While a large empirical literature exists on the use of medical services in general, few studies concentrate on preventive services and fewer still analyze use of these services by the elderly.[1] Apart from the analyses presented for the first time in this paper, only nine studies offer empirical evidence about the use of preventive services among older adults. Appendix C summarizes the scope and methods of each of these studies.

Because of the small volume of research examining preventive service use by the elderly, this paper also draws upon empirical investigations of use by the non-elderly. Appendix D describes 35 studies in this category. Several of these studies examine how age affects the use of preventive services and offer insight into the behavior of older patients in seeking out such care.

Sources of Data

Table 3 presents comparative estimates of the percentages of elderly people using 17 preventive services within specified periods of time. Three of the seven sources contain national estimates. OTA analyzed data from the 1982 National Health Interview Survey (NHIS). (See appendix E for a description of the NHIS.) Results of this analysis, showing the percentage of the elderly who have received five preventive services--glaucoma screening, eye exams, blood pressure measurement, breast exams, and Pap smears -- within periods of time roughly similar to the intervals suggested by expert groups are shown in the sixth column of the table.

The second source of national estimates in table 3 comes from a survey conducted by the Gallup Organization every 3 or 4 years for the American Cancer Society (ACS). This household, mail survey examines individuals' knowledge of cancer risk factors and the frequency with which they receive certain screening tests (28). Gallup publishes results by gender, age, and selected demographic variables. Although the study does not present findings for Medicare-eligible respondents as a separate group, it does give results for individuals over 50 years old.

These two studies rely on respondents' self-reported behavior, which may affect the accuracy of the estimates. The direction of this potential bias is unclear. On the one hand, lack of familiarity with medical services may cause respondents not to know that they had received a given service, and hence, to underreport use. On the other hand, respondents may perceive preventive behavior to be socially desirable and may inflate the use they report to the interviewer. The relative importance of each of these biases in affecting the estimates is unknown.

The third national data source is the U.S. Immunization Survey conducted annually by the Centers for Disease Control (CDC) until 1985. A household survey, it provides data on the percentages of individuals immunized against influenza and pneumococcal pneumonia, broken down by age (including people over 65)(26).

Another set of estimates, found in the seventh column of table 3, comes from a large, urban "closed-panel"* health maintenance organization (HMO). This HMO pro-

1 Many studies have been carried out on the use and correlates of use of non-preventive medical services and dental care by the elderly. However, because the purpose, nature, and likely determinants of use of these services differ markedly from those of preventive health services, such studies are not reviewed in this paper.

2 In a 'closed panel" HMO, enrollees must receive health care from a physician employed directly by the HMO usually in a clinic run by the organization.

Table 3--- Percent of Elderly People Receiving Preventive Services Within Specified Periods of Time

Service	Study[a]								
	ACS[b]	Brown[c]	CDC[d]	Chao[e]	Lazaro[f]	OTA[g]	OTA[h]	Rundall[i]	Winawer[j]
Blood pressure									
Men				93		91			
Women				93		92			
Breast exam									
Women	48 (I<yr)					53 (<2 yr)			
Breast self-exam									
Women									
Monthly or more frequently				37					
Less frequently				39					
Cholesterol									
Men							75		
Women							73 (5yr)		
Complete check-up					By age, not sex:				
Men	62				60-74=45		49		
Women	67 (<l yr)				75+=24 (WA)		51 (1 yr)		
Eye examination									
Men						73	72		
Women						76 (<3 yr)	75 (2 yr)		
Fecal occult blood									
Men	20			30			49		
Women	19			29			52	70-80	
Total									
Glaucoma screening									
Men						64			
Women						70 (<3 yr)			
Influenza vaccine									
Men			23				58		
Women			(both sexes; 1 yr)				57 (1 yr)		
Mammography									
Women		6 (ever)		11 (1 yr)					
Pap smear									
Women	60 (<=3 yr)			63 (1 yr)		50 (<4 yr)	71 (3 yr)		
Pneumococcal vaccine									
Men			11				38		
Women			(both sexes; 1 yr)				30 (ever)		

(Cont'd)

Table 3--- Percent of Elderly People Receiving Preventive Services Within Specifed Periods of Time (Cent'd)

Service	study[a] ACS[b]	Brown[c]	CDC[d]	Chao[e]	Lazaro[f]	OTA[g]	OTA[h]	Rundall[i]	Winawer[j]
Procto exam									
Men	15								
Women	12								
	(1 yr)								
Rectal exam									
Men	28								
Women	28								
	(1 yr)								
Sigmoidoscopy									
Total									95
									(N/A)
Swine flu vaccine									
Sample estimate								72	
Population est.								63	
								(N/A)	
Tetanus vaccine									
Men							30		
Women							26		
							(10 yr)		

Abbreviations: HMO = health maintenance organization; NHIS = National Health Interview Survey.

[a] Full descriptions of methodology of each study can be found in table 4.

[b] Gallup Organization, "The1987 Survey of Public Awareness and Use of Cancer Detection Tests: Summary of Findings," Conducted for the American Cancer Society (Princeton, NJ: Gallup Organization, January 1988); n=952; age=50+.

[c] J.T. Brown and B.S. Hulka, "Screening Mammography in the Elderly: A Case-Control Study," J. Gen. Intern. Medicine d 3:126-131, 1988; n=309; age=60+.

D.S. Fedson, "Influenza and Pneumococcal Immunization Strategies for Physicians," Chest 91:436-443, 1987; n=not given; age=65+.

[e] A. Chao, A. Paganini -Hill, R.K. Ross, et al., "Use of preventive Care by the Elderly," Preventive Medicine 16:710-722, 1987; n=11,888; age range=48--100; mean age=74.4.

[f] C.M.Lazaro, D.N. Logsdon, and R. Meier, "Utilization of Preventive Health Services by the Elderly," Insure Project, Lifecycle Preventive Health Services, New York, NY, presentation to the American Pyschological Association Convention, Aug. 31, 1987, New York, NY; n=713; age=60+. Use rates from Lazaro study are proportions of all persons invited to receive checkup who actually received the service. Proportions of persons accepting the invitation who actually received the checkup are as follows: ages 60-74=.65; ages 75+=.53.

[g] Office of Technology Assessment/NHIS, 1988a; n=11434; age=65+.

[h] Office of Technology Assessment/HMO, 1988b; n=5394 for checkup, influenza, and fecal occult blood; 3371 for eye exams and Pap smears; 2322 for cholesterol; and 894 for pneumococcal and tetanus; age=65+.

[i] T.G. Rundall and J.R.C. Wheeler, "Factors Associated With Utilization of the Swine Flu Vaccination program Among Senior Citizens in Tompkins County," Medical Care 17:191-200, 1979; sample n=232; population N=5000; age=65+.

[j] S.J. Winawer, M. Baldwin, E. Herbert, et al., "Screening Experience With Fecal Occult Blood Testing as a Function of Age," in Prospectives on Prevention and Treatment of Cancer in the Elderly, R. Yancik (cd.) (New York, NY: Raven Press, 1983); n=21,961; age=40+.

[k] Notation in parentheses indicates period of time over which use was measured.

Key for parenthetical notations:
yr = year or years
< = up to but not including
<= = up to and including
N/A= not applicable; study is a single trial conducted over a finite period.

SOURCE: Office of Technology Assessment, 1989.

vialed OTA with data on the percentages of adults in various age categories who received each of nine preventive services within periods of time specified in table 8. (See appendix F for a more complete discussion of the data and estimation methods.)

Unlike the three national surveys, these estimates come directly from the provider's records, thus avoiding the potential inaccuracies of self-reported data. However, the population from which the HMO data are drawn is probably not representative of the national experience or even of other HMOs. The elderly enrolled in this single prepaid plan may be different from the total elderly population in the HMO's market area as well as the elderly population of other areas. In addition, HMOs in general tend to provide better coverage of preventive services than do other insurance plans (46). ' This HMO in particular engaged in activities to promote the use of some preventive procedures. All of these potential distortions suggest that estimates from this HMO are probably indicative of the upper bound of use attainable under Medicare coverage rather than national estimates of current use.

In the four remaining sets of data presented in table 3, estimating use was not the authors' primary objective. One paper was a case-control study of breast cancer in elderly women (15). Another looked at the relationship between screening and disease prognosis for colorectal cancer. The third examined factors associated with swine flu vaccination during the predicted epidemic of 1977 and 1978 (59), and the fourth presents self-reported data from a retirement community about respondents' most recent use of five preventive services (19).

Estimates of Use

Because of some overlap in the services examined in the seven studies discussed above, one can compare different estimates of use of the same services. These procedures are general examinations, fecal occult blood screening, mammography, breast examinations, Pap smears, eye examinations, and blood pressure checks. For four services, the estimates of use are consistent across data sources. About 92 percent of the elderly report having their blood pressure checked within a l-year period and 74 percent report eye examinations within the previous 2 years. Although estimates for Pap smear use show a bit more variation across studies, the range runs only from about 50 percent of elderly people in the NHIS sample to 71 percent in the HMO data.

Differences in the periods of time over which researchers measure use do not account for the variation in estimates that does exist. For example, the ACS estimate of Pap smear use within a 3-year period is actually higher than the NHIS estimate that examines a period of up to 4 years. Hence, these differences reflect either different populations or different survey methods.

Despite some consistency across studies for the same service, there is little similarity in rates of use across different services. For example, while less than 15 percent of the elderly report having had annual rectal exams, 92 percent report an annual blood pressure check. Estimates for the remaining services fall within this wide range. These drastic differences in rates of use suggest that preventive services are more different from one another than they are alike. Several studies discussed later in this paper have examined these differences.

Use of Multiple Services

Measuring the percentage of elderly individuals who receive multiple preventive services provides a slightly different profile of individuals' preventive behavior than is revealed by examining one service at a time. As indicated in table 4, a majority of elderly persons report receiving all three services that both sexes can receive (glaucoma screening, eye exams, and blood pressure measurement). One-quarter of men and one-fifth of women

report receiving one or fewer of the three services. The extremely small percentages who report using no services reflect the almost universal measurement of blood pressure. Looking only at women and including the two additional services they can receive (Pap smears and breast exams) reveals that only 13 percent report using none or one service. However, only 30 percent report using all five services. These data indicate a great deal of variation in the number of services elderly people receive. In the only other study to examine multiple preventive service use, Calnan found that among middle-aged women, the probability of using one service does not predict whether an individual uses others (17).

Time Trends

The ACS and NHIS data allow examination of time trends in self-reported use of several services over the period from 1973 through 1987. As shown in table 5, the percentage of older Americans who report *ever* having received these preventive services grew over the periods measured. Using identical questionnaires, the NHIS showed substantial increases in the use of seven services between 1973 and 1982 (72,75).

The trends in the ACS data are not quite as dramatic (28). Some procedures show little change between 1980 and 1983 with five services showing a decline in use. The declines between 1980 and 1983 most likely reflect sampling error. While all of the tests except digital rectal exams for women increased between 1980 and 1987, the jumps are less dramatic than those suggested by the NHIS data.

The differences in trends between the ACS and NHIS data sources have several possible explanations:

- Only Pap smears and breast exams overlap the NHIS and ACS surveys. The differences between the two data sources could be due to different trends in the particular services each survey examined.
- NHIS estimates are for individuals over 65 years old, while the ACS data are for wider age ranges. If the trend in the NHIS applies only to the elderly, the inclusion of non-elderly people in the ACS samples might obscure this trend.

Table 4--- Percent of Persons Over 65 Using Multiple Preventive Services (From the 1982 National Health Interview Survey)[a]

Number of services	Glaucoma, eye exam and blood Pressure[a]		Breast exam, Pap smear glaucoma, eye exam and blood pressure
	Men	Women	Women
Zero	4	3	3
One	22	19	10
Two	16	13	11
Three	58	65	26
Four	N/A	N/A	21
Five	N/A	N/A	30
Total	100	100	100

Abbreviation: N/A = Not applicable.

[a]For men and women, table presents proportions of the noninstitutionalized, civilian, over-65 population using none, one, two, or three of the following services--glaucoma screening, eye examination, and blood pressure measurement--within ~the periods of time listed in table 8.
For women only, the table also presents the proportions of this same population using none, one, two, three, four, or five of the following services--glaucoma screening, eye examination, blood pressure measurement, Pap smears, and breast examination--within the periods of time listed in table 8.

SOURCE: Office of Technology Assessment, 1989.

Table 5.--Some Trends in the Percent of Adults or Older Adults Ever Having Received Selected Preventive Services[a]

Service	National Health Interview Survey[b] Year 1973	1982	American Cancer Society/Gallup Organization survey[c] Year 1976	1980	1983	1987
Check-up (annual)[a]			45 (All adults)	42	46	47
Breast exam (Women only)	58 (Ages 65+)		74	79 (All adult women)	89	81
Pap smear (women only)	54 (Ages 65+)		79	86 (All adult women)	84	87
EKG	67 (Ages 65+)	82				
Eye exam	(Ages 65+)					
Glaucoma	56 (Ages 65+)					
Fecal occult blood						
Men				17	29	43
Women				20	27 (Ages 50+)	47
Mammography (women only)				43	41 (Ages 50+)	62
Proctosigmoidoscopy						
Men				37	32	43
Women				35	31 (Ages 50+)	42
Rectal exam						
Men				54	56	53
Women				52	47 (Ages 40+)	58

Abbreviation: EKG = electrocardiogram

With the exception of the medical check-up, this table presents data on the proportion of individuals who report ever having received each service. For medical check-ups, the statistics refer to the proportion who report having a regular, annual exam.

[b] National Center for Health Statistics, U.S. Department of Health, Education, and Welfare, "Use of Selected Preventive Services U.S.--1973," Vital and Health Statistics, Series 10, No. 110 (Washington, DC: U.S. Government Printing Office, March 1977); and National Center for Health Statistics, U.S. Department of Health and Human Services, "Use of Selected Preventive Services U.S.--1982," Vital and Health Statistics, Series 10, No. 157 (Washington, DC: U.S. Government Printing Office, August 1986).

[c] Gallup Organization, "The 1987 Survey of public Awareness and Use of Cancer Detection Tests: Summary of Findings," conducted for the American Cancer Society (Princeton, NJ: Gallup Organization, January 1988).

SOURCE: Office of Technology Assessment, 1989.