

INDICES

DEFINITION

- Dental indices provide a quantitative method for measuring, scoring and analyzing dental conditions in individuals and groups.
- An index describes the status of individuals or groups with respect to the condition being measured.

FEATURES OF AN INDEX

1. Clarity, Simplicity and Objectivity
2. Validity
3. Reliability
4. Quantifiability
5. Sensitivity
6. Acceptability

CLASSIFICATION OF INDICES

Index	Features
Simplified Indices	<ul style="list-style-type: none"> • Measures only a representative sample of the dental apparatus • Ex: Oral Hygiene Index-Simplified (OHI-S)
Simple index	<ul style="list-style-type: none"> • Measures the presence or absence of a condition • Ex: Gingival index
Cumulative Index	<ul style="list-style-type: none"> • Measures all the evidence of a condition. Past and present (AIIMS-01) • Ex: DMF index for dental caries.
Irreversible Index	<ul style="list-style-type: none"> • Measure conditions that will not change • Index scores once established cannot decrease in value on subsequent examination • Ex: DMFT index
Reversible Index	<ul style="list-style-type: none"> • Measure conditions that can be changed • Index scores can increase or decrease on subsequent examinations • Ex: OHI index

PURPOSES AND USES OF AN INDEX

Individual Patients	Research	Community Health
Provide individual assessment to help a patient recognize an oral problem	Determine base line data before experimental factors are introduced.	Show the prevalence & trends of incidence of a condition occurring within a given population
Reveal the degree of effectiveness of present oral hygiene practice	Measure the effectiveness of specific agents for the prevention, control or treatment of oral conditions	Provide baseline data to show existing dental health practice
Motivate the person in preventive & Professional care for the elimination & control of oral disease	Measure the effectiveness of mechanical for personal care, such as toothbrushes, interdental cleaning devices or water irrigants	Assess the needs of community
Evaluate the success of individual & professional treatment over a period by comparing index scores		Compare the effects of a community program & evaluate the results
Provide a means for personal assessment by the dental hygienist of		

abilities to educate & motivate individual patient		
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INDICES USED FOR ORAL HYGIENE ASSESSMENT

ORAL HYGIENE INDEX (OHI)

- Developed by John C. Greene, Vermillion, and Waggener (MAHE-02, AIIMS-01, KCET-2K)
- It has two components, the *Debris Index* and the *Calculus Index*

Debris Index (DI)	<ul style="list-style-type: none"> • 0 – no debris or stain present • 1 – debris covering not more than one-third of the tooth surface or extrinsic stain without debris • 2 – debris covering between one- and two-thirds of the tooth surface • 3 – debris covering more than two-thirds of the tooth surface
Calculus Index (CI)	<ul style="list-style-type: none"> • 0 – No calculus present • 1 – Supragingival calculus present covering not more than one third of the tooth surface • 2 – Supragingival calculus covering between one- and two-thirds of the tooth surface, or scattered subgingival calculus • 3 – Supragingival calculus covering more than two-thirds of the tooth surface, or a continuous heavy band of subgingival calculus around the tooth.

Suggested Nominal Scale: DI and CI

<i>Rating</i>	<i>Scores</i>
Excellent	0
Good	0.1 – 1.2
Fair	1.3 – 3
Poor	3.1 – 6.0



Oral Hygiene Index (OHI = DI + CI)

<i>Rating</i>	<i>Scores</i>
Excellent	0
Good	0.1 – 2.4
Fair	2.5 – 6.0
Poor	6.1 – 12.0

SIMPLIFIED ORAL HYGIENE INDEX: OHI-S

- John C. Greene and Jack R. Vermillion in 1964
- Differ from OHI in,
 - No. of tooth surfaces scored are 6 rather than 12 (UPSC-01)
 - Method of selecting the surfaces to be scored
 - Scores which can be obtained
- Criteria used for assigning scores to the tooth surfaces are the same as OHI index.

Selection of tooth surfaces

- The six surfaces are selected from four posterior and two anterior teeth.

- The buccal surfaces of the selected upper molars and the lingual surfaces of the selected lower molars are inspected.
- In the anterior portion of the mouth, the labial surfaces of the upper right and the lower left central incisors are scored.

Interpretation of DI- S, CI- S and OHI-S

Interpretation for DI- S and CI- S

0.0 – 0.6	Good
0.7 – 1.8	Fair
1.9 – 3	Poor

Interpretation for OHI – S = DI- S + CI- S

0.0 – 1.2	Good
1.3 – 3.0	Fair
3.1 – 6.0	poor

Uses of OHI-S (MAHE-95)

- Widely used in studies for epidemiology of Periodontal diseases
- Useful in evaluation of Dental Health programs.
- Evaluation of cleansing efficiency of toothbrushes
- To evaluate an individual’s level of oral cleanliness and in clinical trials

PATIENT HYGIENE PERFORMANCE INDEX (PHP) (AIPG-07)

- A Simplified index introduced by Podshadley and Haley J.V -1968 (KCET-09)
- Developed to assess the extent of plaque and debris over a tooth surface. (MAHE-97)
- The index teeth, surfaces scored, and Substitutions for missing teeth are same as OHI –S index (AIIMS-07)

MODIFIED PATIENT HYGIENE PERFORMANCE INDEX

- Modified by Leslie V. Martens and Lawrence H. Meskin in 1972
- Developed for assessing the patient’s performance in removing debris after tooth brushing instruction
- Each tooth surface is divided into 5 areas
- Here both the facial and lingual surfaces of following teeth are scored
- Patient is scored three times
 - 1st – stained and scored at the time initial examination
 - 2nd – patient is asked to brush as usual and then stained and scored.
 - 3rd – patient has received OHI and later after 4 weeks is stained and scored.

PLAQUE COMPONENT OF THE PERIODONTAL DISEASE INDEX (KCET-99)

- Sigurd P. Ramfjord in 1959
- Was the first one that attempted to use numerical scale to assess plaque covering over tooth surfaces

Shick & Ash modification of plaque criteria

- Original criteria of the plaque component of PDI was modified by Shick and Ash in 1961
- Modified criteria consist of examining
 - Only facial and lingual surfaces are scored
 - The scoring of plaque is restricted to only half of gingival surface
 - Index teeth are same as PDI index

PLAQUE INDEX (PI)

- Developed by Silness and Loe (AIPG-98, COMEDK-03, 05)
- Most widely used and unique among the indices because it assesses only the thickness of plaque at the gingival area of the tooth – ignores coronal extent
- Four areas, distal, facial or buccal, mesial, and lingual are examined

MODIFICATIONS OF PLAQUE INDEX (1967)

- In 1967 Loe has suggested

Scoring teeth

- Examination of all the teeth

Change in sequence of examination procedure

- 17 – 27 distal, facial, mesial, and lingual
- 37 – 47 distal, facial, mesial, and lingual

Slight modification of criteria

- No application of disclosing solution

Uses

- Reliable technique for evaluating both mechanical anti-plaque procedures and chemical agents
- Used in longitudinal studies and clinical trials

TURSKY – GILMORE – GLICKMAN MODIFICATION OF THE QUIGLEY – HEIN PLAQUE INDEX

- Quigley G. & Hein J. (1962)
- Focused on gingival third of tooth surface.
- Examined only facial surface of anterior teeth.
- Uses Basic Fuschin as disclosing solution. (KCET-2K, 01, 02)
- Scoring 0-5
- Turskey S., Gilmore N.D. and Glickman I. modified in 1970.
 - Assessed on Labial and lingual surfaces of all teeth.



NAVY PLAQUE INDEX (AP-10)

- Developed by Grossman F.D and Fedi P.F in 1970 (KCET-08)
- Designed to assess the plaque control status among naval personnel and to measure any subsequent changes

MODIFIED NAVY PLAQUE INDEX

- The Modified Navy Plaque Index was developed by Elliott J.R., Bower G.M., Clemen B.A. and Rovelstad G.H. in 1972.
- The purpose of this index was to evaluate oral hygiene performance in the Navy Personnel.
- Index teeth are same as Navy Plaque Index
- This index records the presence or absence of plaque, by a score of 1 or 0, respectively on nine areas of each tooth surface of the six index teeth

Uses

- In assessing health education programs
- In assessing the ability of individuals to perform oral hygiene practices

GINGIVAL INDEX (GI) (MAHE-95)

- Also called Loe and Silness Index (MAHE-01)
- The GI assesses the severity of gingivitis based on color, consistency, and bleeding on probing.
- Each tooth is examined at the mesial, lingual, distal, and facial (or buccal) surface.

- Four criteria are possible
 - 0 – Normal gingiva;
 - 1 – Mild inflammation but no bleeding on probing;
 - 2 – Moderate inflammation and bleeding on probing; (AIIMS-94, AIPG-2K)
 - 3 – Severe inflammation and ulceration, with a tendency for spontaneous bleeding.
- Each surface is given a score, and then the scores are totaled and divided by four. That number is divided by the number of teeth examined to determine the GI.

COMMUNITY PERIODONTAL INDEX (CPI) (AIIMS-97)

Indicators

- Three indicators of periodontal status are used for this assessment:
 1. Gingival bleeding
 2. Calculus
 3. Periodontal pockets

Instruments

- A specially designed lightweight CPI probe with a 0.5 mm ball tip is used, with a black band between 3.5 and 5.5 mm and rings at 8.5 and 11.5 mm from the ball tip

Sextants

- The mouth is divided into sextants defined by tooth numbers: 18-14, 13-23, 24-28, 38-34, 33-43, and 44-48
- A sextant should be examined only if there are two or more teeth present and not indicated for extraction

Examination and Recording (AP-03)

- The index teeth, all remaining teeth in a sextant where there is no index tooth, should be probed and the highest score recorded in the appropriate box.
- The codes are
 - 0 – Healthy
 - 1 – Bleeding observed, directly or by using mouth mirror, after probing
 - 2 – Calculus detected during probing, but the entire black band on the probe visible
 - 3 – Pocket 4 - 5 mm (gingival margin within the black band on the probe)
 - 4 – Pocket 6 mm or more (black band on the probe not visible)
 - X – Excluded sextant (less than two teeth present)
 - 9 – Not recorded

COMMUNITY PERIODONTAL INDEX –TREATMENT NEED (CPI-TN) (PGI-01)

- CPI-TN developed for the “joint working committee” of the WHO and FDI by Jukka Ainamo, David Barmes, George Beagire, Terry Cutress, Jean Martin and Jennifer Srdo-Infirri in 1982. (PGI-98, AIPG-01)
- CPI-TN developed primarily to survey & evaluates periodontal treatment needs rather than determining past and present periodontal status i.e. the recession of the gingival margin and alveolar bone. (KCET-97, MAHE-02)

Indicators (COMEDK-08)

- Three indicators of periodontal status are used for this assessment
 1. Presence or absence of gingival bleeding
 2. Supra- or subgingival calculus
 3. Periodontal pockets-subdivided into shallow (4- 5 mm) and deep (6 mm or more)

Instruments (PGI-97, AIPG-96, 04, MAHE-2K, 02)

- A specially designed lightweight probe with a 0.5 mm ball tip is used, bearing a black band between 3.5 and 5.5 mm from the ball tip.
- Also known as WHO probe, no.621 probe. (KCET-04)

RUSSELL'S PERIODONTAL INDEX (PI)

- Periodontal index (PI) is described by Russell in 1956 (KAR-2K, MAHE-2K, 01)
- It was the most widely used periodontal index for many years then (in the 60s). (AIIMS-97)
- It was seen as an ideal field index and used for epidemiological surveys as it needs less time, less equipments, & its criteria is clear.
- PI is a composite index
 - *Reversible*, as it measures gingivitis
 - *Irreversible*, as it measures destructive periodontal disease

Scoring criteria (KAR-97, 01, MAHE-99, PGI-01, 03, AP-03)

Score	Criteria
0	Negative
1	Mild gingivitis
2	Gingivitis
6	Gingivitis with pocket formation
8	Advanced destruction with loss of masticatory function

Scoring (MAHE-94, 97)

- Each erupted tooth is examined & given a score between 0 to 8
- PI score for a person =

$$\frac{\text{sum of scores of examined teeth}}{\text{number of examined teeth}}$$

- Mean PI score for a group =

$$\frac{\text{sum of persons scores}}{\text{number of persons examined}}$$

- Russell chose the scoring values (0, 1, 2, 6, 8) to relate the stages of the disease scored in a survey to the clinical conditions observed.
- Low scores are given for gingival inflammation & much higher scores when the alveolar bone has been destroyed. Thus the jump from 2 to 6 in the scale
- An additional score 4 which is not used in the field study. It is an x-ray criterion used only for individual clinical examination.
- Score 4 = Early notch like resorption of the alveolar crest

Limitations

- It does not discriminate between moderate and severe gingivitis
- It does not measure loss of attachment; graded all pockets of 3 mm or more equally.
- Scored gingivitis & periodontitis on the same weighted scale

INDICES USED FOR DENTAL CARIES ASSESSMENT**DECAYED - MISSING - FILLED TEETH INDEX FOR PERMANENT TEETH (DMF INDEX)**

- Developed by Henry T Klein, Carrole E Palmer and Knutson JW in 1938 (KCET-07)
- Most universally accepted since it is based on the fact that the dental hard tissues are not self-healing; established caries leaves a scar of some sort. (AP-03)
- The tooth either remains decayed or if treated, it is extracted or filled.
- Irreversible index - measures total lifetime caries experience. (KCET-10)
- It is composed of 3 components (MAHE-98, PGI-2K)
 - D = Decayed component
 - M = Missing component
 - F = Filled component

Method of Examination

- Instruments used are,
 - No. 3 plain mouth mirror
 - Standard no. 23 explorer
- All 28 teeth are examined.
- Ask the patient and determine the reasons for absent teeth.
- Teeth surface should be cleaned if obscured by debris and calculus.

Rules for Scoring

- A tooth is erupted when the occlusal surface or incisal edge is totally exposed.
- A tooth is present even if the crown has been destroyed and only the roots are present.
- Temporary filling is considered as decayed. (KCET-97, AIIMS-06)
- No tooth should be counted more than once.
- Decayed, Missing and Filled teeth should be recorded separately.
- Third molars are excluded – difference in their status like congenitally missing, impacted, or unerupted.
- Tooth lost for reasons other than dental caries like orthodontic treatment or impaction is not included.
- Tooth restored for reasons other than dental caries such as trauma (fracture), cosmetic purpose or bridge abutment are not included.
- In cases where primary tooth is retained with the permanent successor erupted; the permanent tooth is evaluated since the primary tooth is never included in this index.
- When counting the number of Decayed teeth, also include those teeth which have restoration with recurrent decay.

Criteria for scoring (MAHE-02)

- D = Decayed component
 - Discoloration
 - Definite catch
 - Discontinuity of enamel surface
 - Definite cavitation
 - Softness of base
- M = Missing component
 - Refers to tooth missing due to caries only
- F = Filled component
 - Tooth that has been filled because of caries (permanent restoration only)

WHO criteria for Dental Caries - 1986

- 3rd molars are included.

- In persons below 30 years, teeth lost only due to caries are considered as missing.
- In persons above 30 years, teeth lost for any reasons other than caries.
- Initial caries is not considered as decayed.

Advantages (MAHE-05)

1. Caries experience (past and present) and prevalence of an individual and community can be found out.
2. By using caries experience, oral health status can be estimated indirectly.
3. It gives a broad overview of the caries experience in a population over a period.
4. D component gives tooth status affected by dental caries – caries morbidity.
5. M component gives tooth lost (caries mortality).
6. F component gives the account of the filling done among the population.

DMFS INDEX

- Developed by Henry T Klein, Carole E Palmer and Knutson JW in 1938.
- When the DMF index is employed to assess individual surface of each tooth rather than the tooth as a whole it is termed as *decayed-missing-filled surface index*.
- The principles, rules and criteria are same as that of DMFT index *EXCEPT* that all the surfaces of tooth are examined.
- The “m” component of the index is most likely to give false score. (MAHE-98)

def INDEX

- The 'def index' was described by GRUEBBEL A.O. in 1944, as an equivalent index to DMF index, for measuring dental caries in primary dentition.
- The Caries indices used for primary dentition are 'deft' index and 'defs' index equivalent to the DMFT and DMFS indices used for permanent dentition.
- As defined by Gruebbel,
 - d = decayed tooth
 - e = indicated for extraction
 - f = filled tooth
- The basic principles and rules for def index are the same as that for DMF index.
- *d - decayed indicates the number of deciduous teeth that are decayed.* (MAHE-97, 2K)
- *e – indicated for extraction*
 - Indicates those deciduous teeth which are so badly decayed that they are indicated for extraction
 - Because of the wide variation in the time of exfoliation of deciduous teeth, it is difficult to determine whether a tooth missing from the deciduous dentition was normally exfoliated or was extracted because of advanced caries.
 - If it can be accurately established that a missing deciduous tooth has been lost due to caries, include it under 'e' component.
- *f - filled indicates the number of deciduous teeth that have been attacked by caries, but which have been restored without any recurrent decay present. If a tooth has a filling but shows evidence of recurrent decay it is counted as a decayed tooth.*

Modifications of 'def' index

- 'dmf' index: dmf index for use in children before ages of Exfoliation. (MAHE-97)
- Upto 5 years of age: 'dmf' index for all the teeth
- 5 – 9 years of age:
 - 'dmf' - primary molars and canines
 - 'df' – central and lateral incisors
- 9 years and above: 'df' for all the teeth
- In case of Mixed Dentitions, the Caries Indices for the Permanent teeth and deciduous teeth must be done separately. 'DMFT' or 'DMFS' and a 'deft' or 'defs' are never added together.
- Each child is given a separate index for permanent teeth and another for primary teeth.

CARIES SEVERITY INDEX

- Developed by Tank Certrude and Storvick Clara in 1960.
- It was developed to study the depth and extent of the caries surfaces and the extent of pulpal involvements based on clinical and radiographic examinations.

DENTAL CARIES SEVERITY CLASSIFICATION SCALE (DI-D3 SCALE)

- The 01-03 scale was first published by the World Health Organization in 1979 as an aid to diagnosing coronal caries.
- It is traditionally used among European investigators who diagnose dental caries from the earliest detectable non cavitated lesion through to pulpal involvement.
- It is said to be of extreme value in research studies because it permits identification of lesion progression as well as initiation.

Procedure

- The scale is as follows,
 - 0 - Surface Sound
 - D1 - Initial Caries
 - D2 - Enamel Caries
 - D3 - Caries of Dentin
 - D4 - Pulpal Involvement

CARIES SUSCEPTIBILITY INDEX

- It was developed by – Richardson A. in 1961
- It is based on Bodecker and Mellanby caries indices. Two factors are involved in measuring caries susceptibility using the dynamic survey:
 - Amount of tooth surface at risk
 - Amount of caries developing during the period of observation
- Measure of susceptibility = 'b' divided by 'a'

SIGNIFICANT CARIES INDEX (SiC)

- It was proposed in the year 2000 by Prof. Douglas Bratthall, WHO Collaborating Centre, in order to bring attention to those individuals with the highest caries scores in each population.
- The SiC Index is the Mean DMFT of the one third of the study group with the highest caries score. The index is used as a complement to the mean DMFT value.
- To calculate Significant Caries Index:
 - Sort the individuals according to their DMFT
 - Select the one third of the population with the highest caries values
 - Calculate the Mean DMFT for this subgroup

MOLLER'S INDEX

- It was developed by Moller I. J. and Poulsen S. in 1966.
- It is a standardized system for diagnosing, recording and analyzing dental caries data. (AIPG-96, 01)
- This index is flexible and meets the various needs of different types of clinical studies on dental caries.

ROOT CARIES INDEX

- It was developed by **Ralph V Katz** in 1979 for measuring the prevalence of root caries by including the concept of teeth at risk for root caries.
- It is based on the requirements that gingival recession must occur before root surface lesions begin.

CLASSIFICATION SYSTEMS OF FLUOROSIS

DEAN'S INDEX

- Trendly H. Dean in 1934 (MAHE-2K)
- Initially this index categorized dental fluorosis on a seven point ordinal scale :-
- Normal, questionable, very mild, mild, moderate, moderately severe, severe
- In 1939 Dean combined moderately severe and severe as only severe and thus modified it into 6 point scale

Criteria of Scoring (KCET-05)

- 0 – Normal
- 1 – Questionable
- 2 – Very Mild
- 3 – Mild
- 4 – Moderate
- 5 – Severe

COMMUNITY FLUOROSIS INDEX

- Trendley H Dean in 1935

<i>Clinical appearance</i>	<i>Numerical weight</i>
Normal	0
Questionable	0.5
Very mild	1
Mild	2
Moderate	3
Severe	4



Community Fluorosis Index (CFI)

- Proposed by Trendley Dean in 1942 (MAHE-2K)
- In CFI, numerical statistical values (weights) as a score for each degree are given.
- Everyone is allotted a score according to the following scale below

<i>Fluorosis Category</i>	<i>Numerical Weight</i>
Normal	0
Questionable	0.5
Very Mild	1.0
Mild	2.0
Moderate	3.0
Severe	4.0

$$CFI = \frac{\text{Sum of (no.of individuals x statistical weights)}}{\text{No.of individuals examined}}$$

- Only when the CFI value is greater than 0.6 is fluorosis considered to be a public health problem in that area
- Public Health significance of CFI score

<i>Range</i>	<i>Significance of Scores</i>
0.0 – 0.4	Negative
0.4 – 0.5	Borderline
0.5 – 1.0	Slight
1.0 – 2.0	Medium
2.0 – 3.0	Marked

3.0 – 4.0 Very marked

- **Criteria for Fluorosis Index**

- Normal (0)
- Questionable (0.5)
- Very Mild (1)
- Mild (2)
- Moderate (3)
- Severe (4)

