A STUDY ON DENTAL CARIES
AMONG NEGRO CHILDREN OF PORTLAND, OREGON

by

Adolphe Debrot, B.A., D.D.S.

A Thesis

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APPROVED

[redacted]

Donald R. Porter, D.D.S., M.S.
Professor of Pedodontics

[redacted]

Ellis B. Jump, D.M.D., Ph.D.
Chairman, Graduate Education Committee

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INTRODUCTION

In the field of the medical sciences, three approaches are utilized to increase understanding of the diseases that afflict mankind. The two methods most commonly applied are clinical observations on individual patients and experiments conducted under controlled conditions. Epidemiology, the third approach, "is concerned with the various factors and conditions which determine the occurrence and distribution of health, disease, defect, disability and death among groups of individuals." (10)

The epidemiological approach to the study of disease is divided into three phases. The first phase, descriptive epidemiology, involves the gathering of data in an orderly fashion to determine the prevalence of a disease in a population group. In the second phase, analytical epidemiology, factors which may influence the manifestation of the disease are studied. In experimental epidemiology, the third phase, hypotheses are put to test by subjecting population groups to controlled testing conditions. Although the epidemiological approach has been utilized mainly in the study of communicable diseases, it is now being used to great advantage in the study of other types of pathological manifestations (13, 42) and of traumatic injuries (35).

The application of epidemiological methods and principles in the study of dental diseases and abnormalities is of rather recent development. An era when the epidemiological approach could be utilized to its fullest in studies on dental caries began with the design of the DMF index by Klein and Palmer (22). The success of their index is due to the fact that it is not only a reproducible, quantitative measurement, but also that it can easily be applied to a large group. Studies employing this index have obtained important findings on the behavior patterns of this chronic disease.

The objective of this investigation is to determine the dental caries prevalence in the permanent dentition of Negro children between the ages of six to 12 years by employing the descriptive phase of the epidemiological method. By using the DMF teeth index, the behavior patterns of dental caries as they occur in this group will be demonstrated. The role played by the first permanent molar in the dental caries prevalence for this age span will be illustrated. The dental care received by this group in contrast to their unmet dental needs will be evaluated by a comparison of the components of the DMF index. Information regarding the prevalence of dental caries and the dental status of Negro school children in the United States is limited, and the findings of this study will provide further knowledge in these areas.

REVIEW OF THE LITERATURE

Although numerous epidemiological studies have been conducted on dental caries, only a few have had as main interest the colored population. Additional information has been derived secondarily from studies on dental caries prevalence where Negroes were chance inclusions in the sample. Other data has been acquired by design where dental caries prevalence in Negro and white groups have been compared. A review of these related investigations permits an evaluation of the present knowledge on this subject.

One of the earliest epidemiological reports on dental conditions was published by Suk (48) in 1919. This study was noteworthy in that it brought forth three important findings concerning dental caries: the bilateral occurrence of dental caries; the higher prevalence of dental caries in girls as compared to boys in the same age group; and the lower dental caries prevalence in Negroes as compared to a Caucasian group. The sample consisted of 492 males and 516 females up to 20 years of age, of Natal and Zululand in South Africa. The study was concerned with the eruption time of the permanent dentition as well as the prevalence and patterns of dental caries. Suk presented evidence that in the Negro population, girls erupted their permanent dentition earlier

than did the boys. The findings in relation to dental caries were expressed in percentages of decayed permanent teeth, with separation of the data by sex and age.

In 1927 Coon and Rosenthal (11) reported on a survey conducted on 24,000 school children of Bridgeport, Connecticut. The findings were grouped into 16 ethnic and nationality categories, the average age for each being close to nine years. Of the 7,732 American children examined by dental hygienists, only 8.2 per cent were reported caries-free while of the 56 American Negroes examined, 18.6 per cent fell into this division.

In a health study on the physical status of the urban Negro child, Sterling (46) reported his findings on dental caries. In addition to the study of physical measurements, such as height, weight and chest girth, the prevalence of physical defects, including dental defects, was investigated. The sample of 5,079 Negro school children from Atlanta, Georgia, ranged in age from five to 14 years. The findings were expressed in terms of the percentage of children free from dental caries. The data was separated into age groups and sexes; however, no attempt was made to distinguish between the caries prevalence of deciduous and permanent dentitions. He reported that 31.6 per cent of the children were free from dental caries. Of those with carious teeth, about one-third had only one or two defective teeth. Furthermore, his findings showed that from ages six to 13 years, the

percentage of girls free from dental caries was higher than that of boys. In regard to the dental care received by this group, only 75 children had had any teeth filled, roughly less than two per cent.

McRae (36) published a study comparing oral conditions of Negro and white children in Shelby County, Tennessee. This sample consisted of children in the first six grades and included 3,188 white children and 1,096 Negro children, the average age for the two groups being about the same. The factors studied were occlusion, stain, calculus, gingival condition, dental caries, and the usage of the tooth brush. The findings on dental caries were expressed in terms of children with dental caries and were not separated for the dentitions, ages, or sexes. In the group of white children 73.7 per cent were affected by dental caries, while 41.0 per cent of the colored children were affected. In regard to the presence of fillings, there was an average of one filling per three white children and an average of one filling per 219 colored children. McRae felt that diet played an important role in the lower prevalence of dental caries in the Negro children and stated that their diet required more mastication. The Negro children also showed less stain and calculus than did the white children and this difference was also attributed to the dietary variations.

At the Rochester Dental Dispensary in Rochester, New York, Marshall Day and Sedwick (38) did a study on the seventh

graders who were receiving periodical treatments there. They balanced their sample in about equal numbers of boys and girls, within four groups: children of American, Northern European, Italian, and American Negro percentage. The average ages for these four groups were about the same. All patients received a prophylaxis prior to the examinations which were done by two examiners. Their findings on dental caries, calculated separately by sexes for the four groups, were expressed in terms of a ratio of total dental defects to the number of teeth present. It was found that for both sexes the Negro group had a lower dental caries prevalence. The number of fillings present per child was 3.9 fillings for the American white child and 1.1 for the American Negro child. The sample of Negro children consisted of 15 of the total 433 children studied.

An all male population at the Ohio State Reformatory in Mansfield was studied by Gafafer and Messner (15). The sample consisted of 1,499 white and 409 colored inmates, ranging in age from 16 to 30 years. Subjects were combined into three age ranges, 16 to 20, 21 to 25, and 25 to 30 years of age. Observations were made by a single examiner. For each of the age groups the percentage of Negro inmates completely free of dental caries was higher than that of the white inmates. The findings on dental caries were summarized as follows: "Color and increasing age are important factors in the incidence of caries, the white being attacked with

greater frequency than the colored . . ." It was also noticed that for all age spans the white group had received more previous dental treatment than had the colored group.

Blackerby (4) conducted an investigation on the dental caries prevalence in rural and semi-rural children of Tennessee. His sample consisted of 1,117 Negro children in 32 schools of ten counties and 11,674 white children in 328 schools of 21 counties. The age range was from six to 17 years. The findings were combined into four age spans of three years each, without differentiation by sex or dentition, and were reported in terms of children needing dental care. The results showed that 80.2 per cent of the white and 67.5 per cent of the Negro children required dental care. A tendency for the racial differences in dental caries prevalence to decrease with an increase in age was noted by the investigator. Blackerby postulated that the racial differences seen in dental caries prevalence might be primarily due to the difference in caries resistance in the deciduous dentition. In relation to fillings present he noted that there were four times as many children with filled teeth in the white group as compared to the Negro group. When the lost permanent tooth indices were compared, the white children had an average of 9.7 and the colored children had an average of 13.0. This finding was reported to demonstrate that in the Negro population extraction was more often performed than in the white population.

Study of a female population was done at an institution, Letchworth Village, New York, by Lathrop (31). The sample consisted of 144 girls ranging in age from ten to 19 years. All participants received a prophylaxis prior to the examinations which were done by two observers. The findings, expressed in terms of carious teeth per person, were reported for the three categories into which the sample was divided, Negroes, Italians, and native American whites. The 30 Negro girls had an average of 7.2 carious teeth, the Italian girls 7.8, and the native American white girls 8.3 carious teeth.

Klein and Palmer (26) used their DMF teeth index to determine the caries prevalence in school children of Baltimore and Hagerstown, Maryland. The sample for the Baltimore study consisted of 1,428 colored children between the ages of six and 13 years and 811 white children between six to 14 years of age. In Hagerstown 363 colored children and 5,277 white children, both groups ranging in age from six to 14 years, made up the sample. Their findings were expressed in terms of DMF teeth per child and were reported separately for color and age group but not for the sexes. In both of these studies they found that for all ages the Negroes had a lower caries prevalence than did the white children, with the exception of the age range of six to eight years in Hagerstown where the Negro children had a slightly higher caries prevalence. The difference in caries

prevalence between the races was not marked before the age of nine, but the investigators noted that thereafter this difference became markedly increased.

Brucker (7) surveyed dental caries prevalence in school children of Newark, New Jersey. His findings led him to conclude that "there is undoubtedly a greater resistance to caries in the Negro pupils." The sample of 7,447 white children and 1,882 Negro children ranged in age from six to 16 years. His findings, expressed in terms of percentage of children free from dental caries, were separated for sexes and ethnic groups but not for specific ages nor for specific dentitions. He reported that the white children had a lower percentage free from dental caries than had the Negro children. Brucker noted that a smaller percentage, 19.6 per cent, of the colored boys were completely free from dental caries as compared to 25.6 per cent of the colored girls.

Sibelius (44) compiled and reported on data collected by several dentists from 1937 to 1941 in 24 counties of Tennessee on a sample of 2,928 white children and 2,917 Negro children, ranging in age from three to 17 years. The findings were given for six age groups of three years span each and were not separated for the sexes. In terms of DMF teeth per 100 children, the white children had a higher caries prevalence than did the Negro children for all age spans except three to five years. In relation to the lost permanent

tooth index, the colored children from 12 years on showed a greater loss than did the white children. Analysis for number of fillings present revealed that the white children had eight times more fillings than had the Negro children.

Bellinger (2) reported on the dental caries prevalence of white and Negro children in Kansas City, Kansas. The sample consisted of 1,472 white children ranging in age from six to 14 years who were selected from 12 schools and 418 Negro children of seven, ten, and 13 years of age who were chosen from five schools. Both ethnic groups were balanced according to age and sex. The examinations were done by two dentists who standardized themselves against each other prior to the study. The findings, reported in terms of DMF teeth per child, were not presented separately by sex. A lower prevalence of dental caries was noted in the Negro group for the ages studied as compared to the white group.

Two dental surveys conducted in Baltimore, Maryland, were reported by McCauley and Frazier (34). The examinations for the first study, 1952, were performed by two teams of dentists; six white dentists surveyed the white children and four Negro dentists surveyed the Negro children. The findings for the 12,000 children, ranging from five to 18 years of age, were reported in terms of DMF teeth. A difference in caries prevalence between the two ethnic groups at each age and for each sex was noted, the Negroes

having the lower caries prevalence. In the second study, conducted in 1955, all children were examined by one dentist. The sample consisted of 1,800 white children and 720 Negro children at the selected ages of six, eight and ten years. The sample for both ethnic groups was perfectly balanced in relation to age as well as sex. These findings, also expressed in terms of DMF teeth, failed to reveal any difference in caries prevalence between the two ethnic groups. The bias introduced by having ten examiners in the first study was suggested as a possible reason for the differences seen between the ethnic groups in the earlier study. In the latter study the unmet dental needs of the ethnic groups were compared and the Negroes were found to have a higher rate than had the white children.

Hill et al. (19), in reporting on the Evanston study of 1946 as compared to 1954, separated the data for the white and Negro children. The findings in terms of DMF teeth per 100 children were reported for six specific ages and for boys and girls in both ethnic groups. The sample size for the Negro groups in the two studies varied from 24 to 73 children for any given age and sex. From the data of these studies it is noticed that for most of the ages the caries prevalence in the Negro children was lower than in the white children. An exception is seen in two groups where the white boys had a lower caries prevalence than had the Negro boys, namely, at age six in the 1946 report and

age 13 in the 1954 report. In the 1954 study, for the ages 12, 13, and 14 years, the Negro girls had a slightly lower caries prevalence than had the Negro boys.

Mobley and Pointer (39) determined dental caries prevalence and periodontal conditions among teenage Negroes of Tennessee at successive times, 1958 and 1959. In the first survey, 1,856 children 14 to 16 years of age were examined. One year later only 753 children of the original groups were available for re-examination. The data, in terms of DMF teeth was separated for the sexes and for locale, rural and urban, but not for specific ages. Results for the 1958 study showed an average of 14.7 DMF teeth per child and for the 1959 study an average of 15.5 DMF teeth per child. The relation of periodontal conditions to dental caries was found not to be statistically significant. The females showed a slightly higher caries prevalence than did the males, but this was not statistically significant. The first permanent molars accounted for more than half of the missing teeth.

MATERIALS AND METHODS

Ten grade schools of Portland, Oregon, with Negro enrollments ranging from 11 to 97 per cent were surveyed. The total number of Negro pupils per school as well as the percentage of the total enrollment represented by this group is shown in Table I. All these schools were included in order to avoid weighting the sample with a particular socio-economic level.

The parents of all Negro children, aged six, eight, ten or 12 years as of their last birthday, were sent a request (Figure 1) to permit their child(ren) to be included in this survey. All children whose parents had granted permission were examined except those who were absent at the time the survey was conducted at their school. Table II shows the estimated enrollment for Negro children in the specified age groups and the percentages of these children which were examined. The sample consisted of 1,010 children which represents an overall return of 62 per cent.

Facilities for the examinations were made available at the schools. The pupils were seated in a dental chair and a dental light was used for illumination. Prior to the examinations the teeth were dried with compressed air and the examinations were made with a No. 4 Kerr plain surface

TABLE I

THE SCHOOLS SURVEYED AND THE TOTAL NUMBER OF PUPILS, NEGRO PUPILS, AND PERCENTAGE OF NEGRO PUPILS IN EACH

SCHOOLS	TOTAL NUMBER OF PUPILS	TOTAL NUMBER OF NEGRO PUPILS	PERCENTAGE OF NEGRO PUPILS
Boise	830	801	97
Eliot	410	377	92
Humboldt	378	326	86
Highland	939	788	84
Holladay	262	135	52
Irvington	703	268	38
Woodlawn	760	232	31
Sabin	645	133	21
Peninsula	821	111	14
Vernon	761	80	11

UNIVERSITY OF OREGON DENTAL SCHOOL
DEPARTMENT OF DENTISTRY FOR CHILDREN

Dear Parent:

A dental survey is being conducted to determine the extent of dental problems among school children.

Your child has been selected for this survey. We would appreciate your cooperation in permitting your child to participate in this program.

Please sign and return this card to the classroom teacher.

I hereby give permission to have my child's teeth examined:

_____

Signature of Parent or Guardian

Figure 1. Request form sent to parents.

TABLE II

THE ESTIMATED ENROLLMENT FOR NEGRO PUPILS OF AGES 6, 8, 10 AND 12 YEARS AND THE PERCENTAGE OF CHILDREN EXAMINED IN THESE AGE GROUPS AT EACH SCHOOL

SCHOOL	ESTIMATED NEGRO ENROLLMENT IN THE SPECIFIED AGE GROUPS	NUMBER OF NEGRO PUPILS EXAMINED	PERCENTAGE OF PUPILS EXAMINED
Boise	400	333	83
Eliot	188	115	61
Humboldt	163	91	56
Highland	394	232	59
Holladay	67	37	55
Irvington	134	85	63
Woodlawn	116	44	38
Sabin	66	23	35
Peninsula	55	17	31
Vernon	40	33	83
Total	1,623	1,010	62

mouth mirror and a No. 5 American Dental Manufacturing Company explorer. The findings were reported to an assistant who recorded the information on a specially designed dental record, shown in Figure 2.

A tooth was recorded as carious if a carious lesion was found on any surface upon careful clinical examination. Pits and fissures were considered carious when the explorer caught and resisted withdrawal from the pit or fissure. Buccal (labial) and lingual surfaces were noted as carious if upon light touch the explorer caught on irregularities of the surface and by close inspection a carious lesion was present. All proximal surfaces were carefully explored and only if there was a definite catch with the explorer were they noted as having a carious lesion.

Excluding deciduous dentition and third molars, the following items were recorded on the records: carious teeth, missing teeth or those indicated for extraction, and teeth with fillings. The patients were questioned concerning their missing teeth and if the reason given for extraction was other than carious involvements, such as lost by accident or extracted for orthodontic reasons, these teeth were not recorded as missing.

The present and past caries experience was reported in terms of DMF teeth. A tooth, both carious and filled, was counted only once in the total DMF score; however, such a carious and filled tooth added a score of one to both

THE UNIVERSITY OF OREGON DENTAL SCHOOL

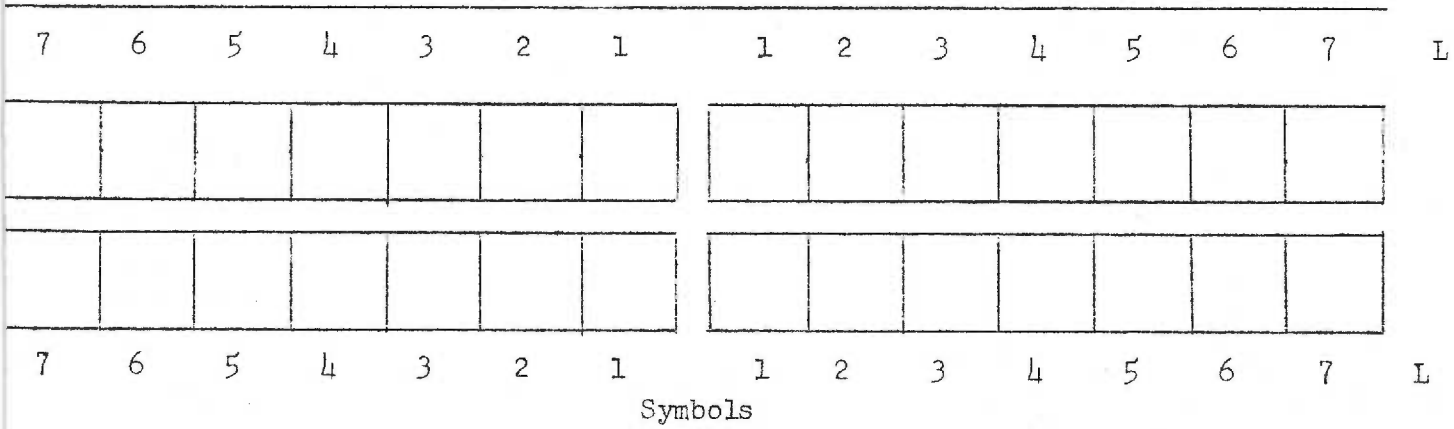
Dental Examination Record

No. _____

Date. _____

Name _____ Age (Years) _____ Sex. _____

School _____ Portland, Oregon



Symbols

Filling present = blue line. Filling indicated = red line.
Extraction indicated = X. Missing = O.

	Total	Left Quadrant	First Permanent Molar
mber of decayed teeth:			
mber of missing teeth and indicated for extractions:			
mber of filled teeth:			
mber of DMF teeth:			

marks:

igure 2. Dental examination record.

components, D (decayed) and F (filled).

From the data collected the following items were calculated:

1. The percentage of caries-free children by age group for combined sexes.
2. The average DMF teeth per child by age group for combined and separate sexes.
3. The components of DMF teeth per child by age group for combined sexes.
4. The DMF first molar per child by age group for combined sexes.
5. The DMF teeth per child by age group for right and left quadrants.
6. The standard error of measurement.

For statistical evaluation of the influence of sex and age, the data was first normalized. An analysis of variance, utilizing the technique for r x 2 table for non-orthogonal data with disproportionate numbers in the sub-classes, was performed.

A double determination was utilized to determine the consistency of the examiner's observations. As each pupil was examined, his dental record was given a number sequentially beginning with number one. Prior to the survey, a list of 70 numbers selected at random between one and 1,200 was prepared. The pupils whose numbers were on the list were examined twice at different times unknown to the

investigator; this was accomplished since the assistant was in charge of having the pupils brought in for the examinations. With the information available from these double records, the "Students T-test" was performed to determine the significance of differences in the means of the DMF teeth per child for these two separate series of examinations at the 5 per cent level. The standard error of measurement was also calculated.

FINDINGS

Sample description. A total of 1,010 Negro elementary school children of Portland, Oregon, were examined; 460 were boys and 550 were girls. Only pupils of six, eight, ten or 12 years of age were included in this study, and the number of girls was higher than that of the boys for each age category. The number of children per age group decreased with increase in age, except for the boys of ages six and eight years. The distribution of the children examined by age and sex is described in Table III.

Children free of dental caries in their permanent dentition. The number of children examined for each age group and the percentage of children without caries in their permanent dentition is presented in Table IV. Of the total pupils examined 35.3 per cent had no carious permanent teeth. With increase in age the percentage of children who were caries-free decreased. For the six-year-old group 70.2 per cent were caries-free, while for the twelve-year-old group 6.5 per cent were free from dental caries.

DMF teeth by age, for combined and separate sexes. The findings on the average DMF teeth per child separated by age and sex are shown in Table V. At age six the

TABLE III

DISTRIBUTION BY SEX AND AGE OF 1,010 NEGRO ELEMENTARY SCHOOL CHILDREN EXAMINED IN PORTLAND, OREGON

SEX	AGE IN YEARS (LAST BIRTHDAY)				
	6	8	10	12	ALL AGES
Boys	129	134	123	74	460
Girls	180	150	125	95	550
Both Sexes	309	284	248	169	1,010

TABLE IV

NUMBER OF NEGRO CHILDREN EXAMINED BY AGE GROUPS, AND PERCENTAGE OF CHILDREN CARIES-FREE IN PERMANENT DENTITION

AGE IN YEARS (LAST BIRTHDAY)	NUMBER OF CHILDREN EXAMINED	PER CENT OF CHILDREN CARIES-FREE
6	309	70.2
8	284	33.1
10	248	14.1
12	169	6.5
All Ages	1,010	35.3

TABLE V

NUMBER OF DMF TEETH BY SPECIFIED AGE GROUPS AND SEX OF 1,010 NEGRO ELEMENTARY SCHOOL CHILDREN OF PORTLAND, OREGON

(RATES ARE EXPRESSED PER CHILD)

SEX	AGE IN YEARS (LAST BIRTHDAY)			
	6	8	10	12
Boys	.47	1.40	2.94	4.93
Girls	.59	2.25	3.47	6.27
Both Sexes	.54	1.85	3.21	5.69

average DMF teeth for the boys was .47 and for the girls .59; by age 12 it was 4.93 DMF teeth for the former group and 6.27 DMF teeth for the latter group. The findings showed that for each age group the girls had a higher DMF teeth prevalence than did the boys.

The data was normalized for statistical evaluation to permit comparison of prevalence by sex and age. The normalized T-score for each value of DMF teeth is shown in Table VI. With this information available an analysis of variance was performed. Between all age groups studied there was a significant difference for the average DMF teeth per child in both sexes. For each age group the average DMF teeth per child was significantly different between boys and girls. Interaction of age and sex was also significant. The data for the complete analysis is shown in Table VII.

Components of DMF teeth separated by ages. The components of the DMF teeth separated by ages are given in Table VIII. Component D comprised the largest part of the total DMF teeth makeup, and component F comprised a larger share than component M. This interrelation between the components was seen for all the ages studied.

Comparison of DMF teeth to DMF first molar. The findings for the DMF teeth and the DMF first molars are presented in Table IX. At the age of six the average DMF

TABLE VI

CONVERSION OF DMF TEETH TO STANDARDIZED NORMAL SCORES

DMF Teeth	Freq.	Cum. freq. to mid-point	Cum. prop. to mid-point	$\frac{T - 50}{10}$	T Score
0	357	178.5	.1767	-.93	40.7
1	87	400.5	.3965	-.27	47.3
2	175	531.5	.5262	.06	50.6
3	81	659.5	.6529	.40	54.0
4	161	780.5	.7727	.75	57.5
5	39	880.5	.8717	1.13	61.3
6	37	918.5	.9094	1.34	63.4
7	17	945.5	.9361	1.53	65.3
8	18	963.0	.9534	1.67	66.7
9	7	975.5	.9658	1.82	68.2
10	8	983.0	.9732	1.93	69.3
11	7	990.5	.9806	2.07	70.7
12	6	997.0	.9871	2.23	72.3
13	2	1001.0	.9910	2.37	73.7
14	2	1003.0	.9930	2.45	74.5
15	2	1005.0	.9950	2.58	75.8
16	0	0	0	0	0
17	2	1007.0	.9970	2.75	77.5
18	2	1009.0	.9990	3.10	81.0

TABLE VII

THE INFLUENCES OF AGE AND SEX ON DMF TEETH,

ANALYSIS OF VARIANCE

FACTORS	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F RATIO	F.95
A (SEX)	34,749.95	1	34,749.95	774.80	3.84
B (AGE)	960.75	3	320.25	7.14	2.60
A B	376.04	3	125.34	2.79	2.60
Error	44,944.16	1002	44.85		

TABLE VIII

COMPONENTS OF DMF TEETH OF NEGRO ELEMENTARY SCHOOL CHILDREN OF PORTLAND, OREGON

(RATES ARE EXPRESSED PER CHILD)

ITEMS SPECIFIED	AGE IN YEARS (LAST BIRTHDAY)			
	6	8	10	12
Decayed	.53	1.48	2.23	3.95
Missing (or extraction indicated)	.0	.20	.42	.78
Filled	.02	.24	.74	1.18

TABLE IX

NUMBER OF DMF TEETH AND DMF FIRST MOLAR OF 1,010 NEGRO ELEMENTARY SCHOOL CHILDREN OF PORTLAND, OREGON

(RATES ARE EXPRESSED PER CHILD)

ITEMS SPECIFIED	AGE IN YEARS (LAST BIRTHDAY)			
	6	8	10	12
DMF Teeth	.54	1.85	3.21	5.69
DMF First Molar	.54	1.81	2.61	3.00

teeth per child and the average DMF first molar per child were of equal value, namely, .54. The difference between these indices increased with increase in age. At age 12 the difference was 2.69 DMF teeth.

DMF teeth - right quadrants as compared to left quadrants. The average DMF teeth per child for the left and right quadrants was calculated for all ages studied and the figures are shown in Table X. The difference in DMF teeth between the left and the right quadrants did not increase with age. The largest difference obtained between the quadrants was .04 DMF teeth at age six.

Double blind random determination. The sample for the two observations consisted of 58 children. For the first series of observations, the average DMF teeth per child was 2.18 with a standard deviation of 2.89. For the second group of observations, the average DMF teeth per child was 2.25 with a standard deviation of 3.00. No significant differences were found at the 5 per cent level between the two average DMF teeth per child of the two groups. Using the formula, S.E.M. = $\sqrt{\frac{d^2}{2n}}$, the standard error of measurement was calculated and found to be .26 DMF teeth.

TABLE X

NUMBER OF DMF TEETH BY SPECIFIED AGE GROUPS OF 1,010 NEGRO ELEMENTARY SCHOOL CHILDREN OF PORTLAND, OREGON, IN TERMS OF RIGHT AND LEFT QUADRANTS

(RATES ARE EXPRESSED PER CHILD)

ITEMS SPECIFIED	AGE IN YEARS (LAST BIRTHDAY)			
	6	8	10	12
Right Quadrants	.25	.91	1.59	2.85
Left Quadrants	.29	.94	1.61	2.83

DISCUSSION

There are a number of problems inherent in comparing the findings of epidemiological studies. The first problem arises due to the fact that no one mode of expression is common to all such studies. However, with the development and use of the DMF teeth index, a standard, easily applicable means has been found to express the findings in a uniform way. The second problem involves methodology; with this is connected sampling procedures, the equipment utilized, and the criteria for dental caries. The sample selected should be representative so that valid conclusions can be drawn concerning the population under study. A detailed specification of the equipment used should be given to permit an evaluation of the effects of such equipment on the caries prevalence reported. The criteria for caries should be defined in order to maintain consistency in observations. This applies not only to studies with a single examiner but also to studies where there are multiple examiners who, in addition to establishing consistency in observations, must also standardize themselves with each other. An awareness of these problems does not negate the value of information that can be obtained through judicious interpretations of different

epidemiological studies considered as a whole.

In the present study the DMF teeth index was utilized, the criteria for caries was specified, and the instruments were enumerated. By the inclusion of all ten schools with Negro enrollment and of all children aged six, eight, ten or 12 years of both sexes, whose parents had granted permission to participate, weighting of the sample toward a specific economic status of the children or in relation to sex was eliminated.

The consistency of observation in this study was determined by using a double blind random determination. In a comparison of the average DMF teeth per child calculated separately for the two series of observations, no significant difference was found at a 5 per cent level. In addition, the standard error of measurement was calculated and found to be .26 DMF teeth.

The least sophisticated method used to describe dental conditions in a population is to separate the group into those with and those without caries; the method is improved when the findings are separated by dentition and age as was done in this study. Other studies done on Negro groups, utilizing this expression for the findings, combined either dentition or ages and therefore cannot be compared with the present study. In this investigation it was found that 70.2 per cent of the children at six years were free from dental caries while at age 12, only 6.5

per cent were. Some studies done on white children separated their findings both in relation to dentition and age and have shown a similar rapid decline of the caries-free group (17, 29, 49). The universal occurrence of dental caries even in the young age group was quite well demonstrated from the above findings.

In epidemiological studies on white children, where findings were expressed in terms of DMF teeth, group characteristics of dental caries in regard to age and sex have been elucidated. With increase in age there is an increase in DMF teeth for both sexes (20, 24, 45); the same pattern was seen in the present study of a colored group as has also been noted by other investigators (19, 34). The explanation for such a behavior pattern is that with an increase in age there are not only more permanent teeth available for caries involvement but also that those present have been exposed for a longer period of time to the oral environment.

Concerning sex differences it has been found that in the white population girls at all ages have a higher DMF teeth index than do boys for the same age (5, 8, 20, 24, 27, 37, 47). In the present study of Negro children this same pattern was seen and was also reported by Suk in 1919 (48). A partial explanation for this characteristic is that in girls the teeth erupt earlier than in boys, and therefore girls, of the same age as boys, have more

permanent teeth available for caries involvement (23, 25, 41, 48). This in itself, however, does not fully explain the difference seen (37, 45).

Hill (19) in his study on the evaluation of the fluoridation program in Evanston, Illinois, had in his group some colored children for whom he gave the findings separately. His sample size for the Negro children, specified by age and sex, was very small for both the initial survey of 1946 and the evaluation study of 1956. Due to this small sample, intra-racial differences in relation to the sexes may not be illustrated correctly. His findings for the 1946 study showed that boys at age six and 14 had a higher DMF teeth index than did the girls and for his 1956 study that boys at ages 12, 13, and 14 also had a higher DMF teeth index than did the girls. Group tendencies, however, may not become evident with such a small sample.

Sterling (46) studied a colored group and reported his findings in terms of percentage of children free from dental caries, combined into four groups for ages six to 13. The girls had a higher percentage free from dental caries than had boys for the same age groups. Brucker (7) used the same method of expressing findings and combined ages six through 16. He found that the percentage of Negro girls free from dental caries was higher than that of the boys and stated: "The influence of sex on freedom

from caries, while rather definite in the colored group, appeared inconclusive in the white children." Neither study reported on the dentitions separately, nor for separate ages. The use of percentage of children free from dental caries as the sole method of expressing findings in these two studies makes interpretation on dental caries prevalence not only impossible but misleading. A natural tendency is to assume that the group with the higher percentage of children free from dental caries has the lower caries prevalence. This in actuality is not necessarily so, and to illustrate such a case, an example can be drawn from the present study. At age ten, the percentage of girls free from dental caries was 15.2 and their average DMF teeth was 3.47, while the boys had only 13.0 per cent free from dental caries but their average DMF teeth was 2.94. It was also shown that the DMF teeth for girls at all ages was significantly different at the five percent level from the DMF teeth for boys of the same age. With this in mind there is no doubt that occasions exist where a group with a higher percentage free from dental caries can still have a higher caries prevalence than a group with a lower percentage free from dental caries.

Another finding of this study in respect to age and sex was that interaction between age and sex was found to be significant at the 5 per cent level. This indicates that for the boys the DMF teeth distribution in relation

to age is different than that for the girls. This finding can be partially explained by the different eruption time for permanent teeth in boys and girls, making different numbers of permanent teeth available for decay per time exposed.

The relation existing between the components of the DMF teeth index permits evaluation of the unmet dental needs and the services received by the children in relation to dental caries. The decayed and missing components are considered as unmet dental needs while the component filled represents services received. In the present study it was seen that with an increase in age there was an increase both in services received and in unmet dental needs. At the age of six the average filled permanent teeth per child was .02 and at age 12 it was 1.18. The unmet dental needs of this group at age six was an average of .53 teeth and at age 12 it was 4.73 teeth. For the ages ten and 12, only about 20 per cent of the dental work needed by these children had been done. In contrasting the findings of this group to the findings on a group of white school children in Corvallis, Oregon (17), it is noticed that for those in Corvallis about 50 per cent of the required dental work had been met. In another group of 12-year-old school children in Athens, Greece, only 6 per cent of the required dental services had been met (18). Utilization of the components for an accurate estimation

of actual number of fillings and/or type of filling required by a group is not possible.

As the six-year molars are usually the first permanent teeth to erupt and also the ones most likely to become cariously involved at an early age (27, 28), their importance was studied separately. In order to determine the role played by the first molar in the total DMF teeth makeup of the children in this study, the DMF of the first molar was calculated at each age level studied. At the age of six the first molars made up the total DMF teeth, and with increase in age, their role in the total DMF teeth makeup decreased. However, at the age of 12 they still accounted for about 52 per cent of the total DMF teeth. From a study done by Hadjimarkos (17) in Corvallis, Oregon, it can be seen that at the age of 12 the six-year molars contributed 53 per cent to the total DMF teeth. In the follow-up study (49) done in the same locality after seven years of fluoridation, it is noticed that at the age of 12 the first permanent molars contributed 63 per cent to the total DMF teeth. The role played by the six-year molars in the total caries experience was studied by Fulton (14). His findings on the important position held by these teeth in the young age group led him to state that, ". . . it would not seem essential, at least in a limited program, to examine any of the permanent teeth except the first molars among children under age ten years." The

Another aspect in which this phenomenon could be utilized is in prevalence studies where only half the mouth, either right or left quadrants, is examined; the findings multiplied by two should closely approximate the DMF teeth count. This possibility was demonstrated by Hadjimarkos (16). From data obtained through the present study the simplified method seems also of value for the age range of six to 12 years in a colored group.

SUMMARY

A dental survey was conducted among Negro elementary school children of Portland, Oregon; all pupils, aged six, eight, ten or 12 years, whose parents had granted permission were examined. All grade schools which had an appreciable Negro enrollment were included, the percentage of the Negro enrollment varying from 11 to 97 per cent. A single examiner, using a dental light, mouth mirrors, explorers, and compressed air, conducted the examinations. The findings were reported in terms of DMF teeth for the ages and sexes separately. To determine the consistency in examinations, a double blind random determination was used; the standard error of measurement was calculated. The role played by the first permanent molar in the total caries experience was investigated for each age level studied. The amount of dental services received by this group was evaluated and was noted to be far from ideal inasmuch as only 20 per cent of the required dental work had been met by the age of 12. The behavior patterns of dental caries were found to be similar to those reported for white groups.

CONCLUSION

From epidemiological studies done on white groups in the United States, it is noted that certain behavior patterns of dental caries are constant, independent of geographic location. These basic patterns were studied in a colored group in the present investigation. It was apparent that, when the findings were expressed in terms of children free from caries in their permanent dentition, there was a rapid increase in the prevalence of dental caries and that by age 12 only a small minority was caries-free. For the group studied boys had a lower caries prevalence than did the girls for all ages, and with increase in age there was a significant increase in the prevalence of dental caries for both sexes. In this group the first permanent molar accounted for a large share of the total DMF teeth, as it does in the white group. The manifestation of bilaterality in this group has added support to the possibility of using only half the mouth in prevalence studies.

From the above findings it is noted that the intra-racial group characteristics of dental caries are the same for the colored group studied as they are for the white. As previously noted, geographic location does not affect

these manifestations of dental caries in the white group; consequently, the findings for this colored group are not necessarily restricted to its geographic location. It is, therefore, apparent that, for both white and Negro groups within the United States, behavior patterns of dental caries are the same.

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