

## **Influence of Treatment Procedures on the Uptake of Oral Health Services in Public Dental Facilities in Nandi County, Kenya**

**Fredrick Ngeno Arap Soi<sup>1\*</sup>, Wanja Mwaura Tenambergen<sup>2</sup>, Caroline Kawila<sup>3</sup>**

<sup>1,3</sup>Department of Health Systems Management, Kenya Methodist University

<sup>2</sup>School of Business, Riara University

\*Corresponding Author's E-mail: [ngenosoi62@gmail.com](mailto:ngenosoi62@gmail.com)

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### **Abstract**

While developed countries have made notable advancements in oral health technologies and preventive care, low- and middle-income countries, including Kenya, continue to face challenges in delivering comprehensive oral health services. This study aimed to determine the influence of oral healthcare treatment procedures on the uptake of oral health services in public dental facilities in Nandi County, Kenya. The study adopted a descriptive cross sectional research design targeting five public oral health facilities. Respondents included 5 general dental practitioners, 5 dental technologists, 23 nurses, and 40 community oral health officers. Data collection involved structured questionnaires, interviews, and a review of dental service reports. A pretest was conducted at Kericho County Referral Hospital to validate the research instruments. Quantitative data were analyzed using SPSS Version 24, generating descriptive statistics and chi-square tests. Qualitative data were analyzed thematically to capture key insights. The results revealed that a majority of respondents (91%) indicated their facilities offered basic dental procedures such as tooth filling and extraction. Composite and glass ionomer were the most used filling materials. Common extractions included first and second molars and lower incisors. Chi-square analysis showed a significant positive association ( $p < 0.05$ ) between uptake of oral health services and procedures such as fillings, extractions, scaling, and awareness of crowning techniques. However, advanced procedures like teeth alignment and crowning services showed no significant influence ( $p > 0.05$ ) on service uptake. Most facilities served between 10 and 50 patients daily, indicating moderate utilization. While the resolution of dental complications increased public confidence and reduced disease cases, respondents highlighted poor oral hygiene and delayed health-seeking behavior as barriers to effective care. Education efforts were inconsistent, with 55 respondents rating public awareness as low. The study concludes that while basic procedures positively influence uptake, comprehensive policy reforms and investment in advanced treatments and public awareness are needed to strengthen oral health services in Nandi County. The study recommends that the county health office develop targeted awareness programs to educate the public on the availability and benefits of diverse oral treatment options and introduce regular in-service training for dental practitioners to build capacity in delivering advanced oral healthcare.

**Keywords:** *Treatment Procedures, Uptake of Oral Health Services, Public Dental Facilities*

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## 1. Introduction

A well-functioning healthcare system is crucial to building a healthy and productive society. The World Health Organization identifies six health system pillars: leadership and governance, health service delivery, human resources, financing, medical products and technologies, and health information systems. Oral health, a critical component of overall health, should receive equal attention and investment as other health services (CDC, 2020).

Globally, developed countries have made significant strides in advancing oral healthcare. Investments in technology, such as intraoral 3D scanners, have improved diagnostics and treatment. Regenerative dentistry and artificial teeth compatible with individual patients have also emerged through sustained research funding (Sehrawat et al., 2022; Thalakiriyawa & Dissanayaka, 2024). Cost-effective interventions like smart toothbrushes and fluoride toothpaste are widely promoted. Moreover, community-based training on oral hygiene, including flossing and proper brushing, has increased awareness and reduced cavity rates in several countries. However, oral health challenges persist across various global contexts. In the UK and France, chronic illnesses like diabetes and costly insurance policies contribute to poor oral health outcomes (WHO, 2021). In Asia, limited human resources and high treatment costs, such as in China, hinder access to affordable oral care (Wu et al., 2020).

Across Africa, public dental facilities often suffer from inadequate equipment and understaffing. In Nigeria, low patient turnout is attributed to high treatment costs (Gallagher et al., 2023). South Africa faces limitations in dental insurance coverage, forcing many to pay out-of-pocket (Mbele-Kokela & Moodley, 2021). In Botswana and Rwanda, low public awareness and adverse side effects from costly pharmaceuticals hinder uptake. Somalia reports high incidences of bleeding gums and tooth loss due to a lack of effective treatment options (Hackley et al., 2021).

In Kenya, oral health services are largely underfunded. Public dental facilities offer limited services, and private insurance dedicates minimal coverage to oral care (Miriti, 2022). The decentralization of healthcare functions to county governments has further complicated financing. The Interpeace report (2023) noted that oral health remains centrally controlled, causing bureaucratic delays in service delivery. At the county level, ambiguity in financing structures and budget allocations has left dental facilities under-resourced.

Nandi County, located in Kenya's North Rift region, exemplifies these challenges. In 2022, the dentist-to-patient ratio in public facilities stood at 1:188,241, highlighting a critical shortage of dental professionals (Okumu, 2022). Preventive and promotive programs are rarely prioritized due to limited funding and workforce gaps (Owino et al., 2020). According to the Ministry of Health (2022), 46.3% of children under five in the county had dental caries, while 34.3% of adults suffered from similar conditions. Periodontal disease affected 98.1% of the population, and 41.7% of children experienced dental fluorosis. Many of these cases remained untreated due to the high cost of care.

Oral healthcare encompasses prevention, diagnosis, treatment, and palliative management of mouth-related diseases (WHO, 2023). Services should be accessible, affordable, and delivered by qualified professionals using appropriate equipment and pharmaceuticals (FDI World Dental Federation, 2021). Yet, in Kenya, access remains constrained. The Kenya Medical Research Institute's 2019 national oral health survey reported that 72.3% of the 1,462 adults sampled had never visited a dentist.

Financial barriers are central to the low uptake of oral health services. The devolution of healthcare services has not been matched with sufficient funding for oral health at the county level. The lack of standardized budgetary allocation for dental services means counties struggle to equip facilities and hire staff (Miriti, 2022). Nationally, only 1,288 dentists serve a population of over 50 million, translating to approximately three dentists per 100,000 people (MOH, 2022).

For the average Kenyan, the cost of dental care is prohibitive. Routine check-ups cost between Ksh 2,000 and Ksh 4,000, while more complex procedures like fillings or root canals can exceed Ksh 10,000. Government insurance only covers basic services such as scaling and tooth extraction, leaving patients to fund other procedures out of pocket. Private insurance options are often unaffordable for most citizens, leading to widespread neglect of oral health conditions (MOH, 2022). The absence of a robust oral health financing system also limits public awareness about the effects of diet, poor hygiene, and lifestyle choices on oral health. Schaper et al. (2021) argue that inadequate policy frameworks, lack of modern treatment technologies, and the high cost of care contribute significantly to the poor oral health outcomes seen across Kenya.

This study, therefore, sought to determine the influence of oral healthcare treatment procedures on the uptake of oral health services in public dental facilities in Nandi County, Kenya. By exploring how treatment protocols, cost, and facility conditions affect service utilization, the study aims to inform strategies to improve access and delivery of oral health services within public healthcare systems.

## **2. Methodology**

The study employed a descriptive cross-sectional research design to examine the relationship between oral healthcare treatment procedures and the uptake of services in public dental facilities. The research targeted five public oral health facilities in Nandi County, Kenya. The respondents included 5 general dental practitioners, 5 dental technologists, 23 nurses, and 40 community oral health officers. Data were collected through a combination of structured questionnaires, interviews, and a review of dental service reports. To ensure the reliability and validity of the instruments, a pretest was conducted at Kericho County Referral Hospital in Kericho County. Reliability was assessed using internal consistency methods, while content, criterion, and construct validity were evaluated to enhance the credibility of the findings. Quantitative data were analyzed using SPSS Version 24, generating descriptive statistics such as frequencies, percentages, and means. Qualitative data were analyzed using thematic analysis to identify patterns and insights related to the uptake of oral health services.

### **3. Results and Discussion**

#### **3.1 Uptake of Oral Health Services**

The findings presented in Table 1 indicate that a majority of the respondents (38) reported a high prevalence of dental complications, particularly tooth decay, within the last 3 to 6 months. Interestingly, despite this, only 15 respondents (27%) reported directly encountering patients with tooth decay, suggesting a potential underreporting or lack of frequent clinical engagement in some facilities. Additionally, 38 respondents noted a significant reduction in oral disease cases following the resolution of various dental complications. This suggests that timely and effective interventions by oral healthcare staff contributed positively to improved patient outcomes.

Neglect of oral healthcare was identified as a key contributor to common conditions such as tooth decay and stained teeth, as highlighted by the healthcare workers. However, once addressed, these issues were effectively resolved, leading to increased public confidence in the services offered by oral health departments. This was further supported by data showing that most facilities served between 10 and 50 patients per day, indicating a relatively high level of service uptake.

Despite the growing utilization of services, the study also revealed a critical gap in public oral health awareness. A majority of respondents (55) rated prevention awareness efforts as low, suggesting that oral healthcare facilities were not actively engaging the public in preventive education. As a result, while treatment uptake was improving, the facilities had yet to fully realize their potential in promoting oral health literacy and early intervention among the population.

**Table 1: Uptake of Oral Health Services**

<b>Dental Complications/Diseases Encountered in the Last 3-6 Months?</b>	<b>High</b>	<b>Low</b>
Rampant oral diseases	27	28
Stained teeth of patients	33	22
Tooth decay	38	17
Other Problems: ,Tooth fractures	2	53
<b>What are the changes you have noticed in the hospital after the dental complications have been resolved?</b>		
Increased number of patients	24	31
Reduced cases of oral diseases	38	17
Enhanced prevention awareness of oral healthcare to the public	5	50
<b>What is the average number of patients served in your public health facility per day?</b>		
Less than 10	4	51
10-30	21	34
31-50	28	27
More than 50	2	53

Respondents emphasized that good oral hygiene practices, such as regular brushing with fluoride toothpaste and flossing, significantly reduced the risk of oral diseases and, by extension, lowered the cost of treatment. These practices were seen as key contributors to the performance of Universal Health Coverage (UHC), as they reduced the burden on healthcare systems. In contrast, poor oral hygiene increased the incidence of oral diseases, raising the cost of care. As one key informant noted:

*“...Poor oral hygiene practices may put a strain on the resource availability, especially when the number of oral issues increases, leading to out-of-pocket payments to patients since universal healthcare supports selected treatment plans...” (KII, #5)*

On the theme of health-seeking behaviour, respondents noted that many patients delayed dental visits until their conditions became severe. This reluctance to seek timely care often led to tooth extractions or the need for specialized and costly treatment, usually not covered under UHC. This observation aligns with findings by Kalita et al. (2023), who highlighted poor health-seeking behaviour as a major barrier to UHC in India.

Respondents also discussed the influence of oral health products and technologies on the effectiveness of UHC. They noted that access to essential products, such as dental floss, toothpaste, and whitening agents, and advanced technologies like intraoral scanners, lasers, and powered scalers, improved both service quality and patient confidence. These tools made it easier to provide a wider range of treatments, encouraging patients to seek care and supporting the success of UHC. As expressed by key informants:

*“...technologies such as intraoral scanners enabled patients to access a wide range of services...” (KII, #2)*

*“... availability of oral health care products and technologies will help in providing better oral healthcare to the populace, hence improving the performance of UHC ... availability of specialized dental tools and lasers inspires the patients to come for treatment, hence making the UHC program a success...” (KII, #4)*

Lastly, on the theme of financial factors, respondents pointed to the importance of payment methods in influencing access to oral healthcare. Facilities offering diverse and flexible payment options, including the use of the Social Health Insurance Fund (SHIF) and private insurance, recorded higher patient turnout. Payment flexibility was thus seen as a key enabler of UHC effectiveness in oral health. One respondent stated:

*“... patients have been increasing in number when allowed to use Social Health Insurance Fund (SHIF) and other insurance covers to make payments...” (KII, #1)*

### **3.2 Oral Healthcare Treatment Procedures**

The critical aspects considered included tooth filling and extraction, tooth alignment, tooth crowding, and mouth scaling. Findings from Table 2 reveal that a significant majority of respondents (50, 91%) indicated that their facilities provided tooth filling and extraction services, while only 5 respondents (9%) reported that these services were not available. Among the types of tooth filling materials used, composite fillings were the most commonly utilized (36%), followed by glass ionomer fillings (33%), and ceramic fillings (9%). Regarding commonly extracted teeth, first and second molars were cited by 38% of respondents, while lower incisors and canines were identified by 29%.

The results from the Pearson Chi-Square test ( $r = 3.841$ ,  $p < 0.05$ ) demonstrate a statistically significant positive association between a range of dental procedures and the uptake of oral health services. These include tooth filling, extraction, type of filling material, scaling procedures and intervals, mouth scaling frequency, crowning techniques, and awareness creation on crowning services. However, teeth alignment and crowning services recorded a  $p > 0.05$ , indicating that they did not significantly influence the uptake of oral health services in the public dental facilities studied. This suggests that these advanced procedures are not primary drivers of public demand for oral healthcare in Nandi County.



**Table 2: Oral Healthcare Treatment Procedures**

<b>Tooth Filling and Extraction</b>	<b>Frequency</b>	<b>Percent</b>	<b>R</b>	<b>P-value</b>
<b>Do you offer tooth filling and extraction dental services?</b>			346.20	0.001
Yes	50	91		
No	5	9		
<b>What are the various tooth filling materials do you use?</b>			474.12	0.000
Ceramic fillings	5	9		
Silver amalgam fillings	12	22		
Composite fillings	20	36		
Glass ionomer fillings	18	33		
<b>What are the common tooth extractions?</b>			169.01	0.018
First and Second Molars	21	38		
Upper first and second molars	18	33		
Lower incisors and canines	16	29		
<b>Teeth Alignment</b>				
<b>Do you have teeth alignment services at your facility?</b>			693.17	0.206
Yes	5	9		
No	50	91		
<b>What are the various teeth alignment techniques?</b>			880.90	0.000
Dental braces	21	37		
Dental bonding	9	17		
Expander	14	25		
Invisalign	4	8		
Surgery	7	13		
<b>After what intervals do you recommend dentist routine check-ups on aligned teeth?</b>			113.24	0.033
1 Month	20	36		
3 months	17	31		
6 months	16	29		
1 year	2	4		
<b>Mouth Scaling</b>				
<b>Do you have teeth scaling services at your facility?</b>			583.45	0.006

Yes	51	93		
No	4	7		
Total				
<b>What mouth scaling techniques are done at your facility?</b>			340.01	0.007
Prophylaxis cleaning	38	75		
Scaling and root planning	8	15		
Gross debridement	5	10		
<b>What is the recommended duration for mouth scaling intervals?</b>			286.34	0.032
1 Month	4	7		
3 months	8	15		
6 months	12	22		
1 year	31	56		
<b>Tooth Crowning</b>				
<b>Do you have teeth-crowning services at your facility?</b>			428.21	0.111
Yes	20	36		
No	35	64		
<b>What teeth-crowning techniques are done at your facility?</b>			904.18	0.000
Gold crowns	5	25		
All Porcelain Crowns	9	45		
Porcelain Fused-to-Metal Crowns	4	20		
Zirconia Crowns	2	10		
<b>What methods do you use to create awareness of teeth-crowning services?</b>			748.39	0.033
Word of mouth	40	73		
Group discussions	0	0		
Pamphlets	0	0		
Social media	15	27		

In relation to oral hygiene instructions, respondents acknowledged that health education played a critical role in influencing health-seeking behavior. Patients were increasingly aware that preventive practices could reduce the need for curative care. As one key informant noted:

*“...We offer oral hygiene instructions in the dental facility and oral health education through different programmes like in schools, seminars, and church...” (KII, #6)*



Another respondent reinforced the value of consistent, small-scale educational interactions:

*“...The little things done consistently matter. Therefore, we create awareness through interpersonal discussions on these small oral practices that should be maintained...”*  
(KII, #1)

Community outreach programs were also reported as key strategies in enhancing public engagement. These initiatives were often spearheaded by oral health departments and included school visits, public seminars, and oral health camps. While not consistently funded, these camps were made possible through support from various stakeholders, including the national and county governments, local donors, and international organizations. One respondent highlighted:

*“...Funding mainly through national government, county government, individual local donors, and international organizations enabled the success of such programs...”* (KII, #4)

### 3.3 Discussion

In the last three to six months, public dental facilities in Nandi County, Kenya, reported high incidences of dental complications, particularly tooth decay, which was noted by 38 respondents as highly prevalent. This aligns with Gallagher et al. (2023), who identified that a limited oral healthcare workforce in Africa hinders effective public outreach programs, resulting in poor awareness and worsening oral health. Similarly, Goettems et al. (2021) indicated that insufficient public knowledge led to risky self-treatment practices such as teeth bleaching, causing avoidable damage that could have been resolved with professional interventions like crowning.

Despite these challenges, several factors were found to positively influence the uptake of oral healthcare services. These include the availability of treatment procedures (OHPTs), financial affordability, and the presence of trained oral health professionals. Gallagher et al. (2023) emphasized that the presence of skilled staff is crucial in increasing dental service utilization. Likewise, Owino et al. (2020) found that the inclusion of dental procedures in the Universal Health Coverage (UHC) package encouraged more people to seek care. Additionally, Schaper et al. (2021) and Sehrawat et al. (2022) reported that adequate equipment availability at facilities improved service delivery and uptake.

Financial infrastructure also played a significant role. Koh et al. (2024) noted that systems with sustainable financial support contributed to better utilization of dental services. Kihara and Ngugi (2021) further emphasized that managing patient expectations through modern technologies, such as inventory systems and scanners, enhanced satisfaction with UHC dental services. Rimberia (2022) highlighted that accessible, acceptable, and timely insurance coverage reinforced UHC success. High upfront payment requirements discouraged service use, while flexible payment models were more acceptable to patients. Interestingly, Seminario et al. (2024) contested the idea of flexible payments, arguing that due to the perceived risk of HIV transmission in dental settings, initial payments were essential to motivate staff to initiate care.

Regarding treatment types, dental facilities provided a range of services including tooth filling (using composite and ionomer materials), extractions (mostly first and second molars), and

scaling using prophylaxis cleaning at yearly intervals. Thalakiriyawa and Dissanayaka (2024) confirmed that molar extractions were common and often a last resort. However, services such as teeth alignment and crowning were less frequently performed. Vlosava et al. (2021) found that such services, though considered elective or aesthetic by many, were often part of a larger plan toward teeth whitening. The CDC (2020) categorized alignment and crowning as cosmetic procedures aimed at improving confidence, while Hackley et al. (2021) considered scaling, filling, and extraction as essential clinical interventions.

In terms of oral hygiene promotion, patients were encouraged to brush their teeth at least twice daily, preferably after meals, using fluoride toothpaste and soft-bristled toothbrushes. Miriti (2022) confirmed that youth in Igembe Sub-County were educated to use fluoride toothpaste over traditional tree-based brushes for better oral outcomes. Regular dental visits were advocated to ensure early detection and treatment of dental issues. Schaper et al. (2021) found that hygiene training and routine care helped patients maintain long-term oral health. Patients were also taught to floss using materials like silk or cotton threads to remove food debris between teeth. Diet counselling was provided, with a focus on reducing sugar intake to preserve dental integrity.

Community outreach played a crucial role in improving service uptake. Adenyi and Oyapero (2021) demonstrated that public engagement efforts significantly increased dental service usage among Nigerian adults. Nzabonimana et al. (2024) reported similar findings from Rwanda, where knowledge was disseminated through dentist-led discussions, outreach camps, and empowerment programs. The National Academy of Medicine (2023) warned that assuming the public already knows basic oral care routines, such as correct brushing and flossing techniques or healthy dietary practices, contributed to declining oral health. As a corrective measure, both governments and private entities were encouraged to conduct sustained health education campaigns. Given that the mouth is the body's gateway, maintaining oral health through approved methods is essential in preventing broader health complications.

#### **4. Conclusion**

The study found that commonly available oral healthcare procedures, such as tooth filling, extraction, and scaling, positively influenced the uptake of services in public dental facilities in Nandi County. However, advanced treatments like dentures, dental implants, and orthodontic services were not offered in the facilities studied. Additionally, existing treatment policies were found to be ineffective, focusing mainly on basic procedures and excluding more specialized care.

#### **5. Recommendations**

- 1) It is recommended that the Nandi County Health Office should:
- 2) Review and expand oral health treatment policies to include advanced procedures such as dentures, dental implants, and orthodontic treatments.
- 3) Equip public dental facilities with the necessary tools, materials, and trained personnel to offer a wider range of oral healthcare services.
- 4) Strengthen collaboration between dental care staff and county health management to ensure treatment needs are well-communicated and addressed.

- 5) Increase budgetary allocation for oral healthcare to support the implementation of comprehensive treatment procedures.
- 6) Develop targeted awareness programs to educate the public on the availability and benefits of diverse oral treatment options.
- 7) Introduce regular in-service training for dental practitioners to build capacity in delivering advanced oral healthcare procedures.

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