Food Desert Residence Is Not Associated with Adverse Outcomes Following Free Flap Reconstruction for Head and Neck Cancer

Michael Hahn, BS; Kenny Nguyen, MD; Isabella Zaniletti, PhD, MA; Elizabeth Dorman, BS; Mukta Vibhute, BS; Peter Eckard, MD; Deanne King, MD, PhD; James Reed Gardner, MD; Jumin Sunde, MD; Emre A. Vural, MD; Mauricio Moreno, MD

Department of Otolaryngology - Head and Neck Surgery, University of Arkansas for Medical Sciences, Little Rock, AR

Introduction:

Food deserts are USDA-defined areas where residents face economic and geographic barriers to accessing affordable, nutritious food. Prior studies have linked food insecurity and food desert residence to worse surgical and cancer outcomes, but the impact on head and neck cancer (HNC) reconstruction is unknown. This study evaluated whether food desert residence affects postoperative outcomes after free flap reconstruction for HNC. We retrospectively analyzed 286 patients treated between 2020–2022 at a tertiary academic center, of whom 64 (22.4%) lived in USDA-defined food deserts and 222 (77.6%) did not.

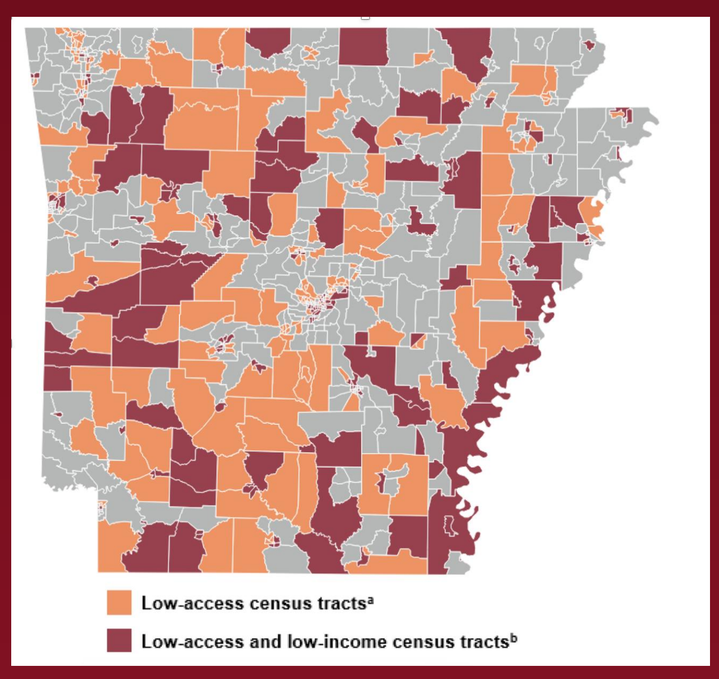


Figure 1: Low access and low access/low income census in Arkansas at 1 mile (urban area) or 10 miles (rural area) from a supermarket in 2019

Background:

Food deserts are USDA-defined low-income areas where residents face limited access to affordable, nutritious food. These regions, common in the southern United States, are linked to poor diet quality and worse health outcomes. Prior studies have shown that food desert residence is associated with increased complications in surgery and higher mortality in cancers such as breast and colorectal, but its role in head and neck cancer (HNC) outcomes has not been established.

Nutritional Challenges in HNC:

Patients with HNC frequently experience dysphagia, taste changes, and poor oral intake due to tumor burden and treatment side effects. These challenges contribute to high rates of malnutrition, which directly impact healing, complication risk, and recovery after free flap reconstruction. Although social factors such as comorbidity and neighborhood deprivation have been tied to worse surgical outcomes, the effect of food access remains unclear.

Study Objective:

This study evaluates whether residence in a USDA-defined food desert is associated with recurrence, complications, readmissions, or length of stay following free flap reconstruction for HNC.

Methods:

We conducted a retrospective cohort study of adult patients (≥18 years) who underwent pedicled or free flap reconstruction for head and neck cancer at the University of Arkansas for Medical Sciences between January 1, 2020 and December 31, 2022. Residential addresses were geocoded and classified according to USDA 2019 food desert definitions. Clinical and demographic variables were extracted from the electronic medical record and managed in REDCap. Primary outcomes included 2-year recurrence, flap loss, surgical complications, hospital length of stay (LOS), 30-day readmission, and reoperation. Group comparisons were performed using chi-square tests for categorical variables and Wilcoxon rank-sum tests for continuous variables. Multivariable logistic regression was used to assess independent associations between food desert residence and outcomes, adjusting for age, sex, race/ethnicity, tumor stage, Charlson Comorbidity Index (CCI), and adjuvant therapy. LOS was modeled with a log-link gamma distribution, and cumulative incidence functions were used for recurrence and reoperation to

Demographics

Variable	Class	Overall	Non-Food Desert	Food Desert	p
n		286	222	64	
Age at Surgery (median [IQR])		65 [56, 72]	66 [57, 72]	63[54, 71]	0.131
CCI (median [IQR])		5 [3, 6.]	5 [3, 6]	5 [4, 6]	0.702
Distance from Hospital (median [IQR])		110 [48, 161]	111 [51.5, 162]	101 [31.8, 153]	0.116
Sex (%)	Female	91 (33.0)	70 (32.7)	21 (33.9)	0.986
	Male	185 (67.0)	144 (67.3)	41 (66.1)	
Race/Ethnicity (%)	African American	28 (10.2)	14 (6.6)	14 (22.6)	0.001
	Hispanic/Latino	4 (1.5)	2 (0.9)	2 (3.2)	
	White	236 (86.1)	192 (90.6)	44 (71.0)	
	Other	6 (2.2)	4 (1.9)	2 (3.2)	
Smoking Status (%)	Chew/smokeless Tobacco	10 (3.7)	8 (3.8)	2 (3.4)	0.994
	Current Smoker	70 (25.9)	54 (25.6)	16 (27.1)	
	Former Smoker	108 (40.0)	85 (40.3)	23 (39.0)	
	None (<1 pack year)	82 (30.4)	64 (30.3)	18 (30.5)	
Alcohol Use (%)	< 1 drink per month	168 (67.2)	133 (68.6)	35 (62.5)	0.593
	>5 drinks per day (ethanol use disorder/abuse)	12 (4.8)	10 (5.2)	2 (3.6)	
	Daily	18 (7.2)	12 (6.2)	6 (10.7)	
	Social	52 (20.8)	39 (20.1)	13 (23.2)	
Adjuvant Therapy (%)	No	168 (58.7)	133 (59.9)	35 (54.7)	0.546
	Yes	118 (41.3)	89 (40.1)	29 (45.3)	

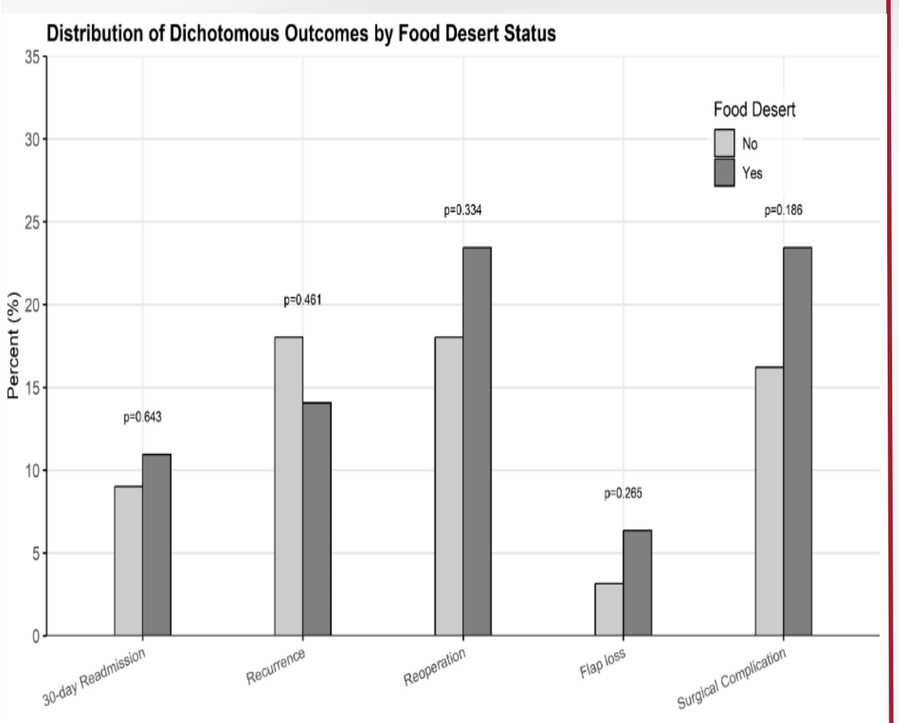
Table 1. Demographic Characteristics by Food Desert Status. Of the 286 patients included, 64 (22.4%) resided in USDA-defined food deserts while 222 (77.6%) did not. Baseline demographics were generally similar between groups (Table 1). Median age was 66 years [57–72] among non-food desert patients versus 63 years [54–71] among food desert patients (p=0.131). There were no significant differences in sex (p=0.986), Charlson Comorbidity Index (CCI; p=0.702), tobacco use (p=0.994), alcohol use (p=0.593), or other demographic factors. Race and ethnicity differed significantly, with a higher proportion of African American or Hispanic patients among food desert residents (p<0.001). Clinical stage at presentation was comparable between groups (p=0.984).

Oncologic and Surgical Outcomes:

On univariable analysis (Figure 1, Table 2), disease recurrence occurred in 9 of 64 (14.1%) food desert patients compared to 40 of 222 (18.0%) non-food desert patients, a difference that was not statistically significant (p=0.461). Readmission within 30 days occurred in 7 (10.9%) food desert patients versus 20 (9.0%) of non-food desert patients (p=0.643). Reoperation rates were 23.4% in food desert patients versus 18.0% in non-food desert patients (p=0.334). Surgical complications occurred in 4.7% and 4.1% of patients, respectively (p=0.829). Flap partial or complete loss was observed in 5 (7.9%) food desert patients versus 7 (3.2%) non-food desert patients. Median length of stay was similar between groups (6 [5–7] vs. 5 [5–7] days; p=0.621).

Multivariable analyses confirmed that food desert residence was not independently associated with recurrence, complications, flap outcomes, or readmissions after adjustment for covariates.

Time-to-event analysis demonstrated that recurrence was more likely than death during the first 5–20 months after surgery, whereas beyond 15 months, death exceeded the likelihood of reoperation (Figure 2a–b).



.**Figure 1.** Distribution of study outcomes with unadjusted comparison between non-food desert and food desert groups

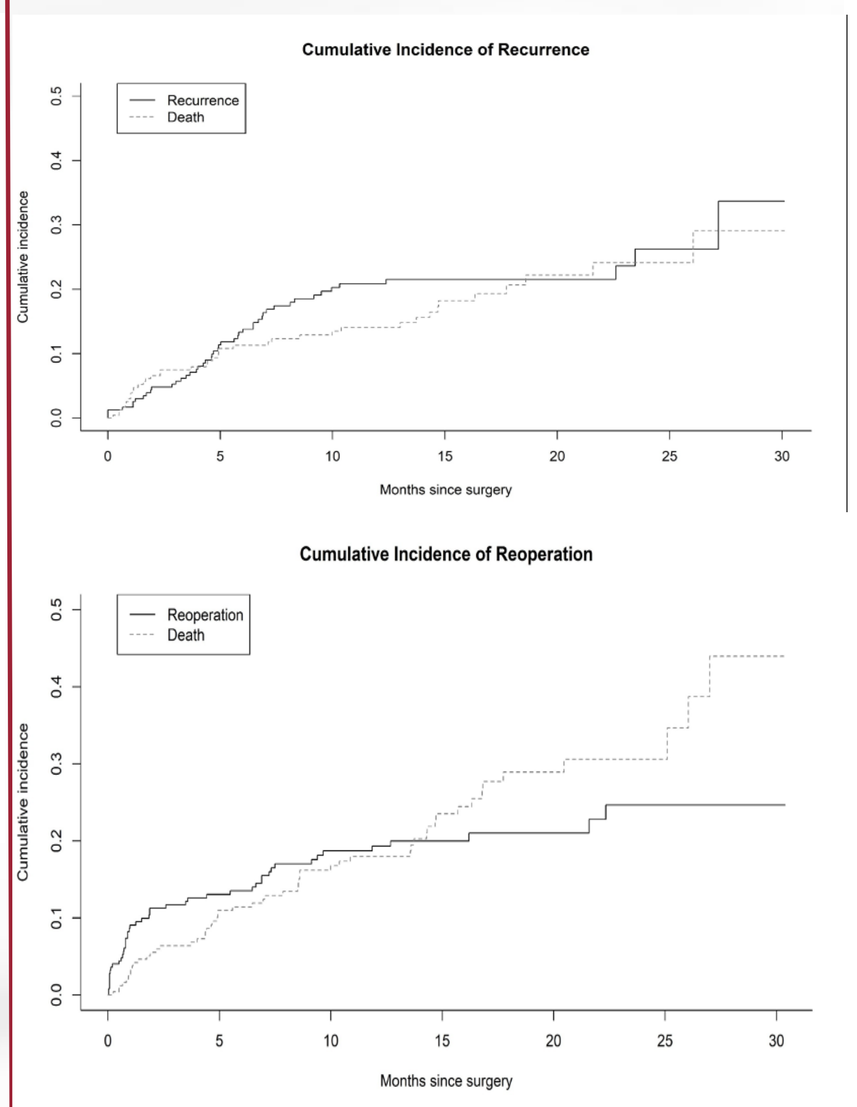


Figure 2. CIFs for a) recurrence and b) reoperation over time adjusted for the competing risk of death.

Discussion:

This study found no independent association between USDA-defined food desert residence and outcomes after free flap reconstruction for head and neck cancer (HNC). Unlike other surgical and cancer populations where food desert status predicts worse survival or complications, patients in this cohort had comparable results regardless of residence. One explanation is the delivery of care in high-volume tertiary centers, where multidisciplinary teams, nutritional assessment, and standardized perioperative protocols may mitigate disparities related to food access. The study is limited by reliance on geographic food desert status as a proxy for individual food insecurity and by small sample size for rare outcomes, which may reduce generalizability. Individual-level screening for food insecurity is needed to better capture social risk.

Conclusion:

Living in a USDA-defined food desert was not associated with higher recurrence, complications, or readmissions after free flap reconstruction for HNC. Comprehensive perioperative care may reduce disparities, but future studies should incorporate patient-level measures of food insecurity and evaluate targeted interventions.

Acknowledgments:

I would like to extend my heartfelt gratitude to the UAMS College of Medicine and the Department of Otolaryngology for making this project possible.

References:

1. Fig 1: Agricultural and Community Health Initiative, Inc. (ACHI). Food deserts fact sheet update. ACHI website. Published September 28, 2022. Accessed January 7, 2025. https://achi.net/wp wp-content/uploads/2022/09/220928F_Food Food-DesertsDeserts-FactFact-Sheet - Update.pdf