Dental Proportion: A Potential Factor in Reducing Adult Smoking and Excessive Drinking in US Counties

Sarah Albalawi

Background: Dentists are well-positioned to address smoking and excessive alcohol consumption due to their regular examination of the oral cavity, where the detrimental effects of these habits are often first visible. [1] They play a vital role in identifying at-risk individuals, providing personalized counseling and education on the oral and systemic health consequences of these behaviors, and offering referrals to cessation programs, medical professionals, or support groups. [2,3] Through consistent reinforcement and monitoring during routine dental visits, dentists can significantly contribute to smoking cessation and alcohol reduction efforts, effectively promoting healthier lifestyle choices and preventing serious oral and general health complications. [2,3] This study aims to assess the impact of high dentist proportions in US counties compared to low dentist proportions on smoking prevalence and excessive drinking among adults.

Does having low dentist proportions in US counties increase smoking prevalence among the population?

Does having low dentist proportions in US counties increase excessive drinking prevalence among the population?

Methods: This is an observational study that uses propensity scores to adjust for hidden biases using carefully selected confounders. The study population includes US counties with health measures recorded in the County Health Ranking 2024 (CHR 2024). The exposure of interest is the dentist proportion in US counties. This variable was dichotomized using quintiles to produce a high proportion group (upper 25th percentile) and a low proportion group (lower 25th percentile). The first outcome of interest is the smoking prevalence, which is defined as the proportion of smoking adults in a county. The second outcome of interest is the drinking prevalence, which is defined as the proportion of adults reporting excessive drinking in a county. The selected covariates include variables related to general health measures, access to healthcare services, socioeconomic factors, and environmental factors.

Three propensity score adjustments were used: matching, weighting, and the double robust method. The first analysis used 1:1 matching with replacement because the exposure groups were equal. The balance greatly improved after matching, and the effective size after matching was 195 counties. The second analysis was ATT weighting. The balance was not as satisfying as the matching results, and the effective size was further reduced to 43 counties. The double robust method used ATT weighting with direct adjustment, which yielded a very similar balance to the previous ATT weighting results. The method used to

compare the outcomes after propensity score adjustment was 1:1 matching with replacement.

Results: After propensity score adjustment using 1:1 matching with replacement, the estimated causal effect of low dentist proportions on smoking prevalence among adults in US counties is an increase of 1.12 percentage points (95% CI: 0.76, 1.48). The estimated causal effect of low dentist proportions on excessive drinking in US counties is an increase of 0.59 percentage points (95% CI: 0.35, 0.82). While the results for both outcomes had statistically significant p-values (<0.05), the sensitivity analysis revealed that a gamma level between 1.25 and 1.50 was enough to render it non-significant. This means that, if there were no hidden biases, then our conclusions are reliable, however, the presence of small hidden biases can change our conclusions about the impact of the exposure on the outcome.

Conclusions: The proportion of dentists in US counties has a minute impact on smoking and excessive drinking prevalence among the population. This reflects the importance of healthcare quality as opposed to quantity. Having more dentists per population cannot directly reduce oral-related health behaviors. Other factors, such as healthcare accessibility and the quality of healthcare services, are vital in improving health behaviors. Further research on the quality of dental visits and their impact on perceived oral-related health behaviors is needed to improve our understanding of dentists' impact on health-related behaviors on a population level. Using the Health Professional Shortage Area (HPSA) may provide better insights into the impact of dentists' deficiency in US counties.

References:

1. American Dental Association (ADA)
2. Çalışkan Batı, B., Buduneli, N., Meriç, P. (2024). Examining awareness of tobacco's oral health effects: Dentists' role in smoking cessation among dental patients. Tobacco Induced Diseases, 22(February), 41. https://doi.org/10.18332/tid/176227
3. Holliday, R., Hong, B., McColl, E., Livingstone-Banks, J., & Preshaw, P. M. (2021). Interventions for tobacco cessation delivered by dental professionals. The Cochrane database of systematic reviews, 2(2), CD005084. https://doi.org/10.1002/14651858.CD005084.pub4

Data Set Reference: US County Health Rankings (CHR) 2024: https://www.countyhealthrankings.org/health-data/methodology-and-sources/data-documentation