Role of Nurses in Oral Cavity and Pharynx Cancers

Patricia Da Rosa, DDS, MSc[1]

Lori Koenecke, MS, RN, CNE[2]

Laura Gudgeon, MS, RHIA [3]

Whitney Keller[4]

Wei Gu[5]

[1] Research Associate, Population Health Evaluation Center/Office of Nursing Research, College of Nursing, South Dakota State University, Patricia.DaRosa@sdstate.edu

[2] Cancer Programs Director, Office of Disease Prevention and Health Promotion, South Dakota Department of Health, Lori.Koenecke@state.sd.us

[3]Chronic Disease Epidemiologist, Office of Disease Prevention and Health Promotion, South Dakota Department of Health, Laura.Gudgeon@state.sd.us

[4]Research Assistant, Population Health Evaluation Center/Office of Nursing Research, College of Nursing, South Dakota State University, Whitney.Keller@jacks.sdstate.edu

[5]Research Assistant, Population Health Evaluation Center/Office of Nursing Research, College of Nursing, South Dakota State University, Wei.Gu@jacks.sdstate.edu

Abstract

Purpose: The incidence of oral cavity and pharynx cancer is rising in the United States and South Dakota (SD) (2009-2018). In 2018, it was estimated that 396,937 of Americans were living with oral cavity and pharynx cancer. The 5-year relative survival rate for oral cancer is 66.2%, which

is less than the survival rates for breast, colorectum, and prostate cancers. Tobacco and alcohol use and human papillomavirus (HPV_{16}) exposure are some of the risk factors for oral cancer. Overall rural populations have higher cancer mortality than no rural population due to higher poverty, lower access to health services, and cigarette use. The purpose of this study is to investigate the prevalence of the oral cancer risk factors (e.g., cigarette smoking), HPV vaccination rates, and to identify the spatial distribution of social and environmental factors (e.g., social vulnerability, dental care access) in SD. Finally, this article discusses how nurses can contribute to oral cancer prevention and early detection.

Methods: This descriptive study used data from multiple data sources (e.g., SD Department of Health, HRSA, County Health Rankings). Maps were created using ArcGIS.

Findings: From the 66 SD counties, nearly 17% presented high-level shortage scores and were also highly socially vulnerable. HPV vaccination among youth was higher than the national average. Studies showed that improving nurse's knowledge by training on oral cancer is needed and this may increase nurses' practice in oral cancer prevention and control.

Conclusions: Primary care professionals like nurse practitioners can assist in early detection of oral cancer and promote awareness of signs and main risk factors in rural areas. As part of the total patient care, nurses hold a vital role in prevention and early detection of oral cancer. These efforts with referral to oral cancer screening are vital for decreasing oral cancers morbidity and mortality rates primarily.

Keywords: Rural health, Nurses, oral cancer, dentalcare access, Geographic Information Systems

Role of Nurses in Oral Cavity and Pharynx Cancers

Background and Significance

Oral cancers, including cancers of the mouth and back of the throat (National Institute of Dental and Craniofacial Research, 2018), account for 3% of all cancers diagnosed and reported annually in South Dakota (SD) and in the United States (U.S.) (U.S. Cancer Statistics Working Group, 2021; South Dakota Cancer Registry, 2020). From 2002-2017, the trends in oral cancer incidence rates for all ages in SD rose 1.7% annually (National Cancer Institute, 2020). A total of 650 new cases (480 male cases and 170 female cases) of oral cancer were diagnosed in SD residents between 2014 to 2018, with 114 oral cancer-related deaths (28 female and 86 male deaths). In the same period, the age-adjusted incidence rate was 12.6 per 100,000 population in SD, a similar rate when compared to the national rate at 12.0 (U.S. Cancer Statistics Working Group, 2021).

The nonmodifiable risk factors for the development of oral cancer include gender and age. Oral cancer diagnoses are significantly higher in men compared to women and most frequently diagnosed among people aged 50–70 years (National Cancer Institute, 2020). The main modifiable risk factors include heavy tobacco and/or alcohol use (National Institute of Dental and Craniofacial Research, 2018). Evidence also shows an association of oral cancer with human papillomavirus strain 16 (HPV_{16}) exposure (National Institute of Dental and Craniofacial Research, 2018).

Moreover, studies show that rural populations have an 8% higher cancer mortality due to higher poverty, lower educational attainment, lack of health insurance, public health resources, and access to health services, a higher proportion of elderly, and cigarette use (Blake et al., 2017; Bolin et al., 2015). When compared to metropolitan areas, oral cancer incidence rates are 10.9 per 100,000 people, compared to 12.7 in rural areas, suggesting living in a rural area increases oral

cancer risk (Blake et al., 2017). A rural area is classified as any area outside of an urban area, which includes urban clusters (2,500 to 50,000 residents) and urbanized areas (50,000 residents or more) (United States Census Bureau, 2020). In SD just over 50% of residents live in rural areas (Rural Health Information Hub, 2018).

Oral cancer is considered a silent disease and may easily pass undiagnosed since the early signs include ulcerative lesions and red and white patches on the oral mucosal. Thus, early detection and referral of oral cancers are crucial to reduce the likelihood of invasive treatments and improve survival. Studies have also shown that older populations living in rural areas do not seek dental care at the same rate when compared to their urban counterparts (Hamano, et al. 2017). Hence due to the Dental Health Professional Shortage Areas, rural nurses can play an important role in cancer prevention and control during routine medical care by having the opportunity to promote oral cancer awareness among patients at high risk, to identify early symptoms, and to refer patients for further care when symptoms are noted.

To better understand the prevalence and distribution of oral cancer risk factor in SD, the purpose of this study was to (I) investigate the overall prevalence of cigarette smoking among SD adults as well as changes in prevalence of cigarette smoking from 2011 to 2020, (II) examine the latest rates in HPV vaccination rates among youth in SD, and (III) to identify the spatial distribution of social and environmental factors (social vulnerability and dental care access) related to oral cancer in the state. Finally, this article discusses how nurses can contribute to oral cancer prevention and early detection in a largely rural state.

Methods

This descriptive study uses secondary data from multiple data sources. The percentage of the adult population who report current use (every day or most days) of cigarette and have smoked

at least 100 cigarettes in their lifetime by county was obtained using the 2011-2020 County Health Rankings estimates (County Health Rankings, 2020). The 2019 HPV vaccination rates among 13–17-year-olds in SD were accessed using the SD Department of Health data (South Dakota Department of Health, 2019). The Social Vulnerability Index (SVI) was obtained from the CDC's Agency for Toxic Substances and Disease (Centers for Disease Control and Prevention [CDC], 2018). Finally, information on the shortage of dental care was obtained from the Health Resources & Services Administration (Health Resources & Services Administration, 2021). Maps were created by the authors using ArcGIS.

Results

Tobacco

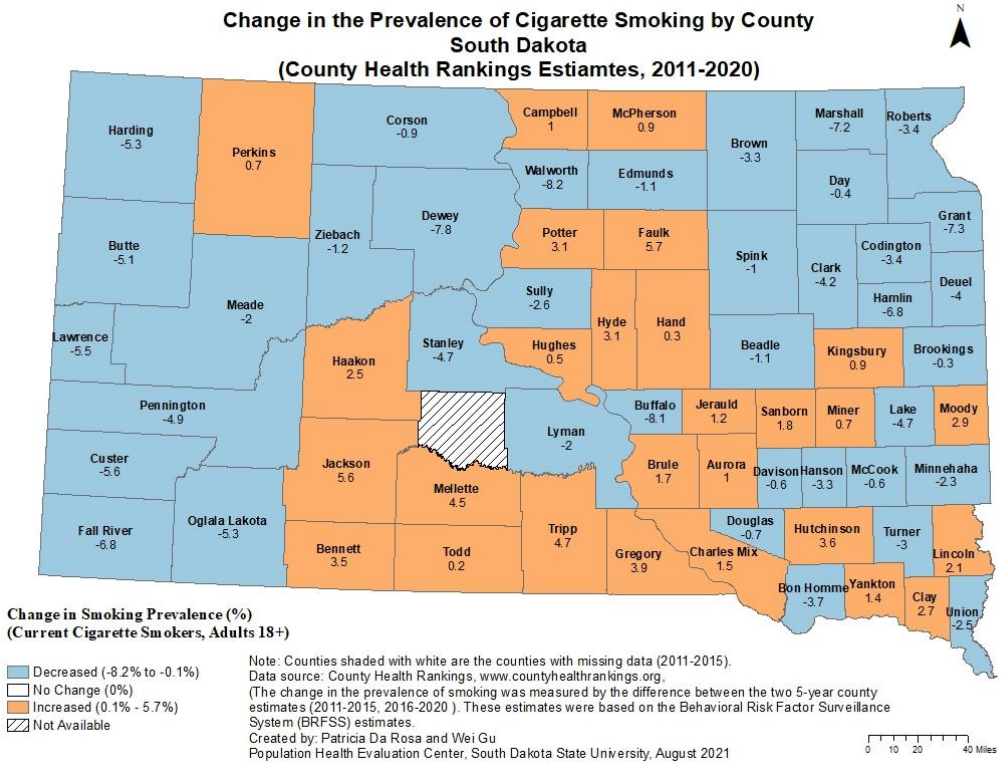
In 2020, the estimated prevalence of adult residents currently smoking cigarettes in SD was 18% (South Dakota Department of Health, 2019a), a higher prevalence when compared to the national median of 16% (CDC, 2020a). Males were more likely to smoke cigarettes (21%) than females (17%) (South Dakota Department of Health, 2019a). The prevalence of smokeless tobacco, which also increases risk for oral cancer, was 6% among adults, a higher rate when compared to the national median of 4% (South Dakota Department of Health, 2019).

According to the SD Department of Health (2019a), 70% or more of individuals who smoke and 47% of smokeless tobacco users have been advised to quit by a healthcare professional. However, geographical disparities on cigarette use among SD residents persist. Figure 1 shows county level change in the prevalence of cigarette smoking among adults from 2011 to 2020. Counties with an increase in prevalence of cigarette smoking were shaded in orange, and counties with a decrease of cigarette smoking were shaded in blue. Comparing the absolute change in prevalence between the two 5-year averages (2011-2015 and 2016-2020), 41% (27 counties) of

the 66 counties had an increase in the prevalence of cigarette smoking. However, improvements have also occurred in more than half of the counties (39 counties) where the absolute change varied from -0.3% to -8.2% during the same period (County Health Rankings, 2020). One of the possible contributing factors is the availability of the SD Quitline service which provides free service, including counseling and medications, for those aiming to quit cigarette smoking, smokeless tobacco, and vaping products (South Dakota Department of Health, 2021a).

Figure 1

County Level Prevalence of Cigarette Smoking Change from 2011-2015 vs. 2016-2020 in South Dakota

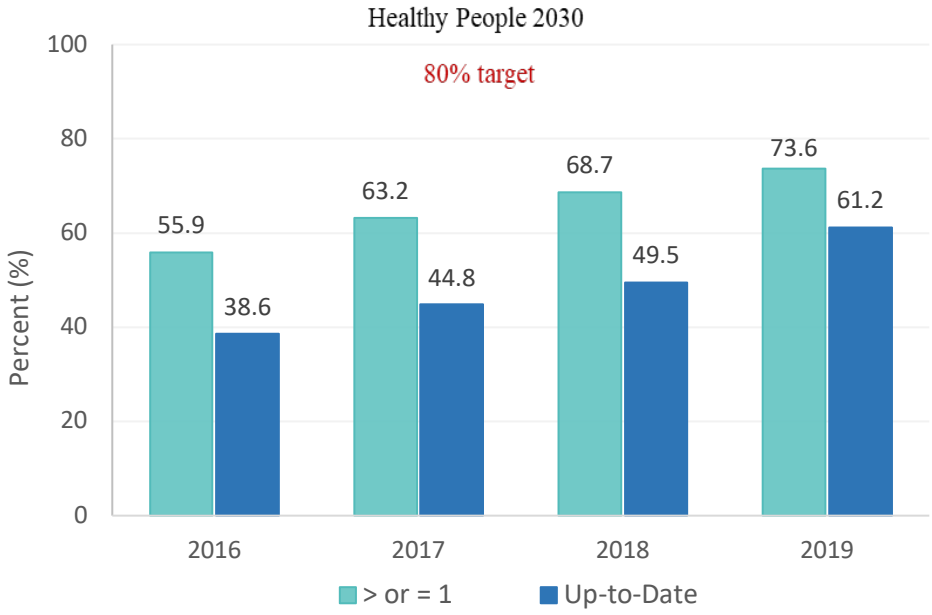


Human Papillomavirus (HPV)

In the U.S., incidence rates for oral cavity and pharynx cancers have increased from 2007 to 2016 (Ellington et al., 2020). Due to the increase in oral cancer cases, specifically oropharyngeal cancers, there is indication that the rising trend of new cases is associated with HPV_{16}. It is reported that 70% of oropharyngeal cancers in the U.S. was associated with HPV infection in patients with previous exposure to the virus (Centers for Disease Control and Prevention, 2020b). In SD this 13-year period, nearly 5,000 cancers were diagnosed in a location that potentially resulted from HPV infection, with head/ neck and oral cancers accounting for almost 45% of the cases (South Dakota Department of Health, 2019a). Thus, the HPV vaccine is crucial in the prevention against HPV infections and reducing the risk to oral cancers (Centers for Disease Control and Prevention, 2020b). Although the goal of HPV vaccination is 80% in the *Healthy People 2030*, the national average of HPV vaccination among adolescents ages 13 to 15 is only 48% (U.S. Department of Health and Human Services, 2020). In SD, more than 2 in 3 adolescents (73.6%) have started the HPV vaccination series, with more than half (61.2%) of adolescents up to date on the HPV vaccination series in 2019, a significant increase from 2016 (Figure 2) (South Dakota Department of Health, 2019b). However, despite HPV vaccination protecting individuals from ever developing these cancers, including oral cancer, SD ranked 31st nationally for up-to-date HPV vaccination rates in adolescents in 2019 (South Dakota Department of Health, 2019b). Education about healthy lifestyle choices, such as the benefits of HPV vaccination, assists in primary prevention against oral cancer.

Figure 2

2016-2019 National HPV Immunization Survey Data for Teens (ages 13-17) in South Dakota



Data source: South Dakota Department of Health (SD DOH)

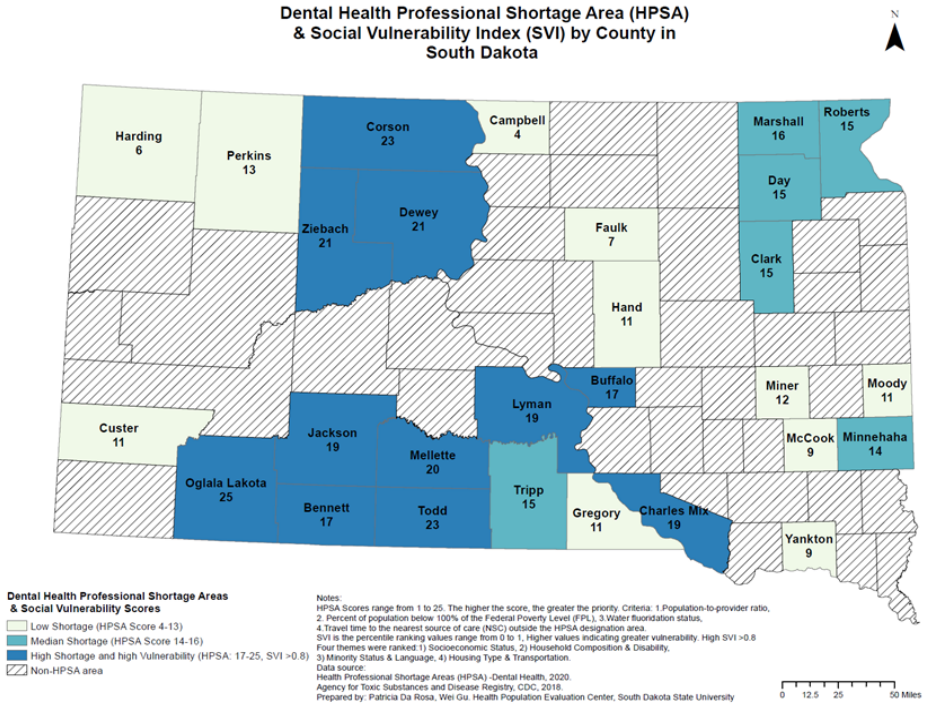
Access to Healthcare

Disparities in access to preventive health services and social vulnerability are important factors that contribute to poor oral health outcomes in rural areas. One way of measuring access to dental care is to use the county level Health Professional Shortage Area (HPSA) scores (Health Resources & Service Administration, 2021). Scores range from 1 to 25, and the higher score means the area needs greater priority of dental health care. Four criteria are used to evaluate HPSA score: (a) population-to-provider ratio, (b) percent of population below 100% of the Federal Poverty Level (FPL), (c) water fluoridation status, and (d) travel time to the nearest source of care (NSC) outside the HPSA designation area. To investigate the shortage of dental care in SD, we classified three levels of shortage: (a) low shortage with a HPSA score from 4 to 13, (b) median shortage with a HPSA score from 14 to 16, and (c) high shortage with a HPSA score from 17 to 25. These

three categories are depicted in Figure 3. Counties with a median-level shortage score and a high-level shortage score are shaded with light blue and dark blue, respectively. The second layer presented in the map is the Social Vulnerability Index (SVI). SVI is the percentile ranking with values from 0 to 1. Higher values indicate greater vulnerability. We considered counties with SVI score greater than 0.8 as highly socially vulnerable. As depicted in Figure 3, one in four counties are considered median to high shortage areas for dental care in the state. It is important to note that in Minnehaha County, the most populated county in the state, only part of the County is considered median shortage area.

Figure 3

Spatial Distribution of Dental Health Professional Shortage Area (2021) and Social Vulnerability (2018) in South Dakota



https://doi.org/10.14574/ojrnhc.v21i2.692

The counties with high-level shortage scores and highly socially vulnerable are Bennett County, Buffalo County, Charles Mix County, Corson County, Dewey County, Jackson County, Lyman County, Mellette County, Oglala Lakota County, Todd County, and Ziebach County.

Early Detection and Role of Nurses

The 5-year relative survival rate for oral cancer is 66.2%, which is less than the survival rates for breast (90%), colorectal (80%), and prostate cancers (90%) (American Cancer Society, 2021). Although no population-based screening programs exists for oral cancer, early diagnosis of cancer has the potential to lower likelihood of mortality, especially for high-risk populations. Often oral cancer screening is performed by dentists; however, primary care providers also play an important role in the early detection of these cancers and subsequent referral of those exhibiting symptoms. In addition, nurses can promote awareness of oral cancer signs and risk factors (e.g., health habits, lifestyle and behaviors) (The United States Preventive Services Task Force, 2013; Walker et al., 2018).

Nurses play an important role in prevention and early detection of cancers because health promotion and disease prevention are essential components of nursing education programs (Li et al., 2020). A recent study showed that 91.5% of nurses think that oral cancer screening for adults is important and 83% of nurses trusted their ability to perform an oral cancer examination (Li et al., 2020). However, the same study suggests that only 39.3% of public health nurses believed nurses have overall sufficient oral cancer education and 46.7% of these nurses believed that sufficient training would increase oral cancer screening by nurses (Li et al., 2020). Furthermore, only 36.1% of these nurses believe that there is sufficient oral cancer screening training currently available (Li et al., 2020). These study results suggest that providing additional training to nurses

on the detection of oral cancer may increase practice behaviors for oral cancer screenings and awareness.

Research suggests that additional training improves nurses' knowledge on oral health care, and oral cancer awareness (Maramaldi et al., 2018). In a recent study, 85% of nurses were aware of risk factors of oral cancer, though only 38% regularly informed patients of oral cancer risk factors during hospital admissions (Priyadharshni & Sivakumar, 2019). Training nurses on providing oral screening examinations as part of routine care is also necessary (Priyadharshni & Sivakumar, 2019). In areas with shortage of dental professionals, rural nurses may have the opportunity to identify high-risk populations (e.g., rural elderly population with long history of tobacco and/or alcohol use) more often than dental professionals. Nonetheless, it is also important to recognize that nurses have a busy routine and, thus an oral assessment should not create extra burden to the nurses' routine. A study carried out by Anderson et al. (2001) showed that after a two-hour training, nurses took on average less than five minutes to complete an oral examination.

Additionally, nurses may assist in the oral cancer prevention efforts by encouraging HPV vaccination (South Dakota Department of Health, 2021b) among adolescents ages 13 to 17. For instance, HPV vaccination is recommended at the same time as other vaccines such as Tdap and Meningococcal. This vaccine also protects against other cancers such as cervical and anal cancers. Finally, by educating about the risks of tobacco and alcohol use and promoting tobacco cessation services, nurses can assist in the reduction of the leading cause of preventable disease, disability, and deaths in rural areas therefore reducing geographical disparities in health.

Conclusions

Although oral cavity and pharynx cancers are primarily preventable, the incidence of oral cancer is rising nationally**.** In SD, where the incidence rate of oral cancer was rising (2002-2017),

we found that five counties showed not only a high prevalence of cigarette smoking but also a high-level of HPSA score and Social Vulnerability Index. Additionally, more than half of the counties are considered shortage areas for dental care. In this context, rural nurses have an imperative role in promoting the primary and secondary cancer prevention strategies. Reducing the modifiable risk factors (e.g., tobacco use, heavy alcohol consumption, and exposure to HPV_{16}) and promoting prevention efforts (e.g., HPV vaccination among youth and cessation from alcohol and tobacco use) are crucial for oral cancer prevention and control. In addition, nurses are the front-line workers in health care who can provide information on oral cancer screening and referrals of patients who are at higher risk (e.g., males, aged 50 and older, with history of heavy smoking). These efforts are vital for decreasing oral cancer morbidity and mortality rates primarily in rural areas.

References

American Cancer Society. (2021). Cancer facts and figures 2021. *American Cancer Society*. https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2021.html

Andersson, P., Persson, L., Hallberg, I. R., & Renvert, S. (1999). Testing an oral assessment guide during chemotherapy treatment in a Swedish care setting: A pilot study. *Journal of Clinical Nursing*, *8*(2), 150-158. https://doi.org/10.1046/j.1365-2702.1999.00237.x

Blake, K., Moss, J., Gaysynsky, A., Srinivasan, S., & Croyle, R. (2017). Making the case for investment in rural cancer control: An analysis of rural cancer incidence, mortality, and funding trends. *Cancer Epidemiology, Biomarkers & Prevention, 26,* 992-997. https://doi.org/10.1158/1055-9965.EPI-17-0092

Bolin, J., Bellamy, G., Ferdinand, A., Vuong, A. M., Kash, B., Schulze, A., & Helduser, J. (2015). Rural Healthy People 2020: New decade, same challenges. *The Journal of Rural Health*, *31,* 326-333. https://doi.org/10.1111/jrh.12116

Centers for Disease Control and Prevention. (2018). *CDC Social Vulnerability Index.* Agency for Toxic Substances and Disease Registry/ Geospatial Research, Analysis, and Services Program. Centers for Disease Control and Prevention. https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html.

Centers for Disease Control and Prevention. (2020a). *National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health. BRFSS Prevalence & Trends Data [online].* https://www.cdc.gov/brfss/brfssprevalence/

Centers for Disease Control and Prevention. (2020b). *HPV and Oropharyngeal cancer.* CDC. https://www.cdc.gov/cancer/hpv/basic_info/hpv_oropharyngeal.htm

County Health Rankings. (2020). *County health rankings*. County health rankings & roadmaps. www.countyhealthrankings.org

Ellington T., Henley, S., Senkomago V., et al. (2020). Trends in incidence of cancers of the oral cavity and pharynx. *Morbidity and Mortality Weekly Report, 69,* 433–438. https://doi.org/10.15585/mmwr.mm6915a1

Hamano, T., Takeda, M., Tominaga, K., Sundquist, K., & Nabika, T. (2017). Is accessibility to dental care facilities in rural areas associated with number of teeth in elderly residents? *International Journal of Environmental Research and Public Health*, *14*(3), 327. https://doi.org/10.3390/ijerph14030327

Health Resources & Service Administration (2021). *Health Professional Shortage Areas: Dental Care.* Health Resources & Service Administration. https://data.hrsa.gov/data/download#SHORT

Li, H. W., Huang, C. H., Chou, C., & Wang, T. F. (2020). Knowledge, attitudes, practice and related factors of oral cancer prevention among public health nurses in Taiwan. *European Journal of Cancer Care, 29*, e13262. https://doi.org/10.1111/ecc.13262

Maramaldi, P., Cadet, T., Burke, S., LeCloux, M., White, E., Kalenderian, E., & Kinnunen, T. (2018). Oral health and cancer screening in long-term care nursing facilities: Motivation and opportunity as intervention targets. *Gerodontology, 35*, 407–416. https://doi.org/10.1111/ger.12365

National Institute of Dental and Craniofacial Research. (2018). *Oral cancer*. National Institute of Health. https://www.nidcr.nih.gov/health-info/oral-cancer/more-info

National Cancer Institute. (2020). *Cancer Stat Facts: Oral Cavity and Pharynx Cancer*. National Institute of Health. https://seer.cancer.gov/statfacts/html/oralcav.html

Priyadharshni, S. & Sivakumar, S. (2019). Awareness about oral cancer among nurses in Saveetha Medical College – A questionnaire-based study. *Drug Intervention Today, 11,* 118-121.

Rural Health Information Hub. (2018). *South Dakota.* Rural Health Information Hub. https://www.ruralhealthinfo.org/states/south-dakota

South Dakota Department of Health. (2019a). *Tobacco use*. SDDOH. https://doh.sd.gov/statistics/2019BRFSS/Tobacco.pdf

South Dakota Department of Health. (2019b). *HPV vaccine information*. SDDOH. https://doh.sd.gov/family/childhood/immunization/HPV_Vaccine.aspx

South Dakota Cancer Registry. (2020). *Data & publications.* South Dakota Department of Health. https://getscreened.sd.gov/registry/data/

South Dakota Department of Health. (2021a). Quitline. SDDOH. https://www.sdquitline.com/

South Dakota Department of Health. (2021b). HPV *Vaccination*. South Dakota Cancer Coalition. SDDOH. https://www.cancersd.com/about-cancer/prevention/hpv-vaccinations//

United States Census Bureau. (2020). *Urban and rural.* United States Census Bureau. https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html

United States Preventive Services Task Force (2013). *Oral cancer: Screening.* U.S. Preventative Task Force. https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/oral-cancer-screening

U.S. Cancer Statistics Working Group. (2021). *U.S. cancer statistics: Data visualizations tool*. U.S. Department of Health and Human Services & Centers for Disease Control and Prevention. www.cdc.gov/cancer/dataviz

U.S. Department of Health and Human Services. (2020). *Healthy people 2030*. Office of Disease Prevention and Health Promotion. https://health.gov/healthypeople

Walker, K., Jackson, R., Edwards, P., & Vadaparampil, S. (2018). HPV and oral cancer: The need to integrate oral health practices into nursing education. *Clinical Journal of Oncology Nursing, 22,* 166-173. https://doi.org/10.1188/18.CJON.E166-E173