



ORAL HEALTH SURVEILLANCE

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Oral health surveillance

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ABSTRACT

Oral health surveillance is an ongoing process involving the collection, analysis, and interpretation of data to produce information for the prevention and control of oral diseases. The data obtained from surveillance are used basically for public health action – to prevent or control diseases. To review available literature on oral health surveillance, an electronic search for relevant literature was conducted. Database searches were carried out using the terms, oral health surveillance, surveillance, indicators of oral health, challenges of oral health surveillance, and sources of oral health indicators. This review is focused on discussing published information concerning the concept, objectives, indicators, sources, elements, and challenges of oral health surveillance. 39 papers published between 2003 and 2021 were selected, assessed, and included in this review. The review revealed that oral health surveillance is integral to the prevention of oral diseases and improving quality of life. Therefore, oral health policies should involve the integration of oral health surveillance into national and community health programmes, and oral health should be promoted as an effective, efficient, and essential part of policies aimed at promoting the overall wellbeing and general health of an individual.

Keywords: *Indicators, Oral diseases, Oral health, Surveillance*

INTRODUCTION

Oral health is essential to general health and the overall well-being of an individual (Agwaral & Gupta, 2020; Inter-Tribal Council of Arizona, 2020). Sound dental health contributes significantly to physical, mental, and social wellbeing, and as well creates a foundation for lifelong health (Islas-Granillo et al., 2018; Tran et al., 2018; Toronto Public Health [TPH], 2016). Poor oral health emanating from consumption of refined carbohydrates, tobacco use, and inadequate oral hygiene has been associated with non-communicable diseases (such as diabetes mellitus and cardiovascular disease) and can lead to tooth decay, orofacial pain, periodontal diseases, and oral cancer (Duangthip & Chu, 2020; Office of Disease Prevention and Health Promotion, n.d.; Parsons et al., 2018; Shetty et al., 2020; World Health Organization Regional Office

for Africa [WHO AFRO], 2016). Oral disease constitutes a major public health problem with the Global Burden of Diseases Study (2017) estimating that oral diseases affect 3.5 billion people worldwide (Akpocha, 2020; Hugo et al., 2021; World Health Organization [WHO], 2020).

Oral health surveillance is an ongoing process that involves the collection, analysis, and interpretation of data to extract information on the prevention and control of oral diseases (Miyazaki et al., 2017). The data obtained from surveillance are used basically for public health action – to prevent or control diseases (Council of State & Territorial Epidemiologists [CSTE], 2013). Oral health surveillance aims to provide a steady source of information that is updated, reliable, and valid for use in developing, implementing, and evaluating programmes geared towards improving oral health (Bourgeois & Llodra, 2003;

Michigan Department of Community Health [MDCH], 2013).

Surveillance activities measure quantifiable outcomes referred to as indicators which are employed to monitor the morbidity and mortality rates of diseases in the population including risk factors like alcohol consumption, tobacco use, nutritional status, smoking, poor oral hygiene, stress, and other risky behaviours (Miyazaki et al., 2017). To ensure that surveillance is effective, the WHO recommends that standard oral health tests be carried out in an interval of about 5-6 years within the same community or the same area (Peterson et al., 2005).

The global burden of oral disease has continued to surge in developing countries (Uguru et al., 2020). With this in view, it is necessary to assess available literature on oral health surveillance to generate information that may support the efforts being invested in the prevention and control of oral diseases. To review available literature on oral health surveillance, a search was made in some databases and electronic search tools, using keywords like oral health surveillance, surveillance, indicators and challenges of oral health, and sources of oral health indicators. The databases searched include SciELO, Google Scholar, Research Gate, Medscape, and Web of Science. 39 articles written in the English language and published between 2003 and 2021 were selected, assessed, and included in this review.

The review discusses the concept, objectives, indicators, sources, elements, and challenges of oral health surveillance

CONCEPT OF SURVEILLANCE

Surveillance is the ongoing systematic collection, analysis, and interpretation of health-related data (Association of State and Territorial Dental Directors, 2017; Centers for Disease Control and Prevention [CDC], 2018; Federal Ministry of Health - Nigeria Centre for Disease Control, 2019; Moysés et al., 2013). It includes the timely dissemination of the resulting information to those who need them for action (Delaware Department of Health and Social Services [DDHSS], 2020). Surveillance data is essential for

the monitoring and evaluation of the impact of an intervention, monitors and clarifies the epidemiology of health problems, and serves as an early warning for impending outbreaks that would result in emergencies (WHO, 2021). Surveillance contributes significantly to the planning, implementation, and evaluation of public health practice (Arkansas Department of Health [ADH], 2017).

Surveillance systems are of two types namely:

Active surveillance: involves an ongoing search for cases or health conditions in the community or health facilities. Though it provides the most accurate, reliable, and timely information, it is often short-term, requires the services of well-trained personnel with adequate logistics, and could be expensive (Nnebue et al., 2013).

Passive surveillance: A system by which a health institution receives routine reports submitted from health facilities, the community, or other sources (Nsubuga et al., 2006). Passive surveillance is relatively inexpensive and covers a wide geographical area. This is the most common form of surveillance, and it depends on people in different institutions to provide data. Attributes such as completeness, usefulness, timeliness, sensitivity, positive productive value (PPV), representativeness, specificity, simplicity, flexibility, acceptability, and reliability are defined by the quality of the surveillance system (CDC, 2012; WHO, 2006).

OBJECTIVES OF ORAL HEALTH SURVEILLANCE

The objectives of the oral health surveillance system as highlighted by Kurmana et al., (2018); Health Systems Bureau and Office of Oral Health (2006); Texas Oral Health Surveillance Plan [TOHSP], (2019) include:

1. Ascertain the severity of oral disease and risk factors
2. Monitor trends in oral health indicators
3. Utilise data obtained from oral health for the planning, implementation, and evaluation of the impact of oral health programmes and policies

4. Identify high-risk populations with unmet oral health needs
5. The timely communication of surveillance data to decision-makers and the public enables the target audience to readily understand the implications of the information.

INDICATORS OF ORAL HEALTH SURVEILLANCE

The indicators that form the framework of the oral health surveillance system are outlined in [table 1](#). They are structured by the domain [oral health outcomes, access to care, risk factors, intervention strategies, and workforce and infrastructure] and age group [preschool children, school children, adults, and older adults] ([Center for Oral Health Systems Integration and Improvement, 2019](#)).

Table 1:
Indicators of Oral Health Surveillance System by Domain and Age Group

Domain	Preschool Children	School Children	Adults	Older Adults
Oral Health Outcomes	Birth Cleft lip & palate Head Start Decay experience Untreated tooth decay Need for treatment	Kindergarten & Third Grade Decay experience Untreated tooth decay Sealant prevalence	18-64 Years Any tooth loss	65+ Years 6+ teeth lost Complete tooth loss
	1-17 Years Parent's self-report of child's oral health, oral health problems		All Ages Incidence of and mortality from cancers of the oral cavity and pharynx	
Access to care	Low income (Medicaid) Dental visit and preventative care.		18+ Years Dental visit Dental care is delayed due to cost.	
Risk factors	0-5 years Poverty, race/ethnicity, medical insurance, etc.	6-17 years Poverty, race/ethnicity, medical insurance, etc.	18+ years Diabetes, tobacco use, alcohol use, HPV vaccination, poverty, education, employment, disabilities, etc.	
Intervention strategies	School-based or school-linked dental sealant programs			
	Topical fluoride programs			
	Community water fluoridation			
Workforce and Infrastructure	Number of dental professionals Number of safety net dental clinics Dental Health Professional Shortage Areas			

Source: CSTE, (2013); Kurmana et al., (2018); Ottolenghi et al., (2007)

In developing countries like Nigeria, the [National Oral Health Policy \(2012\)](#) developed indicators that are used to monitor the activities of oral health divisions at all government levels. The indicators include

- Oral health awareness indicator
 - Knowledge of prevention of common dental diseases
 - Uptake of healthy oral health habits
- Oral health status indicators
 - Decayed Missing and Filled Teeth (DMFT)
 - Oral hygiene status
 - Periodontal Treatment Needs
 - Oral cancer prevalence
- Dental service utilization
 - Uptake of dental care
- Oral health policy indicators
 - Quantity, impact, and quality of oral health activities within key settings
 - Implementation of human resource development activities for oral health
 - Conduct research activities
 - Establishment of Oral Health Information System

RECOMMENDED ESSENTIAL ORAL HEALTH INDICATORS FOR THE AFRICAN REGION

The indicators for monitoring oral health are categorised for children and adolescents, general populations, and oral health systems. The list for monitoring the oral health of children and adolescents contains priority indicators specific to children and adolescents.

A. INDICATORS FOR MONITORING THE ORAL HEALTH OF CHILDREN AND ADOLESCENTS

A.1. DETERMINANT

A.1.1. Preventive Care-Seeking by Pregnant Women

A.1.2. Maternal Knowledge of when to Seek Care for Child Caries

A.1.3. Women's Knowledge of Aetiology and Early Symptoms of Noma

A.1.4. Mother's Knowledge of Fluoride Toothpaste for Tooth Decay Prevention

A.1.5. Daily Brushing with F-Toothbrush or Tradition

A.2. PROCESS

A.2.1. Preventive Oral Health Programmes in Kindergartens

A.2.2. Services with a System for Identifying and Referring Children with Cleft Lip, Cleft Palate, and Noma

A.2.3. Screening Oral Health Programme Coverage

A.2.4. Maternal Child Health Oral Health Prevention Coverage

A.2.5. School-based Health Centres with an Oral Health Component

A.3. OUTCOME

A.3.1. Decay Experience in first Permanent Molars in Children

A.3.2. Prevalence (Incidence) of Detected Case of Noma

A.3.3. Five-Year-Old Children with at Least Three Abscessed Teeth

B. INDICATORS FOR MONITORING THE ORAL HEALTH OF THE GENERAL POPULATION

B.1. DETERMINANT

B.1.1. Knowledge of Oral Health-Related Preventive Practices

B.2. PROCESS

B.2.1. Geographical Access to Oral Health Care

B.2.2. Access to Primary Oral Care Services

B.2.3. Oral Health Integrated in Other Health Programmes in Health Centres

B.2.4. Health Providers Competent to Diagnose and Manage Oral HIV

B.3. OUTCOME

B.3.1. Caries Free

B.3.2. Dental Caries Severity

B.3.3. Untreated Caries Prevalence

B.3.4. Periodontal Health Assessment

B.3.5. Oral Health Manifestations of HIV/AIDS

B.3.6. Cancer of the Oral Cavity

B.3.7. Edentulous Prevalence

B.3.8. Facial Fractures due to Vehicle Accidents

B.3.9. Physical Pain due to Oral Health Status

C. INDICATORS FOR MONITORING THE ORAL HEALTH SYSTEMS

C.1. DETERMINANT

C.1.1. Dentists and Other Oral Care Providers

C.1.2. Cost of Oral Health Services

C.1.3. Oral Health Policy Presence (or as part of general health policy)

C.1.4. Systematically Visiting Traditional Healers as First Choice for Oral Health Care

C.2. PROCESS

C.2.1. Local Health Structure with a Dental Service

C.2.2. Physicians in Training and Other Student Paramedics with an Oral Health Component in Curriculum

C.2.3. Districts with a Systematic Oral Health Data Collection System

C.2.4. Schools with Programmes for Oral Health Personnel Adopting Common List of Graduation Competencies

Source: WHO AFRO (2016)

SOURCES OF ORAL HEALTH SURVEILLANCE DATA

The sources of oral health surveillance data vary among different countries. Generally, according to CSTE (2013), Kanegan & Price (2021), MSDH (2018), Oral Health Workforce Research Centre [OHWRC], (2020) and Oregon Health Authority (2019), the following sources of oral health

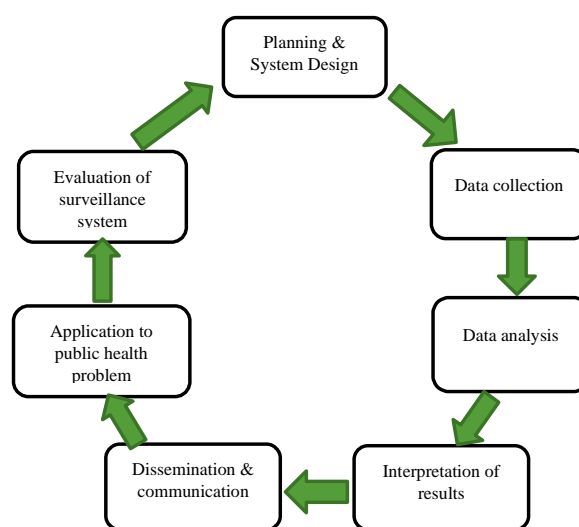
surveillance data can be used for oral health indicators:

- i. Basic Screening Survey (BSS) protocol – the oral health status of Head Start and Third-grade children
- ii. Behavioural Risk Factor Surveillance System (BRFSS) – tooth loss and dental visits among adults
- iii. Centres for Medicare and Medicaid (CMS): Annual Early Periodic Screening, Diagnosis, and Treatment (EPSDT) Program Participation Report – dental visit among children eligible for Medicaid
- iv. Board of Dentistry (BOD) – number of dental professionals
- v. Office of Primary Care – health experts' shortage areas
- vi. National Cancer Institute's Surveillance, Epidemiology and End Results Program (NCI/SEER) – incidence of cancers of the oral cavity and pharynx
- vii. CDC's National Program of Cancer Registries (CDC/NPCR) – incidence of and mortality from cancers of the oral cavity and pharynx
- viii. National Survey of Children's Health (NSCH) – oral health, oral health issues, dental visit, and preventive dental visit among children 1-17 years (perhaps modified or deleted based totally on the redesign of NSCH)
- ix. National Vital Statistics System (NVSS) – mortality from cancers of the mouth and pharynx
- x. Uniform Data System (UDS) – number of federally qualified health centres with dental clinics
- xi. Water Fluoridation Reporting System (WFRS) – populace served by fluoridated water

ELEMENTS OF ORAL HEALTH SURVEILLANCE SYSTEM

In the development of an oral health surveillance system, the "surveillance cycle" (which contains all the elements of a surveillance system) plays an important role (**Figure 1**). The surveillance process requires people with adequate knowledge in public health dentistry, epidemiology and/or biostatistics, writing and graphic arts, and evaluation. A combination of different expertise is important not just for the different perspectives and skills they will offer but also foster partnerships that will be useful for the development and implementation of programmatic activities (CSTE, 2013).

Figure 1:
Surveillance cycle



CHALLENGES OF ORAL HEALTH SURVEILLANCE IN DEVELOPING COUNTRIES

There is a paucity of data as regards oral health surveillance in most developing countries. This could be associated with certain reasons such as:

- A. Limited health facilities to collect the data
- B. Limited or no existing surveillance system
- C. Limited availability of trained oral health workforce
- D. The limited communication network (phones or network)
- E. Underreporting of oral conditions

CONCLUSION

The global burden of oral disease can be greatly reduced should oral health surveillance be given the appropriate attention. Doing so will contribute simultaneously to the prevention and control of other non-communicable diseases that arise because of behavioural risk factors like excess sugar consumption, unhealthy eating habits, smoking, and excessive alcohol consumption. Oral health surveillance will provide a steady source of information that is updated, reliable and valid for use in developing, implementing, and evaluating programs geared towards improving oral health. Oral health policies should involve the integration of oral health surveillance into national and community health programs, and oral health should be promoted as an effective, efficient, and essential part of policies aimed at promoting the overall wellbeing and general health of an individual.

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