

1. INTRODUCTION

There have been dramatic changes in the global pattern of oral conditions^{1,2}. Numerous studies have documented a decline in dental caries particularly among children, along with improved oral health among many age groups^{3,4}. This improved oral health is reflected among older adults with compelling evidence to show that many are retaining more of their natural teeth into old age⁵. Nevertheless periodontal disease is found to be the prevailing problem for the young and young adults. Prevalence of pocketing was reported to increase with age⁶ and there seems to be a striking similarity between industrialised and developing countries. With increasing dentate populations, it is expected that utilisation of oral healthcare will also increase.

The 1970's saw the use of instruments to study the perceived value of Oral Health Related Quality of Life (OHRQoL). Interest in OHRQoL is also spurred on by the changing global demography, with the elderly population being on the increase in many countries⁷. The social impact of oral health conditions on individuals has been reported in many studies⁸⁻¹⁰. These studies offer some insight into the social and psychological impact of oral health.

Malaysia has undertaken two oral health surveys on adults, namely the Dental Epidemiological Survey of Adults in Peninsula Malaysia 1974/1975¹¹ and the Dental Epidemiological Survey of Adults in Malaysia 1990¹². The findings of the latter serve as baseline data for caries and periodontal status of the adult population.

In Malaysia the elderly population of 65 years and above is also projected to increase from 3.9% to 4.2% by the year 2005¹³. In view of the changes in the global pattern of oral conditions, and the increasing number of the elderly, there is a greater need for information on oral diseases among the adult population.

This Oral Health Survey of Malaysian Adults 2000 was a planned ten-yearly survey, and findings will provide a measure of changes in adult oral health profile since 1990. The objectives of this survey were to assess the oral health status, impacts and treatment needs of adults aged 15 years and above, and to determine their utilisation of oral healthcare services. A social questionnaire was

utilised for the first time to match needs and demands. The findings of this survey will prove useful and timely for the formulation of oral health policies and strategies to meet the needs of the population under the Eighth Malaysia Plan (2001 – 2005). In addition, this survey will provide essential baseline data for some of the proposed goals for the National Oral Health Plan for Year 2010 for Malaysia. This document serves as a preliminary report of the National Oral Health Survey of Adults Year 2000.

2. METHODOLOGY

This was a cross-sectional study of adult Malaysian citizens of age 15 years and above. It utilised an interview questionnaire and an oral examination. A two-stage stratified random sampling method was used, involving random selection of Enumeration Blocks (EBs) and subsequently random sampling of Living Quarters (LQs) within the EBs. All subjects of age 15 years and above made up the sampling units. A sample size of 12,359 subjects was calculated to provide estimates of oral conditions within a 5% error.

A total of 22 dental public health officers were selected as examiners and 27 dental nurses as interviewers. Prior to the fieldwork, a trial run was undertaken to ascertain logistics of implementation and to undertake remedial measures for problems identified. The actual data collection was conducted over a five-month period July 2000 – November 2000.

The questionnaire consisted of 35 items. It involved items on oral impacts in terms of prevalence of oral pain and discomfort, oral functional limitations (chewing, speech and appearance), disruption of daily activities, social interactions and seeking care. A pre-test of the questionnaire was conducted to ascertain validity. Training of interviewers was undertaken to ensure standardisation of the interview procedures. The interview questionnaire was conducted before the oral examination.

The oral examination included assessment of periodontal conditions, crown caries, root caries (only in those aged 50 and above), oral lesions, prosthetic status and treatment needs. Examiners were standardised and calibrated for dental caries and periodontal conditions.

Oral examinations were undertaken using torchlight under standardised conditions. Subjects were examined in a seated position (unless bed-ridden). Portable equipment was used to ensure ease of transportation and disposable instruments were utilised where appropriate.

An EPI INFO 6 data entry form was designed to facilitate input of clinical data and questionnaire responses. The statistical tests used in this descriptive study was Chi-square, with the significance level set at $p < 0.05$.

3. FINDINGS

3.1 The Study Population

A total of 10,891 subjects were interviewed and examined, of which 87.2% were from Peninsula Malaysia, 5.2% from Sabah and 7.6% from Sarawak. Females accounted for 55.9%, and urban subjects 60.2%, of the study population. There was similar urban-rural distribution of male and female subjects.

The largest ethnic group was the Malays (57.8%) who were evenly distributed in urban and rural areas, with Chinese and Indian subjects being predominantly urban. The largest proportion of the study population was from the age group 15-24 (24.6%) followed by the age group 35-44 (21.4%).

Education Level III subjects made up 63.6% of the sample while only 3.8% were from Level I.

Education levels were categorised as follows¹⁴:

Level I	
Tertiary Education	University
Level II	
The equivalent of O-levels to institutions of higher learning	College Vocational Institution STPM or the equivalent SPM or the equivalent
Level III	
Middle Secondary School level and below including no formal education	SRP or the equivalent Primary School No formal education

Subjects in each designated Education Level are henceforth referred to as Level I, Level II or Level III subjects in this report.

3.2 Dentition Status

Total Tooth loss

Only 8.8% of the subjects were found to be edentulous (**Table 3.1**). There were no edentulous subjects among those aged 15 to 29 years. Percentage edentulism increased with advancing age from 30 years onwards, with a marked increase from age 45. There was a higher proportion of edentulous females (10.9%) than males (6.1%), and a higher proportion of edentulous rural subjects (11.6%) compared to urban (6.9%).

Table 3.1: Dentition Status of Subjects by Age Group

Age group	No. of subjects	Percentage edentulous	Subjects with 20 teeth and more (%)	Mean number of teeth present (sd)
15 – 19	1,639	0.0	1,638 (99.9)	28.3 (1.4)
20 – 24	1,040	0.0	1,039 (99.9)	29.4 (2.1)
25 – 29	958	0.0	947 (98.9)	30.0 (2.9)
30 – 34	1,064	0.3	999 (93.9)	27.2 (4.5)
35 – 44	2,329	3.1	1,770 (76.0)	23.1 (7.8)
45 – 54	1,806	10.3	969 (53.7)	18.1 (9.7)
55 – 64	1,159	26.6	373 (32.2)	12.5 (10.5)
65 – 74	664	40.8	114 (17.2)	8.3 (9.4)
75 +	232	50.4	34 (14.7)	6.8 (9.2)
ALL	10,891	8.8	7,883 (72.4)	22.2 (9.9)

There were increasing proportions of edentulism with decreasing education level, ranging from 0.5% in Level I to 13.3% in Level III.

Teeth Present

Dentate subjects comprised 91.2% of subjects examined. A total of 72.4% of subjects had 20 teeth or more (**Table 3.1**). The mean number of teeth present was 22.2 (sd 9.9). Mean number of teeth decreased with age, being less than 20 teeth from age 45 onwards.

3.3 Periodontal Conditions

Periodontal Disease Prevalence

Only 9.8% of dentate subjects had healthy gingiva, 56.9% had calculus, while 5.5% had deep pockets of 6 mm or more (**Table 3.2**). As age increases, the proportion of subjects with healthy gingiva decreased. The highest prevalence of deep pockets was found in the age group 45-54.

Table 3.2: Prevalence of Periodontal Disease by Age Group

Age Group	No. examined	No. of dentates	% subjects coded				
			Healthy (0)	Bleeding (1)	Calculus (2)	Shallow Pockets (3)	Deep Pockets (4)
15-19	1,639	1,639	25.9	10.1	60.6	3.2	0.1
20-24	1,040	1,040	14.8	6.4	68.8	8.9	1.0
25-29	958	958	8.6	4.1	68.8	16.2	2.1
30-34	1,064	1,061	7.0	3.3	62.0	22.8	4.6
35-44	2,329	2,258	5.2	2.8	54.5	29.0	7.5
45-54	1,806	1,619	4.8	1.9	49.9	28.8	10.6
55-64	1,159	849	3.9	1.3	44.6	32.3	9.2
65-74	664	392	2.8	1.8	44.6	26.5	9.4
75+	232	116	1.7	0.9	44.0	19.8	6.9
All	10,891	9,932	9.8	4.2	56.9	20.8	5.5

There was a higher proportion of females with healthy gingiva (11.3%) than males (8.1%). Males had twice the prevalence of deep pockets (7.5%), but females were noted to have a higher prevalence of missing sextants (2.8%). This was true for all age groups.

There was a higher proportion of urban subjects with healthy gingiva (11.3%) compared to rural (7.4%). Subjects from rural areas also had higher prevalence of shallow pockets (29.2%), deep pockets (7.1%) and missing sextants (4.0%).

Percentage subjects with healthy gingiva increased with increasing education level - the highest proportion being among Education Level I (21.6%). Similarly, there were no subjects with missing sextants among those in Level I whilst Level III subjects had the most (4.3%).

Periodontal Disease Severity

The mean number of sextants with healthy gingiva was 1.8 (**Table 3.3**). The mean number of sextants with less than two teeth (excluded sextants) increased with age.

Table 3.3: Mean Number of Sextants Affected by Age Group

Age Group	No. of dentate	Mean No. of Sextants					
		Healthy (0)	Bleeding or Higher Score (1+2+3+4)	Calculus or Higher Score (2+3+4)	Shallow Pockets or Higher Score (3+4)	Deep Pockets (4)	Excluded (< 2 teeth) (X)
15-19	1,639	3.5	2.5	1.9	0.1	0.0	0.0
20-24	1,040	2.6	3.4	2.8	0.2	0.0	0.0
25-29	958	2.1	3.9	3.3	0.4	0.2	0.1
30-34	1,061	1.8	3.9	3.5	0.6	0.1	0.3
35-44	2,258	1.3	3.9	3.6	0.8	0.1	0.8
45-54	1,619	0.9	3.5	3.3	0.8	0.2	1.6
55-64	849	0.6	3.1	2.9	0.9	0.1	2.3
65-74	392	0.4	2.4	2.3	0.7	0.1	3.2
75+	116	0.4	2.3	2.2	0.6	0.1	3.3
ALL	9,932	1.8	3.4	3.0	0.6	0.1	0.8

The mean number of healthy sextants was higher among urban subjects (1.9) compared to rural (1.5). Females had a higher mean number of healthy sextants (1.9) than males (1.6). Males from age 35 to 54 contributed the highest mean number of sextants with deep pockets of 6 mm or more.

Mean number of healthy sextants increased with increasing education level, with Level I subjects having the highest (2.8), and Level III subjects the lowest (1.4). Level III subjects had the highest mean number of sextants coded 1 (bleeding) or higher.

Periodontal Treatment Needs

Subjects needing oral hygiene instructions (OHI) amounted to 87.4% (TN1), with 83.2% requiring both OHI and prophylaxis (TN2). Only 5.5% of subjects required complex treatment (TN3) (**Table 3.4**).

Table 3.4: Periodontal Treatment Needs by Age Group

Age Group	Treatment needs			
	% TN0	% TN 1	% TN 2 (Mean no. of sextant coded 2+3+4)	% TN 3 (Mean no. of sextant coded 4)
15-19	25.9	74.0	63.9 (1.9)	0.1 (0.0)
20-24	14.8	85.1	78.7 (2.8)	1.0 (0.01)
25-29	8.6	91.2	87.1 (3.3)	2.1 (0.23)
30-34	7.0	92.7	89.4 (3.5)	4.6 (0.08)
35-44	5.2	93.8	91.0 (3.6)	7.5 (0.11)
45-54	4.8	91.2	89.3 (3.3)	10.6 (0.16)
55-64	3.9	87.4	86.1 (2.9)	9.2 (0.13)
65-74	2.8	78.3	76.5 (2.3)	9.4 (0.12)
75+	1.7	71.6	70.7 (2.2)	6.9 (0.14)
ALL	9.8	87.4	83.2 (3.0)	5.5 (0.08)

A higher proportion of males (7.5%) needed complex treatment compared to females (3.8%). This was markedly notable in the age group 45-54 (13.8%).

A higher proportion of rural subjects (7.1%) needed complex treatment compared to urban (4.4%). Again, the highest proportion of rural subjects needing complex care was from age group 45-54 (12.8%).

Proportions needing complex care were inversely proportionate to education level, with the highest proportion needing complex care among Level III subjects (6.9%) and the lowest among Level I subjects (2.9%).

3.4 Dental Caries

Caries Prevalence

Caries prevalence among subjects examined was 90.7%. Caries prevalence increased with age from 15 years up to 54 years after which a downward trend was observed (**Figure 3.1**).

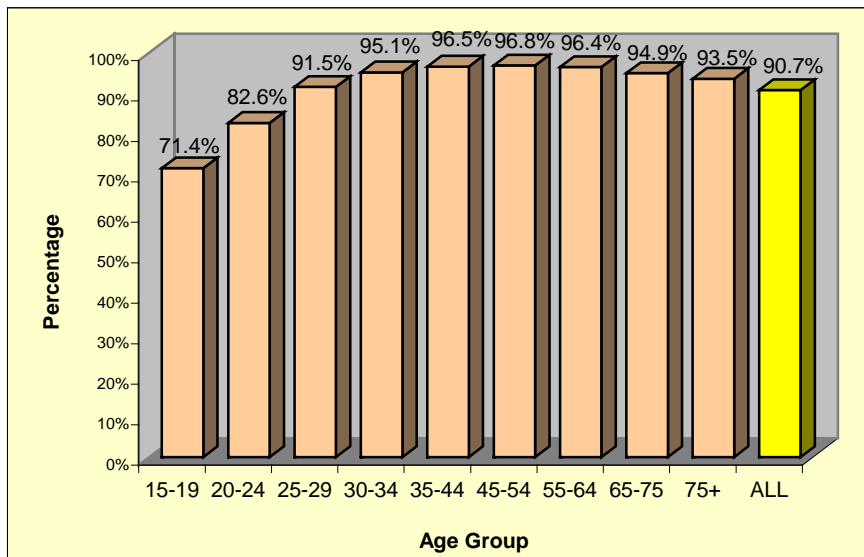


Figure 3.1: Caries Prevalence by Age Group

Caries prevalence was significantly higher among females (92.0%) compared to males (89.0%) up to age 64 years. The observed slight difference in caries prevalence between urban (90.3%) and rural (91.4%) subjects was not significant. Almost similar proportions of subjects with caries were seen in all Education Levels.

Caries Severity

The mean number of teeth affected by caries among all subjects was 11.6 (sd 10.4). However, mean DMFX(T) score among dentate subjects only, was 9.9 (sd 8.4).

Mean DMFX(T) scores increase with increasing age (**Figure 3.2**). As age advances, the M component (missing teeth) is the major contributor to caries severity.

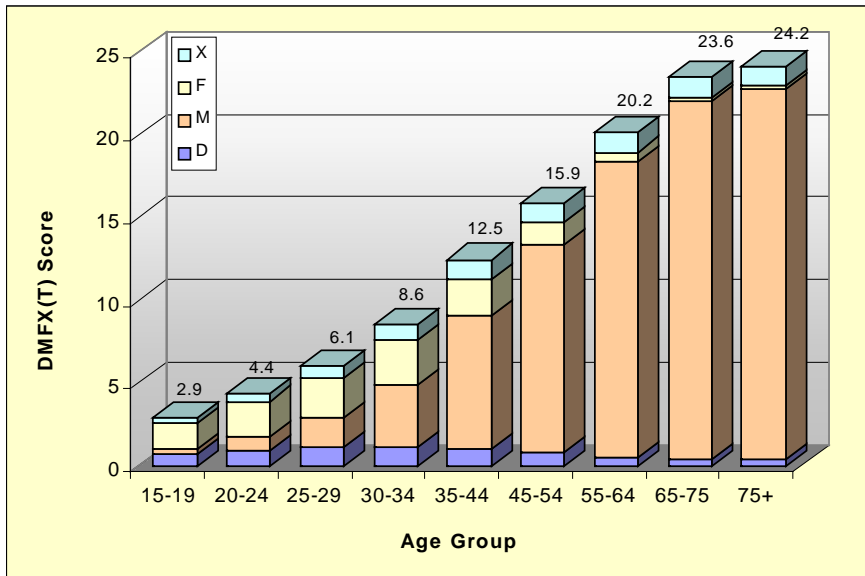


Figure 3.2: Mean DMFX(T) Score by Age Group

Females had significantly greater caries experience with a mean DMFX(T) of 12.8 (sd 10.4) than males (10.2; sd 9.4). This trend was consistent in all age groups up to 74 years.

Rural subjects had a significantly higher mean DMFX(T) of 12.4 (sd 10.6) than urban subjects (11.1; sd 9.6). Mean DMFX(T) was found to be significantly higher among Level III subjects at 13.8 (sd 10.9) as compared to Level I (7.7; sd 6.4) and Level II (7.1; sd 7.0).

The DMFX(T) components for index age groups 15-19, 35-44 and 65-74 are shown in **Table 3.5**.

Table 3.5: Components of DMFX(T) by Index Age Group

Age Group	D(T)		M(T)		F(T)		X(T)		DMFX(T)	
	Mean	sd	Mean	sd	Mean	sd	Mean	sd	Mean	sd
15-19	0.7	1.4	0.3	0.8	1.6	2.1	0.3	1.0	2.9	3.2
35-44	1.0	1.5	8.1	8.0	2.2	3.3	1.2	2.5	12.5	8.2
65-74	0.4	1.0	21.4	11.2	0.3	1.0	1.3	2.6	23.3	10.4

Tooth Mortality (M+X)

Mean tooth mortality, defined as (M+X), was 9.1 (sd 10.5). Mean (M+X) increased with age from 0.6 (sd 1.3) in age group 15-19 to 23.6 (sd 11.0) at age 75+.

Decayed Teeth (D+X)

If (D+X) teeth are defined as decayed teeth, 7.9% of teeth present were decayed. Proportions of (D + X) teeth increased with age from 3.3% at age 15-19 years to 22.9% at age 75+ years.

Restorative Index (RI)

The Restorative Index (RI) is expressed as the following formula:

$$\text{Restorative Index} = \frac{F(T)}{\text{DMFX}(T)}$$

The overall RI was 0.15. This was observed to decrease with increasing age. When expressed as a percentage, subjects aged 15-19 years, 35-44 years and 65-74 years had percentage RI of 55.0%, 17.6% and 1.3% respectively.

Caries Treatment Needs

Assessment of caries treatment needs was categorised into preventive caries-arresting care, restorative care, complex conservative care, extraction and pulp care.

Preventive caries-arresting care

Only 2.1% (230) of subjects were assessed as needing preventive caries-arresting treatment. Of these, 80.4% were for fissure sealants only, with the highest proportion being among the 25-29 year-olds. No significant differences were observed by location or by gender. The highest number of teeth designated for preventive caries-arresting care was the upper and lower first and second molars.

Restorative Care

Overall, 39.0% of subjects required restorations, with the majority being those aged 35-44 years. Need for restorative care increased with age up to 35-44 years after which a downward trend was observed. Significantly higher proportions of rural subjects and females required restorations.

Altogether, 8.7% of teeth present were assessed as requiring restorations. About 35% of these required compound restorations. The proportions of teeth requiring either one-surface or compound restorations were almost similar among 15-19 year-olds and among 35-44 year olds.

Complex Conservative Care

Less than 1% of subjects were assessed as needing crowns/bridges or veneers/laminates. No significant differences were observed between urban-rural subjects or between males-females assessed for complex conservation procedures. There was no obvious pattern for complex care between age groups, although the greatest number was found in age group 35-44 years.

Extraction

The proportion of subjects requiring extraction increased with age, ranging from 14.2% in age group 15-19 years to 33.2% among those 75+ years. Significantly higher proportions were males and those from rural areas. Need for extraction increased with decreasing education level.

Overall, 4.4% of teeth present were indicated for extraction. The majority assessed for extraction was due to caries (93.8%), with the remainder being due to other reasons, such as periodontal involvement or trauma.

If only decayed teeth were considered, 52.4% were indicated for extraction. As age increases, the proportions of decayed teeth for extraction also increased, ranging from 28.3% at age 15-19 years to 75.1% at age 75+ years.

Pulp Care

Only 0.7% of decayed teeth required pulp care, and this involved only 1.2% of dentate subjects. A significantly higher proportion of urban dentate subjects (1.4%) were assessed for pulp care compared to rural (0.8%). Similarly, a significantly higher proportion of males were noted.

3.5 Root Caries

A total of 26.3% of subjects examined were aged 50 years or more. Of these, 71.9% were dentate, and root caries was assessed only in this group.

More than 17% of dentates aged 50+ had decayed roots (rD) and/or filled roots (rF) (**Table 3.6**). There was no particular trend in proportions of subjects with affected roots, the highest being among those aged 70-74 years (24.2%).

The percentage of teeth with (rD + rF) however, increased with age, ranging from 1.6% in those aged 50-54 years to 4.3% in those aged 75+ years.

Overall, mean teeth (rD and rF) was 0.3 (sd 1.1) for those aged 50+. Teeth affected represented only 2% of the total teeth present. Mean number of teeth with root caries increased with age, ranging from 0.3 (sd 0.9) at age 50-54 to 0.6 (sd 1.9) among those aged 75+.

Table 3.6: Root Caries in Dentate Subjects Aged 50 Years and Above

Dentate Subjects (n=2,060)			
No. of subjects with rD and/or rF	No. of teeth present	No. of teeth (rD + rF)	Mean no. of teeth (rD + rF)
353 (17.1%)	34,960	689 (2.0%)	0.3 (sd 1.1)

3.6 Prosthetic Status and Need

Prosthesis Wearing

About 27% of subjects examined had prosthesis. A higher proportion of females wore prosthesis (32.6%) compared to males (19.8%). Proportions of those wearing prosthesis increased with age. About half of the subjects 65 years and above (52.0%) had prosthesis.

The highest proportion wearing prosthesis (32.8%) was among Education Level III subjects.

Partial dentures and full removable dentures were the commonest types of prostheses worn by all subjects. Less than 1% of the study population had a bridge(s).

The lowest proportion of subjects wearing prosthesis was among those with 20 or more teeth.

Prosthetic Need

Assessment for prosthetic need was made on all subjects. About one-third (34.7%) of subjects needed prostheses. Need for prosthesis was observed to increase with age. About half of subjects of 45+ years were in need of prosthesis. There was a higher proportion of Education Level III subjects needing prosthesis.

Overall, only 2.5% of the subjects needed complete full dentures.

3.7 Oral Lesions

Out of subjects examined, 6.4% (697) were found with oral lesions, with only 0.1% presenting with both soft and bony lesions (**Table 3.7**).

Table 3.7: Oral Lesion Status

CONDITION	No. of subjects	% of subjects examined
With soft tissue lesion only	479	4.4
With bony tissue lesion only	202	1.9
With both lesions	16	0.1
Total	697	6.4

The highest proportions with lesions were found among those aged 65-74 (9.2%) and among Education Level III subjects (6.5%). No significant difference was observed between gender or between location.

About 17% of subjects with lesions complained of pain associated with the lesions. Of those with pain, 61.9% needed referral compared to 23.3% of those without pain (**Table 3.8**). Overall, 29.8% (208) of those with lesions needed referral for treatment.

Table 3.8: Oral Lesion Status by Symptom and Need for Referral

Condition n = 697	With pain	With pain & needed referral (%)	Without pain	Without pain & need referral (%)
With both lesions	6	6 (100)	10	1 (10)
With soft tissue lesion only	106	61 (57.5)	373	128 (34.3)
With bony tissue lesion only	6	6 (100)	196	6 (3.1)
Total	118	73 (61.9)	579	135 (23.3)

3.8 Impacts of Oral Conditions

All subjects were interviewed. The recall period for impacts of oral conditions was the last three months prior to the study.

Twenty one per cent of dentate subjects had dentures compared to 86.1% of the edentulous.

Subjects' Perception of Oral Health

Almost two-thirds of subjects perceived their oral health as good (Table 3.9).

Table 3.9: Subjects' Perception of Health of Teeth and Gums

Item	Responses			Total
	Good	Fair	Poor	
Opinion on health of teeth and gums	6,414 (58.9%)	3,376 (31.0%)	1,101 (10.1%)	10,891

A significantly higher proportion of rural subjects rated their oral health as good (60.7%) compared to urban subjects (57.7%).

There was a significantly higher proportion of subjects from Education Level III who rated their oral health as good. There was no significant difference between males and females.

Although edentates, with or without dentures, showed no significant difference in perception of their oral health, a significantly higher proportion of dentate with denture(s) reported their oral health as poor (14.7%) compared to those without dentures (9.6%).

Overall, poor perception of oral health was associated with higher DMFX(T) scores. Good perception was associated with a higher mean number of teeth among those aged below 55 years

When periodontal status was considered, those with poor perception of oral health aged 35 to 54 years were found to have periodontal pockets of 4 mm or more.

In all age groups, most of those with pain due to oral lesions rated their oral health as poor.

Satisfaction with Appearance in Relation to Oral Cavity

More than 85% of subjects were satisfied with their appearance in relation to their oral cavity (**Table 3.10**). The proportion of males who were satisfied (86.7%) was significantly higher than females (85.3%).

Table 3.10: Subject’s Satisfaction Level with Appearance of Oral Cavity

Item	Subject’s Response		
	Satisfied	Not satisfied	Total
Satisfaction with appearance of oral cavity	9,359 (85.9%)	1,532 (14.1%)	10,891

A higher proportion of rural subjects and subjects in Education Level III were satisfied with their appearance. However, there was no trend observed by age group.

A significantly higher proportion of edentates (92.2%) were satisfied with their appearance compared to dentate subjects (85.3%). While there was no difference in satisfaction level between dentates, with or without dentures, there was a significantly higher proportion of edentates with dentures (93.3%) satisfied with their appearance than those without (84.9%).

It was also observed that among subjects with dentures, a significantly higher proportion of edentates with dentures (87.2%) were satisfied with their appearance compared to dentates with dentures (20.9%).

Pain, Discomfort and Oral Functional Limitations

In the last three months, 42.8% of subjects complained of pain and/or discomfort of the oral cavity. About 23% cited discomfort or pain due to teeth and gums, 18.2% experienced pain in other parts of the mouth and only 7.3% had problems associated with their jaw joint(s) (**Table 3.11**).

Table 3.11: Responses to Items on Pain, Discomfort and Oral Functional Limitation

Items	Responses		Total
	Yes	No	
Teeth or gums caused discomfort in last 3 months	2,483 (22.8%)	8,408 (77.2%)	10,891
Teeth or gums caused pain in last 3 months	2,472 (22.7%)	8,419 (77.3%)	10,891
Experienced pain in others parts of mouth in last 3 months	1,980 (18.2%)	8,911 (81.8%)	10,891
Problems with pain, discomfort or 'clicking' of jaw joint in last 3 months	794 (7.3%)	10,097 (92.7%)	10,891

A significantly higher proportion of females (44.1%) cited having oral pain and/or discomfort than males (41.1%) in all age groups. A significantly smaller proportion of Level III subjects (39.5%) cited oral pain and/or discomfort compared to Level I subjects (48.4%) and Level II (48.5%) subjects.

A quarter of the subjects (2,778) had oral functional limitations. The majority cited problems chewing hard foods (**Table 3.12**). Only 3.9% of subjects cited having both problems of chewing and speech.

Table 3.12: Respondents with Oral Functional Limitations

Functional Limitations	Responses		Total
	Yes	No	
Problems chewing hard foods only	2,139 (19.6%)	8,752 (80.4%)	10,891
Problems only in pronouncing words clearly	210 (1.9%)	10,681 (98.1%)	10,891
Problems with both	429 (3.9%)	10,462 (96.1%)	10,891

Among those complaining of functional limitations, 14.5% were edentulous and 85.5% were dentate (**Table 3.13**). Within the edentate group, a higher proportion without dentures reported having oral functional problems. Among the dentates, the opposite was observed.

Table 3.13: Problems with Chewing and/or Pronunciation by Dentition and Denture Status

Dentition Status	Denture Status	Problems with chewing and/or pronunciation		Total
		Yes	No	
Edentate	No denture	114 (85.7%)	19	133
	With denture	290 (35.1%)	536	826
Dentate	No denture	1,684 (21.5%)	6,160	7,844
	With denture	690 (33.1%)	1,398	2,088
Total		2,778 (25.5%)	8,113	10,891

When only subjects with dentures were considered, there was no significant difference between edentate and dentate subjects who reported oral functional limitations.

The proportion of rural subjects citing oral functional problems (28.2%) was significantly higher than urban subjects (23.7%). The highest proportion citing oral functional limitations was among Level III subjects (28.2%). However, there was no significant difference between gender.

The proportions complaining of oral functional limitations increased with age, ranging from 10.2% in age group 15-19 to 54.3% among those aged 75+.

Subjects with Dentures

Satisfaction with denture appearance

Overall, 20.2% (2,914) of subjects reported owning dentures in the last three months. The majority (86.9%) were satisfied with the appearance of their dentures.

Although there were almost similar proportions of urban (96.2%) and rural subjects (97.0%) satisfied with their dentures, these proportions were significantly different. A higher proportion of males were satisfied with their dentures (97.4%) compared to females (95.8%). There was no significant difference in responses between Education Levels. As age increases, satisfaction with denture appearance decreased up to age 64 years.

Problems of speech and chewing due to dentures

Of those with dentures, 18.6% (542) had problems with either speech or chewing or both on wearing their dentures. A significantly higher proportion had problems chewing food (**Table 3.14**).

Table 3.14: Oral Functional Limitations among Subjects Wearing Dentures in the Last 3 Months

Oral functional limitations	Responses		Total
	Yes	No	
Problems speaking clearly only	97 (3.3%)	2,817 (96.7%)	2,914
Problems chewing food only	313 (10.7%)	2,601 (89.3%)	2,914
Problems with both	132 (4.5%)	2,782 (95.5%)	2,914

There were significant differences in reported oral functional limitations only between gender and Education Levels (**Table 3.15**). The proportion of those reporting oral functional limitations increased with age.

Table 3.15: Oral Functional Limitations by Gender and Education Level

Variables	Reported functional limitations with dentures
Females	5.5%
Males	4.3%
Education Level I	2.6%
Education Level II	2.9%
Education Level III	6.2%

Pain and discomfort due to dentures

About 30% of those with dentures experienced discomfort due to loose dentures and 7% had soreness or pain on wearing dentures (**Table 3.16**). There were no significant differences between gender, location, Education Level or age group.

Table 3.16: Pain, Discomfort and Oral Functional Limitations among Subjects Owning Dentures

Items	Responses		Total
	Yes	No	
Discomfort due to loose denture(s) in last 3 months	871 (29.9%)	2,043 (70.1%)	2,914
Soreness or pain on wearing denture(s) in the last 3 months	208 (7.1%)	2,706 (92.9%)	2,914

Of those complaining of pain on wearing dentures, the only significant difference was between rural (9.2%) and urban (5.8%) subjects. No particular trend was noted among the age groups.

The majority of subjects wore their dentures all the time (**Table 3.17**), of which there were a higher proportion of females (93.6%) and those from rural areas (94.9%). However, more of the urban subjects (6.4%) wore their dentures to eat / socialise.

The observed differences between Education Levels were not significant. It was noted that more of the elderly aged 75+ never wore their dentures at all.

Table 3.17: Frequency of Wearing Denture

Items	Responses			Total
	All the time	only to eat/socialise	never wore	
Frequency of wearing denture in the last 3 months	2,716 (93.2%)	160 (5.5%)	38 (1.3%)	2,914

Dentate Subjects

Pain and discomfort from teeth and gums

Overall, 58.3% of dentate subjects cited one or more problems with teeth or gums, and about 5% cited having all the problems. The highest proportion of subjects had fractured or decayed teeth (**Table 3.18**).

Table 3.18: Pain and Discomfort from Teeth and Gums among Dentate Subjects

Item	Responses		Total
	Yes	No	
Had chipped, broken or decayed teeth in last 3 months	3,903 (39.3%)	6,029 (60.7%)	9,932
Had problems with gums that bled on brushing or flossing in last 3 months	2,933 (29.5%)	6,999 (70.5%)	9,932
Had teeth sensitive to hot and cold in last 3 months	3,471 (34.9%)	6,461 (65.1%)	9,932
Had problems with teeth that ached or throbbled in last 3 months	1,152 (11.6%)	8,780 (88.4%)	9,932

A higher proportion of rural subjects (62.3%) reported problems with teeth/gums compared to urban (55.9%). Problems with teeth/gums were inversely proportionate with education levels. The highest proportions of subjects who reported problems were aged 35-44 years. No significant difference was observed between males and females.

A positive response for problems with teeth was associated with a higher mean D (decayed) component in all age groups except for those 65+ years. The positive responses for gums that bled corresponded with higher proportions of those with pockets of 4 mm or more and those with calculus with gingival bleeding.

3.9 DISRUPTION OF DAILY ACTIVITIES

About two-thirds of subjects (7,159) had problems of mouth or jaw (**Table 3.19**). Only 4.4% cited oral problems disrupted their daily activities in the last three months.

Table 3.19: Problems of Mouth or Jaw Disrupted Daily Activities

Item	Response		Total
	Yes	No	
Subjects with oral problems	7,159 (65.7%)	3,723 (34.3%)	10,891
Problems of mouth and jaw disrupted daily activities in last 3 months	480 (4.4%)	6,679 (61.3%)	3,732 (34.3%)

There were similar proportions of males and females with oral problems. Proportions with problems increased with age ranging from 60.9% in age group 15-19 to 71.3% in age group 35-44. A decreasing trend was noted beyond this age group.

There were no significant differences between location or between Education Levels. The highest proportions of more than 10% complaining of disrupted daily activities were among those aged 20 to 29 years.

Disrupted Sleep

Sleep disruption was the most reported (**Table 3.20**). The highest proportion was among Education Level III subjects (82.9%). The observed differences between gender, location and age groups were not significant. The majority (67.7%) cited one to two nights of disrupted sleep.

Disrupted Work

Of the 480 subjects, 70.2% were employed either part-time or full-time (**Table 3.20**). Of those employed, 53.1% reported that their work was disrupted.

Among the employed, there was no significant difference in responses of disrupted work between gender, location, Education Levels or between age groups.

Table 3.20: Responses to Items on Disruption of Daily Activities

Item	Response			Total
Sleep disrupted	Yes	No		480
	381 (79.4%)	99 (20.6%)		
Work disrupted	Yes	No	Not employed	480
	179 (37.3%)	158 (32.9%)	143 (29.8%)	
Studies disrupted	Yes	No	Not a student	480
	23 (4.8%)	53 (11.0%)	404 (84.2%)	
Daily activities (chores) disrupted	Yes	No		480
	210 (43.7%)	270 (56.3%)		

Disrupted Study

Of those reporting disrupted daily activities, only 15.8% (76) were studying. Of those studying, 30.3% (23) cited that oral problems caused disruption of their studies (**Table 3.20**).

Disrupted Usual Daily Activities/Chores

More than 43% reported that oral problems disrupted their daily activities/chores (**Table 3.20**). There was a significantly higher proportion of rural subjects (49.5%) citing disrupted daily chores compared to urban (39.1%). No significance differences in responses were observed between gender, Education Levels or between age groups.

3.10 Psychosocial Impact

Of those with disrupted daily activities, 68.5% (329) reported one or more psychosocial impact, with higher proportions observed among rural subjects (75.8%) and among Education Level III subjects (73.6%). The psychosocial impact most reported was ‘refrained from smiling or laughing’ (**Table 3.21**).

No significant differences were found between gender or between age groups.

Table 3.21: Responses to Items on Psychosocial Impact

Item	Response			Total
	Never	Sometimes	Often	
Refrained from smiling or laughing	218 45.4%	203 42.3%	59 12.3%	480
Avoided talking with other	220 45.8%	214 44.6%	46 9.6%	480
Avoided eating with others	300 62.5%	143 29.8%	37 7.7%	480

3.11 Perceived Need to See Dentist

Subjects with oral problems (7,159) were asked whether they perceived a need to see the dentist. About 60% felt that they needed to, while more than one-quarter did not perceive any need for dental treatment (**Table 3.22**).

Table 3.22: Perceived Need to See Dentist

Item	Response					Total
	Yes, I need to/ want to	Don't need to/ don't want to	No need, treatment done	No need, problem resolved itself	Don't know	
Need to see dentist	Subjects with Oral Problems					7,159
	4,239 59.2%	1,900 26.5%	357 5.0%	609 8.5%	54 0.8%	
Need to see dentist	Subjects with Disrupted Daily Activities					480
	378 78.8%	29 6.0%	53 11.0%	17 3.5%	3 0.6%	

For those with disrupted daily activities, 78.8% felt that they needed to see a dentist, with only 6.0% having no perceived need (Table 3.22). Less than 15% did not feel a need to see a dentist either because they have had treatment done, or their oral problems had resolved.

3.12 Utilisation of Dental Services

Timing of Last Visit to Dentist

About 48% of subjects cited having had a dental check-up or treatment within the last two years (Figure 3.3). More than a quarter had visited a dentist within the last year. Only 5.5% had never had dental treatment.

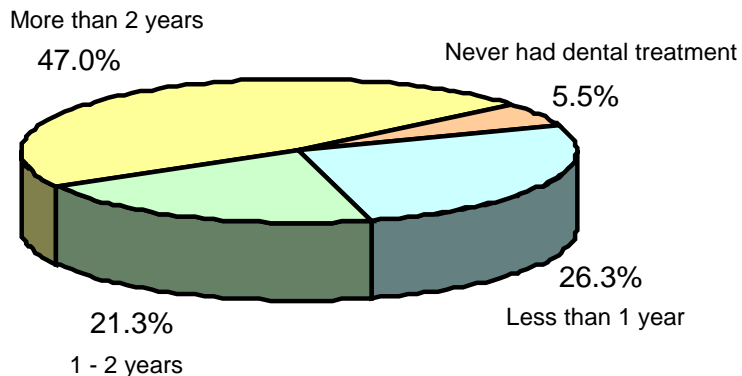


Figure 3.3: Timing of Last Visit to Dentist
(Percentages show rounding-off error)

Among those who have never had treatment, there were higher proportions of males (57.5%), subjects from Education Level III (89.3%) and rural subjects (58.9%).

Only 17.2% of edentulous subjects had visited a dentist within the last two years compared to 50.4% of the dentate subjects.

Reasons for Visit within the Last Two years

More than 51% of subjects who had treatment within the last two years did so because of dental problems (**Table 3.23**). Only 13.2% undertook ‘preventive visits’ defined as being ‘reminded by dentist’ (0.6%) and ‘time for examination/cleaning’ (12.6%). A greater proportion of subjects in urban areas went for preventive visits than those in rural areas.

Table 3.23: Reasons for Visit within the Last Two Years

Reasons for visit	No. of responses (%)
Something wrong	2,653 (51.2)
Time for examination/cleaning	651 (12.6)
Reminded by dentist	29 (0.6)
Part of school health programme	968 (18.7)
Part of treatment series	548 (10.6)
Part of ante-natal examination	148 (2.9)
Referred	179 (3.5)
Others	1 (0.0)
Total	5,177 (100)

Percentages show rounding-off error

Reasons for Not Seeking Care within the Last Two Years

There were 5,714 subjects who did not have treatment within the last 2 years (**Table 3.24**). Majority of these subjects (73.8%) cited ‘no problem’ and ‘problem not serious enough’ as the main reasons for not visiting a dentist. While having a problem was the most common reason for visiting a dentist, 50% of those who had a problem within the last three months had not visited a dentist within the last two years.

There were 5.6% who cited emotional reasons (‘fear’, ‘bad experience’) and 0.5% who cited economic reasons (‘cannot afford’, ‘do not wish to spend’) for not seeking treatment. A higher proportion of females cited ‘fear’, ‘distance’ and ‘lack of dentition’ as their reasons compared to male subjects.

Table 3.24: Reasons for Not Seeking Care within the Last 2 Years

Reasons	No. of Responses (%)
No problem	3,524 (61.7)
Problem not serious enough	693 (12.1)
Too busy	525 (9.2)
No teeth / false teeth	410 (7.2)
Fear	284 (5.0)
Bad experience	36 (0.6)
Expected problem to go away	74 (1.3)
Too far	43 (0.8)
Physical problems	44 (0.8)
Cannot afford treatment	17 (0.3)
Do not wish to spend money	13 (0.2)
Requires an appointment	10 (0.2)
Could not get appointment	7 (0.1)
Others	34 (0.6)
Total	5,714 (100)

Percentages show rounding-off error

A higher proportion of subjects in Education Level I (12.9%) and II (14.5%) cited being 'too busy' to seek care compared to Level III subjects (7.2%). The proportion of those who cited physical difficulties increased with age from 45 years onwards.

A higher proportion of urban subjects (10.5%) cited being 'too busy' compared to rural subjects (7.4%), while a higher proportion of rural subjects cited 'distance' (1.1%) as their reason for not seeking treatment.

Usual Facility Used

Slightly more than half of subjects sought treatment at public facilities (**Figure 3.4**), the higher proportion being females (53.1%) compared to males (49.3%).

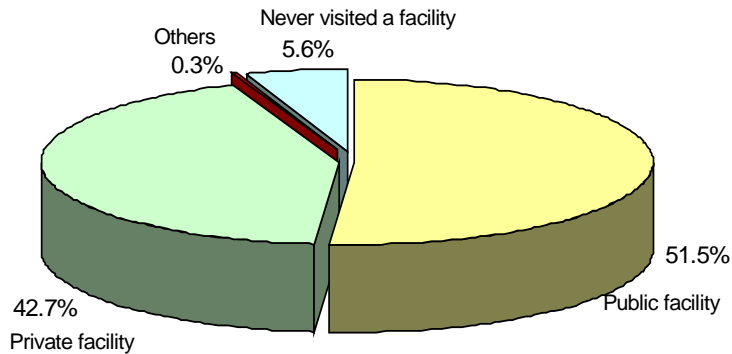


Figure 3.4: Usual Facility Used
(Percentages show rounding-off error)

A higher proportion of subjects in Education Level III were found to utilise private facilities (64.9%). While a higher proportion of subjects in age group 15-19 years (86.8%) attended public facilities, the usual facility used after the age of 30 years was private facilities. The proportion of subjects who sought alternative forms of treatment was highest in age group 55-64 years.

About 91.8% of the school-going subjects usually attended public facilities. A higher percentage of urban subjects usually attended private facilities (49.9%) compared to rural subjects (59.7%) who preferred public facilities.

Reasons for Attending Usual Facility

The four most common reasons for attending a usual facility were the 'short waiting time' (17.4%), 'part of the school health programme' (15.5%), 'habit/usual place of treatment' (14.2%) and 12.6% cited 'reasonable charges' (**Table 3.25**).

Table 3.25: Reasons for Attending Usual Facility

Reasons	No. of Responses (%)
Short waiting time	1,786 (17.4)
Part of school health programme	1,599 (15.5)
Habit, usual place of treatment	1,460 (14.2)
Reasonable charges	1,303 (12.7)
Convenient location	1,092 (10.6)
Convenient hours	806 (7.8)
Required to use this source	636 (6.2)
Good facilities and equipment	558 (5.4)
Care is free	325 (3.2)
Do not know any other dentist or clinic	152 (1.5)
Staff helpful & courteous	149 (1.4)
Only available source	114 (1.1)
Patients treated with respect	98 (1.0)
Many dentists available	8 (0.1)
Others	195 (1.9)
Total	10,281 (100)

The main reasons given for using public facilities were the ‘reasonable charges’ (22.9%), ‘usual place of treatment’ (12.4%) and ‘convenient location’ (12.4%).

Facility of Choice

If given the freedom to choose without constraints, 66.1% of subjects would prefer to have treatment at a public facility (Figure 3.5).

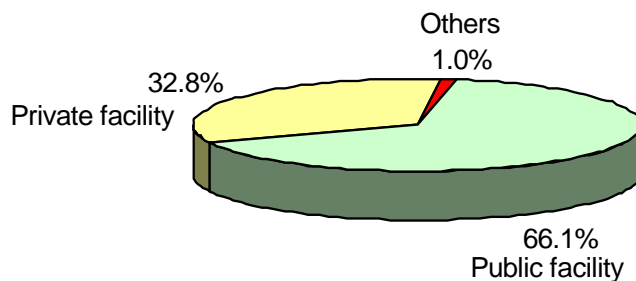


Figure 3.5: Preferred Facility if Given Freedom of Choice
(Percentages show rounding-off error)

With increasing education level, the proportions of subjects who prefer public facilities decreased. A higher proportion of urban subject (39.0%) would prefer using private facilities compared to rural subjects (23.5%).

Reasons for Choice of Facility

The most common reason for choosing a facility was ‘reasonable charges’ followed by the ‘short waiting time’ (**Table 3.26**).

Table 3.26: Reasons for Choice of Facility

Reasons	No. of Responses (%)
Reasonable charges	3,227 (29.6)
Short waiting time	1,448 (13.3)
Habit, usual place of treatment	1,372 (12.6)
Good facilities and equipment	1,101 (10.1)
Convenient location	1,018 (9.4)
Care is free	624 (5.7)
Convenient hours	600 (5.5)
Required to use this source	351 (3.2)
Staff helpful & courteous	289 (2.7)
Part of school health programme	280 (2.6)
Patients treated with respect	189 (1.7)
Only available source	56 (0.5)
Do not know any other dentist or clinic	49 (0.4)
Many dentists available	26 (0.2)
Others	261 (2.4)
Total	10,891 (100)

Percentages show rounding-off error

When only subjects who chose public facilities were considered, the most common reasons were ‘reasonable charges’ (44.6%), ‘good facilities and equipment’ (12.6%) and ‘convenient location’ (11.4%). The most common reasons cited for choosing private facilities were the ‘short waiting time’ (39.7%), ‘habit, usual place of treatment’ (17.9%) and the ‘convenient hours’ (14.8%).

Subjects aged 65+ years ranked ‘convenient location’ higher than ‘good facilities and equipment’.

A higher proportion of urban subjects cited 'good facilities and equipment' (14.1%), while a higher proportion of rural subjects cited 'convenient location' (15.2%) as reasons for choice of a facility.

4. DISCUSSION

This study adopted a two-stage random sampling method as utilised in previous adult surveys^{11,12}. The findings are based on an unweighted sample population. Any comparisons made between this study and the 1990 adult survey findings are based on unweighted samples for both surveys. Analyses pertain only to the subjects interviewed and examined.

Study Population

Mid-year population projection for the regions of Malaysia in 2000 comprised 79.6% for Peninsula Malaysia, 11.3% for Sabah and 9.1% for Sarawak. In this study there was over-representation of subjects from Peninsula Malaysia at 87.2% of the study population. Sabah and Sarawak were under-represented at only 5.2 % and 7.6% of the study population respectively. This shortfall arose due to logistic problems associated with distance and accessibility in areas of Sabah and Sarawak, particularly so for rural subjects living in the interior remote villages.

The ethnic breakdown and the urban-rural distribution of the study population compare favourably with that of preliminary census data for year 2000 for Malaysia¹⁵. The gender proportions for Malaysia are 50.4% males to 49.6% females¹⁶. In this study females were slightly over-represented at 55.9%. More than 8% of subjects aged 65+ were included, double that of the percentage population for that age group. The higher proportions of females and the elderly are likely due to the fact that more females were unemployed and at home during the visits, as were the elderly population.

There were specific problems associated with the urban Federal Territory of Kuala Lumpur (FTKL), which yielded the lowest number of expected adults (62%). Due to rapid commercialisation of areas in FTKL, 6.5% of LQs randomly sampled no longer existed. Subjects were not at home after repeated three visits in 43.5% of

the LQs, there were high refusal rates in 35.9% of LQs and 16.0% of LQs housed non-citizens.

Methodological Considerations

The adult survey undertaken in 1974¹¹ only covered adults of Peninsula Malaysia, and the results of the 1990 adult survey¹² for the whole of Malaysia are taken as baseline data for the country. Although not directly comparable, previous surveys in Malaysia provide a general indication of the oral health country profile for adults.

This study not only looked into dental caries and periodontal conditions, as did the previous surveys, but the objectives also encompassed treatment needs for the two conditions. For the first time for Malaysia, prosthetic status and needs were assessed. An interview questionnaire was utilised to assess impacts of oral conditions and utilisation of oral healthcare services.

To simplify logistics of access and to overcome attrition of subject numbers, all subjects were interviewed followed by an oral health examination. This is unlike adult surveys in other countries where subjects were interviewed and subsequently given an appointment to be examined on a separate occasion^{17,18}.

In line with previous adult surveys in the country, all adults above the age of 15 formed the sampling units. This Malaysian criterion for 'adults' differs from that of adult surveys in other countries^{17,19}.

Standardisation of examiners

Examiners were only calibrated and standardised for caries and periodontal conditions. The examiners comprised experienced public health dentists who have had exposure in using the indices employed. Benchmark examiners were chosen based on their persistent and reliable assessment of the oral conditions under study. However, due to the large area of coverage and the concurrent examination of subjects in all states in Malaysia, it was not possible to employ a roving epidemiologist for the study. Examiners however, conducted random examination on 5% of subjects for intra-examiner variability. All examiners achieved an

intra-examiner Kappa score of > 0.8, classified as ‘almost perfect’ agreement.

Oral Conditions

Tooth Loss and Edentulism

Edentulism rates were found to increase with age consistent with the 1990 survey. However, there has been improvement in dentition status over the 10-year period. This is manifested by decreased rates of edentulism in all age groups, with no edentulous subject found among those 15 to 29 years (**Table 4.1**). Studies in other countries have shown similar falling trends of edentulism^{17,18}. It is quite likely that the overriding contributing factor may be an overall change of philosophy in oral healthcare with increased emphasis on prevention.

Table 4.1: Percentage Edentates, Mean Tooth Mortality (M+X) and Mean Number of Teeth Present by Age Group (1990 and 2000 Surveys)

Age Group	Year	No. Examined	Edentates		Mean Tooth Mortality (M+X)	Mean Teeth Present
			No.	%		
15-19	1990	1,928	0	0	1.3	28.2
	2000	1,639	0	0	0.6	28.3
20-24	1990	1,597	8	0.5	3.0	28.4
	2000	1,040	0	0	1.4	29.4
25-29	1990	1,745	16	0.9	5.3	27.2
	2000	958	0	0	2.6	30.0
30-34	1990	1,747	39	2.2	7.2	25.2
	2000	1,064	3	0.3	4.8	27.2
35-44	1990	2,644	192	7.3	10.0	22.8
	2000	2,329	73	3.1	9.3	23.1
45-54	1990	1,925	308	16.0	13.4	20.3
	2000	1,806	187	10.3	13.7	18.1
55-64	1990	1,339	411	30.7	19.1	14.0
	2000	1,159	308	26.6	19.1	12.5
65+	1990	815	461	56.6	22.1	11.6
	2000	896	388	43.3	22.9	7.9
ALL	1990	13,740	1,435	10.4	10.2	22.3
	2000	10,891	959	8.8	9.1	22.2

The proportion of those with 20 or more teeth decreased with age consistent with that of 1990. However, improvement in dentition status is again demonstrated by a greater number of teeth present between the ages 15 to 44 years over that period (**Table 4.1**).

Females were found to have lost more teeth than males despite a higher prevalence of females having healthy periodontium. This is consistent with other local studies^{20,21}. This may be attributed to different patterns of dental services utilisation where females have been found to utilise services more than males. More frequently females have been found to have their few remaining teeth extracted and replaced by prosthesis for cosmetic reasons^{20,22}.

The urban population had a lower rate of edentulism than rural, consistent with other local studies^{12,21}. This could be due to differences in socio-economic conditions. This is supported by the fact that this study found a higher proportion of edentulous subjects among those in Education Level III, who comprised almost three-quarters of subjects in rural areas. This finding is also consistent with that of the Second International Collaborative Study (ICS II)²³ where lower education was found to be related to a higher number of decayed teeth, missing teeth and poorer periodontal status.

However, the overall rate of edentulism at 8.8% in 2000 is still higher than that for Singapore adults at 3.4% in 1992¹⁷.

Dental Caries

The DMFX(T) index for caries is utilised in Malaysia where the X component denotes decayed teeth indicated for extraction. It is stressed that the numerical values of DMFX(T) and that of DMF(T) which is universally employed, are the same. The use of the X component is still employed based on the high need for extractions for decayed teeth. This is especially so for the rural areas, where extraction may still be deemed the most appropriate treatment for the community.

Caries prevalence increased with age consistent with other surveys^{11,12,17}. This study seems to indicate some reduction in caries prevalence - prevalence being 90.7% compared to 95% (1974) and 94.6% (1990). This slight improvement is mainly contributed by a large majority of caries-free subjects in the younger ages between 15 and 30 years (**Figure 4.1**).

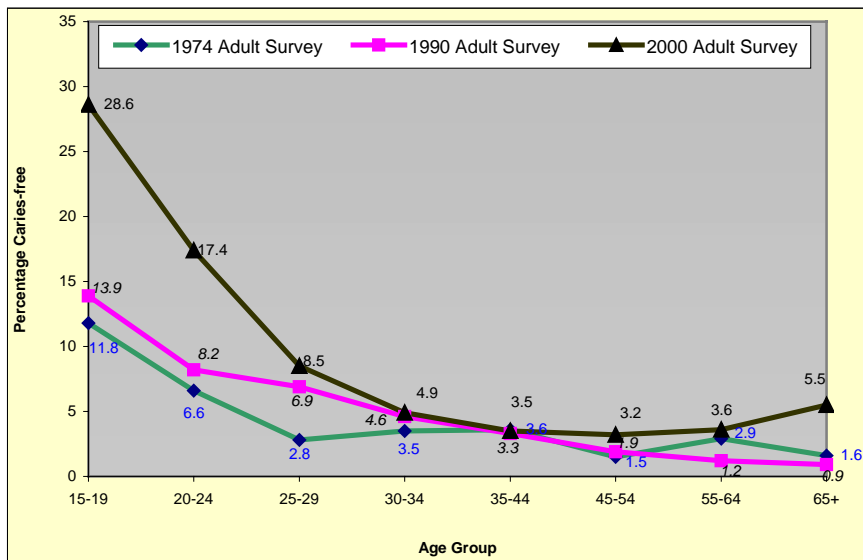


Figure 4.1: Percentage Caries-free Adults by Age Group

DMFX(T) increased with age. However, there is reduction in severity among those below 44 years over the 10-year period of 1990 to 2000 (**Figure 4.2**). Tooth mortality (M+X) also decreased in those aged 44 years and below in the same period (**Table 4.1**). This cut-off age of 44 may likely be linked to several developments in fluoride use in the years following Independence in 1957. Water fluoridation in Malaysia started sporadically in 1957 and became widespread after the cabinet committee approved a national fluoridation programme in 1972. Improved dentition status may also be attributed to the use of topical fluoride application for primary school children.

Caries prevalence was significantly higher among females. Females were also found to have higher caries experience. This trend is consistent in all age groups. This is consistent with past local surveys^{11,12,24}.

Overall caries severity among dentate subjects was 9.9 (sd 8.4). This is only slightly lower than the DMFT score of 10.7 for dentate adults in Singapore in 1992¹⁷.

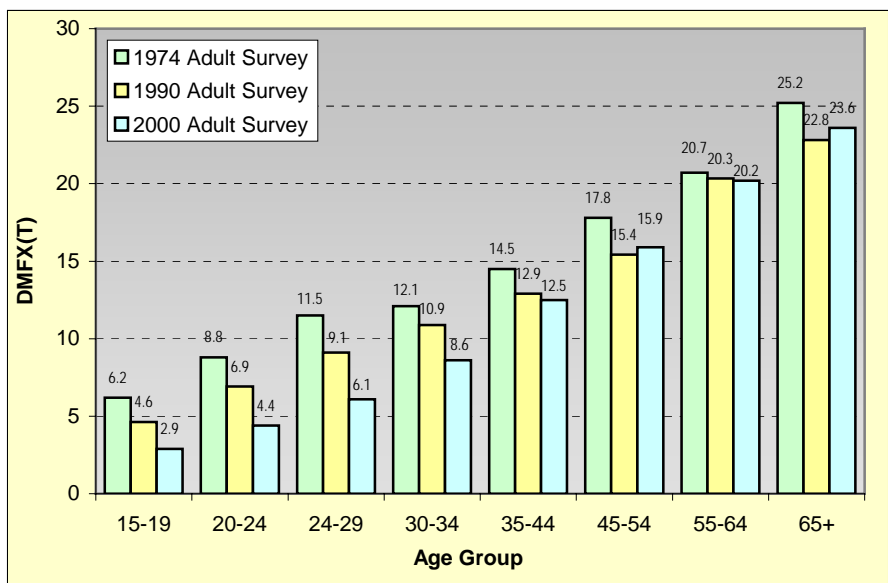


Figure 4.2: DMFX(T) by Age Group (1974, 1990 and 2000 Adult Surveys)

Unmet caries needs expressed as (D + X) is very low among the younger adults especially among those aged 15 – 29 years. This is complemented by high Restorative Indices among the younger age groups. This is most likely explained by the exposure of this group to the wide-ranging school dental programme in Malaysia, which provides comprehensive care to schoolchildren. The older adults did not have the benefit of the school dental service or that of water fluoridation.

Root Caries

This is the first national adult study in Malaysia that encompassed an assessment of root caries and thus will serve as baseline data for the country. Root caries was only assessed in those aged 50+ years, of which more than 71% were dentate. The limitation to age 50+ years was made on the basis that data from other countries show very slow progression of root caries^{17,25}. Age has been found to be the only variable associated with incidence of root caries²⁵. The 1992 Singapore study¹⁷ had shown that adults younger than 50 years had almost negligible root caries, and that it was only in those 50+ years that a mean of 0.5 roots or more were affected. In this study, the percentage of teeth with root caries increased with age, consistent with other studies^{17,25}.

Teeth affected represented only 2% of the total teeth present, the mean teeth present among 50+ years being 17.0 (sd 8.7). A similar proportion of 2.5% of susceptible root surfaces being affected has been quoted²⁶. Root caries prevalence and severity in this study was found to be lower than that of Singapore adults of corresponding age groups. In this study 20.5% of dentates aged 65+ years had root caries, lower than the prevalence for Singapore of 38.2% for the same age group. Similar to the results of the Singapore study, roots of teeth affected by decay were also largely found to be unrestored.

Periodontal Conditions

As in the 1990 survey, this survey also utilised the Community Periodontal Index to assess the periodontal status and treatment needs of adults. There seems to be a slight reduction in dentate subjects presenting with periodontal conditions. It was found that 90.2% of the dentate subjects were affected compared to 92.8% in the 1990 survey. As age increased, the proportion of subjects with healthy gingiva decreased, comparable to other studies^{12,27-29}.

Higher proportions of females had healthy gingiva consistent with the 1990 survey¹².

Preliminary findings for periodontal conditions in this study are encouraging. This is shown by decreasing proportions designated for treatment over the 10-year period between 1990 and 2000 (**Table 4.2**). There is also indication of decrease in severity with a reduction in mean number of sextants coded 2 and above, and a decrease in mean number of sextants for complex periodontal treatment (Code 4).

Table 4.2 : Periodontal Treatment Need by Age Group (1990 and 2000 Adult Surveys)

Age Group	Year	No. examined	No. of dentate	Treatment Need			
				% TN 0	% TN 1	% TN 2 (Mean no. of sextants coded 2+3+4)	% TN 3 (Mean no. of sextants coded 4)
15 – 19	1990	1,928	1,928	16.9	83.1	72.7 (2.2)	0.3 (0.0)
	2000	1,639	1,639	25.9	74.0	63.9 (1.9)	0.1 (0.0)
35 – 44	1990	2,644	2,452	4.6	95.4	92.5 (3.6)	8.5 (0.2)
	2000	2,329	2,258	5.2	93.8	91.0 (3.6)	7.5 (0.0)
65+	1990	815	354	4.2	95.8	95.2 (3.0)	16.4 (0.3)
	2000	896	508	2.6	76.8	75.2 (2.3)	8.9 (0.1)
ALL	1990	13,740	12,305	7.2	92.8	88.1 (3.2)	6.0 (0.1)
	2000	10,891	9,932	9.8	87.4	83.2 (3.0)	5.5 (0.08)

Prosthetic Status and Need

This is the first national study that has encompassed an assessment of prosthetic status and need. In this study females presented with more prosthesis than males, consistent with findings of other local studies^{11,21,30}. Females have been found to be more motivated towards rehabilitation than males²⁰. The prevalence of prosthesis wearing between urban and rural subjects was almost similar despite a higher proportion of rural subjects being edentulous. This could be due to a difference in expressed need since more than one-third of the rural edentates who did not seek treatment within the last two years felt that they had ‘no problems’ or that their problems were ‘not serious enough’.

Subjects with 20 or more teeth were least likely to wear prosthesis and this observation is supported by other findings³⁰⁻³², which found that those with 20 functional teeth were able to function effectively, both physically and from a psychosocial aspect.

The Interview Questionnaire

Impacts

The assessment of impacts of oral health through use of a questionnaire was undertaken for the first time in this national survey. This will provide invaluable information on the effect of oral health on the quality of life of Malaysian adults.

In this study, 60% felt they needed to see a dentist and this was higher in the younger age groups comparable to the results for Singapore¹⁷. This may be due to increased awareness on oral health among the younger adults.

Overall, about two-thirds of subjects had problems associated with the oral cavity, with about 43% citing oral pain and/or discomfort. More than 25% complained of functional problems of chewing and eating. Although less than 7% cite that oral problems disrupt daily activities, about half suffered psychosocial setbacks due to their problems. All these findings serve to demonstrate that oral pain and discomfort is one of the causes of morbidity among a high percentage of subjects.

This study shows that as mean number of teeth decreases and a higher proportion become edentulous with increasing age, there were less complaints of oral problems; the most contented being the edentates with dentures. The older subjects may perceive the loss of teeth associated with ageing as unavoidable, and it has been reported that the elderly in comparison to the young seem to have a less favourable attitude towards the value of natural teeth³³.

Utilisation of dental services

Only slightly more than one quarter had made a visit within the last year. However, if visits within the last two years are considered, 47.5% had made visits, a large majority of visits having been made

by those aged 15-19 years. This is not unexpected due to the extensive coverage of the school dental programme under the Ministry of Health.

Females and those with tertiary education were more likely to make dental visits and these are consistent with findings of other major studies^{34,354}.

'Preventive visits'²³ were defined as those visits made based on responses that "it was time for examination/cleaning" or "the dentist reminded me". In this study only about 13% had made 'preventive visits', with the highest proportion among the young aged 15-24 years. There was also a higher proportion of those with tertiary education who had undertaken 'preventive visits'. This is encouraging because it indicates that a substantial number of those who have left secondary school made self-initiated oral health visits. However, more than half of subjects who had made visits within the last two years, cited dental problems as reasons for their visits. The results thus, also indicate that 'preventive visits' are not sustained as age increases, with visits made only when there is a perceived oral problem.

About three quarters of those who had not made a dental visit within the last 2 years cited having 'no problems' (61.7%) or their oral problems 'not being serious enough' (12.1%). A higher proportion of urban subjects cited being 'too busy'. These appear to indicate that there may be a lack of importance or urgency associated with dental visits.

Only 0.5% cited economic reasons as a barrier to dental visits. It would appear that the majority of Malaysian adults find dental care affordable. This may likely be due to the fact that the public sector shoulders a major responsibility for oral healthcare delivery. Charges at public facilities are very nominal and the public incur low, or even zero, out-of-pocket expenditure for oral healthcare at such facilities. This finding is consistent with that of a major household health expenditure study undertaken in 1996³⁵.

More than half of the subjects had utilised a public sector facility. When further asked as to their preference should there be no constraints, more than 65% said they would prefer public sector facilities due to the 'reasonable charges', 'convenient location' and

'the good facilities and equipment'. These responses are encouraging in that it indicates confidence in public sector services. The Ministry of Health (MOH) has a large network of decentralised facilities where about 81.1% live within 3 km of a static health facility, and close to 90% live within 5 km³⁶. The responses are a reflection of how government policies have succeeded in delivering healthcare to both urban and rural populations. The responses also give a good perspective of the Oral Health Division, MOH initiative towards upgrading of facilities and strengthening of infection control processes.

However, despite the wide network of public facilities, a higher proportion of rural subjects still cited 'distance' as reasons for not visiting a dentist. This may be due to the fact that logistics of transport may still be a problem in the rural areas.

For those who preferred private facilities the most common reasons were 'short waiting time' and 'convenient hours'. It is likely that at private facilities there is recourse to immediate attention and early appointments. This is unlike the public facilities where care is prioritised to cater to specific age groups, in particular school children. This leads to longer wait time between appointments for adults. The other likely reason may be the flexible hours of the private sector to suit clients' needs, given that public sector facilities work within 'normal' working hours.

5. CONCLUSION AND RECOMMENDATION

These preliminary findings of the adult survey in year 2000 provide invaluable insight into current adult oral health profile of Malaysian adults.

There seems to be evidence of improved oral health status compared to the findings of the 1990 adult survey. This is demonstrated by an increase in the number of dentates, an increase in the number of those with healthy gingiva, lower DMFX(T) scores among those aged 45 years and below, and greater proportions of caries-free adults below the age of 30. More than 70% of subjects examined had 20 or more teeth.

Treatment need is still quite high. A large majority required oral hygiene instructions and prophylaxis while there has not been much change in those requiring complex treatment. More than a third of subjects required restorations. Need for extraction is relatively high.

Proportions of teeth with root caries increased with age although there was no particular trend in proportions of subjects with roots caries from age 50 onwards.

Oral lesions were not very common, found in slightly more than 6% of subjects only, the highest proportion being among those aged 65-74. Of this, almost one-third needed further referral, despite less than 20% complaining of pain associated with the lesions.

Education level and location were associated with poorer oral health status. Education level was found to be inversely proportionate to proportion of edentulous subjects, those with prosthesis and those with periodontal conditions. However, there was no clear-cut trend with caries experience. A higher proportion of rural subjects were found to be edentulous, had more periodontal problems and exhibited higher caries experience than urban subjects.

Paradoxically, although a higher proportion of females were found with healthy gingiva, yet a higher proportion of females were also edentulous. Females were more likely to have prosthesis and higher caries experience than males.

Although one-third of subjects required prostheses, only about a quarter of subjects had prostheses. More than half of the elderly (65+ years) had prosthesis.

About two-thirds of subjects had problems of the oral cavity within the last three months. Slightly more than a quarter of subjects cited having functional problems of chewing or speaking. However, despite 42.8% complaining of oral pain or discomfort within the last three months, almost 60% of subjects perceived their oral health as good, with more than 85% professing satisfaction with their appearance in relation to their oral cavity.

Very few subjects reported oral problems that resulted in disruption of their daily activities; the most reported being disruption of sleep. An equally small proportion reported disruption of social interactions; the majority reporting 'refraining from smiling or laughing'.

Less than half of subjects cited making a dental visit within the last two years, and more than 50% of them did so because they had dental problems. Only about 13% made self-initiated 'preventive visits'.

Only about 60% of those with problems of the oral cavity perceived a need to see a dentist. In fact, about 50% of those with problems of the oral cavity did not make a dental visit within the last two years, the large majority perceiving dental problems as 'not being serious enough'.

Economic reason was not a barrier to dental treatment for a large majority of Malaysians.

Public facilities seemed to rate quite highly with a substantial number of subjects. More than half of subjects attended a public facility, yet if given a choice of facilities, more than two-thirds would actually prefer to use a public facility. The reasons for preference of public facilities were 'reasonable charges', 'good facilities and equipment' and 'convenient location'. Those who chose private facilities did so mainly because of the 'short waiting time' and 'convenient hours'.

Noting the findings of this study, the following recommendations are considered.

- While priority for oral healthcare in the public sector is for the younger age groups, there must be concerted efforts to target oral health promotion towards middle-aged adults to decrease oral health problems among the elderly.

- Oral health promotion among the younger age groups must emphasise self-care and continuation of 'preventive visits' after discontinuance of school dental programmes.
- In view of the gender, educational and location bias in severity and prevalence of oral conditions, oral health messages should take consideration of these differences.
- In consideration of the large number of subjects requiring oral health counselling and prophylaxis, the option to expand and extend the role and function of dental auxiliaries in periodontal treatment should be developed to enable delegation of such care.

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