

Factors Related to Utilization of Dental Services by the Elderly

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Abstract: A household interview survey of 883 persons age 62 and older residing in Seattle, Washington, asked about a broad range of health care and social service issues, including the need for and use of dental care. The Andersen model of health services utilization was used to identify predisposing, enabling, and need characteristics hypothesized to affect the use of dental services. A path analysis was conducted to distinguish the direct and indirect effects of the variables. The results showed that none of the predisposing variables, including age, was a significant factor in explaining the use of dental services. Education had

both direct and indirect positive relationships to use. Having a regular source of dental care was also an important factor affecting utilization. Neither income nor insurance variables were powerful factors. Need, measured by an index of dental problems and having dentures, was the strongest determinant of dental care use. In general, the model was better at predicting whether or not dental care would be sought by an older person at all ($R^2 = .27$) than in predicting the amount of service used ($R^2 = .06$). (*Am J Public Health* 1982; 72:1129-1135.)

Dental care for people over age 64 is a complex issue with major financial and political implications. Three trends seem to focus attention on use of dental services by the elderly. The number and relative proportion of persons in this age group are growing rapidly.¹ Second, insurance for dental services is also growing rapidly. From 1973 to 1978, dental insurance increased 294 per cent and now covers more than 60 million Americans.² Informed sources in the geriatric field suggest that the elderly have increased their dental coverage through private insurance policies that are designed to supplement Medicare.³

Third, insurance coverage for dental services through public programs is a topic of national debate. The efficacy and cost effectiveness of preventive care as opposed to restorative care is one issue in deciding whether or not to include preventive and/or restorative dental care in federal and state health programs. Expansion of Medicare Part B to cover dental care has been proposed in Congress on a number of occasions and was discussed in a report of the US House of Representatives Select Committee on Aging.⁴ Medicaid does pay for some dental care, but amount and type of coverage vary from state to state. Since many of the present cohort of elderly are Medicaid eligible, Medicaid expenditures as well as potential Medicare expenditures for dental care may be expected to increase. This will pose

problems to many federal and state programs for the elderly already facing severe financial constraints.

Although a fair amount of research has been done on the factors related to the utilization of dental services,⁵ very little work has focused specifically on the elderly. Existing evidence suggests that older people use services differently than younger persons.⁶

In an analysis of 1958-1962 data from an insured population, Avnet and Nikias found that the proportion of persons over age 55 receiving some dental care during the previous year—approximately 33 per cent—was the lowest of all age groups.⁷

Similarly, data from the 1977 National Medical Care Expenditure survey reveal that 68 per cent of the sample respondents aged 65 and above did not visit the dentist during the year. With the exception of the population under age six, the annual rate of dental services utilization among the elderly (1.0 visits per person) was the lowest of all age groups in the population.⁸ Possible contributing factors to this relatively low rate of utilization include: the small proportion of elderly persons with private health insurance for dental care; the loss in income concomitant with retirement; and the higher rate of edentulousness among the elderly, significantly reducing their demand for dental care.

Other data corroborate the evidence which suggests that, despite the relatively low rate of utilization, demand for dental care by the elderly may be highly sensitive to insurance coverage. For example, Manning and Phelps cite a comparison of the utilization of fillings, extractions, cleanings, and oral examinations among the Group Health Insurance (GHI) population over age 55 with utilization of the same procedures for same age group in the US population as a whole.⁹ Demand among the GHI group (which had comprehensive dental coverage) was roughly 2.3 times that for the US aggregate population.

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Recent work by one of the co-authors of the present study found that the demand for dental care among the elderly (based on a nationwide sample of persons over age 65) was related significantly to several factors: the level of family income, the presence of a usual source of medical care (as a proxy for a usual source of dental care), the relative supply of dentists, the presence of adverse dental health symptoms (toothache, bleeding gums), and the level of price for specific procedures (the demand for fillings, cleanings, and oral examinations was particularly price-sensitive).¹⁰

Additional information is needed in order to gain a better understanding of the factors influencing the use of dental services by the elderly. The present study was undertaken for this purpose.

Materials and Method

This study was done in conjunction with the Community-Based Comprehensive Care Project of Seattle, Washington. This is a model service project developed by the University of Washington with funds from the federal Administration on Aging. Faculty and students from eight university health sciences schools provide comprehensive health services to the elderly and handicapped residents of two public housing buildings and the surrounding neighborhoods. The purpose of the project is to enable frail elderly and handicapped persons to maintain their independence in their own homes rather than being institutionalized. The project includes the provision of dental care, and a dental operator has been installed in one of the buildings to enable the elderly residents to be seen at a location convenient for them.

The data for this study came from a survey that was conducted in the fall of 1979 to gather the baseline data for the subsequent evaluation of the Community-Based Comprehensive Care Project. The target population was persons age 62 and older and the few handicapped persons under age 62 who live in the public housing buildings. A household interview was conducted with all of the residents of the two public housing sites, of two additional public housing buildings selected as control sites, and of all apartment buildings and houses within six blocks of the two experimental buildings. One of the experimental buildings turned out to be located in a commercial district, with virtually no other housing units nearby. Limitations on resources prevented surveying the elderly persons living near the control sites. Thus the "neighborhood" part of the sample consisted of persons age 62 or older living near the one experimental building.^{11,12} The 883 respondents, 461 from public housing and 442 from the neighborhood, represented 78 per cent of the potential universe. Of the 883 cases, 717 provided complete information of all of the variables required for study. These cases became the sample used in the analysis.

The characteristics of the pooled sample are presented in Table 1. The respondents were primarily White (92 per cent), female (74 per cent), and had an average age of 77. There was a high percentage of persons in low-income

TABLE 1—Characteristics of Sample (N = 717)

Characteristics	Per Cent*
Age	
62-64 and handicapped persons under age 62	10
65-69	17
70-74	20
75-79	22
80-84	18
85-89	10
90 and over	3
Race	
White	92
Black	4
Other	4
Sex	
Male	26
Female	74
Marital Status	
Married	18
Widowed	44
Single, Separated, Divorced	37
Education Completed	
8 grades or less	26
Some high school	19
High school graduate	17
Some college, trade, or technical	17
College graduate	18
Annual Income	
\$3,000 and below	20
\$3,100-4,000	23
\$4,100-8,000	25
\$8,100 and above	13
Not available	19

*Totals may not add to 100% due to rounding.

brackets because of the income ceiling requirements for public housing. There was initial concern that the disproportionate representation of the income and race characteristics of the sample may have affected the findings. However, the results of preliminary analyses were not inconsistent with those of other surveys of the elderly, thus the potential sampling bias was not considered to be a severe limitation. The low income status of the sample should nonetheless be kept in mind in drawing inferences from the results.

All data analyses were done for the pooled sample and for each of the two sub-samples, the public housing residents and the neighborhood residents. The estimated effects of the independent variables in each of the two sub-samples were consistent with one another and with the pooled sample. Thus only the analyses for the pooled sample are presented here.

The survey instrument was composed of items taken from previous surveys of elderly persons. It included information on social, economic, family, and demographic characteristics; physical, mental, and functional status; current utilization of health and social services; problems of access to services; and need for services. As stated above, the questionnaire was not designed to gather information solely on dental health and dental care. Thus several questions which would have contributed to the analysis were not included.

TABLE 2—Independent and Dependent Variables

Variable	Definition	Value Range	Mean	Standard Deviation
Age	0 = 65 to 6 = 90+	0-6	3.191	1.074
Male	Female = 0, Male = 1	0, 1	.265	.441
Education	No School = 0 Grades 1-4 = 1 to College Grad = 7	0-7	4.776	1.803
Transportation	Problems with transportation No = 0, Yes = 1	0, 1	.195	.396
Dentist	Has regular dentist	0, 1	.533	.499
Income	Annual Income: 0 = \$100 or less 1 = \$110-200 to 13 = \$40,000 or more	0-12	1.877	3.775
Dental Problems*	Index of problems with tooth aches, gums, chewing, other No = 0, Yes = 14	0-4	.711	1.010
Dentures	Wears dentures No = 0, Yes = 1	0, 1	.214	.410
Delay in Dental Visit	Most recent visit to dentist 0 = One month or less to 4 = More than 1 year	0-4	3.060	1.453
Number of Dental Visits	Number of visits to dentist in past 12 months 0 = 0 to 15 = 15 or more	0-15	1.240	4.970

*Dental Problems Index created by summing total number of problems reported

No problems	= 0
Toothaches	= 1
Chewing problem	= 1
Gum problem	= 1
Other problem	= 1

Total = Sum of above, values 0 through 4

**Delay in Dental Visit (Most recent visit to a dentist)

Within one month or less	= 0
During last two to three months	= 1
During last four to six months	= 2
During last seven to twelve months	= 3
More than one year ago	= 4

The model of health care utilization originally formulated by Andersen and Newman was used as the conceptual basis for the study.*

The independent variables were selected on the basis of those which have been found to be related to the utilization of dental or medical care¹⁴ and for which information had also been collected as part of the survey. The original list of independent variables included the predisposing variables of age, sex, race, marital status, household composition, and education; the enabling variables were income, private health insurance, Veterans Administration coverage, Medicare coverage, Medicaid coverage, problems with transportation, regular source of dental care (i.e., regular dentist or

regular place); and variables representing the need for dental care were perceived health status, use of dentures, and an index of problems with teeth and mouth.

The two dependent variables were the respondent's most recent visit to a dentist (including never), which can be interpreted as delay in visiting the dentist, and number of visits in the past 12 months. The operational definition and descriptive statistics for each of the variables used in the final analysis are presented in Table 2.

Previous research in health services utilization led us to expect the following significant relationships:

- Education, income, Medicaid coverage, presence of a regular source of dental care, and the extent of perceived oral health problems were hypothesized to be negatively related to delay in visiting the dentist.
- The same variables were expected to be positively related to number of dental visits per person.
- Given the tradeoff between increased likelihood of receiving some care and the reduced need for multiple visits which might result from some "preventive" care-seeking behavior, the model was expected generally to explain delay better than volume of visits.

*Anderson and his colleagues postulate that utilization of health care services is a function of the characteristics of the consumer, of the provider, and of the system. The characteristics of the consumer include the following three variables: "predisposing" (primarily demographics), "enabling" (e.g., income, type of insurance, regular source of care), and "need" (e.g., perceived health status, diagnosed conditions). Conditions are either "mutable"—i.e., subject to change through policy, education, or other interventions; or "immutable"—i.e., not amenable to change.¹³

TABLE 3—Pearson's Correlations of Independent and Dependent Variables (N = 717)

	Age	Male	Education	Transportation	Regular Dentist	Income	Medicaid	Dental Problems	Dentures	Delay in Dental Visit
Male	.00786									
Education	.03377	-.14153								
Transportation	.02200	-.03597	-.03589							
Dentist	.02026	-.10011	.19330	-.05240						
Income	.02231	-.08027	.24077	-.09028	.26324					
Medicaid	.00032	-.02350	-.11137	-.02023	-.05907	-.15616				
Dental Problems	-.04265	-.05954	-.06136	.16606	-.04081	-.10587	.09618			
Dentures	.02005	-.08095	-.08087	.10774	-.14491	-.13260	.01569	.36942		
Delay of Visit	-.01960	.03964	-.21513	.02778	-.50387	-.17041	.04897	-.02583	.08458	
Number of Visits	-.00703	.03242	.08518	-.02329	.21756	.05456	-.03744	.04816	.05231	-.25976

In terms of the prior stage (predisposing, enabling, and need) variables, we posited the following key relationships:

- Higher levels of education, the absence of transportation problems, and the presence of a regular source of care were expected to relate negatively to the extent of oral health problems.
- Higher education and income levels were expected to increase the likelihood of having a regular source of care.

Two separate path analyses were estimated: one for each of the two measures of dental services utilization.

Each path analysis was conducted in the following stages. First, multiple regression analyses were done for each dependent variable and the full set of independent variables. Several variables were dropped from the final estimations because they appeared to have little or no empirical relationship with either the dependent variables for utilization or the other independent variables at earlier stages in the path model. The remaining variables were analyzed using ordinary least squares regression equations to examine the relationships posited by the Andersen construct. Thus, each enabling variable was regressed on all predisposing variables; each need variable was regressed on all enabling and predisposing variables; and finally, the use variables were regressed on all need, enabling, and predisposing variables. Variables which made no significant contribution ($p < .05$) to explaining a dependent variable were

excluded from further analysis. The regression equations were then repeated using only the final set of variables.

Results

The zero-order (Pearson Product Moment) correlations among the variables are presented in Table 3. Several relationships are noteworthy. The importance of having a regular dentist or source of dental care is evident. Having a regular dentist is also positively related to income. The number of dental visits per year is negatively related to delay for obvious reasons. There is a strong positive association between income and education and between having dentures and having dental problems. The relationship between income and Medicaid is in the expected direction (negative), but the association is weak.

Within this group of elderly, incremental differences in age do not have a significant correlation with any of the variables.

The path analyses are depicted in Figures 1 and 2.** The cross-sectional and correlational nature of the analysis does not permit a causal interpretation (and thus the specific measures of the direct and indirect effects are not emphasized). Nonetheless, the path analysis is helpful in clarifying

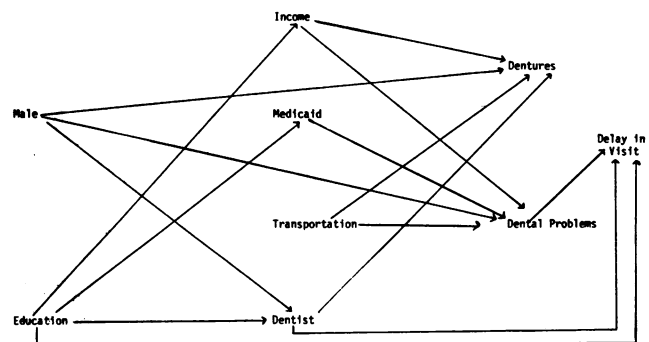


FIGURE 1—Schematic of Significant Paths for Delay in Visits

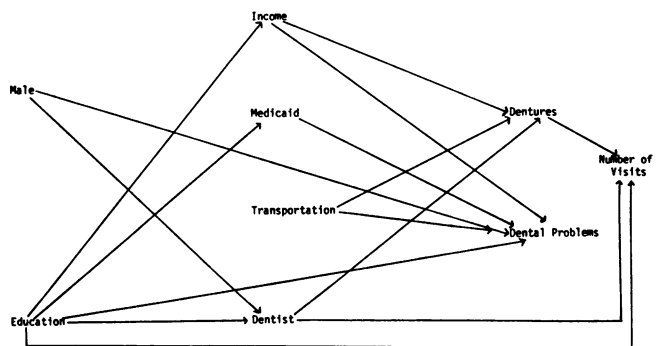


FIGURE 2—Schematic of Significant Paths for Number of Visits per Year

**Arrows indicate existence of relationship; direction can be ascertained from Tables 3 and 4.

the relationships among the variables. Table 4 gives the standardized partial regression coefficients and significance levels for each of the regressions performed as part of the path analysis.

Of the final set of predisposing variables—age, sex, and education—age has no significant effect on any of the variables at subsequent stages in the path model. Thus, in planning dental services, there would appear to be no documented reason to give special attention to different cohorts of the older population. The findings would indicate that projections of the demand for services by future cohorts of elderly could use present cohort utilization rates, with one or two modifications.

Sex has no direct significant effect on the number of visits per year, nor is it significantly related to delay in visiting the dentist. Females are more likely to have a regular source of care, have dentures, and have dental problems. The latter two findings may be due to the fact that women are more likely to live to an age where they would have dentures and have accumulated dental problems.

Education has a significant direct and indirect effect (through its influence on having a regular source of care) on delay and is positively related to having a regular source of dental care, income, and number of visits per year (although the latter relationship is not statistically significant). Education is negatively related to having dentures, dental problems, and to delay. The average education of the present cohort of elderly is relatively low. However, a higher average level of education is one of the changes that will mark future cohorts of the elderly. Thus this would lead us to expect an increase in the demand for dental care.

The final set of enabling variables investigated were the presence of a regular source of dental care, income, Medicaid, and problems with transportation. Transportation problems are directly related to having dentures and dental problems. However, the direct relationship of transportation problems with the dental utilization variables is negligible. Medicaid has a significant positive relationship with dental problems, but is not significant in any of the other regression

equations. The value of including the Medicaid variable is that it distinguishes between the effect of minimum financial access by the poor as facilitated by public assistance and the impact of discretionary income on the use of dental services. Income shows a significant negative relationship with dental problems and with having dentures, and an insignificant relationship with each of the other dependent variables.

Thus financing does not seem to pose a major constraint to obtaining care. Those who are concerned about barriers to access argue that people do not get the dental services they need if they must pay from their own funds. Those who advocate additional coverage of dental services by public programs or private insurance believe that such coverage would promote use. We would have preferred to have had a specific variable for dental insurance rather than using the surrogate variables of health insurance, Veterans Administration coverage, and Medicaid. Nonetheless, our findings suggest that neither source of payment nor income has a direct effect on use.

The effect of the enabling variables seems to be on level of dental problems. This may indicate that preventive care was and is not sought due to financial costs, hence more dental problems and the need for restorative care. In future studies of service utilization by the elderly, it would be helpful to be able to distinguish the type of care sought.

Regular source of care—more than income, insurance, or any other of the access or enabling variables—was found to have a substantial influence on use of services. Regular source of dental care has a significant negative effect on having dentures, one of our proxies for need, and a direct and significant effect on each of the use variables. It has a negative relationship with delay and a positive relationship with number of dental visits per year. Future cohorts of elderly may be more likely to have a regular dentist. The present cohort of elderly grew up in an era prior to mass media and public school campaigns to educate the general public about the need to visit a dentist regularly. Orthodontia and other specialized technologies, which offer additional avenues to attract people into the system of dental care, did

TABLE 4—Beta Values for Ordinary Least Squares Regression for Path Analysis (N = 717)

	Income	Medicaid	Dentist	Dentures	Dental Problems	Delay in Visit	Number of Visits
Age			.015	.025	-.040	-.009	-.013
Male			-.074**	-.091**	-.051***		
Education	.241***	-.111***	.182***	-.051	-.041	-.119***	.050
Transportation				.089**	.130***		
Income				-.075*	-.065*	-.018	-.005
Medicaid				-.009	.079**	.011	-.024
Dentist				-.121**	-.010	-.474***	.221***
Dentures						.208	.076*
Dental Problems						-.066*	.033
R ²	.058	.012	.000	.049	.040	.27	.058
F Value	43.99	8.98	10.67	5.21	4.24	37.91	6.29
Significance Level	.000	.003	.000	.000	.000	.000	.000

Level of significance: * = .10, ** = .05, *** = .01.

not exist or were not as prevalent as today. In brief, dental care may have been less recognized and less of a priority for earlier generations than the generations to come. Thus this, too, might lead to increased demand.

Need, as indicated by dental problems, is the single most important factor governing use of services. Need variables in this study are represented by having dentures and by an index of dental problems. Having dentures is positively and significantly related to the number of dental visits per year, and positively but not significantly related to delay. Dental problems has a significant negative relationship with delay and a positive but not significant relationship with number of visits per year. The significance of the need variables is encouraging, given the current federal budget cuts, based on arguments that services may be used indiscriminately and may not be used by those who need them most. The accompanying federal economic policies assert that consumers should be allowed to purchase services according to their own discretion. To the extent that dental hygiene and regular maintenance practices have improved due to education, and that preventive and restorative treatment technologies and patterns have changed, need for services in response to dental problems may decrease for future cohorts of the elderly.

The final results of the two path analyses are shown in the last two columns of Table 4. The path analysis using the preceding variables explains 27 per cent of the variation in delay in seeking dental care, but only 5.8 per cent of the variation in the number of visits per year to a dentist.

Discussion

This paper demonstrates the utility of a single behavioral model to explain differences among elderly persons in the use of dental services. In particular, three factors—education, the presence of a regular source of dental care, and the individual's perception of the extent of his or her oral health problems—are significantly related to visiting the dentist. The final model explains 27 per cent of the variation in delay among individuals, which constitutes relatively high explanatory power in a micro (individual-specific) data set. In addition, the direction of effect of the education, regular source, and need variables is consistent with previous empirical work regarding the elderly. These findings further suggest that the demand for dental services among the elderly, although lower than the demand for services by younger age groups, is nonetheless responsive to many of the same independent variables which influence the utilization of dental services by persons of all age groups.¹⁵ The study supports the use of normative models of health care demand for elderly persons. Response parameters may vary among age groups, but the factors governing utilization appear to be broadly comparable.

While we have chosen not to present the direct and indirect path coefficients implied by the regression results, the relationships do lend themselves to an interpretation of direct and indirect effects. The major indirect relationships are between education and regular source of care and between transportation difficulties and extent of dental prob-

lems. Increased income is weakly related to a lesser degree of dental problems. Once these prior stages of effect are partialled out, only the presence of a regular source of care and level of education, and, to a lesser extent, having dentures and dental problems are significantly related to utilization.

The model is generally weaker in explaining the *number* of dental visits per person than delay in visiting the dentist. Conceptually, delay approximates the probability of receiving any dental care during a fixed time interval. One possible interpretation consistent with the evidence is that the initial visit to the dentist is a patient-initiated decision, whereas subsequent visits are likely to be governed principally by the dental practitioner. Our results conform to previous findings that the behavioral model is more successful in explaining the probability that an individual visits a dentist during one year than in explaining an individual's level of total use of dental services during the year.¹⁰

The policy inferences that can be drawn from this study are somewhat limited by the data. More detailed information on the type of services received, dental insurance, and regular source of care would enable us to make stronger statements. Nonetheless, the findings suggest that public policies related to dental care for the elderly should focus on access issues other than the financing of restorative care. Education and level of awareness about preventive techniques, transportation, and establishing relationships with a regular source of care appear to be equally or more important than the availability of funds in promoting the use of dental services. Furthermore, there is some indication that attention to preventive rather than restorative care may be warranted. Our sample seemed to get restorative care if they were having problems. The differences in the results of the total variation explained by the two alternative path analyses suggest that more control over the utilization of dental services may be gained by focusing public policies on providers than on consumers.

The relatively low utilization of dental services by those now over the age of 64 may be a cohort phenomenon. Anticipated changes in the predisposing and enabling characteristics of future cohorts of the elderly which would increase the demand for care may be offset by changes in the level of need or in the characteristics of the system.

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Data Systems of the National Center for Health Statistics

The recently published report, "Data Systems of the National Center for Health Statistics," *Vital and Health Statistics, Series 1, No. 16*, describes in brief, semitechnical terms each of the data collection programs managed by the Center. It is designed primarily to serve the needs of those who wish to understand the structure and scope of ongoing NCHS programs.

The Center's data collection programs are grouped into four major areas—Vital Statistics, General Population Surveys, Health Resources Utilization, and Health Resources. All of these diverse surveys and inventory programs collect statistics relating to the status of health in America. The data collected provide information on the extent and nature of illness and disability, the supply and use of health services, family formation and dissolution, and health care costs and financing. For each program, the background, purpose, scope, sample design, data collection procedures, content of data collection forms, method of data release, and uses of data are presented.

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Primary Care Research in 1981

Abstracts submitted to five societies concerned with primary care research have been organized and collected in a single volume by the Society for Research and Education in Primary Care Internal Medicine, the Ambulatory Pediatrics Association, and the North American Primary Care Research Group. The abstracts of these societies as well as of the Society for Teachers of Family Medicine and the Society for Adolescent Medicine are included.

Abstracts have been organized in sections including education, clinical decision making and clinical epidemiology, practice, practitioner, patients, research issues, clinical studies, behavioral issues. The work is introduced by Mack Lipkin, Jr., and Kerr L. White; edited by Mack Lipkin, Jr., Jo Boufford, Jack Froom, and Kerr L. White. The purpose of the collection, aside from the intrinsic interest of the work, is to better inform members of the separate disciplines about the work of the others.

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