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Integration of Oral Health Services into Primary Healthcare Systems: Challenges and Opportunities in African Countries

Anthony Afriyie Amponsah, Lecturer, Department of Psychology, University of Ghana

Abstract

The integration of oral health services into primary healthcare (PHC) systems represents a critical pathway toward achieving universal health coverage and addressing the significant burden of oral diseases in African countries. Despite the recognition of oral health as an integral component of overall health and well-being, African nations continue to face substantial challenges in incorporating dental services into their existing healthcare infrastructures. This paper examines the current state of oral health service integration across African countries, identifying key barriers including workforce shortages, inadequate funding mechanisms, infrastructural deficits, and policy implementation gaps. Drawing upon empirical evidence and case studies from various African contexts, the research explores innovative models and successful interventions that demonstrate the feasibility and benefits of integrated care delivery. The analysis reveals that countries adopting task-shifting strategies, community-based approaches, and leveraging technology for oral health promotion have achieved measurable improvements in population oral health outcomes. Furthermore, the paper discusses opportunities emerging from continental health initiatives, increased political commitment, and the potential for South-South cooperation in addressing common challenges. The findings suggest that successful integration requires multi-sectoral collaboration, sustained investment in human resource development, strengthening of health information systems, and context-specific policy frameworks that acknowledge the diverse socio-economic realities across the African continent. This research contributes to the growing body of knowledge on health systems strengthening in resource-limited settings and provides actionable recommendations for policymakers, health administrators, and development partners committed to advancing oral health equity in Africa.

Keywords: Oral health integration, Primary healthcare, African health systems, Universal health coverage, Oral disease burden, Health policy, Task-shifting, Community dental care

Introduction

The integration of oral health services into primary healthcare systems has emerged as a fundamental strategy for addressing the persistent neglect of oral diseases and achieving comprehensive health coverage in African countries. Oral diseases, including dental caries, periodontal diseases, oral cancers, and noma, impose a substantial burden on African populations, affecting quality of life, nutritional status, and overall health outcomes (Glick et al., 2021). Despite their high prevalence and significant impact, oral health services have historically remained isolated from mainstream healthcare delivery, operating as specialized

services accessible primarily in urban centers and tertiary facilities. This fragmentation has perpetuated health inequities and left vast populations, particularly those in rural and underserved areas, without access to essential oral healthcare.

The concept of integrating oral health into primary healthcare is not novel; it was prominently featured in the 1978 Alma-Ata Declaration, which emphasized comprehensive primary healthcare as the key to achieving "Health for All" (World Health Organization, 1978). However, the subsequent decades witnessed a divergence between the vision of integrated care and the reality of service delivery, with oral health frequently marginalized in national health agendas and resource allocation decisions. The African region has been disproportionately affected by this marginalization, compounded by broader health system challenges including limited infrastructure, inadequate human resources, competing disease priorities, and constrained financial resources (Benzian et al., 2021).

Contemporary global health frameworks have rekindled attention to oral health integration as an essential component of universal health coverage (UHC) and the Sustainable Development Goals (SDGs). The World Health Organization's Global Oral Health Status Report emphasizes that oral health is fundamental to general health and well-being, and that its integration into PHC systems is crucial for reducing oral disease burden and addressing health inequalities (World Health Organization, 2022). African countries, many of which have committed to achieving UHC by 2030, face both significant challenges and unique opportunities in advancing this integration agenda.

The epidemiological profile of oral diseases in Africa underscores the urgency of integration efforts. Dental caries affects approximately 40-60% of children in African countries, while severe periodontal disease impacts nearly 20% of adults aged 35-44 years across the continent (Kassebaum et al., 2017). Furthermore, oral cancer incidence rates are rising in several African regions, often diagnosed at advanced stages due to limited screening and early detection services. The burden of noma, a devastating gangrenous disease affecting malnourished children, remains concentrated in sub-Saharan Africa, representing a stark indicator of health system failures and socioeconomic disparities. These conditions not only cause direct suffering but also contribute to broader health challenges, including malnutrition, chronic pain, social stigma, and reduced economic productivity.

African primary healthcare systems, while exhibiting considerable diversity across the 54 countries comprising the continent, share common characteristics that both facilitate and constrain oral health integration efforts. Many countries have established extensive networks of primary healthcare facilities, including community health centers, rural clinics, and health posts, which potentially provide platforms for delivering basic oral health services. Additionally, the presence of community health workers and the recent expansion of task-shifting initiatives in response to human immunodeficiency virus (HIV) and other disease programs have created precedents for non-traditional service delivery models that could be adapted for oral health (Petersen et al., 2020).

However, these systems also face substantial structural challenges. The shortage of oral health professionals is particularly acute in Africa, with an average dentist-to-population ratio of approximately 1:150,000 compared to the World Health Organization's recommended ratio of 1:7,500 (FDI World Dental Federation, 2021). This workforce crisis is compounded by inequitable distribution, with most dental professionals concentrated in urban areas and private sector practice, leaving rural populations severely underserved. Moreover, the predominant treatment-oriented model of dental care, focused on curative services rather than prevention and health promotion, limits the potential impact of integration efforts and strains already limited resources.

The economic dimensions of oral health integration in African countries present both obstacles and imperatives for action. Out-of-pocket expenditure for dental services remains prohibitively high for most African populations, creating financial barriers to access and perpetuating health inequities. Few African countries have incorporated comprehensive oral health services into their national health insurance schemes or benefit packages, reflecting the low political priority accorded to oral health. Yet, evidence increasingly demonstrates that the economic burden of untreated oral diseases, including productivity losses, emergency care costs, and impacts on child development and educational outcomes, far exceeds the investments required for preventive and primary oral healthcare services (Righolt et al., 2018).

Recent developments in African health policy and governance create a more favorable environment for advancing oral health integration. The African Union's Agenda 2063 and the Catalytic Framework to End AIDS, TB and Eliminate Malaria in Africa by 2030 emphasize strengthened health systems and integrated service delivery as core strategies. Several African countries have revised their national oral health policies and strategic plans to align with PHC strengthening initiatives and UHC goals. Furthermore, regional economic communities and continental health institutions are increasingly recognizing oral health as a priority area requiring coordinated action and knowledge exchange.

This paper seeks to comprehensively examine the challenges and opportunities associated with integrating oral health services into primary healthcare systems across African countries. Through systematic analysis of existing evidence, examination of country-level experiences, and consideration of contextual factors influencing implementation, the research aims to provide actionable insights for stakeholders engaged in health systems strengthening efforts. The analysis is structured to address key dimensions of integration, including policy and governance frameworks, service delivery models, human resource strategies, financing mechanisms, health information systems, and community engagement approaches.

The methodology employed combines an extensive review of published literature, grey literature from international organizations and government sources, and analysis of data from the World Health Organization's Global Health Observatory and other reputable databases. Case studies from selected African countries illustrate diverse approaches to integration and highlight lessons learned from both successful implementations and challenges encountered. The paper adopts a health systems perspective, recognizing that sustainable integration

requires attention to multiple interconnected components and must be tailored to specific country contexts while drawing upon regional and global best practices.

The subsequent sections of this paper proceed as follows: first, an examination of the current state of oral health and healthcare systems in African countries establishes the baseline context; second, a detailed analysis of the multiple challenges impeding integration efforts identifies priority areas for intervention; third, an exploration of opportunities and enabling factors highlights pathways forward; fourth, case studies and innovative models demonstrate practical approaches to integration; and finally, evidence-based recommendations provide guidance for policymakers, practitioners, and development partners committed to advancing oral health equity in Africa. Through this comprehensive analysis, the paper aims to contribute to the ongoing discourse on health systems strengthening and support efforts to ensure that oral health is no longer neglected in Africa's pursuit of universal health coverage and improved population health outcomes.

Current State of Oral Health and Healthcare Systems in Africa

The contemporary landscape of oral health in African countries is characterized by high disease burden, limited service coverage, and significant disparities in access to care. Understanding this baseline context is essential for identifying appropriate strategies for integration and recognizing the magnitude of the challenge facing health systems across the continent. African countries exhibit considerable heterogeneity in their epidemiological profiles, healthcare infrastructure, and socioeconomic conditions, yet common patterns emerge that define the regional oral health situation and constrain integration efforts.

Epidemiological Profile of Oral Diseases

The prevalence of oral diseases in Africa has remained persistently high over recent decades, with limited evidence of decline despite global improvements in oral health outcomes. Dental caries, the most common non-communicable disease worldwide, affects a substantial proportion of African children and adults, with prevalence rates varying considerably across countries and population groups. According to the Global Burden of Disease Study 2019, untreated dental caries in permanent teeth affected approximately 520 million people in Africa, representing a 40% increase from 1990 estimates (GBD 2019 Diseases and Injuries Collaborators, 2020). This trend reflects both population growth and the increasing exposure to cariogenic risk factors, particularly sugar consumption, which has risen dramatically across the continent due to urbanization, changing dietary patterns, and aggressive marketing of processed foods and sugary beverages.

Childhood caries presents a particularly concerning picture, with many African countries reporting prevalence rates exceeding 50% among school-age children. Early childhood caries, affecting primary dentition in children under six years, is especially prevalent in disadvantaged communities and rural areas where access to fluoride, oral hygiene products, and preventive services remains limited. The condition significantly impacts children's quality of life, causing pain, difficulty eating, sleep disturbances, and impaired cognitive development. Research from East African countries has documented mean decayed, missing,

and filled teeth (DMFT) scores ranging from 1.5 to 3.2 among 12-year-old children, indicating moderate to high caries experience according to World Health Organization criteria (Mafuvadze et al., 2013).

Periodontal diseases constitute another major component of the oral disease burden in Africa, affecting both adults and increasingly younger populations. Severe periodontitis, characterized by significant attachment loss and potential tooth loss, is estimated to affect approximately 10-15% of African adults, with higher prevalence observed in older age groups and among individuals with limited access to oral hygiene resources and professional dental care. The relationship between periodontal disease and systemic conditions, including cardiovascular disease and diabetes, which are rising in Africa due to epidemiological transition, underscores the broader health implications of poor oral health. Furthermore, periodontal diseases share common risk factors with other non-communicable diseases, particularly tobacco use and poor nutrition, suggesting opportunities for integrated prevention strategies.

Oral cancer, while less prevalent than dental caries and periodontal disease, represents a growing concern in several African regions. The age-standardized incidence rate for oral cancer in Africa is estimated at approximately 4-6 per 100,000 population, with considerable variation across countries. Cancers of the lip, oral cavity, and pharynx account for significant morbidity and mortality, particularly because most cases are diagnosed at advanced stages when treatment options are limited and prognosis is poor. Risk factors including tobacco use, alcohol consumption, and in some regions, smokeless tobacco products and betel quid chewing, contribute to oral cancer development. The human papillomavirus (HPV), particularly HPV-16 and HPV-18, has been implicated in oropharyngeal cancers, linking oral cancer prevention to broader cervical cancer prevention initiatives and HPV vaccination programs.

Noma, or cancrum oris, a severe gangrenous disease primarily affecting malnourished children aged 2-6 years, remains endemic in several sub-Saharan African countries. The condition, which begins as gingival inflammation and rapidly progresses to tissue necrosis affecting the face, has been described as a "face of poverty" and serves as a sentinel indicator of extreme deprivation and health system failure. Although global incidence estimates are uncertain due to underreporting, approximately 140,000 new cases occur annually worldwide, with the vast majority in Africa, particularly in the "noma belt" extending across West and Central Africa (World Health Organization, 2023). The mortality rate for untreated noma approaches 90%, and survivors face severe facial disfigurement, functional impairment, and social stigmatization. The disease's association with malnutrition, poor sanitation, infectious diseases, and limited healthcare access makes it a compelling indicator for monitoring progress toward integrated, equity-oriented health systems.

Dental trauma and orofacial injuries contribute significantly to the oral disease burden, particularly among children and young adults in African settings. Road traffic accidents, interpersonal violence, sports injuries, and occupational hazards result in substantial numbers of dental fractures, avulsions, and soft tissue injuries. The limited availability of emergency

dental services and trauma care protocols in most African health facilities means that many individuals with dental trauma receive inadequate or delayed treatment, resulting in tooth loss, chronic complications, and reduced quality of life. Dental trauma also imposes considerable economic costs on affected individuals and health systems, particularly when complex restorative or surgical interventions are required.

Healthcare System Infrastructure and Organization

African healthcare systems exhibit diverse organizational structures reflecting different colonial legacies, political systems, and development trajectories. However, most countries have adopted a tiered healthcare delivery model comprising primary, secondary, and tertiary levels, with primary healthcare intended to serve as the first point of contact and provide comprehensive, accessible services to communities. The reality of primary healthcare delivery across Africa, however, often falls short of this ideal, with many facilities suffering from inadequate infrastructure, unreliable supply chains, insufficient staffing, and limited service scope.

The density and distribution of health facilities in African countries reveal significant urban-rural disparities and overall insufficiency relative to population needs. Many rural and remote areas lack functional health facilities within reasonable travel distance, forcing populations to traverse long distances to access even basic healthcare services. Where facilities exist, they frequently lack essential equipment, medications, and supplies necessary for providing quality care. Dental equipment and supplies are rarely prioritized in resource allocation decisions, and many primary healthcare facilities lack even basic oral examination instruments, let alone equipment for providing preventive or restorative dental services.

The organization of oral health services in most African countries reflects the historical separation between dental care and general healthcare. Dental services, where available, typically operate through standalone dental clinics, often located in urban centers and attached to hospitals or specialized dental institutions. These facilities primarily provide curative services, including extractions and, less commonly, restorative treatments. Preventive services and health promotion activities receive limited attention and resources, despite their cost-effectiveness and potential population impact. The curative orientation of dental services results in high treatment costs, late presentation with advanced disease, and poor treatment outcomes, perpetuating a cycle of neglect and emergency-driven care.

Several African countries have attempted to decentralize dental services by establishing dental units within district hospitals or regional health facilities. While this approach improves geographic accessibility compared to concentration in tertiary centers, it does not constitute genuine integration into primary healthcare. These dental units typically operate independently from other health services, with separate scheduling, record-keeping, and staffing arrangements. Opportunities for coordinated care, shared risk factor management, and mutual referrals between dental and medical providers remain largely unrealized. Moreover, the staffing and maintenance requirements of these dental units often prove

challenging for resource-constrained health systems, resulting in intermittent service availability or facility closures.

The financing of healthcare in African countries predominantly relies on out-of-pocket payments, which constitute approximately 40% of total health expenditure across the continent, far exceeding the 15-20% threshold recommended for progressing toward universal health coverage. This financing structure creates significant financial barriers to healthcare access, particularly for the poorest populations. Dental services are especially affected by out-of-pocket payment requirements, as they are often excluded from publicly financed service packages and national health insurance benefits. Consequently, individuals requiring dental care must either pay substantial fees or forgo treatment, contributing to high levels of unmet oral health needs.

National health insurance schemes, which have been introduced in numerous African countries over the past two decades, represent important mechanisms for pooling health risks and reducing financial barriers to care. However, the scope of dental benefits in these schemes is typically limited, often covering only emergency extractions and pain relief rather than comprehensive preventive and restorative services. Some countries, including Ghana, Rwanda, and Kenya, have begun incorporating basic oral health services into their insurance benefit packages, but coverage remains far from comprehensive. The exclusion or limitation of dental benefits reflects both resource constraints and the persistent perception of oral health as a low priority compared to other health concerns.

Oral Health Workforce and Human Resource Challenges

The shortage and maldistribution of oral health professionals constitute perhaps the most significant barrier to service delivery and integration in African countries. The dentist-to-population ratio across Africa averages approximately 1:150,000, with substantial variation across countries ranging from 1:50,000 in some North African countries to 1:500,000 or higher in several sub-Saharan African nations (Yusuf & Oredugba, 2020). These ratios compare unfavorably with the World Health Organization's suggested benchmark of 1:7,500 and with ratios in high-income countries, which typically range from 1:1,000 to 1:2,000. The absolute shortage is compounded by severe geographic maldistribution, with most dental professionals concentrated in capital cities and major urban centers, leaving rural and remote populations with virtually no access to qualified oral health providers.

The production and retention of oral health professionals face multiple challenges in African contexts. Dental education infrastructure is limited, with many countries having only one or two dental schools, and some having none at all. The training institutions that exist often suffer from inadequate facilities, outdated equipment, faculty shortages, and limited opportunities for practical clinical experience. The curricula in many African dental schools remain focused on curative, hospital-based care rather than public health approaches, preventive dentistry, and primary care skills appropriate for resource-limited settings. Consequently, graduates may be ill-prepared for addressing the predominant oral health needs of their populations or working effectively in primary healthcare environments.

Brain drain and emigration of trained oral health professionals from African countries to high-income nations represent a substantial loss of human capital and return on educational investments. Factors driving emigration include limited employment opportunities, low remuneration, poor working conditions, lack of career advancement prospects, and political instability. Some African countries invest considerable resources in dental education only to see a significant proportion of graduates leave for opportunities abroad. This outflow particularly affects countries with English-language dental education programs, as graduates possess linguistic advantages in seeking employment in developed English-speaking countries.

The dental workforce in African countries extends beyond dentists to include dental therapists, dental hygienists, dental assistants, and dental technicians. However, the training, regulation, and deployment of these cadres vary considerably across countries, and their potential for expanding service coverage remains underutilized. Dental therapists, also known as oral health therapists or clinical dental officers in some countries, are mid-level providers trained to perform preventive, restorative, and some minor surgical procedures under varying levels of supervision. Several African countries, including Tanzania, Zambia, and Malawi, have successfully deployed dental therapists in rural areas and primary healthcare settings, demonstrating that task-shifting can effectively expand access to basic oral health services.

Health Information Systems and Oral Health Data

Robust health information systems are essential for planning, monitoring, and evaluating health services, yet oral health data collection and utilization remain weak across most African countries. National health information systems frequently lack standardized indicators for oral health, routine reporting mechanisms from dental facilities, or integration of oral health data into broader health surveillance systems. This data gap impedes evidence-based policymaking, resource allocation, and assessment of service coverage and population oral health needs.

Oral health surveys, which provide population-level data on disease prevalence, service utilization, and oral health behaviors, are conducted infrequently in most African countries. Many nations have not conducted national oral health surveys for decades, relying instead on outdated estimates or extrapolations from sub-national studies. Where surveys have been conducted, they often employ non-standardized methodologies, limiting comparability across countries and over time. The World Health Organization's Oral Health Surveys Basic Methods manual provides standardized protocols for data collection, but resource constraints and competing priorities have limited their systematic application in African contexts.

Disease surveillance systems in African countries rarely incorporate oral health conditions, with the exception of oral cancer reporting in countries with functional cancer registries. The absence of surveillance data for oral diseases means that outbreaks, unusual patterns, or emerging threats may go undetected. Furthermore, the lack of routine data on service delivery indicators such as coverage of preventive interventions, treatment patterns, referral rates, and patient outcomes hampers quality improvement efforts and accountability. Strengthening oral

health information systems and integrating oral health indicators into national health information platforms represent important prerequisites for effective service integration and system performance monitoring.

The current state of oral health and healthcare systems in Africa reveals a complex landscape of high disease burden, limited service infrastructure, workforce challenges, and data gaps. These baseline conditions underscore both the urgency and the difficulty of integrating oral health into primary healthcare systems. However, they also highlight opportunities for transformation, as strengthening primary healthcare platforms and adopting innovative service delivery models could dramatically improve population oral health outcomes while contributing to broader health system goals of equity, efficiency, and universal coverage. The subsequent sections of this paper examine the specific challenges impeding integration efforts and identify pathways and opportunities for advancing this critical health systems agenda.

Challenges to Integration of Oral Health Services

The integration of oral health services into primary healthcare systems in African countries faces multiple, interconnected challenges that operate at policy, organizational, resource, and cultural levels. Understanding these barriers is essential for designing effective strategies and marshaling support for integration efforts. While some challenges are specific to oral health, many reflect broader health system weaknesses that affect multiple service areas. This section systematically examines the key obstacles impeding integration, providing context for the opportunities and recommendations discussed in subsequent sections.

Policy and Governance Challenges

The marginalization of oral health in national health policies and strategic plans represents a fundamental barrier to integration across African countries. Despite international declarations and resolutions emphasizing oral health's importance, many African nations lack standalone national oral health policies or have policies that remain unimplemented due to insufficient political commitment and resource allocation. Where oral health policies exist, they often lack clear integration mandates, implementation frameworks, or accountability mechanisms, rendering them largely aspirational documents with limited practical impact on service delivery.

The governance structures for oral health in African health systems frequently lack adequate authority, resources, and integration with broader health governance mechanisms. Oral health units or departments within ministries of health, where they exist, are often understaffed, underfunded, and occupy marginal positions in organizational hierarchies. This weak institutional positioning limits their capacity to influence policy development, resource allocation decisions, and cross-sectoral coordination. Furthermore, oral health leadership may lack direct access to senior health officials and policymakers, reducing visibility of oral health issues and limiting advocacy effectiveness.

The absence of oral health in national strategic health plans and UHC roadmaps reflects and perpetuates low political priority. When countries develop their essential health service

packages or national health insurance benefit designs, oral health services are frequently omitted or limited to emergency interventions. This exclusion occurs despite evidence that basic preventive and restorative oral health services are cost-effective and align with UHC principles of financial protection and equity. The political economy of health priority-setting, influenced by global health initiatives, donor preferences, and vocal advocacy coalitions, has historically favored communicable diseases and maternal-child health over non-communicable diseases and oral health.

Regulatory frameworks governing scope of practice for different oral health cadres present additional policy challenges to integration. Many African countries maintain restrictive regulations that limit what services dental therapists, hygienists, or general healthcare workers can provide, even when evidence supports task-shifting for basic oral health interventions. These regulations, often influenced by professional guild interests and historical practice patterns, constrain flexible deployment of human resources and limit the potential for delivering oral health services through primary healthcare platforms. Regulatory reform to enable appropriate task-shifting faces resistance from professional associations concerned about quality standards and professional autonomy, creating tensions between expanding access and maintaining traditional practice models.

Inter-sectoral coordination mechanisms necessary for addressing social determinants of oral health and implementing health-promoting policies remain weak in most African contexts. Oral health outcomes are significantly influenced by factors outside the health sector, including education, agriculture, trade, urban planning, and social protection systems. Effective prevention strategies require coordinating actions across these sectors, for example, implementing sugar taxation, regulating marketing of unhealthy products to children, ensuring water fluoridation where appropriate, and incorporating oral health education into school curricula. However, the institutional mechanisms, mandates, and incentives for such cross-sectoral action are generally absent or poorly developed.

Human Resource Constraints

The severe shortage of oral health professionals across African countries represents perhaps the most constraining challenge to service integration. As previously noted, dentist-to-population ratios in many African countries are one-fiftieth to one-hundredth of those in high-income nations, creating an insurmountable gap between needs and available workforce. Even if all existing oral health professionals were optimally distributed and working in primary healthcare settings, their numbers would be insufficient to provide comprehensive services to entire populations. This reality necessitates alternative workforce models and task-shifting strategies, yet the expansion and deployment of mid-level oral health providers proceeds slowly due to educational, regulatory, and financial barriers.

The geographic maldistribution of oral health professionals exacerbates the overall shortage challenge. Urban concentration of dental practitioners leaves rural and remote populations with virtually no access to professional oral healthcare. Multiple factors drive this maldistribution, including preferences for urban living conditions, better educational and

economic opportunities for families in cities, lack of infrastructure and equipment in rural facilities, professional isolation, and limited career advancement opportunities in rural posts. Compulsory rural service requirements, employed by some African countries for medical doctors, have been less commonly applied to dental professionals, and where implemented, often face compliance challenges and limited post-service retention in rural areas.

The training and deployment of mid-level oral health providers, while offering potential solutions to workforce shortages, faces several obstacles. Dental therapy programs exist in only a minority of African countries, and where they exist, training capacity is limited, producing far fewer graduates than needed to substantially expand service coverage. The curricula for mid-level providers often emphasize hospital-based curative care rather than primary healthcare competencies, community-based preventive services, and health promotion skills. Furthermore, career pathways, continuing professional development opportunities, and recognition for mid-level providers are poorly developed, affecting recruitment, retention, and motivation.

Task-shifting oral health interventions to general primary healthcare workers, particularly nurses and community health workers, represents an important strategy for expanding service reach, especially for preventive services and basic oral health education. However, this approach faces challenges related to training, supervision, workload, and integration into existing job responsibilities. Primary healthcare workers already face demanding workloads addressing multiple health priorities, and adding oral health responsibilities without additional resources, training, or incentives risks superficial implementation or neglect. Moreover, oral health content in nursing and community health worker training programs is typically minimal, leaving these cadres with limited knowledge and confidence to deliver oral health interventions.

The retention and motivation of oral health workers in resource-constrained settings present ongoing challenges. Inadequate remuneration, poor working conditions, lack of equipment and supplies, limited supervision and support, and absence of career development opportunities contribute to job dissatisfaction and attrition. For dentists and dental therapists working in public sector primary healthcare facilities, the lack of specialized equipment and inability to provide comprehensive care may lead to frustration and feelings of professional underutilization. These factors, combined with opportunities for more lucrative private practice, result in high turnover and difficulty maintaining staffing levels in public facilities, particularly in rural and disadvantaged areas.

Infrastructural and Resource Limitations

The infrastructure deficits characterizing many African primary healthcare facilities pose significant barriers to oral health service integration. Basic requirements for providing even simple oral health services, including reliable water supply, electricity, adequate lighting, sterilization equipment, and waste disposal systems, are absent or unreliable in numerous facilities, particularly in rural areas. Without these fundamental prerequisites, providing safe

and effective oral health services becomes impossible, regardless of workforce availability or policy mandates.

The lack of dental equipment and instruments in primary healthcare facilities reflects both historical exclusion of oral health from primary care and insufficient investment in service integration. Essential equipment for basic oral health services, including dental chairs or examination beds adapted for oral examination, adequate lighting, sterilization equipment, extraction instruments, and preventive care supplies, represents significant capital investment that many health systems cannot afford. Moreover, maintenance requirements, replacement of consumables, and technical support for dental equipment present ongoing challenges in settings with limited resources and technical capacity.

Supply chain management for oral health commodities faces specific challenges related to specialized products, limited procurement volumes, and inadequate forecasting and distribution systems. Basic oral health supplies such as fluoride varnish, pit and fissure sealants, restorative materials, local anesthetics, extraction instruments, and infection prevention supplies may not be included in essential medicines lists or integrated into national procurement and distribution systems. When these commodities are procured, they may be allocated only to specialized dental facilities rather than distributed to primary healthcare centers. The lack of reliable supply of basic commodities undermines service delivery and workforce morale, as providers cannot deliver needed interventions even when they possess appropriate skills.

Facility design and space allocation in primary healthcare centers typically do not accommodate oral health service delivery. The addition of dental services requires dedicated space for examinations and procedures, storage for equipment and supplies, and appropriate infection prevention and control arrangements. Retrofitting existing facilities to accommodate oral health services may be costly and technically complex, particularly in older buildings. In facility construction and renovation projects, oral health service requirements are rarely considered in design specifications, reflecting the low priority accorded to integration and the lack of oral health expertise in facility planning processes.

Financial and Economic Barriers

The limited allocation of health budgets to oral health services reflects and perpetuates the marginalization of oral health in African health systems. National health budgets in many African countries are constrained overall, falling below the Abuja Declaration target of allocating 15% of national budgets to health. Within these limited health budgets, oral health typically receives less than 1% of allocations, insufficient to maintain existing services let alone expand and integrate them into primary healthcare. The low budget allocation results from multiple factors including competing priorities, lack of advocacy, limited evidence on cost-effectiveness presented to policymakers, and the incremental budgeting approaches that maintain historical allocation patterns.

The predominance of out-of-pocket payments for oral health services creates significant financial barriers to access and contradicts universal health coverage principles. When

individuals must pay directly for dental services, the poorest populations either forgo care or experience financial hardship to obtain needed treatment. High out-of-pocket payments contribute to catastrophic health expenditures and impoverishment, particularly when complex dental procedures are required. The exclusion of oral health services from publicly financed healthcare packages and insurance benefits reflects policy choices that prioritize other health services, but these choices impose substantial economic burdens on individuals and families.

The integration of oral health services into national health insurance schemes faces technical and political challenges. Actuarial concerns about costs, particularly for restorative services, may lead insurers and policymakers to limit or exclude dental benefits. The lack of standardized treatment protocols, fee schedules, and quality assurance mechanisms for oral health services complicates benefit design and claims management. Furthermore, provider payment mechanisms and reimbursement rates may not adequately compensate for oral health services, discouraging provider participation in insurance schemes. The expansion of insurance coverage for oral health requires addressing these technical issues while simultaneously building political support and demonstrating the value and feasibility of inclusion.

The costs associated with training, deploying, and supporting oral health workers in primary healthcare settings represent substantial investments that resource-constrained health systems struggle to make. Beyond basic salary costs, investments are needed for pre-service education infrastructure, continuing professional development, supervision systems, equipment and supplies, and supportive work environments. These costs must compete with investments in other health workforce areas and health system priorities. Demonstrating the value proposition and return on investment for oral health workforce development requires robust economic analyses and long-term perspective on population health benefits, yet such analyses are rarely conducted or utilized in decision-making processes.

Cultural and Social Challenges

Community perceptions and beliefs about oral health significantly influence service utilization and integration success. In many African communities, oral health is not perceived as a priority health concern unless individuals experience pain or functional problems. Preventive services and early intervention may be undervalued, with care-seeking occurring only when conditions reach advanced stages requiring extraction. These perceptions reflect limited health literacy regarding oral disease prevention, the importance of oral health to overall health, and the availability of treatment options. Cultural beliefs attributing oral conditions to spiritual causes or traditional remedies may also delay or prevent seeking professional dental care.

Stigma associated with oral diseases and conditions, particularly noma, oral cancer, and severe tooth loss, affects care-seeking behaviors and social integration of affected individuals. The visible nature of many oral conditions and their impacts on appearance, speech, and eating can lead to social isolation, discrimination, and psychological distress.

Fear and embarrassment may prevent individuals from seeking care, particularly in settings where dental services are provided in open or semi-private spaces without adequate privacy. Addressing stigma requires community education, sensitive service delivery approaches, and integration strategies that normalize oral health as a routine component of comprehensive healthcare.

The lack of community awareness about the relationship between oral health and general health limits demand for integrated services and support for integration policies. Many people do not recognize that oral infections can affect systemic health, that poor oral health during pregnancy can impact birth outcomes, or that oral diseases share common risk factors with other non-communicable diseases. This knowledge gap stems from limited health education, the historical separation of dental care from medical care, and inadequate emphasis on oral health in community health promotion programs. Building awareness and understanding of these connections is essential for generating demand for integrated services and community support for integration initiatives.

Traditional healers and informal providers play important roles in oral healthcare in many African communities, particularly in rural areas with limited access to professional dental services. While these providers may offer culturally acceptable services and fill gaps in formal health system coverage, their practices may include unsafe or ineffective treatments, delay appropriate care, and sometimes cause harm. The relationship between formal health systems and traditional oral health practitioners is often characterized by mutual suspicion rather than collaboration. Developing respectful engagement strategies, identifying appropriate roles for traditional healers in oral health promotion and referral, and regulating harmful practices represent complex challenges requiring cultural sensitivity and community participation.

Technical and Operational Challenges

The development and implementation of standardized clinical guidelines and protocols for oral health service delivery in primary healthcare settings remain incomplete in most African countries. Clear, evidence-based protocols are essential for guiding non-specialist providers in delivering preventive services, recognizing oral diseases, providing basic treatments, and making appropriate referrals. However, few African countries have developed such guidelines, adapted international protocols to local contexts, or disseminated them effectively to primary healthcare workers. The absence of standardized protocols contributes to variable service quality, inefficient resource utilization, and provider uncertainty about appropriate interventions.

Referral systems linking primary oral health services to specialized dental care are often poorly developed or non-functional. Effective integration requires mechanisms for referring complex cases from primary healthcare facilities to secondary or tertiary dental services, and for counter-referrals returning patients to primary care for follow-up and maintenance. However, many African health systems lack formalized referral protocols, reliable transportation systems, communication mechanisms between facilities, and specialized dental

services with capacity to receive referrals. The absence of functional referral systems leaves primary healthcare providers and patients frustrated when conditions exceed primary care capabilities, undermining confidence in integrated service delivery models.

Quality assurance and monitoring systems for integrated oral health services are typically absent or inadequate. Ensuring consistent, high-quality service delivery across multiple primary healthcare facilities requires standardized indicators, routine supervision and supportive supervision visits, clinical audits, and feedback mechanisms. However, the capacity for conducting these quality assurance activities is limited in many African health systems. Oral health expertise is often unavailable at district and regional levels to provide technical supervision, and general health supervisors may lack knowledge to assess oral health service quality. Establishing appropriate quality assurance systems requires investments in supervision capacity, information systems, and quality improvement culture.

The integration of oral health into health management information systems faces technical challenges related to indicator standardization, data collection tools, reporting workflows, and data utilization. Most health management information systems in African countries were designed without consideration of oral health services, lacking data fields for oral health indicators, treatment codes for dental procedures, or reporting forms for dental facilities. Retrofitting oral health into existing information systems requires technical expertise, system modifications, training of data collectors and managers, and coordination with information technology teams. Moreover, the value of collecting oral health data must be demonstrated through its utilization in planning, resource allocation, and quality improvement, yet feedback loops from data to decision-making are often weak, reducing motivation for accurate and timely reporting.

The coordination between different levels of healthcare and across service delivery platforms presents operational complexities. Integrated oral health services must function within existing health system structures, coordinating with maternal and child health programs, non-communicable disease clinics, HIV and tuberculosis services, and emergency care. This coordination requires shared scheduling systems, cross-training of staff, integrated patient records, and organizational cultures that support collaboration rather than siloed service delivery. However, vertical disease programs and categorical funding streams in many African health systems create incentives for separate rather than integrated operations, undermining integration efforts.

Educational and Training Gaps

The curricula in dental schools and training programs for oral health professionals across Africa remain predominantly oriented toward curative, specialist care rather than public health, primary care, and integration competencies. Graduates often lack adequate training in preventive dentistry, community oral health, health promotion, interdisciplinary collaboration, and working in resource-limited settings. This educational focus reflects the historical model of dental education, faculty expertise concentrated in clinical specialties, and limited engagement between dental education institutions and primary healthcare systems.

Reforming dental education to emphasize primary care competencies faces challenges including faculty development needs, clinical training site availability in primary healthcare settings, and resistance from those invested in traditional educational models.

The lack of oral health content in training programs for general healthcare workers, including medical officers, nurses, clinical officers, and community health workers, leaves these cadres inadequately prepared to identify oral conditions, provide basic oral health education, or support integrated service delivery. Pre-service curricula for these cadres typically include minimal or no oral health content, and in-service training programs rarely address oral health topics. This educational gap perpetuates the separation between oral health and general health, limits the capacity of primary healthcare workers to support oral health integration, and misses opportunities for early identification and referral of oral conditions.

Continuing professional development opportunities for oral health workers in African countries are limited, affecting knowledge updating, skill maintenance, and adaptation to evolving service delivery models including integration. Professional development activities require funding, time release from clinical duties, accessible training venues, and quality training content, all of which are frequently insufficient. For oral health workers in rural or remote areas, geographic isolation compounds access barriers to professional development. The lack of continuing education particularly affects adaptation to integration models, as workers trained in traditional dental settings require support to transition to primary healthcare environments and collaborative practice models.

Supervisory capacity and mentorship for oral health workers in integrated primary healthcare settings are often inadequate. Effective integration requires skilled supervision that combines clinical expertise with understanding of primary healthcare operations, integration principles, and local contexts. However, experienced oral health professionals with these competencies are rare, and supervisory systems in many African health systems are weak overall. Distance supervision, peer support networks, and telemedicine approaches offer potential solutions but require infrastructure, training, and system support that are not yet widely available.

Research and Evidence Gaps

The limited evidence base on effective integration approaches in African contexts constrains policy development and program design. While international literature provides examples of integration models from diverse settings, the applicability and adaptability of these models to African contexts requires contextual evidence. Research on integration effectiveness, cost-effectiveness, implementation challenges, facilitators and barriers, and population health impacts in African settings remains scarce. This evidence gap leaves policymakers and program managers uncertain about optimal integration strategies, resource requirements, and expected outcomes, reducing willingness to invest in integration initiatives.

Operational research to address implementation questions and generate learning for program improvement is rarely prioritized or funded. As countries pilot integration approaches, systematic documentation of processes, challenges, adaptations, and outcomes would generate valuable knowledge for scaling successful models and avoiding ineffective

approaches. However, the capacity for conducting implementation research is limited in many African health systems, and research funding tends to favor biomedical studies over health systems and implementation research. Strengthening operational research capacity and creating feedback loops from research to policy and practice represent important needs for advancing evidence-informed integration.

Economic evaluations of oral health integration, including cost-effectiveness analyses, budget impact assessments, and distributional analyses, are largely absent from African contexts. Policymakers require evidence on the costs and benefits of integration to justify resource allocation decisions and design financially sustainable service delivery models. However, conducting rigorous economic evaluations requires expertise, data systems, and resources that are often unavailable. The lack of economic evidence makes it difficult to demonstrate value for money or to design optimal service packages and delivery strategies that balance effectiveness, efficiency, and equity considerations.

The mechanisms for translating research evidence into policy and practice remain underdeveloped in most African countries. Even when relevant research exists, pathways for communicating findings to policymakers, engaging stakeholders in evidence interpretation, and supporting evidence-informed decision-making are often unclear or dysfunctional. Research-to-policy interfaces require institutional mechanisms such as technical advisory groups, policy dialogues, evidence synthesis platforms, and knowledge brokering functions, yet these are frequently absent or poorly functioning in oral health domains.

These multifaceted challenges to oral health service integration in African primary healthcare systems operate at multiple levels and interact in complex ways. Policy barriers limit the resources and enabling environment for integration, while resource constraints impede implementation of integration policies. Human resource shortages are compounded by training gaps and maldistribution, which in turn reflect inadequate financing and policy attention. Community perceptions influence service utilization, which affects the visibility and political priority of oral health. The interconnected nature of these challenges suggests that addressing any single barrier in isolation will produce limited results, and that comprehensive, multi-level strategies are required for successful integration. However, recognizing these challenges also illuminates opportunities for intervention and leverage points where strategic investments and policy reforms could catalyze progress, as explored in the following section.

Opportunities and Enabling Factors for Integration

Despite the substantial challenges outlined above, significant opportunities exist for advancing oral health integration into primary healthcare systems across African countries. These opportunities arise from evolving policy environments, innovations in service delivery, technological advances, growing evidence of integration benefits, and increasing recognition of oral health's importance to overall health and development. This section examines key opportunities and enabling factors that can be leveraged to overcome barriers and accelerate progress toward integrated, equitable oral health services.

Favorable Policy and Governance Developments

The global momentum toward universal health coverage and the Sustainable Development Goals has created an enabling environment for oral health integration. The inclusion of UHC in SDG 3 and the emphasis on equitable access to quality essential healthcare services provides a policy framework within which oral health integration can be positioned as necessary for achieving comprehensive coverage. African countries' commitments to UHC, expressed through national policies, regional declarations, and participation in global initiatives, create political spaces for advocating oral health inclusion in essential service packages and benefit designs.

Recent revisions of primary healthcare frameworks at global and regional levels explicitly recognize oral health as an essential component of comprehensive primary care. The Declaration of Astana on Primary Health Care (2018) reaffirmed the Alma-Ata vision and emphasized integrated, people-centered services addressing the full range of health needs across the life course. This contemporary primary healthcare vision provides normative support for oral health integration and can be leveraged in national policy development. African regional health strategies, including the Africa Health Transformation Plan and Universal Health Coverage roadmaps, offer vehicles for embedding oral health integration within broader health system strengthening agendas.

Several African countries have recently developed or revised national oral health policies with explicit integration mandates and implementation frameworks. These policy developments reflect growing awareness of oral health's importance and political commitment to addressing oral disease burden. Countries including Kenya, Ethiopia, Nigeria, and South Africa have formulated oral health policies that emphasize prevention, primary care delivery, and integration with general health services. While implementation challenges persist, these policies provide important foundations and can be strengthened through increased resource allocation, stakeholder engagement, and accountability mechanisms.

The establishment or strengthening of oral health units within ministries of health in several African countries creates institutional capacity for leadership, coordination, and advocacy. Where oral health directorates or departments have been elevated in organizational structures, granted adequate staffing, and empowered with clear mandates, they have demonstrated capacity to advance policy reforms, coordinate partners, and support integration implementation. Continued strengthening of oral health governance structures, including at regional and district levels, represents an important opportunity for building institutional capacity to drive integration forward.

Multi-sectoral platforms and coordinating mechanisms for addressing non-communicable diseases create entry points for oral health integration. Many African countries have established national NCD commissions, coordinating committees, or task forces bringing together health and non-health sectors to develop and implement NCD prevention and control strategies. Since oral diseases share common risk factors with other NCDs and require similar prevention approaches, these multi-sectoral platforms offer opportunities for incorporating

oral health into broader prevention initiatives, including tobacco control, healthy diet promotion, and sugar reduction policies. Leveraging these existing structures is more efficient than creating separate mechanisms for oral health.

Innovations in Service Delivery and Workforce Models

Task-shifting and skill-mix innovations offer promising pathways for expanding oral health service coverage despite workforce shortages. The evidence base supporting task-shifting in healthcare has grown substantially, demonstrating that appropriately trained mid-level and non-specialist providers can safely and effectively deliver many services traditionally provided by specialists. In oral health, systematic reviews have confirmed that dental therapists, oral health therapists, and expanded-duty dental auxiliaries can provide preventive and basic restorative services with outcomes equivalent to those achieved by dentists. Several African countries have successfully deployed these cadres in primary healthcare settings, rural areas, and underserved communities, significantly expanding access to basic oral health services.

Community-based service delivery models bring oral health services closer to populations, particularly in rural and remote areas with limited facility infrastructure. Mobile dental units, outreach programs, school-based services, and integration with community health worker programs demonstrate potential for reaching underserved populations and delivering preventive services in community settings. Countries including Tanzania, Ghana, and Malawi have implemented community-based oral health programs showing improved service coverage and population oral health outcomes. These models require adequate logistical support, supplies, supervision, and coordination with facility-based services, but they offer important complements to facility-based primary care integration.

School-based oral health programs represent high-impact opportunities for reaching children with preventive services and health education. Schools provide accessible platforms for delivering fluoride applications, dental sealants, oral health education, and screening with referral for treatment. The concentration of children in schools enables efficient service delivery and the school environment supports reinforcement of healthy behaviors. Several African countries have implemented school oral health programs, often in partnership with non-governmental organizations, demonstrating feasibility and effectiveness. Systematic expansion and integration of school programs with primary healthcare systems could substantially reduce childhood caries burden and establish foundations for lifelong oral health.

Integration of oral health screening and preventive services into existing maternal and child health platforms offers opportunities for reaching critical populations during routine health contacts. Antenatal care visits, well-child visits, and immunization sessions provide regular touchpoints with healthcare systems during which oral health status can be assessed, preventive services delivered, and health education provided. Evidence indicates that maternal oral health affects pregnancy outcomes and that early childhood is a critical period for establishing oral health trajectories. Several countries have successfully integrated oral

health components into maternal-child health programs, training nurses and midwives to provide basic oral health screening, counseling, and referral.

The integration of oral health with non-communicable disease services and clinics creates synergies in addressing shared risk factors and providing comprehensive care. Individuals attending clinics for diabetes, hypertension, or cardiovascular conditions have elevated risk for oral diseases, particularly periodontal disease, which in turn may affect metabolic control and cardiovascular outcomes. Integrating oral health screening, referral, and health promotion into NCD services enables holistic patient management and efficient resource utilization. Some African health systems have begun piloting integrated NCD clinics that include oral health components, with promising early results regarding patient satisfaction and health outcomes.

Technological Innovations and Digital Health

Digital health technologies offer transformative opportunities for expanding oral health service reach, improving quality, and strengthening systems. Teledentistry and teleconsultation enable remote diagnosis, treatment planning, and specialist consultation, potentially addressing geographic barriers and specialist shortages. Primary healthcare workers in rural facilities can capture images or videos of oral conditions and transmit them to dental specialists for consultation and guidance, enabling appropriate management decisions without requiring patient travel. Several pilot programs in African countries have demonstrated teledentistry feasibility, though scaling requires investments in technology infrastructure, training, and integration with existing health information systems.

Mobile health (mHealth) applications for oral health promotion, education, and appointment reminders can enhance patient engagement and self-care. SMS messaging, smartphone applications, and social media platforms enable cost-effective communication with large populations, delivering health messages, appointment reminders, and behavior change support. Evidence from diverse health domains demonstrates mHealth effectiveness for improving knowledge, promoting health behaviors, and enhancing service utilization. Oral health mHealth initiatives in African settings have shown promise for improving oral hygiene practices, increasing dental care attendance, and supporting disease management, though sustained impact requires attention to digital literacy, access barriers, and content culturalization.

Electronic health records and health management information systems create opportunities for integrating oral health data into comprehensive patient records and population health monitoring. Digital health records enable information sharing across providers and facilities, supporting coordinated care and reducing redundant services. When oral health data are incorporated into electronic systems, they become visible to all providers, potentially improving recognition of oral health issues and facilitating referrals. Several African countries have made substantial investments in health information system digitization, creating foundations for incorporating oral health components during system upgrades or expansions.

Innovative diagnostic technologies, including portable and point-of-care devices, may enable oral disease screening and detection in primary healthcare settings without requiring expensive traditional dental equipment. Emerging technologies such as smartphone-based imaging, artificial intelligence-assisted diagnosis, and simplified diagnostic tools show potential for deployment by non-specialist providers in resource-limited settings. While many of these technologies remain in development or early implementation phases, they represent important future opportunities for expanding diagnostic capacity and enabling earlier disease detection.

Partnerships and Development Assistance

International partnerships and development assistance provide important resources and technical support for oral health integration efforts in African countries. Global health initiatives, bilateral development programs, foundations, and non-governmental organizations have increasingly recognized oral health's importance and provided funding for policy development, workforce training, service delivery programs, and research. Organizations including the World Health Organization, FDI World Dental Federation, and Global Oral Health Network offer technical assistance, normative guidance, and platforms for knowledge exchange. Strategic engagement with development partners can mobilize resources and expertise to support integration initiatives.

South-South cooperation and peer learning among African countries offer opportunities for sharing experiences, adapting successful models, and building regional capacity. Countries that have made progress in oral health integration can provide valuable lessons and technical assistance to those beginning integration efforts. Regional economic communities and organizations such as the African Union and East African Community provide platforms for policy dialogue, technical collaboration, and harmonization of approaches. Regional training programs, collaborative research networks, and communities of practice can strengthen capacity and foster innovation tailored to African contexts.

Academic partnerships between African and international institutions support capacity building, research collaboration, and program evaluation. Dental schools and schools of public health in high-income countries partnering with African institutions can provide faculty exchanges, collaborative research opportunities, and technical assistance for curriculum reform and program development. These partnerships are most valuable when structured as equitable collaborations respecting African leadership and priorities rather than unidirectional technical assistance relationships. Several successful partnership models have contributed to workforce development, research capacity strengthening, and program innovation in African oral health.

Public-private partnerships and corporate social responsibility initiatives offer potential for expanding resources and service delivery channels. Dental product manufacturers, pharmaceutical companies, and other private sector entities have interests in African markets and may contribute resources, products, or services to support oral health programs. Models range from product donations to service delivery partnerships to joint investment in

infrastructure and training. While careful attention to potential conflicts of interest and sustainability considerations is necessary, appropriately structured public-private partnerships can complement public sector efforts and expand service reach.

Growing Evidence Base and Advocacy

The expanding evidence base demonstrating oral health's impact on overall health and quality of life strengthens arguments for integration. Research linking oral diseases to diabetes, cardiovascular disease, adverse pregnancy outcomes, and other systemic conditions makes increasingly compelling cases for addressing oral health within comprehensive healthcare. Evidence that poor oral health impairs nutritional status, particularly in children and elderly populations, links oral health to broader development outcomes. Systematic reviews and meta-analyses synthesizing this evidence provide authoritative references for policy advocacy and can be effectively communicated to policymakers and the public to build support for integration.

Economic evidence demonstrating the cost-effectiveness of preventive oral health interventions and the economic burden of untreated oral diseases supports resource allocation arguments. Studies from diverse settings have shown that preventive interventions including fluoride programs, dental sealants, and oral health promotion are highly cost-effective, with benefit-cost ratios often exceeding those of many other preventive health interventions. Conversely, research quantifying the economic costs of untreated oral diseases, including productivity losses, emergency care costs, and impacts on quality of life, demonstrates the economic imperative for prevention and early intervention. While economic evidence from African contexts remains limited, available studies and adaptations from other settings provide important ammunition for advocacy.

Civil society engagement and advocacy networks for oral health are growing in African countries and globally, creating momentum for policy change and resource mobilization. Professional associations, patient advocacy groups, community organizations, and health advocacy coalitions increasingly include oral health in their agendas and campaigns. The integration of oral health into broader health advocacy movements, including UHC campaigns and NCD alliances, amplifies voices calling for oral health inclusion. Social media and digital communication enable rapid mobilization, information sharing, and coordinated advocacy across geographic boundaries. Strengthening civil society capacity for evidence-based advocacy and creating platforms for coordinated action can accelerate policy progress.

The designation of oral health as a tracer indicator for health equity highlights its importance and creates accountability for addressing disparities. Oral diseases exhibit steep social gradients, with prevalence and severity highest among disadvantaged populations and marginalized communities. This pattern makes oral health status a sensitive indicator of broader health system equity and social justice. As African countries increasingly focus on equity in pursuing UHC, oral health's inclusion as a monitoring indicator creates pressure and opportunity for integration and improved access. Equity-focused monitoring frameworks and

disaggregated data collection enable tracking of progress and identification of populations being left behind.

Demographic and Epidemiological Opportunities

The demographic structure of African populations, with large youth cohorts and growing proportions of elderly individuals, creates both imperatives and opportunities for oral health integration. Children and adolescents represent critical target populations for preventive services that can establish lifelong oral health trajectories and prevent substantial future disease burden. The concentration of youth populations makes school-based and community programs potentially high-impact. Simultaneously, aging populations face increased risks of oral diseases and complex oral health needs, creating demand for accessible primary oral healthcare. Life-course approaches to oral health that reach populations at critical stages align well with integrated primary healthcare models addressing needs across the lifespan.

The epidemiological transition underway in many African countries, with rising prevalence of non-communicable diseases alongside persistent communicable disease burdens, necessitates integrated approaches addressing multiple conditions efficiently. Health systems cannot afford separate vertical programs for each condition and population group. Integrated service delivery models that address oral health alongside other NCDs through common risk factor approaches and coordinated clinical care represent rational, efficient responses to epidemiological complexity. The shared risk factors for oral diseases and other NCDs, particularly tobacco use, unhealthy diets, and harmful alcohol use, enable integrated prevention strategies with multiple health benefits.

Urbanization trends across Africa create both challenges and opportunities for oral health service delivery. While urbanization concentrates populations in areas where facility-based services may be more readily available, it also creates unhealthy environments with increased exposure to sugary products, processed foods, and oral health risk factors. Urban primary healthcare systems, including urban community health programs, provide platforms for reaching rapidly growing urban populations with integrated oral health services. Urban settings may also offer greater feasibility for innovative service delivery models, technology deployment, and private sector engagement in expanding access.

Policy Windows and Strategic Timing

Current health system reform processes in many African countries, including UHC implementation, primary healthcare revitalization, and health financing reforms, create policy windows for oral health integration. During reform processes, stakeholders examine existing service delivery models, identify gaps, and design improved systems. These moments of institutional flux and policy development offer opportunities to incorporate oral health into reformed structures rather than attempting to retrofit oral health into established systems resistant to change. Strategic advocacy and technical input during reform processes can position oral health within core service packages, benefit designs, and delivery platforms.

The COVID-19 pandemic's impacts on health systems and service delivery have prompted reflection on resilience, integration, and people-centered care. While the pandemic severely disrupted dental services globally, it also highlighted the importance of essential health services, infection prevention and control, and integrated approaches enabling continuity of care during crises. Post-pandemic recovery and health system strengthening efforts create opportunities to build back better with oral health integrated into more resilient, comprehensive primary healthcare platforms. The pandemic also accelerated adoption of digital health technologies and innovations in service delivery that can support oral health integration.

Continental and regional health initiatives, including the African Union's Agenda 2063 and various regional health strategies, establish frameworks and momentum for health system development within which oral health integration can be advanced. Alignment of national oral health integration efforts with continental and regional priorities can leverage additional resources, technical support, and political attention. Regional mechanisms for policy harmonization, standard-setting, and collaborative action offer vehicles for advancing oral health integration across multiple countries simultaneously, enabling economies of scale in capacity building and knowledge generation.

These diverse opportunities and enabling factors, operating at multiple levels from global policy to local service delivery, create a favorable environment for advancing oral health integration despite persisting challenges. Seizing these opportunities requires strategic planning, coordinated action, sustained advocacy, and adequate resourcing. The following sections examine specific case studies and innovative models demonstrating how countries and programs have leveraged opportunities to achieve integration progress, and conclude with recommendations for stakeholders committed to advancing oral health equity in Africa.

Case Studies and Innovative Integration Models

Examining concrete examples of oral health integration efforts in African countries provides valuable insights into implementation strategies, contextual adaptations, challenges encountered, and outcomes achieved. This section presents selected case studies representing diverse approaches to integration across different African contexts. These examples illustrate both successful innovations worthy of replication and challenges requiring attention in scaling integration efforts.

Tanzania: Dental Therapists in Primary Healthcare

Tanzania has demonstrated leadership in deploying dental therapists as mid-level oral health providers integrated into primary healthcare structures. The country established dental therapy training in the 1970s, producing graduates trained to provide preventive and basic restorative services, including examinations, health education, fluoride applications, sealants, restorations, and simple extractions. Dental therapists are posted to rural health centers and district hospitals, working as part of primary healthcare teams and serving populations with limited access to dentists.

The Tanzanian model addresses workforce shortages through task-shifting, enabling expanded service coverage with fewer highly specialized professionals. Dental therapists receive three years of post-secondary training at Muhimbili University of Health and Allied Sciences and other institutions, combining classroom instruction with supervised clinical practice. The curriculum emphasizes preventive and primary care competencies appropriate for district-level practice. Upon graduation, dental therapists are deployed through the public sector health system, with deployment prioritizing underserved rural districts.

Evaluation studies of the Tanzanian dental therapist program have documented positive outcomes including expanded service availability, high patient satisfaction, and clinical quality comparable to dentist-provided care for procedures within their scope of practice. Research by Kida et al. (2014) found that dental therapists effectively delivered preventive and basic restorative services in rural primary healthcare facilities, with populations served by dental therapists experiencing improved oral health outcomes compared to areas without oral health providers. The program has demonstrated sustainability over decades, with continued government support for training and deployment despite resource constraints.

Challenges in the Tanzanian model include retention difficulties in remote rural posts, limited supervision and continuing professional development opportunities, and constraints imposed by inadequate equipment and supplies at health facilities. Career advancement pathways for dental therapists remain limited, with few opportunities for specialization or progression to senior positions. Some tension exists between dental therapists and dentists regarding scope of practice and professional recognition, though this has diminished over time as the dental therapy cadre has become established. Despite these challenges, the Tanzanian experience provides compelling evidence for the feasibility and effectiveness of mid-level oral health providers in expanding primary healthcare-based services.

Ghana: Integration of Oral Health into School Health Programs

Ghana has implemented comprehensive school health programs incorporating oral health components, demonstrating effective integration of preventive services into education sector platforms. The Ghana School Health Education Programme (SHEP), supported by the Ministries of Health and Education, delivers oral health education, screening, and preventive services to primary school children nationwide. The program trains teachers to deliver oral health education using standardized curricula and materials, conducts regular dental screenings, and provides fluoride applications and dental sealants to high-risk children.

The integration approach leverages existing school health infrastructure and education sector reach to deliver oral health interventions efficiently. Teachers, already familiar to children and trusted by communities, receive training on oral health topics, teaching methodologies, and identification of common oral conditions requiring referral. Health workers, including dental therapists and dental health educators, visit schools on scheduled rotations to conduct screenings and provide preventive treatments. The program emphasizes behavior change, teaching children proper toothbrushing techniques, healthy dietary practices, and the importance of regular dental care.

Evaluation of the Ghana school program has documented significant improvements in oral health knowledge, attitudes, and behaviors among participating children, as well as reduced caries prevalence in schools receiving comprehensive interventions. Research by Acheampong et al. (2018) found that children in program schools demonstrated better oral hygiene practices, lower plaque scores, and fewer untreated dental caries compared to children in non-program schools. Parents reported increased awareness of oral health importance and greater likelihood of seeking dental care for their children. The school-based delivery model proved cost-effective, reaching large numbers of children with relatively modest resource investments.

Sustainability challenges include maintaining program funding, ensuring consistent supply of preventive materials, sustaining teacher engagement and accurate knowledge delivery over time, and establishing effective referral linkages between schools and dental treatment facilities. Geographic coverage remains incomplete, with some rural and disadvantaged schools not yet reached by the program. Nevertheless, the Ghana model demonstrates the potential for education-health sector collaboration in advancing oral health, and similar approaches have been adapted by other African countries including Nigeria, Kenya, and Uganda.

Rwanda: Inclusion of Oral Health in Community-Based Health Insurance

Rwanda has made notable progress in integrating oral health services into its community-based health insurance scheme (Mutuelle de Santé), expanding financial protection and access for the population. Following health system reconstruction after the 1994 genocide, Rwanda invested heavily in primary healthcare strengthening and achieving universal health coverage. The Mutuelle system, established in the early 2000s, now covers over 90% of the population and includes basic oral health services in its benefit package.

Covered oral health services include emergency care for dental pain and infection, simple extractions, and selected preventive interventions. Beneficiaries access these services at primary healthcare facilities for subsidized co-payments, with the poorest populations exempt from co-payment requirements. The inclusion of oral health in the insurance benefit package required advocacy from the Ministry of Health's oral health unit, demonstration projects showing service demand and feasibility, and integration of oral health into costing and benefit design processes. Negotiations addressed concerns about service costs, utilization patterns, and provider capacity.

The integration of oral health into Rwanda's insurance system has demonstrably improved access and reduced out-of-pocket expenditures for covered services. Research by Habiyakare et al. (2016) found increased utilization of dental services following insurance coverage expansion, particularly among rural and lower-income populations who previously faced prohibitive financial barriers. The financial risk protection provided by insurance coverage prevented dental emergencies from causing catastrophic health expenditures and impoverishment. Providers reported improved ability to serve patients when payment mechanisms were established, reducing dependence on unreliable out-of-pocket payments.

Implementation challenges included initial provider resistance due to concerns about reimbursement adequacy and delays in insurance payments affecting health facility cash flow. The limited scope of covered services, primarily emergency and extraction rather than comprehensive preventive and restorative care, means that significant oral health needs remain unmet. Geographic disparities in provider availability continue to limit access in some areas despite insurance coverage. Ongoing efforts focus on expanding the benefit package, strengthening provider networks, improving payment timeliness, and monitoring service quality. Rwanda's experience provides important lessons on the technical and political processes of including oral health in insurance schemes and demonstrates the access improvements possible through financial protection mechanisms.

Ethiopia: Community Health Workers for Oral Health Promotion

Ethiopia has leveraged its extensive Health Extension Program (HEP) to deliver oral health promotion and basic preventive services through community health workers. The HEP, launched in 2003, deploys Health Extension Workers (HEWs) to rural communities to provide health education, disease prevention, and selected clinical services. With over 38,000 HEWs deployed nationally, the program has achieved impressive reach into previously underserved rural areas. The integration of oral health into HEW activities represents a strategic approach to addressing oral disease prevention at the community level.

Health Extension Workers receive training on oral health topics during their initial year-long training program and through periodic refresher training. The oral health curriculum includes topics such as oral hygiene instruction, dietary counseling for caries prevention, tobacco cessation counseling, and identification of oral conditions requiring referral to health facilities. HEWs are equipped with basic supplies including toothbrushes, toothpaste, and educational materials to support their health promotion activities. The integration approach emphasizes common risk factor approaches, linking oral health promotion to broader health education on nutrition, hygiene, and non-communicable disease prevention.

Program evaluations have documented improved oral health knowledge and behaviors in communities served by HEWs trained in oral health. A study by Azage et al. (2017) found that children in communities with active HEW oral health activities demonstrated better toothbrushing practices, lower plaque accumulation, and greater parental awareness of oral health importance compared to comparison communities. The integration of oral health into routine home visits and community health education sessions normalized oral health as a component of comprehensive primary healthcare. The community-based approach proved culturally acceptable and cost-effective, reaching populations unlikely to access facility-based services.

Challenges in the Ethiopian model include the heavy workload already faced by HEWs covering multiple health topics and services, which may limit time and attention devoted to oral health promotion. Knowledge retention and skill maintenance require ongoing supervision and refresher training, which are not always consistently provided. The linkages between community-based health promotion and facility-based treatment services remain

weak in many areas, limiting the impact of early problem identification and referral. Supply chain challenges sometimes result in stockouts of toothbrushes and toothpaste, undermining program delivery. Despite these challenges, the Ethiopia experience demonstrates the feasibility and potential impact of leveraging community health worker platforms for oral health, an approach with applicability across many African countries with similar community health programs.

South Africa: Comprehensive Primary Oral Healthcare Package

South Africa has developed a comprehensive oral health service package for primary healthcare facilities, supported by policy frameworks, clinical guidelines, and workforce development initiatives. The National Oral Health Strategy emphasizes prevention, early intervention, and equitable access through primary healthcare platforms. The basic oral health care package includes screening and assessment, health education and promotion, preventive interventions including fluoride applications and sealants, pain relief, emergency management of dental infections, and simple restorations and extractions. The strategy envisions these services delivered through community health centers and primary healthcare clinics by appropriately trained providers.

Implementation involves training of oral hygienists, dental therapists, and dental assistants to deliver the primary oral health package, with dentists providing specialized services and supervision at district and tertiary levels. South Africa's well-developed oral health education infrastructure, including multiple dental schools and training programs for mid-level providers, supports workforce production. Clinical guidelines and standard treatment protocols provide evidence-based guidance for service delivery. Quality assurance systems including clinical audits and supervision visits aim to ensure consistent, high-quality care.

Evaluations of South Africa's primary oral healthcare approach have documented both successes and ongoing challenges. Where fully implemented with adequate staffing, equipment, and supplies, the model has achieved good service coverage and patient satisfaction. The emphasis on prevention and early intervention has shown potential for reducing emergency presentations and extraction rates. However, implementation remains uneven across provinces and districts, with some areas achieving comprehensive service delivery while others face persistent resource and staffing constraints. The legacy of apartheid-era inequities continues to affect resource distribution and service access, particularly in rural and former homeland areas.

Ongoing challenges include budget constraints limiting staff positions and service expansion, difficulties recruiting and retaining oral health professionals in rural and disadvantaged areas, and gaps in referral systems for complex cases requiring specialist intervention. The integration of oral health data into health information systems remains incomplete, limiting performance monitoring and quality improvement. Despite these challenges, South Africa's comprehensive approach provides a model for systematic integration of oral health into primary healthcare, demonstrating what is possible with adequate policy frameworks, workforce investment, and sustained implementation efforts.

These case studies illustrate diverse approaches to oral health integration adapted to different contexts and health system structures. Common success factors across cases include strong policy foundations, workforce innovations addressing provider shortages, community and school-based service delivery expanding reach, integration with existing health platforms and programs, and sustained commitment from government and partners. Common challenges include resource constraints limiting scale and sustainability, workforce recruitment and retention difficulties, supply chain and equipment challenges, and weaknesses in referral systems and supervision. The experiences from these and other African countries provide valuable lessons for scaling integration efforts across the continent.

Recommendations and Strategic Pathways Forward

Based on the analysis of challenges, opportunities, and country experiences presented in preceding sections, this section offers evidence-based recommendations for stakeholders committed to advancing oral health integration into primary healthcare systems in African countries. The recommendations address multiple levels and actors including policymakers, health system administrators, development partners, professional associations, academic institutions, and civil society organizations. Implementation requires coordinated action, sustained commitment, and adaptation to specific country contexts.

Policy and Governance Recommendations

African governments should develop or revise national oral health policies with explicit integration mandates, implementation frameworks, timelines, and accountability mechanisms. Policies must move beyond aspirational statements to include concrete objectives, designated responsible entities, resource allocation commitments, and monitoring indicators. The policy development process should involve multi-stakeholder consultation including health professionals, community representatives, academic institutions, and civil society organizations. Policies should align with broader health sector strategic plans, UHC roadmaps, and non-communicable disease strategies, positioning oral health as an integral component rather than a standalone issue.

Ministries of health should strengthen oral health governance structures, ensuring adequate staffing, authority, and resources for national, regional, and district oral health offices. Oral health units should be positioned to influence policy development, resource allocation, and program implementation across health system levels. Leadership positions should be filled with qualified professionals possessing both technical expertise and health systems management competencies. Governance structures should include mechanisms for coordinating with other health programs, particularly maternal-child health, school health, and non-communicable disease programs, facilitating integrated planning and implementation.

Essential oral health services should be explicitly included in national essential health service packages and universal health coverage benefit designs. The services included should emphasize preventive interventions, health promotion, and basic treatments addressing common conditions, reflecting epidemiological priorities and cost-effectiveness evidence.

Benefit design processes should involve actuarial analysis, costing studies, and stakeholder consultation to ensure financial sustainability and political acceptability. Insurance schemes and purchasing arrangements should include appropriate provider payment mechanisms, quality standards, and utilization monitoring to ensure efficient, high-quality service delivery.

Regulatory frameworks governing oral health professional scope of practice should be reviewed and reformed to enable evidence-based task-shifting and optimize workforce utilization. Regulations should clearly define the roles and competencies of different oral health cadres including dentists, dental therapists, oral hygienists, and dental assistants, ensuring that scope of practice aligns with training, evidence of safe effective practice, and population needs. Regulatory reform processes should balance concerns about quality and safety with imperatives for expanding access, drawing on international evidence regarding task-shifting effectiveness. Professional associations should be constructively engaged in regulatory reform to build consensus and support for changes.

Inter-sectoral coordination mechanisms should be established or strengthened to address social determinants of oral health and implement prevention policies. Multi-sectoral committees or task forces should include representatives from health, education, agriculture, trade, finance, and urban planning sectors, with mandates to develop and implement coordinated policies addressing tobacco control, sugar reduction, food marketing to children, water fluoridation where appropriate, and oral health-promoting environments. These mechanisms require high-level political support, clear terms of reference, adequate secretariat support, and accountability for producing results. Oral health should be incorporated into broader non-communicable disease prevention platforms and healthy lifestyle promotion initiatives rather than pursued through separate siloed mechanisms.

African Union and regional economic community health frameworks should explicitly address oral health integration, establishing regional standards, facilitating knowledge exchange, and mobilizing resources for capacity building. Regional mechanisms can support policy harmonization, mutual recognition of professional qualifications facilitating workforce mobility, collaborative training programs, and joint research initiatives. Continental health strategies should include oral health indicators in monitoring frameworks, creating accountability for progress and enabling comparative assessment across countries. Regional technical working groups on oral health integration can provide platforms for sharing experiences, solving common problems, and developing contextually appropriate guidance materials.

Workforce Development and Deployment Strategies

African countries should expand training capacity for mid-level oral health providers including dental therapists and oral hygienists, prioritizing curricula emphasizing primary healthcare competencies, prevention, health promotion, and community-based practice. Training programs should be established or expanded in countries currently lacking dental therapy education, drawing on expertise and models from countries with successful programs. Curricula should be regularly reviewed and updated based on evolving evidence,

population health needs, and integration requirements. Clinical training should occur substantially in primary healthcare settings rather than exclusively in tertiary hospitals, exposing students to the practice environments where they will work and ensuring competency development in relevant skills.

Task-shifting implementation should be supported through development of standardized clinical protocols, training packages, supervision guidelines, and quality assurance systems. Evidence-based protocols should clearly specify which services can be provided by different cadres, under what circumstances, with what training and supervision requirements, and with what quality standards. Training packages should include both initial and refresher training components, using adult learning methodologies and competency-based assessment. Supervision systems should provide supportive, mentoring-oriented oversight rather than punitive inspection approaches, with frequency and intensity appropriate to provider experience and practice complexity.

Recruitment and retention strategies for oral health workers in rural and underserved areas should be implemented, drawing on evidence regarding effective interventions. Strategies should be multi-faceted, addressing financial incentives including rural allowances and student loan forgiveness programs, non-financial factors including housing, educational opportunities for families, and professional development support, compulsory service requirements with appropriate duration and conditions, and career pathways enabling advancement and specialization while maintaining rural practice. Preferential admission to training programs for candidates from rural areas, who demonstrate higher likelihood of returning to rural practice, should be considered. Retention monitoring systems should track workforce stability and identify areas experiencing high turnover requiring targeted interventions.

Pre-service training programs for general primary healthcare workers including nurses, clinical officers, and community health workers should incorporate oral health content addressing basic knowledge, screening skills, health promotion competencies, and referral decision-making. Curricula should reflect the common risk factor approach, emphasizing links between oral health and general health, shared prevention strategies, and integrated patient management. Training should be practical and competency-based, enabling providers to confidently incorporate oral health into their routine patient interactions. In-service training programs should similarly include oral health modules for the existing primary healthcare workforce, using cascade training, distance learning, and supportive supervision approaches to achieve broad coverage.

Continuing professional development systems for oral health workers should be established or strengthened, using diverse delivery modalities including workshops, mentoring, peer learning networks, and technology-enabled distance learning. Professional development should address both clinical skill maintenance and competency in emerging areas such as integrated service delivery, health promotion, and use of information systems. Accreditation or certification systems linking professional development participation to licensure renewal can incentivize engagement. Funding mechanisms for continuing professional development,

whether through government allocations, professional association dues, or development partner support, must be identified and sustained.

Service Delivery and Operational Strategies

Primary healthcare facilities should be systematically assessed for oral health service readiness, and prioritized investments made in infrastructure, equipment, and supplies necessary for delivering basic oral health services. Service readiness assessments should evaluate physical infrastructure including water, electricity, and appropriate clinical space, availability of essential equipment including examination lights, instruments, and sterilization capacity, commodity supplies including preventive and restorative materials, and human resources including trained providers and supervision systems. Based on assessment findings, phased investment plans should upgrade facilities beginning with highest-impact, lowest-cost improvements and progressing toward more comprehensive capability. Equipment selection should prioritize durable, low-maintenance, appropriate technology suitable for resource-limited settings.

Standardized service delivery models appropriate for different facility levels should be developed and disseminated, clearly defining service scope, staffing requirements, equipment needs, and clinical protocols for community health posts, health centers, and district hospitals. Service models should reflect the progressive realization approach, with basic screening, health promotion, and preventive services available at all levels, and increasingly complex diagnostic and treatment capabilities at higher facility levels. Clear referral criteria and pathways should link different facility levels, enabling appropriate patient management and avoiding both under-treatment and unnecessary referrals. Service models should be tested through pilot implementation, refined based on experience, and scaled systematically with adequate preparation and support.

Supply chain management systems should be strengthened to ensure reliable availability of essential oral health commodities at service delivery points. Oral health commodities including fluoride varnish, restorative materials, local anesthetics, instruments, and personal protective equipment should be incorporated into national essential medicines lists and quantification, procurement, and distribution systems. Consumption data should inform forecasting to prevent stockouts and wastage. Distribution systems should deliver commodities reliably to peripheral facilities, with tracking mechanisms enabling rapid identification and resolution of supply interruptions. Cold chain requirements for certain products must be accommodated within existing pharmaceutical supply systems.

Referral systems linking primary oral health services to specialized care should be formalized through protocols, communication mechanisms, and capacity development at referral facilities. Referral protocols should specify indications for referral, required information transfer, expected timeframes, and follow-up responsibilities. Communication mechanisms may include referral forms, telephone or digital communication, and periodic case conferences. Specialized dental facilities receiving referrals require capacity to accommodate referred patients in a timely manner, necessitating adequate staffing and scheduling

flexibility. Counter-referral processes should return patients to primary care for continuing management after specialized interventions. Monitoring referral system functioning through tracking referral completion rates and patient outcomes can identify bottlenecks requiring attention.

Community-based and outreach service delivery models should complement facility-based services, particularly for reaching rural, remote, and marginalized populations. Mobile dental units, periodic outreach visits to communities and schools, and community-based screening with referral programs expand service reach beyond fixed facilities. These approaches require careful planning regarding scheduling, logistics, supply management, and coordination with facility-based services. Community mobilization and engagement ensure populations are aware of service availability and prepared to utilize services. Documentation and reporting systems should capture outreach activities and outcomes, integrating data with facility-based information systems.

Quality assurance systems should be established for integrated oral health services, including standardized indicators, routine supervision, clinical audits, patient satisfaction monitoring, and feedback mechanisms for continuous improvement. Quality indicators should address both process measures such as adherence to protocols and availability of supplies, and outcome measures such as treatment completion rates and patient-reported outcomes. Supervision visits should provide supportive mentoring to providers, identify system barriers requiring management attention, and verify data quality. Clinical audits reviewing samples of patient records can assess quality of care and identify learning needs. Patient feedback mechanisms including suggestion boxes, exit interviews, and community consultations provide important perspectives on service accessibility, acceptability, and quality.

Financing and Economic Strategies

Health budget allocations for oral health should be increased to levels adequate for delivering essential services, moving toward targets of at least 5% of health budgets allocated to oral health services. Budget advocacy should emphasize cost-effectiveness evidence, the economic burden of untreated oral disease, and alignment with UHC commitments. Budget allocations should be protected from diversion to other priorities through specific line items for oral health in health sector budgets. Transparent budget execution monitoring and reporting can ensure allocated resources are actually expended on intended purposes. Multi-year budget planning provides predictability supporting sustained program implementation.

National health insurance and financing schemes should be expanded to include comprehensive oral health benefits, moving beyond emergency care to cover preventive services and basic restorative treatments. Benefit expansion requires actuarial analysis informing sustainable benefit designs and premium structures. Phased benefit expansion, beginning with high-impact preventive services and gradually adding restorative interventions, enables managed cost escalation and system learning. Provider payment mechanisms should ensure adequate reimbursement while incentivizing appropriate care, potentially using capitation for preventive services and fee-for-service for complex

treatments. Pre-authorization requirements and utilization review can manage costs while maintaining quality.

Out-of-pocket payment requirements should be reduced or eliminated for priority populations and services, particularly preventive services for children and emergency care for the poor. User fee exemptions require compensatory financing to service delivery facilities, ensuring that exemptions do not reduce service availability or quality. Targeting mechanisms identifying exempt populations should be administratively feasible and minimize exclusion errors leaving deserving populations unprotected. Universal exemptions for specific services, while potentially expensive, avoid targeting challenges and stigma. Economic evaluations comparing alternative approaches to financial protection can inform policy choices.

Cost-effectiveness analyses and economic evaluations should be conducted to inform service prioritization, delivery models, and resource allocation decisions. Economic evaluations should compare alternative approaches to achieving oral health objectives, considering both health outcomes and costs from health system and societal perspectives. Analyses should incorporate local cost data and, where possible, effectiveness estimates from African contexts rather than relying solely on international evidence. Results should be effectively communicated to policymakers in accessible formats informing budget and policy decisions. Capacity for health economics analysis should be strengthened in ministries of health and academic institutions to enable routine economic evaluation informing policy.

Innovative financing mechanisms including social health insurance, community-based insurance schemes, performance-based financing, and results-based financing should be explored for supporting oral health service expansion. Experiences from other health service areas provide models potentially adaptable to oral health. Performance-based financing linking payment to achievement of service coverage or quality targets can incentivize improved performance, though careful design is required to avoid unintended consequences such as neglect of unmeasured outcomes. Community involvement in financing through insurance schemes or health facility committees can generate local resources and ownership, though equity implications require attention.

Health Information and Research Strategies

Oral health indicators should be integrated into national health management information systems, ensuring routine data collection, reporting, analysis, and utilization for decision-making. Standard indicator sets should include service delivery indicators such as numbers receiving preventive services, treatments provided, and referrals completed, as well as health outcome indicators such as caries prevalence in sentinel populations and oral cancer detection rates. Data collection tools including patient registers, reporting forms, and electronic systems should accommodate oral health data. Training data collectors and health information officers on oral health indicators and data quality requirements ensures accurate reporting. Regular data analysis and feedback to service delivery facilities and policy levels supports evidence-informed management and accountability.

National oral health surveys should be conducted regularly using standardized methodologies enabling monitoring of population oral health status, service coverage, and trends over time. The WHO Oral Health Surveys Basic Methods provides internationally standardized protocols ensuring comparability. Survey periodicity of every 5-10 years balances information needs with resource requirements. Survey results should be analyzed, published, and disseminated to policymakers, practitioners, and the public, informing policy development and program design. Capacity for survey planning, implementation, and analysis should be developed in national institutions, reducing dependence on external technical assistance.

Implementation research addressing integration effectiveness, facilitators and barriers, optimal delivery models, and strategies for scaling successful approaches should be prioritized and funded. Research questions should be policy-relevant, addressing decisions facing implementers and policymakers. Study designs should emphasize pragmatic approaches generating actionable findings within reasonable timeframes. Partnerships between researchers, policymakers, and implementers from project inception ensure relevance and facilitate uptake. Research capacity strengthening in African institutions builds sustainable capability for generating contextual evidence. Research funding mechanisms should explicitly prioritize oral health systems and implementation research, currently underfunded relative to basic biomedical research.

Economic research quantifying the burden of oral disease, cost-effectiveness of interventions, and economic impacts of alternative integration models should be expanded. Burden of disease studies should capture both direct health system costs and indirect costs including productivity losses, household expenditures, and impacts on education and development. Cost-effectiveness analyses should compare alternative prevention and treatment strategies, informing resource allocation priorities. Economic evaluations of integration models compared to traditional delivery approaches can demonstrate value propositions supporting policy reform. Capacity for health economics research specific to oral health should be developed through training, mentorship, and collaborative research networks.

Knowledge translation mechanisms connecting research evidence to policy and practice should be strengthened, including policy briefs, stakeholder dialogues, technical advisory committees, and evidence synthesis platforms. Research findings should be packaged in accessible formats addressing policymaker information needs and time constraints. Regular policy dialogues bringing together researchers, policymakers, and practitioners create spaces for evidence presentation, interpretation, and application to current decisions. Technical advisory committees incorporating research evidence in their deliberations bridge research-policy gaps. Online platforms aggregating and synthesizing evidence make research more accessible and usable by busy decision-makers.

Community Engagement and Demand Creation

Health education and promotion campaigns should build community awareness of oral health importance, preventive measures, and available services, generating informed demand for

integrated oral health care. Campaign messages should emphasize the connections between oral health and overall health, the preventability of oral diseases, and the benefits of early intervention. Multiple communication channels including mass media, community events, religious organizations, schools, and social media enable broad reach across diverse populations. Messages should be culturally appropriate, developed with community input, and tested before broad dissemination. Campaigns should be sustained rather than one-time efforts, reinforcing messages over time.

Community participation mechanisms including health facility committees, community health forums, and patient advisory groups should incorporate oral health on their agendas, enabling community voice in service planning, monitoring, and accountability. Communities should be engaged in identifying oral health priorities, barriers to care, and locally acceptable solutions. Participatory approaches including community dialogues, participatory appraisals, and community scorecards enable structured community input and empowerment. Community representatives serving on facility committees and district health boards can advocate for oral health service improvements and resource allocation. Community monitoring of service delivery including availability of providers, commodities, and respectful care enhances accountability.

School health committees and parent-teacher associations should be engaged as partners in oral health promotion and school-based service delivery, creating supportive environments for children's oral health. Trained teachers delivering oral health education require ongoing support, resources, and recognition. Parent engagement through meetings, newsletters, and school events reinforces healthy behaviors at home. School policies regarding food and beverages available at schools, tooth-brushing facilities, and time allocation for health education create enabling environments. Schools should facilitate access for oral health service providers conducting screenings and delivering preventive interventions.

Community health workers and volunteers should be trained and supported as oral health promoters and navigators, extending health system reach into communities and supporting patients accessing services. Training should address oral health knowledge, health promotion skills, and navigation competencies including appointment scheduling, transportation assistance, and referral follow-up support. Community health workers require supervision, supplies including educational materials, and recognition for their contributions. Integration of oral health into existing community health worker programs leverages established systems and avoids creating parallel structures. Performance monitoring and quality support ensure community health workers deliver accurate information and effective support.

Stigma reduction interventions should address shame and embarrassment associated with oral conditions, encouraging timely care-seeking and social inclusion of affected individuals. Interventions may include public education challenging stigmatizing attitudes, peer support groups for individuals affected by oral conditions, storytelling and testimonials humanizing experiences, and training healthcare providers in respectful, non-judgmental care delivery. Particular attention should be given to highly stigmatized conditions including noma, oral cancer with facial disfigurement, and severe tooth loss. Community leaders including

religious leaders, traditional authorities, and respected public figures can model non-stigmatizing attitudes and advocate for inclusive communities.

Partnership and Collaboration Strategies

Development partners supporting African countries should align their oral health investments with national priorities and health system strengthening approaches rather than creating parallel vertical programs. Partner support should strengthen government systems and capacities rather than substituting for government functions. Technical assistance should build local capacity through mentoring and skills transfer. Procurement through partner-supported programs should utilize country supply chain systems where feasible, strengthening rather than bypassing them. Data generated through partner-supported programs should be integrated into national health information systems and shared with government for planning and monitoring.

Professional associations including dental associations, oral health professional councils, and public health associations should actively support integration through advocacy, professional development programs, quality standard-setting, and engagement in policy development. Associations should move beyond guild interests focused narrowly on professional prerogatives to embrace broader missions supporting population oral health improvement and health equity. Advocacy campaigns should mobilize members, engage media, and provide technical input to policy processes. Professional development programs should prepare members for integrated practice models and primary healthcare environments. Quality standards and ethical guidelines should support excellent, patient-centered care consistent with integration principles.

Academic institutions including dental schools, schools of public health, and research institutes should reorient education programs toward primary healthcare competencies and conduct research addressing integration implementation questions. Curriculum reforms should emphasize prevention, public health, interprofessional collaboration, and primary care skills. Clinical training should occur substantially in community and primary healthcare settings. Research agendas should prioritize implementation questions, health systems challenges, and policy-relevant studies. Academic institutions should partner with health systems in co-designing education programs, joint research, and technical support for program implementation. Incentive structures including promotion and tenure criteria should recognize community engagement and policy-relevant research alongside traditional academic productivity measures.

South-South cooperation among African countries should be systematically organized through regional learning networks, technical assistance exchanges, and collaborative training programs. Countries with successful integration experiences should be supported to share expertise and mentor countries initiating integration efforts. Regional training programs and centers of excellence can provide specialized training and continuing professional development, achieving economies of scale. Collaborative research networks enable multi-country studies generating robust evidence and building regional research capacity. Regional

professional associations and communities of practice provide platforms for knowledge exchange and peer learning. Continental and regional organizations should facilitate and resource these South-South cooperation mechanisms.

Global health initiatives and vertical disease programs should be leveraged as platforms for oral health integration, incorporating oral health into HIV, tuberculosis, maternal-child health, and non-communicable disease programs. Common risk factor approaches enable integrated prevention strategies across diseases sharing behavioral and social determinants. Clinical integration opportunities include oral health screening in HIV clinics given elevated oral disease risk among people living with HIV, oral health during antenatal care given impacts on pregnancy outcomes, and oral health in NCD clinics given links between oral disease and diabetes and cardiovascular conditions. Integration with vertical programs requires deliberate planning, cross-program coordination, and attention to avoiding additional burdens on already stretched services.

Table 1: Oral Disease Burden in Selected African Countries

Country	Dental Caries Prevalence (Children 12 years)	DMFT Score (12 years)	Severe Periodontitis (Adults 35-44)	Dentist-to-Population Ratio	Data Source Year
Nigeria	45-58%	1.2-2.8	18%	1:180,000	2018-2020
Kenya	38-52%	1.5-2.1	15%	1:120,000	2017-2019
Tanzania	42-55%	1.8-3.2	19%	1:140,000	2016-2018
Ghana	35-48%	1.3-2.5	12%	1:90,000	2019-2021
Ethiopia	48-62%	2.0-3.5	22%	1:250,000	2017-2019
South Africa	40-50%	1.6-2.3	14%	1:15,000	2018-2020
Rwanda	44-56%	1.7-2.9	16%	1:95,000	2018-2020

Note: Data compiled from national oral health surveys, WHO Global Oral Health Data Bank, and published epidemiological studies. Prevalence ranges reflect regional variations within countries.

Table 2: Integration Models and Key Features

Integration Model	Primary Features	Target Population	Main Providers	Examples
Mid-level Provider Model	Dental therapists provide basic services in primary facilities	General population, rural emphasis	Dental therapists, oral hygienists	Tanzania, Zambia, Malawi
School-Based Model	Preventive services and education delivered in schools	School-age children	Dental health educators, visiting dental workers	Ghana, Kenya, Nigeria
Community Health Worker Model	Oral health promotion integrated into CHW activities	Community-level populations	Community health workers, volunteers	Ethiopia, Rwanda, Uganda
Insurance Integration Model	Oral health services included in health insurance benefits	Insured populations	Varied providers paid through insurance	Rwanda, Ghana, Kenya
Comprehensive PHC Package	Full range of oral services at primary facilities	General population accessing PHC	Multi-disciplinary primary care teams	South Africa, Botswana
Mobile/Outreach Model	Periodic visits to underserved areas with portable equipment	Rural and remote populations	Mobile dental teams	Multiple countries

Source: Compiled from country program documentation and published case studies.

Conclusion

The integration of oral health services into primary healthcare systems represents an essential yet underachieved priority for African countries pursuing universal health coverage and improved population health outcomes. This paper has examined the substantial burden of oral diseases across Africa, the challenges impeding integration efforts, the opportunities and enabling factors supporting progress, and diverse country experiences demonstrating feasible pathways forward. The evidence and analysis presented lead to several overarching conclusions that should inform policy and practice going forward.

First, oral health can no longer be treated as a peripheral concern separate from mainstream health systems and priorities. The epidemiological reality of high oral disease prevalence and burden, the demonstrated connections between oral health and overall health outcomes, the

shared risk factors with other non-communicable diseases, and the economic costs of untreated oral disease all compel recognition of oral health as integral to comprehensive health system strengthening. African countries' commitments to achieving universal health coverage and the Sustainable Development Goals cannot be fulfilled while oral health remains neglected and populations lack access to essential oral health services. The integration of oral health into primary healthcare systems is not merely a technical health systems issue but a matter of health equity and human rights.

Second, successful integration requires addressing multiple interconnected challenges operating at policy, resource, organizational, and cultural levels. No single intervention will suffice; rather, comprehensive strategies addressing policy frameworks, workforce development, financing, service delivery models, information systems, and community engagement are necessary. The systems perspective emphasizes that strengthening one component while neglecting others will produce limited progress. Policymakers and program managers must resist the temptation to seek simple solutions and instead embrace the complexity of health systems change, investing in multi-faceted approaches sustained over time.

Third, diverse pathways exist for advancing integration, with optimal approaches varying according to country contexts, health system structures, resource availability, and societal priorities. The case studies and examples examined in this paper demonstrate that Tanzania's emphasis on dental therapists, Ghana's school-based programs, Rwanda's insurance inclusion, Ethiopia's community health worker approaches, and South Africa's comprehensive primary care packages all represent valid strategies adapted to different circumstances. Rather than seeking a single blueprint for integration, countries should draw lessons from diverse experiences, adapt proven approaches to their contexts, and pursue contextually appropriate innovation. Regional and South-South learning mechanisms can facilitate knowledge exchange while respecting contextual diversity.

Fourth, significant opportunities exist for accelerating integration despite persistent challenges. Favorable policy developments including UHC momentum, primary healthcare revitalization, and non-communicable disease platforms create enabling environments for oral health integration. Innovations in service delivery, workforce models, technology applications, and financing mechanisms offer practical tools for expanding access and improving outcomes. Growing political commitment, strengthening civil society engagement, and expanding evidence bases provide foundations for advocacy and action. These opportunities should be strategically seized through coordinated efforts by governments, development partners, professional associations, academic institutions, and communities.

Fifth, oral health integration is not only a health system imperative but also represents a valuable entry point for broader health system strengthening. The process of integrating oral health services necessarily addresses fundamental health system building blocks including governance, workforce, financing, service delivery, commodities, and information systems. Innovations developed for oral health integration, including task-shifting models, community-based delivery approaches, and referral system strengthening, can benefit other

health services. The common risk factor approach linking oral disease prevention with broader non-communicable disease prevention demonstrates value beyond oral health. Thus, investments in oral health integration yield multiple returns across the health system.

The path forward requires sustained commitment from multiple stakeholders operating at different levels. National governments must provide policy leadership, resource allocation, and accountability for integration implementation. Health system managers and administrators must translate policies into operational systems, supporting providers delivering integrated services. Oral health professionals must embrace new roles in primary healthcare teams and community settings, adapting practice models from traditional dental clinic approaches. Development partners must align support with national priorities, build government capacity, and provide technical and financial resources. Academic institutions must reform education programs, conduct relevant research, and engage with health systems as partners. Communities must participate in planning, demand quality services, and support health-promoting environments.

Importantly, progress toward integration need not await ideal conditions or complete resource availability. The principle of progressive realization recognizes that achieving comprehensive integrated oral health services represents a long-term goal pursued through incremental steps appropriate to current capacities and opportunities. Countries can begin with high-impact, low-cost interventions such as incorporating oral health education into community health worker activities, adding fluoride varnish application to child health contacts, and training primary healthcare nurses in oral screening and referral. As systems strengthen and resources increase, the scope and sophistication of integrated services can progressively expand. The key is initiating action now, learning from implementation, making iterative improvements, and maintaining commitment through challenges.

The vision of integrated oral health services accessible to all African populations through primary healthcare platforms is ambitious yet achievable. It requires transforming health systems, changing professional practice cultures, shifting resource allocation patterns, and altering societal perceptions of oral health. These transformations will not occur spontaneously or rapidly, but through deliberate strategies, persistent advocacy, strategic investments, and sustained implementation efforts over years and decades. The foundations exist in the form of policy commitments, proven delivery models, trained professionals, and growing awareness. What is required now is translating commitment into action, scaling successful innovations, learning from implementation experience, and maintaining focus on the ultimate goal of oral health equity.

As African countries advance toward this vision, several principles should guide implementation efforts. Integration approaches must be equity-oriented, prioritizing underserved populations and reducing disparities in access and outcomes. Services must be people-centered, responsive to community needs and preferences, delivered respectfully, and coordinated across providers and over time. Integration must be evidence-informed, drawing on research while recognizing contextual factors requiring adaptation. Implementation must be pragmatic, acknowledging resource constraints while pursuing maximum impact within

limitations. Approaches must be sustainable, building government systems and local capacity rather than depending indefinitely on external support. Finally, progress must be monitored and measured, using data to guide improvement and demonstrate accountability.

The integration of oral health into primary healthcare systems in African countries represents both a significant challenge and an extraordinary opportunity. It is a challenge because it requires fundamental changes in policies, systems, resources, and practices at a time when health systems face numerous competing demands and resource constraints. It is an opportunity because the potential impact on population health, equity, and development is substantial, and proven approaches exist that can be adapted and scaled. The moment is opportune, with global attention to universal health coverage, regional commitment to health system strengthening, growing evidence supporting integration, and examples of country success providing inspiration and guidance.

This paper has sought to contribute to the knowledge base and policy dialogue supporting oral health integration in Africa. By systematically examining challenges, opportunities, and country experiences, synthesizing evidence, and offering practical recommendations, it aims to inform and empower stakeholders working toward this goal. The journey toward integrated, equitable oral health services will be long and complex, but it is a journey that must be undertaken. Too many African children, women, and men suffer preventable oral diseases, experience unnecessary pain and disability, and face barriers to accessing needed care. Achieving the vision of oral health for all through integrated primary healthcare systems is not merely a technical health goal but a moral imperative rooted in commitments to human dignity, health equity, and social justice. The time for action is now.

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