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An oral health module for use in noncommunicable disease risk factor surveys

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Abstract

The World Health Organization (WHO) Global Oral Health Action Plan 2023–2030 emphasizes the need to strengthen oral health information systems, including surveillance, to support public health action. Objective 5 of the Global Oral Health Action Plan 2023–2030 calls for reliable, timely and policy-relevant data to inform decision-making, promote accountability and monitor progress, in other words, surveillance of oral diseases. However, most countries face challenges in identifying and applying practical tools to generate such population-level data. Until recently, the WHO STEPwise approach to noncommunicable disease risk factor surveillance (STEPS) included an oral health module that relied on self-reported data on perceived oral health and oral health-seeking behaviour. However, this module is outdated. In response to growing global demand and policy needs, the new WHO STEPS oral health module updated the self-reported questionnaire and includes a clinical assessment component that can be done by oral or nonoral health workers after a short training. This paper presents the rationale, development process, structure and policy implications of the updated module. The paper provides an outline of the updated module and evidence to support this new approach as a practical, scalable and aligned solution to one of the most persistent gaps in noncommunicable disease surveillance. As countries move towards universal health coverage and integration of oral health into broader noncommunicable disease strategies, the updated WHO STEPS oral health module is a timely and necessary improvement in surveillance of noncommunicable diseases and their risk factors.

Oral disease surveillance

Oral diseases and conditions (herein collectively referred to as oral diseases) are the most prevalent noncommunicable disease, affecting an estimated 3.7 billion people worldwide.[1] Despite being largely preventable, this high burden of oral diseases has continued to rise over the past 30 years, with prevalence rates indicating widespread social and economic inequalities.[2] At an individual level, untreated oral disease may cause pain, reduced quality of life, lost school days, disruption to family life, decreased work productivity and, in some cases, can lead to severe complications and death.[3] Yet the availability of surveillance data on oral diseases is limited.

In recent years, integration of oral health into the broader noncommunicable disease agenda has gained momentum, with growing recognition that oral diseases are a major public health issue and that comprehensive, people-centred care primary health care is the pathway to achieving universal health coverage (UHC). Within primary care, task-shifting and interprofessional teams are being used to expand access to oral care, for example by training nurses or community health workers to deliver essential oral health interventions, such as topical fluoride application. This development underscores the need to embed essential oral health services into prevention, care, surveillance and financing mechanisms across the life course to advance equity and population health.

The 2021 World Health Assembly Resolution on oral health (WHA74.5) mandated the development and adoption by World Health Organization (WHO) Member States of the first *Global strategy and action plan on oral health 2023–2030*.[4] Together, these strategic documents define a renewed global oral health agenda built on six strategic objectives to advance affordable and accessible oral health care within the vision of UHC (Box 1). Objective 5 of Global Oral Health Action Plan 2023–2030[4] prioritizes effective surveillance systems to monitor oral diseases, service access and equity, inform policy, optimize resource allocation and track progress and outcomes over time. The actions focus on integrating oral health data with national level noncommunicable disease surveillance and embracing digital technologies to support timely and accurate data collection.

Surveillance of oral diseases at both facility-based and population-based levels, is underdeveloped in most countries. Typically, population data on oral diseases are gathered through national oral health surveys which are costly, conducted infrequently, absent in some countries, or insufficiently representative of the entire population. Previous WHO guidance aimed to standardize the approach to national oral health surveys through the *Oral health surveys: basic methods, 5th edition*, but the suitability of such surveys for policy development and outcome evaluation is limited.[5] These surveys typically focus on narrow age groups and rely on technical epidemiological measures, without a rigorous sampling method to ensure population representativeness. For most countries, the surveys are unaffordable and isolated from other public health surveillance programmes; they serve mainly research purposes rather than integrated surveillance and monitoring.

Much of the data currently used to estimate the global burden of oral diseases, particularly from the Global Burden of Disease (GBD) study, relies on the identification of high-quality primary research studies on oral diseases burden and advanced data modelling.[6] Therefore, as GBD estimates will inevitably depend on primary sources, developing more efficient approaches to conducting primary studies based on representative population samples would help strengthen the data quality of comparable country data on oral diseases globally.[7] However, GBD data alone may be insufficient for national planning and lack the local specificity needed to guide implementation strategies or assess policy impact.

Recognizing the need for improvement, WHO initiated a comprehensive revision of the oral health module of the WHO STEPwise approach to noncommunicable disease risk factor surveillance (STEPS). The new version contains a shorter and more focused questionnaire and includes a brief clinical assessment component that trained oral or nonoral

health workers can conduct. This paper introduces the updated module, discusses its development process, details its structure and explores its potential contribution to national and global monitoring of oral diseases as part of noncommunicable disease surveillance.

Rationale for the update

WHO STEPS is a standardized method for collecting data on behavioural and biological risk factors of noncommunicable diseases. STEPS adopts probabilistic sampling to ensure national representativeness and weighted data. This sampling is achieved by a multistage cluster design, with the households surveyed being randomly selected from within each cluster. The STEPS survey is designed for use with people aged 18−69 years and gathers essential information through questionnaires, physical measurements and biochemical assessments. The core module is supported by optional modules that countries can include based on their specific public health priorities and capacity. These optional modules may also include questionnaires and physical measurements. The approach enables comparability across populations and time, while allowing customization to meet national needs.[8] Even when collected at multiyear intervals, STEPS surveys provide essential anchor points for trend analysis, benchmarking and evaluation of policy impact.

From 2000 to 2023, the previous STEPS optional module on oral health was included by 46 of the 136 countries that completed the STEPS survey. However, this earlier version had limitations. The module relied solely on self-reported data on perceived oral health and oral health-care-seeking behaviour, provided limited policy-relevant information and lacked alignment with global indicators. These limitations made the module less useful for countries and restricted its analytical use.

WHO recognized that updating the oral health module within the STEPS framework offered the most practical opportunity to improve the collection of population-level data on oral diseases. Therefore, the process to revise the STEPS oral health module was undertaken with three strategic goals for direct policy relevance: (i) to focus the questionnaire on core oral health and access to care indicators; (ii) to add a clinical component that would be feasible in household survey settings; and (iii) to align with both the monitoring framework of the Global Oral Health Action Plan 2023–2030 and the requirements of the GBD study. This approach reflects a shift from research-oriented oral health surveys towards policy-oriented surveillance tools designed for routine integration within national health information systems.

Development of the updated module

The development of the updated module followed a rigorous, consultative process. The WHO Oral Health Programme and the Surveillance, Monitoring and Reporting Unit both within the WHO Noncommunicable Diseases Department jointly undertook a preliminary review of the existing module.

In November 2023, WHO convened an expert workshop in London, United Kingdom of Great Britain and Northern Ireland, with in-person and online attendance and hosted by the WHO Collaborating Centre for Oral Health Inequalities and Public Health at University College London. The workshop brought together oral epidemiologists, surveillance experts, GBD collaborators, and staff from WHO headquarters and regional offices. The expert panel reviewed draft proposals for both the updated questionnaire and the new clinical component. Participants discussed the selection of indicators, methodological considerations and practical aspects of implementation.[9]

Consensus was reached on several key elements. First, the questionnaire would be reduced from 14 questions to five questions: self-rated oral health; the functional and psychosocial impacts of oral disease; recent patterns of care-seeking behaviour; barriers to access; and use of fluoride toothpaste. Second, the question on the use of fluoride toothpaste would be strengthened through a showcard-based verification process where respondents would be presented with a selection of locally available toothpaste brands to help identify which one they use. Fluoride toothpaste is widely available and its use is well suited to data collection through population-based surveys. By contrast, water fluoridation (another way to deliver fluoride) is typically monitored through administrative and regulatory data systems rather than population-based surveys. Accordingly, data on fluoridation coverage and concentration are obtained directly from national authorities and interpreted alongside STEPS findings. Third, the clinical assessment would focus on four indicators: tooth count; untreated caries (using the stop-after-first-encounter approach);[10–12] caries-related complications (assessed using a simplified pulp involvement, ulceration, fistula or abscess index);[13,14] and identification of any other soft tissue lesion of the lip or oral cavity. All clinical assessments would rely on visual inspection, allowing data collectors who are not oral health workers to conduct these assessments safely and effectively in field settings, as part of the standard STEPS training procedures.

During the workshop discussion, application of digital technologies using a portable intraoral camera to record videos or photographs was explored. However, the group could not

identify a scalable tool and concluded that further research was needed on the reliability and affordability of emerging tools in diagnosing oral diseases for surveillance purposes.[9] The outcomes of the workshop are reported elsewhere.[9]

Updated module

The updated WHO STEPS oral health module consists of two components: a structured questionnaire and a clinical assessment (Table 1 and Table 2).[8]

The questionnaire includes five questions that assess the respondent's perceived oral health,[15–17] experiences of the impact of oral health issues on daily functioning (such as pain and difficulty eating),[18,19] and the use of health-care services when experiencing an oral health problem including the reason(s) for not accessing care.[20–22] The final question asks about toothpaste and presents showcards of locally available toothpaste brands. The system has coded which of these toothpastes contain fluoride and which ones do not to enable analysis on the use of fluoride toothpaste, which is known to be effective at a concentration of 1000–1500 parts per million (ppm).[8,23,24] The classification of fluoride toothpaste is based on information provided on the packaging, supported by the knowledge of national oral health leaders within the STEPS implementation team. This approach reflects real-world regulatory environments, where packaging serves as the primary source of consumer information, and prioritizes feasibility and external validity within population-based surveys. This approach is a means of monitoring access to and use of fluoridated toothpaste in a scalable way across countries, although some non-differential exposure misclassification may occur.

The clinical component has a structured sequence. First, the examiner counts the number of teeth present and records whether the participant has zero, 1–9, 10–19, or 20 or more teeth. Next, the examiner systematically checks each tooth for the presence of cavitated carious lesions using the stop-after-first-encounter approach.[10–12] The examination is stopped after the first carious lesion is detected and recorded. If caries is detected, restarting the cycle from the beginning, the examiner then assesses each tooth for any signs of pulp involvement, ulceration, fistula, or abscess visible in the mouth, again using the stop-after-first-encounter approach: if the examiner detects a sign of pulp involvement, ulceration, fistula, or abscess, the examination is stopped and the presence of severe caries is recorded.[10–14] Finally, the examiner assesses the presence of severe pain, swelling, damage or unusual lesions in or around the mouth based on a visual inspection of the soft tissues in and around the mouth and records the finding.

Implementation of the module

Following consensus on the content and structure of the updated WHO STEPS oral health module, the module then underwent an internal WHO review and field testing process. The results of the field tests were used to refine both the questionnaire and clinical assessment protocols before finalization. Implementation of the questionnaire section remained the same as with the previous STEPS oral health module. The clinical component however is a new addition designed to be implemented by trained oral and nonoral health workers in household settings. WHO provides training on the oral health module as part of the STEPS comprehensive training package for field data collectors. The training emphasizes visual recognition of clinical signs, appropriate use of light sources and respectful interaction with participants, including obtaining informed consent and providing referral information as needed. As the oral health module is implemented as part of a broader STEPS survey, sampling, data quality checks and other logistical aspects are managed by the in-country team responsible for planning the survey with the support of the WHO STEPS team.[8]

Since the updated oral health module was first released for field testing in 2024, it has been implemented as part of STEPS surveys in eight countries. Current engagement and feedback from WHO Member States indicates growing interest in adopting the updated oral health module.

Advances and innovations

The updated WHO STEPS oral health module represents a methodological innovation, shifting from episodic, research-driven surveys towards continuous, integrated surveillance within broader noncommunicable disease monitoring systems. The new oral health module offers an updated self-reported questionnaire and a practical clinical assessment that can be conducted by oral and nonoral health workers with training. The module represents an important step forward in expanding surveillance coverage, especially in resource-constrained settings, while substantially reducing the cost and logistical complexity associated with isolated and full-scale national oral health surveys.

Furthermore, the module's compatibility with the broader STEPS survey structure provides opportunities for integrated data analysis. By connecting oral health data with other STEPS modules, such as diabetes, hypertension, nutrition and tobacco use, countries can better understand common risk factors and explore the interrelationships between oral health and general health. This data-driven approach enhances the rationale for coordinated, cross-sectoral policy development, planning and surveillance to improve population health.

Another important innovation is the module's alignment with indicators used in the GBD study. By adopting compatible definitions and streamlined assessment protocols, such as the stop-after-first-encounter method for untreated caries and binary pulp involvement, ulceration, fistula, or abscess scoring,[10–14] the data generated through this module can directly contribute to the GBD estimation process on dental caries. The alignment is further enhanced by the adoption of probabilistic sampling that allows national representation. Enabling countries to generate primary data that can be integrated into global disease burden estimates enhances both the visibility and policy utility of national survey efforts in shaping international oral health metrics.

Beyond the STEPS framework

The WHO STEPS method with its adult-focused surveillance of 18–69-year-olds provides substantial policy value. Adults carry the cumulative burden of oral diseases, including untreated caries and tooth loss, making this age group central to estimating population needs. In addition, adult data are directly relevant for health-system planning, including service delivery, financing and integration within UHC frameworks. The use of a standardized STEPS platform further enables comparability across countries and over time, which is not currently achievable through most school-based surveys.

However, population-level data on oral diseases for people outside this age range are not assessed. While countries may like to expand the survey to younger or older age groups, the current module does not offer guidance or standardization for these applications. Future adaptations of the STEPS tool may revisit the age range in line with evolving needs and experience from early implementation. However, it is important to note that countries are free to adapt core elements of the STEPS oral health module through the inclusion of additional indicators aligned with their national noncommunicable disease surveillance. Similarly, geographically large countries with diverse population groups may benefit from subnational data for policy design and evaluation.

Limitations

While the updated WHO STEPS oral health module introduces advances in feasibility and policy alignment, there are some limitations. The module is designed to generate consistent and policy-relevant population-level estimates under real-world conditions, rather than to achieve diagnostic precision at the individual level.

The clinical component focuses exclusively on dental caries as the most prevalent oral disease globally.[2,6] This focus ensures alignment with disease burden estimates and global monitoring frameworks but also reflects a compromise. At present, no validated, simple and reliable method exists for assessing periodontal disease that can be performed without periodontal probing,[9,25] although work to develop such a method is ongoing.[26,27] Such assessments would require trained oral health workers and specialized instruments, substantially increasing the cost, time required and complexity of implementing the survey. This additional assessment would undermine the module's goal of use in routine household surveys with the potential for data collection by nonoral health workers.

A second limitation relates to the simplified diagnostic approach adopted for caries and its consequences. The module uses binary scoring through the stop-after-first-encounter method[10–12] for caries detection and a simplified pulp involvement, ulceration, fistula, or abscess index to identify severe disease.[13,14] These approaches do not capture the full range of clinical details typically gathered using indices such as decayed, missing, and filled teeth or full pulp involvement, ulceration, fistula, or abscess scoring system.[13,14] The visual-only examination excludes detection of early-stage carious lesions and may also reduce detection sensitivity of subtle soft-tissue or mucosal conditions, which may have otherwise been detected with the use of a dental probe. This streamlined approach reflects another compromise of large epidemiological surveys where a simplified method is preferred in the interest of feasibility.

These limitations are trade-offs that prioritize feasibility, affordability, reliability and integration. The updated module is a practical alternative to national oral health surveys using the *Oral health surveys: basic methods, 5th edition*[5] to collect policy-relevant oral health data. Further work is needed to evaluate the module's performance in various country contexts and settings. Particular emphasis should be given to assessing the diagnostic sensitivity for estimating caries prevalence, evaluating consistency across data collectors with different health-worker profiles and conducting implementation research.

Conclusion

The updated WHO STEPS oral health module is an important step in the global effort to strengthen surveillance of noncommunicable diseases and associated risk factors. Additionally, the module contributes to improved evidence-informed decision-making towards the Global Oral Health Action Plan 2023–2030's vision of UHC for oral health. By revising and updating the questionnaire content to make it more policy-relevant and

integrating a practical clinical assessment into a standardized household survey framework, the module has the potential to bridge a long-standing gap in surveillance of oral diseases. These changes equip national health information systems with the means to strengthen noncommunicable disease surveillance in a practical, integrated and equity-sensitive way. The updated module provides a practical tool for countries to generate credible and actionable data. The data generated through the module are intended to inform national decision-making processes led by government health agencies, including chief dental officers, noncommunicable disease programme managers and planners responsible for UHC, who are accountable for translating surveillance data and evidence into policy, planning and resource allocation decisions.

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Competing interests:

None declared.

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Box 1. Strategic objectives (and purpose) of the Global Oral Health Action Plan 2023–2030

1. Oral health governance (to improve political and resource commitment to oral health, strengthen leadership and create win–win partnerships within and outside the health sector).
2. Oral health promotion and oral disease prevention (to enable all people to achieve the best possible oral health and address the social and commercial determinants and risk factors of oral diseases and conditions).
3. Health workforce (to develop innovative workforce models and revise and expand competency-based education to respond to population oral health needs).
4. Oral health care (to integrate essential oral health care and ensure related financial protection and essential supplies in primary health care).
5. Oral health information systems (to enhance surveillance and health information systems to provide timely and relevant feedback on oral health to decision-makers for evidence-based policy-making).
6. Oral health research agendas (to create and continuously update context- and needs-specific research focused on the public health aspects of oral health).

Source: World Health Organization; 2024.[4]

Table 1. **WHO STEPwise approach to noncommunicable disease risk factor surveillance, oral health module questionnaire**

Question	Theme	Purpose and rationale
O1. How do you rate your oral health (conditions of teeth, gums and mouth) right now?	Self-rated oral health	• Provides a validated global item correlated with objective oral health status and quality of life.[15–17] • Is simple, widely comparable and in alignment with self-rated health measures in other sectors
O2. During the past twelve months, did you experience one or more of the following issues because of your teeth, gums, or mouth? Please mark all that apply: pain; difficulty eating food; difficulty speaking; avoided smiling; difficulty doing other usual activities.	Functional and psychosocial impacts	• Reflects oral health-related quality of life, i.e. the impact of oral conditions on daily life of people.[18,19] • Has direct relevance to economic productivity, social well-being and daily functioning
O3. During the past twelve months, have you used health care services because of a problem with your teeth, gums or mouth?	Use of health-care services	• Is aligned with universal health coverage indicators and access to essential care.[20–22] • Indicates structural and system access to health-care services. • Enables monitoring of recent service use
O4. What were the reasons for not using health care services? Please mark all that apply: no service available; too expensive; service too far away; poor service quality; fear (afraid of dental care); no appointment available; relief from self-medication	Barriers to care	• Explores access barriers and equity and systemic challenges[20–22] • Helps identify actionable problems in service delivery and use
O5. Please indicate which of the toothpastes shown do you use to clean your teeth? (showcard method to verify fluoride content)	Fluoride use	• Links self-report with visual verification of fluoride toothpaste use.[8,23,24] • Is practical for field use

WHO: World Health Organization.

Note: the questions are verbatim from the survey module.

Source: WHO, 2026.[8]

Table 2. **WHO STEPwise approach to noncommunicable disease risk factor surveillance, oral health module clinical assessment**

Clinical component	Description	Rationale and alignment
O6. Tooth count	Examiner visually counts and categorizes natural teeth: 0, 1–9, 10–19 or ≥ 20	• Is aligned with WHO and GBD metrics on tooth loss and edentulism (Global Oral Health Action Plan 2023–2030 complementary indicator B7).[4] • Functional dentition is a core component of oral health. • Is simple, meaningful and related to quality of life and nutrition
O7. Presence of untreated dental caries	Using Stop After First Encounter, examiner checks for visible cavitated lesions and stops when one lesion is identified	• Provides prevalence estimate for untreated caries (Global Oral Health Action Plan 2023–2030 complementary indicators B4/B5).[4] • Reduces examination time. • Is GBD-aligned and feasible for field use without probing or complex diagnosis
O8. Presence of severe dental caries	If caries is found, examiner assesses whether it has progressed to pulp involvement, ulceration, fistula or abscess. Stops after first sign	• Identifies advanced cases of decay and dental infection. • Uses pulp involvement, ulceration, fistula or abscess which is recognized in WHO global oral health monitoring as a key indicator for disease severity (Global Oral Health Action Plan 2023–2030 complementary indicator B3)[4]
O9. Presence of severe pain, swelling, damage or unusual lesion in or around the mouth	Examiner assesses the presence of severe pain, swelling, damage or unusual lesion in or around the mouth based on a visual inspection of the soft tissues in and around the mouth, and the declaration of the participant	• Identifies any other soft tissue lesions that may require referral for further investigation

GBD: Global Burden of Disease; WHO: World Health Organization.

Source: WHO, 2026.[8]