
DataWatch

The Effects Of Aging And Population Growth On Health Care Costs

by Daniel N. Mendelson and William B. Schwartz

Abstract: Aging and population growth both contribute importantly to the rise in health care costs. However, the percentage contribution of these factors declined between 1970 and 1990, and we expect a continued decline through 2005. Data indicate that the relative costs of treating patients age sixty-five and over grew more rapidly than did the costs of treating other patients. Sensitivity analyses indicate that regardless of whether these trends persist, the percentage contribution of aging and demography is likely to decline between 1990 and 2005. Application of our model through 2030 suggests that if current trends persist, aging will cause a major acceleration in the rise in costs.

Every year health care expenditures rise appreciably due to the growth and aging of the population. Although policymakers can do practically nothing to affect these factors, it is important that they understand and anticipate the fiscal impact of such demographic changes. The purpose of this DataWatch is to quantify the contribution of population growth and aging to the increase in personal health care costs between 1975 and 1990 and to project their impact between 1990 and 2005.

We estimate the effect of demographic changes on past and future costs using existing secondary data and a series of models described below. Data on health spending by age group in 1987, the most current year available (also the midpoint of our study period), were obtained from the Health Care Financing Administration (HCFA).¹ Estimates of population, both past and future, were obtained from the Bureau of the Census.² We estimate the impact of both aging and population growth on spending in the hospital, physician, and nursing home sectors. We also estimate their effect on "other personal" health care spending, which includes dental care, other health professionals, drugs and medical sundries, and vision products.

Our initial calculations assume that the fraction of total health spending incurred by each age group in 1987 will remain constant in future years. It is possible, however, that the relative expense of care for the elderly and the young will increase over time, as suggested by the changes in reported values between 1977 and 1987 discussed below. We therefore include an

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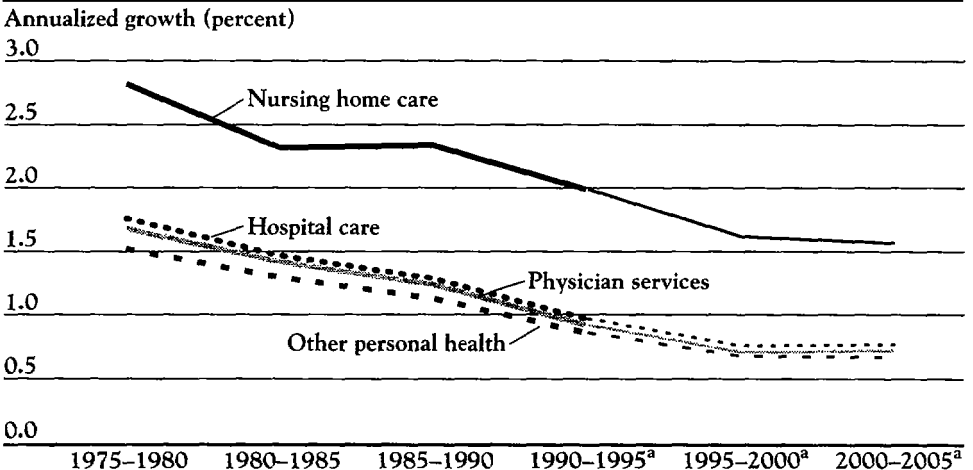
alternative calculation of the effects of aging and population growth, which assumes that care of the elderly and the young will become relatively more expensive in the future. This alternative calculation also serves as a test of the sensitivity of the results to changes in our assumptions.

Effects Of Aging And Population Growth On Health Costs

We first estimated the annual percentage contribution of aging and population growth (taken together) to the rise in costs for each five-year period between 1975 and 1990 and then projected their likely contribution to growth between 1990 and 2005.³ Exhibit 1 shows that the rise in costs attributable to the aging and growth of the population has been decreasing in all four sectors. Similar patterns of change are reported for the physician, hospital, and “other” sectors. As might be expected, demographic factors had the most impact on the costs of nursing home care.

It is also of interest to understand the degree to which the overall demographic changes described above were determined by aging and population growth, respectively. We calculated the average growth in costs due to aging alone.⁴ Exhibit 2 shows that the attenuation of costs described in Exhibit 1 resulted from a slowing in both population growth and aging between 1975 and 1990. As might be expected, the data also show that the effect of aging explains the greater impact of these factors in the nursing home sector.

Exhibit 1
Annualized Changes In Health Care Spending Due To Aging And Population Growth, 1975-2005



Source: Authors calculations based on data from the Health Care Financing Administration and the Bureau of the Census.

^a Projected.

Exhibit 2**Annualized Changes In Health Care Spending Attributable To Population Growth And Aging, 1975-2005**

Years	Hospital		Physician		Nursing home		Other personal		
	Population growth	Aging ^a and population ^b	Aging ^a and population ^b	Aging ^a and population ^b	Aging ^a and population ^b	Aging ^a and population ^b	Aging ^a and population ^b	Aging ^a and population ^b	
1975-80	1.06%	0.69%	1.77%	0.62%	1.69%	1.75%	2.83%	0.45%	1.53%
1980-85	0.99	0.49	1.48	0.43	1.43	1.32	2.33	0.31	1.31
1985-90	0.91	0.39	1.30	0.33	1.25	1.42	2.35	0.23	1.14
1990-95	0.76	0.22	0.98	0.17	0.93	1.23	2.00	0.11	0.87
1995-00	0.62	0.15	0.77	0.10	0.72	1.01	1.63	0.08	0.69
2000-05	0.54	0.24	0.78	0.19	0.73	1.03	1.58	0.14	0.68

Source: Authors' calculations based on data from the Health Care Financing Administration and the Bureau of the Census.

Note: All figures expressed as annualized percent changes for the periods indicated. Figures for 1990-2005 are projections.

^a Rise in spending per capita due to the aging of the population.

^b Rise in spending due to aging and growth in population. Total may not add to the sum of "aging" and "population growth" due to rounding.

Alternative Assumptions Regarding Health Costs By Age Group

All of the calculations described thus far assume that the relative expense of treating each age group, observed in 1987, will remain constant over time. In fact, as noted earlier, historical data for 1977 and 1987 suggest that there have been small changes in the relative expense of the care rendered to each age group. Comparison of the relative levels of spending in each age group between 1977 and 1987 illustrates that spending on those age sixty-five and older seemed to grow more rapidly than overall health spending in both the physician and hospital sectors (Exhibit 3). Spending on those under age nineteen also appeared to grow more rapidly than total spending in the hospital sector and less rapidly than total spending in the physician sector; spending on those ages nineteen to sixty-four appeared to grow more slowly than overall health spending.

These changes probably can be explained by the ongoing development of new medical technology and the disproportionately heavy use of new advances among the elderly and newborns. If technological advances continue to selectively increase the cost of caring for the elderly and the young in the future, we would expect the current gaps in spending to continue to widen between now and 2000. Relative health spending by age group may also continue to change because of decreases in age-specific mortality rates.⁵

We therefore offer an alternative calculation of the effects of aging and population growth on costs, which assumes that the relative expense of care for those over age sixty-five and under age nineteen will continue to increase in the future at the rates observed between 1977 and 1987. This

Exhibit 3
Changes In Health Spending By Age Group, 1977-1987

Hospital care	Age category			
	Under 19	19-64	65 and over	Average
Spending in 1977	\$106	\$306	\$ 830	\$298
Spending in 1987	\$305	\$695	\$2,248	\$773
Annualized percent change ^a	10.57%	8.20%	9.96%	9.53%
Physician services				
Spending in 1977	\$ 63	\$148	\$ 319	\$139
Spending in 1987	\$181	\$373	\$1,107	\$408
Annualized percent change ^a	10.55%	9.24%	12.44%	10.77%

Source: Authors' calculations based on figures from the Health Care Financing Administration.

^a Annualized percent changes represent nominal changes in each age category between 1977 and 1987. Our "alternative analysis" is based on the observation that costs in the under age 19 and age 65 and over categories have risen faster than average.

calculation also serves to test the sensitivity of our basic results to changes in one of our primary underlying assumptions.⁶

Exhibit 4 compares these alternative calculations with the baseline calculations derived previously for the hospital and physician sectors. The alternative calculations show that if the relative expenses of care for elderly and young patients continue to rise as they did between 1977 and 1987, costs will still be attenuated between now and the year 2000 because of demographic factors. In fact, the attenuation would be more dramatic under the alternative scenario. This result is observed in part because more individuals are expected to move into the category of ages nineteen to sixty-four between 1990 and 2000 than in previous years.

Exhibit 4
Comparison Of 'Alternative' Estimates With Baseline Estimates Of Annualized Changes In Costs Due To Aging And Population Growth, 1975-2005

Hospital costs	1975-80	1980-85	1985-90	1990-95	1995-00	2000-05
Baseline	1.77%	1.48%	1.30%	0.98%	0.77%	0.78%
Alternative	1.77	1.48	1.04	0.60	0.40	0.44
Physician costs						
Baseline	1.69	1.43	1.25	0.93	0.72	0.73
Alternative	1.69	1.43	1.09	0.79	0.66	0.78

Source: Authors' calculations based on data from the Health Care Financing Administration and the Bureau of the Census.

Note: The baseline analysis, also plotted in Exhibit 1, assumes that the relative expense of care will remain constant between 1987 and 2000. The alternative analysis, designed to test this assumption, assumes that in each year after 1987 the fraction of health spending attributable to each age category will change at the rate observed between 1977 and 1987. See text for further details.

Contribution Of Demographic Factors To Total Cost Increases

Thus far, we have limited our discussion to the annual effects of aging and population growth, without relating these factors to the issue of most concern to policymakers: the current and future rise in total costs. To give a sense of the relative importance of our results, we calculate the contribution of aging and population growth to the overall rise in spending at one point in time—the period 1987-1990.⁷ Exhibit 5 shows the percentage contribution of aging and population growth to the rise in spending, the overall increase in costs, and the fraction of the overall increase in costs accounted for by aging and population growth.⁸ In the acute care sector, aging and population growth accounted for roughly 20 percent of the real rise in costs; in long-term care, roughly 35 percent. Our calculations show that if these results are indicative of future increases in costs, a substantial portion of the rise is simply beyond the reach of policymakers.

Of course, the percentages derived in Exhibit 5 could well change in the future. Absent major changes in health policy that effectively reduce the level of spending, we would expect technologic changes and other factors to accelerate the rise in spending on hospital and physician services. The fraction of the rise in spending attributable to aging and population growth thus would decrease in the future. Alternatively, if efforts to contain costs are highly successful, aging and population growth could account for an appreciably larger portion of the rise in costs in future years.

Policy Implications

Our analysis indicates that there has been a steady reduction in the contribution of aging and population growth (taken together) to the rise in costs in both the acute care and long-term care sectors between 1975 and

Exhibit 5

Contribution Of Aging And Population Growth To The Rise In Total Spending By Sector, 1987-1990

	Annualized rise in costs due to aging and population growth	Annualized rise in total real spending	Fraction of total rise in real spending resulting from aging and population growth
Hospital care	1.3%	6.1%	21.3%
Physician care	1.2	7.0	17.1
Long-term care	2.3	6.5	35.4
Other personal care	1.1	7.5	14.7

Source: Authors' calculations based on data from the Health Care Financing Administration and the Bureau of the Census.

1990. We project that this trend is likely to continue to attenuate the rise in costs slightly between now and 2005. Both the historical and the projected trends resulted from attenuations in both population growth and aging. Finally, a sensitivity analysis indicates that our projections of an attenuation in costs due to demographic factors will occur even if care of the young and the elderly continues to become relatively more expensive.

It is important to note that the upward pressure in costs that we have predicted for the future will not necessarily be reflected in an actual attenuation of health care spending. For example, in the nursing home sector, regulatory policy such as state certificate-of-need (CON) programs, Medicaid moratoria on spending, and federal funding decisions have been the primary determinants of spending. Demographic factors will, therefore, attenuate the rise in long-term care costs only if they are incorporated into the formulae that determine nursing home spending in most states.

Our projections of the likely future increase in costs due to demographic factors are limited to the period 1990-2005 for two reasons. First, this is the period most relevant to current policy efforts to contain costs. Second, levels of health spending by age group over the long term could be influenced by factors such as technologic change, reimbursement mechanisms, and changes in age-specific mortality. But if one assumes, as a point of departure, that there is no change in relative levels of spending by age group, our model indicates that between 2010 and 2030 there will be an acceleration in the rise in costs due to aging. The reason is, of course, that the "baby boomer" generation will reach and exceed age sixty-five during this time. Unless expensive care is shifted away from the elderly before this period, the likely attenuation of the rise in costs due to population growth and aging between now and 2005 will probably be short lived.

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NOTES

1. D.R. Waldo et al., "Health Expenditures by Age Group, 1977 and 1987," *Health Care Financing Review* (Summer 1989): 114. To be consistent with our population data, we estimated one figure for the group ages sixty-five to eighty-four by averaging the four groups weighted by their 1987 population. Our age groups thus are under age nineteen, ages nineteen to sixty-four, ages sixty-five to eighty-four, and age eighty-five and over.
2. Population data for 1975 were obtained from *Statistical Abstract of the United States, 1977* (Washington: Bureau of the Census, 1977). Population data from 1980-1987 were obtained from Bureau of the Census, *United States Population Estimates by Age, Sex, and Race: 1980 to 1987*, P-25, no. 1022 (Washington: Bureau of the Census, 1992). Middle Series projections of future population were obtained from Bureau of the

Census, *Projections of the Population of the United States, by Age, Sex, and Race, 1988 to 2080*, P-25, no. 1018 (Washington: Bureau of the Census, 1992). For ease of calculation, we used population data for every fifth year between 1975 and 2005 and calculated the population effects over five-year intervals.

3. The following equation was used to calculate the average annual contributions over each five-year period.

$$\sqrt[5]{\frac{\sum \text{Population}_{\text{age } i, \text{year } t} * \text{Spending}_{\text{age } i, \text{year } 1987}}{\sum \text{Population}_{\text{age } i, \text{year } t-5} * \text{Spending}_{\text{age } i, \text{year } 1987}}}$$

In this formulation, i denotes the age of the population and t denotes the year of the observation. Our baseline calculations use the figures for health spending by age group obtained for 1987.

4. We substituted the fraction of the population in each age group, as follows:

$$\sqrt[5]{\frac{\sum \% \text{Population}_{\text{age } i, \text{year } t} * \text{Spending}_{\text{age } i, \text{year } 1987}}{\sum \% \text{Population}_{\text{age } i, \text{year } t-5} * \text{Spending}_{\text{age } i, \text{year } 1987}}}$$

This calculation isolates the influence of aging by effectively holding the size of the population constant. To calculate the increase in costs due to the increase in population alone, we simply assume that costs increase in proportion to population growth and report the annualized increase in population growth for each five-year period. The calculated effects of aging and population growth alone may not sum exactly to the total reported, because of the interaction of these two components.

5. A number of researchers have questioned whether increases in age-specific mortality might increase the disparity between spending on the very old and other age groups. See, for example, H.J. Aaron, *Serious and Unstable Condition: Financing America's Health care* (Washington: The Brookings Institution, 1991), 44-45. Joseph Newhouse has indicated that any potential effect of changing age-specific mortality rates is likely to be small. J.P. Newhouse, "Medical Care Costs: How Much Welfare Loss?" *Journal of Economic Perspectives* 6 (1992): 3-21. Because our "alternative" method models changes observed over the past ten years, any such effect that has been in place over this time would be included in our calculations.
6. We recalculated the demographic effect as follows:

$$\sqrt[5]{\frac{\sum \text{Population}_{\text{age } i, \text{year } t} * \text{Spending}_{\text{age } i, \text{year } t}}{\sum \text{Population}_{\text{age } i, \text{year } t-5} * \text{Spending}_{\text{age } i, \text{year } t-5}}}$$

7. We have taken 1987-1990 as a baseline period for estimating the spending increases in Exhibit 5. It is not possible to use older data, because of the changes in reimbursement and utilization observed in those years. For further discussion of why large future savings are unlikely, see W.B. Schwartz and D.N. Mendelson, "Hospital Cost Containment in the 1980s: Hard Lessons Learned and Prospects for the 1990s," *The New England Journal of Medicine* 324 (1991): 1037-1042; and W.B. Schwartz and D.N. Mendelson, "Why Managed Care Cannot Contain Hospital Costs-Without Rationing," *Health Affairs* (Summer 1992): 100-107.
8. S.T. Sonnefeld et al., "Projections of National Health Expenditures through the Year 2000," *Health care Financing Review* (Fall 1991): 1-28. Increases in costs are deflated for inflation using the gross national product (GNP) implicit price deflator.