Dental care expenditures and retirement

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Abstract

Objectives: To examine the relationship of dental care coverage, retirement, and out-of-pocket (OOP) dental expenditures in an aging population, using data from the Health and Retirement Study (HRS).
Methods: We estimate OOP dental expenditures among individuals who have dental utilization as a function of dental care coverage status, retirement, and individual and household characteristics. We also estimate a multivariate model controlling for potentially confounding variables.
Results: Overall, mean OOP dental expenditures among those with any spending were substantially larger for those without coverage than for those with coverage. However, controlling for coverage shows that there is little difference in spending by retirement status.
Conclusions: Although having dental coverage is a key determinant of the level of OOP expenditures on dental care; spending is higher among those without coverage than those who have dental insurance. We also found that while retirement has no independent effect on OOP dental expenditures once controlling for coverage, dental coverage rates are much lower among retirees.

Introduction

The transition from work to retirement affects household income and the time that individuals have available for non-work activities. In the United States, most people also experience a change in their health and dental insurance coverage around retirement. Prior to age 65, the majority of individuals with coverage receive it through an employment setting, but beginning at age 65, virtually all Americans become universally covered by Medicare.

The coverage differences between employer-provided coverage and Medicare matter less for most types of health care than for dental care. Medicare provides generous coverage for many types of care, but it does not offer a comprehensive dental benefit (1), leaving many older Americans without any dental coverage. Further, many people retire prior to being eligible for Medicare (2), meaning that they potentially face several additional years without coverage. In the past, many relied on retiree health benefits to bridge the gap until Medicare, but this is becoming decreasingly likely as retiree health benefits continue to erode (3).

Previous work (4) has shown that only 38 percent of retired individuals have dental coverage, approximately 15 percent lower than those who are not retired, controlling for other individual and household factors known to affect the likelihood of coverage. Given this lower level of coverage, a concern is that retired individuals may not seek needed dental care (5). This could occur because individuals do not seek any care at all, or because they forego more costly treatments that are recommended to them.

In terms of having any dental care use, retirees do not seem to have less use, despite their lower rates of coverage. In fact, Manski *et al.* (6) find that once controlling for other factors, individuals who are fully retired report rates of use that are 20 percent higher than those who are not retired at all. However, information about any use does not indicate how much care individuals are receiving or whether that care is relatively cheap or expensive.

This paper uses the 2006 Health and Retirement Study (HRS) to explore how retirement affects out-of-pocket (OOP) dental care expenditures. The combination of decreased coverage and increased use, suggests that spending on dental care among those who have dental expenditures may increase after retirement. Given that this is a time when most households rely on a fixed income, large OOP spending on dental care could lead to important financial consequences for older adults.

Methods

The HRS is a nationally representative longitudinal household survey that interviews individuals over age 50 and their spouses every 2 years; approximately 20,000 interviews are completed in each survey wave. Administered by the Institute for Social Research at the University of Michigan and sponsored by the National Institute on Aging, the HRS is useful for the study of aging, retirement, and health among older populations in the United States (2-7).[1]

Each HRS respondent is asked a large battery of questions including information about demographics; income and assets; physical and mental health; cognition, family structure and social supports; health care utilization and costs; health insurance coverage; labor force status and job history; and retirement planning and expectations. Because of the breadth of data available across health and labor force measures and the large sample of older Americans, the HRS is the ideal data source for assessing the association between dental coverage, use, and retirement among an older population.

[1] This analysis is based on data from the Early Release of the 2006 HRS. The Final Release of these data may contain slightly different data if errors in the Early Release data were detected, but we do not expect that these changes will substantively affect our results.

This analysis focuses on self-reports in the HRS of the amount spent OOP for dental care during the 2-year period prior to the most recent survey in 2006. As is common in analyses of health expenditures, we use the natural logarithm of expenditures, as this transformation places relatively little weight on higher expenditure values, which may be outliers and/or skew the results (8). By using the natural log of expenditures, coefficient estimates can be interpreted as a percentage change in spending, as opposed to a dollar value change. All expenditure values are in 2006 dollars.

Rather than accounting for the probability of positive expenditures and the dollar value of expenditures among those with spending in a two-part or other model, we focus only on expenditures among those with OOP spending. In other words, our model conditions on having had some spending during the 2-year period preceding 2006. We do this for several reasons. First, the HRS does not ask about OOP spending to individuals who report no use, meaning that we would be imputing data for those individuals. Second, the logarithm of zero is undefined, meaning that we would have had to transform our dependent variable in some way to account for cases with no spending. Third, and most importantly, in earlier work (6), we explored the effect of retirement on utilization, so we have already explored the first part of the two-part problem. Based on that work, we found that most people had some use, meaning that restricting only to people with OOP yields a sufficient sample size to focus specifically on expenditure levels.

HRS survey respondents are designated as fully retired if at the time of the survey interview they were not working for pay or they were self-employed and either a) said that they were completely retired, or b) reported their sole employment status as retired. Individuals are classified as partially retired if they were not fully retired but they report retirement and either they are working or looking for work. Individuals not classified as fully or partly retired are designated as in the labor force if they report working for pay or report their labor force status as working full-time, part-time, or unemployed. Persons are classified as not retired and out of the labor force if they report being disabled and not in the labor force or never in the labor force.

Along with calculating the bivariate relationships between mean OOP dental expenditures, dental coverage, retirement status, and other person and household characteristics, we also estimate the natural logarithm regression model of the association OOP dental care expenditures for various conditions of dental care coverage status with retirement status, controlling for other potentially confounding variables.

We used z tests to identify differences in mean OOP expenditures. Unless otherwise stated, all reported results are significant at the 0.05 level. The HRS core sample design is a multistage area probability sample of households, so all esti-

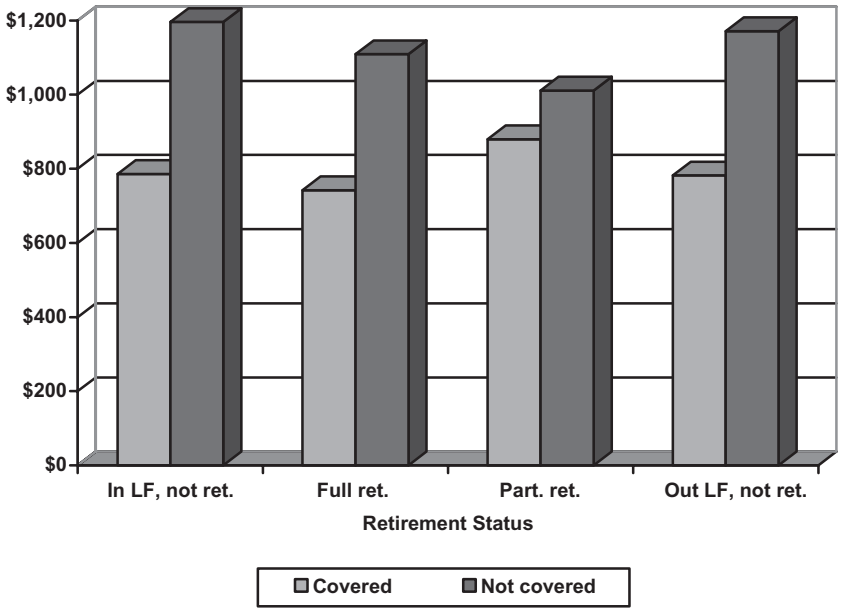

Figure 1 Weighted estimates. Mean out-of-pocket dental expenditures in the 2-year period ending in 2006 for those with a dental visit, by coverage and retirement status. LF, labor force.

mates and statistics reported were computed taking into account this design with the use of the software packages SUDAAN and STATA (9,10).

Results

The 16,911 participants in the 2006 HRS represented 76,367,762 members of the community-based population aged 51 and above in that year, and comprise the study sample. Of these, more than half of the participants were female (58 percent, $n = 6{,}171$). Ten percent ($n = 1{,}036$) of the participants were non-Hispanic Black and 7 percent ($n = 698$) were Hispanic. Twenty-five percent ($n = 2{,}635$) of the participants were aged 75 or older, 36 percent ($n = 3{,}764$) were between the ages of 65 and 74, and 40 percent ($n = 4{,}184$) were between the ages of 51 and 64.

Approximately two-thirds of these participants reported some amount of OOP spending during the 2-year survey period ending in 2006. Among the sample with any expenditure, mean 2-year spending was $951. One-half of the sample (50 percent, $n = 5{,}287$) was fully retired; 11 percent ($n = 1{,}133$) partially retired; 10 percent ($n = 1{,}045$) were not retired and in the labor force; and 29 percent ($n = 3{,}118$) were not retired and out of the labor force.

Descriptive results

Mean OOP dental expenditures among those with any spending were substantially larger for those without coverage than for those with coverage ($1,126 versus $776, respectively). Stratifying the sample by coverage status takes into account the strong relationship between retirement and coverage which has been previously demonstrated (3), allowing isolation of the independent effect of retirement. Figure 1 presents mean OOP spending by coverage and retirement status. Once controlling for coverage, there is little difference in spending by retirement status.

Aside from coverage status, there are other characteristics that might affect spending. Table 1 shows the mean total OOP expenditure for those with dental expenditures, by dental coverage status and other characteristics. When not controlling for coverage status, there were no statistically meaningful differences in the mean level of OOP spending by retirement status, but there were other important differences by other characteristics, as shown in Table 1. Those who were older, White non-Hispanic, Hispanic, had higher income, more education, were widowed or divorced, or did not have teeth had higher OOP spending than their respective comparison categories. Differences in OOP dental expenditures by health status were not observed.

Mean OOP spending is higher among those without coverage in every instance in Table 1, showing the important reason for taking coverage into account. Stratification by dental coverage status also reveals differences by individual and household characteristics not observed in the full sample. Among those with coverage, White non-Hispanic and Hispanic older adults have higher OOP dental expenditures than Black non-Hispanics; this racial difference is not observed for those without coverage. Poor older adults without dental coverage have higher OOP expenditures for dental care than higher income older adults, but no such difference by income groups is observed for those with coverage. Similarly, no difference is observed among education categories for those with coverage, but high school graduate and college graduate

Table 1 Weighted Estimates. Number, Mean Out-of-Pocket Dental Expenditures, and Characteristics of Persons Aged 51 Years and Above in the 2-Year Period Ending in 2006 for Those with a Dental Visit

			Dental coverage status			
			Covered		Not covered	
Population characteristic	Total population (000's)	Mean out-of-pocket dental expenditures	Total population (000's)	Mean out-of-pocket dental expenditures	Total population (000's)	Mean out-of-pocket dental expenditures
Total	50,465	951	28,157	776	22,308	1,126
		25		29		39
Age in years						
51 to 64	282,989	875	20,051	756	8,248	1,105
		33		34		69
65 to 74	12,277	1,008	5,212	886	7,065	1,079
		37		60		46
75 and over	9,889	1,085	2,894	717	6,995	1,199
		42		46		46
Sex						
Male	22,601	927	13,125	748	9475	1,125
		41		41		68
Female	27,864	971	15,032	801	12,833	1,127
		29		45		42
Race						
Black Non-Hispanic	3,277	716	23,890	555	888	995
		45		35		110
Hispanic	2,601	838	1,458	742	1143	918
		68		71		121
White Non-Hispanic	43,412	973	23,554	799	19,859	1,142
		28		33		41
Other	1,174	902	756	644	418	1,220
		78		52		134
Family Income*						
Poor	2,274	831	1,160	882	1,114	1,274
		64		176		64
Low income	5,664	924	1,955	691	3,709	1,034
		66		98		45
Middle income	13,430	891	6,085	672	7,345	1,002
		36		53		82
High income	29,097	993	18,957	811	10,140	803
		35		37		115
Education						
Some or no school	4,935	785	2,056	828	2,880	869
		38		50		53
High school graduate	29,540	927	16,021	760	13519	1,084
		26		38		40
College graduate	15,990	1,043	10,080	828	5,,909	1,348
		55		50		102
Marital status						
Married	36,163	908	21,205	741	14,958	1,099
		27		27		49
Widowed, divorced	12,580	1,072	6,060	906	6,520	1,188
		50		95		47
Never married	1,721	988	891	796	830	1,141
		88		109		82
Family size						
One	9,702	1,076	4,452	972	5,250	1,143
		54		114		55
Two	28,607	917	15,468	731	13,139	1,094
		31		28		52
Three or more	12,157	931	8,238	758	3,919	1,212
		53		62		100

Table 1 *Continued*

Population characteristic	Total population (000's)	Mean out-of-pocket dental expenditures	Dental coverage status: Covered — Total population (000's)	Covered — Mean out-of-pocket dental expenditures	Not covered — Total population (000's)	Not covered — Mean out-of-pocket dental expenditures
Health status						
Excellent/very good	25,832	932	15,323	772	10,510	1,126
		30		36		52
Good	14,953	952	8,165	780	6,787	1,117
		52		59		75
Fair/poor	9,680	1,004	4,669	785	5,011	1,140
		45		65		56
Teeth						
Has teeth	47,840	932	27,104	768	20,736	1,102
		28		31		44
Has no teeth	2,625	1,325	1,053	1027	1,572	1,454
		125		207		149
Retirement status						
Not retired in labor force	20,173	914	14,702	786	5,470	1,196
		43		39		94
Fully retired	20,774	977	8,840	742	11,934	1,109
		24		43		33
Partially retired	4,903	951	2,475	880	2,428	1,011
		71		129		69
Not retired out of labor force	4,616	999	2,140	782	2,476	1,171
		82		43		33

Source: RAND HRS Data, Version H. Produced by the RAND Center for the Study of Aging, with funding from the National Institute on Aging and the Social Security Administration. Santa Monica, CA (February 2008).

Note: Persons with missing data for race/ethnicity, education, marital status, and health status are included in the population total but excluded from the respective categories. Persons never in the labor force are included in the not retired, not in the labor force group. Sample size is 16,911.

Standard errors appear beneath estimated dental use percentages in the shaded rows of the table.

* Where low income refers to persons in families with incomes 101 percent to 199 percent of the poverty line; middle income, 201 percent to 400 percent of the poverty line; and high income, over 400 percent of the poverty line. Poor persons are at or below 100 percent of the poverty line including persons in families with negative income.

adults have higher OOP expenditures for dental care than adults without a high school degree. Controlling for dental coverage, differences in OOP expenditures for dental care are not observed within age, sex, marital status, health status, or retirement status categories.

Multivariate results

Table 2 presents the results of three regression models of the natural logarithm of OOP dental care expenditures, controlling for confounding factors that could influence the observed association between retirement status and dental expenditures. Similar to Table 1, the first model includes all participants, regardless of dental coverage status, though dental coverage status is included as a covariate. The second and third models are limited to participants with and without dental coverage, respectively.

Controlling for confounders including coverage for the full sample, we do not find that retirement has any significant impact on OOP expenditures in the full model. Estimates obtained from the full model show that adults aged 65 to 74, adults without teeth, adults with a health status of fair or poor and adults without dental coverage are likely to have higher OOP expenditures for dental care than their respective comparison categories. On the other hand, Black non-Hispanic adults, poor adults, low and middle income adults, and those without a high school or college degree are likely to have lower OOP expenditures for dental care than their comparison groups.

In the model restricted to those with dental coverage, differences in education, the category poor income level, presence of teeth and the category health status fair or poor are no longer observed.

Table 2 Natural Logarithm of Out-of-Pocket Dental Care Expenditures During the 2-Year Survey Period Ending in 2006, HRS Estimates

	With and without dental coverage		With dental coverage only		Without dental coverage only	
Population characteristic	Coefficient	*P* value	Coefficient	*P* value	Coefficient	*P* value
Age						
51 to 64	Omitted		Omitted		Omitted	
65 to 74	0.096	0.017	0.228	0.0002	0.002	0.974
75 and over	0.074	0.136	0.025	0.784	0.062	0.281
Sex						
Male	Omitted		Omitted		Omitted	
Female	–0.021	0.500	–0.028	0.611	–0.005	0.912
Ethnic/racial background						
Black Non-Hispanic	–0.165	0.008	–0.193	0.006	–0.112	0.328
Hispanic	0.032	0.676	0.163	0.228	–0.064	0.440
White	Omitted		Omitted		Omitted	
Other	0.089	0.374	0.076	0.594	0.094	0.551
Family income by poverty status*						
Poor	–0.396	<.0001	–0.116	0.517	–0.517	<.0001
Low income	–0.294	<.0001	–0.296	0.020	–0.279	<.0001
Middle income	–0.180	0.0001	–0.250	0.001	–0.132	0.005
High income	Omitted		Omitted		Omitted	
Education						
Some or no school	–0.308	<.0001	–0.161	0.143	–0.381	<.0001
High school graduate	–0.121	0.0004	–0.074	0.139	–0.174	0.002
College graduate	Omitted		Omitted		Omitted	
Marital status						
Married	Omitted		Omitted		Omitted	
Widowed, divorced	0.072	0.300	0.033	0.770	0.1083432	0.135
Never married	0.101	0.252	0.056	0.721	0.1384928	0.160
Family size						
One	Omitted		Omitted		Omitted	
Two	–0.038	0.553	–0.142	0.164	0.0373939	0.626
Three or more	–0.004	0.960	–0.097	0.435	0.0651963	0.480
Teeth status						
Has teeth	Omitted		Omitted		Omitted	
Has no teeth	0.268	0.006	0.122	0.425	0.3297659	0.005
Health status						
Excellent/very good	Omitted		Omitted		Omitted	
Good	0.015	0.681	0.016	0.778	0.0086867	0.838
Fair/poor	0.113	0.033	0.129	0.129	0.0949647	0.102
Dental coverage						
Has coverage	Omitted		Omitted		Omitted	
No coverage	0.580	<.0001	NA	NA	NA	NA
Retirement status						
Not retired in labor force	Omitted		Omitted		Omitted	
Fully retired	–0.011	0.825	–0.042	0.580	–0.0082227	0.885
Partially retired	0.011	0.843	0.053	0.538	–0.0418217	0.570
Not retired out of labor force	0.059	0.322	0.090	0.454	0.0402305	0.553

Source: RAND HRS Data, Version H. Produced by the RAND Center for the Study of Aging, with funding from the National Institute on Aging and the Social Security Administration. Santa Monica, CA (February 2008).

* Where low income refers to persons in families with incomes 101 percent to 199 percent of the poverty line; middle income, 201 percent to 400 percent of the poverty line; and high income, over 400 percent of the poverty line. Poor persons are at or below 100 percent of the poverty line including persons in families with negative income.

In the model restricted to those without dental coverage, differences are only observed for different levels of income, education, and presence of teeth. Adults with lower income or less formal education are likely to have lower OOP expenditures for dental care than adults with higher income or more education. Also, in our model restricted to those without dental coverage, adults without teeth are likely to have higher OOP expenditures for dental care than adults with teeth.

Discussion

This work shows that having dental coverage is a key determinant of the level of OOP expenditures on dental care; spending is 45 percent higher among those without coverage than those who have dental insurance. We also found that retirement has no independent effect on OOP dental expenditures once controlling for coverage. Given earlier work which showed that levels of any use were higher among retirees after controlling for coverage, why did we not observe increases in OOP dental spending? First, documented increases in use may have been offset by the use of reduced-cost or free clinics among retirees, who may have the additional time necessary to seek out such care. Second, it could be that retirees seek dental care initially, but forego more costly procedures if a dental provider recommends them. Overall, this could lead to similar levels of OOP expenditures but differing levels of any use by retirement status.

According to 2006 National Health Expenditures data available from the Centers for Medicare & Medicaid Services, approximately half of all dental expenditures are paid by private insurance (11). While retirement does not have an independent effect on spending, dental coverage rates are much lower among retirees. Increasing coverage could be done by offering a dental benefit through Medicare, which the program currently lacks. However, our results show that even among retirees who have coverage and seek care, average OOP dental expenditures are nearly $400 annually, which can be a large expense among those who live on a fixed income. Indeed, among the fully retired in our sample, the average household income was approximately $45,000, meaning that OOP dental expenditures for a two-person household would consume almost 2 percent of annual income on average. OOP expenditures also vary by other individual and household characteristics, suggesting that targeting additional protections against high OOP dental spending to particular vulnerable populations could ease their burden. Reducing the cost of dental care may lead retirees to seek more appropriate care, resulting in better oral and overall health (12).

We caution that the expenditure levels reported in this study only apply to those individuals who seek dental care during a 2-year period. Manski *et al.* (6) find that controlling for the same set of covariates as in this study, retirees are more likely to seek dental care. Thus, a higher fraction of retirees than non-retirees are likely to face the expenditures reported in this study, even though we did not find an independent effect of retirement on expenditure levels.

We were not able to discern in this study the types of services that individuals were using when spending OOP on dental care. New HRS data to be released in 2009 will contain more detailed information on dental utilization for a subset of respondents, and our future work will explore differences in utilization by retirement. We also intend to consider changes in dental coverage, use, and spending that occur around the transition from work to retirement. However, the data still will contain only self-reported data (less accurate than observational data) and will not contain information on the generosity of dental coverage which would allow us to better understand differences in OOP expenditures.

Despite some limitations, our results using the HRS appear to comport well with results of other studies. In earlier work (4-6), we showed that 2-year use rates from the HRS fall within the bounds of estimates from the Medical Expenditure Panel Survey, the National Health Interview Survey, and the National Health and Nutrition Examination Survey (13). For these reasons, we believe that information from the HRS about dental insurance coverage, service utilization, and OOP spending are the most reliable available for studying a national representation of the older population in the United States.

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References

1. Centers for Medicare & Medicaid Services. *Medicare & you, 2009*. Baltimore, MD: Centers for Medicare & Medicaid Services; 2008. Publication Number 10050.
2. National Institute on Aging. *Growing older in America: the health and retirement study*. Bethesda, MD: National Institute on Aging; 2007.
3. The Kaiser Family Foundation and Health Research & Educational Trust. Employer Health Benefits: 2008 Annual Survey. Menlo Park, CA: Kaiser Family Foundation; September 24, 2008. Publication Number 7790.
4. Manski RJ, Moeller JF, Chen H, St. Clair PA, Schimmel J, Magder L, Pepper JV. Dental care coverage and retirement. *J Public Health Dent*. [Epub ahead of print].
5. Manski RJ, Macek MD, Moeller JF. Private dental coverage: who has it and how does it influence dental visits and expenditures? *J Am Dent Assoc*. 2002 Nov;**133**(11):1551-9.
6. Manski RJ, Moeller JF, Chen H, St. Clair PA, Schimmel J, Magder L, Pepper JV. Dental care coverage and utilization. *J Public Health Dent*. [Epub ahead of print].
7. RAND HRS Data, Version H. Produced by the RAND Center for the Study of Aging, with funding from the National Institute on Aging and the Social Security Administration. Santa Monica, CA (February 2008).

8. Wooldridge J. *Introductory econometrics*. Mason, OH: Thomson-Southwestern; 2006. p. 197-200.
9. Research Triangle Institute. *SUDAAN Software for analysis of correlated data. Release 6.40*. Research Triangle Park, NC: Research Triangle Institute; 1995.
10. Statacorp. *Stata statistical software: release 7.0*. College Station, TX: Stata Corporation; 2001.
11. Centers for Medicare & Medicaid Services, Office of the Actuary, Table 8, National Health Expenditures (NHE), January 2009.
12. U.S. Department of Health and Human Services. *Oral health in America: a report of the surgeon general*. Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health; 2000.
13. Macek MD, Manski RJ, Vargas CM, Moeller JF. Comparing oral health care utilization estimates in the U.S. across three nationally representative surveys. *Health Serv Res*. 2002 April;**37**(2):499-521.