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Article

Prevalence of Non-Daily Teeth Cleaning and Its Associated Factors Among Adults Population in Rwanda

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Abstract: Oral hygiene practices are vital for maintaining health, yet many adults do not engage in daily teeth cleaning. This study examined the prevalence and determinants of non-daily teeth cleaning in Rwanda using data from the 2022 Rwanda Non-Communicable Diseases STEPS Survey (N = 5,673). Weighted prevalence estimates and logistic regression models assessed associated factors. The prevalence of non-daily teeth cleaning was 33.1% (95% CI: 31.0–35.2). Factors associated with increased odds of non-daily teeth cleaning included rural residence (AOR = 2.5, 95% CI: 1.5–4.1), lower education (AOR = 0.3, 95% CI: 0.2–0.6), lower income (AOR = 2.0, 95% CI: 1.3–3.2), and lack of toothpaste use (AOR = 1.3, 95% CI: 1.0–1.7). Addressing these disparities through oral health education, economic policies, and affordable hygiene products may improve daily oral hygiene practices.

Keywords: daily teeth cleaning; associated factors; Rwanda

1. Introduction

Oral hygiene is an essential aspect of overall health, directly influencing the risk of dental diseases such as caries and periodontal diseases. These conditions can lead to significant physical health problems, including pain, tooth loss, and infections, as well as broader impacts on quality of life, such as difficulties with eating, speaking, and social interaction [1,2]. Poor oral health is also linked to systemic conditions like cardiovascular disease and diabetes, further emphasizing its critical role in maintaining overall health [3]. Globally, inadequate oral hygiene remains a major contributor to the burden of oral diseases, and regular teeth cleaning is widely recognized as one of the most effective preventive measures. Despite this understanding, disparities in oral hygiene practices persist across different countries and populations, influenced by factors such as access to dental care, education, socioeconomic status, and geographic location [4].

In Rwanda, oral health has emerged as a significant public health concern, largely due to gaps in preventive dental practices and limited access to oral healthcare services. The most recent nationwide data from the 2022 Rwanda Non-Communicable Diseases (NCD) STEPS Survey provides important insights into these issues. It reveals that while 67% of adults clean their teeth at least once a day, only 19.3% adhere to the recommended twice-daily teeth cleaning practice, which is considered the gold standard for maintaining oral health [5]. This low adherence to twice-daily teeth cleaning underscores the challenge of improving oral hygiene behaviors across the population. Furthermore,

more than half of the population—57%—reported never having received dental care, and only 11.5% had visited a dentist within the past year, typically due to acute pain or dental problems [5]. These statistics highlight significant gaps in both routine oral hygiene and access to dental services in Rwanda.

Several studies have sought to understand the factors associated with oral hygiene practices in Rwanda. Hackley et al. [4] conducted a comprehensive analysis of oral hygiene behaviors and found that individuals in urban areas, those with higher levels of education, and those in professional occupations were more likely to engage in daily teeth cleaning. This suggests that oral hygiene practices are closely linked to socioeconomic status and educational attainment, which likely influences individuals' access to oral health information and resources. Similarly, Nzabonimana et al. [3] explored oral health knowledge and practices in Nyarugenge District and found a strong association between education and better oral hygiene behaviors, particularly among individuals who owned smartphones and had access to online health resources. Despite these findings, some factors, such as gender and medical insurance status, showed limited association with teeth cleaning habits [4], suggesting that the determinants of oral hygiene in Rwanda are complex and multifaceted.

The disparities between rural and urban areas also play a critical role in shaping oral hygiene behaviors in Rwanda. Rural residents often face greater barriers to accessing dental care and oral health education, leading to poorer oral hygiene practices [1]. The gap between urban and rural populations in oral health outcomes is further compounded by differences in healthcare infrastructure, with urban areas typically having better access to dental services and preventive care. This is reflected in the findings of studies like Mukabizimana et al. [6], which highlighted significant differences in the use of toothbrushes and toothpaste between children in urban and rural areas. These findings underscore the importance of addressing geographic disparities in oral health interventions to improve outcomes in underserved rural regions.

2. Materials and Methods

This cross-sectional study utilizes data from the 2022 Rwanda NCD STEPS Survey, which was designed to capture national trends in key NCD risk factors across Rwanda. The survey was conducted following the World Health Organization's (WHO) Stepwise Approach to Surveillance, which involves the collection of data through three stages: behavioral risk factors, physical measurements, and biochemical assessments. For the purposes of this study, data from Step 1, which focuses on behavioral factors, was analyzed. This step included self-reported behaviors such as teeth cleaning frequency. The target population for this study included Rwandan adults aged 18 to 69 years [5].

A multi-stage sampling design was employed to ensure the survey's national representativeness. In the first stage, enumeration areas were selected using probability proportional to size to ensure that larger population centers had a greater chance of being chosen. Within each selected enumeration area, a random sample of households was then selected for participation in the survey. Finally, one eligible adult from each household was randomly chosen to participate. Ethical approval was obtained from the Rwanda National Ethics Committee, and informed consent was secured from all participants before data collection. This process resulted in a sample of 5,676 participants (RBC, 2022).

The primary outcome variable for this study was teeth cleaning frequency, categorized into two groups: daily and non-daily. The daily group included individuals who reported cleaning their teeth either once a day or twice or more. The non-daily group comprised individuals who reported teeth cleaning less frequently, including those who cleaned their teeth never, once a month, 2-3 times a month, once a week, or 2-6 times a week. The study also considered several demographics, socio-economic, and behavioral factors, including sex, age, marital status, residence, education, employment, income, alcohol use, smoking, physical inactivity, dental visits, and toothpaste use, to explore their associations with teeth cleaning behaviors.

Frequencies, weighted prevalences, along with 95% confidence intervals (CIs), were used to describe the distribution of teeth cleaning habits across different factors. To assess the association between teeth cleaning frequency and the explanatory variables, we conducted weighted binary logistic regression analyses. First, Crude Odds Ratios (CORs) were estimated for each variable through univariate logistic regression models. These CORs allowed for the initial evaluation of the independent associations between factors. Next, Adjusted Odds Ratios (AORs) were calculated through multivariate logistic regression models, controlling for potential confounders. The AORs helped identify the variables that remained significantly associated with teeth cleaning frequency after adjusting for the influence of other factors. An association was considered statistically significant if the 95% CI for the odds ratio did not include 1.

3. Results

The sample for this study consisted of 5,673 participants. The overall prevalence of non-daily teeth cleaning was 33.1% (95% CI: 31.0-35.2), aligning with the findings from the RBC (2022). A detailed breakdown of teeth cleaning frequency revealed that the highest proportion of participants, 47.6% (95% CI: 45.5-49.7), cleaned their teeth once a day, while 19.3% (95% CI: 17.6-21.2) reported teeth cleaning twice or more a day. 16.2% (95% CI: 14.9-17.6) cleaned their teeth 2-6 times a week, and 7.9% (95% CI: 7.0-9.1) reported never cleaning their teeth. Smaller proportions of participants cleaned their teeth only once a week (4.4%, 95% CI: 3.8-5.1), 2-3 times a month (2.0%, 95% CI: 1.6-2.5), and once a month (2.4%, 95% CI: 2.0-3.0).

Among individuals who clean their teeth, the majority (88.0%) use a toothbrush, with a prevalence of 86.1% for toothpaste use as shown in Table 1. Wooden toothpicks are the second most common tool, used by 32.6% of respondents. Less frequently used methods include plastic toothpicks (1.0%), dental floss (1.8%), and chewsticks (1.6%). Charcoal is also used by 5.9% of individuals, while other methods account for 6.0%. This indicates that traditional and less conventional methods still play a role in oral hygiene among some Rwandese.

Table 1. Prevalence of Different Teeth Cleaning Methods.

	Frequency	Teeth cleaning	
		Prevalence (%)	95% CI
Toothbrush	4,372	88.0	86.5-89.4
Wooden toothpicks	1,809	32.6	30.6-34.6
Plastic toothpicks	60	1.0	0.7-1.5
Thread (dental floss)	73	1.8	1.3-2.5
Charcoal	322	5.9	5.1-6.9
Chewstick / miswak	63	1.6	1.1-2.3
Other	347	6.0	5.1-7.1
Toothpaste	4228	86.1	84.6-87.5

The analysis of non-daily teeth cleaning in Table 2 revealed notable differences across various factors. Regarding sex, the prevalence of non-daily teeth cleaning was slightly higher among males (34.3%) compared to females (31.9%). In terms of age groups, younger adults aged 18-29 had the lowest prevalence of non-daily teeth cleaning at 25.0%, while those aged 60-69 showed the highest prevalence at 51.0%. The prevalence increased progressively with age.

Table 2. Frequencies and Prevalence of Non-Daily teeth cleaning by Demographic, Socio-Economic, Behavioral, and Oral Health Practices Factors.

No daily teeth cleaning			
	Frequency	Prevalence (%)	95% CI
Demographic Factors			

Sex			
Male	2128	34.3	31.4-37.2
Female	3545	31.9	29.5-34.3
Age group			
18-29	1310	25.0	21.9-28.0
30-44	2383	36.7	34.2-39.1
45-59	1293	41.4	37.8-45.0
60-69	687	51.0	46.3-55.8
Marital Status			
Single	937	20.8	17.3-24.4
Married	3636	37.9	35.5-40.3
Separated	1095	44.0	39.9-48.2
Residence status			
Urban	1141	11.2	7.6-14.7
Rural	4532	38.0	35.7-40.3
Socio-economic factors			
Educational Status			
No Formal Education	2030	48.1	45.1-51.0
Basic Education	2793	32.6	29.9-35.2
Higher Education	820	10.0	7.0-13.1
Employment status			
Employed	4829	36.0	33.9-38.1
Unemployed	844	21.6	17.6-25.6
Income status in USD			
> 48.8	419	17.9	12.4-23.4
≤ 48.8	4792	34.9	32.7-37.1
Behavioral factors			
Alcohol use			
No	488	31.1	25.7-36.5
Yes	2754	39.0	36.3-41.7
Smoking			
No	5169	31.5	29.4-33.7
Yes	504	53.7	48.3-59.1
Physical inactivity			
No	5412	33.4	31.4-35.5
Yes	261	25.8	17.5-34.1
Oral health Practices			
Dental Visit			
< 6 Months	343	36.1	28.8-43.4
≥ 6 Months	5330	32.9	30.8-35.1
Use of toothpaste			
Yes	4228	24.5	22.5-26.5
No	879	44.6	39.9-49.2

For marital status, single individuals exhibited the lowest prevalence of non-daily teeth cleaning at 20.8%, while separated individuals had the highest prevalence at 44.0%. In terms of residence status, rural residents had a much higher prevalence of non-daily teeth cleaning (38.0%) compared to urban residents (11.2%).

Regarding socio-economic factors, those with no formal education had the highest prevalence of non-daily teeth cleaning at 48.1%, while individuals with higher education had the lowest at 10.0%. Employed individuals had a prevalence of 36.0%, compared to 21.6% among the unemployed. In

terms of income, those earning less than or equal to 65 USD had a prevalence of 34.9%, compared to 17.9% for those earning more than 65 USD.

For behavioral factors, alcohol users had a higher prevalence of non-daily teeth cleaning (39.0%) compared to non-drinkers (31.1%). Smokers had a significantly higher prevalence of non-daily teeth cleaning at 53.7% compared to non-smokers (31.5%). Physically active individuals showed a prevalence of 33.4%, while those who were physically inactive had a lower prevalence of 25.8%.

Lastly, examining oral health practices, individuals who had visited a dentist in the last 6 months had a prevalence of 36.1%, compared to 32.9% for those who had not. The use of toothpaste was also a significant factor, with those not using toothpaste having a prevalence of 44.6%, compared to 24.5% among those who did use toothpaste.

Table 3 shows the associations between various demographic, socio-economic, and behavioral factors with non-daily teeth cleaning. Age was significantly associated with non-daily teeth cleaning in an unadjusted model. Individuals aged 60-69 years had more than three times the odds of non-daily teeth cleaning compared to the 18-29 age group (COR = 3.1, 95% CI: 2.5-3.9), but this association was not significant after adjustment (AOR = 1.3, 95% CI: 0.8-2.0). The 45-59 age group also had significantly higher odds of non-daily teeth cleaning compared to the 18-29 group (COR = 2.1, 95% CI: 1.7-2.6), though this effect was insignificant in the adjusted model (AOR = 1.0, 95% CI: 0.7-1.5). Similarly, individuals aged 30-44 had higher odds of non-daily teeth cleaning in the crude model (COR = 1.7, 95% CI: 1.5-2.1), but this effect was not significant after adjustment (AOR = 0.9, 95% CI: 0.7-1.4).

Table 3. Crude and Adjusted Odds Ratios for Non-Daily Teeth Cleaning by Demographic, Socio-Economic, Behavioral, and Oral Health Factors.

	Crude Odds Ratio (COR)	Adjusted Odds Ratio (AOR)
Demographic Factors		
Gender		
Male	Reference	Reference
Female	0.9 (0.8-1.0)	0.9 (0.7-1.1)
Age group		
18-29	Reference	Reference
30-44	1.7 (1.5-2.1)	0.9 (0.7-1.4)
45-59	2.1 (1.7-2.6)	1.0 (0.7-1.5)
60-69	3.1 (2.5-3.9)	1.3 (0.8-2.0)
Marital Status		
Single	Reference	Reference
Married	2.3 (1.8-2.9)	1.5 (0.9-2.4)
Separated	3.0 (2.3-3.9)	1.6 (0.9-2.7)
Residence Status		
Urban	Reference	Reference
Rural	4.9 (3.6-7.1)	2.5 (1.5-4.1)
Socio-economic factors		
Educational Status		
No Formal Education	Reference	Reference
Basic Education	0.5 (0.4-0.6)	0.8 (0.7-1.0)
Higher Education	0.1 (0.1-0.2)	0.3 (0.2-0.6)
Employment Status		
Employed	Reference	Reference
Unemployed	0.5 (0.4-0.6)	1.0 (0.7-1.7)
Income status in USD		
> 48.8	Reference	Reference
≤ 48.8	2.5 (1.7-3.6)	2.0 (1.3-3.2)

Behavioral factors		
Alcohol use		
No	Reference	Reference
Yes	1.4 (1.1-1.8)	1.3 (0.9-2.0)
Smoking		
No	Reference	Reference
Yes	2.5 (2.0-3.2)	1.2 (0.9-1.7)
Physical inactivity		
No	Reference	Reference
Yes	0.7 (0.5-1.1)	0.7 (0.4-1.3)
Oral health Practices		
Dental Visit		
< 6 Months	Reference	Reference
≥ 6 Months	0.9 (0.6-1.2)	0.9 (0.5-1.5)
Use of toothpaste		
Yes	Reference	Reference
No	2.5 (2.0-3.0)	1.3 (1.0-1.7)

For marital status, being separated was associated with higher odds of non-daily teeth cleaning compared to single individuals (COR = 3.0, 95% CI: 2.3-3.9), although this effect diminished and was not significant after adjustment (AOR = 1.6, 95% CI: 0.9-2.7). Married individuals also had higher odds of non-daily teeth cleaning compared to singles in the crude model (COR = 2.3, 95% CI: 1.8-2.9), but this effect was not significant in the adjusted model (AOR = 1.5, 95% CI: 0.9-2.4).

Residence status was also significantly associated with teeth cleaning frequency. Rural residents had significantly higher odds of non-daily teeth cleaning compared to urban residents (COR = 4.9, 95% CI: 3.6-7.1), and this relationship remained significant after adjustment (AOR = 2.5, 95% CI: 1.5-4.1).

For educational status, individuals with basic education had lower odds of non-daily teeth cleaning compared to those with no formal education in the crude model (COR = 0.5, 95% CI: 0.4-0.6), but this association was not statistically significant after adjustment (AOR = 0.8, 95% CI: 0.7-1.0). Those with higher education had significantly lower odds of non-daily teeth cleaning compared to individuals with no formal education even after adjustment (COR = 0.1, 95% CI: 0.1-0.2; AOR = 0.3, 95% CI: 0.2-0.6).

For employment status, unemployed individuals had lower odds of non-daily teeth cleaning compared to employed individuals in the crude model (COR = 0.5, 95% CI: 0.4-0.6), but this association was not significant after adjustment (AOR = 1.0, 95% CI: 0.7-1.7). Income status was another significant factor, with individuals earning less than or equal to 65 USD having higher odds of non-daily teeth cleaning compared to those earning more than 65 USD (COR = 2.5, 95% CI: 1.7-3.6), and this association remained significant after adjustment (AOR = 2.0, 95% CI: 1.3-3.2).

Among behavioral factors, alcohol users had higher odds of non-daily teeth cleaning compared to non-drinkers (COR = 1.4, 95% CI: 1.1-1.8), but this association was not significant after adjustment (AOR = 1.3, 95% CI: 0.9-2.0). For smoking, smokers had significantly higher odds of non-daily teeth cleaning compared to non-smokers (COR = 2.5, 95% CI: 2.0-3.2), but this association was not significant after adjustment (AOR = 1.2, 95% CI: 0.9-1.7). For oral health practices, individuals who did not use toothpaste had significantly higher odds of non-daily teeth cleaning compared to those who did (COR = 2.5, 95% CI: 2.0-3.0), and this effect remained significant after adjustment (AOR = 1.3, 95% CI: 1.0-1.7).

In summary, the adjusted analysis revealed that residence status, educational status, income status, and toothpaste use were significant predictors of non-daily teeth cleaning. Variables such as gender, physical inactivity, and dental visits were not statistically significant in either model.

4. Discussion, Recommendations, Limitations, and Future Research

Discussion

This study provides critical insights into the socio-economic and behavioral factors associated with non-daily teeth cleaning among adults in Rwanda. The findings revealed that while most participants engaged in regular teeth cleaning, a substantial proportion reported inadequate oral hygiene practices, with some using traditional methods such as chewsticks and charcoal. Despite the widespread availability of modern dental products like toothbrushes and toothpaste, traditional methods remain common, especially in rural areas, highlighting the influence of cultural practices on oral hygiene. Among the key findings, rural residents, individuals with lower education levels, individuals who did not use toothpaste, and those with lower incomes had significantly higher odds of non-daily teeth cleaning.

Residence status was identified as a significant factor in oral hygiene habits, with rural residents being more likely to practice non-daily teeth cleaning compared to their urban counterparts. This finding reflects disparities in access to oral health services and education, as has been noted in previous studies [4]. Rural residents often face barriers such as limited access to dental care, health education, and dental products, contributing to these differences. Structural inequities, such as geographical isolation and fewer available resources, likely exacerbate the differences between urban and rural areas in terms of oral hygiene practices.

Education played a crucial role in oral hygiene behavior, with individuals having higher levels of education showing lower odds of non-daily teeth cleaning. This is consistent with global findings that link better education to improved health literacy and greater awareness of the importance of oral hygiene [3]. Those with higher education are more likely to be exposed to health promotion messages and have the resources to implement better hygiene practices, such as regular teeth cleaning with toothpaste. This emphasizes the role of education in promoting good oral hygiene habits across different population groups.

Income was another significant factor affecting teeth cleaning habits, with individuals from lower-income groups more likely to engage in non-daily teeth cleaning. This is consistent with research linking lower socioeconomic status to poorer access to dental care products and services. Nzabonimana et al. [3] and Hackley et al. [4] found that individuals with lower income levels were less likely to have regular dental visits and access to dental products like toothpaste, leading to poorer oral hygiene outcomes. Limited financial resources often result in prioritizing other essential expenditures over dental care, contributing to less frequent teeth cleaning.

Toothpaste use emerged as a key factor influencing daily teeth cleaning habits. Individuals who regularly used toothpaste were significantly more likely to engage in daily teeth cleaning, underscoring the critical role that access to basic dental care products plays in maintaining oral hygiene. This finding is consistent with the results of Hackley et al. [4], who also observed that regular use of toothpaste in Rwanda was associated with better oral hygiene practices. Improving access to affordable toothpaste, particularly in low-income and rural areas, remains essential for enhancing oral health outcomes and promoting consistent teeth-cleaning behaviors.

Recommendations

This study highlights the need for targeted interventions to improve oral hygiene practices in Rwanda, particularly among rural, low-income, and less-educated populations. While the Rwanda Ministry of Health (2019) report plan and other ongoing initiatives have laid a foundation, the findings of this study suggest several areas for enhancement and expansion:

1. Increase awareness and knowledge enhancement on Oral Health:

Limited information on oral health and its connection to overall well-being contributes to the prevalence of non-daily teeth-cleaning behaviors. To address this, it is essential to leverage media and social media platforms to raise public awareness and enhance knowledge about the importance of oral hygiene in preventing oral diseases. By delivering targeted, accessible educational content

through these channels, the population can be better informed about the critical role oral health plays in maintaining general health, thereby promoting consistent oral hygiene practices.

2. Enhancing Rural Oral Health Outreach and Mobile Dental Clinics:

Rural residents were found to have significantly higher odds of non-daily teeth cleaning. Expanding rural outreach programs, including mobile dental clinics, would provide access to underserved communities, offering oral health education and affordable dental products such as toothbrushes and toothpaste. These mobile services can integrate oral health with other community health services, ensuring regular visits to rural areas and offering fluoride treatments, screenings, and education on proper dental hygiene.

3. Culturally Sensitive Health Education Campaigns:

Traditional oral hygiene methods such as chewsticks and charcoal are still used by some individuals, particularly in rural areas. Instead of discouraging these practices outright, culturally sensitive campaigns should be developed that educate people on the benefits of modern dental products while recognizing the role of traditional practices. This approach can help gradually shift communities toward using more effective methods without alienating their cultural heritage. Public health messaging should emphasize the importance of using fluoride toothpaste for cavity prevention, and explore ways to integrate traditional methods with modern practices, such as promoting the use of toothbrushes alongside chewsticks.

4. Improving Access to Affordable Dental Products in Low-Income Communities:

Lower-income individuals were significantly more likely to engage in non-daily teeth cleaning. To address this, programs that subsidize toothpaste and toothbrushes for low-income households should be expanded. Initiatives could also include partnerships with local manufacturers to produce affordable, locally made dental products. Distribution of free or low-cost dental products through community health centers and schools can help overcome financial barriers and encourage daily teeth cleaning.

5. Strengthening School-Based Oral Health Programs:

The existing school-based oral health programs have been successful in promoting good oral hygiene habits among children. Expanding these programs to include more rural schools and incorporating supervised teeth cleaning activities that include the use of toothpaste, can help instill lifelong habits. Schools can also serve as distribution points for free toothbrushes and toothpaste, particularly for children from low-income families, ensuring they have the necessary tools for maintaining good oral hygiene.

6. Integrating Oral Health into Community Health Programs:

Oral health should be integrated into broader community health programs, especially those focused on non-communicable diseases (NCDs). Community health workers can be trained to deliver oral health education, distribute dental products, and refer individuals for dental care as part of their regular health visits. Community health campaigns can promote the use of fluoride toothpaste and educate the public on the importance of daily teeth cleaning, while also addressing misconceptions about traditional practices.

7. Targeting Vulnerable Populations for Improved Access

Vulnerable groups, such as individuals with lower education levels and those in rural areas, require targeted interventions. Community health campaigns and services tailored to these groups should focus on improving oral health literacy, with clear messaging on the importance of regular teeth cleaning and the benefits of using modern dental products. Providing these groups with easier access to affordable or free dental products will encourage consistent teeth cleaning habits.

Limitations

The study has several limitations that should be acknowledged. First, its cross-sectional design limits the ability to establish causality between socioeconomic factors and oral hygiene behaviors. Additionally, the reliance on self-reported data may introduce recall bias, potentially affecting the

accuracy of the responses. Another limitation is the possible underrepresentation of vulnerable groups, such as individuals with disabilities, who may not be fully captured in the data.

Future Research

Future research should focus on exploring the health impacts of traditional oral hygiene methods, such as chewsticks and charcoal, which remain common in certain communities. Longitudinal studies are also necessary to track changes in oral hygiene behavior over time, providing valuable insights into the effectiveness of interventions. Further investigation is needed to understand the specific barriers to accessing dental products in low-income communities. Finally, there is a need to evaluate the impact of Rwanda's National Oral Health Strategic Plan, to identify areas that require further improvement and ensure that policies effectively promote oral health across the population.

5. Conclusions

This study has revealed important socioeconomic and behavioral factors that contribute to non-daily teeth cleaning among adults in Rwanda. Rural residence, lower education levels, lower income, and the non-use of toothpaste emerged as the strongest predictors of inadequate oral hygiene practices. These findings highlight the disparities in oral hygiene behaviors, with rural and low-income populations facing greater challenges in maintaining regular teeth cleaning. The persistence of traditional methods like chewsticks and charcoal, especially in rural areas, points to the influence of cultural practices on oral health behaviors. While these practices remain widespread, efforts to integrate modern dental products like toothpaste into daily routines are critical for improving oral health outcomes.

Addressing these challenges requires targeted public health interventions that focus on improving access to dental care products, enhancing education, and reaching underserved populations. By leveraging Rwanda's existing oral health programs and expanding on them, these interventions can play a pivotal role in reducing the burden of oral diseases across the country. Future research should continue to explore the long-term effectiveness of these interventions and investigate how traditional oral hygiene practices might be adapted or integrated into modern health initiatives.

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Institutional Review Board Statement: The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and approved by the Rwanda National Ethics Committee (RNEC) (Approval Reference Number: 553/RNEC/2021). Ethical clearance ensured that the study adhered to the highest research integrity standards, with a focus on minimizing risks to participants. Oversight was provided by the Rwanda Ministry of Health and the Rwanda Biomedical Centre (RBC), ensuring compliance with national guidelines for human subject research.

Informed Consent Statement: Patient consent was waived as the study involved secondary analysis of anonymized data collected through routine mental health service provision.

Data Availability Statement: The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request. The data are not publicly available due to privacy reasons.

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Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

RNEC	Rwanda National Ethics Committee
RBC	Rwanda Biomedical Centre
COR	Crude Odds Ratios
AOR	Adjusted Odds Ratios
NCD	Non-Communicable Disease
CI	Confidence Interval

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