

# THE DENTAL HEALTH OF SEVEN YEAR OLD CHILDREN IN MALTA'S STATE-RUN PRIMARY SCHOOLS

H. GALEA

F.D.S., R.C.S. (ENG.)

*School Dental Surgeon and Demonstrator,  
Department of Dental Surgery,  
Royal University of Malta.*

The school dental inspection provides a unique opportunity for epidemiological investigation. It can prove to be a valuable educational experience for the examiner and the examinee alike.

Malta's 93 state-run primary schools enrolled 28,419 pupils in October, 1970. Schools differ widely in size and capacity; 47 children attend Ghemieri Mixed School, and the schools at Hamrun register 2,076 pupils.

Dental disease is seen to occur more frequently in one community than in another. For instance, 24% and 63% of 200 five and six year olds examined by myself in 1969 were affected by dental caries in Naxxar and Luqa respectively.

The opportunity was taken of utilising sessions normally devoted to school inspection and personalised dental health education to investigate the dental needs of seven year old children in towns and villages with school populations in excess of 700. Emphasis was laid on the age of seven years because it is at this age that the accumulated backlog of neglect of dental caries in the deciduous dentition makes its heaviest demands on curative services. The school admitting age is five years and the school child receives one yearly dental inspection during the first two years and another at the end of its school life. An inspection at seven years would serve to evaluate the effectiveness of the school dental programme as it exists. The attendance rate following a school inspection, when no attempt is made to increase demand beyond informing parent through their child that treatment is necessary, is usually around 40%.

Unpublished data from a previous

survey (Galea, 1970), show that at this age 50% of

a/a

ba/ab

have exfoliated. Much of the caries affecting parents through their child that treatment overlooked. Data from the same source indicate that the peak incidence of carious lesions in the anterior interproximal segments of the deciduous dentition (including the mesial aspects of the canines) occurs at the age of five years and is likely to be 14% of the total caries in the mouth.

## Objectives of the survey

1. To provide data on the specific requirements for preventive and curative services in different localities on the Island.
2. To obtain objective data which can be used in evaluating the effectiveness of existing dental programmes in eliminating the hazards to dental and general health.
3. To provide guidelines for national action to develop child dental health services.
4. To serve as a pilot study for the continuous collection of information needed by governments to evaluate child dental health services.

## Materials and methods

An assistant selected pupils from the school register who were, or were to be, seven years old on the date of inspection. Only those schools with a minimum of 100 seven year olds were included in the survey. The sample consisted of 2,176

children, of whom 1,958 were available for examination. Inspections were performed by one clinician using sickle explorers, plane mouth mirrors, and a 75 watt light source in an anglepoise lamp. Data were recorded by one assistant.

### Dental Caries

#### *Standards of Assessment*

The examination for caries and the diagnosis of the minimal lesion were carried out according to the recommendations of the World Health Organisation (1962 and 1965).

#### *Indices of caries experience*

Summarisation of data is made for each community and for the sexes separately. The report includes the percentage of persons referred for treatment, the percentage of persons with decayed and/or filled deciduous and permanent teeth, the percentage of persons with one or more deciduous teeth filled (f), requiring filling (d), or extraction (i), and with no decayed and/or filled teeth.

Separate data are given for the mean 'def' rate and for 'd', 'i', 'e', or 'f' per person.

The lower case letters 'def' have been used here to indicate caries experience in the deciduous dentition as represented by a summation of teeth which are decayed, teeth (molars) extracted because of caries, and teeth which have received a permanent restoration. A tooth was presumed indicated for extraction (i) when caries had encroached on four or more of its surfaces. Missing deciduous molars are, at this age, presumed extracted.

Summarisation for the permanent dentition includes the percentage of persons with decayed and/or filled first permanent molars. The number of affected first permanent molars is also expressed as a percentage of those present in the mouth.

### Periodontal Disease

#### *Standards of Assessment*

Periodontal status is measured in terms of the condition of the periodontal

tissues and the presence of calculus. The investing tissues of the upper and lower six front teeth were scored by the Periodontal Index (PI) developed by Russell (1956). Individual PI scores were totalled and divided by the number of persons examined in each locality to determine the group PI score. The percentage of persons with overt gingivitis and with destructive periodontal disease is also given.

### Oral Hygiene

#### *Standards of Assessment*

The Oral Hygiene Index simplified OHI-S (Greene and Vermillion, 1964) was used to provide information on the amount of calculus and debris present in each group. Oral debris and stain were scored together and calculus was scored separately. The subject's OHI-S was obtained by adding the mean oral debris and mean calculus scores, the means being the total of individual scores divided by the number of surfaces examined. The group OHI-S was obtained by dividing the sum of individual OHI-S scores by the number of persons examined.

### Results

The total school population, the number of children sampled and actually inspected in each locality is given in *Table 1*. *Table 2* gives the percentage of children referred for treatment. The highest referral rates were for children attending schools in Zabbar, Cospicua and Rabat. If allowances are made for school population density, the region encompassing Cospicua, Paola, Zabbar and Zejtun would make the greatest demands on curative services. Hamrun, Qormi and Zebbug together come a close second. The school populations of Valletta, Floriana, Msida, Gzira, Sliema and St. Julians combined are less than three fourths of those of Birkirkara, Rabat, and Mosta, localities making the next heaviest demand on the resources of the School Dental Service.

Eighty percent of seven year olds in Zabbar suffer from dental caries and thirty percent have dental calculus. The lowest

LOCALITY	SCHOOL POPULATION	SAMPLE			NUMBER INSPECTED		
		MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
Birkirkara	1925	139	138	277	127	125	252
Cospicua	932	65	62	127	55	49	104
Hamrun	2096	123	96	219	116	89	205
Mosta	942	67	64	131	65	62	127
Paola	1410	105	81	186	92	71	163
Qormi	1973	140	116	256	131	110	241
Rabat	1204	108	78	186	97	71	168
Sliema	732	50	72	122	44	67	111
Valetta	809	51	52	103	40	47	87
Zabbar	1216	85	67	152	76	55	131
Zebbug	1020	69	72	141	59	55	114
Zejtun	1196	85	87	172	77	79	156
Zurrieq	826	58	46	104	55	44	99
Total	16281	1145	1031	2176	1034	924	1958

Table 1. Total school populations, number of seven year old children sampled, and actual number available for inspection (October, 1970 - July, 1971).

LOCALITY	% OF CHILDREN REFERRED FOR TREATMENT			% OF CHILDREN REQUIRING TREATMENT FOR					
	MALE	FEMALE	MIXED	DENTAL CARIES			REMOVAL OF CALCULUS		
	MALE	FEMALE	MIXED	MALE	FEMALE	MIXED	MALE	FEMALE	MIXED
Birkirkara	68.5	71.2	70.0	60.0	57.6	58.7	16.5	22.4	19.4
Cospicua	78.2	85.7	81.7	65.5	81.6	73.1	18.2	12.2	15.4
Hamrun	59.5	61.8	60.5	51.7	58.4	54.6	12.1	9.0	10.7
Mosta	55.4	43.5	49.6	50.8	43.5	47.2	9.2		4.7
Paola	67.4	78.9	72.4	59.8	70.4	64.4	10.9	23.9	16.6
Qormi	55.7	71.8	63.1	53.4	66.4	59.3	9.2	12.7	10.8
Rabat	73.2	85.9	78.6	62.9	76.1	68.5	25.8	26.8	26.2
Sliema	65.9	71.2	68.5	56.8	64.2	61.3	18.2	13.4	15.3
Valetta	60.0	72.3	66.7	55.0	72.3	64.4	5.0	2.1	3.4
Zabbar	90.8	90.9	90.8	80.3	80.0	80.1	31.6	27.3	29.8
Zebbug	74.6	76.4	75.4	62.7	67.3	64.9	11.8	10.9	11.4
Zejtun	70.1	81.0	75.6	67.5	74.7	71.2	5.2	21.5	13.5
Zurrieq	72.7	78.5	75.8	65.5	70.5	67.7	14.5	18.2	16.1

Table 2

Locality	def			d			i			e			f		
	M	F	Mixed	M	F	Mixed	M	F	Mixed	M	F	Mixed	M	F	Mixed
Birkirkara	2.31	2.24	2.28	1.35	1.18	1.26	0.08	0.15	0.12	0.87	0.88	0.88	0.01	0.03	0.02
Cospicua	2.80	4.02	3.38	1.47	2.31	1.87	0.33	0.49	0.40	1.00	1.20	1.10		0.02	0.01
Hamrun	1.78	2.00	1.88	1.14	1.17	1.15	0.14	0.09	0.12	0.50	0.72	0.60		0.02	0.01
Mosta	2.02	1.58	1.81	0.99	1.05	1.02	0.23	0.11	0.17	0.81	0.39	0.61		0.03	0.02
Paola	2.31	2.39	2.35	1.18	1.55	1.34	0.18	0.22	0.20	0.93	0.62	0.80	0.02		0.01
Qormi	2.04	2.22	2.11	1.06	1.17	1.11	0.22	0.29	0.25	0.71	0.75	0.72	0.05	0.02	0.03
Rabat	2.27	3.14	2.62	1.42	1.86	1.61	0.35	0.28	0.31	0.50	1.00	0.70			
Sliema	2.18	2.48	2.36	1.30	1.52	1.43	0.20	0.15	0.17	0.68	0.81	0.76			
Valletta	2.34	2.54	2.45	1.02	1.49	1.28	0.60	0.38	0.48	0.72	0.67	0.69			
Zabbar	3.44	3.37	3.42	2.16	2.22	2.18	0.44	0.20	0.35	0.84	0.95	0.89	0.04		0.03
Zebbug	2.64	2.33	2.49	1.63	1.33	1.48	0.31	0.18	0.24	0.66	0.82	0.74			0.03
Zejtun	3.22	3.05	3.14	1.86	1.83	1.85	0.58	0.43	0.51	0.73	0.78	0.76	0.05		0.03
Zurrieq	3.04	2.56	2.83	1.75	1.66	1.71	0.38	0.22	0.31	0.91	0.68	0.81			

Table 3. Mean "def" rates. Separate data are given for the mean number of deciduous teeth indicated for filling (d) or extraction (i), missing deciduous molars presumed extracted (e), and deciduous teeth filled (f).

prevalence rate for caries in 47.2% (Mosta) and for calculus 3.4% (Valletta).

Dental Caries — Deciduous Dentition

The "def" rates vary from 1.81 (Mosta) and 1.88 (Hamrun) to 3.42% (Zabbar). The percentages of children in Mosta and Zabbar with caries-free primary dentition were 55.1 and 24.4 respectively. When the "def" rates are broken down into their constituents (Table 3), 30% of the mean number of affected teeth per person have apparently received curative treatment, and this is usually extraction. The most favourable ratio of teeth extracted to teeth restored is 24:1, the treatment Index (Jackson, 1961) for filled teeth in this locality (Qormi) being 1.5%.

The highest percentage of children with fillings (2.6%) and teeth requiring extraction (28.2%) attend the school at Zejtun.

Approximately 50-70% of children in all localities require fillings and 9-28% require extractions (Table 4).

Dental Caries — Permanent Dentition

The majority of children aged seven years have erupted all four of their first permanent molars (Table 5). When the percentage of persons with affected first permanent molars is considered, a disparity is apparent between the sexes in several localities. Girls are affected more than boys, with the exception of those attending Valletta and Zabbar schools. The percentage of Rabat girls with decayed first permanent molars was 32.4, they had erupted 3.8 of these teeth, 10.6% of which had decayed. At the lower end of the scale, 6.2% of Mosta boys had decayed molars, 3.6 of these teeth had erupted per person, 6.2% of which had decayed.

Caries tended to occur in pits and fissures on the occlusal surfaces, the buccal pits of lower molars being especially vulnerable. Incomplete eruption and deficient masticatory function encourage the formation of soft deposits in the vicinity of these pits which at this age lie at or slightly above gingival crest level.

When allowances are made for school population densities, again the region com-

Locality	% with "d"			% with "t"			% with "f"			% with nil "djf"		
	M	F	Mixed	M	F	Mixed	M	F	Mixed	M	F	Mixed
Birkirkara	56.7	50.4	53.6	7.1	10.4	8.7	0.0	3.2	1.9	42.5	46.4	44.4
Cospicua	61.8	77.6	69.2	21.8	29.1	26.9		2.0	1.0	36.4	20.0	29.8
Hamrun	48.3	47.2	47.5	11.2	7.9	9.8		1.1	0.5	50.0	49.4	49.8
Mosta	41.5	38.7	40.2	20.0	8.1	14.2		1.6	0.8	50.8	59.7	55.1
Paola	54.3	62.0	57.7	13.0	15.5	14.1	1.1		0.6	44.6	38.0	41.7
Qormi	48.1	58.7	52.9	17.6	16.5	17.1	1.5	0.9	1.2	49.6	40.4	45.4
Rabat	56.7	64.8	60.1	20.6	19.7	20.2				40.2	32.4	36.3
Sliema	50.0	56.7	54.1	13.6	10.4	11.7				50.0	40.3	44.1
Valletta	47.5	72.3	60.9	22.5	19.1	20.7				50.0	27.7	37.9
Zabbar	71.5	76.4	73.7	25.0	10.9	19.1				25.0	23.6	24.4
Zebbug	59.3	61.8	60.5	16.9	14.5	15.8	1.7		0.9	39.0	34.5	36.8
Zejtun	63.6	70.9	67.3	31.2	25.4	28.2	5.2		2.6	32.5	27.8	30.2
Zurrieq	58.2	65.9	61.6	27.3	15.9	22.2				38.2	34.1	36.3

**Table 4.** Point prevalence rates, deciduous dentition. Separate data are given for persons with one or more teeth indicated for filling (d), or extraction (t), or one or more teeth filled (f), and no decayed or filled teeth.

prising Cospicua, Paola, Zabbar, and Zejtun would record the highest number of decayed first permanent molars requiring treatment with Birkirkara, Rabat and Mosta coming second.

*Periodontal status*

Approximately 80% of seven year old children show signs of gingivitis (Table 6). The lowest prevalence is found in Qormi (55.6%) and the highest in Valletta (94.2%). No obvious correlation could be traced at this age between the prevalence of gingivitis, the PI Index, the OHI-S, the percentage of persons with calculus, and the mean number of erupted permanent incisors per person in the various localities.

The percentage of children with destructive periodontal disease in Paola was 1.8, and in Birkirkara and Qormi 1.2%. This condition usually presents as a grossly receded inflamed gingival margin on the labial surface of a lower permanent incisor. The lesion may not be associated with calculus deposits, anomalous occlusion or frenal insertion. Probably this is a manifestation of a developmental deficiency of the bony alveolar plate (fenestration or dehiscence). Trivial bone resorption may then lead to massive pocket formation, or the inflamed gingiva may recede to the level of alveolar bone support.

Ten to fifteen percent of children in all localities had dental calculus, the highest prevalences were however found in Zabbar (29.8%), Rabat (26.2%), and Birkirkara (19.4%).

*Oral Hygiene Status*

In all children examined a clean mouth is a rare finding (Table 7). The lowest group OHI-S scores are for Birkirkara (0.94) and Hamrun (1.10), and the highest for Valletta (1.38). Very few children admitted to brushing their teeth, and several denied ever having seen a toothbrush before.

**Discussion and conclusion**

Childhood is an important phase in the life of every person when maximum

LOCALITY	MEAN NUMBER OF ERUPTED FIRST PERMANENT MOLARS PER PERSON				% OF DECAYED FIRST MOLARS		% OF PERSONS WITH DECAYED FIRST MOLARS	
	UPPER		LOWER		MALE	FEMALE	MALE	FEMALE
	MALE	FEMALE	MALE	FEMALE				
Birkirkara	1.9	1.9	1.9	1.9	3.4	7.5	11.0	19.2
Cospicua	2.0	2.0	2.0	2.0	6.0	9.8	18.2	30.6
Hamrun	1.9	2.0	1.9	2.0	3.2	3.5	8.6	11.2
Mosta	1.8	1.8	1.8	1.9	6.2	9.7	6.2	8.1
Paola	1.8	1.9	1.8	2.0	2.4	4.7	7.6	22.2
Qormi	1.9	2.0	2.0	2.0	5.3	7.1	14.5	17.3
Rabat	2.0	1.9	2.0	1.9	5.6	10.6	17.5	32.4
Sliema	1.8	2.0	1.8	2.0	10.0	9.0	20.5	23.9
Valletta	1.9	2.0	1.9	2.0	7.2	2.2	20.0	6.4
Zabbar	1.9	2.0	1.9	2.0	13.1	7.8	27.6	18.2
Zebbug	1.8	1.8	1.9	1.8	6.0	6.7	15.3	18.2
Zejtun	1.9	2.0	1.9	2.0	4.5	5.1	9.1	16.5
Zurrieq	1.9	1.9	1.9	1.9	5.7	5.9	10.9	15.1

Table 5

Locality	OHI-S			% Clean Mouths		
	M	F	Mixed	M	F	Mixed
Birkirkara	0.93	0.94	0.94	2.4	0.9	1.7
Cospicua	1.27	1.22	1.25			
Hamrun	0.96	1.33	1.10			
Mosta	1.26	1.27	1.26			
Paola	1.06	1.25	1.15			
Qormi	1.12	1.13	1.13	0.8		0.4
Rabat	1.30	1.28	1.29	1.1		0.6
Sliema	1.31	1.15	1.18			
Valletta	1.33	1.44	1.38			
Zabbar	1.23	1.17	1.21			
Zebbug	1.32	1.27	1.29	1.9		0.9
Zejtun	1.18	1.32	1.26			
Zurrieq	1.39	1.30	1.35			

**Table 7.** The Group Oral Hygiene Index Simplified (OHI-S) and the percentages of persons with clean mouths are given for the various localities, and the sexes separately.

Locality	Group PI			% with gingivitis			% with destructive periodontal disease			% with calculus		
	M	F	Mixed	M	F	Mixed	M	F	Mixed	M	F	Mixed
Birkirkara	0.35	0.26	0.31	74.0	83.2	78.6				16.5	22.4	19.4
Cospicua	0.47	0.80	0.63	76.4	89.8	82.7		2.4	1.2	18.2	12.2	15.4
Hamrun	0.33	0.36	0.34	60.3	59.4	60.0	0.9	1.1	1.0	12.1	9.0	10.7
Mosta	0.44	0.42	0.43	73.8	71.0	72.4		1.6	0.8	9.2		4.7
Paola	0.40	0.57	0.47	71.7	76.1	73.6	2.2	1.4	1.8	10.9	23.9	16.6
Qormi	0.31	0.40	0.35	54.2	57.3	55.6	1.5	0.9	1.2	9.2	12.7	10.8
Rabat	0.61	0.71	0.65	76.3	87.3	81.0		1.4	0.6	25.8	26.8	26.2
Sliema	0.48	0.49	0.49	81.8	83.6	82.9				18.2	13.4	15.3
Valletta	0.63	0.68	0.66	100.0	89.4	94.2				5.0	2.1	3.4
Zabbar	0.66	0.58	0.63	92.1	92.7	92.4		1.8	0.9	31.6	27.3	29.8
Zebbug	0.66	0.62	0.64	88.2	90.9	89.5				11.8	10.9	11.4
Zejtun	0.42	0.49	0.46	80.5	77.2	78.8				5.2	21.5	13.5
Zurrieq	0.59	0.50	0.54	85.5	75.0	80.8				14.5	18.2	16.1

**Table 6.** The Group Periodontal Index (PI) for children in the various localities. Additional data are provided on the percentage of persons with overt gingivitis, destructive periodontal lesions, and calculus.

physical, mental and emotional development is occurring. It is a period which offers a favourable opportunity for the inculcation of positive health habits and the initiation of the practice of preventive dentistry. However, it is still accepted by parents that it is normal for milk teeth to decay, and that their loss is of no consequence. The consciousness of the need for dental care is also very low.

The children included in this survey had been inspected and referred for treatment, however only 20-53% had been rendered caries-free, 6-32% had decayed permanent teeth, 3-30% had dental calculus, and 100% had unclean mouths.

The child should be given a standard to aim at in terms of comprehensive care. However, even if a mouth is restored by proper treatment, neglect and failure to seek further professional services soon will allow recurring attacks of disease to reduce it to its former condition. Individual motivation is the key to improving dental health.

Today, a major goal of society is to enable everyone to work to full capacity toward the fulfilment of purposeful living. It is in this area that dentistry makes its greatest contribution. Any realistic plan to bring about a rapid improvement in the dental health of the community will involve a measure of organised action. The solution to the dental health problem to solution to the dental health problem will require a reappraisal of the value of dental service. It is necessary to inform the public about the dental health problem to stimulate constructive action.

The fact that funds available for health programmes are always limited make it important to determine the types of programmes that will do the most to improve oral health conditions within the limitations of available resources. For this reason, preventive and educational activities should usually be given priority over treatment programmes. The profession has paid little attention to the use of mass media in communicating with the general public. Communications people can assist in finding proper directions in preparing programmes, but the individual dentist at the chairside, in the surgery,

and in the community can, and must, make his own contribution. Dental education must encourage the development of a greater social role for the dental profession, and this is best done by the integration of a course of community dentistry into the education of the dental student (Burt, 1970).

The country should have a national dental health plan which integrates the production of manpower with the delivery of services. National shortages of dental manpower can be solved by the inclusion of increasing numbers of some type of operating auxiliary.

To reveal deficiencies of the plan provision should be made for periodic evaluation. This will enable corrections to be made as the plan develops. It must be ascertained whether the objectives are being achieved, what the extent of the programme's contribution is to the improvement of the dental health of the community, and whether each activity of the Service is playing its appropriate part and developing at the planned rate.

A good plan and a good evaluation of it can be of great assistance in the justification of financial support.

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