

**Oral Health Considerations for Seniors (Aged 65+) with Complete Tooth Loss from Tooth Decay or Gum Disease**

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**Abstract**

**Background/Objective:** This study aimed to gain insight into the oral health factors of persons aged 65 and up who had lost all their teeth due to tooth decay or gum disease. The study intended to identify this cohort's possible variations and risk factors for full tooth loss.

**Methods:** The data was analyzed using CDC Oral Health data, focusing on persons aged 65 and up who reported total tooth loss. The proportions of complete tooth loss based on gender, income, Race, and education level were calculated using descriptive statistics. The precision of the findings was estimated using confidence intervals.

**Results:** The study of various demographic parameters found differences in the occurrence of total tooth loss. In 2020, a total of 16,234 cases (13.8%) were reported. However, the overall number of cases has gradually decreased over the study period, with the highest

proportion of cases (16.2%) reported in 2012. Individuals with poorer incomes, specific racial and ethnic backgrounds, and lower education levels were shown to have higher proportions of complete tooth loss in the research population. The data revealed a clear link between income level, Race, education level, and the chance of having total tooth loss.

**Conclusion:** Adults aged 65 and up who have lost all their natural teeth due to dental decay or gum disease confront serious oral health issues. To enhance their overall oral health outcomes and quality of life, addressing the inequities and variables linked with full tooth loss in this population is critical. Oral health practitioners, governments, and community organizations must work together to develop comprehensive policies that promote equitable access to dental treatment, improve oral health education, and address socioeconomic barriers.

**Keywords:** Oral health, complete tooth loss, adults aged 65+, tooth decay, gum disease, socioeconomic disparities.

## Introduction

Regardless of age, oral health is essential for overall well-being and quality of life. Maintaining oral health becomes even more important for those 65 and older who have lost all their natural teeth due to dental decay or gum disease. Natural tooth loss can have serious consequences, affecting not just the ability to eat and talk but also nutrition, self-esteem, and social connections. [1,2] According to World Health Organization (WHO) data on global oral health status, almost 3.5 billion people worldwide are impacted by oral diseases. For people aged 20 and up, the global average prevalence of total tooth loss is almost 7%. However, a substantially larger global frequency of roughly 23% has been observed among persons aged 60 and above. Tooth loss can have a detrimental psychological, social, and functional impact. [3]

Life expectancy has increased due to advancements in healthcare and living conditions, increasing the number of older persons. With this demographic shift comes an increased need to address the unique issues and considerations associated with aging and healthcare, notably regarding oral health. Among the several age-related oral health concerns, tooth decay and gum disease leading to the loss of all natural teeth is a common problem affecting many older persons. [2,4]

Unfortunately, as people age, they become more vulnerable to oral health concerns, and losing natural teeth due to dental decay or gum disease is a common complication. The oral health of older adults who have lost all of their natural teeth poses a unique set of issues that necessitate specialized attention and care. Tooth loss can have far-reaching consequences for the oral cavity

and surrounding structures, affecting the surviving oral tissues and other aspects of health. As a result, it is critical to understand the special oral health considerations to design comprehensive plans to meet their oral health needs. [5-6].

Complete dental loss, also known as complete edentulism, refers to losing all-natural teeth in the mouth. This condition can significantly impact an individual's oral health, nutrition, and overall quality of life. Several factors contribute to complete dental loss in older adults, and these are well-documented in the existing literature [6-9].

Poor oral hygiene is a leading cause of tooth loss in the elderly population. Inadequate oral hygiene practices over a lifetime can lead to various dental issues, such as gum disease (periodontitis) and tooth decay (caries). When left untreated, these conditions can progress and eventually result in the loss of teeth. Chronic periodontal (gum) disease is also identified as one of the most common causes of tooth loss in adults, including the elderly. As people age, they become more susceptible to gum disease due to factors like reduced immune response, diminished tissue repair ability, and other systemic health issues. Untreated dental problems are a significant contributing factor to complete dental loss in the elderly population [6-9]. Failing to address dental issues in their early stages can exacerbate the problem, leading to the eventual loss of teeth. Elderly individuals may delay seeking dental treatment due to factors such as financial constraints, fear of dental procedures, or limited access to dental services.

Additionally, bruxism, a condition characterized by teeth grinding or clenching, often during sleep, can also contribute to tooth loss in older adults. Over time, bruxism can wear down tooth enamel and cause irreversible damage to teeth, potentially leading to tooth

loss. Malnutrition is another crucial aspect that affects oral health and may lead to tooth loss. Poor nutrition, often common among the elderly, can weaken teeth and gums, making them more susceptible to decay and gum disease.

Furthermore, certain systemic health conditions are associated with tooth loss in older adults. Diseases such as diabetes and osteoporosis can adversely affect oral health and may increase the risk of tooth loss. Some medications commonly used by the elderly may have side effects that affect oral health and increase the risk of tooth loss. For instance, certain drugs can cause dry mouth (xerostomia), reducing the protective saliva flow and increasing the risk of dental problems.

In addition to lifestyle factors, accidents or injuries involving the mouth can also result in losing one or more teeth in older adults. Trauma can be a significant factor leading to complete dental loss. Summarily, causes of complete dental loss in older adults are often interconnected and multifactorial. Maintaining good oral hygiene, regular dental check-ups, and early intervention for dental problems are essential to prevent tooth loss and preserve oral health in older adults [6-9].

This article examines different aspects of oral health for older people by assessing the proportion of persons aged 65 and older who had experienced complete tooth loss in the United States (US) based on gender, income, Race, and education level in The Centres for Disease Control and Prevention (CDC.) Oral Health statistics. We aim to present the oral health disparities in the older adult population by using this data to base our findings on these parameters.

This data is critical for establishing evidence-based interventions, policy recommendations, and targeted public health campaigns focused on minimizing tooth loss and improving oral health outcomes for older

individuals of all demographics. Ultimately, the goal is to improve the overall oral health and quality of life of older persons in the US by promoting equal access to oral health care. We intend to focus light on the oral health issues experienced by older persons and emphasize the importance of dental care in enhancing their quality of life and general health. Older persons can have better oral health outcomes and age gracefully with confidence and dignity by implementing preventive measures, adopting suitable dental treatments, and embracing good oral hygiene practices.

## **Methods**

### **Study population**

The study population consists of persons aged 65 and up who have lost their teeth due to gum disease. The data was examined to include only those in this age group with a history of complete tooth loss. The query focused on individuals within this age group from 2012 to 2020.

### **Data source**

The primary data source for this study is CDC Oral Health data, focusing on relevant surveys or surveillance systems that collect information on tooth loss in persons aged 65 and over. It includes data from related data sources such as the National Health and Nutrition Examination Survey (NHANES), the Behavioral Risk Factor Surveillance System (BRFSS), and the National Health Interview Survey (NHIS). These databases provide thorough information on oral health status, including tooth loss, and represent a representative sample of the US population.

### **Variables of interest**

The factors examined in this research encompassed gender, income, Race, and educational attainment. These demographic variables are recognized as influential factors in determining oral health results. They can offer valuable insights into oral health considerations for older

individuals who have experienced complete tooth loss. The pertinent variables were obtained from the datasets to explore their correlation with total tooth loss.

**Data analysis**

In the data analysis phase, aggregate data for selected periods (2012-2020) for available patient characteristics were summarized, and descriptive statistical analysis was performed to determine the percentage of individuals aged 65 and above who have encountered complete tooth loss, considering gender, income, Race, and education level. The proportions were calculated by dividing the number of individuals with complete tooth loss within each demographic category by the total number of individuals in that category. This analysis offers a comprehensive overview of how complete tooth loss is distributed among the study population based on the specified variables.

**Ethical considerations**

Regarding ethical considerations, using CDC Oral Health data ensures compliance with research ethical guidelines. The data acquired from surveys and surveillance systems are de-identified and publicly accessible, guaranteeing privacy and confidentiality. Consequently, this study does not need informed consent or ethical approval. The analyses for this study were

conducted between June 10, 2023, and July 2, 2023, within the specified timeframe.

**Results**

The analysis aimed to examine the proportion of adults aged 65 and above who have experienced complete tooth loss based on gender, income, Race, and education level. These findings provide valuable insights into the oral health considerations for this specific age group who have lost all of their natural teeth due to tooth decay or gum disease.

**The proportion of adults with complete tooth loss by gender and location**

Regarding the proportion of adults with complete tooth loss by gender and location, 16,234 cases (13.8%) were reported in 2020. However, there has been a gradual decrease in the total number of cases over the study period, with the highest proportion of cases (16.2%) reported in 2012 (n=24,078; 95% Confidence interval [CI]: 15.8-16.6). Among the study population of adults aged 65 and above who have experienced complete tooth loss, the analysis revealed no gender disparities in total tooth loss. Both males and females had an equal proportion of tooth loss, with males experiencing a proportion of 13.4% in 2020 and females experiencing a proportion of 13.3% in 2020. (Table 1)

Table 1: Adults aged 65+ who have lost all of their natural teeth due to tooth decay or gum disease based on gender

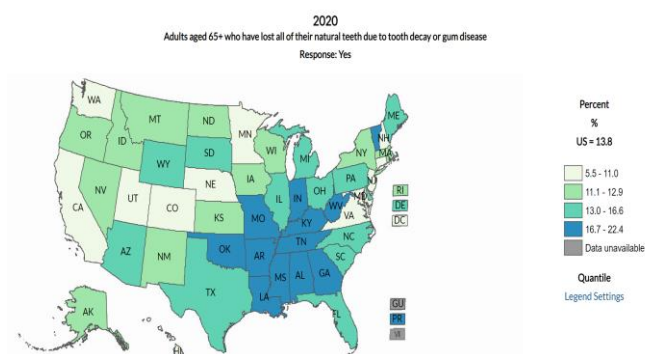
Total	Yes	No	Female	Male
2020				
Percent (%)	13.8	86.7	13.3	13.4
CI	13.3 - 14.3	86.2 - 87.2	12.7 - 13.9	12.7 - 14.1
n	16234	134040	9407	6827
2018				
Percent (%)	13.8	86.6	13.9	12.7
CI	13.4 - 14.2	86.2 - 87.0	13.4 - 14.4	12.2 - 13.2
n	19089	147682	11474	7563

2016				
Percent (%)	14.4	85.6	14.7	14.1
CI	14.0 - 14.8	85.2 - 86.0	14.2 - 15.2	13.5 - 14.7
n	22180	139946	13858	8320
2014				
Percent (%)	14.9	85.1	15.5	14.1
CI	14.5 - 15.3	84.7 - 85.5	15.0 - 16.0	13.6 - 14.6
n	22053	128038	14307	7746
2012				
Percent (%)	16.2	83.8	16.3	16
CI	15.8 - 16.6	83.4 - 84.2	15.8 - 16.8	15.4 - 16.6
n	24078	119602	15962	8116

Abbreviation: CI- Confidence interval

Certain states had consistently high natural tooth decay percentages during the study period, with variability across different areas. Figure 1 depicts dental decay and gum disease trend data by location for 2020.

Figure 1: Breakdown of tooth decay proportion in adults aged 65+ based on US states



Abbreviation- Alabama: AL Alaska: AK Arizona: AZ Arkansas: AR California: CA Colorado: CO Connecticut: CT Delaware: DE Florida: FL Georgia: GA Hawaii: HI Idaho: ID. Illinois: IL Indiana: IN Iowa: IA Kansas: KS Kentucky: KY Louisiana: LA Maine: ME Maryland: MD. Massachusetts: MA Michigan: MI Minnesota: MN Mississippi: MS Missouri: MO Montana: MT Nebraska: NE Nevada: NV New Hampshire: NH. New Jersey: NJ. New Mexico: NM.

New York: NY. North Carolina: NC. North Dakota: ND. Ohio: OH Oklahoma: OK Oregon: OR Pennsylvania: PA Rhode Island: RI South Carolina: SC South Dakota: SD. Tennessee: TN Texas: TX Utah: UT Vermont: VT Virginia: VA Washington: WA West Virginia: WV Wisconsin: WI Wyoming: WY.

**The proportion of adults with complete tooth loss by income**

When assessing the percentage of adults who have experienced complete tooth loss based on their income level, the income categories were divided into five types: less than \$15,000, \$15,000 to \$24,999, \$25,000 to \$34,999, \$35,000 to \$49,999, and more than \$50,000. In 2020, the findings indicated that 27.5% (n: 2316; CI: 24.7-30.3) of individuals with an income less than \$15,000 had experienced complete tooth loss. As income levels increased, there was a gradual decline in the percentage of individuals with total tooth loss. In the high-income category (more than \$50,000), only 5% to 6.1% of individuals had encountered complete tooth loss during the study period from 2012 to 2020, as depicted in Table 2. This implies that a more significant proportion of adults with lower income experienced

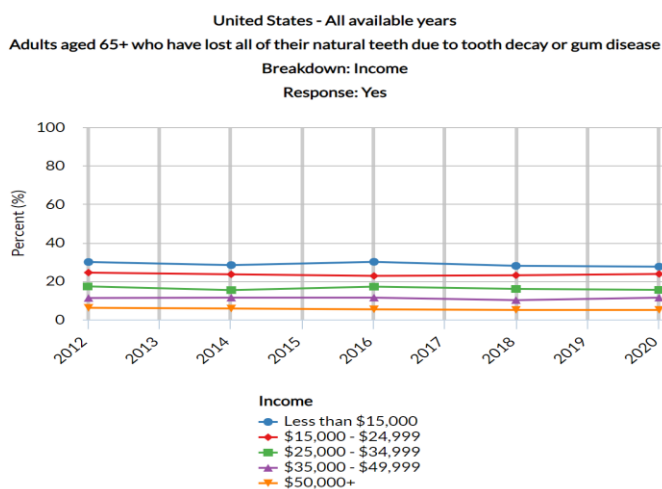
complete tooth loss compared to those with higher income, as illustrated in Figure 2.

Table 2: Adults aged 65+ who have lost all of their natural teeth due to tooth decay or gum disease based on income

Income	Less than \$15,000	\$15,000 - \$24,999	\$25,000 - \$34,999	\$35,000 - \$49,999	\$50,000+
2020					
Percent (%)	27.5	23.7	15.4	11.4	5
CI	24.7 - 30.3	22.1 - 25.3	14.1 - 16.7	10.3 - 12.5	4.5 - 5.5
n	2316	4166	1953	1733	1985
2018					
Percent (%)	27.9	23	15.9	10.1	5
CI	26.0 - 29.8	21.8 - 24.2	14.6 - 17.2	9.3 - 10.9	4.6 - 5.4
n	3221	5044	2344	1924	2187
2016					
Percent (%)	30	22.7	17.1	11.4	5.3
CI	28.1 - 31.9	21.6 - 23.8	15.9 - 18.3	10.5 - 12.3	4.9 - 5.7
n	3880	5960	2856	2266	2330
2014					
Percent (%)	28.3	23.5	15.3	11.4	5.7
CI	26.6 - 30.0	22.5 - 24.5	14.3 - 16.3	10.5 - 12.3	5.2 - 6.2
n	4162	6332	2784	2144	1995
2012					
Percent (%)	29.9	24.4	17.2	11.2	6.1
CI	28.3 - 31.5	23.4 - 25.4	16.0 - 18.4	10.4 - 12.0	5.5 - 6.7
n	5190	7037	2996	2043	1816

Abbreviation: CI- Confidence interval

Figure 2: Breakdown of tooth decay proportion in adults aged 65+ based on income category



**The proportion of adults with complete tooth loss by Race**

The proportion of adults experiencing complete tooth loss was analyzed based on Race. The racial categories examined in this study were white, black, Hispanic,

multiracial, and other. The results indicated that among black adults, 20% (n = 1571; 95% CI: 18.0-22.0) had experienced complete tooth loss in 2020, with the highest proportion reported in 2012 at 24.7% (n=2522; 95% CI: 22.7-26.7). (Table 3) In comparison, among white adults, the proportion was lower, with 12.5% (n = 12,765; 95% CI: 12.0-13.0) experiencing complete tooth loss in 2020. Hispanic adults had a proportion of 13.8% (n = 605; 95% CI: 11.1-16.5), while multiracial adults had a proportion of 16% (n = 263; 95% CI: 12.1-19.9) in 2020. The other racial category exhibited a proportion of 10.7% (n = 633; 95% CI: 8.3-13.1). (Figure 3)

These findings underscore disparities in tooth loss based on Race, with higher proportions of complete tooth loss observed among black and multiracial adults, followed by Hispanic adults, compared to white adults. The other racial category displayed an intermediate proportion of total tooth loss. These results highlight the importance of

targeted interventions and tailored oral health programs to address these disparities and improve oral health

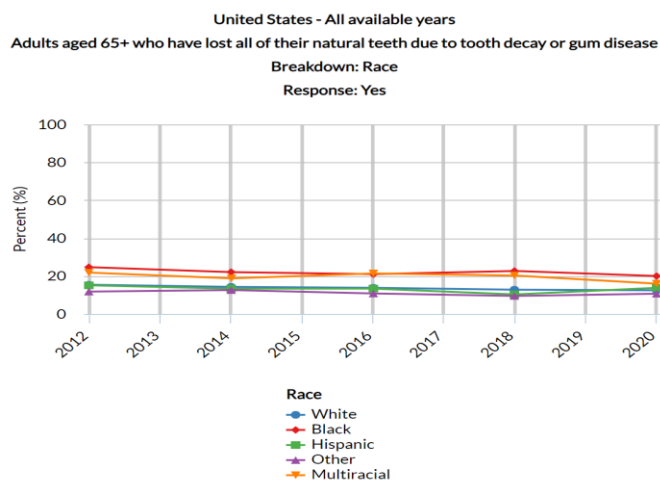
outcomes among different racial groups.

Table 3: Adults aged 65+ who have lost all of their natural teeth due to tooth decay or gum disease based on Race

Race	White	Black	Hispanic	Other	Multiracial
2020					
Percent (%)	12.5	20	13.8	10.7	16
CI	12.0 - 13.0	18.0 - 22.0	11.1 - 16.5	8.3 - 13.1	12.1 - 19.9
n	12765	1571	599	633	263
2018					
Percent (%)	12.8	22.7	10.3	9.5	20.3
CI	12.4 - 13.2	20.9 - 24.5	8.8 - 11.8	7.8 - 11.2	14.9 - 25.7
n	15056	1920	624	741	353
2016					
Percent (%)	13.8	21	13.4	10.8	21.4
CI	13.4 - 14.2	19.3 - 22.7	11.4 - 15.4	8.3 - 13.3	17.3 - 25.5
n	18075	2040	604	648	401
2014					
Percent (%)	14.3	22.1	13.4	12.6	18.8
CI	13.9 - 14.7	20.4 - 23.8	11.4 - 15.4	9.6 - 15.6	15.4 - 22.2
n	17952	2008	660	628	374
2012					
Percent (%)	15.4	24.7	15.1	11.8	21.8
CI	15.0 - 15.8	22.7 - 26.7	12.9 - 17.3	8.8 - 14.8	17.2 - 26.4
n	19239	2522	801	653	411

Abbreviation: CI- Confidence interval

Figure 3: Breakdown of tooth decay proportion in adults aged 65+ based on racial classification



**The proportion of adults with complete tooth loss by education level**

The proportion of adults who have experienced complete tooth loss was examined based on their educational

attainment. The education categories were classified into five types: less than high school (HS), high school or equivalent (such as general academic development or GED), some post-HS education, and college graduate or professional degree.

The results indicated that among adults with less than a high school education, the proportion of individuals with complete tooth loss was 29.6% (n = 3047; 95% CI: 27.4-31.8) in 2020. The highest proportion was reported in 2012 at 32.5% (n = 6317; CI: 31.1-33.9). As the educational level increased, there was a gradual decline in the proportion of individuals with complete tooth loss. (Table 4) Among those with a high school or GED equivalent education, the ratio in 2020 was 17.6% (n = 6827; 95% CI: 16.6-18.6). For individuals with post-HS education, the proportion decreased to 10.6% (n = 4252;

95% CI: 9.9-11.3). Among adults with a college graduate or professional degree, the proportion was significantly lower at 3.6% (n = 2040; 95% CI: 3.3-3.9) in 2020. (Figure 4)

These findings clearly demonstrate an association between educational attainment and the likelihood of experiencing complete tooth loss. Adults with higher

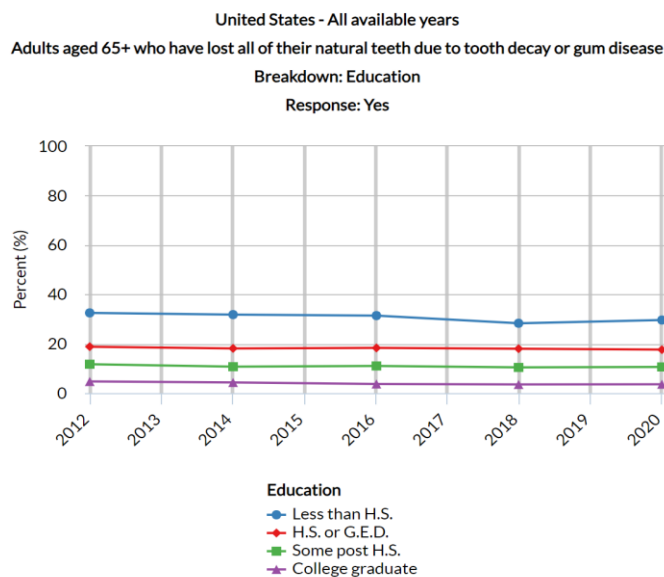
levels of education were less likely to have total tooth loss compared to those with lower levels of education. These results underscore the importance of promoting higher education and oral health education, as they contribute to lower rates of complete tooth loss among the adult population.

Table 4: Adults aged 65+ who have lost all of their natural teeth due to tooth decay or gum disease based on education

Education	Less than HS.	HS or GED.	Some post-HS.	College Graduate
<b>2020</b>				
Percent (%)	29.6	17.6	10.6	3.6
CI	27.4 - 31.8	16.6 - 18.6	9.9 - 11.3	3.3 - 3.9
n	3047	6827	4252	2040
<b>2018</b>				
Percent (%)	28.3	18	10.4	3.5
CI	26.7 - 29.9	17.2 - 18.8	9.8 - 11.0	3.2 - 3.8
n	3934	8139	4683	2245
<b>2016</b>				
Percent (%)	31.4	18.3	11	3.7
CI	29.8 - 33.0	17.6 - 19.0	10.4 - 11.6	3.4 - 4.0
n	4749	9668	5223	2445
<b>2014</b>				
Percent (%)	31.8	18.1	10.7	4.3
CI	30.3 - 33.3	17.4 - 18.8	10.1 - 11.3	3.9 - 4.7
n	5157	9547	4766	2392
<b>2012</b>				
Percent (%)	32.5	18.8	11.7	4.7
CI	31.1 - 33.9	18.2 - 19.4	11.0 - 12.4	4.2 - 5.2
n	6317	10515	4909	2200

Abbreviation: CI- Confidence interval

Figure 4: Breakdown of tooth decay proportion in adults aged 65+ based on education classification



The results underscore disparities in tooth loss based on gender, income, Race, and education level. Specifically, females, individuals with lower income, certain racial groups (such as White and Black adults), and individuals with lower education levels tend to experience a higher proportion of complete tooth loss. It is essential to acknowledge that these findings are derived from the CDC Oral Health data analysis, which has its limitations. The results may be influenced by biases and limitations inherent in the original surveys and surveillance systems, and other unaccounted factors may contribute to the observed patterns.

Nevertheless, these findings serve as a basis for further investigation and the development of targeted interventions to address oral health disparities among older adults with complete tooth loss. By comprehending the demographic factors associated with higher rates of tooth loss, healthcare professionals and policymakers can devise strategies to promote equitable access to oral healthcare, enhance oral hygiene practices, and improve this population's overall oral health and well-being.

## Discussion

The discussion section aims to interpret and contextualize the results obtained from the analysis, and the findings shed light on the proportion of adults with complete tooth loss based on gender, income, Race, and education level, highlighting essential considerations for addressing oral health disparities in this population.

Examining the proportion of adults with complete tooth loss based on gender provides valuable insights into potential disparities in oral health outcomes between males and females. In the present study, no significant gender disparities were observed in the proportion of complete tooth loss among adults aged 65 and above. Both males and females exhibited similar ratios of tooth loss. These findings align with some previous studies conducted by Wong et al. and Zhang et al. that reported no significant gender differences in complete tooth loss. [1,7-9]

Investigating the proportion of adults experiencing complete tooth loss based on income disparity provides valuable insights into the potential oral health inequalities faced by individuals with varying income levels. The study revealed a clear relationship between income level and the likelihood of experiencing complete tooth loss, with adults with lower incomes exhibiting higher proportions of tooth loss than those with higher incomes.

These results align with prior research consistently demonstrating income-related disparities in oral health outcomes [1, 10-12]. Socioeconomic factors, such as restricted access to dental care, financial constraints, and lower oral health literacy, contribute to poorer oral health outcomes among lower-income individuals.

The study's results revealed variations in the prevalence of complete tooth loss among different racial groups, with higher proportions observed among black and

multiracial adults compared to White, Hispanic, and multiracial individuals. These findings are consistent with previous research that reported disparities in oral health outcomes based on race [1, 11,13-17].

The higher proportion of complete tooth loss among black adults aligns with existing literature highlighting disparities in oral health among racial and ethnic minorities in the United States. Factors such as limited access to dental care, socioeconomic inequalities, cultural differences, and systemic barriers contribute to these disparities [11,13-16]. Addressing these underlying factors and developing targeted interventions are essential to reduce the burden of complete tooth loss within this population.

Hispanic adults exhibited a higher proportion of complete tooth loss than White adults but a lower proportion than Black and multiracial adults. This aligns with previous research that has identified oral health disparities among Hispanic populations, which may be influenced by socioeconomic factors, language barriers, and limited access to dental care [1,13-18]. Culturally tailored interventions and targeted outreach programs could significantly improve oral health outcomes within the Hispanic community. The study's findings underscore the importance of addressing oral health disparities based on Race and developing interventions tailored to specific racial groups. Efforts should focus on increasing access to dental care, improving oral health education, and promoting preventive measures such as regular dental check-ups, proper oral hygiene practices, and healthy dietary habits. Additionally, strategies to address socioeconomic inequalities and systemic barriers, such as expanding insurance coverage and implementing community-based oral health programs, are crucial for reducing disparities in complete tooth loss among different racial groups.

The study of the proportion of persons with complete tooth loss based on education level discrepancy gives information on the potential oral health disparities experienced by people from various educational backgrounds. This study's findings demonstrated a clear relationship between education level and the chance of having total tooth loss. Individuals with lower education levels showed a higher proportion of complete tooth loss than those with higher education levels, consistent with prior research [1,19-20]. This indicates that higher education is essential in terms of oral health outcomes. Lower education levels are frequently related to inadequate oral health information, poor oral hygiene practices, and limited access to dental treatment [1,20]. These variables increase the risk of tooth decay and gum disease, leading to tooth loss. Recognizing the limitations of secondary data sources like the CDC Oral Health data is crucial. These data sets may be influenced by reporting biases, recall errors, and sampling limitations inherent in the original surveys or surveillance systems.

Furthermore, the datasets' variables may have limitations or fail to encompass all relevant factors about complete tooth loss in this population. Additionally, the analysis specifically focused on adults aged 65 and above, which restricts the general applicability of the findings to younger populations. In future studies, it would be beneficial to incorporate more comprehensive assessments that involve clinical examinations and longitudinal designs, allowing for a more nuanced comprehension of oral health disparities among different groups. Despite these limitations, utilizing the CDC Oral Health data presents a valuable opportunity to investigate oral health considerations for adults aged 65 and above who have experienced complete tooth loss. The data analysis will yield insights into the proportion

of complete tooth loss based on gender, income, Race, and education level, thus contributing to a better understanding of oral health disparities and considerations within this unique population.

### Conclusion

In conclusion, this study emphasized the oral health concerns of elderly persons who have lost all of their teeth. The findings highlighted critical factors contributing to total tooth loss in this population and focused on the importance of focused interventions and initiatives to enhance oral health outcomes. The prevalence of full tooth loss was found to differ significantly depending on demographic parameters such as gender, income, Race, and education level. These differences reflect the intricate interplay of socioeconomic, cultural, and systemic factors influencing oral health outcomes. Individuals with poorer incomes, particular racial and cultural backgrounds, and lower education levels were discovered to be at a higher risk of total tooth loss.

The study's findings highlight the need to address these differences and implement personalized interventions to enhance oral health outcomes for older persons who have lost all of their natural teeth. Increased access to dental care, oral health education and awareness, and addressing socioeconomic barriers that limit the provision of preventative and treatment services should be the focus of efforts.

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