

**center for
health
administration
studies
university
of chicago**



**patterns of dental
service utilization in
the united states:
a nationwide social
survey**

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**research series
30**

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SUMMARY OF MAJOR FINDINGS

Chapter I—Utilization: Trends and Estimates

1. Dental utilization remains relatively low despite significant increases since 1930
2. Expenditures
 - a. Mean expenditure per family: \$57
 - b. Proportion of families with expenditures: 62 percent
 - c. Mean expenditure per person: \$18
 - d. Proportion of persons with expenditures: 41 percent
3. Visits
 - a. Mean visits per family: 4.6
 - b. Proportion of families with visits: 65 percent
 - c. Mean visits per person: 1.5
 - d. Proportion of persons with visits: 45 percent
4. In terms of total number of visits and expenditures a relatively small number of persons (or families) account for a large proportion of both visits and expenditures
5. Free care and/or reduced charges for dental services were given to about 11 percent of families and 5 percent of all individuals

Chapter II—Demographic, Social Status and Community Resource Variables

1. Data confirm expected relations between independent variables and utilization
 - a. Age—reverse “U-shaped”; utilization is low for youngest age group (2–13); highest for those (14–24) followed by a constant decline for the remaining ages
 - b. Sex—females utilize services more than males
 - c. Race—whites utilize services more than nonwhites

- d. Education of head of household—as education increases utilization increases
 - e. Occupation of head of household—high status occupations use dental services more than low status
 - f. Family life cycle—no uniform pattern
 - g. Family size—little variation in utilization for families of size one to five. Lowest values for families of size six or more
 - h. Region—highest in West and Northeast, followed by North Central and South
 - i. Community type—increased urbanization implies increases in utilization
 - j. Population per dentist—weak relation; as ratio increases, utilization decreases
2. Education and occupation controlling for age, sex, and race
- a. In general, age and racial differences persist in control tables while differences by sex are not important
 - b. However, the effect of education and occupational levels remains strong

Chapter III—Income and Utilization

1. Initial relations
- a. Income is directly related to utilization
 - 1) Differences are not great at lower income levels
 - b. Ability to pay is directly related to utilization
 - c. The family's prior income level is directly related to utilization
 - d. Effect of size followed no consistent pattern except generally lower expenditures in six person families
2. Income measures controlling for age, sex, race
- a. The effect of family income and ability to pay remained strong, although somewhat reduced, in the presence of the control variables
 - 1) Prior income level has an effect, although not as great as income or ability to pay on utilization
 - b. Age remains strongly related to utilization followed by race then sex
3. The relation between income and utilization does not increase regularly when controlling for family size
- a. In general, major differences in utilization by family size are between groups from one to five and those of size six or more

Chapter IV—Utilization by Type of Dental Service Received

1. Six major dental service categories were used: 1) cleaning, 2) examination and x-rays, 3) fillings and inlays, 4) extractions, 5) dentures, 6) other services
2. Initial relations
- a. For all dental services except dentures, age and race are significantly related to utilization
 - 1) Differences by sex when they exist, are not large
 - b. Education and occupation of the head of the household, family life cycle, family size, family income, region, community type and population per dentist, ability to pay, prior income level, are associated (either directly or in an inverse relation) with the use of the following three services: cleaning, examination and x-rays, and fillings and inlays
 - 1) Utilization of the other three service categories is not significantly affected by these variables
3. Multiple cross-tabulations
- a. Age by sex: reverse U-shaped by age for cleaning, examination, fillings and extractions
 - 1) Weak, direct relation by age for dentures
 - 2) No appreciable differences by sex
 - b. Age by race: reverse U-shaped by age for whites and nonwhites for all services except dentures and the "other" services category
 - 1) For these services whites have more visits than nonwhites but these differences *decrease* with age
 - 2) Except for ages 2–13, nonwhites have more visits for extractions
 - c. Race by sex: sex is not significant
 - 1) Whites have more visits than nonwhites for all services except extractions
 - a) Differences are greatest for cleaning, examination and x-rays, and fillings and inlays
 - b) Smaller differences are present for dentures and other services
 - c) Slightly more nonwhites than whites have extractions

- d. Education and occupation by age, sex, and race
 - 1) Even controlling for age, sex, and race there is a direct relation between education and occupational status, although the relation is stronger for the former
 - a) This is true *only* for cleaning, examination, and fillings and inlays
 - b) Differences by education and occupation for the other services are not large
- e. Family income by age, sex, and race
 - 1) Controlling for age, sex, and race we find that
 - a) Income is directly related to the utilization of the following services: cleaning, examinations and x-rays, fillings and inlays
 - (1) however, the lowest income category (less than \$2,000) in some instances had a higher (although not large) proportion of persons with visits than the next income category—\$2,000—\$3,499
 - b) Inverse and weak association between income and extractions
 - c) Direct and weak association between income and dentures and “other” services
 - 2) With some minor exceptions utilization by age or race shows strong association; this is not true for sex

Chapter V—Dental Conditions and Utilization

- 1. Major finding: for both dependent variables using 1) a dental symptoms index and 2) whether tartar or stains were present, utilization measured by expenditures and visits is higher when symptoms or tartar are present than when symptoms or tartar are absent
- 2. Presence and absence of dental conditions
 - a. Systematic variations in utilization by all of the independent variables are observed when symptoms or tartar are present
 - b. Where symptoms or tartar are absent we find that for
 - 1) Demographic variables somewhat larger differences (by levels of the independent variable) are observed by race than for either sex or age
 - 2) Education, occupation, income and ability to pay have similar and low levels of utilization

- a) However, for each of the variables there is a clear and distinct break
 - (1) education and occupation between the high status categories and the low status categories
 - (2) income comparing utilization for those at \$12,500+ and all other incomes
 - (3) ability to pay—“not much trouble” compared to the other two response categories

Chapter VI—Continuity of Utilization

- 1. Major trends
 - a. Continuity
 - 1) A significant proportion of the population (31 percent) had dental visits in the survey year (1964) and the preceding year (1963). These could be designated as having a high level of continuity in the receipt of dental care
 - 2) A slightly smaller proportion (27 percent) had visits in 1964 but not in 1963, or in 1963 but not in 1964 (moderate continuity)
 - 3) A large proportion (28 percent) saw a dentist but only prior to 1963 (low continuity)
 - 4) Some 13 percent have never seen a dentist
 - b. Visits in 1964 and 1963
 - 1) Age—reverse U-shaped
 - 2) Sex—no difference
 - 3) Race—whites more than nonwhites
 - 4) As education, income, ability to pay, and occupational status increases so does utilization
 - c. Visits in 1964 but not in 1963 *or* visits in 1963 but not in 1964
 - 1) Similar relations between independent variables and these two categories exist
 - 2) Not only is the level of utilization low, but the effect of the independent variables is either not *very* strong or non-existent depending on the particular variable
 - a) However, the direction of the relations by age, sex, and race in section “1.b” above are the same
 - b) For education, occupation, income, and ability to pay there were no definite trends in the direction of the relation between these variables and the dependent variable

- d. Visits but only prior to 1963
 - 1) Age—direct relation
 - 2) Sex—no difference
 - 3) Race—nonwhites more than whites
 - 4) Inverse (and strong) relation between education, occupational status, income and ability to pay
 - a) Maintained in control tables
- e. Never made a visit
 - 1) Age is clearly the most single important variable since by ages 14–24 8 percent never had a visit compared to 39 percent for ages 2–13
 - 2) Sex—no differences
 - 3) Race—nonwhites have larger proportion than whites
 - 4) Inverse (and) strong relation between education, occupational status, income and ability to pay
 - a) Maintained in control tables
 - 5) The highest proportion of persons (70 percent) with never a visit are nonwhites, ages 2–13

INTRODUCTION

THIS REPORT on dental service utilization is but one of many studies making use of social survey research techniques in the more general area of health services utilization. The pioneer work of the Committee on the Cost of Medical Care (cf. Falk *et al.*, 1933), and more recently by Andersen and Anderson (1967) in *A Decade of Health Services*, have provided the authors of this report sufficient background information to be able to make comments concerning not only trends in utilization but also a framework for the interpretation of data.

In addition to the insights provided by the above mentioned studies, there have been several social surveys dealing specifically with dental utilization which have provided additional input for our work. Among these was the report by Collins (1939) and periodic surveys by the American Dental Association (1940; 1954; 1966; 1970) of dentists concerning their patients' use of specific dental services.

However, this report is significant in several ways: 1) the data were collected from a national sample of households; this means that expenditure and use data reflects overall population characteristics (age, sex, race, income, occupation, for example); 2) it is the first major report on utilization to appear since the Collins' study (1939); 3) it is the first major study that verified respondent information by going to the dentist for exact cost, service, and visit data; and 4) it will afford an opportunity to compare the results with the ongoing surveys as reported in various National Center for Health Statistics publications (Series 10 and 11).

This report, therefore, is concerned with expenditure and use patterns for dental care. Early in 1965 the field staff of the National Opinion Research Center (NORC) interviewed a national sample

of households to obtain data concerning the use of dental services for the calendar year 1964.¹ In all, 3,165 families were interviewed. An enumeration in each household resulted in a total sample of 10,293 individuals, of whom 9,872 are two years of age or older. In an attempt to collect more detailed information with respect to the type of dental services which were used, an effort was made to obtain from the respondents' dentists utilization data. Undoubtedly, such a procedure yields estimates which may differ from surveys which make minimal or no use of verification procedures.²

While the overall plan of this report is contained in the listing of chapters in the Table of Contents, several decisions were made concerning data presentation. It was initially anticipated that data would be presented separately for both families and individuals for expenditures and visits. However, it was felt that such a procedure would result in an overabundance of data, much of which would be repetitious.

Our solution, except for some preliminary tables in Chapter I was to use a combination of family related variables, such as occupation or education of the head of the household, or family life cycle, ascribed to all family members in conjunction with data on individuals such as age and sex. Insofar as possible, this strategy was used throughout this report.

While there undoubtedly has been some change in the cost of dental services as well as changes in the distribution of services received in the interval between data collection and the publication of this report, we feel that the overall picture of utilization which we present is valid, particularly since dental services have not been significantly affected by insurance or prepayment plans. However, in recognition of these possible changes, the presentation of data emphasizes differences among categories rather than dollar amounts, or the average number of visits.

¹ For further information on data collection and sampling procedures, the reader is referred to Appendix A—Technical Aspects of the Survey.

² Verification procedures and results may be found in Appendix B—Verification Procedures.

CHAPTER I

UTILIZATION: TRENDS AND ESTIMATES

I. TRENDS

It has been pointed out elsewhere (cf. Anderson and Andersen, 1970) that with respect to standards of unmet need, dental service utilization is low relative to other types of medical services. Such a statement implies that despite significant increases in the proportion of persons who visited a dentist from 21 percent in 1930 (cf. Falk *et al.* 1933, p. 101) to 44 percent in 1964 as revealed in this study, going to a dentist is not viewed as important as going to a physician. Furthermore, in recent years the annual number of visits per person has remained relatively constant with fluctuations in the range from 1.4 to 1.6 (Monthly Vital Statistics Reports, 1969).

Other data reveal that with respect to aggregate national health expenditures the proportion of the total health dollar accounted for by dentists' services decreased from 13 percent in 1929 to 6 percent in 1969.¹ Additional data show that relative to hospital care and physicians' services per capita expenditures for dentists' services have not increased as much. From 1929 to 1969 per capita dentists' expenditures increased approximately fivefold, compared to an eightfold increase for physicians' services and an increase of 22 times for hospital services.² Such data suggest that competition for the health dollar has increased in recent years; perhaps one reason why per capita dental expenses have not increased as much as physician and hospital services may be that dental symptoms and conditions

¹ These data were calculated from B. S. Cooper and M. McGee, *Research and Statistics Note No. 25*, December 14, 1970, Table 10.

² These data were recalculated from B. S. Cooper and M. McGee, *Research and Statistics Note No. 25*, December 14, 1970, Table 11.

are not regarded as serious as other types of physical conditions. This contention is supported in the following table where 83 percent of the respondents stated that their dental needs for the coming year were "not much" or "none."

Since the expenditure data for this study represents personal expenditures for dental services we estimated that total personal expenditures for the United States population to be approximately 3.3 billion dollars for 1964.³ This figure is considerably higher than the 2.3 billion dollars for consumer expenditures in 1964 as reported in the Social Security Bulletin.⁴ These differences are reflected in per capita estimates of \$17.00 for this study and \$12.00 based on the Social Security Administration estimates.⁵ In addition, we estimated total personal expenditures for dental services for 1970 to be approximately 4.6 billion dollars using the survey data for 1964 as a base and making allowances for increases in the consumer price index.⁶

TABLE 1.1
IF YOU WENT TO THE DENTIST TODAY,
HOW MUCH WORK DO YOU THINK YOU
WOULD HAVE TO HAVE DONE?*

(Table N = 9504)

A great deal.....	7%
Quite a bit.....	9%
Not much.....	39%
None.....	44%

* Figures may not add to 100% due to rounding errors.

³ This figure was based on 10,293 individuals in the total sample and the civilian resident population of 188,521,000 on July 1, 1964, excluding Alaska and Hawaii. Source: *Current Population Reports*, P-25, No. 368, June 27, 1967.

⁴ L. S. Reed and R. S. Hanft, "National Health Expenditures, 1950-64," *Social Security Bulletin* 29 (No. 1), January, 1966, pp. 3-19.

⁵ Per capita expenditures using the total reported in the Social Security Bulletin were obtained by dividing \$2.3 billion by the civilian resident population (188,521,000) excluding Alaska and Hawaii, for July 1, 1964.

⁶ The 1964 survey data were adjusted for changes in the Consumer Price Index and population increase according to the following formula:

$$[(\$17.38^a) 151.9^b/114.0^c)] [199,922,914^d]$$

where

a = per capita expenditures, 1964.

b = dentist fee, June, 1970, Consumer Price Index.

c = average dentist fee, 1964, Consumer Price Index.

d = U.S. civilian resident population April 1, 1970, excluding Alaska and Hawaii.

Although the preceding estimates should give a rough approximation of the range of values in relation to total expenditures, their utility may be diminished due to different procedures used in data collection. However, data from two surveys are available which allow a more accurate comparison of per capita expenditures. Andersen and Anderson (1967) report per capita dental expenditures of 15 dollars for 1963, while the National Center for Health Statistics (Series 10, No. 27) reports per capita expenditures of 19 dollars for the period July-December, 1962. The data for the present study shows average expenditures of 18 dollars for persons two years of age and older for 1964.⁷ A rough estimate of per capita expenditures for 1964 would be in the range of 15 to 20 dollars.

With respect to visits for dental care the proportion of persons (for all ages) who had visits in 1964 was 43 percent. This figure then is 5 percent higher than the estimate by Andersen and Anderson (1967) for 1963.

While Andersen and Anderson (1967) do not report the volume of dental visits, the National Center for Health Statistics (Series 10, No. 23) reports a total volume of 294 million visits for July, 1963, to June, 1964.⁸ On the basis of calculations for our data the volume of dental visits was estimated at approximately 270 million, or about 8 percent less.⁹

II. FAMILY EXPENDITURES AND VISITS

As shown in Table 1.2, only 38 percent of the families had no expenditures for dental care during the survey year and only 5 percent of the families had expenditures of three hundred dollars or more. The mean family expenditure was 57 dollars while the mean expenditure per family with expenditures was 92 dollars. However, as shown in Figure 1 a small proportion of families accounted for a disproportionate share. Two percent of the families accounted for

⁷ The data reported in Andersen and Anderson (1967) as well as the data for this study were collected by the National Opinion Research Center (NORC) in which similar sampling procedures were used. The fact that per capita expenditures still differed by almost three dollars when changes in price were controlled is probably due to differences in the verification procedures.

⁸ Calculated according to the following formula for the civilian resident population of the continental United States, July 1, 1964:

$$(1.43^a) (188,521,000^b) = 269,585 \text{ where}$$

a = per capita visits for all ages in the sample.

b = civilian resident population.

⁹ This figure was based on a civilian resident population of 185,797,000 (Series 10, No 23).

TABLE 1.2
PERCENTAGE DISTRIBUTION OF FAMILIES
ACCORDING TO LEVEL OF EXPENDI-
TURES FOR DENTAL CARE, 1964
(N = 3165)

Level of expenditures	Percent of families
All families.....	100
No expenditure.....	38
\$ 1-\$ 24.....	23
25- 49.....	11
50- 74.....	7
75- 99.....	4
100- 149.....	6
150- 199.....	3
200- 299.....	3
300- 399.....	2
400- 499.....	1
500 and over.....	2

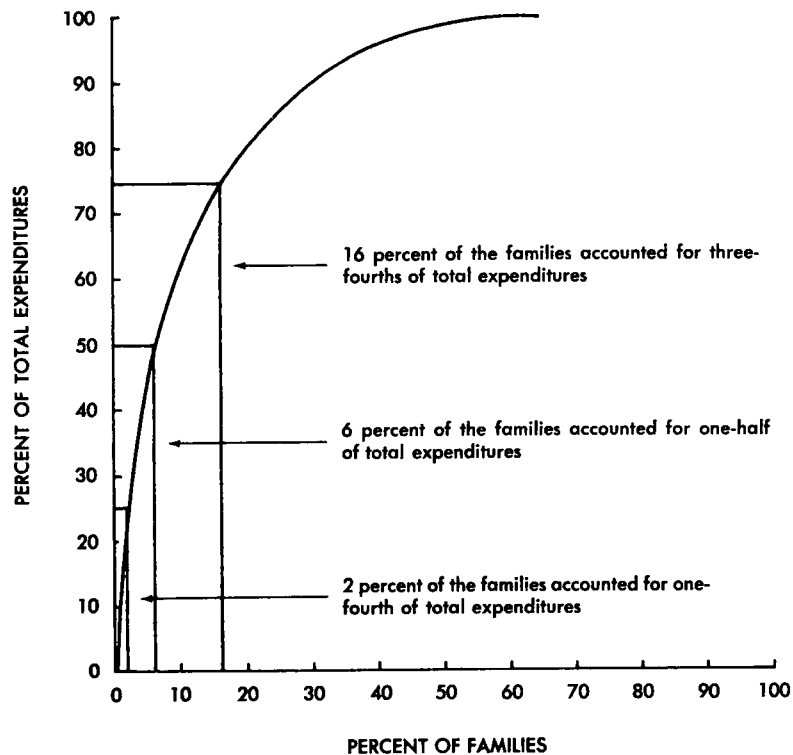


FIG. 1.—Distribution of expenditures for dental care among families, 1964

one fourth of the expenditures and 16 percent accounted for three fourths of the total expenditures.

Similar patterns exist for dental visits. As shown in Table 1.3, 35 percent of the families reported no visits. The mean number of visits per family was 4.6 while the mean number of visits for a family with visits was 7.1. Furthermore, as shown in Figure 2 a small proportion of families account for a large proportion of visits. Three percent of the families accounted for one fourth of the visits and 26 percent of the families accounted for three fourths of the visits.

III. INDIVIDUAL EXPENDITURES AND VISITS

A. Aggregate Data

For individuals, as presented in Table 1.4, 59 percent had no dental expenditures and only 9 percent had expenditures of fifty dollars or more. The mean expenditure for all individuals was 18 dollars and the mean expenditure of persons with expenditures was 45 dollars.

Presented in Figure 3 is the distribution of expenditures in an alternate form. Only 0.8 percent of the individuals accounted for one fourth of the total expenditures and 10 percent accounted for three fourths of the expenditures.

With respect to visits as shown in Table 1.5, 55 percent of the

TABLE 1.3
PERCENTAGE DISTRIBUTION OF FAMILIES
ACCORDING TO NUMBER OF DENTAL
VISITS MADE BY FAMILY MEMBERS IN
1964
(N = 3165)

Number of dental visits	Percent of families
All families.....	100
No visit.....	35
1.....	10
2.....	9
3.....	7
4.....	6
5-6.....	10
7- 8.....	
9-10...	
11-15...	
16-25...	
25 or m	

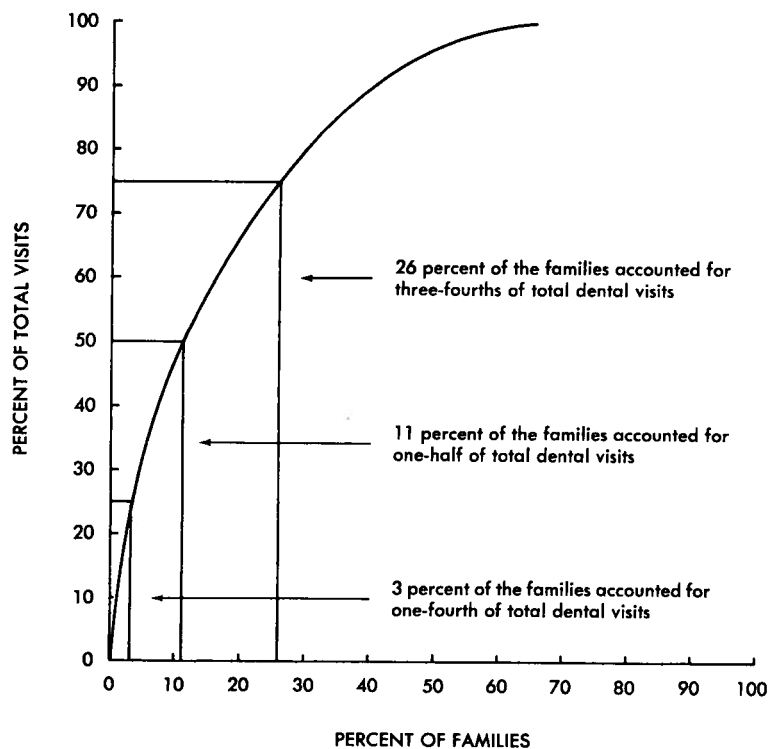


FIG. 2.—Distribution of dental visits among families, 1964

TABLE 1.4
PERCENTAGE DISTRIBUTION OF INDIVIDUALS, TWO YEARS AND OLDER, ACCORDING TO LEVEL OF EXPENDITURES FOR DENTAL CARE, 1964
(N = 9872)

Level of expenditures	Percent of individuals
All individuals.....	100
No expenditure.....	59
\$ 1-\$ 24.....	25
25- 49.....	7
50- 74.....	3
75- 99.....	2
100- 199.....	2
200 and over.....	2

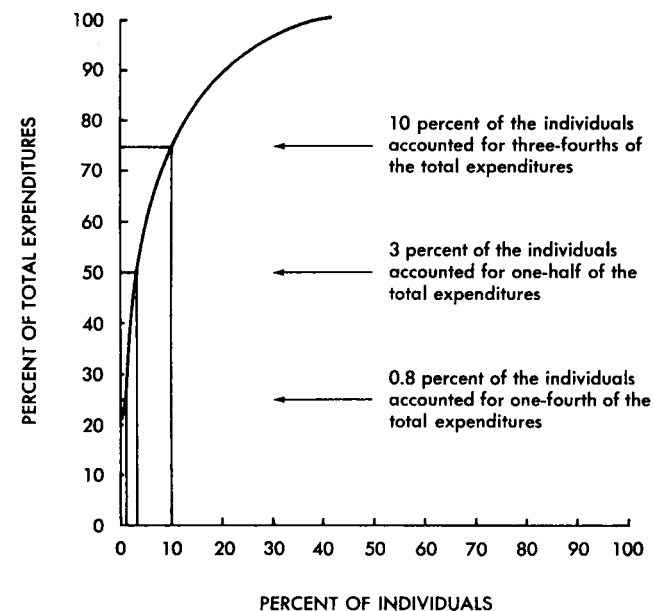


FIG. 3.—Distribution of expenditures for dental care among individuals, 1964

TABLE 1.5
PERCENTAGE DISTRIBUTION OF INDIVIDUALS, TWO YEARS AND OLDER, ACCORDING TO NUMBER OF DENTAL VISITS MADE IN 1964
(N = 9872)

Number of dental visits	Percent of individuals
All individuals.....	100
No visit.....	55
1.....	16
2.....	11
3.....	6
4.....	4
5-6.....	4
7-8.....	1
9-10.....	1
11 or more.....	2

sample made no visits to the dentist. The mean number of visits for all persons was 1.5 while the mean number of visits for those who went to the dentist was 3.3. As expected, as shown in Figure 4, 1.8 percent of the individuals accounted for approximately one fourth of the total visits.

B. Expenditures and Visits by Type of Service

Aggregate data on expenditure and use patterns provide summary measures of total utilization. However, information on the type of dental service received may reveal substantial variations in per capita utilization. Since the verification of expenses and visits was less successful than originally anticipated, the data presented in Table 1.6 is based only on those persons with expenditures and visits for whom the dentist provided information. It is clear from this table that the basic preventive services, examinations, and x-rays, cleaning and fluoride treatments, have both the lowest mean expenditures and visits, while the remaining services have mean values consider-

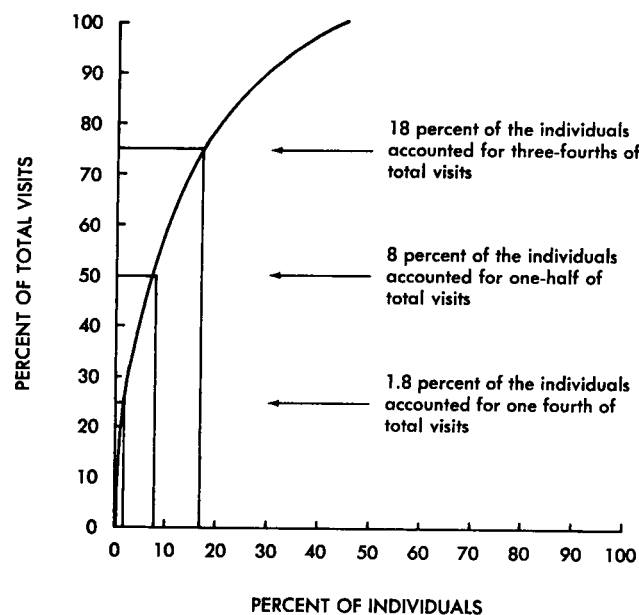


FIG. 4.—Distribution of visits for dental care among individuals, 1964

TABLE 1.6
MEAN EXPENDITURES AND VISITS BY TYPE
OF DENTAL SERVICE RECEIVED AS
REPORTED BY DENTISTS*

Service	Mean Expenditures	Mean Visits
Examination and x-rays.....	\$ 6 (1154)	1.6 (1511)
Cleaning and fluoride.....	7 (1093)	1.4 (1139)
Fillings and inlays.....	21 (1357)	2.3 (1377)
Extractions.....	12 (500)	1.4 (516)
Dentures..	107 (262)	2.0 (257)
All other services.....	43 (343)	2.6 (433)
Root canal.....	39 (38)	2.5 (39)
Periodontal.....	30 (66)	2.6 (63)
Orthodontics..	185 (42)	8.9 (44)
Palliative.....	4 (68)	1.3 (67)
Other services.....	14 (279)	1.6 (286)

* The number in parentheses indicates the number of persons on which the means were calculated. A definition of the services included under each heading is given in Appendix C—Variable Definitions.

ably higher. Orthodontic services have the largest mean expenditures and visits, while palliative treatments have the lowest mean value for expenditures and visits.

In addition, Table 1.7 shows the percentage of persons receiving specified services for both expenditures and visits. The highest percentage was for examination and x-rays; since the percentages for the sample were 41 percent and 45 percent respectively, for expenditure and visits, the data show that almost everyone who went to the dentist had either an examination or check-up.¹⁰ Interestingly,

¹⁰ The percentages in Table 1.7 were arrived at by first checking to determine if a dentist provided information; if not, then the respondents' information from the main questionnaire was used. These percentages reflect then a best estimate using both sources of data. For more information see Appendix B—Verification Procedures.

TABLE 1.7
PERCENTAGE OF PERSONS WITH EXPENDITURES AND
VISITS BY TYPE OF DENTAL SERVICE
(N = 9872)

Service	Expenditures	Visits
Examination and x-rays	37.5%	38.1%
Cleaning and fluoride	24.7%	24.8%
Fillings and inlays	25.1%	25.2%
Extractions	12.0%	12.1%
Dentures	6.1%	6.1%
All other services*	3.7%	7.2%

* Since the number of persons who received root canal, periodontal, palliative treatments, orthodontic work, and other services was small (see Table 1.6), the categories were combined.

the proportion of persons with cleaning or fillings and inlays was about the same.

IV. FREE CARE AND INSURANCE

A. Free Care and Reduced Charges

In the preceding tables data were presented on both expenditures and visits. Because of the methods of data collection and verification employed in this study we were able to determine the number of individuals who had no out-of-pocket expenditures for dental care during the survey year even if they made dental visits. Thus, approximately four percent (415) of the sample who had visits also had no expenses; similarly, of the persons with visits, 9 percent had no expenses.

Not only may persons have no expenses, but they also may have received services at reduced rates. Our data indicate that 6.5 percent (451) of the individuals had either no expenses or received reduced charges for dental care. The major reasons given by the respondents are shown in Table 1.8; three reasons, professional courtesy, part of a school program, or the individuals were on public relief, accounted for more than 60 percent of the responses.

B. Insurance Payments

Relative to plans for hospital and surgical insurance, the proportion of persons covered by dental insurance is extremely low. According to survey data collected by the U.S. Public Health Service,

TABLE 1.8
PERCENTAGE DISTRIBUTION OF THE REA-
SONS FOR RECEIVING DENTAL CARE AT
REDUCED RATES OR NO CHARGE
(N = 541)

Professional courtesy	29.2%
Part of a school program	14.8
Public relief or indigent	15.5
Veteran	10.9
Relative or friend	9.8
Participation in dental research	1.7
Other reasons	5.5
No answer	12.6

only 3.2 percent of the civilian population was covered by a private dental health insurance plan in 1968, compared to 76.5 percent and 73.6 percent covered by hospital and surgical insurance, respectively (U.S. Bureau of the Census, 1970, p. 462). On the basis of data collected in this study 2 percent of the sample reported that they were covered by some form of dental insurance or prepayment plan.

The proportion of persons who have some form of dental insurance is not large and the proportion of these persons who collected some type of benefit was only approximately 19 percent. The fact that this figure is so low is presumably due to either the exclusion of certain services such as cleaning or a deductible feature before benefits are paid. While our data must be viewed with some caution due to the small number of persons receiving benefits, the average amount that insurance paid was approximately 68 dollars; this is 23 dollars higher than the average expenditure for persons with expenses for the sample.¹¹

While approximately 19 percent of the 3,165 families in our sample had heard of prepayment or insurance plans, favorable attitudes toward such plans was actually quite low. Families with dental insurance and those without insurance were asked whether such plans have (or would) result in better dental health for the family. These responses are shown in Table 1.9. Clearly at the time of the survey the sample did not view insurance plans as making any difference

¹¹ The 68 dollar figure was based only on the dentists' report of the amount that insurance paid for 25 persons. In all, some 38 persons reported receiving dental insurance benefits.

TABLE 1.9
EFFICACY OF HAVING AN INSURANCE OR PRE-
PAYMENT PLAN FOR FAMILIES COVERED
AND NOT COVERED BY INSURANCE*

	Insurance (N = 63)	No insurance (N = 3102)
Better dental health.....	18%	28%
Not much difference.....	70%	66%
Don't know.....	5%	5%
No answer.....	7%	1%

* Percentages may not add to 100 due to rounding errors.

in their families' dental health status. Furthermore, there appears to be a tendency for those families without insurance to think that such plans would result in better dental health than for those families with insurance. A discussion of this and related topics, however, will be presented in the final chapter of this report.

CHAPTER II

SOCIAL AND ECONOMIC VARIABLES

IN THIS CHAPTER we will examine the effect that selected variables have on total expenditures and visits on a per capita basis.¹ We have grouped the independent variables into four categories: demographic, social status, family composition and community resources.

These categories seem likely to have a bearing on utilization.² For example, demographic variables such as age, sex, or race, are associated with processes which predispose individuals (to a greater or lesser extent) to dental disease.³ Thus, such processes and the onset of periodontal disease, for example, may result in higher rates of utilization compared to the absence of disease.

A second set of variables, social status, was measured by education and occupation of the head of the household. Social status refers to a position in a social structure characterized by a specific "style of life" (cf. Gerth and Mills, 1946, p. 24). "Style of life" then

¹ In this and subsequent chapters all tables are based on 9,872 individuals two years of age or older minus individuals for whom data were not reported.

² Many studies of both dental and medical utilization have developed theoretical schemes to explain differences in utilization. Studies and/or models have emphasized: 1) the structure of social groups to which individuals belong (cf. Strauss, 1961; Suchman, 1966); 2) cultural norms (cf. Maclachlan, 1958; Macgregor, 1961); 3) the perceived seriousness or illness, balanced against the consequences of not seeking care (cf. Rosenstock, 1966; Koos, 1954; Kegeles, 1961, 1963a.b., 1968; Kalimo, 1969); and 4) disease characteristic (cf. Greenlick, *et al.*, 1968). Other mainly economic models have focused on income, the ability to pay for care, need or motivation (cf. Wirick *et al.*, 1962; Wirick and Barlow, 1964; Wirick, 1966; Feldstein and Carr, 1964; Feldstein, 1966; Andersen, 1968). A model of dental utilization based on the work of Andersen (1968) by the senior author of this report (Newman, 1971) incorporates some of the studies cited above.

³ Strictly speaking race may be more appropriately associated with social status and income measures. However, we include it with age and sex because we in some manner may think of race as an ascribed rather than an achieved characteristic.

refers to characteristic behaviors, values and attitudes associated with criteria of social position.

Changes in roles often accompany changes in the size of a family. Two measures of family composition, family life cycle and size are used in this study. Family life cycle may be viewed as part of the developmental "progression of the family through its various stages and the inevitable aging process of its members" (Andersen and Anderson, 1965, p. 7). As such, life cycle methodology makes it possible to identify changes in family cycle represented by the birth of a child or the death of a spouse and the impact that such changes have on utilization. Family size, as a family composition variable, implies that the actual number of persons in a household will have an effect on utilization that would be missed if only life cycle were used since it (life cycle) does not take into account variations in family size if there are three or more adults in the family.⁴

Finally, community resource variables, such as community type, geographical region and the population per dentist, are an important set of variables associated with utilization. In general such variables are correlated with the availability of dental services and personnel. Availability implies that differences in the number of services will have a significant effect on utilization. We will now examine the relationship between the various variables and dental utilization.

I. EXPENDITURES AND VISITS: INITIAL TABULATIONS

Mean expenditures and visits for dental care by age, sex, and race are shown in Table 2.1. As expected, age showed the typical pattern of low utilization in the youngest age category (2-13), followed by a large increase in the 14-25 category and then a decline in utilization reaching the lowest point for those 65 and older. Interestingly, while mean visits follows a consistent and clear-cut pattern, mean expenditures does not; that is, the differences in mean expenditures for the 14-24, 25-44, and 45-64 categories are slight. Apparently, the lower mean visits for the 25-44 and the 45-64 categories relative to ages 14-24 implies that the more expensive dental services are received by the older age groups. Within this pattern, however, utilization for sex and race indicate that males utilize services less than females and nonwhites utilize services less than whites.

⁴ Thus, the life cycle stage in which the family head is married, under 45 years of age, with no children living at home, would be categorically equivalent to the same cycle stage if the head of the household's father lived with him.

TABLE 2.1
MEAN EXPENDITURES AND VISITS BY
AGE, SEX, AND RACE

	Mean Expenditures	Mean Visits
AGE		
2-13.....	\$12	1.3
14-24.....	22	2.2
25-44.....	22	1.6
45-64.....	21	1.3
65 and older.....	11	.8
SEX		
Male.....	15	1.4
Female.....	21	1.6
RACE		
White.....	20	1.6
Nonwhite.....	7	.7

In summary, with respect to expenditures, racial differences would seem more significant than either sex or age. However, to the extent that race is correlated with other social and economic measures, the "true" effect of race must be held in abeyance until multiple cross-tabulations are made. Finally, for visits, both age and race make a significant difference in utilization while sex appears to be of minimal importance.

Utilization is directly related to the education of the head of the household. Major differences, however, are found between the college graduate-professionals and all of the other educational categories. With respect to occupational levels, the lowest utilization is found among the low status-blue collar occupations: laborers, farmers and farm workers, service workers and operatives. At the same time, the high status-blue collar occupations, represented by craftsmen and foremen, occupy an intermediate position with respect to utilization, since the white collar occupations, professional and managerial, and clerical and sales, have higher mean expenditures and visits. Judging from the data in Table 2.2, education appears to have a much stronger effect on utilization than occupation.

The pattern of utilization for expenditures with respect to life cycle, shows that the highest mean expenditures were in 1) categories one and seven where the family head was single with no children and 2) category six where the family head was married with all children 14 years of age and older, respectively. The lowest

TABLE 2.2
MEAN EXPENDITURES AND VISITS BY EDUCATION
AND OCCUPATION OF THE HEAD
OF THE HOUSEHOLD

	Mean Expenditures	Mean Visits
EDUCATION		
8 years or less.....	\$11	.9
9-11 years.....	14	1.2
High school graduate.....	18	1.6
Some college.....	23	1.9
College graduate-professional	37	2.6
OCCUPATION		
Professional-managerial.....	28	2.1
Clerical-sales.....	23	2.0
Craftsmen-foremen.....	16	1.6
Operatives.....	13	1.1
Service workers.....	15	1.0
Farmers-farm laborers.....	10	.8
Laborers.....	13	.9

TABLE 2.3
MEAN EXPENDITURES AND VISITS BY FAMILY
LIFE CYCLE AND FAMILY SIZE

	Mean Expenditures	Mean Visits
FAMILY LIFE CYCLE*		
1. FHS, -45, NC.....	\$24	1.8
2. FHM, -45, NC.....	18	1.4
3. FHS, C.....	13	1.2
4. FHM, C13.....	16	1.4
5. FHM, C13, C14.....	18	1.7
6. FHM, C14.....	23	1.8
7. FHS, 45+, NC.....	25	1.1
8. FHM, 45+, NC.....	18	1.4
FAMILY SIZE		
One.....	22	1.5
Two.....	19	1.3
Three.....	21	1.6
Four.....	19	1.6
Five.....	21	1.8
Six or more.....	12	1.3

* "FHS(M)" = family head single (married); "-45" = family head under 45 years of age; "45+" = family head 45 years of age or older; "C" = children; "NC" = no children; "C13" = children 13 years of age or younger; "C14" = children 14 years of age or older.

mean expenditure (\$13) and the second lowest mean visit (1.2) was where the family head had children and also was single. However, the lowest mean visit (1.1) was in the category with the highest expenditures, namely, category seven. This suggests at least that services such as dentures or inlays rather than examinations or x-rays are being performed.

For family size, families of six or more had the lowest expenditures and visits. Although utilization is high for one person families (\$22; 1.5 visits), there is a decrease for two person families, and then a slight increase for three, four and five person families.

Table 2.4 shows the variations in utilization for the community resource variables: region, community type, and population per dentist. Utilization is lowest in the South (\$13; 1.1 visits). However, while mean expenditures are similar for the Northeast (\$22) compared to the West (\$23) the mean visits differ significantly with values of 2.2 and 1.4 for the Northeast and West respectively. It appears that the higher cost per visit in the West may be responsible in part for the low value in the mean visit. The overall pattern for

TABLE 2.4
MEAN EXPENDITURES AND VISITS BY REGION,
COMMUNITY TYPE, AND POPULATION
PER DENTIST

	Mean Expenditures	Mean Visits
REGION		
Northeast.....	\$22	2.2
North Central.....	17	1.5
South.....	13	1.1
West.....	23	1.4
COMMUNITY TYPE		
Large urban.....	24	2.0
Small urban.....	19	1.5
Rural non-farm.....	16	.8
Rural farm.....	7	.7
POPULATION PER DENTIST (100's)		
13 or less.....	24	1.2
14-15.....	24	1.8
16-17.....	19	1.4
18-19.....	19	1.5
20-25.....	14	1.1
26-33.....	16	1.3
34-127.....	10	.8

visits in descending order are the Northeast, North Central, West and South.

Utilization by community type shows a steady decline from large urban to rural farm inhabitants. Major differences however, are between the urban area categories and the rural-nonfarm and rural farm areas.

Utilization seems to be directly related to the population per dentist ratio although the strength of the relation does not appear to be strong. There are, however, three "natural" breaks in the distribution which bring out the differences in utilization, namely where the ratio is: 1) 1,500 or less; 2) from 1,600 through 1,900; and 3) from 2,000 to 12,700.

II. EXPENDITURES AND VISITS: MULTIPLE CROSS-TABULATIONS

In the preceding section of this Chapter we have been concerned with the effect of several independent variables on utilization. The demographic variables, age, sex and race will be used in this section as control variables. Essentially the problem which we will be considering may be stated as follows: controlling for either age, sex or race; what effect do educational and occupational levels have on utilization? That is, are the original relationships between education (or occupation) and utilization maintained when age, sex or racial categories are introduced. However, prior to that analysis, we will present the joint effects of age and sex, age and race, and sex and race on utilization.

As shown in Table 2.5 expenditures for females are greater than males for all age categories. Mean visits follows a similar pattern with the exception of the 14-24 age group where the mean number

TABLE 2.5
MEAN EXPENDITURES AND VISITS BY AGE AND SEX

	MEAN EXPENDITURES		MEAN VISITS	
	Male	Female	Male	Female
AGE				
2-13.....	\$10	\$15	1.3	1.4
14-24.....	20	24	2.2	2.2
25-44.....	17	28	1.2	1.8
45-64.....	17	24	1.2	1.5
65 and older.....	9	13	.6	.9

of visits for both sexes is 2.2. Overall, the greatest difference in utilization by sex occurs in the 25-44 category.

As expected mean expenditures are lowest for persons 65 and older, followed by the 2-13 age category. For visits the pattern is similar, i.e., utilization is lowest for persons 65 and older, but the next lowest value, 2.2, is for males 25-44.

Table 2.6 presents the cross-tabulation by age and race. At each age level utilization is higher for whites than for nonwhites. In fact the greatest differences in mean expenditures and visits between whites and nonwhites are in the 2-13 and 14-24 age groups. Furthermore, the smallest differences in utilization by race are in the 65 and older category.

For whites, utilization by age is in the expected direction, beginning with a low value for persons 2-13, reaching the highest value for the 14-24 category, and then decreasing for subsequent ages. While for nonwhites the pattern is similar for visits, the largest expenditure occurs in the 25-44 category. White and nonwhite differences in utilization are evident for both males and females; however, these racial differences are more pronounced for females than

TABLE 2.6
MEAN EXPENDITURES AND VISITS BY AGE AND RACE

	MEAN EXPENDITURES		MEAN VISITS	
	White	Nonwhite	White	Nonwhite
AGE				
2-13.....	\$14	\$ 3	1.5	.5
14-24.....	25	6	2.4	1.0
25-44.....	24	15	1.7	.9
45-64.....	22	8	1.4	.6
65 and older.....	12	4	.8	.4

TABLE 2.7
MEAN EXPENDITURES AND VISITS BY SEX AND RACE

	MEAN EXPENDITURES		MEAN VISITS	
	White	Nonwhite	White	Nonwhite
SEX				
Male.....	\$16	\$7	1.5	.7
Female.....	24	8	1.8	.8

for males. In addition, differences between males and females are evident for whites; but for nonwhites differences by sex are minimal.

Presented in Tables 2.8, 2.9, and 2.10 are the cross-tabulations for age, sex and race by educational level of the head of the household. As shown in Table 2.8 increases in utilization were associated with increases in education with one exception in the 65 and older age group for expenditures and visits. The largest mean values were in the 25–44 and 14–24 age groups for college graduates-professionals. Utilization was lowest for those 2–13 and 65 and older where educational attainment was low.

Within each educational category the typical utilization pattern was low utilization for ages 2–13, higher means for the next three age groups and a substantial decrease for those 65 and older. However, there were differences in the ages with the largest mean values according to education. For expenditures where education was given as eight years or less or nine to eleven years the largest value was in the 45–64 category; for high school graduates and some college,

TABLE 2.8
MEAN EXPENDITURES AND VISITS BY EDUCATION OF THE
HEAD OF THE HOUSEHOLD AND AGE

	MEAN EXPENDITURES				
	Age				
	2–13	14–24	25–44	45–64	65+
EDUCATION					
8 years or less.....	\$ 5	\$10	\$14	\$17	\$ 9
9–11 years.....	8	15	17	19	9
High school graduate.....	12	27	20	21	12
Some college.....	17	30	25	26	24
College graduate-professional	31	42	46	34	22
	MEAN VISITS				
EDUCATION					
8 years or less.....	.7	1.3	.9	1.0	.6
9–11 years.....	1.1	1.9	1.1	1.3	.8
High school graduate.....	1.4	2.6	1.6	1.6	1.3
Some college.....	1.8	2.8	1.7	2.1	1.0
College graduate-professional	2.4	2.9	2.9	2.4	1.4

expenditures were greatest in the 14–24 category. College graduates-professionals had the greatest mean expenditure in the 25–44 category; however, for visits the greatest means were in the 14–24 category.

Educational level was associated with increases in utilization for both males and females. Differences in utilization by sex were not pronounced for the educational categories from eighth grade or less through some college. The greatest differences were \$16 and 0.5 visits in the college graduate-professional category.

For whites education was directly related to increases in utilization while among nonwhites those households in which the education of the head was eight years or less the smallest mean values were obtained. The major differences for nonwhites for both expenditures and visits appear to be between those with a high school

TABLE 2.9
MEAN EXPENDITURES AND VISITS BY EDUCATION OF THE
HEAD OF THE HOUSEHOLD AND SEX

	MEAN EXPENDITURES		MEAN VISITS	
	Male	Female	Male	Female
EDUCATION				
8 years or less.....	\$ 9	\$13	.8	1.0
9–11 years.....	12	16	1.1	1.4
High school graduate.....	15	21	1.5	1.8
Some college.....	21	25	1.9	1.9
College graduate-professional	29	45	2.3	2.8

TABLE 2.10
MEAN EXPENDITURES AND VISITS BY EDUCATION OF THE
HEAD OF THE HOUSEHOLD AND RACE

	MEAN EXPENDITURES		MEAN VISITS	
	White	Nonwhite	White	Nonwhite
EDUCATION				
8 years or less.....	\$13	\$ 5	1.0	.4
9–11 years.....	15	9	1.3	.9
High school graduate.....	20	6	1.8	.8
Some college.....	24	15	1.9	2.1
College graduate-professional	39	15	2.7	1.3

education or less and those with some college education or more. For whites on the other hand, the crucial break occurs between those with some college or less and those who have graduated from college.

Cross-tabulations of age, sex and race by occupational level of the head of the household are presented in Tables 2.11, 2.12, and 2.13. With several exceptions in Table 2.11 the two high status occupations, professional-managerial and clerical-sales have higher utilization than the remaining occupations.

With respect to expenditures for ages 25–64, service workers have mean values which do not appear to differ significantly from clerical-sales. Furthermore, for the 65 and older ages, professional-managerial, operatives, and laborers have similar mean expenditures. For visits, craftsmen-foremen for the ages 14–44 have mean values which

TABLE 2.11
MEAN EXPENDITURES AND VISITS BY OCCUPATION OF THE
HEAD OF THE HOUSEHOLD AND AGE

	MEAN EXPENDITURES				
	Age				
	2-13	14-24	25-44	45-64	65+
OCCUPATION					
Professional-managerial.....	\$20	\$35	\$34	\$31	\$12
Clerical-sales.....	17	28	24	25	24
Craftsmen-foremen.....	11	24	17	20	7
Operatives.....	7	18	19	10	12
Service workers.....	4	11	25	24	7
Farmers-farm laborers.....	8	8	6	17	6
Laborers.....	10	8	15	19	13
	MEAN VISITS				
OCCUPATION					
Professional-managerial.....	2.0	3.0	2.1	2.0	1.0
Clerical-sales.....	2.5	2.7	1.7	2.0	1.8
Craftsmen-foremen.....	1.3	2.8	1.5	1.2	.7
Operatives.....	1.0	1.7	1.1	.8	.9
Service workers.....	.7	1.3	1.4	1.1	.4
Farmers-farm laborers.....	.7	1.0	1.0	1.0	.4
Laborers.....	.9	1.0	1.1	.9	.4

correspond more to the professional-managerial and clerical-sales than the other occupations.

Expenditure patterns by age do not reveal the familiar reversed "U" trend. In fact, for professional-managerial, clerical-sales and craftsmen-foremen mean expenditures were highest for ages 14–24, while for 1) operatives, 2) service workers, 3) farmers-farm laborers and laborers, mean expenditures were highest in the 14–44, 25–64, and 45–64 categories, respectively.

However, for visits the highest means were in the 14–24 ages for professional-managerial through the operative category. For service workers mean visits were highest in the 14–44 ages. For both farmers-farm laborers and laborers had similar patterns of utilization by age.

For both males and females utilization is considerably higher in professional-managerial and clerical-sales occupations relative to all other occupations as shown in Table 2.12. While females have higher mean values than males at all occupational levels, differences are the greatest in the professional-managerial occupations. Differences by sex are the smallest for 1) farmers-farm workers for expenditures and 2) service workers for visits.

For whites, mean expenditure and visits differences are greatest between the professional-managerial and clerical-sales categories relative to the other occupations. For nonwhites, mean expenditures are highest in the professional-managerial occupations (\$13); vari-

TABLE 2.12
MEAN EXPENDITURES AND VISITS BY OCCUPATION OF THE
HEAD OF THE HOUSEHOLD AND SEX

	MEAN EXPENDITURES		MEAN VISITS	
	Male	Female	Male	Female
OCCUPATION				
Professional-managerial.....	\$21	\$35	1.9	2.4
Clerical-sales.....	21	25	1.8	2.0
Craftsmen-foremen.....	14	18	1.4	1.7
Operatives.....	10	16	1.0	1.3
Service workers.....	16	13	1.0	1.1
Farmers-farm laborers.....	9	11	.7	.9
Laborers.....	10	16	.8	1.0

TABLE 2.13
MEAN EXPENDITURES AND VISITS BY OCCUPATION OF THE
HEAD OF THE HOUSEHOLD AND RACE

	MEAN EXPENDITURES		MEAN VISITS	
	White	Nonwhite	White	Nonwhite
OCCUPATION				
Professional-managerial.....	\$29	\$13	1.1	2.4
Clerical-sales.....	24	10	2.0	1.4
Craftsmen-foremen.....	17	8	1.6	.6
Operatives.....	14	10	1.2	.6
Service workers.....	18	8	1.4	.4
Farmers-farm laborers.....	10	3	.9	.2
Laborers.....	18	3	1.0	.4

ations are slight for clerical-sales through service workers, and the lowest expenditures are for farmers and farm laborers, and laborers. For mean visits for nonwhites on the other hand there is a sharp drop 1) between professional-managerial and clerical-sales, and 2) between clerical-sales and craftsmen-foremen.

CHAPTER III

INCOME AND UTILIZATION

IN THIS CHAPTER we will examine the relation between several income-related measures and utilization. The income-related variables are as follows: 1) gross family income; 2) the family's perceived ability to pay a large dental bill; and 3) the family's income level prior to 1964. Income measures are viewed as resources reflecting the ability to pay for dental services. A given amount of resources available means that dental services compete not only with medically related services, but also with such services as food, rent, or clothing (cf. Feldstein and Carr, 1964; Wirick and Barlow, 1964; Draker and Allaway, 1963).¹

Income measures are important in that lack of funds implies that the cost of services becomes a deterrent to utilization. Several studies (cf. O'Shea and Cohen, 1966; Weeks, 1961; Koos, 1954) have demonstrated that cost is a primary consideration in not going to see a dentist.

With these considerations in mind three family-based income measures were collected in the survey. First, gross family income was obtained by summing the income for all individuals in the household. Second, following from the work of Kriesberg and Treiman (1960; 1962) each family was asked the following question:

If your family suddenly had to pay a \$500 dental bill, could you manage this without too much trouble, or would it be very difficult, or would you just not be able to pay it?

¹ Income, therefore, is not viewed primarily as an indicator of social position in the sense that both occupation and education were used. Occupation and education, while correlated with income are not resources which can be used directly to pay for dental services.

This measure was treated as the perceived ability to pay a large dental bill. A final measure, designated as "prior family income level," was used in order to measure changes in income levels as related to utilization. Each household was asked:

How did your family income for 1964 compare with the family's average income over the past three years—would you say it was much higher, somewhat higher, about the same, somewhat lower, or much lower?

I. UTILIZATION BY FAMILY INCOME, ABILITY TO PAY, AND PRIOR INCOME LEVELS

Tabulations showing the relation between family income, ability to pay, and prior income level are presented in Table 3.1 for expenditures and visits. Increases in family income are associated with increases in utilization. However, there is very little difference in mean expenditures and visits for the three income categories below \$5,000.

A family's perceived ability to pay for dental services is directly related to utilization. Those persons in families where the response was "not much trouble" had mean expenditures approximately 2.5

TABLE 3.1
MEAN EXPENDITURES AND VISITS BY FAMILY
INCOME, ABILITY TO PAY AND PRIOR
INCOME LEVEL*

	Mean Expenditures	Mean Visits
FAMILY INCOME		
Less than \$2,000	\$10	.9
\$ 2,000- 3,499	10	.8
3,500- 4,999	11	.9
5,000- 5,499	16	1.4
7,500- 9,999	21	1.7
10,000-12,499	26	2.0
12,500 or more	35	2.8
ABILITY TO PAY		
Not much trouble	25	1.8
Very difficult	18	1.4
Not able to pay	9	1.0
PRIOR INCOME LEVEL		
Higher	21	1.7
About the same	17	1.4
Lower	17	1.3

* In this and subsequent tables mean expenditures and visits by family income, ability to pay, and prior income level are calculated for individuals.

times higher and mean visits about 1.8 times higher than those whose response was "not able to pay."

However, prior income level was important mainly between those families in which family income was higher prior to the survey year and those families where the average income was about the same or lower.²

II. UTILIZATION BY FAMILY INCOME, ABILITY TO PAY, PRIOR INCOME LEVEL BY AGE, SEX, RACE, AND FAMILY SIZE

In this section we examine the relation between utilization, income measures and three demographic variables. As shown in Table 3.2 mean expenditures for dental care are associated with increases in family income but only for ages 14-64. For ages 2-13, there is only slight variation in expenditures for families with incomes of less than \$5,000. In the 65 and older age group the irregular pattern

TABLE 3.2
MEAN EXPENDITURES AND VISITS BY FAMILY INCOME AND AGE

INCOME	MEAN EXPENDITURES				
	Age				
	2-13	14-24	24-44	45-64	65 and older
Less than \$2,000	\$ 4	\$10	\$12	\$15	\$ 9
\$ 2,000- 3,499	5	7	9	18	13
3,500- 4,999	4	12	16	16	5
5,000- 7,499	11	20	18	17	19
7,500- 9,999	18	27	21	25	8
10,000-12,499	14	31	36	26	8
12,500 or more	31	43	42	27	13
	MEAN VISITS				
	2-13	14-24	24-44	45-64	65 and older
Less than \$2,000	.7	1.3	1.1	1.1	.7
\$ 2,000- 3,499	.7	1.3	.7	.8	.8
3,500- 4,999	.7	1.5	1.0	.9	.4
5,000- 7,499	1.2	2.0	2.7	2.6	1.5
7,500- 9,999	1.7	2.1	1.6	1.5	.7
10,000-12,499	1.7	2.8	2.1	1.7	.6
12,500 or more	2.9	4.1	4.8	2.9	1.2

² The original five categories for "prior income level" were recategorized into three, as follows: 1) Higher—much higher, somewhat higher; 2) About the Same—not changed; 3) Lower—somewhat lower, much lower.

may be attributed more to the effect of age rather than income, since age variations follow the pattern of low expenditures in ages 2–13, somewhat higher levels for ages 14–64 and then a decrease in expenditures (with one exception) for ages 65 and older. Finally, the largest mean expenditure was (1) at ages 45–64 for family incomes of less than \$5,000 and (2) at ages 14–24 for family incomes of \$5,000 or more.

With respect to mean visits as shown in Table 3.2, for the 2–13 category increases in utilization are associated with increases in income, if incomes of less than \$5,000 are considered as one category. Likewise, for the 14–24 category if incomes of less than \$3,500 are considered as one category, then income is directly related to mean visits. No consistent pattern emerges for the 25–44 and 45–64 age groups except for the relatively low level of visits for family incomes of less than \$5,000, medium levels of visits for income from \$5,000–\$12,499 and the highest level of visits for incomes of \$12,500 or more.

Utilization by family income and sex is shown in Table 3.3. For males, considering incomes of \$3,499 or less as one category, utilization increases with income. For females, there is only slight variation in utilization among the three lowest income categories, but there is a tendency for income to be positively related to utilization. Within income levels with one exception for expenditures, utilization is greater for females than for males. These sex differences in utilization are considerably larger in the \$10,000 and over categories than in the other income categories.

Considering the effect of race and income on utilization in Table 3.4 there appears to be slight variation within racial categories for

TABLE 3.4
MEAN EXPENDITURES AND VISITS BY
FAMILY INCOME AND RACE

INCOME	MEAN EXPENDITURES		MEAN VISITS	
	White	Nonwhite	White	Nonwhite
Less than \$2,000.....	\$12	\$ 6	1.0	.6
\$ 2,000– 3,499.....	13	5	1.0	.5
3,500– 4,999.....	11	7	1.0	.3
5,000– 7,499.....	17	9	1.5	.7
7,500– 9,999.....	22	11	1.7	.8
10,000–12,499.....	27	6	2.0	1.0
12,500 or more.....	35	22	2.7	4.8

families with incomes of less than \$5,000. As was the case for age and sex, if incomes below \$5,000 are grouped as one category then increases in utilization are accompanied by increases in income.

Within racial categories, whites utilize dental services more than nonwhites with one exception for incomes \$12,500 or greater for mean visits. White-nonwhite differences are relatively small for incomes less than \$7,500; rather large differences are evident for incomes \$7,500 or more. The major exception to the pattern of white-nonwhite differences shows nonwhites having 4.8 mean visits and whites having 2.2 mean visits where family incomes are \$12,500 or more. This finding may be attributed to an artifact of the data since the number of observations for nonwhites was 48 and the standard deviation 17; these factors act to overestimate the mean visits for nonwhites.

Presented in Tables 3.5, 3.6, and 3.7, are the data for utilization cross-tabulated by ability to pay and age, sex, and race, respectively. In Table 3.5 we find that those families whose response was “not much trouble” also had higher levels of utilization than the other two ability to pay categories. The one exception was for expenditures for persons 45–64. Considering the effect of age, utilization was 1) low in the 2–13 category, 2) higher in the ages 14–44; thereafter, there was a decline in utilization beginning with the 45–64 ages and continuing through the 65 and older ages.

For visits the highest mean value occurred in the 14–24 age group for each ability to pay category. For expenditures, the highest mean value occurred in the 14–44 age group for those families responding “not much trouble.” For the other two ability to pay categories the

TABLE 3.3
MEAN EXPENDITURES AND VISITS BY FAMILY INCOME BY SEX

INCOME	MEAN EXPENDITURES		MEAN VISITS	
	Male	Female	Male	Female
Less than \$2,000.....	\$ 6	\$13	.8	1.0
\$ 2,000– 3,499.....	7	13	.8	.9
3,500– 4,999.....	12	10	1.0	.9
5,000– 7,499.....	15	17	1.3	1.5
7,500– 9,999.....	18	25	1.5	1.8
10,000–12,499.....	18	33	1.7	2.3
12,500 or more.....	26	44	2.4	3.2

TABLE 3.5
MEAN EXPENDITURES AND VISITS BY ABILITY TO PAY AND AGE

ABILITY TO PAY	MEAN EXPENDITURES				
	Age				
	2-13	14-24	25-44	45-64	65 and older
Not much trouble.....	\$20	\$30	\$30	\$21	\$15
Very difficult.....	11	21	20	25	10
Not able to pay.....	6	12	12	12	6
	MEAN VISITS				
	2-13	14-24	25-44	45-64	65 and older
Not much trouble.....	1.9	2.6	2.0	1.6	.9
Very difficult.....	1.2	2.1	1.4	1.3	.9
Not able to pay.....	.9	1.6	1.0	.8	.5

highest values were in the 45-64 age group. However, the fact that expenditures in the three age categories, 14-24, 25-44, and 45-64, for those families responding "not able to pay" were the same, implies that age does not have a significant impact.

Table 3.6 shows the joint effect of ability to pay and sex. Within sex categories the ability to pay is directly related to the use of dental services. Differences between the ability to pay categories are, however, greater for females than for males.

In addition, while utilization for females is higher than for males, sex differences are greatest in those families responding "not much trouble"; these differences then decrease for the "very difficult" cate-

TABLE 3.6
MEAN EXPENDITURES AND VISITS BY
ABILITY TO PAY AND SEX

ABILITY TO PAY	MEAN EXPENDITURES		MEAN VISITS	
	Male	Female	Male	Female
Not much trouble.....	\$19	\$29	1.6	2.0
Very difficult.....	15	20	1.3	1.5
Not able to pay.....	8	10	1.0	1.0

gory; little or no differences are evident in the "not able to pay" category.

Differences in utilization by ability to pay and race are shown in Table 3.7. Within racial categories utilization is directly related to the ability to pay a large dental bill. With respect to white-nonwhite differences, whites use dental services more than nonwhites. These differences are smallest for visits in the "not much trouble" category, while for expenditures differences are smallest in the "not able to pay" category.

In Table 3.8 utilization is cross-tabulated with the family's income

TABLE 3.7
MEAN EXPENDITURES AND VISITS BY
ABILITY TO PAY AND RACE

ABILITY TO PAY	MEAN EXPENDITURES		MEAN VISITS	
	White	Nonwhite	White	Nonwhite
Not much trouble.....	\$25	\$15	1.9	1.4
Very difficult.....	19	8	1.5	.7
Not able to pay.....	12	4	1.2	.4

TABLE 3.8
MEAN EXPENDITURES AND VISITS BY PRIOR INCOME LEVEL AND AGE

	MEAN EXPENDITURES				
	Age				
	2-13	14-24	25-44	45-64	65 and older
PRIOR INCOME LEVEL					
Higher.....	\$15	\$28	\$24	\$21	\$ 6
About the same.....	11	19	21	21	12
Lower.....	11	17	23	21	14
	MEAN VISITS				
	2-13	14-24	25-44	45-64	65 and older
PRIOR INCOME LEVEL					
Higher.....	1.5	2.4	1.7	1.4	.5
About the same.....	1.2	2.1	1.4	1.3	.9
Lower.....	1.1	2.0	1.3	1.3	.8

level for the three years preceding the study. For age categories 2–44, those whose prior family income was “higher” also had the highest levels of dental utilization. Apparently for these ages we can conclude that the response categories “about the same” and “lower” produced similar results in terms of utilization, i.e., differences in utilization were small. In the 45–64 age group differences in prior income level were not associated with differences in utilization.

For those persons 65 and older the pattern of utilization was the reverse of the pattern for the 2–44 age groups. That is, those families reporting income levels “about the same” or “lower” had the highest levels of utilization. To the extent that those persons whose response for income levels was “higher” were recently retired then their low level of utilization could be attributed to a temporary cutback in dental expenses, since their standard of living may have been more recently lowered.

The effect of age is, as expected, to have low levels of utilization in the 2–13 category, relatively high levels in the 14–44 category, followed by subsequent decreases in the next two categories, 45–64 and 65 and older.

In Table 3.9 we again see that the natural break in terms of the effect of income level is between those families whose response was “higher” and those who responded “about the same” or “lower”; utilization was lowest in the latter categories. Differences were greater for females than for males. However, females had higher rates of utilization than males and the greatest differences (\$9 for expenditures; 0.3 for visits) were in the response category designated as “higher.”

TABLE 3.9
MEAN EXPENDITURES AND VISITS BY
PRIOR INCOME LEVEL BY SEX

PRIOR INCOME LEVEL	MEAN EXPENDITURES		MEAN VISITS	
	Male	Female	Male	Female
Higher.....	\$16	\$25	1.5	1.8
About the same.....	14	19	1.3	1.5
Lower.....	15	20	1.2	1.4

With respect to expenditures as shown in Table 3.10 whites whose prior income level was designated as “higher” had the highest mean expenditures. In contrast for nonwhites the effect of prior income level on expenditures is minimal with a slightly higher mean for those families reporting “lower” income levels. For mean visits on the other hand, those reporting “higher” income levels for both whites and nonwhites had higher levels of utilization than those families responding “about the same” or “lower.”

Utilization by whites is considerably greater than nonwhites. These differences do not appear to be affected by prior income level.

III. THE JOINT EFFECT OF FAMILY SIZE WITH FAMILY INCOME, ABILITY TO PAY, AND PRIOR INCOME LEVEL ON UTILIZATION

In this section we will examine the effect that family size has on utilization in combination with the three income-related variables. Family size is important in that given a certain income level or prior income levels, individual expenditures for dental care may vary according to the per capita income level. In addition the perceived need for care may be constrained by the allocation of financial resources on a per capita basis.

As shown in Table 3.11 the relation between income and utilization is not consistent within family size categories.³ In general those families at higher income levels (\$7,500 or more) use dental services

TABLE 3.10
MEAN EXPENDITURES AND VISITS BY
PRIOR INCOME LEVEL AND RACE

PRIOR INCOME LEVEL	MEAN EXPENDITURES		MEAN VISITS	
	White	Nonwhite	White	Nonwhite
Higher..	\$22	\$7	1.8	.9
About the same	18	7	1.5	.6
Lower... .	19	9	1.4	.7

³ The analysis is further complicated by the small number of observations upon which the means for the three highest income categories for one person families were based: 1) \$7,500–9,999, N = 25; 2) \$10,000–12,499, N = 8; 3) \$12,500 or more, N = 13.

TABLE 3.11

MEAN EXPENDITURES AND VISITS BY FAMILY INCOME AND FAMILY SIZE

INCOME	MEAN EXPENDITURES					
	Size					
	One	Two	Three	Four	Five	Six or more
Less than \$2,000...	\$19	\$ 9	\$ 6	\$11	\$ 4	\$ 5
\$ 2,000- 3,499...	22	16	15	3	10	1
3,500- 4,999...	9	13	22	10	7	5
5,000- 7,499...	33	18	20	17	16	10
7,500- 9,999...	51	22	25	22	22	16
10,000-12,499...	*	31	26	31	31	16
12,500 or more....	*	50	26	29	40	35
	MEAN VISITS					
	Size					
	One	Two	Three	Four	Five	Six or more
Less than \$2,000...	1.3	.7	.9	1.3	.5	.7
\$ 2,000- 3,499...	1.8	1.0	.7	.7	.8	.4
3,500- 4,999...	.9	.8	1.2	1.0	1.1	.7
5,000- 7,499...	1.7	1.6	1.5	1.5	1.5	1.2
7,500- 9,999...	2.4	1.3	1.8	1.6	1.8	1.6
10,000-12,499...	*	2.8	2.3	2.1	2.2	1.8
12,500 or more....	*	2.7	2.2	2.7	3.7	2.2

* Number of observations are less than 25.

more than families at lower income levels. However, the relation between income and utilization controlling for family size does not increase regularly. For example, in two person families, per person expenditures and visits are higher for incomes from \$2,000-\$3,499 than for families with incomes from \$3,500-\$4,999. Likewise, four person families with incomes under \$2,000 have higher expenditures and visits than in those families with incomes from \$2,000-\$3,499. These findings suggest the notion of a critical income level (varying with family size) above which utilization is relatively high and below which utilization is relatively low.

A further examination of Table 3.11 reveals that except for family incomes of \$12,500 or more, families of six or more persons tend to have lower expenditures than for families ranging in size from 2-5; for visits the same relation holds for families of size 3-5.

The relation between family size and ability to pay is shown in Table 3.12. With the exception of three person families the ability

TABLE 3.12

MEAN EXPENDITURES AND VISITS BY ABILITY TO PAY AND FAMILY SIZE

ABILITY TO PAY	MEAN EXPENDITURES					
	Size					
	One	Two	Three	Four	Five	Six or more
Not much trouble...	\$29	\$23	\$21	\$25	\$29	\$21
Very difficult.....	21	18	26	18	17	12
Not able to pay....	17	10	10	8	15	5
	MEAN VISITS					
	Size					
	One	Two	Three	Four	Five	Six or more
Not much trouble...	1.6	1.5	1.8	2.1	2.4	1.7
Very difficult.....	1.7	1.3	1.6	1.4	1.4	1.3
Not able to pay....	1.3	.7	.9	1.0	1.5	.9

to pay is directly related to mean expenditures for dental care; for visits with the exception of one person families the ability to pay is directly related to utilization.

Within the categories for the ability to pay, utilization is high in one person families and then decreases for two person families. For families of size three or greater the pattern of utilization is not consistent. Where the response was "not much trouble" maximum expenditures were at family size five, as well as in one person families, and maximum visits were recorded for two person families. Where the response was "very difficult" maximum values for both expenditures and visits were in three person families. For the response, "not able to pay" expenditures were highest in one person families, while for visits the highest value was for family size five.

An examination of Table 3.13 shows that within family size categories (except for expenditures for family size one) those whose prior income level was higher also had the highest levels of utilization, although differences between the prior income level categories were not consistent for family size categories.

For expenditures, utilization was highest in two person families who indicated that their prior income level was "higher" before the survey year, while those reporting "about the same" or "lower" had highest expenditures in one person families.

TABLE 3.13

MEAN EXPENDITURES AND VISITS BY PRIOR INCOME LEVEL AND FAMILY SIZE

PRIOR INCOME LEVEL	MEAN EXPENDITURES					
	Size					
	One	Two	Three	Four	Five	Six or More
Higher.....	\$21	\$28	\$23	\$23	\$22	\$14
About the same.....	22	16	21	17	19	11
Lower.....	26	22	19	15	23	7

PRIOR INCOME LEVEL	MEAN VISITS					
	Size					
	One	Two	Three	Four	Five	Six or More
Higher.....	1.5	1.6	1.9	1.9	1.8	.14
About the same.....	1.5	1.1	1.5	1.4	1.8	1.3
Lower.....	1.4	1.3	1.3	1.5	1.8	.9

The pattern for visits is slightly different. Those reporting prior income as "higher" had the greatest number of visits in families of size three to five, while the "about the same" and the "lower" categories reported the largest number for one person families.

CHAPTER IV

UTILIZATION BY DENTAL SERVICE

IN THIS CHAPTER we examine dental service utilization according to the type of dental service received. In so doing, we focus on six major categories: cleaning, examinations, fillings, extractions, dentures, and other services.¹ These services are then cross-tabulated with the demographic, social status, family composition, community resource and income measures. Our results are presented as the proportion of persons in specific categories who received services during 1964.²

I. TYPE OF DENTAL SERVICES RECEIVED: INITIAL TABULATIONS

As shown in Table 4.1 there are significant variations in the proportion of persons receiving dental services for both age and racial categories, but not for sex. For example, for all services except dentures, utilization is relatively low for ages 2-13; however, for the next age group (14-24) utilization increases to its highest level, and then decreases in subsequent age groups. There is a direct relation between the proportion of persons receiving denture services and age.

The dental service most frequently used in each age category was

¹ A complete enumeration of the services received is contained in Appendix C-Variable Definitions. In a less detailed manner, the major services subsumed under each category are as follows: 1) Cleaning-all prophylaxis and fluoride treatments; 2) Examinations-examinations and x-rays; 3) Fillings-all types of fillings and inlays; 4) Dentures-includes crowns, bridges and denture repairs; 5) Extractions-simple and surgical extractions; 6) Other services-palliative treatment, root canal, gum treatment, orthodontics and all other services.

² Since the proportion of persons with specified services for expenditures and visits was practically the same for all of the independent variables, only the proportion of persons with visits are shown in the tables in this Chapter.

TABLE 4.1
PROPORTION OF PERSONS WITH VISITS BY AGE, SEX,
AND RACE BY TYPE OF SERVICE

	Cleaning	Examina- tion and X-rays	Fillings and Inlays	Extrac- tions	Dentures	Other Services
AGE						
2-13.....	23%	42%	26%	10%	1%	5%
14-24.....	30	49	36	15	4	9
25-44.....	28	41	27	15	8	8
45-64.....	25	31	20	12	11	8
65 and older.....	10	16	8	6	10	5
SEX						
Male.....	24	36	24	12	6	7
Female.....	26	39	27	12	7	8
RACE						
White.....	28	41	28	12	7	8
Nonwhite.....	8	18	6	14	3	4

examinations. However, there are some interesting differences by age in terms of the second most frequent service received: 1) for younger ages, 2-13 and 14-24 fillings were reported for 26 percent and 36 percent of the individuals, respectively, and 2) for persons 25-44, 45-64, and 65 and older cleaning was reported for 28 percent, 25 percent, and 10 percent of the individuals, respectively.

Racial differences in utilization are large with a higher proportion of whites receiving cleaning, examinations, and fillings than nonwhites. In fact, for cleaning and fillings the difference is approximately 20 percent while the difference is 23 percent for examinations. For dentures and other services the differences are relatively slight—approximately 4 percent. However, only for extractions is the proportion of nonwhites greater than whites and then only by 2 percent.

Presented in Table 4.2 is the cross-tabulation of type of dental service received by education and occupation of the head of the household. With respect to education we find a direct relation between education and utilization for cleaning, examinations and x-rays, fillings and inlays, and other services. In fact, for college graduates 55 percent, 67 percent, and 46 percent have received cleaning, examination and x-rays, and fillings and inlays, respectively. For all forms of dentures, increases in utilization associated with increases in education are slight. College graduates on the other hand have the lowest proportion (nine percent) of extractions; this

TABLE 4.2
PROPORTION OF PERSONS WITH VISITS BY EDUCATION AND OCCUPATION
OF THE HEAD OF THE HOUSEHOLD BY TYPE OF SERVICE

	Cleaning	Examina- tion and X-rays	Fillings and Inlays	Extrac- tions	Dentures	Other Services
EDUCATION						
8 years or less.....	12%	21%	14%	12%	5%	4%
9-11 years.....	17	31	20	13	5	6
High school graduate.....	27	44	29	12	6	8
Some college.....	37	51	34	11	8	10
College graduate-professional.....	55	67	46	9	10	12
OCCUPATION						
Professional-managerial.....	42	55	38	10	8	10
Clerical sales.....	37	50	34	12	7	11
Craftsmen foremen.....	21	36	23	14	6	7
Operatives.....	17	29	19	14	5	6
Service workers.....	17	28	16	13	5	6
Farmers-farm laborers.....	11	28	19	12	5	6
Laborers.....	10	22	12	13	5	5

finding may be the result of more extensive use of preventive services by persons with high educational levels.

The most common service received by individuals at each educational level was examinations and x-rays. However, for the second most common service there are variations by education: 1) for head of households with 12 years of schooling or less the service is fillings and inlays; 2) for head of households with some college or more the service is cleaning.

A pattern similar to that of educational levels is found for occupation of the head of the household. That is, as occupational status increases so does utilization for cleaning, examination and x-rays, fillings and inlays, and other services. However, in those households where the head is either an operative or a service worker the proportion of persons with a visit for each of the six dental services is about the same. For dentures and extractions differences in utilization are slight, although professional-managerial occupations have slightly fewer visits for extractions and slightly more visits for dentures than other occupations.

The most common service within each occupational category was for examinations and x-rays. For professional-managerial occupations cleaning is the second most common service; for all other occupations the second most common service is fillings and inlays.

As shown in Table 4.3 family life cycle stage is related to dental service utilization according to the type of dental service received. For example, within each dental service category the lowest proportion of persons with visits (category 7) was where the family head was single, 45 years of age or older, and having no children. This category of course reflects the strong influence of age. However, the highest proportion of persons with visits for cleaning, examinations and x-rays was in life cycle category 6 where the family head was married and all children were 14 years of age or older. Differences in utilization for extractions, dentures, and other services by life cycle stage are slight; utilization for these three services remains low relative to the other dental services.

An examination of the relation between utilization and family size (as shown in Table 4.3) reveals that for cleaning, examinations and x-rays, and fillings and inlays, utilization is low in one person families; subsequent increases for these three services in utilization are associated with increases in family size for two and three person families, while utilization reaches a maximum for four and five person families; finally, there is a sharp decrease in utilization for six person families. Utilization for extractions follows the same pat-

TABLE 4.3
PROPORTION OF PERSONS WITH VISITS BY FAMILY LIFE
CYCLE AND FAMILY SIZE BY TYPE OF SERVICE

	Cleaning	Examina- tion and X-rays	Fillings and Inlays	Extrac- tions	Dentures	Other Services
FAMILY LIFE CYCLE*						
1. FHS, -45, NC.....	25%	35%	23%	14%	8%	10%
2. FHM, -45, NC.....	29	42	23	16	7	10
3. FHS, C.....	20	34	19	13	4	7
4. FHM, C13.....	26	42	27	13	4	7
5. FHM, C13, C14.....	25	41	29	12	4	7
6. FHM, C14.....	32	42	31	11	8	9
7. FHS, 45+, NC.....	14	21	13	9	11	7
8. FHM, 45+, NC.....	21	27	17	9	11	8
FAMILY SIZE						
One.....	19	27	16	10	11	8
Two.....	22	30	18	11	10	8
Three.....	28	39	27	12	7	9
Four.....	29	44	30	13	4	7
Five.....	29	45	31	13	6	7
Six or more.....	19	36	23	12	3	5

* "FHS(M)" = family head single (married); "-45" = family head under 45 years of age; "45+" = family head 45 years of age or older; "C" = children; "NC" = no children; "C13" = children 13 years of age or younger; "C14" = children 14 years of age or older.

tern as for the above mentioned services but differences between adjacent categories were in the magnitude of 1 percent.

Although differences between categories are relatively small, the proportion of persons with visits for dentures is inversely related to family size. For other services category differences are small with a slight tendency for utilization to decrease as family size increased.

Shown in Table 4.4 are the cross-tabulations for region, community type, and population per dentist. The pattern of utilization for cleaning, examination and x-rays, and fillings and inlays is in descending order 1) Northeast, 2) North Central, 3) West, and 4) South. For extractions, dentures, and other services, variations by region are small.

For cleaning and examination and x-rays differences by community type are large (5 percent or more) and consistent with utilization highest in large urban areas, followed by small urban areas, rural non-farm and rural farm in that order. A similar pattern is found for fillings and inlays, but between category differences are smaller. Differences of 1 to 4 percent are evident for extractions, dentures, and other services; for the latter two services utilization, however, is lowest for rural farm individuals.

TABLE 4.4
PROPORTION OF PERSONS WITH VISITS BY REGION, COMMUNITY
TYPE, AND POPULATION PER DENTIST BY TYPE OF SERVICE

	Cleaning	Examina- tion and X-rays	Fillings and Inlays	Extrac- tions	Dentures	Other Services
REGION						
Northeast.....	34%	46%	34%	13%	6%	8%
North Central.....	25	41	27	11	6	6
South.....	19	29	19	12	5	6
West.....	24	38	23	11	8	9
COMMUNITY TYPE						
Large urban.....	33	46	28	13	7	9
Small urban.....	27	40	26	11	6	8
Rural farm.....	12	26	18	12	4	5
Rural non-farm.....	18	33	24	12	7	6
POPULATION PER DENTIST (100's)						
13 or less.....	31	46	30	12	7	9
14-15.....	33	46	29	13	7	8
16-17.....	28	42	28	14	6	8
18-19.....	25	39	28	14	8	8
20-25.....	18	31	20	11	5	6
26-33.....	20	35	23	11	6	7
34-127.....	15	25	18	10	5	4

With reference to population per dentist the pattern of utilization shows no orderly increase or decrease. However, for all services the smallest proportions are observed for the last (3,400–12,700) category. For cleaning, examination and x-rays, and fillings and inlays the highest proportions are found in the two lowest population per dentist ratios, i.e., 1,300 or less and 1,400–1,500.

As was the case for utilization by region or community type, variations by population per dentist for extractions, dentures, and other services are slight.

According to the data in Table 4.5, family income is directly related to the utilization of cleanings, examinations and x-rays, and fillings and inlays; the differences in proportions between the lowest and highest income categories were 41 percent, 45 percent, and 32 percent, respectively. In addition, there is a direct relation between income and utilization for dentures and the category "other services," although differences between categories are rather small. For extractions there is little if any relation between income and utilization. In fact, the highest income category (\$12,500 or more) had the lowest proportion (10 percent) of extractions.

In addition, as the ability to pay a large dental bill increases, utilization also increases for every service except extractions. As

TABLE 4.5

PROPORTION OF PERSONS WITH VISITS BY FAMILY INCOME, ABILITY TO PAY, AND PRIOR INCOME LEVEL BY TYPE OF SERVICE

	Cleaning	Examination and X-rays	Fillings and Inlays	Extractions	Dentures	Other Services
FAMILY INCOME						
Less than \$2,000.....	9%	19%	10%	12%	5%	4%
\$ 2,000– 3,499.....	10	20	10	12	4	4
3,400– 4,999.....	12	25	17	14	4	6
5,000– 7,499.....	22	37	24	13	5	7
7,500– 9,999.....	31	46	33	12	7	8
10,000–12,499.....	39	54	37	11	7	10
12,500 or more.....	52	64	42	10	10	12
ABILITY TO PAY						
Without much trouble...	36	49	33	10	8	9
Very difficult.....	22	36	24	12	5	7
Not able to pay.....	10	23	14	14	4	5
PRIOR INCOME LEVEL						
Higher.....	31	45	30	12	6	8
About the same.....	22	35	23	12	6	7
Lower.....	18	33	21	13	6	7

shown in Table 4.5 the relation between ability to pay and utilization is quite strong (differences of 10 percent or more between adjacent categories) for cleaning, examination and x-rays, and fillings and inlays; the relation is somewhat weaker for dentures and other services. Furthermore, there is a weak but inverse relation between the ability to pay and extractions.

For the variable "prior income level" we find that major differences in utilization for cleaning, examination and x-rays, and fillings and inlays, are between those families reporting "higher" incomes and those reporting "about the same" or "lower" income levels. Utilization is low for extractions, dentures, and other services; finally, there is no apparent relation between prior income level and these services.

II. MULTIPLE CROSS-TABULATIONS

In this section we present the results of cross-tabulations with the proportion of persons with visits as the dependent variable and age, sex, race, education and occupation of the head of the household, and family income as the independent variables.³ In general, the three demographic variables are used as control variables when we use education, occupation and income.

With respect to age and sex (Appendix D: Table D.1) we find that for both males and females there is a reverse "U-shaped" curve of utilization by age for cleaning, examination and x-rays, fillings and inlays, and extractions. That is, utilization is 1) low for ages 2–13, 2) highest for either ages 14–24 or 25–44, 3) declining for ages 45–64, and 4) lowest for persons 65 and older. For examinations and fillings the highest proportion of persons with a visit is for ages 14–24. For males, cleaning has the highest proportion of persons with visits in ages 14–24, while for extractions the highest proportion is found among those 25–44; for these two services the pattern by age is reversed for females. Finally, there is a direct but weak relation by age between utilization and visits for denture work.

In most instances females have a higher proportion of visits than males for all services, although the differences are not large (Appendix D: Table D.1). There are two exceptions, however, where in the age group 25–44 for examinations and x-rays the difference is 9 percent and for fillings and inlays the difference is 8 percent.

³ Because of the complexity of these tables we do not include them in the text. They may be found in Appendix D.

Cross-tabulating age and race (Appendix D: Table D.1) reveals that for both whites and nonwhites for all services except dentures and the category other services, utilization is 1) low for ages 2–13, 2) highest for ages 14–24 and 25–44, 3) declines somewhat for ages 45–64, and 4) lowest for ages 65 and older. Whites for all services except dentures and other services have the highest proportion of visits at ages 14–24. Nonwhites on the other hand have at ages 14–24 and 25–44 the highest proportions for cleaning and examinations and x-rays; visits for fillings and inlays and other services are greatest for ages 14–24, while for extractions and dentures the ages are 25–64 and 25–44, respectively.

For cleaning, examinations and x-rays, and fillings and inlays, whites at any age have more visits than nonwhites; the same relation holds for both dentures and other services, but differences are small. The magnitude of racial differences is emphasized by the fact that the excess percentage in favor of whites, ages 2–13, for examinations and x-rays is 32 percent. Differences by race, however, decrease with age.

Nonwhites have more visits for extractions than whites for all ages except the 2–13 category; these differences range from three to seven percent.

Cross-tabulating race by sex (Appendix D: Table D.1) reveals that for both whites and nonwhites for any given service, differences in utilization by sex are indeed small. In fact, the largest percentage difference by sex (four percent) is for whites with visits for examinations and fillings. For the three major services, cleaning, examination, and fillings, the excess proportion of whites with a visit is approximately 20 percent or greater; smaller differences are present for dentures and other services. Only for extractions is there a slight tendency for nonwhites to have a higher proportion of visits than whites.

Interestingly, while the most common service for whites and nonwhites is examinations and x-rays, the second most frequent service for nonwhites is extractions while for whites the services are cleaning and fillings and x-rays. This finding suggests that examinations or other preventive services may in the long run reduce the number of extractions.

Variations in utilization by education and age, sex, and race are now considered. For example, utilization by education and age (Appendix D: Table D.2) follows the reversed U-shaped pattern only for cleaning, examination and x-rays and fillings; highest utili-

zation of these services is for ages 14–24. The same reverse U-shaped pattern is also true for extractions in most instances; a major exception is in the college graduate-professional category where there is no apparent difference by age. The utilization of services for dentures on the other hand exhibits a direct but weak relation with age for all educational levels except for college graduates where utilization is low for ages 24 or younger and relatively high for those persons 25 or older. For the category “other services” the relation between age and utilization is weak; among college graduates utilization had a direct relation with age, while in each of the other education categories there is the reverse U-shaped pattern.

Education is directly related to utilization for cleaning, examinations and fillings with the largest percentage differences between adjacent age categories occurring between those 45–64 and those 65 and older. There is a slight tendency for extractions to be more common as educational levels decrease. Services related to dentures are slightly more common in the higher educational groups than in the lower educational levels.

With respect to education and sex (Appendix D: Table D.3) in all but two instances females have a higher proportion of visits than males for all types of dental services. However, these differences of from one to two percent lend additional support to the contention that sex is not a significant factor in utilization.

For all services except extractions and dentures education is directly related to utilization for both males and females. With respect to extractions, there is a slight decrease in utilization as education increases while for dentures there is a tendency for education and utilization to be directly related.

Whites have more visits for cleaning, examination and x-rays, and fillings and inlays than nonwhites at all educational levels (Appendix D: Table D.4); percentage differences by race for these services increase as education increases. Except for high school graduates, whites have more visits for extractions than nonwhites. In addition the largest percentage differences occur for individuals in families where the head of the household has had some college or more education. Whites, however, have slightly more visits for dentures and other services than nonwhites.

It is also evident that education is directly related to utilization for cleaning, examinations, and fillings; differences between education categories are greater for whites than nonwhites, however. For whites there is a slight decrease in the proportion of persons with

slightly more visits for extractions than whites for incomes less than \$3,500 and incomes between \$5,000 and \$7,499; these differences are not large.

Income is directly related to use of such services as cleaning, examinations, and fillings. Changes in utilization by income are small, however, for incomes of \$4,999 or less. There is no strong relation between income and utilization for extractions and dentures and for the category "other services" there is a direct and weak association between income and utilization.

CHAPTER V

DENTAL CONDITIONS AND UTILIZATION

IN THIS CHAPTER we look at the effect that dental conditions or symptoms have on utilization in conjunction with the demographic variables (age, sex, and race), the education and occupation of the head of the household and family income and the family's ability to pay a large (\$500) dental bill.

Theoretical schemes which postulate that dental symptoms account for the utilization of dental services have been based in large part on social-psychological models. This is somewhat in contrast to utilization studies of physician and hospital services which have strongly been influenced by economic-demand analysis.

Dental utilization models as well as some of the more general medical care models frequently make the assumption that whether a person seeks care or not is based on an assessment of his physical health. Such a perspective implies that a person's physical condition in conjunction with his perception of whether care is needed influences utilization.

For example, Wirick (1966) using a demand model emphasized the importance of physiological need and the realization of need together with motivation, financial resources, and the availability of services with respect to the number of dental visits.

Kegeles (1961, 1963a, 1963b) and a report by Tash, *et al.* (1969), based on the theory of Kegeles, have developed a social-psychological model of health behavior applied to dental utilization. The model identifies several perceptual categories which influence utilization: the person feels susceptible to illness or disease; the person believed that, once afflicted, illness or disease will have serious consequences; then the need for action must be more important than other alterna-

tives; therefore, a person will take action to prevent or alleviate illness. The first three elements describe the conditions which relate to a person's readiness to act.

Rosenstock (1966) has developed a model for the use of health services which is similar to the one developed by Kegeles. An elaboration of the adequacy of Rosenstock's model in the light of preventive health (dental) behavior is reported by Antonovsky and Kats (1970). The authors developed a model which emphasizes the importance of motivational, blockage, and conditioning variables in preventive dental behavior.

What is suggested in the works of Wirick, Kegeles and others is perhaps best summarized by the following quotation from Freidson and Feldman (1958, p. 16):

The prospective patient assesses his dental condition and the seriousness of its consequences if he does not seek dental care. This self-diagnosis is weighed or balanced against the factors of cost, anticipated pain, and inconvenience, to see if going to the dentist "is worth it."

While the theoretical schemes and operational definitions of the variables used in the above mentioned studies are subject to criticism, it nonetheless seems apparent that some assessment of an individual's physical condition or dental health status, as well as perceptions of illness or conditions may be important predictors of dental utilization.

The assessment of physical conditions obtained from physical examinations has not been used extensively because of the difficulties in implementation. However, symptom reporting by the individual has been used in many areas of health research, particularly in survey research. As a research method, symptom reporting has been used in many areas of health-related behavior: 1) Richards, *et al.*, (1965) and Blum (1963) with respect to dental health; 2) Andersen (1967) and Andersen, *et al.*, (1970a) in studies of family and individual use of health services respectively; 3) Srole, *et al.*, (1962) in a mental health survey; 4) Hoffer and Schulman (1948) in an index of health status; and 6) Abramson (1966) for the construction of the Cornell Medical Index.

The methodology suggested in this report is simply that symptom reporting in some way represents an estimate of the dental condition of a person's mouth and subsequently influences utilization. No assumption is made concerning the physical need for treatment, which presumably could be made by a dentist if health examination data were available.

In this study two measures of an individual's dental health status are used. First, measures of the presence or absence of dental symptoms were obtained. Each individual was asked if they had any of the following dental conditions during the survey year: 1) toothache, 2) sore or bleeding gums, 3) loose permanent tooth, 4) pain in tooth when drinking hot or cold liquid, 5) cavity in back tooth, 6) cavity in front tooth. If an individual reported one or more of these conditions he was said to have dental symptoms which were present during the survey year. Likewise, if no conditions were reported, we designated such persons as having an absence of dental symptoms. Utilizing this procedure and excluding those persons for whom complete data were not available some 45 percent reported one or more conditions.

In addition, we attempted to take into account predispositions for preventive dental services use (as opposed to what might be termed symptomatic use of services on the basis of the dental conditions enumerated in the previous paragraph). Each individual was asked if he had tartar or stains on his teeth. Excluding those persons for whom no data were available, approximately 25 percent reported this condition.

I. DEMOGRAPHIC, SOCIAL STATUS, AND INCOME MEASURES BY THE PRESENCE OR ABSENCE OF DENTAL SYMPTOMS

Shown in Table 5.1 are the cross-tabulations by age, sex, and race in relation to utilization. In all instances expenditures and visits where dental symptoms are present are approximately twice as large as the values obtained where dental symptoms are absent within each age, sex, or racial category.

A more detailed examination of Table 5.1 reveals that where symptoms are present mean expenditures are the largest for ages 45-64 while mean visits were largest for ages 25-44. For the absence of dental symptoms mean expenditures and visits are greatest for ages 14-24.

With respect to sex an interesting finding emerges. While females have larger expenditures than males, they have fewer visits when symptoms are present. Otherwise, females have higher rates of utilization than males. Finally, whites utilize dental services more than nonwhites.

In Table 5.2 we see that both the presence and absence of symptoms are related to utilization for both education and occupation

TABLE 5.1
MEAN EXPENDITURES AND VISITS BY THE PRESENCE OR ABSENCE
OF DENTAL SYMPTOMS BY AGE, SEX, AND RACE

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
AGE				
2-13.....	\$23	\$ 6	2.6	.7
14-24.....	29	15	2.5	1.3
25-44.....	35	10	2.9	.7
45-64.....	39	10	2.4	.6
65 and older.....	23	9	2.6	.5
SEX				
Male.....	27	7	2.6	.7
Female.....	34	11	2.4	.8
RACE				
White.....	33	10	2.8	.8
Nonwhite.....	15	2	1.3	.4

TABLE 5.2
MEAN EXPENDITURES AND VISITS BY THE PRESENCE OR ABSENCE
OF DENTAL SYMPTOMS BY EDUCATION AND OCCUPATION
OF THE HEAD OF THE HOUSEHOLD

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
EDUCATION				
8 years or less.....	\$19	\$ 7	1.6	.7
9-11 years.....	26	6	2.2	.4
High school graduate....	33	6	2.9	.6
Some college.....	41	10	3.2	.7
College graduate-profes- sional.....	50	30	3.6	1.9
OCCUPATION				
Professional-managerial..	42	17	3.3	1.3
Clerical-sales.....	39	11	3.3	1.0
Craftsmen-foremen.....	30	6	2.9	.5
Operatives.....	22	6	2.0	.5
Service workers.....	29	5	1.9	.5
Farmers-farm laborers....	19	3	1.5	.4
Laborers.....	20	7	1.6	.4

levels. With respect to the presence of symptoms, education and occupation are directly related to dental utilization.

However, for the absence of dental symptoms interesting differences are evident: 1) for education major differences are between college graduates and all other educational levels, 2) for occupation there is an orderly decrease in utilization from professional-managerial to clerical-sales and then relatively low and consistent levels of utilization for the remaining occupations.

Utilization is consistently higher for all educational and occupational levels where dental symptoms are present as opposed to where they are absent.

With respect to income-related measures as shown in Table 5.3 family income is directly related to utilization where dental symptoms are present. Where symptoms are absent, relatively low levels of utilization are evident for incomes of \$7,499 or less, followed by increased levels of utilization for incomes from \$7,500 to \$12,499, with the highest levels of utilization found in families with incomes of \$12,500 or more.

The ability to pay a large dental bill is directly related to utilization for both the presence and absence of symptoms. However, the mean values are higher when symptoms are present than when symptoms are absent.

A detailed comparison by age and sex, age, and race, and race by sex is shown in Table 5.4. First, with respect to the presence of

TABLE 5.3
MEAN EXPENDITURES AND VISITS BY THE PRESENCE OR ABSENCE
OF DENTAL SYMPTOMS BY FAMILY INCOME AND ABILITY TO PAY

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
INCOME				
Under \$2,000.....	\$15	\$ 8	1.6	.5
\$ 2,000- 3,499.....	18	4	1.4	.4
\$ 3,500- 4,999.....	21	3	1.8	.3
\$ 5,000- 7,499.....	28	7	2.5	.6
\$ 7,500- 9,999.....	36	10	2.9	.8
\$10,000-12,499.....	44	12	3.2	.9
\$12,500 or more.....	51	24	4.2	1.8
ABILITY TO PAY				
Not much trouble.....	40	14	3.1	1.0
Very difficult.....	32	7	2.5	.6
Not able to pay.....	15	4	1.7	.3

TABLE 5.4
MEAN EXPENDITURES AND VISITS BY THE PRESENCE OR ABSENCE
OF DENTAL SYMPTOMS BY AGE AND SEX,
AGE AND RACE, RACE AND SEX

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
MALE				
2-13.....	\$21	\$ 4	2.5	.6
14-24.....	29	12	3.0	1.3
25-44.....	27	8	2.0	.6
45-64.....	34	8	2.5	.6
65 and older.....	21	6	1.8	.3
FEMALE				
2-13.....	24	8	2.5	.7
14-24.....	29	19	2.8	1.2
25-44.....	41	11	2.7	.8
45-64.....	44	11	2.6	.7
65 and older.....	25	11	2.7	.6
WHITE				
2-13.....	25	7	2.6	.8
14-24.....	33	18	3.2	1.4
25-44.....	37	11	2.6	.8
45-64.....	42	11	2.8	.7
65 and older.....	26	9	2.4	.5
NONWHITE				
2-13.....	8	0	1.5	.2
14-24.....	9	2	1.2	1.0
25-44.....	25	3	1.4	.3
45-64.....	16	2	1.0	.4
65 and older.....	*	5	*	.4
WHITE				
Male.....	29	8	2.7	.7
Female.....	37	13	2.9	.8
NONWHITE				
Male.....	14	2	1.1	.4
Female.....	16	2	1.5	.3

* Number of observations are less than 25.

symptoms, age increases are associated with increases in expenditures for males and females through ages 45-64 followed by a decline for those persons 65 and older. Mean expenditures where symptoms are not present show a tendency to be low for ages 2-13, highest for ages 14-24, and lower expenditures with little variation for the remaining ages. For visits the reverse U-shaped pattern of utilization by age was present for males only; females have low utilization in ages 2-13, the highest mean visits for ages 14-24, and lower but similar levels for the remaining age groups.

Utilization for the age and sex categories is from two to six times

greater when symptoms are present than when they are absent. In addition, male-female differences in utilization are as expected not very large; smaller differences by sex are evident for the absence of symptoms as opposed to their presence.

For expenditures, substantial differences by age and race are present. Among whites the presence of symptoms is associated with expenditure increases through ages 45-64 and then decrease for whites only. Nonwhites on the other hand have increases in expenditures through ages 25-44 and then decrease for the other two age categories. In the situation where dental symptoms are absent the reverse U-shaped pattern of utilization exists for whites; no apparent relation between age and expenditures exists for nonwhites.

Looking at mean visits in Table 5.4, whites for both the presence and absence of symptoms have a reverse U-shaped pattern of utilization by age. Nonwhites, however, have the greatest number of visits at ages 2-13 where symptoms are present; where symptoms are absent utilization is highest for ages 14-24. In addition, white-nonwhite differences in utilization for each age category are greater where symptoms are present than where symptoms are absent.

The last part of Table 5.4, race by sex, shows that for both expenditures and visits whites have higher levels of utilization than nonwhites. Again these differences by race are greater when symptoms are present than when they are absent.

Females have greater expenditures than males only for whites; for nonwhites differences by sex are small. With respect to visits, differences by sex are quite small for both the presence and absence of symptoms. Finally, where symptoms are present we have greater differences in utilization by race than where symptoms are absent. While the relation between education, occupation, and family income with age, sex, and race show significant variations, we will at this point refrain from a detailed discussion of these findings. A description of the pattern of relations for these multiple cross-tabulations would prove to be tedious for the reader. However, the appropriate tables are included in Appendix D, Tables D.11-13.

II. DEMOGRAPHIC, SOCIAL STATUS, AND INCOME MEASURES BY THE PRESENCE OR ABSENCE OF TARTAR OR STAINS ON ONE'S TEETH

The previous section of this chapter was concerned with the joint effect of dental symptoms and selected variables on utilization. While the presence or absence of symptoms may involve discomfort

as a contributing condition to utilization, the presence or absence of tartar or stains on one's teeth may involve a slightly different process of decision-making. We may therefore consider utilization differences to be associated primarily with preventive orientations towards dental care. In this section we will consider how age, sex, race, education, occupation, family income and ability to pay are related to utilization according to the presence or absence of tartar or stains.

It can be seen from an examination of Table 5.5 that utilization is higher where tartar is reported than when it is absent for each age, sex, or racial category. For age, expenditures are highest for ages 45–64 and 14–24 where tartar is present and absent respectively. Visits show a different pattern where utilization is highest at ages 2–24 and 14–24 when tartar is present and absent respectively.

Females have higher levels of utilization than males, and whites have higher levels of utilization than nonwhites. However, differences by sex or race are considerably greater when tartar is present than when it is absent.

An examination of Table 5.6 also reveals that utilization is higher where tartar is present than when it is absent for both education and occupation. Variations in the magnitude of these differences do exist: 1) by educational levels the largest differences between presence and absence are for high school graduates (\$20; 1.5 visits); 2) by occupational levels differences of roughly the same magnitude

TABLE 5.5

MEAN EXPENDITURES AND VISITS BY THE PRESENCE OR ABSENCE
OF TARTAR ON TEETH BY AGE, SEX, AND RACE

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
AGE				
2–13.....	\$27	\$10	2.8	1.2
14–24.....	31	20	2.8	2.1
25–44.....	30	20	2.4	1.2
45–64.....	34	17	2.3	1.0
65 and older.....	23	10	2.6	.5
SEX				
Male.....	25	12	2.2	1.2
Female.....	35	17	2.8	1.3
RACE				
White.....	32	17	2.6	1.3
Nonwhite.....	17	6	1.3	.7

TABLE 5.6

MEAN EXPENDITURES AND VISITS BY THE PRESENCE OR ABSENCE
OF TARTAR ON TEETH BY EDUCATION OF THE HEAD
OF THE HOUSEHOLD AND OCCUPATION

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
EDUCATION				
8 years or less.....	\$20	\$10	1.7	.7
9–11 years.....	23	11	2.1	1.0
High school graduate....	34	14	2.8	1.3
Some college.....	29	22	2.4	1.9
College graduate-professional.....	45	36	3.6	2.2
OCCUPATION				
Professional-managerial...	35	26	2.9	1.9
Clerical-sales.....	35	19	3.3	1.5
Craftsmen-foremen.....	29	13	2.5	1.3
Operatives.....	20	12	1.9	1.0
Service workers.....	40	9	2.3	.8
Farmers-farm laborers....	20	7	1.6	.7
Laborers.....	26	9	1.8	.7

exist for clerical-sales (\$16; 1.8 visits), craftsmen-foremen (\$16; 1.2 visits), and service workers (\$31; 1.5 visits).

Where tartar is absent utilization is directly related to education; where it (tartar) is present utilization increases through the high school graduate category and then declines for persons with some college; utilization reaches the highest level of utilization for college graduates. A similar pattern is observed for occupation. When tartar is absent utilization does increase with status, although service workers, farmers, and laborers have similar levels of utilization. In the situation where tartar is reported relatively high levels of utilization are found for professional, clerical, craftsmen, and surprisingly, operatives; lower levels of utilization exist for other occupations.

The effect of income-related measures are shown in Table 5.7. In every case utilization is higher when tartar is present than when it is absent both for family income and ability to pay. Income differences between tartar present or absent are greatest for incomes \$7,500–\$12,499 and not as might be expected in the \$12,500 or more category. For the ability to pay, differences between the presence and absence of tartar are about the same for the responses “not much trouble” and “very difficult.” They are, however, greater than the differences observed for the response “not able to pay.”

TABLE 5.7

MEAN EXPENDITURES AND VISITS BY THE PRESENCE OR ABSENCE
OF TARTAR ON TEETH BY FAMILY INCOME AND ABILITY TO PAY

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
FAMILY INCOME				
Under \$2,000.....	\$20	\$ 9	1.9	.7
\$ 2,000-\$ 3,499.....	12	10	1.4	.7
\$ 3,500-\$ 4,999.....	23	8	1.9	.7
\$ 5,000-\$ 7,499.....	26	14	2.4	1.2
\$ 7,500-\$ 9,999.....	36	17	2.8	1.4
\$10,000-\$12,499.....	40	20	2.9	1.6
\$12,500 or more.....	39	35	3.4	2.7
ABILITY TO PAY				
Not much trouble.....	35	21	2.8	1.6
Very difficult.....	30	14	2.6	1.1
Not able to pay.....	18	7	1.5	.9

As income level increases utilization also increases when tartar is present; the three lowest income categories have similar levels of utilization. Where tartar is present moderate levels of utilization exist for incomes less than \$2,000, followed by a decrease in utilization in the next two categories and then subsequent increases as income increases. A direct relation between utilization and the ability to pay exists for both the presence and absence of tartar.

Turning to cross-tabulations by age and sex, age and race, and race and sex, in Table 5.8 we again find that utilization is higher when tartar is present than when it is absent. Comparing differences in utilization between the presence and absence of tartar, we find greater differences for females than for males, particularly for ages 2-13, 25-44, and 65 and older.

Where tartar is absent utilization is highest for ages 14-24, for both males and females. However, where tartar is present it is found that males have the largest expenditures at ages 45-64, while for females the largest expenditures are at ages 25-44. Furthermore, in every case females have higher rates of utilization than males.

Differences by age and race indicate that the presence of tartar is associated with higher levels of utilization than its (tartar) absence; indeed, differences are greater for whites than for nonwhites at each age level.

TABLE 5.8

MEAN EXPENDITURES AND VISITS BY THE PRESENCE OR ABSENCE
OF TARTAR ON TEETH BY AGE AND SEX,
AGE AND RACE, AND RACE AND SEX

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
AGE AND SEX				
<i>Male</i>				
2-13.....	\$21	\$ 9	2.6	1.1
14-24.....	29	18	2.9	2.0
25-44.....	22	15	1.9	1.0
45-64.....	31	13	2.0	1.0
65 and older.....	17	8	1.6	.5
<i>Female</i>				
2-13.....	32	11	2.9	1.2
14-24.....	32	23	2.7	2.1
25-44.....	38	23	2.9	1.3
45-64.....	36	20	2.6	1.1
65 and older.....	28	11	3.5	.6
AGE AND RACE				
<i>White</i>				
2-13.....	28	12	2.9	1.3
14-24.....	33	24	3.0	2.3
25-44.....	32	21	2.5	1.3
45-64.....	35	19	2.4	1.1
65 and older.....	24	10	2.7	.5
<i>Nonwhite</i>				
2-13.....	5	2	.9	.5
14-24.....	12	5	1.2	1.0
25-44.....	20	15	1.8	.7
45-64.....	23	4	.9	.6
65 and older.....	*	4	*	.2
RACE AND SEX				
<i>White</i>				
Male.....	26	14	2.3	1.3
Female.....	37	19	2.9	1.4
<i>Nonwhite</i>				
Male.....	14	6	1.1	.6
Female.....	19	6	1.5	.7

* Number of observations are less than 25.

When tartar is absent age has a reverse "U-shaped" relation with utilization and the highest values occur at ages 14-24, except for nonwhites where this occurs at ages 25-44.

Where tartar is perceived to be present whites have relatively high levels of utilization with only moderate variations between age categories. Nonwhites on the other hand have increases in expenditures associated with increases in age through the 45-64 category. Non-

white visits 1) increase through age 44, 2) and then decrease for ages 45–64.

While utilization is higher when tartar is present as opposed to its absence for each race-sex category, whites have greater differences than nonwhites. For both whites and nonwhites females have higher levels of utilization than males, although differences by sex are greater for whites.

As we did for dental symptoms, detailed breakdowns for the presence-absence of tartar or stains on the teeth are contained in Appendix D; Tables D.14–16. These tables include cross-tabulations between education, occupation, and income with age, sex, and race.

CHAPTER VI

CONTINUITY OF UTILIZATION

STUDIES of dental service utilization have most commonly measured utilization by 1) mean expenditures or visits and 2) the proportion of persons (families) with expenditures or visits. Similarly, the time since the last dental visit has also been used.

In this chapter we extend the concept of utilization to include past dental behavior rather than focusing only on a one year period. Such an approach enlarges our perspective.

The dependent variable, which we have labeled as “continuity of utilization” is a measure of utilization expressed as the proportion of persons who are in the following mutually exclusive categories and who in descending order of continuity:

- 1) had a visit in 1963 and 1964—31 percent,
- 2) had a visit in 1964 but not in 1963—16 percent,
- 3) had a visit in 1963 but not in 1964—11 percent,
- 4) did not have a visit in either 1963 or 1964 but who did have a visit prior to 1963—28 percent,
- 5) never had a visit—13 percent.

For the 9,872 persons two years of age and older data were obtained on 9,397 persons on whom the preceding percentages were based. Quite a few people (31 percent) could be said to have reached relatively high levels of utilization and a substantial proportion (28 percent) have seen a dentist at least once in their life prior to 1963.

In the subsequent sections of this chapter, continuity of utilization will be cross-tabulated with the following variables: age, sex, race, education, and occupation of the head of the household, family income, and the ability to pay a large dental bill.

I. INITIAL TABULATIONS

In Table 6.1 age, sex, and race, are shown. For those persons who had seen a dentist in 1963 and 1964 and those who had seen a dentist in 1964 but not 1963, age has a reverse U-shaped relation to utilization with the highest proportion (41 percent) observed for those 14–24 and the lowest proportion (10 percent) with visits at ages 65 and older. Utilization for those with visits in 1963 but not in 1964 was relatively low and the highest proportion (16 percent) was at ages 25–44. A direct relation exists between age and the proportion of persons with a visit prior to 1963 and for those never having a visit the proportion declines with age.

Within age categories, those from 2–13 had the highest proportion with never a visit, but at the same time there was a relatively high percentage (31 percent) who had visits in both 1964 and 1963. For persons from ages 14–24, highest proportions were found for those who had a visit in 1964 and 1963; smaller percentages are found in the next two utilization categories followed by large percentages who had seen a dentist prior to 1963 and considerably smaller percentages of those who had never seen a dentist. Persons at ages 65 or older tend to have lower levels of utilization as evidenced by the fact that only 14 percent had seen a dentist in both 1964 and 1963, although a large proportion (67 percent) had seen a dentist prior to 1963.

With respect to sex we find no difference in the continuity of utili-

TABLE 6.1
PROPORTION OF PERSONS WITH VISITS BY CONTINUITY
OF UTILIZATION BY AGE, SEX, AND RACE

	1964 and 1963	1964 but not in 1963	1963 but not in 1964	Prior to 1963	Never
AGE					
2–13.....	31%	16%	7%	7%	39%
14–24.....	41	18	12	21	8
25–44.....	35	16	16	31	2
45–64.....	29	13	14	44	1
65 and older.....	14	10	8	67	2
SEX					
Male.....	30	15	12	29	14
Female.....	33	15	11	28	13
RACE					
White.....	35	15	12	28	10
Nonwhite.....	10	16	10	32	31

zation between males and females. Similar percentages are observed for both sexes where approximately 30 percent saw a dentist in both 1964 and 1963 and approximately 28 percent had seen a dentist prior to 1963.

Finally, whites have a higher proportion (35 percent) than non-whites (10 percent) who had a visit in both 1964 and 1963 and a lower proportion (10 percent versus 31 percent) who have never seen a dentist. However, for the remaining categories percentage differences by race are small.

Differences by education and occupation are presented in Table 6.2. As education increases the proportion of persons with visits in both 1964 and 1963 increases; for example the respective proportions for college graduates and those with eight years or less of schooling are 61 percent and 8 percent. For individuals who have never been to a dentist or who went prior to 1963 there is an inverse relation between education and the proportion with visits; the effect of education however is stronger for the category “prior to 1963” than for the response “never.” The two remaining utilization categories do not appear to be related to educational levels.

Within educational categories a large proportion of those family heads with some college education (45 percent) or a college degree (61 percent) had seen a dentist in both 1964 and 1963; in addition for both categories those who had never been to a dentist was 10

TABLE 6.2
PROPORTION OF PERSONS WITH VISITS BY CONTINUITY OF UTILIZATION BY
EDUCATION AND OCCUPATION OF THE HEAD OF THE HOUSEHOLD

	1964 and 1963	1964 but not in 1963	1963 but not in 1964	Prior to 1963	Never
EDUCATION					
8 years or less.....	16%	15%	10%	42%	17%
9–11 years.....	23	16	12	32	15
High school graduate.....	35	17	12	23	13
Some college.....	45	14	14	17	10
College graduate-professional	61	13	11	9	6
OCCUPATION					
Professional-managerial.....	49	14	12	18	7
Clerical-sales.....	42	16	12	23	8
Craftsmen-foremen.....	28	16	13	28	15
Operatives.....	23	17	12	33	15
Service workers.....	21	17	12	32	19
Farmers-farm laborers.....	25	14	12	36	14
Laborers.....	14	17	9	37	23

percent or less. These patterns are reversed for the lower educational levels where continuity of utilization in terms of visits in 1964 and 1963 is low but where the proportion of persons with visits prior to 1963 is relatively high.

Occupational differences in utilization are not as pronounced as they are for education. Rather than observing consistent increases (or decreases) in continuity by occupational status we can instead by combining categories state that the higher status occupations (professional-managerial and clerical-sales) have more recent utilization of dental services than either middle status occupations (craftsmen-foremen, operative, and service workers) or low status occupations (farmers-farm laborers and laborers). In general, increases in status are 1) directly related to visits in both 1964 and 1963 and 2) indirectly related to the proportion of persons with visits prior to 1963 or for that percentage who have never been to a dentist. There is no apparent relation between occupation and the proportion of persons with visits in the other two utilization categories.

As a way of illustrating differences, 49 percent of those in the professional-managerial category saw a dentist in both 1964 and 1963 compared to 14 percent for laborers. Similarly, among professional-managerial occupations 18 percent had seen a dentist prior to 1963 compared to 37 percent for laborers.

A direct relation exists between family income and the proportion of persons with visits in both 1964 and 1963 as shown in Table 6.3.

TABLE 6.3

PROPORTION OF PERSONS WITH VISITS BY CONTINUITY OF UTILIZATION
BY FAMILY INCOME AND ABILITY TO PAY

	1964 and 1963	1964 but not in 1963	1963 but not in 1964	Prior to 1963	Never
FAMILY INCOME					
Less than \$2,000.....	15%	12%	9%	48%	16%
\$ 2,000-\$ 3,499.....	15	16	10	39	21
\$ 3,500-\$ 4,999.....	17	17	9	39	18
\$ 5,000-\$ 7,499.....	29	16	13	26	16
\$ 7,500-\$ 9,999.....	39	16	12	23	10
\$10,000-\$12,499.....	46	15	16	16	7
\$12,500 or more.....	60	12	10	15	3
ABILITY TO PAY					
Not much trouble.....	44	14	12	25	6
Very difficult.....	29	16	13	28	14
Not able to pay.....	15	17	9	36	24

However, an inverse relation exists between income and those with visits prior to 1963 and those never having a visit.

For example, where the family income is \$12,500 or more individuals are four times more likely to have had visits in both 1964 and 1963 than in families with incomes of less than \$3,500. In contrast families with incomes of less than \$2,000, 48 percent of the individuals had visits only prior to 1963 as compared to 15 percent for persons at the highest income level. For the two remaining utilization categories and income no apparent relation exists.

Furthermore, in the lower income groups (\$4,900 or less) the highest proportion of persons fall into the category of having visits prior to 1963 while in the higher incomes the largest category proportions occur for persons with visits in both 1964 and 1963.

The ability to pay a large dental bill is also 1) directly related to seeing a dentist in both 1964 and 1963 and 2) (like income) inversely related to never seeing a dentist and seeing a dentist prior to 1963. Unlike income there is 1) an inverse and weak association between ability to pay and seeing a dentist in 1964 but not in 1963 and a 2) direct and also weak association between ability to pay and seeing a dentist in 1963 but not in 1964.

In those families where the response is "not much trouble" 44 percent (which is also the largest percentage in that category) had seen a dentist in both 1964 and 1963 as compared to 15 percent whose response was "not able to pay." However, for those persons who were "not able to pay" the largest proportion was 36 percent for those who had seen a dentist only prior to 1963.

II. MULTIPLE CROSS-TABULATIONS

We now consider the cross-tabulations of age and sex, age and race, and race and sex. For example, in the age-sex tabulation we find that for both males and females who have had a visit in 1964 and 1963 there is a reverse U-shaped pattern of utilization by age; a similar but considerably weaker relation exists for persons with visits in 1964 but not in 1963. A direct relation between age and the proportion with visits exists both for those persons who have never seen a dentist and those who saw a dentist prior to 1963. Individuals with visits in 1963 but not in 1964 not only constituted a relatively small proportion of the sample but there was little differentiation in percentages by age for both males and females; however, the lowest proportions were at ages 2-13 and 14-24.

In general sex differences between ages for any of the continuity

TABLE 6.4

PROPORTION OF PERSONS WITH VISITS BY CONTINUITY OF UTILIZATION
BY AGE AND SEX, AGE AND RACE, RACE AND SEX

	1964 and 1963	1964 but not in 1963	1963 but not in 1964	Prior to 1963	Never
AGE AND SEX					
<i>Male</i>					
2-13.....	32%	16%	7%	7%	39%
14-24.....	40	18	12	22	8
25-44.....	31	16	18	33	2
45-64.....	27	13	13	45	2
65 and older.....	12	11	11	64	2
<i>Female</i>					
2-13.....	31	17	7	6	40
14-24.....	41	18	13	20	8
25-44.....	38	16	15	29	2
45-64.....	30	13	14	42	1
65 and older.....	15	9	6	70	2
AGE AND RACE					
<i>White</i>					
2-13.....	36	17	7	6	33
14-24.....	46	17	13	20	4
25-44.....	38	15	16	29	1
45-64.....	31	13	14	42	1
65 and older.....	15	10	8	66	1
<i>Nonwhite</i>					
2-13.....	8	10	4	8	70
14-24.....	13	23	10	26	29
25-44.....	11	24	18	41	7
45-64.....	12	15	13	58	3
65 and older.....	3	8	6	80	4
RACE AND SEX					
<i>White</i>					
Male.....	34	15	12	28	10
Female.....	36	15	11	27	10
<i>Nonwhite</i>					
Male.....	10	16	10	32	33
Female.....	10	18	10	33	30

of utilization categories are relatively small. In fact, the largest percentage difference (7 percent) by sex occurred at ages 25-44 for persons with visits in both 1964 and 1963.

The interrelation between age and race shows distinct differences. For whites, we can summarize the findings as follows: 1) visits in both 1964 and 1963—reverse U-shaped pattern by age; 2) 1964 but not 1963—inverse but weak relation by age; 3) 1963 but not 1964—increase in utilization by age through age 44, then a decrease; 4) prior to 1963—direct relation by age; 5) never a visit—decrease in utilization by age, greatest percentage differences between ages 2-13

and 14-24. Nonwhites on the other hand show a different relation between age and utilization: 1) visits in both 1964 and 1963—small changes by age, with the lowest proportion at ages 65 and older, 2) 1964 but not 1963 and 1963 but not 1964—strong effect by age; increase in utilization to age 44, then a decrease, 3) prior to 1963—direct relation with age, 4) never a visit—decrease in utilization by age.

Other findings with respect to age and race reveal that for individuals with visits in both 1964 and 1963 whites have a higher proportion of visits than nonwhites at all age levels, but these differences decrease with age. For those with visits in 1964 but not 1963 whites have higher proportions at ages 2-13 and 65 and older, while for the remaining ages nonwhites have higher proportions. Smaller differences by age and race are evident for those with visits in 1963 but not in 1964. Nonwhites have higher percentages of visits prior to 1963 than whites, although these differences increase with age. Finally, for those who never have made a visit nonwhites have a higher proportion of visits than whites but the differences decrease with age.

Within racial categories (in the race by sex tabulation) we find no substantial differences by sex in any of the continuity of utilization categories. However, differences by race with a larger proportion of whites than nonwhites (for both males and females) are evident for all utilization categories except one. The greatest differences by race are found among those with visits in both 1964 and 1963. Small differences, however, are found among those with visits in 1) 1964 but not in 1963 and 2) 1963 but not in 1964. Differences of 4 to 6 percent by race are observed for those with visits prior to 1963. However, among those who have never been to a dentist the proportion of nonwhites is larger than the proportion for whites.

Cross-tabulations for education by age, sex, and race will now be discussed (Appendix D: Table D.17). An examination of the tabulation by education and age reveals that for persons who saw a dentist in 1964 and 1963 age shows a reverse U-shaped relation with utilization with the highest proportion in ages 14-24 and the lowest proportion for ages 65 and older; in addition as educational level increases the proportion of persons with visits increases for each age group.

The proportion of individuals who have never been to a dentist declines with age, although the major cut-off point appears to be between ages 2-13 and the remaining age groups. Education shows

an inverse relation for each proportion by age for those with never a visit with differences most pronounced in the 2–13 and 14–24 age categories. Individuals with visits prior to 1963 have higher proportions of visits as age increases; also as educational level increases the proportion of persons with visits decreases in each age group.

For persons with visits in 1964 but not in 1963 there is a weak, reverse U-shaped pattern of utilization by age for all educational levels. Persons with visits in 1963 but not in 1964 have increasing proportions through age 44 (or in some cases age 64) followed by a decrease. In both of these two continuity of utilization categories there is little variation by age as educational level increases.

The relation between education and sex indicates that females have a higher proportion of visits in both 1964 and 1963, but the differences in percentages is only in the range of 1 to 3 percent; for both sexes utilization increases as education increases. With respect to those who never have had a dental visit males have a higher proportion of visits than females except for college graduates; again the percentage differences by sex are quite small.

In terms of those with visits in 1964 but not in 1963 there are only two instances where there is even a small difference (2 percent) and this is for the categories “some college” or “college graduate.” Among those with visits in 1963 but not in 1964 males have slightly higher (1 or 2 percent) proportions than females, except in the education category “eight years or less.” For these last two continuity of utilization categories there is little variation in proportions as education increases.

Racial differences by educational levels are also evident. Where individuals had visits in both 1964 and 1963 whites had more visits than nonwhites and these percentage differences increase with education; for both whites and nonwhites utilization increased with education, although the effect was stronger for whites.

Among those who never had a dental visit, nonwhites had higher proportions than whites but racial differences decrease with education. For those with visits prior to 1963 the effect of education is evident where for those with eleven years or less of schooling the percentage of whites was greater than the percentage for nonwhites; for the remaining education levels, the situation was reversed. For both of these utilization categories (never a visit and visit prior to 1963) and for both racial categories proportions declined as education increased.

Those with visits in 1964 but not in 1963 had higher percentages

for nonwhites than for whites except for high school graduates or those with eight years of education or less. With respect to whites there is a slight decrease in proportions as education increases, while for nonwhites the relation is reversed.

Among individuals with visits in 1963 but not in 1964 only among college graduates do we find large white-nonwhite differences. For whites there is no strong relation between education and age, although for nonwhites we find a direct relation with education.

In the next to last table considered in this chapter, occupation is cross-tabulated with the three demographic variables, age, sex, race (Appendix D: Table D.18). Age has a reverse U-shaped relation in each occupation category for persons with dental visits in both 1964 and 1963; within this utilization category we find that increases in occupational status are also associated with decreases in the proportion with visits for all age groups. Age has an inverse relation in each occupation among those who have never been to a dentist for all age groups and in this utilization category proportions increase as occupational status increases.

Among those who had visits only prior to 1963 the proportions increase with age. For all ages except 2–13 increases in occupational status are associated generally with increases in the proportion of persons with visits.

For those who had visits in 1964 but not in 1963 we find that 1) among professionals and managers proportions increase with age and 2) for all other occupations age has a reverse, U-shaped relation. For those with visits in 1963 but not in 1964 for all occupations except operatives and laborers there is an increase in utilization through age 44 with subsequent declines in the next two age categories; for operatives the highest proportion is reached for ages 14–24 and for laborers the highest proportion is reached for ages 25–44. In both of these utilization categories there are only slight variations within age groups at all occupational levels.

Variations by occupation and sex are also evident (Appendix D: Table D.18). In general, male-female differences in utilization for any occupational category are small, with most of the differences in the range of 1 to 3 percent.

We can summarize the effect of occupation on utilization in the following manner: 1) visits in both 1964 and 1963—utilization decreases as occupational status decreases, 2) never made a dental visit or had a visit prior to 1963—utilization increases as occupational status decreases, and 3) visits in 1964 but not in 1963 or visits in

1963 but not in 1964—no significant changes in utilization by occupation.

Finally, (Appendix D: Table D.18) we find that in terms of visits in both 1964 and 1963 whites have higher levels of utilization than nonwhites and these differences decrease as occupational status increases; for both racial categories as occupational status is inversely related to the proportion with visits.

More nonwhites than whites have never made a dental visit; however, differences become smaller as occupational status increases. For whites there is a slight tendency for utilization to increase with occupational status, while for nonwhites the reverse is true.

Among those with visits prior to 1963 there are only small differences between whites and nonwhites with two exceptions: 1) for professional-managerial nonwhites have seven percent more visits than whites, 2) for laborers whites have six percent more visits than nonwhites.

For those with visits in 1964 but not in 1963 nonwhites have 14 percent more visits than whites in the clerical-sales category. Other racial differences are less than 5 percent. Similarly, those with visits in 1963 but not in 1964 show small differences by race except in two categories: 1) professional-managerial nonwhites more than whites by 9 percent, 2) farmers-farm laborers whites more than nonwhites by 6 percent. In both of these utilization categories within racial categories occupation has little effect.

The last table in this chapter, cross-tabulations of income by age, sex, and race are discussed (Appendix D: Table D.19). It is found that among those with visits in 1964 and 1963 age has a reverse U-shaped pattern of utilization with the highest proportion in the 14–24 category. For this same utilization category increases in age are associated with increases in utilization only where family incomes are \$5,000 or more.

Among those who have never been to a dentist age is inversely related to having never been to a dentist within each income category. Furthermore, as income level increases the proportion of persons increases within each age category. For those with visits prior to 1963 within income levels utilization increases with age. However, the pattern within age categories is interesting: 1) for ages 2–13, 14–24, and 25–44, utilization increases through the income category \$3,500–\$4,999; utilization then decreases for incomes through \$12,499 and then increases for the highest income category, 2) for persons 45–64 utilization increases to incomes in the \$2,000–\$3,499 range

and then decreases for subsequent income levels, 3) for persons 65 and older utilization is high for incomes less than \$2,000, decreases in the \$2,000–\$3,499 range followed by increases in utilization to the \$10,000–\$12,499 range and a subsequent decrease in the highest income category.

Individuals with visits in 1964 but not in 1963 have the lowest proportions in each income level at ages 65 and older. However, within each category we find increases in utilization only from the first income category to the second; for other income and age levels the pattern of utilization is irregular.

Within incomes individuals with visits in 1963 but not in 1964 have increases in utilization through age 25–44 followed by a decline in utilization for ages 45–64 and 65 and older. Within age categories it is found that the highest proportion of persons with visits occurs in the next to last income category \$10,000–\$12,499.

With respect to the relation between income and sex (Appendix D: Table D.19) it is found that all income levels differences in utilization by sex are quite small (usually 1 or 2 percent). In fact, the largest percentage difference of 5 percent occurs at the \$10,000–\$12,499 level for persons with visits in both 1964 and 1963 or with visits in 1963 but not in 1964.

The effect of income on continuity of utilization is summarized as follows: 1) visits in 1964 and 1963—income is directly related to utilization, 2) never a visit—utilization is low for incomes less than \$2,000, followed by an increase in the \$2,000–\$3,499 category and then decreases as income increases, 3) prior to 1963—income is inversely related to utilization, 4) visits in 1964 but not in 1963—(a) males—increases in utilization through the \$3,500–\$4,999 level followed by decreases, (b) females—increase in utilization through the \$2,000–\$3,499 level followed by decreases, 5) visits in 1963 but not in 1964—similar levels of utilization (eight to ten percent) for incomes of \$4,999 or less, followed by slight increases in utilization (12–13 percent) for incomes in the \$5,000–\$9,999 range; highest levels of utilization are then reached at incomes from \$10,000–\$12,499 followed by a decrease in utilization in the largest income category.

Differences by income and race (Appendix D: Table D.19) indicate that among those with visits in 1964 and 1963 whites have higher levels of utilization than nonwhites but that racial differences decrease as income increases. With respect to whites it is found that utilization is directly related to income; for nonwhites we find that

utilization is inversely related to income for incomes of \$4,999 or less and directly related to incomes of \$5,000 or more.

Among those who have never been to a dentist nonwhites outnumber whites although these differences decrease as income increases. For whites utilization increases through the \$3,500–\$4,999 category and then decreases while for nonwhites utilization only increases through the \$2,000–\$3,499 category and then decreases for subsequent incomes.

Whites had more visits prior to 1963 than nonwhites only for incomes of \$4,999 or less; at higher income levels the pattern by race was reversed. However, for both racial categories income is inversely related to utilization.

Only at incomes of \$10,000 or more is there a significant difference by race with nonwhites having a higher proportion of visits in 1964 but not in 1963 than whites. The effect of income for whites is for utilization to increase through \$4,999 and then decrease, while for nonwhites utilization increases through \$4,999 and then attains higher but similar levels of utilization for the remaining incomes.

For persons with visits in 1963 but not in 1964 the only major difference by race (20 percent) is at incomes of \$12,500 or more where utilization is higher for nonwhites. The effect of income on utilization is 1) direct for nonwhites and 2) direct for whites through \$10,000–\$12,499 level, followed by a decline in utilization for family incomes \$12,500 or more.

CHAPTER VII

SUMMARY AND IMPLICATIONS

I. SUMMARY OF FINDINGS

In the preceding chapters we have shown that the utilization of dental services is influenced by a large number of variables.¹ More specifically of the variables included in this study, age, race, education and occupation of the head of the household, income measures, and health status variables are crucial to an understanding of utilization. Other variables such as sex, region, community type, population per dentist, family life cycle and family size do not appear to be strongly related to utilization.

The results of the data presentation with respect to total expenditures and visits are also consistent with the results of a multivariate analysis in which the same data were used (Newman, 1971). The multivariate analysis, using the Automatic Interaction Detector Program (AID), however, provides information as to the relative importance of variables. In particular, variables related to dental health status, education and occupation measures and family income were (in descending order) the most important predictors of utilization. These results suggest that individual decisions to seek dental care are made within the context of a small number of proximate influences which are both individual and family based.

II. THE POSSIBILITY OF INCREASED UTILIZATION

Despite significant increases in the proportion of persons with dental visits since the thirties, dental utilization remains low relative

¹ We have foregone a detailed summary of findings in this chapter. Our option, in the interest of the reader, was to present in outline form the major findings at the beginning of the report.

to other health services. Comparable data reported by Andersen and Anderson (1967, pp. 26–27) indicate that 65 percent of the population saw a physician during 1963 while according to our data 45 percent saw a dentist. Similarly, mean visits for physicians (Andersen and Anderson, 1967, pp. 26–27) were 4.6 compared to mean visits of 1.5 for dentists as reported for this survey.

Thus, it is doubtful that dramatic increases in utilization will occur unless public attitudes and values towards dental care become more favorable. Such a change with an emphasis on preventive dental health practices may in the long run reduce the prevalence of periodontal disease and associated dental problems and concomitantly decrease the demand for symptomatic services.

However, the implementation of some form of national dental health insurance in the next few years may have a considerable influence on utilization. The impact of an insurance or prepayment plan on utilization at the national level is, of course, debatable. In fact, on the basis of the data presented in Chapter I (Table 1.9) the lack of strong positive attitudes towards the efficacy of insurance with respect to better dental health should be questioned. It is conceivable that increases in utilization would be less than anticipated.²

One interesting issue which would also be of concern is the relation between utilization and socioeconomic variables. We might anticipate that insofar as insurance reduces financial barriers for dental care, socioeconomic variables may have little effect on utilization, as is now the case for hospital services. Such a perspective implies, therefore, that actual or perceived need for dental care may become more important as determinants of utilization.

Associated with a possible increase in utilization is the question of whether present levels of dental manpower would be adequate. While we can offer no solutions at this point, it seems evident that the relatively slight decline from 1950 to 1969 in the dentist-population ratio implies that an increase in utilization could not be met unless graduating classes increase in size (U.S. Public Health Service, 1970).

Another aspect of utilization also deserves attention, namely, the continuity of utilization which was discussed in Chapter VI. If there

² Unfortunately, the data base on persons covered by dental insurance or prepayment plans was too small to make an extensive analysis. Since the proportion of persons with insurance has increased somewhat in recent years, it may now be possible to compare utilization between those with and those without insurance in future social surveys.

were significant increases in the frequency of dental visits we might initially anticipate a large increase in symptomatic services with a concomitant increase in expenditures. However, this phenomenon may only be temporary since once having provided these services continued visits may result in the receipt of more preventive services, cleaning for example, and a decrease in expenditures.

III. RACE AS AN IMPORTANT VARIABLE

Throughout the previous chapters in this report in the multiple cross-tabulation, race emerged as one of the crucial variables as a determinant of utilization. White-nonwhite differences remained large with whites utilizing services more than nonwhites, with respect to both expenditures and visits (Chapters II and III) and continuity of utilization (Chapter VI). These differences are also influenced by the type of dental service received by the individual. For example, differences of more than 20 percent were observed for cleanings, examinations and x-rays, and fillings and inlays, with whites having a higher proportion of visits than nonwhites. However, for the remaining dental services (dentures, extractions, and other services) differences by race were small and in several instances nonwhites had more visits than whites.

On the basis of these data we may infer that where the acute need for dental care is relatively high, discretion on the part of the individual may be minimal; that is, regardless of his attitude towards dental care, an individual would be very likely to go to a dentist if he had a toothache. Thus, racial (or social and economic) differences would be small.

Since white-nonwhite differences are relatively large for preventive services where presumably discretion is great, future research might be directed towards the delineation of various attitudes and supporting values relative to dental care as these attitudes and values reflect differences in life experiences and socialization.

IV. HEALTH STATUS

Finally, the data in this study clearly demonstrate the overriding importance of dental health status in relation to utilization (Chapter V).³ The presence of dental conditions means that individuals

³ Additional support to this statement was demonstrated in another study using the same data (Newman, 1971) In fact dental health status was the most important variable(s) for the prediction of utilization.

are much more likely to visit a dentist than if they have no conditions.

While the analysis in Chapter V was restricted in one instance to a symptoms index, we now show in Table 7.1 the proportion of persons with specified dental conditions and if such conditions were present, whether a dental visit was made. Not only is the distribution of conditions subject to variation, but also there is a tendency for the conditions, in varying degrees, to affect the probability of seeing a dentist. These findings suggest that future studies of utilization should specify quite carefully the dimensions of health status. Methodologically then, an index of dental health status could be constructed with different weights assigned to each condition according to the probability of making a visit.

In summary, in this chapter, we have discussed several important issues related to dental utilization which emerged from the data presented in previous chapters. Our knowledge of factors related to utilization, we hope, has been increased by this study. However, more research remains to be done particularly with reference to the dimensions of preventive and symptomatic orientations towards dental care and how these orientations are related to utilization.

TABLE 7.1
DISTRIBUTION OF DENTAL CONDITIONS AND THE
PROPORTION OF PERSONS WITH CONDITIONS
WHO MADE A DENTAL VISIT

Condition	Proportion with Condition	Proportion with Condition Who Made a Visit
Toothache.....	20% (9330)	75% (1401)
Sore or bleeding gums.....	8% (9302)	45% (698)
Loose permanent tooth.....	5% (9321)	61% (451)
Pain in tooth when drinking hot or cold liquid.....	14% (9302)	54% (1256)
Tartar or stains on teeth.....	25% (9255)	57% (2363)
Crooked teeth.....	7% (9311)	32% (698)

APPENDIX A

TECHNICAL ASPECTS OF THE SURVEY

I. A DESCRIPTION OF SURVEY SAMPLE

The data for this study were made available through the Center for Health Administration Studies, University of Chicago, from a research project entitled, "Family Expenditure and Use Patterns for Dental Care," in which the primary goal was to collect detailed expenditure and visit data for dental services. The National Opinion Research Center (NORC) was contracted to administer the survey.

Early in 1965 the field staff of NORC interviewed a national sample of households in order to obtain data on expenditures and visits for the calendar year 1964. Without going into the complete details of NORC's field procedure, a brief description of the sampling design will be presented.¹

The universe for the study was the non-institutionalized population of the continental United States. Thus, residents of medical, mental, penal, religious or other institutions who were not residents of a private dwelling unit at any time during 1964 were excluded. In addition, transients, persons living in group quarters such as college dormitories, fraternity houses, convents or monasteries, or military personnel living on military bases were excluded.

NORC's sampling department used a multi-stage probability sample in order to give each dwelling unit an equal probability of being included in the survey. A dwelling unit is defined as follows:

¹ The description of the sampling design was taken from the NORC manual, "Specifications for SRS 390," and from Appendix I in *A Decade of Health Services* by Ronald Andersen and Odin W. Anderson, 1967.

A room or group of rooms is regarded as a dwelling unit when it is occupied or intended for occupancy as separate living quarters. Living quarters are separate when 1) the actual or intended occupants do not live and eat with any other persons in the structure, *and* when there is either 2) direct access from the outside through a common hall or 3) a kitchen or cooking equipment for exclusive use of the occupants.

The first stage of the sample procedure involved the selection of primary sampling units (PSU) from among all the counties and metropolitan areas in the country. Within each PSU a locality was selected; a locality is usually the name of a city, town, township or other political division. Within each locality segments which are blocks or other geographic areas are selected and within each segment dwelling units are chosen.

All households (family units) residing in the dwelling unit were scheduled to be interviewed. A household is comprised of the head of the household, the head's spouse, unmarried children living in the dwelling unit during the survey period, plus married children and other relatives who did not live with their spouses in 1964 but who lived with the head. For additional family units, married couples, married children, and other relatives who lived with their spouses during 1964, and persons unrelated to anyone in the household, separate interviews were conducted.

II. INTERVIEW RESPONSE RATES AND VERIFICATION RESULTS

Household data for this study were collected in January and February, 1965. Of the 3,723 families originally included in the sample 558 were not interviewed. Thus, 3,165 families or 85 percent of the sample were interviewed. Detailed data were collected on 10,293 individuals. However, the analytic sample in this report, except where noted, was comprised of 9,872 individuals two years of age and older.

The problems involved in obtaining interviews in sample surveys are well known. The interviewer may not have been able to locate a dwelling unit, or once a unit had been located the respondents may have refused. However, an examination of selected characteristics of the survey sample with comparable Census estimates indicates relatively close agreement as shown in Table A1.

TABLE A1
COMPARISON OF NORC SAMPLE WITH CENSUS
ESTIMATES—PERCENTAGES¹

Characteristics	NORC	Census
<i>Sex</i>		
Male.....	49	49 ^a (April, 1965)
Female.....	51	51
<i>Age</i>		
Under 14.....	30	29 ^a (April, 1965)
14-24.....	17	17
25-34.....	11	11
35-44.....	12	13
45-64.....	20	20
65 and older.....	9	9
<i>Residence</i>		
Metropolitan.....	65	64 ^a (April, 1965)
Metropolitan-nonfarm.....	27	30
Rural-farm.....	8	6
<i>Color</i>		
White.....	86	88 ^a (April, 1965)
Nonwhite.....	14	12
<i>School Years Completed</i> (head of household)		
None.....	2	1 ^b (March, 1965)
1-8.....	29	30
9-11.....	20	19
12 (high school graduate).....	26	29
Some college.....	12	10
College graduate or more.....	11	11
<i>Major Occupation</i> (head of household)		
Professional and managerial.....	27	26 ^c (March, 1965)
Clerical and sales.....	12	13
Craftsmen.....	20	18
Operatives.....	16	20
Service workers.....	9	7
Laborers (except farm).....	8	8
Farmers and farm laborers.....	9	7
<i>Family Size</i>		
1 person.....	15	15 ^a (March, 1965)
2 persons.....	29	28
3 persons.....	17	18
4 persons.....	17	16
5 persons.....	10	11
6 persons or more.....	12	12
<i>Region</i>		
Northeast.....	23	25 ^a (July 1, 1965)
North Central.....	30	28
South.....	32	31
West.....	15	16
<i>Family Income</i>		
Under \$2,000.....	14	10 ^d (1964)
\$2,000-4,999.....	27	25
\$5,000-9,999.....	40	43
\$10,000 or more.....	19	22

¹ Percentages may not add up to 100 due to rounding error. All of the following tables are for the resident population of the United States unless otherwise stated; the figures include members of the Armed Forces in the United States living off post or with their families on post, but exclude all other Armed Forces members.

^a *Current Population Reports*, P-20, No. 151, Table 1.

^b *Ibid.*

^c *Ibid.*

^d *Ibid.*

^e *Current Population Reports*, P-20, No. 153, Table 10.

^f *Current Population Reports*, P-20, No. 150, Table 10. These figures are for the employed male population 14 years old and older.

^g *Ibid.*, Table 2.

^h *Current Population Reports*, P-25, No. 350, Table 1. Total resident population which excludes the estimated size of the Armed Forces.

ⁱ *Current Population Reports*, P-60, No. 44, Table 1. This report excludes inmates of institutions but includes members of the Armed Forces living off post or with their families on post. It also excludes all other members of the Armed Forces.

APPENDIX B

VERIFICATION PROCEDURES

I. INDIVIDUAL AND DENTIST VERIFICATION

One of the primary objectives in this survey was to obtain accurate and detailed information on utilization and expenditures for dental care during a twelve month period. In order to achieve this objective, certain features were incorporated in the questionnaire design and the interview procedure.

The validity of the utilization and expenditure data depends, in the first instance, on the knowledge and the accuracy of the memories of the respondents. For this reason, information on use and expenses were sought separately for each individual member of the family. The presence and consultation with other members of the family were encouraged during the interview. Efforts were also made to encourage respondents to consult bills, receipts, and other records. Interviewers were allowed to clarify certain questions which seemed to be misunderstood or misinterpreted by the respondents.

Regardless of how elaborate a system of internal checks and precautionary measures are incorporated into the design, there remains a certain amount of response error due to 1) tendencies to overestimate the amounts of the charges or 2) underreporting the receipt of services. Furthermore, it is not possible to obtain detailed information on use and expenses according to type of services received during a year's time from household informants. For these reasons, it was decided that only minimum of information regarding expenses, dentists' services, and number of visits would be asked of the household respondents. This information could then be verified by the dentists.

In addition, dentists were asked to supply the detailed information regarding type of services and charges made on these services. By following this procedure of gathering and verifying information, it was felt that the accuracy and usefulness of the data would be maximized.

While this procedure may be quite satisfactory for verifying reported information, it may provide some problems as a method of securing data on use and expenditures by type of services. The most delicate of such problems is that of sample loss and conciliating estimates based on dentists' records with estimates based on data obtained from the household respondents. Discussion of this problem will be discussed at a later point in this appendix.

All dentists reported as having attended any family member during 1964 were included in the verification procedure. Prior to the field work, a letter from the Director of the National Opinion Research Center (NORC) was sent to each of these dentists, alerting him to the study and to a call from a field staff member. This letter was accompanied by a letter of endorsement of the study by the President of the American Dental Association.

Following these letters, a package containing Family Face Sheets for Patient Records, Patient Record Forms, Dentist Permission Forms and a letter requesting cooperation and introducing the field staff member who would be calling on the dentist.

The Family Face Sheet listed the names of the family members reported to have received treatment from the particular dentist. For each member, the dentist was asked if he had in fact treated the person during 1964, or, if not, whether he had treated the person prior to 1964, in 1965, or never. The dentist was asked further if he had treated any other member of the family during 1964 not listed in the Family Sheet, and if so, to complete a Patient Record Form for each of such persons.

The Patient Record Form is a four page questionnaire of the self-administering type. The first part of the questionnaire consisted of questions verifying amount of recommended care completed, provision of care at reduced rate or free of charge, frequency of billing patient, amount of uncollected bills, insurance coverage, place where services were rendered, number and type of prescription written, and some questions regarding orthodontic care. In the second part of the questionnaire, some 32 different services are listed and the

dentists were asked to supply information on the number of services provided for each service, the total charges for the service, date service was performed, total number of visits made in 1964, and the total 1964 charges.

The Dentist Permission Form is an authorization for the dentist to supply NORC with information on costs and services provided during 1964 for each member of the family listed in the form. Letters of endorsement from the presidents of the respective constituent societies were also used when presentation of such letters was deemed to be useful for gaining cooperation of the dentists.

Thus, three sources of data provided the basis for utilization data: 1) the individual, 2) the dentist, and 3) Patient Record Forms. The

TABLE B.1
MAIN QUESTIONNAIRE RESPONSE
AND REJECTION

100%
(4,877)—Persons reported seeing a dentist.
10%
(476)—Persons rejected through verification.
90%
(4,401)—Persons remaining who reported a visit.

reconciliation of these sources of data is presented in Tables B.1 through B.6.

As shown in Table B.1, 4,877 persons reported seeing a dentist in 1964. Through the verification process some 10 percent were determined not to have had a visit. The data on the 10 percent who were "rejected" were taken from the Patient Record Form and consist largely of those persons who had a visit in some year prior to 1964. The persons with a dental visit were those 1) who were verified as having a visit by a dentist and 2) for those with no Patient Record Form, we took the individual's reporting.

In all, 4,811 Patient Record Forms were sent out. The completeness of the returns are shown in Table B.2. The actual loss of forms was relatively small since only 13 percent were not returned due to the dentists' refusals and only six percent were due to other losses such as the forms not being returned by the dentist or the dentists' addresses were incomplete, etc.

TABLE B.2
PATIENT RECORD FORMS

100%
(4,811)—Record forms sent out. (4,764 mailed + 47 filled out because dentist supplied data)
58%
(2,779)—Completed and verified as visits in 1964.
16%
(773)—Completed and verified as <i>no</i> visit in 1964.
8%
(371)—No record of visit by dentist.
13%
(615)—Refusals by dentist.
6%
(273)—Other losses.

Since more than one Patient Record Form could be completed for each individual, a summary table based on individual verifications is presented below in Table B.3. Of the 4,434 persons with visits 58 percent were verified by dentists. Aside from some of the other percentages, a substantial proportion of persons (16 percent) could not be verified because the dentist refused to cooperate.

Furthermore, as shown in Table B.4, of the 1964 dentists who were named by the respondents 15 percent were not contacted because the respondent refused permission.

TABLE B.3
VERIFICATION CATEGORIES

100%
(4,434)—Persons who had a dental visit in 1964.
58%
(2,568)—Persons verified from Patient Record Forms.
10%
(446)—Persons who refused dentist contact, although they stated that they had a visit.
16%
(722)—Persons who could not be verified because dentist refused, although they stated that they had a visit.
8%
(371)—Persons lost because dentist could not be located but stated that they had a visit.
7%
(327)—Other losses, but stated that they had a visit.

TABLE B.4
DENTIST REFERRALS BY RESPONDENTS

100%
(1,964)—Dentist referred by respondents.
85%
(1,660)—Dentists for whom information was sought.
15%
(304)—Dentists named were refused by respondents.

TABLE B.5
DENTIST COMPLETIONS

100%
(1,660)—Dentists for whom information was sought.
80%
(1,334)—Completed.
20%
(326)—Not completed.

However, as shown in Table B.5, the response rate, 80 percent, from those dentists for whom information was sought returned the Patient Record Forms. Those dentists who completed the Record Form (1,334) provided the basic expenditure and use data for the 2,568 individuals (out of 4,434 with visits) who were actually verified as having seen the dentist in 1964.

II. VERIFICATION BY TYPE OF DENTAL SERVICE

Data on total expenditures and visits were gathered from the Patient Record Forms. However, for different types of services, the respondents were asked in the main questionnaire to indicate where and which services they received during 1964. This list of services was by necessity not as extensive as the Patient Record Form; however, they were asked if the services were received at the dentists' 1) private office—clinic or 2) in their home, hospital or hospital outpatient clinic.

Shown in Table B.6 is the result of the matching of respondent data from the main questionnaire and the data from the Patient Record Form. The service categories are the ones used in the main questionnaire; data from the Patient Record Form were reworked to conform to these categories.

TABLE B.6

VERIFICATION OF PERSONS WHO REPORTED SPECIFIED DENTAL SERVICES
(number of persons with specified services)

CATEGORY	MAIN QUESTIONNAIRE			PATIENT RECORD FORM	PERCENT OF "TOTAL"
	Private Office	Other	Total**		
Examination.....	3,233	239	3,472	961	28%
X-rays.....	1,794	75	1,869	1,323	71
Cleaning.....	2,199	81	2,280	1,190	52
Fluoride treatment.....	115	7	122	106	87
Palliative treatment ¹				61	*
Fillings.....	2,120	71	2,191	2,283	
Inlays.....	79	6	85	42	49
Extractions.....	959	36	995	562	56
Crowns.....	136	4	140	83	59
Bridges.....	79	2	81	33	41
Complete denture.....	66	7	73	89	*
Partial denture.....	99	4	103	45	45
Denture repairs.....	169	4	173	90	52
Gum work.....	194	12	206	63	31
Root canal.....	50	2	52	39	75
Orthodontics ²			128	44	34

* In some instances the number of persons verified from the Patient Record Form exceeds the number of persons who report having a given service. This is due to the fact that the summing from the Patient Record Form in several instances counted a person more than once if more than one service is subsumed under a more general category. That is, "complete dentures" includes both "upper dentures" and "lower dentures." Thus, the proportion of the main questionnaire responses which are verified is overestimated for x-rays, fillings, inlays, extractions, crowns, and complete dentures.

** Individuals may be counted more than once if they received a service at a private office and another location.

¹ Palliative treatments were not listed for the respondents.

² Orthodontic treatments were asked in a separate question.

APPENDIX C

VARIABLE DEFINITIONS AND NUMBER OF PERSONS IN EACH CATEGORY

I. BASIC VARIABLES

A. *Dental Expenditures*: all out of pocket expenditures for dental services and prescriptions. This does not include amounts paid by insurance or expenses paid for individuals by non-family members. This includes charges which were incurred but not paid during the survey year.

B. *Dental Visits*: number of dentist-patient or hygienist-patient contacts at either the patients' home or in a hospital or out-patient clinic, or at a dentists' office or clinic. Thus, on any given contact (visit) a person may receive more than one service.

C. Age:

1. 2-13	2,699 ¹
2. 14-24	1,741
3. 25-44	2,450
4. 45-64	2,005
5. 65 and older	918
6. NA	59

D. Sex:

1. Male	4,819
2. Female	5,048
3. NA	5

¹ The number of persons in each category is shown for all variables.

E. *Race*: interviewer's determination.

1. White	8,484
2. Nonwhite	1,292
3. NA	55

F. *Education of the Head of the Household*:

1. Eight years or less (grammar school or no education)	2,829
2. Nine to 11 years (some high school)	2,011
3. 12 years (high school graduate)	2,707
4. Some college	1,170
5. College graduate or professional degree	1,084
6. NA	71

G. *Occupation of the Head of the Household*: according to the Bureau of the Census, 1950.

1. Professional-managerial: includes professional, technical and kindred workers, managers, officials, and proprietors except farm—2,467
2. Clerical-sales: includes clerical and kindred workers and sales workers—1,008
3. Craftsmen-foremen: includes craftsmen, foremen and kindred workers—1,985
4. Operatives: includes operatives and kindred workers—1,523
5. Service workers: includes all service workers (private household and others)—770
6. Farmers-farm laborers: includes farmers, farm managers, farm laborers and foremen—752
7. Laborers: includes all laborers except farm and mine—738
8. NA—629

H. *Family Life Cycle*: a composite index based on marital status of the head of the household, his age, and the age of children.*

1. FHS—45, NC	210
2. FHM—45, NC	292

- * "FHS(M)" = family head single (married)
 "F—45" = family head under 45
 "45+" = family head 45 or older
 "C" = children
 "NC" = no children
 "C13" = children 13 years old or younger
 "C14" = children 14 years old or older

3. FHS—C	764
4. FHM—C13	3,343
5. FHM—C13, C14	2,104
6. FHM—C14	1,288
7. FHS—45+, NC	458
8. FHM—45+, NC	1,298
9. NA	115

I. *Family Size*:

1. One	479
2. Two	1,808
3. Three	1,541
4. Four	2,025
5. Five	1,553
6. Six or more	2,466

J. *Family Income*: gross family income summed for all family members for income received for working plus the total amount of transfer payments to family members. Transfer payments include monies from the following sources: friends or relatives, alimony, armed forces allotment, unemployment insurance, relief or welfare, interest or dividends, rents, pensions, or Social Security.

1. Under \$2,000	854
2. \$2,000—3,499	1,230
3. \$3,500—4,999	1,191
4. \$5,000—7,499	2,630
5. \$7,500—9,999	1,682
6. \$10,000—12,499	1,259
7. \$12,500 or more	993
8. NA	33

K. *Ability to Pay a \$500 Dental Bill*: response to question; If your family suddenly had to pay a \$500 dental bill, could you manage with

1. Not much trouble	3,798
2. Very difficult	3,825
3. Not able to pay	2,182
4. NA	67

one surface, two surfaces, three or more surfaces; plastic fillings and others—2,488

D. *Extractions*: includes tooth removed, simple and surgical—1,195

E. *Dentures*: includes full, three-quarter, and jacket crowns; fixed bridge placed; complete upper and lower denture; partial denture; denture relined, rebased, repaired or adjusted—602

F. *Other services*: includes root canal treatment, periodontal treatment, orthodontic treatment, palliative treatment, and other services—711

APPENDIX D

MULTIPLE CROSS-TABULATIONS

TABLE D.1

PROPORTION OF PERSONS WITH VISITS BY AGE AND SEX,
AGE AND RACE, AND RACE AND SEX

	Cleaning	Examina- tion and X-rays	Fillings and Inlays	Extrac- tions	Dentures	Other Services
AGE BY SEX						
<i>Male</i>						
2-13.....	23%	41%	25%	10%	1%	5%
14-24.....	32	48	36	14	4	9
25-44.....	25	36	23	16	7	8
45-64.....	22	29	19	12	10	7
65 and older.....	9	16	7	5	9	5
<i>Female</i>						
2-13.....	23	42	27	10	2	5
14-24.....	29	50	36	16	4	10
25-44.....	32	45	31	15	9	9
45-64.....	27	33	22	11	12	8
65 and older.....	11	16	8	6	11	5
AGE BY RACE						
<i>White</i>						
2-13.....	26	47	30	11	2	6
14-24.....	34	54	41	14	4	10
25-44.....	32	43	31	14	8	9
45-64.....	27	33	23	11	12	8
65 and older.....	11	17	8	6	11	5
<i>Nonwhite</i>						
2-13.....	6	15	6	4	0	2
14-24.....	10	25	11	17	2	7
25-44.....	10	25	6	21	5	6
45-64.....	7	11	3	18	5	3
65 and older.....	1	4	0	5	2	4
RACE BY SEX						
<i>White</i>						
Male.....	26	39	26	12	6	7
Female.....	29	43	30	12	7	8
<i>Nonwhite</i>						
Male.....	8	18	6	13	2	4
Female.....	8	19	7	14	3	5

TABLE D.2
PROPORTION OF PERSONS WITH VISITS BY EDUCATION OF
THE HEAD OF THE HOUSEHOLD AND AGE

Education	Cleaning	Examina- tion and X-rays	Fillings and Inlays	Extrac- tions	Dentures	Other Services
EIGHT YEARS OR LESS						
2-13.....	10%	22%	17%	10%	1%	2
14-24.....	17	34	25	17	3	6
25-44.....	12	25	14	19	6	6
45-64.....	12	19	13	14	7	5
65 and older.....	7	10	5	5	9	4
NINE TO ELEVEN YEARS						
2-13.....	18	38	24	13	1	5
14-24.....	22	37	28	13	2	8
25-44.....	14	27	16	17	7	6
45-64.....	18	27	15	12	10	8
65 and older.....	7	14	7	8	10	5
HIGH SCHOOL GRADUATE						
2-13.....	23	45	29	9	1	6
14-24.....	31	57	40	18	5	10
25-44.....	30	42	29	16	6	9
45-64.....	31	35	25	11	12	7
65 and older.....	14	23	8	4	9	8
SOME COLLEGE						
2-13.....	29	51	31	10	2	7
14-24.....	45	64	45	13	5	15
25-44.....	40	52	35	14	10	11
45-64.....	38	43	29	7	12	7
65 and older.....	22	25	13	10	18	7
COLLEGE GRADUATE—PROFESSIONAL						
2-13.....	49	68	38	9	3	7
14-24.....	60	74	57	8	1	9
25-44.....	60	69	53	9	13	12
45-64.....	62	67	45	8	20	17
65 and older.....	25	40	22	6	15	13

TABLE D.3
PROPORTION OF PERSONS WITH VISITS BY EDUCATION OF THE
HEAD OF THE HOUSEHOLD AND SEX

Education	Cleaning	Examina- tion and X-rays	Fillings and Inlays	Extrac- tions	Dentures	Other Services
EIGHT YEARS OR LESS						
Male.....	10%	20%	13%	13%	5%	4%
Female.....	13	23	16	12	6	5
NINE TO ELEVEN YEARS						
Male.....	15	29	18	12	5	6
Female.....	19	33	21	14	6	7
HIGH SCHOOL GRADUATE						
Male.....	27	42	29	13	5	7
Female.....	28	45	30	12	6	8
SOME COLLEGE						
Male.....	35	48	30	10	7	10
Female.....	38	54	37	12	8	9
COLLEGE GRADUATE—PROFESSIONAL						
Male.....	58	67	44	9	9	12
Female.....	52	68	48	9	10	12

TABLE D.4
PROPORTION OF PERSONS WITH VISITS BY EDUCATION OF THE
HEAD OF THE HOUSEHOLD AND RACE

Education	Cleaning	Examina- tion and X-rays	Fillings and Inlays	Extrac- tions	Dentures	Other Services
EIGHT YEARS OR LESS						
White.....	14%	24%	17%	12%	6%	5%
Nonwhite.....	4	12	3	14	1	3
NINE TO ELEVEN YEARS						
White.....	19	34	22	13	6	7
Nonwhite.....	7	18	5	14	4	5
HIGH SCHOOL GRADUATE						
White.....	29	46	32	13	6	8
Nonwhite.....	11	22	8	11	2	4
SOME COLLEGE						
White.....	39	53	35	11	8	10
Nonwhite.....	13	30	14	18	5	6
COLLEGE GRADUATE—PROFESSIONAL						
White.....	58	70	48	8	10	12
Nonwhite.....	22	40	22	16	5	10

TABLE D.5

PROPORTION OF PERSONS WITH VISITS BY OCCUPATION OF THE
HEAD OF THE HOUSEHOLD AND AGE

Occupation	Cleaning	Examina- tion and X-rays	Fillings and Inlays	Extrac- tions	Dentures	Other Services
PROFESSIONAL—MANA- GERIAL						
2-13.....	36%	59%	36%	9%	2%	8%
14-24.....	49	67	52	12	3	12
25-44.....	46	57	44	10	11	11
45-64.....	44	50	32	10	17	10
65 and older.....	19	25	12	6	9	7
CLERICAL—SALES						
2-13.....	37	54	37	12	2	7
14-24.....	43	63	46	13	2	15
25-44.....	38	46	30	12	8	11
45-64.....	38	51	34	16	10	12
65 and older.....	18	26	13	2	20	8
CRAFTSMEN—FOREMEN						
2-13.....	19	39	25	13	2	4
14-24.....	27	47	32	16	4	11
25-44.....	21	37	23	17	7	8
45-64.....	23	26	19	12	10	8
65 and older.....	9	12	8	4	11	4
OPERATIVES						
2-13.....	19	35	23	10	1	5
14-24.....	23	40	28	19	4	5
25-44.....	18	30	18	18	6	8
45-64.....	12	14	11	10	8	5
65 and older.....	9	18	9	10	14	8
SERVICE WORKERS						
2-13.....	13	27	14	5	1	4
14-24.....	21	37	22	19	5	10
25-44.....	24	36	22	20	8	8
45-64.....	15	22	11	12	10	6
65 and older.....	7	8	1	7	0	3
FARMERS—FARM LABOR- ERS						
2-13.....	7	32	20	9	1	4
14-24.....	13	45	35	9	5	7
25-44.....	16	31	23	24	4	7
45-64.....	14	24	17	10	8	6
65 and older.....	7	13	7	6	8	4
LABORERS						
2-13.....	11	26	14	11	2	4
14-24.....	13	26	20	11	4	5
25-44.....	11	25	9	16	8	3
45-64.....	6	15	7	18	10	3
65 and older.....	2	4	0	2	6	2

TABLE D.6

PROPORTION OF PERSONS WITH VISITS BY OCCUPATION OF THE
HEAD OF THE HOUSEHOLD AND SEX

Occupation	Cleaning	Examina- tion and X-rays	Fillings and Inlays	Extrac- tions	Dentures	Other Services
PROFESSIONAL—MANA- GERIAL						
Male.....	41%	53%	35%	9%	7%	9%
Female.....	42	58	42	11	9	10
CLERICAL—SALES						
Male.....	37	49	33	11	6	9
Female.....	37	52	35	13	7	12
CRAFTSMEN—FOREMEN						
Male.....	19	34	21	14	6	6
Female.....	23	38	25	13	6	8
OPERATIVES						
Male.....	16	28	18	14	4	6
Female.....	19	31	21	13	6	5
SERVICE WORKERS						
Male.....	18	27	16	12	7	7
Female.....	16	29	16	13	4	6
FARMERS—FARM LABOR- ERS						
Male.....	11	26	17	12	4	4
Female.....	12	29	22	11	5	7
LABORERS						
Male.....	8	21	13	12	4	3
Female.....	12	22	10	14	7	5

TABLE D.7

PROPORTION OF PERSONS WITH VISITS BY OCCUPATION OF THE
HEAD OF THE HOUSEHOLD AND RACE

Occupation	Cleaning	Examina- tion and X-rays	Fillings and Inlays	Extrac- tions	Dentures	Other Services
PROFESSIONAL—MANA- GERIAL						
White.....	43%	57%	40%	10%	8%	10%
Nonwhite.....	23	33	20	11	4	8
CLERICAL—SALES						
White.....	38	51	36	12	7	10
Nonwhite.....	22	43	13	20	5	12
CRAFTSMEN—FOREMEN						
White.....	22	38	25	14	6	7
Nonwhite.....	7	15	4	14	4	3
OPERATIVES						
White.....	19	30	22	14	5	6
Nonwhite.....	8	22	5	13	3	4
SERVICE WORKERS						
White.....	25	37	23	11	6	7
Nonwhite.....	4	13	3	15	3	6
FARMERS—FARM WORK- ERS						
White.....	12	30	21	12	5	6
Nonwhite.....	1	6	4	15	1	4
LABORERS						
White.....	13	26	16	12	8	5
Nonwhite.....	4	15	5	14	2	2

TABLE D.8

PROPORTION OF PERSONS WITH VISITS BY FAMILY INCOME AND AGE

Family Income	Cleaning	Examination and X-rays	Fillings and Inlays	Extractions	Dentures	Other Services
LESS THAN \$2,000						
2-13.....	11%	23%	13%	8%	1%	4%
14-24.....	19	31	25	21	1	3
25-44.....	8	25	13	15	6	7
45-64.....	12	22	10	18	5	5
65 and older.....	3	9	4	6	8	3
\$2,000-\$3,499						
2-13.....	7	18	12	6	1	2
14-24.....	14	33	18	21	2	8
25-44.....	7	21	6	20	3	5
45-64.....	13	16	8	10	6	5
65 and older.....	9	5	8	5	10	3
\$3,500-\$4,999						
2-13.....	8	23	16	11	1	5
14-24.....	18	36	28	17	4	7
25-44.....	11	29	16	19	4	7
45-64.....	11	18	12	12	9	6
65 and older.....	10	10	6	5	5	4
\$5,000-\$7,499						
2-13.....	19	39	24	10	1	5
14-24.....	26	48	33	14	4	6
25-44.....	25	36	26	16	6	8
45-64.....	18	25	17	12	11	7
65 and older.....	23	29	14	7	16	9
\$7,500-\$9,999						
2-13.....	29	54	36	10	2	6
14-24.....	33	54	40	14	5	13
25-44.....	34	44	32	13	8	7
45-64.....	30	37	29	11	12	8
65 and older.....	7	13	5	6	14	10
\$10,000-\$12,499						
2-13.....	39	60	37	10	2	6
14-24.....	44	61	50	11	4	14
25-44.....	44	56	40	12	12	12
45-64.....	30	38	26	12	12	10
65 and older.....	14	21	7	5	7	0
\$12,500 OR MORE						
2-13.....	46	72	41	13	3	10
14-24.....	59	74	55	9	5	16
25-44.....	52	62	43	12	14	12
45-64.....	53	58	36	9	17	11
65 and older.....	29	33	18	2	11	16

TABLE D.9

PROPORTION OF PERSONS WITH VISITS BY FAMILY INCOME AND SEX

Family Income	Cleaning	Examination and X-rays	Fillings and Inlays	Extractions	Dentures	Other Services
UNDER \$2,000						
Male.....	8%	18%	9%	12%	4%	5%
Female.....	10	20	12	12	6	4
\$2,000-\$3,499						
Male.....	10	19	9	10	4	4
Female.....	10	21	11	14	4	5
\$3,500-\$4,999						
Male.....	10	24	16	15	4	6
Female.....	13	26	18	13	4	5
\$5,000-\$7,499						
Male.....	20	34	23	13	5	5
Female.....	25	39	25	12	6	8
\$7,500-\$9,999						
Male.....	30	44	30	12	6	8
Female.....	31	48	35	12	8	8
\$10,000-\$12,499						
Male.....	37	50	34	12	6	9
Female.....	41	58	40	10	9	10
\$12,500 OR MORE						
Male.....	51	61	39	8	10	12
Female.....	52	67	45	12	11	13

TABLE D.10

PROPORTION OF PERSONS WITH VISITS BY FAMILY INCOME AND RACE

Family Income	Cleaning	Examination and X-rays	Fillings and Inlays	Extractions	Dentures	Other Services
UNDER \$2,000						
White.....	11%	21%	14%	11%	6%	5%
Nonwhite.....	3	14	3	14	3	4
\$2,000-\$3,499						
White.....	13	22	14	11	6	5
Nonwhite.....	4	16	4	13	1	4
\$3,500-\$4,999						
White.....	13	27	20	14	5	6
Nonwhite.....	3	14	3	12	1	4
\$5,000-\$7,499						
White.....	23	38	26	12	6	7
Nonwhite.....	9	21	7	16	4	5
\$7,500-\$9,999						
White.....	32	48	34	12	7	8
Nonwhite.....	17	22	13	12	6	2
\$10,000-\$12,499						
White.....	41	55	38	11	7	10
Nonwhite.....	16	26	16	12	4	8
\$12,500 OR MORE						
White.....	52	65	43	10	11	12
Nonwhite.....	35	48	23	10	6	6

TABLE D.11

MEAN EXPENDITURES AND VISITS BY THE PRESENCE OR ABSENCE
OF DENTAL SYMPTOMS BY EDUCATION OF THE HEAD OF THE
HOUSEHOLD AND AGE, SEX, AND RACE

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
EDUCATION AND AGE				
<i>8 Years or Less</i>				
2-13.....	\$11	\$1	1.3	.3
14-24.....	13	9	1.9	.7
25-44.....	17	9	1.4	.4
45-64.....	34	7	1.9	.4
65 and older.....	12	8	1.2	.4
<i>9-11 Years</i>				
2-13.....	14	3	2.1	.5
14-24.....	24	3	2.3	1.1
25-44.....	28	9	1.9	.5
45-64.....	37	8	2.7	.5
65 and older.....	*	4	*	.3
<i>High School Graduate</i>				
2-13.....	26	2	2.8	.6
14-24.....	37	14	3.6	1.2
25-44.....	32	6	2.5	.6
45-64.....	43	8	2.6	.7
65 and older.....	32	7	4.3	.5
<i>Some College</i>				
2-13.....	34	7	3.6	.8
14-24.....	41	18	3.6	2.0
25-44.....	41	9	2.6	.8
45-64.....	48	12	3.8	1.0
65 and older.....	*	15	*	.8
<i>College Graduate—Profes-</i>				
<i>sional</i>				
2-13.....	40	29	3.5	1.9
14-24.....	42	47	3.4	2.7
25-44.....	65	24	3.9	1.8
45-64.....	47	25	3.4	1.6
65 and older.....	30	22	2.7	1.2
EDUCATION AND SEX				
<i>8 Years or Less</i>				
Male.....	16	5	1.6	.4
Female.....	21	8	1.6	.5
<i>9-11 Years</i>				
Male.....	24	4	2.2	.6
Female.....	27	7	2.3	.6
<i>High School Graduate</i>				
Male.....	28	4	2.7	.6
Female.....	37	8	3.1	.7
<i>Some College</i>				
Male.....	40	10	3.5	1.0
Female.....	41	10	3.0	1.0
<i>College Graduate—Profes-</i>				
<i>sional</i>				
Male.....	42	21	3.2	1.8
Female.....	56	38	3.9	2.0
EDUCATION AND RACE				
<i>8 Years or Less</i>				
White.....	21	8	1.8	.5
Nonwhite.....	10	2	.7	.1
<i>9-11 Years</i>				
White.....	27	6	2.5	.5
Nonwhite.....	20	1	1.1	.8

* Number of observations are less than 25.

TABLE D.11—Continued

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
EDUCATION AND RACE—				
<i>Continued</i>				
<i>High School Graduate</i>				
White.....	\$35	\$7	3.1	.7
Nonwhite.....	11	2	1.2	.5
<i>Some College</i>				
White.....	42	11	3.1	1.0
Nonwhite.....	30	1	4.0	.2
<i>College Graduate—Profes-</i>				
<i>sional</i>				
White.....	52	31	3.7	2.0
Nonwhite.....	25	7	2.1	.5

* Number of observations are less than 25.

TABLE D.12

MEAN EXPENDITURES AND VISITS BY THE PRESENCE AND ABSENCE
OF DENTAL SYMPTOMS BY OCCUPATION OF THE HEAD OF THE
HOUSEHOLD AND AGE, SEX, AND RACE

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
OCCUPATION AND AGE				
<i>Professional—Managerial</i>				
2-13.....	\$26	\$16	3.2	1.3
14-24.....	42	31	3.7	2.6
25-44.....	49	19	3.2	1.1
45-64.....	54	15	3.5	1.0
65 and older.....	31	8	2.3	.6
<i>Clerical—Sales</i>				
2-13.....	30	7	3.0	.8
14-24.....	32	23	3.6	1.8
25-44.....	44	8	2.8	.9
45-64.....	49	10	3.6	1.0
65 and older.....	*	16	*	.7
<i>Craftsmen—Foremen</i>				
2-13.....	26	2	2.8	.5
14-24.....	35	12	3.8	1.0
25-44.....	27	7	2.4	.5
45-64.....	40	8	2.5	.5
65 and older.....	*	6	*	.4
<i>Operatives</i>				
2-13.....	12	3	1.8	.5
14-24.....	27	7	2.2	.8
25-44.....	30	9	1.7	.6
45-64.....	19	6	1.9	.4
65 and older.....	*	11	*	.4
<i>Service Workers</i>				
2-13.....	9	2	1.5	.5
14-24.....	16	7	1.7	.8
25-44.....	42	6	2.3	.4
45-64.....	48	9	2.1	.4
65 and older.....	*	2	*	.2

* Number of observations are less than 25.

TABLE D.12—Continued

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
OCCUPATION AND AGE—Continued				
<i>Farmers—Farm Laborers</i>				
2-13.....	\$20	\$1	1.3	.5
14-24.....	11	4	1.4	.5
25-44.....	10	1	1.8	.4
45-64.....	33	6	1.4	.4
65 and older.....	18	3	1.2	.2
<i>Laborers</i>				
2-13.....	26	4	1.8	.5
14-24.....	8	7	1.4	.6
25-44.....	25	3	1.8	.3
45-64.....	23	13	1.5	.3
65 and older.....	*	12	*	.2
OCCUPATION AND SEX				
<i>Professional—Managerial</i>				
Male.....	37	12	3.1	1.2
Female.....	47	24	3.5	1.4
<i>Clerical—Sales</i>				
Male.....	35	12	3.1	1.1
Female.....	43	11	3.6	.9
<i>Craftsmen—Foremen</i>				
Male.....	29	5	2.9	.5
Female.....	31	7	2.8	.6
<i>Operatives</i>				
Male.....	17	7	1.8	.5
Female.....	28	6	2.1	.5
<i>Service Workers</i>				
Male.....	34	5	1.9	.5
Female.....	25	5	2.0	.4
<i>Farmers—Farm Laborers</i>				
Male.....	19	2	1.4	.3
Female.....	19	5	1.5	.5
<i>Laborers</i>				
Male.....	16	6	1.6	.4
Female.....	24	8	1.6	.4
OCCUPATION AND RACE				
<i>Professional—Managerial</i>				
White.....	44	18	3.3	1.2
Nonwhite.....	23	5	3.6	1.5
<i>Clerical—Sales</i>				
White.....	41	12	3.4	1.0
Nonwhite.....	19	2	2.7	.3
<i>Craftsmen—Foremen</i>				
White.....	31	6	3.0	.6
Nonwhite.....	19	1	1.2	.2
<i>Operatives</i>				
White.....	23	7	2.1	.6
Nonwhite.....	22	1	.9	.3
<i>Service Workers</i>				
White.....	36	7	2.6	.7
Nonwhite.....	18	0	1.0	.1
<i>Farmers—Farm Laborers</i>				
White.....	21	4	1.6	.4
Nonwhite.....	5	0	.5	.0
<i>Laborers</i>				
White.....	29	10	2.1	.6
Nonwhite.....	5	2	.8	.2

* Number of observations are less than 25.

TABLE D.13

MEAN EXPENDITURES AND VISITS BY THE PRESENCE OR ABSENCE OF DENTAL SYMPTOMS BY FAMILY INCOME AND AGE, SEX, AND RACE

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
FAMILY INCOME AND AGE				
<i>Under \$2,000</i>				
2-13.....	\$ 9	\$ 2	1.2	.4
14-24.....	15	4	2.0	.5
24-44.....	15	10	1.8	.6
45-64.....	22	7	1.7	.6
65 and older.....	10	10	1.4	.5
<i>\$2,000-\$3,499</i>				
2-13.....	12	0	1.3	.4
14-24.....	9	4	1.8	.5
25-44.....	14	1	.9	.2
45-64.....	39	6	1.5	.4
65 and older.....	30	9	1.9	.5
<i>\$3,500-\$4,999</i>				
2-13.....	10	1	1.6	.2
14-24.....	17	5	2.2	.6
25-44.....	27	2	1.6	.3
45-64.....	35	5	2.0	.4
65 and older.....	*	4	*	.2
<i>\$5,000-\$7,499</i>				
2-13.....	22	4	2.3	.5
14-24.....	28	10	3.0	.8
25-44.....	29	7	2.3	.6
45-64.....	32	9	2.3	.6
65 and older.....	46	12	4.9	.6
<i>\$7,500-\$9,999</i>				
2-13.....	35	6	3.2	.8
14-24.....	39	16	3.1	1.2
25-44.....	33	10	2.5	.8
45-64.....	40	16	2.8	.7
65 and older.....	*	7	*	.5
<i>\$10,000-\$12,499</i>				
2-13.....	23	7	2.8	1.0
14-24.....	44	20	3.8	1.3
25-44.....	55	18	3.2	1.0
45-64.....	56	9	3.7	.6
65 and older.....	*	7	*	.4
<i>\$12,500 or More</i>				
2-13.....	34	32	4.5	2.0
14-24.....	50	40	4.5	4.0
25-44.....	66	20	4.2	1.1
45-64.....	49	13	3.7	1.1
65 and older.....	*	10	*	.9
FAMILY INCOME AND SEX				
<i>Under \$2,000</i>				
Male.....	11	4	1.5	.3
Female.....	18	11	1.7	.7
<i>\$2,000-\$3,499</i>				
Male.....	13	3	1.4	.4
Female.....	23	5	1.5	.4
<i>\$3,500-\$4,999</i>				
Male.....	24	3	1.9	.3
Female.....	19	3	1.7	.3

* Number of observations are less than 25.

TABLE D.13—Continued

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
FAMILY INCOME AND SEX				
<i>—Continued</i>				
\$5,000–\$7,499				
Male.....	\$28	\$6	2.4	.5
Female.....	28	8	2.6	.7
\$7,500–\$9,999				
Male.....	32	9	2.8	.7
Female.....	39	12	2.9	.9
\$10,000–\$12,499				
Male.....	33	8	3.1	.8
Female.....	53	16	3.4	1.1
\$12,500 or More				
Male.....	42	18	3.4	2.0
Female.....	58	31	4.7	1.7
FAMILY INCOME AND RACE				
<i>Under \$2,000</i>				
White.....	17	10	1.9	.6
Nonwhite.....	11	4	1.0	.4
\$2,000–\$3,499				
White.....	24	5	1.8	.4
Nonwhite.....	9	1	.7	.3
\$3,500–\$4,999				
White.....	22	4	2.0	.4
Nonwhite.....	17	0	.7	.1
\$5,000–\$7,499				
White.....	29	7	2.6	.6
Nonwhite.....	19	1	1.3	.2
\$7,500–\$9,999				
White.....	36	11	2.9	.9
Nonwhite.....	27	1	1.9	.2
\$10,000–\$12,499				
White.....	45	13	3.3	1.0
Nonwhite.....	14	1	2.2	.4
\$12,500 or More				
White.....	52	25	4.1	1.7
Nonwhite.....	*	9	*	3.7

* Number of observations are less than 25.

TABLE D.14

MEAN EXPENDITURES AND VISITS BY THE PRESENCE OR ABSENCE
OF TARTAR ON TEETH BY EDUCATION OF THE HEAD OF THE
HOUSEHOLD AND AGE, SEX, AND RACE

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
EDUCATION AND AGE				
<i>8 Years or Less</i>				
2–13.....	\$ 9	\$ 4	1.3	.6
14–24.....	22	8	2.3	1.1
25–44.....	15	14	1.3	.9
45–64.....	29	15	1.9	.7
65 and older.....	9	9	1.3	.5

TABLE D.14—Continued

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
EDUCATION AND AGE—				
<i>Continued</i>				
<i>9–11 Years</i>				
2–13.....	\$12	\$6	2.5	.9
14–24.....	17	15	2.1	1.7
25–44.....	22	16	1.6	.9
45–64.....	36	14	2.4	1.0
65 and older.....	*	5	*	.3
<i>High School Graduate</i>				
2–13.....	30	10	3.0	1.3
14–24.....	44	21	3.4	2.4
25–44.....	29	15	2.5	1.1
45–64.....	39	14	2.4	1.0
65 and older.....	*	8	*	.6
<i>Some College</i>				
2–13.....	33	12	2.4	1.7
14–24.....	27	35	2.6	3.2
25–44.....	28	27	2.5	1.4
45–64.....	31	25	2.3	2.1
65 and older.....	*	25	*	.8
<i>College Graduate—Profes-</i>				
<i>sional</i>				
2–13.....	43	29	4.2	2.0
14–24.....	39	47	3.3	3.0
25–44.....	56	41	4.1	2.2
45–64.....	36	35	2.9	2.1
65 and older.....	*	17	*	.9
EDUCATION AND SEX				
<i>8 Years or Less</i>				
Male.....	17	8	1.5	.7
Female.....	22	11	1.8	.8
<i>9–11 Years</i>				
Male.....	20	10	1.8	1.1
Female.....	27	12	2.4	1.0
<i>High School Graduate</i>				
Male.....	27	12	2.4	1.3
Female.....	41	15	3.2	1.4
<i>Some College</i>				
Male.....	26	21	2.3	1.9
Female.....	32	23	2.6	1.8
<i>College Graduate—Profes-</i>				
<i>sional</i>				
Male.....	40	25	3.2	1.9
Female.....	50	45	4.0	2.4
EDUCATION AND RACE				
<i>8 Years or Less</i>				
White.....	21	11	1.8	.8
Nonwhite.....	12	4	1.1	.3
<i>9–11 Years</i>				
White.....	24	12	2.2	1.0
Nonwhite.....	23	6	1.5	.8
<i>High School Graduate</i>				
White.....	36	15	3.0	1.4
Nonwhite.....	12	5	1.0	.7
<i>Some College</i>				
White.....	30	23	2.5	1.8
Nonwhite.....	*	17	*	2.4
<i>College Graduate—Profes-</i>				
<i>sional</i>				
White.....	46	38	3.7	2.3
Nonwhite.....	*	11	*	.9

* Number of observations are less than 25.

TABLE D.15

MEAN EXPENDITURES AND VISITS BY THE PRESENCE OR ABSENCE
OF TARTAR ON TEETH BY OCCUPATION OF THE HEAD OF THE
HOUSEHOLD AND AGE, SEX, AND RACE

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
OCCUPATION AND AGE				
<i>Professional—Managerial</i>				
2-13.....	\$23	\$19	2.9	1.8
14-24.....	35	39	2.1	3.3
25-44.....	42	31	3.1	1.6
45-64.....	35	30	2.6	1.7
65 and older.....	27	9	2.5	.6
<i>Clerical—Sales</i>				
2-13.....	48	11	4.1	1.3
14-24.....	40	23	3.7	2.4
25-44.....	25	26	2.5	1.3
45-64.....	39	18	3.2	1.4
65 and older.....	*	21	*	.8
<i>Craftsmen—Foremen</i>				
2-13.....	21	10	2.7	1.3
14-24.....	42	20	3.0	2.7
25-44.....	26	13	2.4	1.1
45-64.....	29	18	1.9	1.0
65 and older.....	*	6	*	.4
<i>Operatives</i>				
2-13.....	8	7	1.7	1.0
14-24.....	27	16	2.7	1.4
25-44.....	20	21	1.4	1.0
45-64.....	19	8	1.9	.6
65 and older.....	*	10	*	.6
<i>Service Workers</i>				
2-13.....	7	4	1.8	.7
14-24.....	15	11	2.1	1.1
25-44.....	50	16	2.8	.9
45-64.....	70	10	2.3	.7
65 and older.....	*	7	*	.4
<i>Farmers—Farm Laborers</i>				
2-13.....	*	3	*	.6
14-24.....	*	7	*	.8
25-44.....	8	6	1.3	.9
45-64.....	32	12	1.8	.7
65 and older.....	*	6	*	.3
<i>Laborers</i>				
2-13.....	*	6	2.4	.7
14-24.....	12	6	*	.8
25-44.....	26	10	2.0	.8
45-64.....	35	15	1.3	.8
65 and older.....	*	12	*	.3
OCCUPATION AND SEX				
<i>Professional—Managerial</i>				
Male.....	30	19	2.5	1.8
Female.....	40	33	3.3	2.0
<i>Clerical—Sales</i>				
Male.....	32	18	3.0	1.5
Female.....	37	20	3.5	1.4
<i>Craftsmen—Foremen</i>				
Male.....	26	12	2.3	1.3
Female.....	31	15	2.6	1.3
<i>Operatives</i>				
Male.....	14	10	1.6	.9
Female.....	25	14	2.1	1.0

* Number of observations are less than 25.

TABLE D.15—Continued

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
OCCUPATION AND SEX— Continued				
<i>Service Workers</i>				
Male.....	34	12	2.0	.8
Female.....	45	7	2.5	.8
<i>Farmers—Farm Laborers</i>				
Male.....	\$12	\$7	1.3	.6
Female.....	32	7	2.1	.7
<i>Laborers</i>				
Male.....	18	8	1.6	.7
Female.....	34	10	2.0	.7
OCCUPATION AND RACE				
<i>Professional—Managerial</i>				
White.....	36	28	2.9	1.9
Nonwhite.....	23	11	2.8	2.4
<i>Clerical—Sales</i>				
White.....	35	20	3.3	1.5
Nonwhite.....	*	5	*	1.1
<i>Craftsmen—Foremen</i>				
White.....	29	14	2.5	1.4
Nonwhite.....	30	4	1.3	.5
<i>Operatives</i>				
White.....	20	12	1.9	1.0
Nonwhite.....	16	10	1.1	.5
<i>Service Workers</i>				
White.....	51	11	3.1	1.0
Nonwhite.....	18	6	.7	.4
<i>Farmers—Farm Laborers</i>				
White.....	22	7	1.7	.7
Nonwhite.....	*	3	*	.2
<i>Laborers</i>				
White.....	34	13	2.2	.9
Nonwhite.....	2	3	.6	.4

* Number of observations are less than 25.

TABLE D.16

MEAN EXPENDITURES AND VISITS BY THE PRESENCE OR ABSENCE
OF TARTAR ON TEETH BY FAMILY INCOME AND AGE, SEX,
AND RACE

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
FAMILY INCOME AND AGE				
<i>Under \$2,000</i>				
2-13.....	\$*	\$ 3	*	.5
14-24.....	*	11	*	1.5
25-44.....	*	11	*	1.0
45-64.....	31	11	2.0	.9
65 and older.....	12	9	1.9	.5
<i>\$2,000-\$3,499</i>				
2-13.....	*	2	*	.6
14-24.....	12	6	1.8	1.2
25-44.....	6	11	.7	.7
45-64.....	13	21	1.4	.7
65 and older.....	27	11	2.0	.6

* Number of observations are less than 25.

TABLE D.16—Continued

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
FAMILY INCOME AND AGE				
<i>Continued</i>				
\$3,500-\$4,999				
2-13.....	\$10	\$4	2.1	.5
14-24.....	14	11	1.7	1.5
25-44.....	26	12	1.7	.7
45-64.....	42	8	2.3	.5
65 and older.....	*	5	*	.3
\$5,000-\$7,499				
2-13.....	18	10	2.0	1.1
14-24.....	37	15	3.0	1.7
25-44.....	24	17	2.2	1.1
45-64.....	26	15	2.0	1.1
65 and older.....	26	18	5.2	.7
\$7,500-\$9,999				
2-13.....	52	13	3.8	1.5
14-24.....	60	20	4.2	1.8
25-44.....	27	18	2.4	1.2
45-64.....	33	23	2.3	1.3
65 and older.....	*	2	*	.4
\$10,000-\$12,499				
2-13.....	25	11	3.2	1.4
14-24.....	38	31	3.4	2.4
25-44.....	45	31	3.0	1.5
45-64.....	49	16	2.3	1.6
65 and older.....	*	7	*	.4
\$12,500 or More				
2-13.....	34	32	3.4	2.9
14-24.....	24	55	3.1	4.8
25-44.....	52	40	3.9	1.9
45-64.....	38	20	3.2	1.4
65 and older.....	*	8	*	.9
FAMILY INCOME AND SEX				
<i>Under \$2,000</i>				
Male.....	17	4	1.6	.6
Female.....	22	13	2.0	.9
\$2,000-\$3,499				
Male.....	8	7	.9	.8
Female.....	16	11	1.7	.7
\$3,500-\$4,999				
Male.....	25	8	1.8	.8
Female.....	21	7	1.9	.7
\$5,000-\$7,499				
Male.....	23	13	2.1	1.2
Female.....	29	14	2.7	1.2
\$7,500-\$9,999				
Male.....	29	15	2.5	1.3
Female.....	44	18	3.1	1.4
\$10,000-\$12,499				
Male.....	30	14	2.6	1.5
Female.....	51	26	3.2	1.7
\$12,500 or more				
Male.....	31	26	2.8	2.4
Female.....	46	44	4.0	2.9
FAMILY INCOME AND RACE				
<i>Under \$2,000</i>				
White.....	20	11	2.2	.8
Nonwhite.....	17	5	.7	.6
\$2,000-\$3,499				
White.....	14	12	1.5	.9
Nonwhite.....	6	5	1.0	.4

* Number of observations are less than 25.

TABLE D.16—Continued

	MEAN EXPENDITURES		MEAN VISITS	
	Presence	Absence	Presence	Absence
FAMILY INCOME AND RACE				
<i>Continued</i>				
\$3,500-\$4,999				
White.....	\$26	\$8	2.0	.8
Nonwhite.....	4	7	.6	.3
\$5,000-\$7,499				
White.....	27	14	2.5	1.3
Nonwhite.....	17	8	1.3	.6
\$7,500-\$9,999				
White.....	36	18	2.8	1.4
Nonwhite.....	*	5	*	.5
\$10,000-\$12,499				
White.....	41	21	2.9	1.7
Nonwhite.....	*	5	*	1.0
\$12,500 or More				
White.....	38	37	3.4	2.5
Nonwhite.....	*	15	*	5.1

* Number of observations are less than 25.

TABLE D.17

PROPORTION OF PERSONS WITH VISITS BY CONTINUITY OF DENTAL CARE BY EDUCATION OF THE HEAD OF THE HOUSEHOLD AND AGE, SEX, AND RACE

	1964 and 1963	1964 but not in 1963	1963 but not in 1964	Prior to 1963	Never
EDUCATION AND AGE					
<i>8 Years or Less</i>					
2-13.....	17%	12%	6%	10%	56%
14-24.....	26	20	11	24	18
25-44.....	16	20	14	46	5
45-64.....	16	14	11	56	2
65 and older.....	9	10	8	70	2
<i>9-11 Years</i>					
2-13.....	26	17	6	7	44
14-24.....	30	19	14	28	9
25-44.....	20	17	19	42	3
45-64.....	24	15	14	47	1
65 and older.....	11	8	6	73	2
<i>High School Graduate</i>					
2-13.....	32	18	8	6	35
14-24.....	45	21	11	21	3
25-44.....	38	16	17	27	2
45-64.....	32	12	17	39	0
65 and older.....	20	7	8	65	1
<i>Some College</i>					
2-13.....	42	16	10	3	29
14-24.....	58	14	13	12	3
25-44.....	46	15	15	24	0
45-64.....	43	9	20	28	0
65 and older.....	22	15	15	48	0

TABLE D.17—Continued

	1964 and 1963	1964 but not in 1963	1963 but not in 1964	Prior to 1963	Never
EDUCATION AND AGE—					
<i>Continued</i>					
<i>College Graduate—Professional</i>					
2-13.....	55%	16%	4%	4%	21%
14-24.....	71	10	15	4	0
25-44.....	64	13	15	8	0
45-64.....	67	10	12	10	0
65 and older.....	34	10	3	53	0
EDUCATION AND SEX					
<i>8 Years or Less</i>					
Male.....	16	15	10	42	18
Female.....	17	15	10	42	16
<i>9-11 Years</i>					
Male.....	22	16	13	34	15
Female.....	25	16	12	31	16
<i>High School Graduate</i>					
Male.....	35	17	13	23	13
Female.....	36	17	12	23	12
<i>Some College</i>					
Male.....	44	13	15	18	10
Female.....	47	15	13	16	9
<i>College Graduate—Professional</i>					
Male.....	60	14	11	9	6
Female.....	62	12	10	10	6
EDUCATION AND RACE					
<i>8 Years or Less</i>					
White.....	19	15	11	44	12
Nonwhite.....	6	14	7	37	36
<i>9-11 years</i>					
White.....	26	16	12	34	12
Nonwhite.....	10	19	12	27	32
<i>High School Graduate</i>					
White.....	38	17	13	22	11
Nonwhite.....	12	17	10	33	29
<i>Some College</i>					
White.....	47	14	14	17	8
Nonwhite.....	21	20	11	21	26
<i>College Graduate—Professional</i>					
White.....	64	12	9	8	6
Nonwhite.....	22	22	26	21	8

TABLE D.18

PROPORTION OF PERSONS WITH VISITS BY CONTINUITY OF DENTAL CARE BY
OCCUPATION OF THE HEAD OF THE HOUSEHOLD AND AGE, SEX, AND RACE

	1964 and 1963	1964 but not in 1963	1963 but not in 1964	Prior to 1963	Never
OCCUPATION AND AGE					
<i>Professional—Managerial</i>					
2-13.....	47%	18%	6%	5%	24%
14-24.....	62	15	12	10	1
25-44.....	53	13	16	18	0
45-64.....	48	11	14	27	0
65 and older.....	22	8	10	59	1

TABLE D.18—Continued

	1964 and 1963	1964 but not in 1963	1963 but not in 1964	Prior to 1963	Never
OCCUPATION AND AGE—					
<i>Continued</i>					
<i>Clerical—Sales</i>					
2-13.....	44%	16%	9%	3%	29%
14-24.....	51	17	15	14	3
25-44.....	37	17	18	27	0
45-64.....	45	14	8	33	0
65 and older.....	21	15	9	55	0
<i>Craftsmen—Foremen</i>					
2-13.....	29	16	8	7	40
14-24.....	37	19	10	26	8
25-44.....	29	18	19	32	2
45-64.....	24	14	15	45	2
65 and older.....	12	8	7	73	1
<i>Operatives</i>					
2-13.....	26	16	7	7	44
14-24.....	30	20	17	26	7
25-44.....	23	18	13	44	2
45-64.....	14	14	14	56	1
65 and older.....	12	18	8	58	4
<i>Service Workers</i>					
2-13.....	17	13	6	7	56
14-24.....	29	21	10	29	11
25-44.....	29	19	18	31	4
45-64.....	15	18	16	50	1
65 and older.....	7	10	10	70	3
<i>Farmers—Farm Laborers</i>					
2-13.....	24	15	7	8	46
14-24.....	40	17	15	20	9
25-44.....	31	18	17	30	5
45-64.....	24	12	13	50	1
65 and older.....	11	9	8	70	2
<i>Laborers</i>					
2-13.....	15	17	4	11	54
14-24.....	18	20	9	30	23
25-44.....	13	19	12	49	6
45-64.....	11	17	13	57	2
65 and older.....	2	8	8	78	4
OCCUPATION AND SEX					
<i>Professional—Managerial</i>					
Male.....	47	14	12	19	7
Female.....	52	14	11	17	7
<i>Clerical—Sales</i>					
Male.....	40	18	12	22	8
Female.....	44	14	12	23	8
<i>Craftsmen—Foremen</i>					
Male.....	28	16	12	30	15
Female.....	29	17	13	26	15
<i>Operatives</i>					
Male.....	22	16	13	32	16
Female.....	23	17	12	34	14
<i>Service Workers</i>					
Male.....	22	16	12	30	20
Female.....	20	17	12	32	19
<i>Farmers—Farm Laborers</i>					
Male.....	24	13	12	39	12
Female.....	27	14	12	32	15
<i>Laborers</i>					
Male.....	12	18	9	38	22
Female.....	15	17	8	36	24

TABLE D.18—Continued

	1964 and 1963	1964 but not in 1963	1963 but not in 1964	Prior to 1963	Never
OCCUPATION AND RACE—					
<i>Continued</i>					
<i>Professional—Managerial</i>					
White.....	51%	14%	11%	18%	7%
Nonwhite.....	24	15	20	25	15
<i>Clerical—Sales</i>					
White.....	43	15	12	23	7
Nonwhite.....	18	29	14	20	20
<i>Craftsmen—Foremen</i>					
White.....	30	16	13	28	13
Nonwhite.....	9	15	12	29	35
<i>Operatives</i>					
White.....	25	16	13	33	13
Nonwhite.....	11	19	8	32	30
<i>Service Workers</i>					
White.....	29	16	12	32	11
Nonwhite.....	7	18	11	31	34
<i>Farmers—Farm Laborers</i>					
White.....	28	14	12	36	10
Nonwhite.....	0	16	6	38	40
<i>Laborers</i>					
White.....	17	19	10	40	15
Nonwhite.....	8	15	6	34	36

TABLE D.19

PROPORTION OF PERSONS WITH VISITS BY CONTINUITY OF DENTAL CARE BY
FAMILY INCOME AND AGE, SEX, AND RACE

	1964 and 1963	1964 but not in 1963	1963 but not in 1964	Prior to 1963	Never
FAMILY INCOME AND AGE					
<i>Under \$2,000</i>					
2-13.....	16%	10%	2%	6%	67%
14-24.....	25	17	12	25	22
25-44.....	18	15	16	41	10
45-64.....	20	14	9	54	3
65 and older.....	7	9	8	74	2
<i>\$2,000-\$3,499</i>					
2-13.....	13	13	6	9	60
14-24.....	22	24	10	28	17
25-44.....	12	21	17	45	4
45-64.....	14	12	13	61	0
65 and older.....	14	10	7	67	2
<i>\$3,500-\$4,999</i>					
2-13.....	13	16	4	11	56
14-24.....	27	22	11	29	10
25-44.....	20	20	12	45	3
45-64.....	14	16	10	58	2
65 and older.....	10	6	7	76	2
<i>\$5,000-\$7,499</i>					
2-13.....	28	17	7	7	41
14-24.....	37	18	16	22	8
25-44.....	31	17	17	34	2
45-64.....	22	15	15	46	2
65 and older.....	24	12	7	57	0

TABLE D.19—Continued

	1964 and 1963	1964 but not in 1963	1963 but not in 1964	Prior to 1963	Never
FAMILY INCOME AND AGE—					
<i>Continued</i>					
<i>\$7,500-\$9,999</i>					
2-13.....	41%	17%	6%	6%	29%
14-24.....	47	18	10	21	4
25-44.....	40	14	16	29	1
45-64.....	33	14	15	37	0
65 and older.....	9	17	12	57	5
<i>\$10,000-\$12,499</i>					
2-13.....	49	18	12	2	19
14-24.....	56	14	13	15	2
25-44.....	48	15	19	17	1
45-64.....	34	14	18	32	1
65 and older.....	18	5	20	58	0
<i>\$12,500 or More</i>					
2-13.....	60	16	5	5	14
14-24.....	71	11	11	6	1
25-44.....	58	14	14	15	0
45-64.....	58	8	11	23	1
65 and older.....	36	7	7	48	2
FAMILY INCOME AND SEX					
<i>Under \$2,000</i>					
Male.....	15	11	9	45	20
Female.....	16	13	8	50	14
<i>\$2,000-\$3,499</i>					
Male.....	14	15	10	40	22
Female.....	15	16	10	39	20
<i>\$3,500-\$4,999</i>					
Male.....	16	19	8	40	18
Female.....	18	15	10	38	18
<i>\$5,000-\$7,499</i>					
Male.....	28	16	13	27	16
Female.....	30	17	12	25	15
<i>\$7,500-\$9,999</i>					
Male.....	37	16	12	25	10
Female.....	41	16	12	21	10
<i>\$10,000-\$12,499</i>					
Male.....	44	15	18	16	6
Female.....	49	15	13	16	7
<i>\$12,500 or More</i>					
Male.....	59	12	9	18	3
Female.....	61	12	12	12	4
FAMILY INCOME AND RACE					
<i>Under \$2,000</i>					
White.....	17	12	9	53	8
Nonwhite.....	10	12	8	35	35
<i>\$2,000-\$3,499</i>					
White.....	18	15	10	45	12
Nonwhite.....	8	17	9	29	38
<i>\$3,500-\$4,999</i>					
White.....	20	17	9	38	16
Nonwhite.....	4	15	8	44	29
<i>\$5,000-\$7,499</i>					
White.....	31	16	13	26	14
Nonwhite.....	10	20	7	31	32
<i>\$7,500-\$9,999</i>					
White.....	41	16	12	23	9
Nonwhite.....	11	16	16	31	25
<i>\$10,000-\$12,499</i>					
White.....	48	15	16	16	6
Nonwhite.....	20	22	17	25	17
<i>\$12,500 or More</i>					
White.....	61	11	9	15	4
Nonwhite.....	33	19	29	17	2

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