



INSTITUT DER DEUTSCHEN ZAHNÄRZTE

Johannes Einwag/Klaus Keß/Elmar Reich

Oral Health in Germany: Diagnostic Criteria and Data Recording Manual

**Instructions for examination
and documentation
of oral health status**

Materialienreihe
Band 11.2

– With an appendix of the sociological survey instruments for the assessment of oral health attitudes and behaviour



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**Instructions for examination
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of oral health status**

– With an appendix of the sociological survey instruments
for the assessment of oral health attitudes and behaviour –

Foreword by R. Naujoks

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“Representative population survey of oral health status and
oral hygiene practice in the Federal Republic of Germany”

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Foreword

The Institut der Deutschen Zahnärzte (Institute of German Dentists – IDZ), Cologne, laid the foundations for the research project “Representative population survey of oral health status and oral hygiene practice in the Federal Republic of Germany” in 1987/88. One of the prerequisites for the implementation of this project was the development of specific instruments, comprising in particular:

- a) a Manual detailing the methods of examination and recording of dental data in the fields of cariology, periodontology orthodontics and prosthodontics, and
- b) a questionnaire covering the relevant behavioural and sociological aspects.

On completion of the surveys and evaluation of the findings, both the questionnaire and the instructions for examination and data recording proved to have been very effective. As a result of this positive outcome, it was decided to publish the instruments developed for the project in the present volume so as to make them available to interested groups. The Manual has been translated into English, principally because the publishers considered that a Data Recording Manual of this kind might find application in similar projects, including ones conducted in non-German-speaking countries. Another consideration was that comparability with future surveys of oral health status and oral hygiene practice might thus be enhanced.

However, it is hoped that the Manual will also be useful to those concerning themselves with epidemiological questions in the field of oral health for the first time. It will provide them with suggestions and directions that may help them to avoid misconceptions in the planning and conduct of such surveys.

Epidemiological investigations are in any case likely to assume a crucial role within the range of dental research activities in the future. It is, for instance, very important to define the population and age groups that are particularly liable to dental and oral pathology and diseases of the jaw. These risk groups in turn present specific challenges to the social sciences, which are required to analyse the factors deemed responsible, at least in part, for these risk situations.

A detailed mosaic reflecting the oral health or morbidity of the relevant populations, derived from epidemiological surveys, will then constitute a reliable foundation on which subsequent scientific endeavours and health-policy measures can be based.

The Data Recording Manual (Volume 11.2 IDZ-Materialienreihe) is a supplement to the basic scientific publication (Volume 11.1 IDZ-Materialienreihe) describing in detail the methods and the results of the oral health survey conducted by the Institut der Deutschen Zahnärzte in the Federal Republic of Germany in 1989.

Prof. Dr. Rudolf Naujoks, Würzburg

Chapter 1

Explanatory Notes on the Recordings of Findings

**(General, oral hygiene, dental fluorosis, trauma to anterior teeth,
DMF-T and DMF-S)**

1.1 GENERAL DATA SHEET

Institut der Deutschen Zahnärzte

Representative population survey of oral health status and oral hygiene practice in the Federal Republic of Germany

No.:

--	--	--	--

Please do not tear out any pages from the Data Book!

Please enter:

Subject No.:

Date of birth:
Month

Year

Please mark appropriate box with a cross. Like this only:

Sex

Male

Female

Oral hygiene

1. Good (no plaque visible)

2. Poor (plaque clearly visible)

Dental fluorosis:

No

Uncertain

Yes, slight

Yes, moderate

Yes, severe

Trauma to anterior teeth:

Yes No

↓

If yes:

Loss of teeth

How many teeth?

Loss of tooth structure

Affecting how many teeth?

No visible damage

The entries made in the data sheet upon examination are transferred by a scanner to the data storage medium for electronic data processing. It is therefore essential for the entries to be made with *clear* marks.

1.2 Personal data

The following personal data is to be entered in the first data sheet:

- a. Subject number
- b. Date of birth
In recording the date of birth, the months from January to September should be represented by 01 to 09.
- c. Sex
For the question: male/female
please put a cross (x) in the relevant box.

1.3 Oral hygiene

Only two groups are to be formed under this heading. For subject coding, the information for the assistant entering the data should be, for example, as follows:

Upper box or 1 = good

Lower box or 2 = poor

Mark with a cross (x).

1.4 Dental fluorosis

There are five groups for this item:

No: No staining indicative of dental fluorosis

Uncertain: Corresponds to figs. 1 a) and b)

Yes, slight: Corresponds to fig. 1 c)

Yes, moderate: Corresponds to fig. 1 d)

Yes, severe: As shown in figs. 1 e) and f)

The boundaries between the individual groups are, of course, fluid.

The teeth should be carefully blown dry before assessment.

Mark with a cross (x).

Note: Mottling of the enamel, at least where slight, must not be equated with fluorosis and must on no account be confused with traumatogenic, hypoplastic white staining of the enamel. For this reason, the principal criteria for the diagnosis of fluorosis are recalled below:

- a. The first signs of fluorine-induced alteration of the enamel are whitish lines which accentuate the perikymata and tend to be distributed uniformly over the labial surface of the enamel. If enamel formation is impaired more severely, these lines become wider and coalesce into irregular areas.
- b. All these alterations are bilaterally symmetrical.



Fig. 1 a–f: Dental fluorosis. The boundaries between the individual degrees of severity are, of course, fluid. The clinical illustrations show examples of the degrees of severity ranging approximately from 0.5 (uncertain) to 4.0 (severe) and correspond to the definitions: uncertain – very mild – mild – moderate – severe.

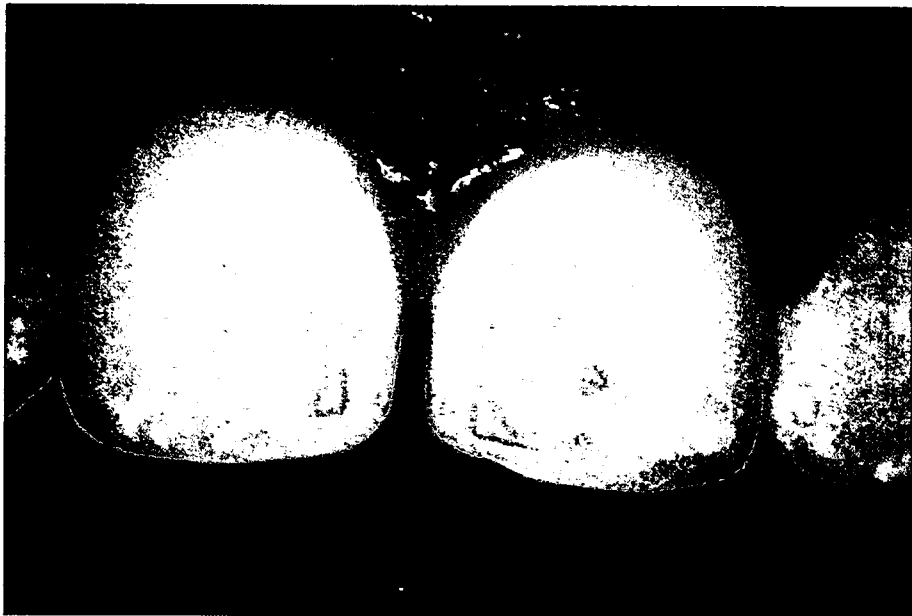


Fig. 1b



Fig. 1c

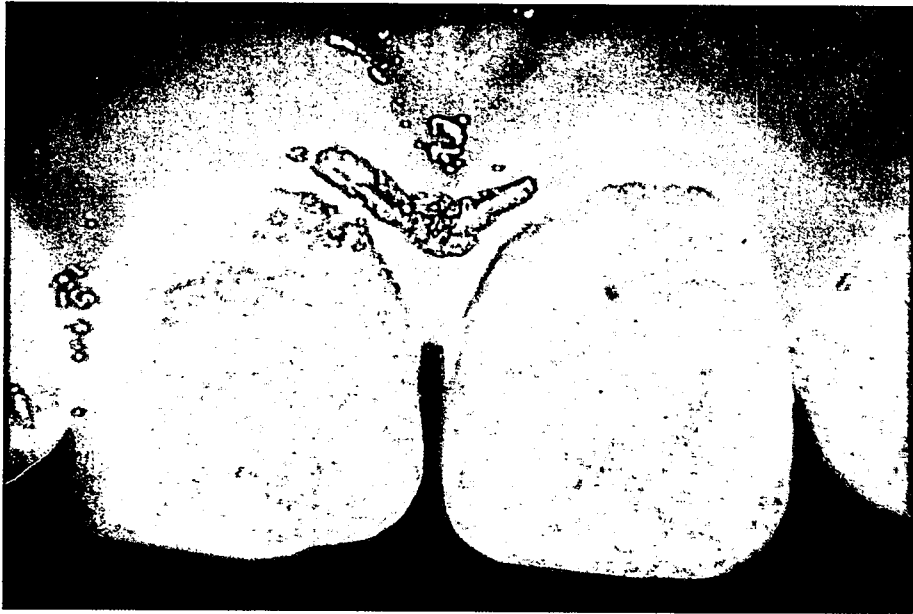


Fig. 1d



Fig. 1e

complete denture prosthesis or extensive bridgework, please make the following entries:

Trauma to anterior teeth:

Yes

No

If "yes":

↓

- Loss of teeth How many teeth?
- Loss of tooth structure Affecting how many teeth?
- No visible damage

If the information is too vague, simply mark the "no" box under anterior tooth trauma.

Chapter 2

Tooth Data Recording

2.1 Data Recording Sheet "MAXILLA"

Maxilla
OK

Data for maxilla only to be recorded here!

Please mark the relevant data box clearly with a vertical line! Like this only: |

The abbreviations in the data fields are explained on page 77

8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
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type="checkbox"/>	
Maxilla															

2.2 Data Recording Sheet "Mandible"

Mandible
UK

Data for mandible only to be recorded here!
Please mark the relevant data box clearly with a vertical line! Like this only: |

The abbreviations in the data fields are explained on page 77

8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.	<input type="checkbox"/> Crown <input type="checkbox"/> Bucc. <input type="checkbox"/> Ling.

Mandible

Each "column" on the data recording sheet represents one tooth. The teeth are identified by the arabic numerals 8-1/1-8.

2.3 Data on the entire tooth

The first field under the tooth identification consists of nine boxes, intended for data on the *entire* tooth.

The abbreviations used for the entries have the following meanings:

- F** = missing tooth (due to caries or for periodontal reasons)
- KL** = extracted for orthodontic reasons or because of trauma, or missing for non-pathological reason
- NA** = congenitally missing tooth
- M** = deciduous tooth
- FM** = deciduous tooth missing, or permanent tooth not yet erupted
- Ra** = retained root
- Hy** = hypoplasia
- Er** = replaced tooth (prosthesis)
- Zw** = pontic

More than one entry may be made for one and the same tooth – e.g., **F** (missing tooth) and **Ra** (retained root).

2.4 Data on crown restorations

The second field under the tooth number, marked "crown" and consisting of four boxes, is intended for information on crown restorations.

The abbreviations used for the entries have the following meanings:

- G** = all-cast or band crown
- V** = veneer crown
- J** = jacket crown (plastics or porcelain)
- St** = post crown

(Mark **G**, **V** or **J**, as appropriate in accordance with the clinical examination, and then, where applicable, add **St** after evaluation of X-rays [if available].)

2.5 Data on tooth surfaces

On the data recording sheet boxes for eight different findings are printed on each tooth surface. More than one item may be marked.

Meaning of abbreviations:

- K** = caries
- SK** = secondary caries
- A** = amalgam filling
- G** = cast filling
- Z** = cement filling
- C** = composite filling
- PV** = temporary filling material
- Fi** = fissure sealant

The surfaces of the teeth should preferably be examined in a particular order.

Suggestion:

Right-hand half of jaw: buccal, *distal*, occlusal, *mesial* and lingual

Left-hand half of jaw: buccal, *distal*, occlusal, *mesial* and lingual

The tooth symbols represent a tooth crown laid out flat.

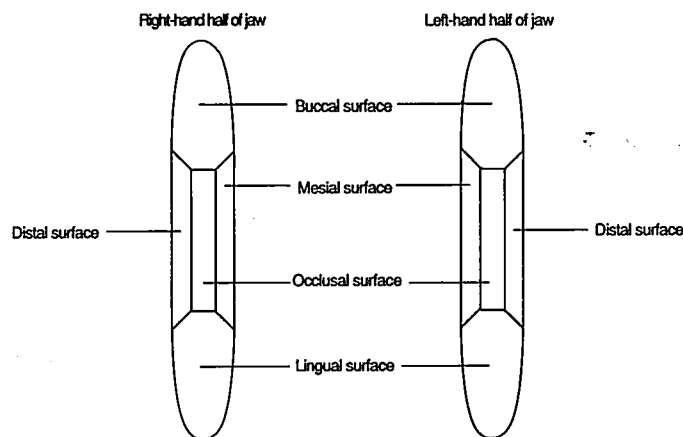


Fig. 2 Tooth Surfaces

There is no occlusal surface in the case of anterior teeth.

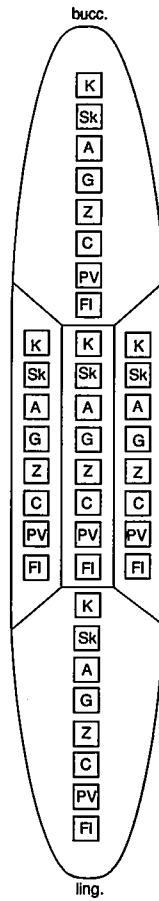


Fig. 3 Coding System

N.B.: In this case all entries should be made with a clear **vertical** mark in the relevant box.

For details, see the next chapter "Methods of determining oral health".

(To facilitate the entry of information in the Data Book, a list of all symbols used and their meanings is given on page 77.)

Chapter 3

Methods of Determining Oral Health

- Dental caries (on tooth crown)
- The DMF index (DMF-T and DMF-S)

The DMF index is an epidemiological instrument for recording data on carious lesions. The DMF-T index is used for entire teeth [T = tooth] and the DMF-S index for tooth surfaces [S = surfaces]. D stands for decayed, M for missing and F for filled.

3.1 Carious tooth surfaces (the D component of the index)

Advanced carious lesions are recognizable as gross cavitations and thus present few problems in diagnosis.

Initial carious lesions, on the other hand, are more difficult to diagnose reliably. These initial stages of caries may be divided into three categories according to location, each with the following diagnostic particularities:

3.1.1 Pits and fissures on occlusal, buccal and lingual tooth surfaces

These areas are diagnosed as *carious* when the probe catches after insertion with moderate, uniform pressure and when the catch is accompanied by one (or both) of the following signs of caries:

- a. Softening at the base of the relevant area.
- b. Opacity adjacent to the area, indicating undermining or demineralization.

In other words, these pits or fissures in which the probe catches do not in themselves constitute sufficient evidence of caries; they must be accompanied by at least one of the above signs.

3.1.2 Smooth areas on buccal (labial) or lingual surfaces

These areas are deemed carious if a carious defect is visible or identified by careful testing with the probe.

These areas should be deemed sound when there is only visual evidence of demineralization (chalky staining).

3.1.3 Approximal surfaces

For areas accessible to direct visual and tactile examination (e.g., when there is no adjacent tooth), the criteria are the same as those for smooth areas on facial or lingual surfaces.

For areas not available to direct examination, other criteria must be found.

In the case of *anterior teeth*, transillumination can serve as a useful aid in discovering approximal lesions. Transillumination can be achieved by placing the mouth mirror lingually and positioning the examining light so that it passes through the teeth and reflects into the mirror. If a characteristic shadow or loss of translucency is seen on the approximal surface, this is indicative of caries on that surface. If possible, the diagnosis should be confirmed by detection of a defect with the probe. However, the clear shadow of a lesion revealed by transillumination can justify a positive diagnosis.

In *posterior teeth*, however, visual evidence alone, such as undermining under a marginal ridge – is not sufficient proof of the presence of an approximal lesion. A positive diagnosis is possible only if a surface defect can be detected with the probe.

3.2 Missing teeth (the M component of the index)

This component traditionally relates to those permanent teeth that have been extracted only as a result of caries. Because of the difficulty of correctly distinguishing between teeth extracted due to caries and those extracted for periodontal reasons, no attempt should be made to distinguish between these two causes of tooth loss at the time of examination, especially in older subjects. *However, it is essential to distinguish between teeth extracted because of caries or marginal periodontal disease on the one hand and ones extracted for other reasons on the other.* The symbol **F** is used for teeth extracted because of caries or periodontal disease. If teeth are missing because of trauma, orthodontic treatment or other, non-pathological reasons, they are recorded as **KL** ("orthodontic gap"). Congenitally missing teeth are coded **NA** and missing deciduous teeth **FM**.

3.3 Filled tooth surfaces (the F component of the index)

The **F** component represents a tooth surface that has been filled either permanently or temporarily as a result of caries. Here again, it is necessary to distinguish between surfaces restored because of caries and ones filled for other reasons (e.g., trauma, hypoplasia or malformation). Fillings due to trauma, hypoplasia or malformation are *not* recorded.

3.4 Guidelines for data recording

The following conventions have been adopted for the sake of diagnostic consistency:

3.4.1 *Incisal edges of anterior teeth* are not considered to be separate surfaces. If a lesion or filling is confined to the incisal edge, its score should be assigned to the nearest adjacent surface of the relevant tooth. *Anterior teeth* thus have only four scorable surfaces (mesial, distal, labial and lingual). The inclusion of the occlusal surface of *posterior teeth* means that these teeth have five surfaces.

3.4.2 When a carious lesion extends beyond the line angle on to an adjacent surface, this surface is also deemed to be carious. However, an approximal filling on an anterior tooth is not considered to involve the adjacent labial or lingual surface unless at least one third of the crown towards the other approximal surface of the tooth is involved in the filling. The reason for this criterion is that tooth structure on the adjacent surfaces must often be removed to give access for treatment of the approximal lesion on an anterior tooth.

The same applies to approximal surfaces of *posterior teeth*, if access is via the marginal ridge.

To guard against a similar possibility of overscoring in posterior teeth, an approximal-occlusal filling should extend at least a millimetre past the line angle to the adjacent surface before the adjacent buccal or lingual surfaces are also deemed to be involved.

3.4.3 If a permanent tooth has a full crown restoration because of caries, it will be coded **G**, **J**, **V** or **St**. All surfaces of the tooth (four or five depending on the type of tooth) are then counted under the **F** component of the index.

By convention, all *crowns on posterior teeth*, including ones used as bridge abutments or anchors for removable prostheses, are deemed to have been "placed on account of caries". On *anterior teeth*, however, the examiner should investigate why these crowns have been placed. If a crown was placed for any reason other than caries – e.g., fracture, malformation or aesthetics – the reason should not be recorded as caries. If the crown exhibits marginal caries, secondary caries (**SK**) should also be recorded in the relevant position on the data sheet.

3.4.4 *Teeth banded or bracketed* for orthodontic reasons are examined as usual and all visible surfaces scored appropriately.

3.4.5 Certain teeth, especially *first premolars*, are occasionally extracted *in the course of orthodontic treatments*. These teeth are to be excluded from the DMF-S analysis. The examiner must make the determination that the teeth were extracted for orthodontic reasons (**KL**). This

is not usually difficult owing to the typical symmetry of these extractions.

3.4.6 Non-vital teeth are scored in the same way as vital teeth. However, if a filling on a non-vital tooth was placed solely to seal a root canal and not for caries, this filling should not be scored. If no other lesions or fillings are present, the tooth is deemed sound (caries-free).

3.4.7 Hypoplastic teeth (with defects of form) are recorded as **HY**. However, it may be determined that a filling or crown was placed on such a tooth for *aesthetic reasons* without being necessary because of caries. *In this case the filling/crown is not recorded.*

3.4.8 *Malformed teeth* are recorded in the usual way (e.g., hypoplasia and/or caries). If restored with a full crown for aesthetic reasons, they are *not* recorded.

3.4.9 If a tooth crown has been completely destroyed by caries and *only the root remains, all surfaces are deemed carious.*

3.4.10 If tooth surfaces are both carious and filled, only the caries is scored. If the caries extends from the edge of the filling, score **SK**.

3.4.11 *Fractured or missing fillings* are recorded as if they were intact unless caries is present. In this case the relevant surfaces are deemed to be carious (and not filled).

3.4.12 In the case of *supernumerary teeth*, only one tooth is scored in the relevant position. The examiner must decide which tooth is the "legitimate" occupant of the space.

3.4.13 If both a deciduous and a permanent tooth occupy the same position, *only the permanent tooth is scored.*

3.4.14 *Third molars* are disregarded in determination of the DMF-T index. In examination of first and second molars, it is important to check whether a second or third molar might have drifted mesially, so that it now occupies the position of the first or second molar. In this case, the *first* and *second* molars should be diagnosed and recorded, and not the third. If the second molar has been extracted because of caries and the space is now occupied by the third (sound) molar, the second molar is deemed to have been extracted (code **F**) and the third molar is not recorded.

N.B.: For recording “*tooth restorations*”, the wisdom teeth are to be taken into account.

3.4.15 *Stain and pigmentation* alone should not be regarded as symptoms of caries, as they also occur on sound teeth.

3.5 Recording of deciduous teeth

Cariou or filled surfaces are recorded in the same way as with permanent teeth, using the same diagnostic criteria. Since many field studies are concerned with both deciduous and permanent teeth, the surface scores for deciduous teeth must be preceded by an **M** (in the headline) to distinguish them from permanent teeth.

The **M** code can then be combined with any other conventional code for caries or filled surfaces.

Example: If a deciduous molar has occlusal caries and is otherwise sound, the **M** code would be combined with the code for occlusal caries. If the deciduous tooth is sound, the **M** code is used alone.

Missing deciduous teeth present problems in recording because it is often not possible to distinguish whether they were lost because of resorption of the roots or caries, especially during the period of mixed dentition. To avoid this problem, deciduous teeth lost up to one year before average physiological exfoliation are recorded as **FM**. For *deciduous teeth lost before this time, both F (missing due to caries) and M (deciduous tooth) are recorded.*

Note again that if *both* a permanent *and* a deciduous tooth are visible in the same space, *only the status of the permanent tooth is recorded.* The deciduous tooth is disregarded.

3.6 Recording the presence of fissure sealants

Fissure seals using adhesive materials should also be recorded. This applies to pits and fissures on posterior teeth and maxillary lateral incisors. The code **Fi** is then recorded in the relevant parts of the data sheet. Sealant on these surfaces is recorded in addition to any other finding. The presence of a sealant should be noted *after* the tooth has been examined for caries.

It is important to realize that different sealant products may vary in appearance (colourless, coloured or white). Sealant should be recorded as present when any part of the surface remains covered. If it appears that *sealant has been used as a filling material* rather than preventively, *the relevant surfaces should be deemed filled and not sealed*.

3.7 Recording procedure – General Rules

In the conduct of the examinations, each subject should be examined as far as possible in the same way. For instance, the examiner should resist the temptation to examine a person with severe caries more thoroughly than one who appears less susceptible.

Recommended instruments: A sharp probe, # 23, and a non-magnifying, unscratched mirror. The examination lamp should be positioned to allow transillumination of the approximal surfaces of the anterior teeth from the lingual by means of the mirror. The teeth should be dried in quadrants before examination.

The order of recording should correspond to that of the data sheet. It is a good plan to practise the procedure for overall data recording on a few patients before the main examination commences.

3.8 Photographs illustrating oral health status recording methods

The following photographs illustrate DMF-S assessment (coronal caries). Part of the photos of dental caries were kindly made available to the Institut der Deutschen Zahnärzte by the National Institute of Dental Research, Bethesda, for the purposes of the study (Ref.: National Institutes of Health "Oral Health Surveys of the National Institute of Dental Research: Diagnostic Criteria and Procedures". NIH Publication No. 91-2870, January 1991). We thank the NIDR for the permission to reprint the photos.



Fig. 4: Caries in the occlusal pits and fissures of the molar and premolar. Each of these teeth would be scored K for the occlusal surface. The buccal surface of the molar would receive a K if caries is confirmed with the probe. Undermining caries seems to be present on the mesial surface of the first molar, but this must be confirmed with the probe.



Fig. 5: The second premolar has a large carious lesion extending beyond the line angle on to the buccal surface. This tooth would be scored K for the occlusal, buccal and distal surfaces.