

Oral Health Surveys

Basic Methods

4th Edition



World Health Organization
Geneva



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**World Health Organization
Geneva 1997**

First edition, 1971
Second edition, 1977
Third edition, 1987

WHO Library Cataloguing in Publication Data

Oral health surveys : basic methods. — 4th ed.

1. Dental health surveys 2. Manuals

ISBN 92 4 154493 7 (NLM Classification: WU 30)

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PRINTED IN ENGLAND

95/10761—Best-set/TWC/Clays—8000

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Contents

Preface	1
Aims of the manual	1
Acknowledgements	3
1. Design of a basic oral health survey	4
Objectives	4
Special characteristics of oral diseases	4
Pathfinder surveys	5
2. Organizing the survey	10
Preparing a survey protocol	10
Obtaining approval from the authorities	10
Budgeting	11
Scheduling	11
Emergency care and referral	11
Courtesy reporting	12
3. Reliability and validity of data	13
Training and calibrating examiners	13
Duplicate examinations	14
4. Implementing the survey	16
General	16
Contacts with persons in authority	16
Keeping a logbook	16
Preliminary exercise	16
Sources of fluorides	17
Personnel and organization	17
Recording clerk	17
Organizing clerk	17
Daily review of assessment forms	18

Instruments and supplies	18
Infection control	18
Examination area	19
Examination position	19
Lighting	19
Table or platform	20
Seating of recording clerk	20
Supply of survey forms	20
Avoidance of crowding	20
Avoidance of noise	20
5. Assessment form	21
General	21
Standard codes	21
Oral health assessment form	22
Identification and general information sections of the form	23
Date of examination (boxes 5–10)	24
Identification number (boxes 11–14)	24
Examiner (box 15)	24
Original/duplicate examinations (box 16)	24
Name	25
Date of birth (boxes 17–20)	25
Age (boxes 21 and 22)	25
Sex (box 23)	25
Ethnic group (box 24)	25
Occupation (box 25)	30
Geographical location (boxes 26 and 27)	30
Location type (box 28)	30
Other data (boxes 29 and 30)	30
Contraindication to examination (box 31)	30
Clinical assessment	31
Extra-oral examination (box 32)	31
Temporomandibular joint assessment (boxes 33–36)	31
Oral mucosa (boxes 37–42)	32
Enamel opacities/hypoplasia (boxes 43–52)	34
Dental fluorosis (box 53)	35
Community Periodontal Index (CPI) (boxes 54–59)	36
Loss of attachment (boxes 60–65)	38
Dentition status and treatment need (boxes 66–161)	39
Prosthetic status (boxes 162 and 163)	46
Prosthetic need (boxes 164 and 165)	46

Dentofacial anomalies (boxes 166–176)	47
Need for immediate care and referral (boxes 177–180)	51
6. Obtaining assistance from WHO	53
Pre-survey assistance	53
Post-survey assistance	54
7. Post-survey action and preparation of survey reports	55
Sending forms for analysis	55
Preparation of survey reports	55
References	58
Annex 1. Tables prepared from survey data	59
Annex 2. Explanation of statistical calculations and guidelines for data analysis	62
Annex 3. Survey summary based on WHO Oral Health Assessment Form (1997)	66

Preface

Basic oral health surveys provide a sound basis for estimation of the present oral health status of a population and its future needs for oral health care. They produce reliable baseline data for development of national or regional oral health programmes and for planning for appropriate numbers and types of personnel for oral care.

Since the first edition of this manual was published in 1971, more than 130 health administrations have conducted oral health surveys in accordance with the recommended basic methods. These surveys have shown that dramatic changes in oral health have occurred in many populations, as a result of changes in disease trends and new treatment techniques as well as changes in age structure.

In this new edition of the manual, the basic methods have been brought up to date to include recent developments in oral care and epidemiological techniques. In particular, new sections on the evaluation of extra-oral conditions, the oral mucosa, enamel opacities/hypoplasia, loss of periodontal attachment and dentofacial anomalies have been included, in order to provide a more complete assessment of oral diseases and conditions.

Aims of the manual

The aims of this manual are:

1. To provide a systematic approach to the collection and reporting of data on oral diseases and conditions.
2. To ensure that data collected in a wide range of environments are comparable.
3. To encourage oral health administrators in all countries to make standard measurements of oral diseases and conditions as a basis for planning and evaluating oral health programmes.

To achieve these aims the manual provides:

1. Guidelines on a practical and economic sample design suitable for assessing oral diseases and treatment needs for planning and monitoring oral health services.
2. A description of diagnostic criteria that can be readily understood and applied in all countries.
3. Information on means of obtaining practical assistance for planning and implementing surveys, summarizing data and analysing results.

Chapter 1 describes general principles for designing basic oral health surveys on which both monitoring of oral disease trends and estimation of oral care needs for populations can be based; Chapter 2 gives advice on organizing and conducting a survey; Chapter 3 describes ways of ensuring that the data collected are as consistent and reliable as possible; Chapter 4 provides practical guidance on implementing the survey; Chapter 5 gives instructions on completing the standard oral health assessment forms; Chapter 6 describes the assistance that can be provided from WHO; and Chapter 7 explains how survey reports should be prepared and presented. A list of the tables that can be prepared at WHO from data collected in a basic oral health survey is given in Annex 1.

Acknowledgements

Particular thanks are due to Dr C.J. Holmgren, Department of Conservative Dentistry, Faculty of Dentistry, University of Hong Kong, Hong Kong, for his valuable assistance in the preparation of this manual, and to the following people, who field-tested the manual: Dr N. al-Beruti, Director, WHO Regional Demonstration, Research and Training Centre for Oral Health, Damascus, Syrian Arab Republic; Dr P. Culebra, Puerto Rico; and Dr P. Leous, Director, WHO Collaborating Centre for Inter-country Demonstration, Training and Implementation of Oral Health in Europe, Minsk, Belarus. Thanks are also due to all those who reviewed the draft manuscript, including: Dr T.M. Marthaler, Department of Preventive Dentistry, Periodontology and Cariology, Dental School, University of Zurich, Zurich, Switzerland; Dr D.M. O'Mullane, Oral Health Services Research Centre, University Dental School and Hospital, University of Cork, Cork, Ireland; Dr G. Suckling, New Zealand; and Dr H.P. Whelton, Oral Health Services Research Centre, University Dental School and Hospital, University of Cork, Cork, Ireland.

1. Design of a Basic Oral Health Survey

Objectives

Basic oral health surveys are used to collect information about the oral health status and treatment needs of a population, and subsequently, to monitor changes in levels and patterns of disease. In this way, it is possible to assess the appropriateness and effectiveness of the services being provided and to plan or modify oral health services and training programmes as needed. Basic oral health surveys are not designed to collect information about etiological factors affecting disease distribution or severity, or about the clinical effectiveness of different preventive or care procedures. However, the information obtained using basic surveys can be used to monitor aspects of the effectiveness of oral care services.

The methods described in this manual can be used to determine:

1. The extent to which existing oral health services are coping with the current need for care.
2. The nature and extent of required preventive, curative and restorative services.
3. The resources needed to establish, maintain, expand or reduce an oral health care programme, including an estimate of the number and type of personnel required.

Surveys to determine the oral health status and treatment needs of communities and populations are an essential part of the duties of chief dental officers and other administrators responsible for oral health care services. Where there is no national or regional dental officer with specific responsibility for oral health activities, either members of the dental association, or staff of training institutions for oral care personnel, should undertake regular epidemiological surveys of oral health conditions.

Special characteristics of oral diseases

In some situations, investigators will have access to the advice of an expert in health statistics who might be able to provide guidance on planning a

survey. However, particular features of the epidemiology of oral diseases have permitted the development of an approach to sample design and survey planning for the most common oral diseases that is different from traditional sample designs. The special considerations concerning the two major oral diseases—dental caries and periodontal diseases—are as follows:

1. The diseases are strongly age-related, as there is often an increase in severity and prevalence with increased age.
2. The diseases exist in all populations, varying only in severity and prevalence.
3. One of the diseases, dental caries, is irreversible (at the cavitation level used in the methods described here) and thus information on current status provides data not only on the amount of disease present, but also on previous disease experience.
4. There is extensive documentation on variation of profiles of dental caries for population groups with different socioeconomic levels and environmental conditions.
5. Many observations are made in standard measurements for each subject, i.e. for each tooth in the case of caries and for the six sextants of the mouth in the assessment of periodontal diseases.

Other important information which needs to be collected routinely in oral health surveys is also included in the assessment. It should be noted, however, that in-depth studies of the less common oral diseases require different survey designs.

Pathfinder surveys

The special factors associated with the most common oral diseases and the extensive experience gained in oral epidemiology over the past 25 years have enabled a practical, economic survey sampling methodology to be defined, called the “pathfinder” method.

The method used is a stratified cluster sampling technique, which aims to include the most important population subgroups likely to have differing disease levels. It also proposes appropriate numbers of subjects in specific index age groups in any one location. In this way, reliable and clinically relevant information for planning is obtained at minimum expense. The method is suitable for obtaining the following information:

- The overall prevalence of the common oral diseases and conditions affecting the population.
- Variations in disease level, severity and need for treatment in

subgroups of the population. This enables groups in special need of services to be identified.

- Age profiles of oral diseases in the population to enable care needs for different age groups to be determined, to provide information about severity and progression of disease, and to give an indication as to whether the levels are increasing or decreasing.

Pathfinder surveys can be either pilot or national, depending on the number and type of sampling sites and the age groups included.

A *pilot survey* is one that includes only the most important subgroups in the population and only one or two index ages, usually 12 years and one other age group. Such a survey provides the minimum amount of data needed to commence planning. Additional data should then be collected in order to provide a reliable baseline for the implementation and monitoring of services.

A *national pathfinder survey* incorporates sufficient examination sites to cover all important subgroups of the population that may have differing disease levels or treatment needs, and at least three of the age groups or index ages (see page 7). This type of survey design is suitable for the collection of data for the planning and monitoring of services in all countries whatever the level of disease, availability of resources, or complexity of services. In a large country with many geographical and population subdivisions and a complex service structure, a larger number of sampling sites is needed. The basic principle of using index ages and standard samples in each site within a stratified approach, however, remains valid.

The following method is recommended as a general guideline for basic oral health surveys for the planning, monitoring and evaluation of oral care services.

Subgroups. The number and distribution of sampling sites depend upon the specific objectives of the study. Sampling sites are usually chosen so as to provide information on population groups likely to have different levels of oral disease. The sampling is usually based on the administrative divisions of a country—the capital city, main urban centres, and small towns and rural areas. In countries where there are different geophysical areas, it is usual to include at least one sampling site in each area type.

If there are several distinct ethnic groups in the population with known, or suspected, differences in levels of oral disease, it may be necessary to include separate samples of each of these groups in the main subdivisions for the survey. However, maximum use should be made of available knowledge about variations between the different groups in order to limit the number of additional subsamples needed. Once the

different groups are decided upon, application of random sampling of subjects within the groups is desirable.

The assistance of local health administrators can be very useful when the final decision is made as to which population subgroups are significant for the study and should be represented in the final sample. For a national pathfinder survey, between 10 and 15 sampling sites are usually sufficient. If, however, there are large urban centres in the country, it may be necessary to locate several additional sampling sites in at least two cities.

Index ages and age groups. The following ages and age groups are recommended: 5 years for primary teeth and 12, 15, 35-44 and 65-74 years for permanent teeth.

- *5 years.* Where it is practical and feasible, children should be examined between their 5th and 6th birthdays. This age is of interest in relation to levels of caries in the primary dentition which may exhibit changes over a shorter time span than the permanent dentition at other index ages. In some countries 5 years is also the age at which children begin primary school.

Note: In countries where school entry is later, e.g. at 6 or 7 years, these ages can be used, though the mean age should be reported with the results. In these older age groups, missing primary incisor teeth should not be scored as missing because of the difficulty in differentiating between primary incisors lost due to exfoliation and those lost because of caries or trauma.

- *12 years.* This age is especially important as it is generally the age at which children leave primary school, and therefore in many countries, is the last age at which a reliable sample may be obtained easily through the school system. Also, it is likely at this age that all permanent teeth, except third molars, will have erupted. For these reasons, 12 years has been chosen as the global monitoring age for caries for international comparisons and monitoring of disease trends.

In some countries, however, many school-age children do not attend school. In these circumstances, an attempt should be made to survey two or three groups of non-attenders, from different areas, in order to compare their oral health status with that of children attending school.

- *15 years.* At this age the permanent teeth have been exposed to the oral environment for 3-9 years. The assessment of caries prevalence is therefore often more meaningful than at 12 years of age. This age is also important for the assessment of periodontal disease indicators in adolescents. In countries where it is difficult to obtain

reliable samples of this age group, it is usual to examine 15-year-olds in two or three areas only, i.e. in the capital city or other large town, and in one rural area.

- 35–44 years (*mean* = 40 years). This age group is the standard monitoring group for health conditions of adults. The full effect of dental caries, the level of severe periodontal involvement, and the general effects of care provided can be monitored using data for this age group. Sampling adult subjects is often difficult. Samples can, however, be drawn from organized groups, such as office or factory workers. Use may also be made of readily accessible groups, e.g. at a market, to obtain a reasonably representative sample in situations where truly representative sampling is not feasible. Care must be taken to avoid obvious bias, such as sampling patients at medical care facilities.
- 65–74 years (*mean* = 70 years). This age group has become more important with the changes in age distribution and increases in life-span that are now occurring in all countries. Data for this group are needed both for planning appropriate care for the elderly and for monitoring the overall effects of oral care services in a population. Examination of representative members of this age group is often not as difficult as for the previous age group, as elderly people are more likely to be found in or near their homes, or in day centres or institutions, and can therefore be examined during the day. Nevertheless, care should be taken to sample adequately both house-bound and active members of this age group.

Number of subjects. The number of subjects in each index age group to be examined ranges from a minimum of 25 to 50 for each cluster or sampling site, depending on the expected prevalence and severity of oral disease.

An example of a sample design for a national pathfinder survey for each index age or age group is as follows:

Urban:	4 sites in the capital city or metropolitan area	(4 × 25 = 100)
	2 sites in each of 2 large towns	(2 × 2 × 25 = 100)
Rural:	1 site in each of 4 villages in different regions	(4 × 25 = 100)
Total	12 sites × 25 subjects	= 300

If this cluster distribution is applied to four index ages in the population under study, the total sample is $4 \times 300 = 1200$.

Such a sample design permits the identification of significant differences between urban and rural groups and, in certain situations, between different socioeconomic groups in the capital city or large towns. Areas

where the disease prevalence is either much higher or much lower than the national average may also be identified from the results of such a survey.

However, a total of 25 subjects, with approximately equal numbers of females and males, is sufficient only in populations where caries and periodontal disease levels are estimated to be low or very low. In populations where these disease levels are known to be moderate or high—e.g. the percentage of caries-free 12-year-olds is 5–10% or lower—the standard size for each sample should be 40–50 subjects.

If the level of dental caries in the population is unknown, it will be necessary to estimate the level of disease before starting a survey. A rapid and effective way of estimating the prevalence of caries in a population is by classifying a group of subjects as caries-free or not. For example, it should be possible to examine two or three classes of 12-year-olds of different socioeconomic levels, in two or three local, easily accessible schools, where the widest possible differences in disease may be expected. If more than 20% of the children in the class are caries-free, the caries prevalence is low; if 5–20% are caries-free, the prevalence is moderate; and if fewer than 5% are caries-free, the prevalence is high. This estimate of prevalence may then be used as a guide when deciding on standard sample size and when completing the protocol.

2. Organizing the Survey

Preparing a survey protocol

It is important to prepare a written protocol for the survey, which should contain the following information:

- Main objective and purpose of the survey.
- A description of the type of information to be collected and of the methods to be used.
- A description of the sampling methods to be used.
- Personnel and physical arrangements.
- Statistical methods to be used in analysing the data.
- A provisional budget.
- A provisional timetable of main activities and responsible staff.

Obtaining approval from the authorities

Permission to examine population groups must be obtained from a local, regional or national authority. For example, if schoolchildren are to be examined, then the school authorities should be approached, the purpose of the survey explained and their approval obtained. In some instances, written permission from parents must be given before children can be examined. It is the responsibility of the local organizer of the survey to ascertain local practices regarding consent. The survey organizer should also notify the health authorities, since it may be necessary to time the survey to fit in with other health-related activities. This applies particularly when adult populations are to be surveyed.

It is important to provide the dental profession and oral health administrators in the area with details of the survey. Officers of dental societies and local dental practitioners can often help in gaining the cooperation of the community for the survey, and of any of their patients who may be included in the sample.