THE DENTAL NEEDS OF BIRKIRKARA PRIMARY SCHOOL CHILDREN

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Summary

(1) A programme planning survey was performed on 1543 children aged four to thirteen attending Birkirkara Primary School.

(2) An estimate of the prevalence of specific oral diseases and conditions and current needs for treatment has been obtained.

(3) School Dental Health programmes have great usefulness, when based upon dental health education, case finding and preventive procedures. They succeed best when they include good co-operation with medical and school personnel.

Twenty-five years of School Dentistry in these Island have not mitigated the flowing tide of oral disease, nor has there been any remarkable change in the attitude of the community to dental matters.

When the work to be done greatly exceeds his capacity, a dentist can adopt one of two alternatives. He may work at random, placing fillings whenever he can without any particular plan, or he may treat those patients who are responsive and with whom he can form a good relationship, treating them fully and recalling them at regular intervals. Neither is satisfactory. Rather, he must consider the size of the problem, use all preventive measures at his disposal, and create priorities among the younger children to ensure that a block of complete treatment is created and maintained (McKendrick, 1970).

The collection of information concerning community characteristics of a disease is an acknowledged prerequisite to effective planning of a control programme, and if the collection of data is undertaken periodically, an evaluation of the worth of that programme can be made.

A dental survey, consisting of a clinical examination, was performed on 1543 school children, aged four to thirteen years attending the Government Primary School at Birkirkara between the months of February and June, 1970. The objectives of this survey were:

(1) To determine the extent to which existing dental services are coping with the current need for treatment.

(2) To obtain an estimate of the prevalence of specific oral diseases and conditions requiring treatment.

(3) To provide base-line data for subsequent evaluation of dental services and preventive programmes.

(4) To obtain oral health data needed when estimating the cost of maintaining and expanding a dental health programme.

Materials and methods

This survey was carried out during sessions normally devoted to school inspection, and costing, with respect to sample size, was of no consequence. The sample, which was not randomised, included 50% or more persons from each age group, and 61.5% of the total school child population was examined.

All examinations were performed by one clinician and data recorded by one assistant. Instruments and materials used were explorers of the sickle type, plane mouth mirrors, chip syringes, stainless

steel sterilising pans, and a 75 watt light source in an angle-poise lamp. The use of radiographs was considered impracticable.

Dental caries

Standards of assessment (W.H.O. 1962 and 1965)

A tooth is considered present when visible or detectable with an explorer. When a deciduous tooth and its successor both occupy the same tooth space only the permanent tooth is counted. Observations were recorded for the whole mouth in order that a correct assessment of caries-free individuals could be made.

Decayed teeth

Dental caries is considered present when the lesion has a softened floor or wall, or undermined enamel. These criteria apply to the one-surface interproximal lesion which can be explored directly; when an adjoining tooth is present, the criterion of diagnosis is a collapsed marginal ridge. White or chalky spots, discoloured or rough spots, and hard, stained pits or fissures which just catch on the explorer point are not recorded as caries. When a tooth has one or more filled surfaces, and another surface which is carious, or there is recurrent caries around a filling, or the tooth contains a temporary restoration, the tooth is scored as decayed (d) or (D). A decayed deciduous tooth which is about to be exfoliated, but no part of its successor is detectable in the mouth, should also be classed as (d).

Missing teeth

A permanent tooth is counted as missing (M) only when it has been extracted primarily because of caries. No measure of missing teeth is made for the deciduous dentition.

Teeth indicated for extraction

A tooth is classed (i) or (I) when caries has so destroyed the crown that it may not be restored. Included in this category are teeth where decay has involved four or more surfaces and residual roots.

Filled teeth

Teeth are considered filled, (f) or (F), whenever a filling of any permanent material is present, and there is no recurrent decay.

Indices of caries experience

Summarisation is made separately for the sexes and for the deciduous and permanent dentitions.

The report includes per cent. persons with caries, and age-specific, d.f. and D.M.F. per person. Separate figures are given for (d) or (D), (i) or (I), (f) or (F), and (M). These are measures of intensity, indicating the average number of teeth affected per person. A measure of scatter around the mean is afforded by the standard deviation computed for each age group and the sexes separately.

To assess treatment needs in greater detail, data are made available on:

Mean decayed surfaces per person.

Point prevalence rates. These indicate per cent. population with one or more cavities (d) or (D), with one or more teeth indicated for extraction (i) or (I), with one or more teeth missing because of caries (M), or with one or more teeth filled (f) or (F).

Measures of incidence. When age-specific d.f. and D.M.F. rates are available it is possible to estimate the incidence of clinical caries between any two ages, by subtracting the number of d.f./D.M.F. teeth per person at the younger age from the number of d.f./D.M.F. teeth at the higher age. Reckonings for the deciduous dentition are attempted only for children under 6 years, as calculations are complicated by the natural shedding of primary teeth in older children.

Periodontal disease

Standards of assessment (W.H.O. 1962 and 1965)

A rapid examination of the whole mouth is conducted with mirror only. Periodontal status is measured in terms of the condition of the periodontal tissues. In

order to assess local factors related to this condition the presence of calculus was recorded and the amount of soft debris covering the teeth was also graded. The gingivae around all teeth present, except residual roots, are considered in making this assessment. Sites of dental abscess or sinus, and areas of inflammation secondary to food impaction in open interproximal cavities are ignored. One recording is made for the whole mouth based on the most severe condition observed. The classification of periodontal status was completed in under one minute.

Periodontal status

Criteria

Good — Absence of intense gingivitis and destructive periodontal disease

At *first* glance no conspicuous change in colour of the gingival tissues is noted and there is no periodontal pocket. Persons having minor alterations in gingival form alone without definite colour change or bleeding on digital palpation are included in this category.

Fair — Presence of intense gingivitis

At *first* glance, one or more gingival areas are found to have marked changes in colour to a definite red or bluish-red and/or there is bleeding on digital palpation.

Poor — Presence of destructive periodontal disease

This condition is considered present when there is a periodontal pocket resulting from loss of bone accompanied by gingival inflammation. Alveolar resorption accompanied by gingival recession and exposure of cementum is considered as destructive periodontal disease only when accompanied by intense gingivitis.

Note: Periodontal status is scored "Fair" or "Poor" only when no doubt exists that the criteria for the particular condition have been met.

Calculus

Calculus is considered present only when deposits can be seen on one or more teeth by inspecting all exposed tooth surfaces with the aid of a plane mirror, i.e. only obvious calculus is scored. An explorer is used only to confirm that a deposit which is visible without probing is in fact calcified.

Periodontal disease and calculus data are reported as per cent. of persons:

(1) with intense gingivitis only
(2) with destructive periodontal disease
(3) with obvious calculus.

Oral debris

Limited information on the status of oral cleanliness is obtained by inspecting the labial surfaces of upper and lower anterior teeth. The tine of an explorer is run on the surfaces of the teeth concerned to determine the presence and extent of plaque and materia alba.

One recording of the highest score is made for the whole area inspected. Oral debris and extrinsic stain (green only) are scored together:

0: no debris or extrinsic stain
1: soft debris covering not more than one third of any tooth surface or the presence of extrinsic stain without debris regardless of the surface area covered
2: soft debris covering more than one third of any tooth surface.

Traumatic injuries to anterior teeth

Criteria for assessment

Missing, displaced or loose teeth, and darkening of the clinical crowns are not recorded. Only upper and lower permanent incisor teeth with part or parts of their crowns deficient are scored. Data recorded as per cent. persons affected and mean number of fractured teeth per person so affected.

Results

Dental Caries

The age range for the school population and the numbers and percentages of children inspected are shown in *Table 1.*

Table 1
Government Primary School, Birkirkara.
Age range as on 30th. September, 1969

Age last birth-day	Male	Female	Number inspected			
			Male	percent	Female	percent
4			7		13	
5	190	181	94	49.5	97	53.6
6	148	134	83	56.1	73	54.9
7	206	199	113	55.0	110	55.3
8	163	160	91	55.8	99	61.9
9	155	194	83	53.5	119	61.3
10	131	141	86	65.7	102	72.3
11	137	94	104	76.0	63	67.0
12	101	55	71	70.3	39	70.9
13	50	69	44	88.0	52	
Total	1281	1227	776		767	

The Deciduous dentition

Table II shows percentage of persons affected and age specific mean d.f. rates. Separate data are presented for (d), (i), (f) and for the sexes. Data on d.f. (S) are shown in *Table IV. Figure I* gives the point prevalence rates for the deciduous dentition. The d.f. rates for both sexes are similar but, once decayed, girls' teeth appear to deteriorate and are lost at a faster rate than boys'.

The four-year-old group was too small to draw broad conclusions from, but 51.6% had one or more decayed teeth, twenty children requiring forty fillings between them.

The d.f. rate rises through age six years and then falls to nil after the thirteen years as the deciduous teeth are shed.

If the primary teeth indicated for filling in the four to eight year old group were restored, and other teeth for this and the remaining group extracted, it would be necessary to place 1,525 restorations and to perform 930 extractions. If five and six year old children were to receive priority, it would be necessary to place 765 fillings and to extract 125 teeth for 390 and 70 children respectively. An annual increment of 0.15 d.f. teeth and 0.40 d(S) is to be expected at age 6 years.

Table IV Dental Caries

Decayed Surfaces

MALE AGE	Number Examined	Per Person Mean df (S)	Per Person Mean DMF (S)	FEMALE AGE	Number Examined	Per Person Mean df (S)	Per Person Mean DMF (S)
5	94	2.2	0.02	5	97	2.5	0.15
6	83	2.6	0.05	6	73	2.8	0.16
7	113	2.7	0.09	7	110	3.1	0.23
8	91	3.3	0.44	8	99	3.4	0.68
9	83	2.3	0.54	9	119	1.9	0.73
10	86	1.3	0.62	10	102	1.8	1.2
11	104	1.0	1.0	11	63	0.4	1.1
12	71	0.27	1.2	12	39	0.15	1.3
13	44	0.13	1.3	13	52	0.42	1.0

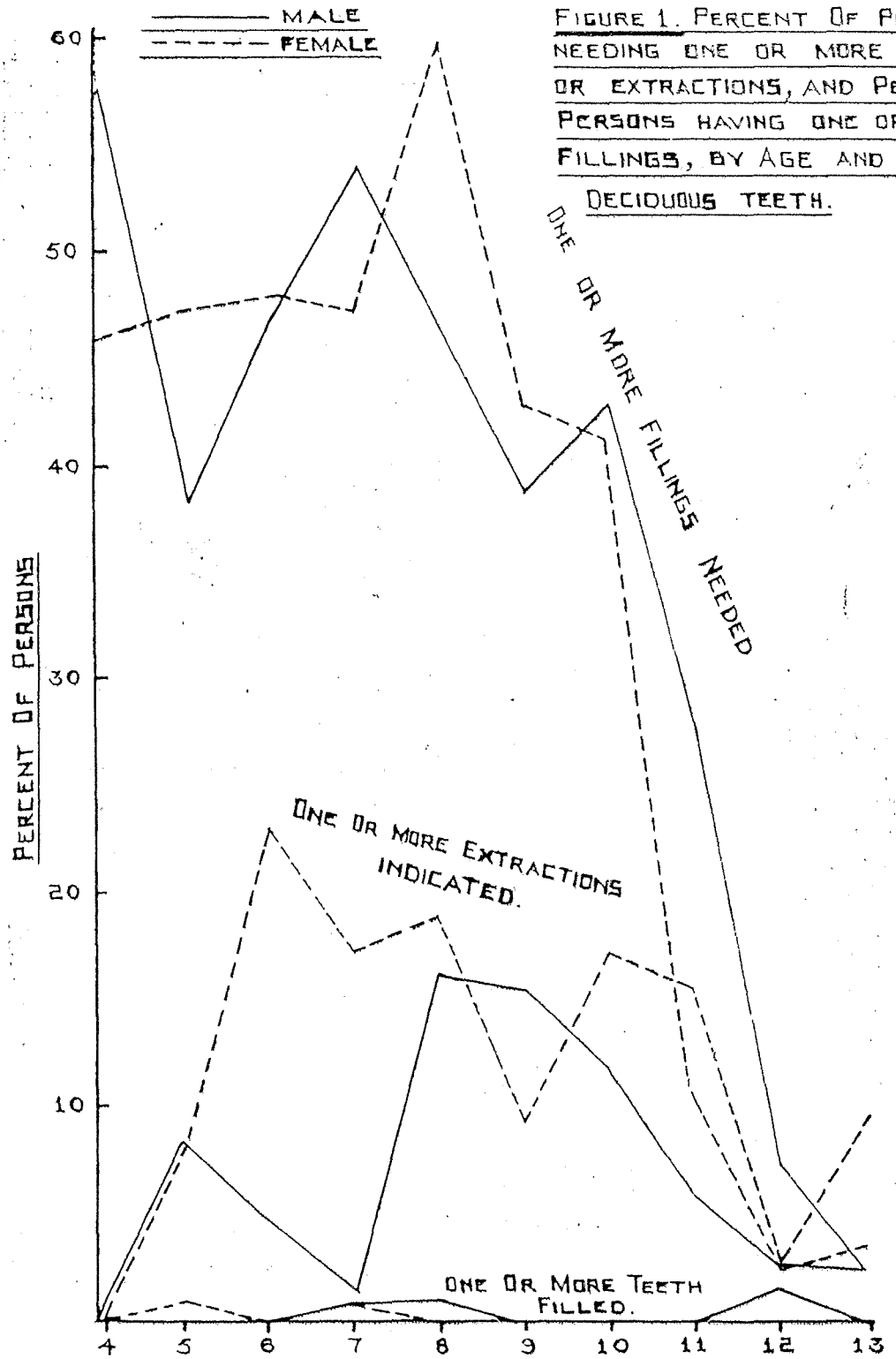

FIGURE 1. PERCENT OF PERSONS NEEDING ONE OR MORE FILLINGS OR EXTRACTIONS, AND PERCENT PERSONS HAVING ONE OR MORE FILLINGS, BY AGE AND SEX.

DECIDUOUS TEETH.

Table II Dental Caries
Incidence in deciduous teeth

MALE Age	Number Examined	Number Affected (percent)	Per Person d	f	i	df	Standard Deviation
4	7	57.1	2.57			2.57	0.876
5	94	40.4	0.96		0.18	1.14	1.193
6	83	47.0	1.40		0.08	1.48	1.881
7	113	59.3	1.00	0.02	0.24	1.26	1.454
8	91	53.8	0.91	0.03	0.25	1.19	0.447
9	83	42.2	0.70		0.25	0.95	1.343
10	86	47.7	0.66		0.14	0.80	0.604
11	104	39.4	0.39		0.09	0.48	0.823
12	71	8.5	0.07	0.03	0.03	0.13	0.146
13	44	4.5	0.02		0.02	0.04	0.235
FEMALE Age							
4	13	46.2	1.38			1.38	1.688
5	97	47.4	1.20	0.01	0.16	1.37	1.286
6	73	53.4	1.07		0.25	1.32	1.594
7	110	50.9	1.04	0.01	0.30	1.35	1.880
8	99	63.0	1.33		0.28	1.61	1.912
9	119	47.9	0.70		0.16	0.86	1.148
10	102	45.1	0.54		0.20	0.74	1.012
11	63	14.0	0.21		0.02	0.23	0.497
12	39	5.0	0.03		0.03	0.06	0.217
13	52	11.5	0.13		0.04	0.17	0.552

The mean d.f. rate for both sexes tends to fall after age six years, however there is a further rise for girls at age eight. An average increment of 0.3 d(S) per year can be expected for ages seven and eight.

The extent of the area devoted to "d" and "i" compared to "f" in *Figure 1* indicates neglected needs and low demands for dental care. Treatment indices have been devised in an attempt to indicate the amount of dental treatment received by a group. The Jackson Index (Jackson, 1961) for filled deciduous teeth in six, seven and eight year olds is nil %, 0.8% and 0.7% respectively.

The Permanent Dentition

Table III shows age-specific D.M.F. rates with separate data for (D), (M), (I) or (F), and the sexes. 7.7% of four year old girls included in this study have already acquired one or more permanent teeth.

Figures II A and *B* depict age-specific point prevalence rates for the permanent dentition.

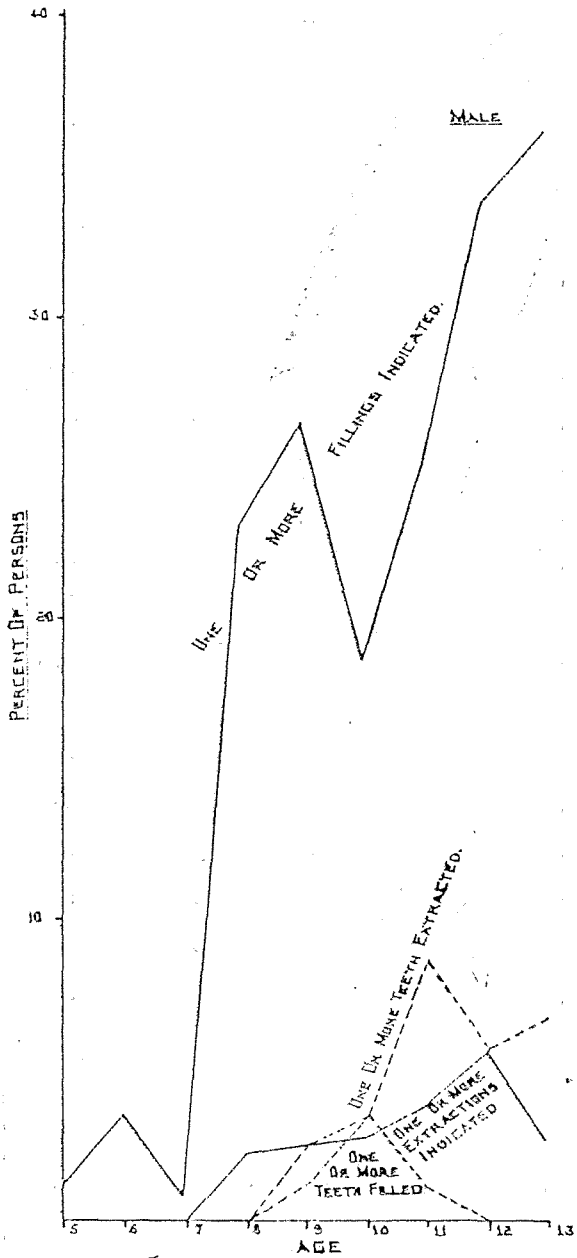

FIGURE II A PERCENT PERSONS NEEDING ONE OR MORE FILLINGS OR EXTRACTIONS, AND PERCENT PERSONS HAVING ONE OR MORE FILLINGS OR EXTRACTED TEETH, BY AGE PERMANENT TEETH.

The D.M.F. rates for both sexes are very low up to the age of seven years, but later rise abruptly and then continuously. Girls are affected more than boys, but they also tend to acquire their permanent teeth earlier.

If priority groups were recognised at ages five and six it would be necessary to treat 40 persons and to place 60 restorations. The requirements of the entire school population are 700 restorations and 60 extractions.

Table III Dental Caries

Incidence in Permanent Teeth

MALE Age	Number Examined	Number Affected (percent)	Per Person D	F	I	E	DMF	Standard Deviation
5	94	1.1	0.02				0.02	0.205
6	83	3.6	0.05				0.05	0.191
7	113	7.0	0.09				0.09	0.341
8	91	23.1	0.35		0.02		0.37	0.723
9	83	30.0	0.34	0.02	0.02	0.02	0.40	0.677
10	86	25.6	0.24	0.05	0.05	0.03	0.37	0.615
11	104	31.7	0.40	0.04	0.05	0.12	0.61	1.026
12	71	41.0	0.53		0.08	0.07	0.68	0.990
13	44	36.4	0.73		0.05	0.09	0.87	1.358
FEMALE Age								
5	97	8.2	0.15				0.15	0.562
6	73	11.0	0.17				0.17	0.524
7	110	13.7	0.19			0.01	0.20	0.738
8	99	31.0	0.42	0.02	0.04	0.02	0.50	0.914
9	119	26.0	0.35		0.02	0.06	0.43	0.597
10	102	32.4	0.53	0.08	0.04	0.11	0.76	1.104
11	63	36.5	0.35	0.13	0.01	0.14	0.63	1.012
12	39	41.0	0.59	0.20	0.05	0.08	0.92	1.649
13	52	40.4	0.73	0.06	0.02	0.02	0.83	1.222

An annual increment of 0.03 D.M.F. teeth is to be expected at six and seven years, and, on average, 0.1 D.M.F. teeth per year thereafter. A D(S) increment of 0.06 is expected at seven, years, 0.4 for the eighth year, and, on average, 0.2 D(S) per year thereafter.

The distribution of affected first permanent molars was computed for the group as a whole and for the sexes and the two jaws.

The age-specific distribution of carious or filled surfaces was also worked out as a percentage of the surfaces of the teeth so affected It was assumed that all teeth with fillings have at some time been carious.

Mandibular first molars decay more rapidly than their opposite counterparts, more so in girls than in boys, the attack in girls reaching its greatest intensity at ten years. The attack on girls' maxillary first molars tends to reach its peak at ten years, whilst the rate of decay of maxillary first molars in boys continues to rise through thirteen years of age.

Not only the average number of permanent teeth affected by caries but also

FIGURE IIB. PERCENT PERSONS NEEDING ONE OR MORE FILLINGS OR EXTRACTIONS, AND PERCENT PERSONS HAVING ONE OR MORE FILLINGS OR EXTRACTED TEETH, BY AGE. PERMANENT TEETH.

the percentage of persons who have experienced attack on the permanent teeth also increases with age.

The D.M.F. rate although remaining very low throughout starts to rise more steeply at seven years of age reaching its peak intensity (0.85) at thirteen years of age for all groups. From age five to age twelve girls have higher age-specific D.M.F. rates than boys.

It is the rate of decay of first permanent molars that accounts for the rising D.M.F. rate, and the great majority of cavities occur on readily accessible surfaces. A residual operculum may be important environmental factor in the etiology of distal lesions in mandibular first permanent molars. The data recorded may be an underestimation of the prevalence of interproximal lesions as radiographs were not available during this study.

In *Figures II A* and *B*, the areas representing "D" and "I" compared to "E" and "F" (which are a measure of persons who have received treatment) again depict unmet needs and a low demand for dental care.

Jackson's Index for filled permanent teeth reaches a peak figure of 12.5% at age twelve, this figure being mainly contributed to by the female group. The highest recording for extracted teeth is found at age eleven with a score of 21%, both sexes making almost equal contributions to this figure.

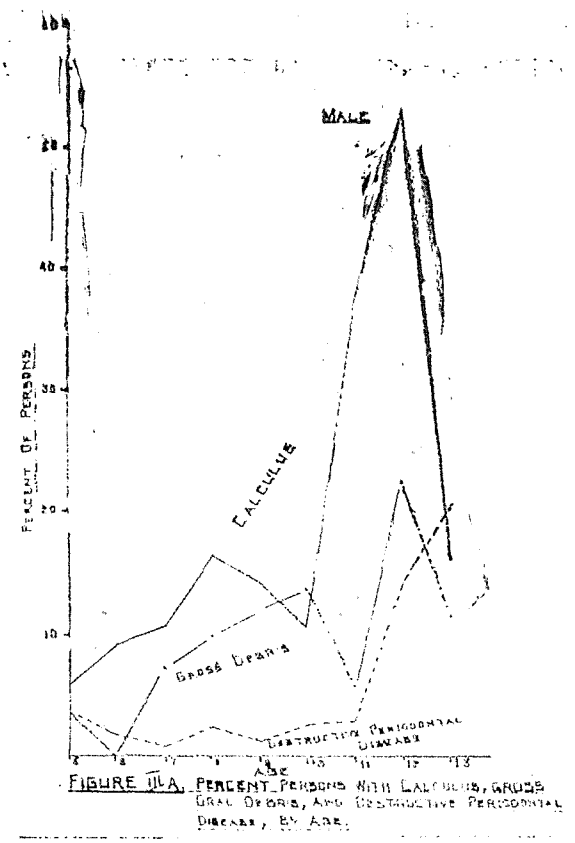

FIGURE III A. PERCENT PERSONS WITH CALCULUS, GROSS ORAL DEBRIS, AND DESTRUCTIVE PERIODONTAL DISEASE, BY AGE.

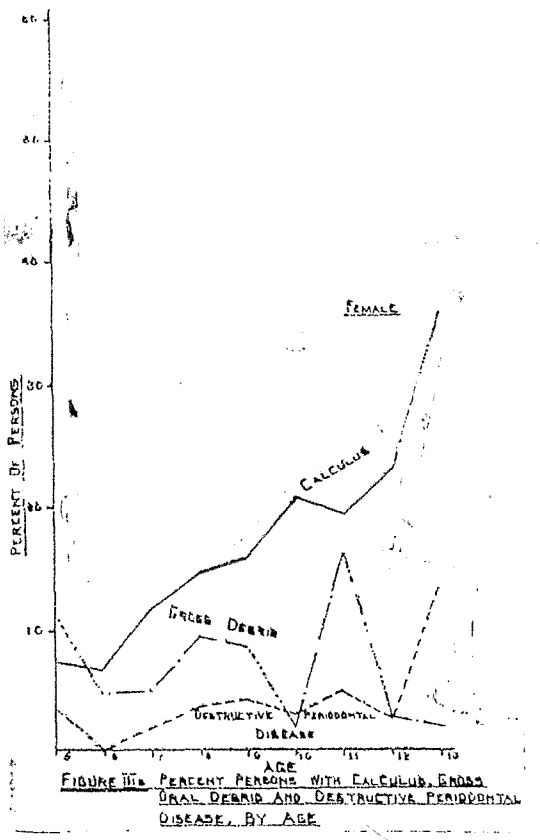

FIGURE III B. PERCENT PERSONS WITH CALCULUS, GROSS ORAL DEBRIS AND DESTRUCTIVE PERIODONTAL DISEASE, BY AGE.

Periodontal Disease

The percentages of girls and boys affected with intense gingivitis (Fair) and destructive periodontal disease (Poor) are shown in *Table V*. An assessment of local factors related to the causation of periodontal disease is afforded by data in *Figures III A* and *B*.

The per cent. population with intense gingivitis is low at age six, but rises steeply as the deciduous incisors are replaced by their successors. This rise achieves its peak at age eight in girls annd age nine in boys. Through eleven years the incidence of intense gingivitis among girls diminishes rapidly but that for boys again rises steeply so that at age thirteen 65.9% are affected.

The prevalence of destructive periodontal disease among girls rises gradually from age six to age twelve so that at thirteen years 13.5% are affected. The prevalence rate for boys which had until eleven years followed that for girls but

Table V Periodontal Disease

MALE Age	PERIODONTAL STATUS percent Affected		CALCULUS	ORAL DEBRIS			Number
	Fair	Poor	(Present percent)	0	1	2	Examined
5	16.7	3.7	5.5	37.8	58.4	3.8	55
6	5.4	1.8	9.1	53.6	46.4		56
7	25.9	0.9	10.7	26.8	66.1	7.1	112
8	37.4	2.2	16.5	18.7	71.4	9.9	91
9	53.0	1.2	14.5	13.3	74.7	12.0	83
10	41.9	2.3	10.5	14.0	72.1	13.9	86
11	50.0	2.9	37.5	12.5	81.7	5.8	104
12	50.7	14.1	53.5	14.1	63.4	22.5	71
13	65.9	20.5	15.9	11.4	54.5	34.1	44
FEMALE Age							
5	17.9	3.6	7.2	41.8	47.3	10.9	55
6	8.1		6.5	55.0	40.3	4.7	62
7	29.1	1.9	11.7	30.1	65.0	4.9	103
8	50.5	3.3	14.3	28.2	62.6	9.2	99
9	41.1	4.1	15.9	20.2	71.4	8.4	119
10	46.5	2.9	20.8	25.8	72.3	1.9	101
11	46.8	4.9	19.4	16.5	77.4	16.1	62
12	38.0	2.6	23.1	31.8	66.6	2.6	39
13	27.0	13.5	36.5	23.0	75.0	2.0	52

at a lower level, rises steeply and continuously beyond that age so that at thirteen 20.5% of boys are affected.

The graphs depicting the prevalence of destructive periodontal disease, obvious calculus and gross debris *(Figures II A* and *B)* in both sexes are similar. There is a sharp rise in the number of children with calculus through the age of ten so that the percentage of twelve year olds affected is 53.5 and 36.5 for boys and girls respectively.

More than half the number of girls and boys examined had clean mouths at age of six, but, at age thirteen, this figure drops to 11.4 and 23.0 for boys and girls respectively. The percentage of boys with poor oral cleansing increases with age and more rapidly through age eleven. The percentage of girls with gross debris diminishes with age then rises abruptly to a peak at age eleven.

Fractured Incisors

Up to the age of nine years girls tend to incur more injuries to their anterior teeth than do boys, a tendency to bilateral involvement being especially marked at age seven. There is a very sharp increase in the percentage of persons affected at age ten. Through this age the per-

Table VI Fractured Incisors

Male Age	Number Examined	Persons Affected percent	Mean number of Fractured teeth per Person so affected
7	113	0.9	1.0
8	91	2.2	1.0
9	83	4.8	1.0
10	86	17.5	1.4
11	94	15.9	1.1
12	71	7.0	1.4
13	44	18.1	1.4
Female Age			
7	108	0.9	2.0
8	99	4.0	1.2
9	119	8.4	1.1
10	102	15.7	1.2
11	63	6.3	1.2
12	39	2.6	1.0
13	52	5.8	1.3

centage of boys affected remains high so that at thirteen 18.1% have sustained injuries to their anterior teeth resulting in the loss of tooth substance.

The prevalence for all ages examined is 9.5% and 6.2% in boys and girls respectively, with a greater tendency for multiple involvement in girls.

Conclusion

The caries experience of Maltese primary school children has been described as "encouragingly low" (Mangion and Olivieri Munroe, 1968). Indices of intensity computed for Birkirkara primary school children are even lower. However, other data considered, two children out of five have decayed primary teeth, yet only one in every four hundred have received conservative treatment; one in four have carious permanent teeth, yet only one in eighty of those affected have fillings.

Neglect on this scale is especially costly in the case of dental disease, because of its cumulative nature and the nature of the treatment required. Once under way, dental caries can rarely be checked except by the application of relatively time-consuming procedures. This tremendous backlog of need is of major importance for purposes of programme-planning, and must be clearly distinguished from the new needs which are constantly developing.

An important goal of public health dentistry is to clear up accrued needs at an early age so that subsequent maintenance on a periodic recall basis can prevent any large accumulation of incident needs. Such programmes might also help establish habits of seeking dental care regularly which would carry over into adult life.

A strong correlation has been observed between the prevalence and severity of periodontal disease and the accumulation of calculus and plaque. This view has been expressed by other workers (Waerhaug, 1967, Olivieri Munroe, 1968).

The management of periodontal disease should be based on prevention rather than on cure. A series of clinical trials have demonstrated that gingivitis and tooth mobility can be drastically reduced by improving oral hygiene (Alexander, Morganstein and Ribbons, 1969, Waerhaug, 1967, and Lindhe and Wicen, 1969).

A child must learn proper dental health habits during the early years. During the first three years of life it is the family doctor and the health visitor who is in more frequent contact with the family as a unit. It is the duty of the dental profession to see that these professional colleagues are properly equipped to impart accurate, practical, common sense knowledge.

We must provide school teachers with good, clear, well-designed visual aid material for specific age groups, whether it be films, film strips, posters, leaflets, wall charts ,or teachers' notes from which they can develop their own projects with minimum effort (Davis, 1967).

Acknowledgements

I am indebted to the Headmaster, Headmistress, and Teachers of Birkirkara Primary School who contributed to the smooth progression of the inspections. I am also grateful to Miss C. Agius, School Dental Nurse, for her clerical assistance throughout this survey.

References

ALEXANDER, A.G., MORGANSTEIN, S.I., and RIBBONS, J.W., (1969), Dent. Practit. Dent. Rec. *19*, 293-297.

DAVIS, H.C. (1967), Dental Health. *6*, 51-52.

JACKSON, D. (1961), Archs. oral Biol., *6*, 80.

LINDHE, J., and WICEN PER-OLOF, (1969), J. Per Res. *4*, 193-201.

MANGION, J.J., and OLIVIERI MUNROE, C., (1966), St. Luke's Hospital Gazette. *3*, 112-115.

MCKENDRICK, A.J.W., (1970), Brit. dent. J., *128*, 185.

OLIVIERI MUNROE, C., (1968), Brit. dent. J., *124*, 177-182.

WAERHAUG, J., (1967), Int. dent. J., *17*, 267-281.

WHO/DH/69.84 — Basic Oral Health Survey Methods (1965).

W.H.O. Technical Report Series No. 242 (1962).