Visits were Females

36% Visits were Young Adults aged 26–45

14% Visits were Children (0-17)

Estimates based on the latest Healthy People 2030 data[2] indicate only **45.5%** of U.S. children, adolescents, & adults used the oral healthcare system in 2022.

Sources:

1. Wani R.J., Craft C.F. (2019) Nebraska State of Oral Health: Hospital Emergency Department Use for Non-Traumatic Dental Conditions Report, 2009 – 2016.
2. Office of Disease Prevention and Health Promotion. (n.d.).*Social determinants of health*. Healthy People 2030. U.S. Department of Health and Human Services. https://odphp.health.gov/healthypeople/priority-areas/social-determinants-health.