THE IMPROVED DENTITION OF 5-YEAR-OLD LONDON SCHOOL-CHILDREN

A COMPARISON BETWEEN 1943 AND 1929

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Historical

It is now established that certain nutritional factors play a prominent part in determining the structure of the dental tissues and their resistance to disease. Interest in this subject was first roused by the investigations on animals and children made by one of us (M. M.) which began in 1917 and have continued up to the present time.

(a) Animal Experiments

It was shown in experiments on puppies and other young animals that perfect and imperfect teeth could be produced at will by small variations in the diet during the period of tooth development (Mellanby, 1918). The chief among these determinants were the fat-soluble vitamins, and especially vitamin D (which in the earlier days was called the calcifying vitamin). This substance acted in association with the calcium and phosphorus of the diet, and for optimum effect required a sufficiency of these elements: in the absence of vitamin D, even large quantities of calcium and phosphorus in the diet did not result in perfectly formed teeth and jaws. A deficiency of this vitamin in the mother's diet during pregnancy and lactation, especially with a low intake of calcium, caused the deciduous or milk teeth, and to a less extent the permanent teeth, of her puppies to be imperfectly calcified, even when, after weaning, their own food contained abundance of these substances; if the puppies continued on the same defective diet as the mother their permanent teeth were very badly formed—more so, in fact, than if the mother's diet during pregnancy and lactation had been good from the point of view of tooth development. It is seen, therefore, that the mother's diet during these periods may to some extent affect the teeth of her offspring for life.

In the living animal, teeth of perfect structure were translucent and felt smooth when their surfaces were rubbed lightly with a probe, whereas varying degrees of roughness were encountered when the teeth were of imperfect structure. It was shown that there was a close correlation between the surface appearance or texture of the teeth, determinable *in situ*, and their minute architecture as seen in microscopical sections made after death.

(b) Investigations on Children

When a large collection of children's shed and extracted teeth was examined and graded according to the standards developed and adopted by M. M. on the basis of the animal experimental work, perfect structure and all grades of imperfection were found, although some 80% came into the latter category. Teeth of good structure were on the whole found to be much less carious than those of defective structure, 78% of the former, compared with 6% of the latter, being caries-free. This relationship, however, did not necessarily apply to the comparatively few teeth with gross enamel defects obvious to the naked eye—forms of dental hypoplasia which used to be, and indeed still are, the only ones generally recognized.

From 1922 onwards a series of investigations on children in a Sheffield tuberculosis hospital (1924, 1926, 1931, and 1934) and in three Birmingham Cottage Homes (1934) were made in co-operation with medical and dental colleagues. These investigations showed that those dietary factors which promoted well-calcified teeth also influenced them after full eruption and tended to retard to some extent the onset and spread of caries. Thus there was in the Birmingham study significantly less incidence and spread of caries in a group of children receiving additional vitamin D and olive oil than in the control group getting extra olive oil without the vitamin; for instance, in the permanent teeth already erupted at the beginning of the

investigation an increase of only 8% of carious teeth was found in the vitamin D group in 2½ years, compared with 13.8% in the control group. Moreover, there was an even greater difference in those which erupted during the actual period of the investigation, the structure of which teeth may have been influenced by the diets (i.e., 7.6% of these teeth were carious in the vitamin D group, compared with 17.8% in the control group). In these series of investigations the most important dietary factors for delaying the onset and spread of decay were milk, cod-liver oil, and irradiated ergosterol (vitamin D₂). With low vitamin D and calcium it was found that increasing the cereal content of the diet allowed the disease to spread more rapidly than in the controls with comparatively little cereal, probable reasons for this being that there are some anti-calcifying substances in cereals.

The above facts and many other experimental and clinical results were brought together in three special reports of the Medical Research Council published in 1929, 1930, and 1934 (M. Mellanby).

More recently these investigations on the initiation and spread of caries in children's teeth have been repeated and extended in different parts of the world (Anderson *et al.*, 1934; McBeath, 1932, 1934; McBeath and Zucker, 1938; McBeath and Verlin, 1942; McKeag, 1930; Schiotz, 1937), so that to-day medical and dental clinicians as well as scientific investigators are realizing more and more that nutrition plays an important part in dental disease. They do not always, however, fully appreciate the long period during which dietetic factors must be operative in order to promote good dental structure and increase resistance to disease. For instance, they often expect results after a few months' administration of cod-liver oil, whereas the treatment should begin in early intra-uterine life and continue during the period of growth, and in a modified way probably throughout life.

The direct cause or causes of dental caries in human beings, as distinct from the predisposing factors, are not yet known, but in the work referred to above there was enough evidence to demonstrate that a great improvement could be obtained if the dietary of pregnant women, infants, and children were changed to one of higher calcifying quality. The teeth of the new generation would then be of better structure and less prone to decay. It seemed, indeed, that such a step must form the basis of any policy likely to lead to mass improvement of teeth—a point of view which has been constantly urged by one of us for many years. The dietetic changes advised were: (1) an increased consumption of milk, eggs, and other foods comparatively rich in calcifying factors; (2) a decreased intake of cereals, such as bread, oatmeal, and oatmeal preparations; and (3) the addition to the diet of cod-liver oil or some other source of vitamins D and A, especially the former.

(c) National Dietary Changes related to Above Investigations

During recent years interest has become focused on public health in relation to food, and the Government has made a special effort to improve the standard of nutrition of pregnant women, infants, and young children. In the past quarter of a century antenatal clinics and infant welfare centres have been established in increasing numbers to advise on the feeding of both mother and baby. Rickets, so common in the 1920's and earlier, has become comparatively rare in England owing largely, no doubt, to the increased consumption of milk and to the greater therapeutic, as well as the prophylactic, use of cod-liver oil and other substances containing vitamin D. The condition of the teeth of the group of children examined in the present investigation could not have been greatly influenced by school feeding, since the majority did not go to school until they were 5 years old, though a few went to nursery classes or schools; but it is of interest to remember that as long ago as 1906 the London County Council made official arrangements for the supply of school dinners to necessitous children, and in 1910 milk and cod-liver oil could be supplied to children whose home conditions were unsatisfactory or when malnutrition was threatened or present. In addition there were an increasingly large number of other children receiving milk, on payment, as the result of voluntary school milk clubs. Only in 1934, however, when the Milk Marketing Board was set up, was a scheme put into operation to supply milk (at first one-third of a pint and later two-thirds of a pint a day) to children, irrespective of their physical condition, in any part of the

country at the reduced rate of $\frac{1}{4}$ d. per one-third pint bottle, or free in necessitous cases.

With the war have come other advances: cheap milk, cod-liver oil, and orange juice, and a priority of eggs, have become available to all pregnant and lactating women, to infants, and to young children. Dinners are provided at most schools, and their quality has been greatly improved; their provision no longer depends on financial or medical necessity, but has been developed as part of the Government's wartime food policy, and many parents take advantage of the scheme. Calcium carbonate has been added to bread (7 oz. to 280 lb. of flour), and the nutritive value of all margarine has been improved by the addition of vitamin D₂ and vitamin A.

(d) Reasons for Present Investigation

While these steps have been taken with the object of bettering the general nutrition of the community and especially of guarding against diseases of childhood such as rickets and concomitant ills, it is obvious that the changes in the dietary are in the main those which the animal and human investigations mentioned above have shown to be necessary for improving the nation's teeth. It seemed of considerable interest, therefore, to see whether there was any evidence that such an improvement had in fact taken place. Fortunately, it was possible to make an inquiry into the question which would provide an answer so far as children attending L.C.C. schools are concerned, for in 1929 a dental examination of some 1,300 unselected 5-year-old children (i.e., children who had not yet come under the full influence of the school dental service) in these schools was made by one of us (M. M.) for the Board of Education. The surface structure of the enamel and the presence and extent of caries in each tooth were recorded; later some of the findings, together with other records made on the same children, were published by the Board of Education (1931). By using the same criteria and examining the same age group attending these schools to-day it would therefore be possible to see what, if any, improvement had taken place in the intervening 14 or 15 years.

Dr. W. Allen Daley, the School Medical Officer to the London County Council, was approached, and the Council's permission to carry out an investigation was readily given.

The Present Investigation

When any school visited in 1929 was closed or was no longer used as an infants' department, one or more other schools in the same neighbourhood, as near as possible to that previously inspected, were taken as substitutes. In addition, a few schools in other districts were visited, but they are not included in the main tables.

In 1929 the schools were divided, with the help of the local Care Committees, according to their level in the social scale. For the purpose of the present investigation, therefore, the Care Committees were again approached, and after consultation they made a rough classification into four grades; but they could not guarantee that their groupings were comparable with those made in 1929, which were indicated by the signs B+, B, B-, and C. Moreover, there is now a greater mixing in the schools than hitherto of children from families of different social and financial levels. This is due to many causes, including the clearance of slums and the building of large blocks of flats, the transference of families from one area to another owing to destruction of homes from enemy action, evacuation schemes, etc. Then, again, the financial status of many families has been altered, either raised or lowered, as a result of the war.

In the present survey the dental examinations were shared by us, the majority of children being inspected by H. C. From time to time during the course of the survey, and especially at the beginning, the teeth of many children were examined separately by both investigators, the two records being compared so that as far as possible the same standard would be kept; this was especially necessary for the grading of structure, in which the personal factor plays a prominent part. We were in agreement in most cases; where differences did occur they were generally small.

Detailed examinations of all teeth were made for signs of M-hypoplasia (see next paragraph), gross hypoplasia (the generally recognized varieties), and caries. Other conditions of the teeth, including their alignment, the presence of mottled enamel, and the state of the gums, were noted, but are not considered in this paper. Since results of the 1929 investigation were given as percentages of children showing varying degrees of hypoplasia and caries, similar figures will be given here. A more detailed analysis of our findings will be published later.

(a) The Structure of the Teeth

The standards used for structure were similar to those adopted in the 1929 Board of Education survey, which were evolved from the results of the investigations referred to above. Individual teeth were taken to be of normal or perfect structure when their surfaces were smooth and shiny, like those of the teeth of puppies given a mixed diet relatively rich in vitamin D and containing the necessary calcium and phosphorus. Teeth showing imperfections of surface structure were classified into three grades: slightly defective, defective, and very defective. These types of defects will be referred to as M-hypoplasia, a term first used by J. D. King in 1940 to distinguish them from the previously recognized gross or G-types, which are rarely seen in deciduous teeth. The M-type defects were originally described by M. Mellanby (1923, 1927, 1934), who found that some 80% of 1,500 deciduous teeth were so affected.

The surfaces of the teeth with M-hypoplasia show varying degrees of roughness which are not always visible to the naked eye when the teeth are *in situ*, but can easily be detected when their surfaces are lightly rubbed with a probe; the degree of roughness as indicated by the "feel" of the probe can be judged with practice. A sufficiently reliable clinical assessment of the enamel surface texture is obtained if the test is confined to the buccal aspect of the teeth. When each tooth had been considered separately a general computation was made for the structure of all the teeth of a given child, keeping so far as possible to the method of assessment used in the 1929 investigation but dividing the children into only four groups instead of seven: Good structure, Little M-hypoplasia (1 and 2), Some M-hypoplasia (3 and 4), and Much M-hypoplasia (5 and 6). The figures in parentheses refer to the 1929 grouping. The few cases of gross hypoplasia were included in Group 4.

Although 1,604 children were examined in the main survey and included in the caries incidence tables, 33 of them had lost too many teeth for it to be possible to classify for structure, reducing the number for this purpose to 1,571.

In Table I the structure of the teeth in the two investigations is set out. It is clear that in the 14 years that have elapsed the

TABLE I.—Incidence of M-hypoplasia in Deciduous Teeth

	Total Number of Children	Percentages of Children Showing:			
		None	Little	Some	Much
1943	1,571	1.2	18.1	47.4	33.3
1929	1,139	0	7.8	33.6	58.5

picture of deciduous tooth structure has changed for the better. Even so, there are very few children with a full complement of perfectly calcified teeth; however, in 1943 18.1% had only slight M-hypoplasia, compared with 7.8% in 1929, and there were fewer with much M-hypoplasia—33.3% as against 58.5% respectively.

In Table II the findings are given when the schools are divided according to their estimated social status. There are no great

TABLE II.—Incidence of M-hypoplasia in Deciduous Teeth at the Different Social Levels

Social Grading of School	Total No. of Children	Percentages of Children Showing:			
		None	Little	Some	Much
Highest grade (B +)					
1943	190	0.5	25.8	49.0	24.7
1929	133	0	12.8	30.8	56.4
2nd grade (B)					
1943	582	1.0	14.8	50.2	34.0
1929	423	0	9.9	36.4	53.7
3rd grade (B -)					
1943	558	1.8	18.0	45.1	35.1
1929	190	0	4.7	30.0	65.3
4th grade (C)					
1943	243	0.8	20.2	44.9	34.2
1929	393	0	5.4	33.3	61.3

differences in these groups in 1943, although the tendency is for the highest-grade schools (B+) to have teeth of rather better structure than the schools in the other three grades, which differ little on the whole. In 1929 there was a suggestion that the quality of structure was worse in the lower-grade schools.

(b) Incidence of Dental Caries

For the grading of caries each tooth was examined by probe and mirror and put into one of four categories, as follows:

No caries: that could be diagnosed as definite caries by our methods of examination. (No radiographs were taken.)

Slight caries: Very early and suspected fissure and approximal caries.

Moderate caries: Cavities involving destruction up to roughly one-quarter of the tooth crown.

Advanced caries: Destruction of more than one-quarter of the tooth crown.

Fillings and arrested caries were classified very roughly according to the extent of the crown involved and included as carious. If deciduous molars or canines had been lost it was assumed that they had been extracted for advanced caries, since they should normally be present at the age under review.

When each tooth had been graded separately the children were divided into four groups according to the total amount of caries present: the method of assessment used was as nearly similar to that of 1929 as possible: No caries,* Little (1 and 2), Some (3 and 4), and Much caries (5 and 6). The figures in parentheses relate to the 1929 classification, when seven groups were distinguished instead of four.

Table III gives a comparison of the relative amount of caries for the two investigations: 22.4% of the children in 1943 were "caries-free," compared with 4.7% in 1929; and only 29.3% had much

TABLE III.—Incidence of Dental Caries in Deciduous Teeth

	Total Number of Children	Percentages of Children Showing:			
		No Caries	Little Caries	Some Caries	Much* Caries
1943	1,604	22.4	25.9	22.4	29.3
1929	1,293	4.7	11.7	20.8	62.8

* Only 6% of the children in this category in 1943 would correspond with the C6 group (very bad caries), compared with 54% in 1929.

caries, as against 62.8% previously. Actually the improvement is even greater than these figures suggest, because in 1943 only about 6% of those in the "Much" caries group could be classed in the C6 category (very bad caries), compared with 54% in the earlier investigation, which included a number of edentulous children. No edentulous child was seen in 1943. In both investigations the amount of caries varied considerably from one school to another; in 1943 the percentages of caries-free children ranged from 5 to 37 and of "Much" caries from 50 to 11.5. In 1929 the comparable figures were 0 to 15.4% and 79 to 39% respectively.

Table IV indicates that in 1943 there was distinctly less caries in the B+ schools than in the other three grades, which differed little

TABLE IV.—Incidence of Dental Caries in Deciduous Teeth at the Different Social Levels

Social Grading of School	Total No. of Children	Percentages of Children Showing:			
		No Caries	Little Caries	Some Caries	Much Caries
Highest grade (B +)					
1943	193	29.5	28.5	21.2	20.7
1929	147	6.1	17.7	15.6	60.6
2nd grade (B)					
1943	596	20.8	27.7	22.0	29.5
1929	480	6.5	11.3	22.6	59.6
3rd grade (B -)					
1943	569	22.9	23.6	21.1	32.5
1929	210	3.8	10.5	22.9	62.8
4th grade (C)					
1943	246	19.5	25.2	27.2	28.1
1929	456	2.8	10.5	19.5	67.1

among themselves. In 1929 there was a slight tendency for the amount of caries present to increase from the better to the poorer schools.

(c) Subsidiary Survey

As already mentioned, a subsidiary survey was made of several schools in districts not visited in 1929. The findings are therefore given separately. The amount of hypoplasia was about the same as that found in the schools in the main survey, but there was less decay: 35% of the children had no definite caries.

TABLE V.—Incidence of M-hypoplasia in the Subsidiary Survey

Social Grading of School	Total No. of Children	Percentages of Children Showing:			
		None	Little	Some	Much
Highest grade (B +)	134	0.8	12.7	61.9	24.6
3rd grade (B -)	128	0	14.8	46.1	39.1
Total	262	0.4	13.7	54.2	31.7

The schools all came into the B+ and B- categories. In the former, 135 children were seen, of whom 40.7% had no definite caries and only 11.1% had "Much" caries. The teeth of the 131 children

* There are children included in this group in whom very early caries was present in two or three teeth, and whom to-day we should probably prefer to include in a separate group between caries-free and little caries; but the standard here used is that adopted in 1929, when so few children were seen with anything approaching a caries-free mouth.

TABLE VI.—Incidence of Dental Caries in the Subsidiary Survey

Social Grading of School	Total No. of Children	Percentages of Children Showing:			
		No Caries	Little Caries	Some Caries	Much Caries
Highest grade (B +)	135	40.7	25.2	23.0	11.1
3rd grade (B -)	131	29.0	19.1	25.2	26.7
Total	266	35.0	22.2	24.1	18.8

in the B- schools were not as good from this point of view as those in the B+ schools, but nevertheless 29% of the children were "caries-free" and 26.7% had "Much" caries. The percentages of "caries-free" children in the individual schools ranged from 27 to 44 and those with "Much" caries from 38 to 8.

(d) Arrest of Caries

In the Sheffield investigation carried out by one of us (M. M.) in co-operation with Dr. Lee Pattison, and referred to above, a striking feature noted in groups of children having a good calcifying diet was the relatively high proportion of decayed teeth in which the caries was no longer active—in other words, in which the caries had become arrested. Many of these children were examined at regular intervals over long periods, and it was found possible to trace the gradual arresting of the carious process. It is therefore significant that in the present survey typical arrest was found in at least some teeth of 28% of all the children with caries.

(e) Association of M-hypoplasia and Caries

A close association exists between the quality of a tooth and its resistance to decay, as has been mentioned above. To assess this relationship accurately it is necessary to consider individual teeth, but it was thought that a rough indication might be obtained by correlating the structure of the teeth and the amount of caries per child, taking for this purpose only those cases in which no canines or molars were missing. None of the few children with perfect and under 5% of those with nearly perfect dentition were placed in the two worst categories of caries, whereas 38% of the children with "Much" hypoplasia had also "Much" caries and only 8% were "caries-free." It is interesting to note that 34% of those with "Some" hypoplasia had no caries and 40% had "Little"; this suggests that some post-eruptive influence (direct or indirect) was at work, though it must be borne in mind that these children were under 6 years of age and the molars still had a long period in the mouth in which they might become carious.

Discussion

The data obtained in this survey show clearly that there has been a distinct improvement since 1929 in the dental condition of 5-year-old children attending London County Council elementary schools. The quality of the teeth is now better; in 1943, 19% of the children had teeth of good structure, compared with 8% in 1929, while the percentages with very defectively formed teeth (i.e., teeth with "Much" M-hypoplasia) were 33 and 58 respectively. The reduction in the incidence of dental decay is even more striking: in 1943, 22% of the children were "caries-free," compared with 5% in 1929, while only 29% had "Much" caries in 1943, as compared with 63% in 1929. When the schools were grouped according to social status there was little difference in dental condition as regards both structure and caries between the various grades, though the teeth tended to be rather better in the highest-grade schools in 1943 and in the two highest grades in 1929.

These observations, however, do not show whether the improvement is of recent occurrence or whether it has been gradual in this social stratum of London during the past 14 or 15 years. Since, however, the teeth of the 1943 5-year-old children were in the main formed in the immediate pre-war years and the first year of the war, the cause of the improvement in these particular children must be sought among factors operative at and since that time and contrasted with the conditions in the years 1922-9, when the teeth of the children examined in the previous survey were developing. Can the improvement be attributed to the changed dietary referred to earlier, which has increased the intake of vitamin D and calcium by the provision of cheap milk and of cod-liver oil to infants and young children, together with the addition of vitamins D and A to the margarine and of calcium carbonate to the bread; or is it due to other unknown influences which have been brought to bear on child life in London during these years? No categorical answer can be given to this question, because there still remains much to be discovered not only about the relation of nutrition to dental conditions but also about the

immediate cause of caries. All we can do in attempting to answer the question is to argue from established knowledge and see to what extent this explains the observations.

It is known that the structure of the deciduous and permanent teeth of young animals is affected by the diet during their period of tooth development, both *in utero*, during lactation, and especially after weaning, when much greater defects in dental structure of the offspring may result from diets poor in calcifying properties. The mother has a large quantity of calcium in her bones and sometimes stores of vitamin D in her body; these substances she undoubtedly sacrifices to some extent to her offspring when she herself is deficiently fed, but these offspring will have little or no stores of vitamin D after weaning, so that a poor calcifying diet taken at this time very soon exerts its baneful influence. The same principle probably applies in the case of the child, and it is therefore very important that the pregnant and lactating woman, and later the infant itself, should have diets rich in the factors necessary for the production of well-calcified teeth.

The experimental evidence that *dental structure* is largely controlled by the ingestion of enough vitamin D, calcium, and phosphorus is so strong that it is difficult to avoid the conclusion that the improvement in dentition of the 1943 children has resulted largely from the changes in dietary in the immediate pre-war and early war period. If this is the case, and if mothers and children are taking and continue to take full advantage of the additional improvements in dietary that have been placed at their disposal during the last year or two, it seems safe to predict that children's teeth now being formed will be even better than those of the children seen in the 1943 survey.

While, therefore, the reason for the improvement in dental structure seems clear, the cause of the reduction in *dental caries* is less certain. Since M. M.'s early investigations on children's teeth showed that those of good structure were less liable to caries than those of poor structure, and since the structure of the teeth in this survey was better than in 1929, some reduction in the amount of caries was to be expected from this cause alone. The reduction observed, however, was greater than could be explained on this basis, so that some other contributory factors were evidently at work.

Investigations carried out by M. M. and her colleagues and others have shown that the dietary factors which promote well-calcified teeth also tend to retard the onset and spread of caries, apart from their influence on structure. The dietary of the young children in the 1943 survey has been improved from this point of view even beyond the standard reached during the immediate pre-war period and early part of the war, when their teeth were being formed, and it is considerably better than the dietary at the corresponding period in the lives of the 1929 group of children. It might be surmised, therefore, that the reduction in caries in 1943 as compared with 1929 is due in part to the better structure, which is related to better calcifying dietary, in part to the post-eruptive influence of the even better dietary condition of the war years, and possibly in part to other unknown changes. What these other factors are that may share the responsibility for the diminution of caries in these children can only be conjectured. Some would say that changes in the carbohydrate intake or the fluorine intake or of food consistency, or a greater use of the toothbrush have played a part. Unfortunately the basis of these suggested factors is too insecure at the present time to allow their effects to be assessed adequately.

If the present national food policy has been responsible, as seems likely, for much of the improvement of the teeth here reported, this only emphasizes the importance of still greater efforts on the part of central and local government in the same direction, for even to-day 78% of these 5-year-old children have some decayed teeth. Parents must be taught to realize that the consumption of milk and vitamin D is a *sine qua non* for improvement of the teeth of their children, and they must be induced to co-operate more willingly in this health-giving project. Much has already been done by the staffs of welfare centres, school medical and dental officers, Care Committee workers, and teachers; but unfortunately there still remains a fair proportion of parents who, for one reason or another, fail to take full advantage of the dietary supplements at their disposal.

The facts emerging from this investigation can be regarded as heartening and as providing evidence that we are at last taking steps in the right direction to attack successfully the most widespread of the ills of civilized man. Florid rickets—the cruder manifestation of defective calcification—has been virtually eliminated in England by better feeding of pregnant and lactating women, and of infants and children. It is possible that the elimination of dental caries may not be attainable until its immediate cause is known, but even without this knowledge it is probable that a continuation and extension of the present nutritional policy and its more whole-hearted adoption by the public would bring about further improvement in the architecture of teeth and in their subsequent resistance to decay. It would then at least be possible to present to dental surgeons a situation which they could tackle hopefully.

Summary

The results are given of two large-scale dental surveys of 5-year-old children in the same or comparable schools of the London County Council in 1943 and 1929.

During the intervening period a great improvement has taken place both in the structure of the deciduous teeth and in their resistance to decay. (a) 19% of the children had teeth of perfect or nearly perfect structure in 1943, compared with 8% in 1929, and only 33% had very defectively formed teeth (i.e., teeth with much M-hypoplasia), compared with 58% in 1929. (b) In 1943 22% of the children were, according to the standards used, "caries-free," compared with about 5% in 1929.

That there is still great room for improvement in dental condition is demonstrated by the fact that even at the present time between 56 and 95% of children in individual schools visited in the two surveys had dental decay in at least some of their teeth.

It is thought that the observed improvement in the dental condition of this age group may be largely due to the changes in feeding habits which have been developing in recent years—in particular to the introduction in 1934 of the cheap milk scheme of the Milk Marketing Board and later to the wartime food policy, which included (a) increased allowances of milk together with cod-liver oil and fruit juices to pregnant and lactating women, to infants, and to young children; (b) the addition of vitamins A and D₂ to margarine; and (c) the addition of calcium carbonate to bread. These are dietetic changes that investigations on animals and children carried out by one of us (M. M.) since 1917 have established as essential for the improved dental condition of the general child population.

Our thanks are due to many people who have helped us directly or indirectly with this investigation. These include: the London County Council and Dr. W. Allen Daley for their permission to carry out the inspections, for making the necessary arrangements at the schools, and for their kind interest in the progress of the survey; the Care Committee Organizers for grading the schools and for other valuable assistance; and Miss Irene Allen for general help, and especially for working out the results given in the tables. Last, but by no means least, we want to thank the head teachers of the infant schools and their assistants, without whose willing and interested co-operation the work would have been impossible. H. C. holds a scholarship from the British Council, and other expenses were paid by the Medical Research Council; to both of these bodies we are very grateful.

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In an address to the Conference of the Children's Nutrition Council (Wales) at Cardiff on May 13, Mr. Eddie Williams reminded his audience that the object of the Council was "to ensure that no child, by reason of the poverty of its parents, shall be deprived of at least a minimum of food and other requirements necessary for full health." He strongly advocated the institution of school meals throughout Great Britain.