U.S. Department of Health and Human Services
Assistant Secretary for Planning and Evaluation
Office of Disability, Aging and Long-Term Care Policy

AGENCY CLOSINGS AND CHANGES IN MEDICARE HOME HEALTH USE:

1996-1999

July 2003

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ABSTRACT

Implementation of the 1997 Balanced Budget Act's home health provisions dramatically reduced Medicare home health utilization and led to closures of many agencies. This paper examined the potential effects of the agency closings on beneficiary utilization rates. Findings suggest that agency closings, *per se*, had only a very small impact on changes in utilization rates between 1996 and 1999.

I. INTRODUCTION

The 1997 Balanced Budget Act (BBA) dramatically reduced Medicare home health spending from $16 billion in 1996 to $7 billion in 1999, and contributed to a 15% decline in the number of Medicare participating home health agencies (HHAs) between 1996 and 1999. Although the central feature of the BBA's home health provisions was the mandate for a prospective payment system (PPS), it was the interim payment system (IPS) that actually caused the structural change in spending. Also required by the BBA, the IPS went into effect in October 1997. Notably, the 50% reduction in spending between 1996 and 1999 associated with the IPS was followed by negligible changes in spending levels after the PPS was implemented in October, 2000. Hence, questions concerning changes in Medicare beneficiaries' access to home health services as a result of the BBA might logically refer to the impact of the IPS, rather than the PPS.

Studies by U.S. General Accounting Office (GAO 1998, 1999) and the U.S. Department of Health and Human Services (HHS), Office of the Inspector General (HHS 1999, 2000) examined the impact of the IPS policies on beneficiaries and providers. In general, findings from these studies suggested no major problems with beneficiaries' access to home health services, but did not rule out the possibility of access problems in the long run. Our study builds on these prior descriptive studies and focuses on the question of how Medicare home health utilization changed after the implementation of the IPS, as a function of HHA closures.

The next section provides background on the Medicare home health benefit and payment changes under the IPS, and highlights findings from prior studies on the relationship between HHA closures and Medicare home health utilization before and after the IPS. We then describe this study's approach and the data sources used. Our findings address county-level utilization rate and agency closure patterns between 1996 and 1999. Estimates from multivariate analyses provide insight on the impact of agency closures on utilization rate changes.

II. BACKGROUND

Medicare Home Health Benefit

Medicare finances home health services for enrollees who require intermittent or part-time skilled nursing care and therapy services, and who are homebound. These services must be prescribed (and re-certified every 62 days) by a physician. There is no prior hospitalization requirement or limit on the number of visits a person may receive. Nor is there a co-payment for Medicare home health visits.

Although the Medicare home health benefit was originally conceived to be a post-hospital extended care service, it evolved during the 1980's into more general home-based care for individuals requiring nursing or rehabilitative care. Despite the broadening of the benefit's intent, Medicare spending for home health grew only modestly during this period, in large part because of relatively strict coverage and eligibility rules. In 1988, however, a class-action lawsuit against HHS (Duggan v. Bowen 1988), which administers the Medicare program, resulted in a liberalization of coverage and eligibility standards by the Department.   New guidelines provided more explicit definitions of when patients' conditions constituted need for intermittent skilled nursing care. In addition, they provided that need for skilled management and evaluation (not necessarily along with skilled nursing care) would qualify an individual for the benefit, and that care needs could be chronic rather than progressively improving. These revisions expanded the number of beneficiaries eligible for home health services.

Not surprising, Medicare home health spending began to increase dramatically starting in 1990. From 1990 to 1996, for example, spending rose from $3.9 billion to $16.7 billion. A large portion of this increase was due to a rise in the number of visits per home health user, but the number of beneficiaries receiving home health services also increased (Komisar and Feder 1998).

1997 BBA

Concerned about the rapid rise in Medicare home health expenditures, Congress mandated in the BBA of 1997 that the Medicare home health benefit be paid through a PPS (implemented eventually in 2000). Until a PPS could be developed, an IPS would be imposed, starting in October 1997, to limit Medicare home health spending.

The IPS established lower per-visit payment limits, as well as a per-beneficiary limit on HHAs. In general, the per-visit limits were reduced from 112% of the national mean cost per-visit to 105% of the national median cost per-visit. The per-beneficiary payment limit was calculated by summing 75% of an agency's costs per beneficiary and 25% of the average cost per beneficiary for agencies in its census region. The latter constraint was expected to reduce payments the most severely.

After the IPS went into effect, utilization of Medicare home health dropped dramatically from 78 visits per user in 1997 to 46 visits per user in 1999 (McCall, Komisar, Petersons, et al. 2001). The use rate declined from 107 per 1000 enrollees to 85 per 1000 enrollees during the same time period. While the payment limits imposed by the IPS put a significant amount of pressure on HHAs to limit utilization, a substantial number of HHAs exited the Medicare program. The dramatic decrease in utilization and agency closings raised questions about whether beneficiaries were retaining access to Medicare home health services. Special concerns were express about rural communities which may have fewer alternatives when a local agency closes and beneficiaries with chronic illness who were likely to incur higher costs than the amounts of the cost limits established by the IPS (Smith and Rosenbaum 1998; Komisar and Feder 1998).

GAO Studies on HHA Closures and Beneficiary Access

Responding to Congressional concerns about HHA closures and beneficiary access, the GAO conducted studies of Medicare home health care with a focus on those concerns (GAO 1998, 1999). For those studies, GAO examined HHA certification status and beneficiary utilization information from Medicare administrative records, and conducted interviews with stakeholders, including hospital discharge planners, consumer advocates, state agency officials, and HHA representatives.

Although GAO found a high (14%) closure rate of Medicare participating HHAs after implementation of the IPS in October 1997, it did not conclude that the reduced capacity would be a threat to beneficiary access to the benefit, largely because there had been a very rapid growth in the number of agencies leading up to 1997.[1] Despite the high HHA closure rate after the IPS was implemented, the number of Medicare participating agencies in 1999 was comparable to the number of participating HHAs before the rapid growth period. GAO also found that agencies that stopped participating in Medicare were distinctive in their regional and provider characteristics. Approximately, 40% of the agencies that closed were located in three states (i.e., Louisiana, Oklahoma, and Texas), which were among those with the highest recent growth in number of agencies. Consistent with this trend, many agencies that closed were among those with under five years of participation in Medicare. Relative to agencies that continued to participate in Medicare after the IPS, agencies that closed were also likely to have been of proprietary ownership, located in urban areas, freestanding, and served lower than average numbers of patients.

GAO found large declines in both rates of beneficiary use and number of visits among users after IPS was implemented. In addition, while the IPS narrowed variations in use among counties, substantial variation continued to exist. Despite the utilization changes, interviews with hundreds of stakeholders indicated that, in general, Medicare

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[1] For example, there were 10,000 Medicare participating HHAs in 1997, as a result of a doubling of agencies between 1990 and 1997.

beneficiary access to home health services were not greatly affected by the agency closures. Some providers indicated, however, that individuals with greater needs (e.g., diabetics, wound care patients, individuals with Alzheimer's disease) required a greater effort to be placed. In sum, the GAO studies' findings suggested that closure of HHAs after the IPS was implemented did not generally affect access to Medicare home health benefit.

III. APPROACH AND DATA SOURCES

Approach

Extending the descriptive studies conducted by the GAO, we conducted county-level, multivariate analyses to estimate the impact of agency closures on Medicare home utilization. We examined the extent to which agency closings affected use rates between 1996 and 1999, years before and after the implementation of the IPS. County-level changes in Medicare home health users between 1996 and 1999 were estimated as a function of various measures of agency supply change between the two years. In particular, we examined: (1) percent of Medicare participating agencies in 1996 that became inactive by 1999; (2) percent of users in 1996 served by the closed agencies; and (3) net change in the number of agencies between 1996 and 1999. We included, in our models, variables on the demographic composition of counties (e.g., age, sex) and distributions of characteristics of agencies (e.g., ownership, recentness of certification). We also addressed the likelihood that changes in agency closings are endogenous with utilization changes.

Data Sources

The major source of data used in this study was Medicare administrative records maintained by the Centers for Medicare and Medicaid Services. The data sets included 1996 and 1999 Medicare HHA claims, Medicare's enrollment files, and data from the Online Survey, Certification and Reporting (OSCAR) system. We also used information from the 2000 Area Resource File (ARF). Medicare HHA claims data provided the number of home health users, while Medicare enrollment data provided denominator information for the construction of utilization rates. Data from the OSCAR provided information on characteristics of providers, including control of ownership (e.g., proprietary, non-profit) and date of participation in Medicare. The ARF files provided information on geographic characteristics of the HHAs, such as whether they were located in metropolitan areas, non-metropolitan urban areas, or rural areas.

We used 100% Medicare claims and enrollment data in 1996 and in 1999 to compare Medicare beneficiary use per thousand enrollees (Users/1000) in those two years. The rates were calculated at the county-level to assess geographic variations in beneficiary use. In both 1996 and 1999, users of the Medicare home health benefit resided in the same 3,079 counties in the United States. We designated agencies "active" in a given year if they had Medicare claims for that year. We also examined counties by age (<65, 65-74, 75-84, 85+), gender (male, female), and race (White, non-White) compositions of their enrollees, and by geographic characteristics, including population density and census region.

IV. FINDINGS

We present our findings in three sections. We first examine statistics on changes in county-level, utilization rates between 1996 and 1999. In this section, we also highlight characteristics of particular counties that had the greatest change in use rates between 1996 and 1999. We then examine patterns of HHA of closures between 1996 and 1999. Whereas the first two sections present descriptive statistics on the outcome of interest (utilization changes) and the intervention of interest (agency closure), the third section presents estimates from our multivariate analysis of the extent to which agency closure affected utilization rate changes after implementation of the IPS.

Changes in Medicare HHA Utilization between 1996 and 1999

We first examined utilization rates and changes by subgroups of Medicare beneficiaries and geographic characteristics of counties to derive insight on whether particular subgroups were disproportionately affected by the IPS. On average, county-level Medicare home health use rates declined by 29% between 1996 and 1999. This change reflects a substantial drop in the use rate from 104 per 1000 enrollees in 1996 to 72 per 1000 enrollees in 1999 (Table 1).

While Medicare home health use rates increase with age of enrollees, changes in the use rates between 1996 and 1999 were about the same for each of the age groups. Similarly, females have higher use rates than males, but the average percent change was identical for males and females. By race, Whites and non-Whites has approximately the same average number of users per county in 1996, but declines in use rates between 1996 and 1999 were considerably lower for non-Whites (19%) than for Whites (28%). These findings suggest that, whereas the IPS had a large impact on use rates between 1996 and 1999, most demographic subgroups of Medicare beneficiaries were not disproportionately affected by the trend. Non-Whites did have a smaller decline than Whites in use rates, but we were unable to explain, in this study, the causes behind this differential.

While differences in use rates varied only slightly by urban and rural location, they tended to be higher in the Small Urban and Rural locations, than in the denser population Metropolitan and Non-metropolitan Urban areas. The change in use rates between 1996 and 1999 was very similar among all four geographic groups.

In contrast to the modest differences among urban/rural locations, the regional differences in beneficiary utilization rates were considerable. In 1996, for example, the use rates were about 142 per 1000 enrollees in the West South Central and East South Central regions, but only 79 per 1000 enrollees in the West North Central region (Appendix A presents a list of the states in each region). Regions also varied widely in terms of changes in utilization rates between 1996 and 1999. For example, where use rates declined by about 20% in the Mid Atlantic and Pacific regions, the decline was

37% in the West South Central region and 32% in the East South Central region, these two regions had the highest use rates in 1996. These findings are consistent with GAO's findings that geographic variations in use rates narrowed after IPS was implemented, but that large differences still existed (GAO 1999).

Counties with the Highest Decline in Users Per 1000. While the statistics presented above refer to average changes across counties, we also sought a better understanding of the characteristics of counties that were most affected by the IPS. Thus, we identified the top 5% of counties (147 counties) with the highest percent decline in users per 1000 between 1996 and 1999. Table 2 shows that such "high impact" counties had a utilization rate decline (59%) that was much higher than that of other counties (29%) in the United States. Almost 90% of these counties were in rural (50%) or Small Urban areas (38%). In contrast, outside these 147 counties, only 65% of the remaining counties were in Rural or Small Urban areas. These "high impact" counties were also located disproportionately by region; 28% of these counties were located in the West North Central region, while almost 30% were located in the West South Central region. In contrast, New England, Mid Atlantic, and Pacific regions contained virtually none of the "high impact" counties.

We also examined the state locations of the "high impact" counties (not shown in tables). About 40% of the "high impact" counties were located in either Kansas (18.4%) or Texas (21.8%). The 27 counties in Kansas that fell into this category were approximately one-third of the total number of counties in Kansas (105) in which beneficiaries received Medicare home health services in 1996 and 1999. The proportion of "high impact" counties relative to all counties in Texas (32 of 253), 13%, was considerably smaller. Another notable state was Idaho which contained nine high impact counties out of a total of 44 counties (20%). Other states that had five or more of the "high impact" counties were Georgia, Illinois, Montana, Oklahoma, and Tennessee, but the proportion of such counties to total counties was relatively small. Although most "high impact" counties were rural and, therefore, contained relatively few people, individuals living in those counties were likely to have encountered greater access problems after the IPS was implemented.

Agency Closure Patterns between 1996 and 1999

This section highlights changes between 1996 and 1999 in the supply of Medicare HHAs. In 1996, 9,797 HHAs submitted claims to the Medicare program while, in 1999, only 8,305 agencies were active Medicare providers, resulting in a 15% net decline in the number of participating HHAs. Between 1996 and 1999, the actual closure rate among HHAs that provided Medicare services in 1996 was 26%. Thus, while one-quarter of active agencies in 1996 closed, entry of "new" agencies after 1996 led to a net change between 1996 and 1999 of only 15%.

Table 3 also presents the changes in supply by control of ownership. Proprietary HHAs had the greatest net decline (21%) between 1996 and 1999, while both non-profit

and government agencies had much smaller declines of about 7% each. Closure rates among participating HHAs in 1996 were greatest for proprietary agencies (36%). Non-profits had a lower percentage of closings (15%) than proprietary ones, while government HHAs were most stable. Proprietary HHAs also had the highest ratio of new Medicare providers in 1999, but the new entrants were much smaller in number than those that closed.

Changes in the home health provider market also varied by urban and rural locations. The largest metropolitan areas had the highest proportion, 30%, of HHA closures between 1996 and 1999. Although non-metropolitan urban areas had the next highest proportion of agency closures, changes in such areas were more like those of small urban and rural areas. Despite the higher number of new starts between 1996 and 1999 in the metropolitan areas, in contrast to the other geographic areas, the metro counties still experienced the largest net decline in HHAs between 1996 and 1999.

The higher percent of agency closings in the largest metropolitan areas, relative to less populated areas, suggests that such areas may have had an abundant supply of HHAs and that needs resulting from the closures of some agencies could be met by other HHAs. In contrast, where relatively few agencies were available, for example in rural areas, community needs could have made it more difficult for HHAs to close.

Finally, Table 3 shows variations across regions in HHA closures and net changes in the supply of agencies. Notably, HHA closures were particularly high in the West South Central (35%), Mountain (32%) and Pacific (36%) regions. Net changes in the supply of agencies were also higher in these same regions. These regions contain certain states that were identified to have notably high rates of HHA closings after the BBA (GAO 1998). Some of the states with the high percentage of HHA closings were also those with the most agencies before the BBA. For example, California, Louisiana, and Texas, collectively had about one-third of all Medicare participating HHAs in 1996. Other states, however, also had relatively large numbers of HHAs in 1996, but had relatively high retention rates among their active agencies. These states included Illinois, Minnesota, and New York. These latter states tended to have lower than average utilization (user rates and number of visits per user) before the IPS, and might, therefore, have been better able to adjust to the per-beneficiary payment limits imposed by the IPS.

"Market share" of closed agencies. An important perspective on the impact of agency closings is the "market share" of total utilization associated with those agencies. Table 4 presents the percent of HHAs that closed, by facility and geographic characteristics and the percent of total users in 1996 that they served. Overall, the 26% of agencies that closed between 1996 and 1999 served only 14% of the total users in 1996.

Percent of total users also varied by agency and geographic characteristics. For example, in the East North Central Region, the 21% of agencies that closed accounted for 11% of total users. In contrast, in the Mountain and Pacific regions the closed

agencies represented over 30% of all agencies active in 1996, but accounted for only 12% of total users in 1996. These findings suggest that the impact on utilization of the closed agencies was likely to be smaller than the agency closure rates implied.

Impact of Agency Closures on Medicare Home Health Utilization

The preceding two sections presented descriptive statistics on changes in home health use and changes in number of HHAs between 1996 and 1999. Here, we present findings from our analysis to relate the two phenomena. We estimated multivariate regression models to better understand the relationship between agency closures and use of home health services. The dependent variable is the percentage change between 1996 and 1999 in the use of home health services per 1000 enrollees within a county. Agency closings are measured as the percentage of agencies that served 20 or more persons in the county in 1996, but have no Medicare claims in 1999. Our assignment of HHAs as being a provider for a given county, conditional upon their serving 20 or more county residents, provided a partial screen of agencies that might have been marginal or random service providers to a particular county. Control variables include the age, gender, and race distributions of enrollees in the county, urban/rural location, geographic region, number of agencies serving over 20 persons in the county in 1996, the profit status of those agencies, and the share that were certified between 1993 and 1996 (i.e., recently certified Medicare providers).

Findings from an ordinary least squares (OLS) regression model are presented in the first column of Table 5. We found that the percentage of closures has a negative effect on the use rate, with a 10% increase in the share of HHA's closed leading to a 1.0% drop in the use rate. The coefficient for agency closure is statistically significant, and it implies a relatively small effect. For example, in the extreme, if all agencies closed, we would predict only 10% drop in service use. One cause of the relatively small coefficient is that in many areas, new agencies opened and remaining agencies expanded to pick up much of the slack. We also know that the HHAs that closed served fewer beneficiaries relative to those that remained open, so even with no new agencies or expansion of existing ones, impact of the closings would have been relatively small.

To test out these possible explanations, we examined two other measures of HHA supply: (1) the percentage of users served in 1996 by closed facilities;[2] and (2) the net change in the number of agencies between 1996 and 1999.[3] The findings are presented in columns two and three. The results show very similar patterns: even controlling for the size (number of users) of the closed agencies and agencies that open we see small effects of closures on utilization rates.

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[2] This was calculated as the percent of users in 1996 served by agencies (with 20 or more users) that closed divided by the users in 1996 served by all agencies (with 20 or more users).

[3] This was calculated by subtracting the number of HHAs (serving 20 or more users) in 1996 from the number of HHAs (serving 20 or more users) in 1999, and then dividing the difference by the number HHAs (serving 20 or more users) in 1996.

Two-stage least squares. Next, we used two-stage least squares to control for the possibility that closings within a county are endogenous. That is, part of the relationship between the use rate and the closings rate is not causal, but due to common variables that affect both measures. For instance, factors that affect the closure rate (e.g., over supply of services in the county, payment rules) may affect both the use rate in the county and rate of closures. A simple regression of the two variables may overstate the causal relationship between the variables.

To estimate the two-stage model, we require at least one instrument--a variable that affects the rate of closures in the county but has no direct effect on the use rate. Finding such a variable is difficult, because reductions in service (cutbacks) may be a step on the way to closure of a facility so that factors that affect one are likely to affect both. We assume that: (1) the share of recently certified (i.e., between 1993 and 1996) agencies in the county; and (2) the number of agencies in the county serving more than 20 beneficiaries each affects the share of facilities that close, but that neither has an effect on the use rate conditional on the extent of closures.[4] These would be valid if: (1) recently certified agencies operated at existing capacity until they decided to close; and (2) agencies in counties with an oversupply of agencies were more likely to close, but no more likely to reduce their services. In each case, we believe that the effect through closures is the primary effect, but that there is a small indirect effect as well.[5]

The two-stage least squares models, which are presented in Table 6 indicate effects similar to those observed in the OLS models, although they are estimated much less precisely as reflected in the larger standard errors. The increased standard errors result from reduced independent variation in the predicted measure of closures as compared to the actual measure. For instance, the point estimate in column one implies that a 10% increase in the closure rate would lead to a drop in the use rate by 1.7%. Measurement of closures using either the proportion of use associated with closed facilities or the net change in the number of agencies again lead to similar results.

Experimentation with other models also led to similar findings of relatively weak effects of closures. We varied the instruments used and obtained qualitatively the same results. For example, when we used the number of agencies in 1996 and the number of agencies interacted with urban status as instruments, following findings from the recent GAO (1999) report, we found a small and statistically insignificant positive impact. Other choices of instruments led to small negative findings. We also restricted the sample to only counties with a large number of agencies and found a larger effect. However, even in these areas, a 10% increase in closures leads to only a 2.1% drop in use using our preferred instruments.

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[4] GAO (1999) found that a large percent (64%) of agencies closing after the BBA were those whose tenure under Medicare was less than five years. It also concluded that a large number of HHAs that closed were located in geographic areas with a large supply of agencies in the first place.

[5] GAO (1999) found, however, that agencies that closed in 1998 had an 8% decline in number of beneficiaries between 1996 and 1997; active agencies, by comparison, had only a 1.6% decline.

V. DISCUSSION

Major reductions in Medicare spending and high rates of HHA closings followed the implementation of the BBA mandated IPS. Beyond the specific payment provisions in the IPS that led to a general reduction in utilization rates, it seemed plausible that the large number of HHAs that discontinued participation in Medicare would exacerbate reductions in utilization. Our study extended prior research to estimate the impact of HHA closings and utilization changes after implementation of the IPS.

We explored a number of different models in the two-stage regression analyses and found varying effects. In virtually all cases, however, the size of the coefficient was small, indicating that, while HHA closings probably had an effect on utilization rate change, that effect was small. This finding is consistent with a simple comparison of counties with zero HHA closings and those with any number of HHA closings. Counties with no HHA closings among their 1996 providers had a reduction in utilization rate of 27%, while counties that lost at least one HHA provider had a reduction in utilization of 32%. Thus, our findings suggest that changes in utilization rates after the IPS was implemented were attributable primarily to the direct effects of payment policy incentives and only marginally through changes in the supply of HHAs.

Responding to concerns about agency closures affecting access, studies by GAO (1998, 1999) concluded that the IPS did not significantly affect the home health industry's capacity to provide services. In addition, interviews with numerous stakeholders, primarily in rural counties, indicated that beneficiaries continued to have access to services, but that individuals with care needs costlier than the average would have increased difficulty obtaining home health care (GAO 1999).

Our findings are generally consistent with those of GAO in terms of the capacity of the HHA after the IPS. Although our analyses do not directly address changes in access to Medicare home health services, some findings are relevant to this question. Changes in use rates before and after the IPS were quite similar by demographic characteristics of Medicare enrollees and by urban/rural location, suggesting that, on average, particular subgroups did not appear to have been disproportionately affected. On the other hand, we identified particular counties that were "high impact" ones where utilization rates declined by 59% or more. Hence, it is reasonable to assume that beneficiaries living in these counties might have encountered reduced access to the Medicare home health benefit. It is notable that most of these counties were in Small Urban or Rural locations.

In conclusion, while the BBA mandated IPS had a remarkable impact on Medicare home health utilization, these outcomes were not significantly affected by the closing of participating HHAs. Thus, future policy considerations of the Medicare home health benefit might usefully focus more on ensuring access to subgroups of beneficiaries, particularly those with conditions requiring higher than average number of visits and

those residing in rural areas, than on addressing the capacity of the home health industry.

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APPENDIX A. STATES BY CENSUS REGION

Region	*Abbreviation*	*States Included*
New England	NE	Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island
Middle Atlantic	MA	New York, New Jersey, Pennsylvania
East North Central	ENC	Ohio, Michigan, Indiana, Illinois, Wisconsin
West North Central	WNC	Minnesota, Iowa, Missouri, Kansas, Nebraska, South Dakota, North Dakota
South Atlantic	SATL	Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida
East South Central	ESC	Kentucky, Tennessee, Mississippi, Alabama
West South Central	WSC	Arkansas, Louisiana, Texas, Oklahoma
Mountain	Mountain	Montana, Wyoming, Colorado, New Mexico, Arizona, Utah, Idaho, Nevada
Pacific	Pacific	Washington, Oregon, California, Hawaii, Alaska

TABLE 1: Number of HHA Users per 1000 Enrollees in a County, by Age and Gender, Urban/Rural Continuum and Region, 1996-1999			
	1996	**1999**	**Percent Change***
All Counties (n=3079)	104.7	72.3	-.29%
<65	50.8	35.4	-.23
65-74	67.3	46.3	-.27
75-84	155.1	105.3	-.29
85+	241.2	167.3	-.28
Male	83.0	57.8	-.28
Female	122.2	84.1	-.28
White	102.8	71.6	-.28
Non-White	105.7	75.9	-.19
Metro	94.7	67.6	-.27
Non-Metro Urban	94.2	68.0	-.26
Small Urban	112.0	75.9	-.30
Rural	106.7	72.6	-.28
NE	122.8	94.0	-.24
MA	91.1	72.3	-.19
ENC	91.0	65.2	-.27
WNC	78.9	56.9	-.26
SATL	106.5	75.5	-.27
ESC	142.3	92.1	-.32
WSC	141.1	87.5	-.37
Mountain	87.5	61.4	-.27
Pacific	74.1	57.6	-.20
* Percent change is the mean of the difference in use rates between 1996 and 1999 in a county.			

TABLE 2: Top 5% of Counties by Largest Decline in Users Per 1000 Enrollees, 1996-1999		
	Select Counties With Highest % Decline (n=147)	All Other Counties (n=2932)
1996 Use Rate	124.3	103.7
1999 Use Rate	51.0	73.3
Percent Change	-59%	-29%
Percent Distribution by Urban/Rural		
Metro	6.8%	27.5%
Non-Metro Urban	5.4	8.0
Small Urban	38.1	40.8
Rural	49.7	23.7
Percent Distribution by Region		
NE	0.0%	2.3%
MA	0.7	5.1
ENC	6.8	14.6
WNC	27.9	19.7
SATL	6.1	18.7
ESC	9.5	11.9
WSC	29.9	14.5
Mountain	18.4	8.6
Pacific	0.7	4.6

TABLE 3: Patterns of Medicare HHA Supply, 1996-1999						
	Active in 1996	Active in 1999	Between 96-99			
			Closed	Opened	Percent Closed	Net Change
U.S.*	9797	8305	2571	1079	26.2%	-15.2%
Voluntary	2977	2739	453	215	15.2	-8.0
Proprietary	5467	4296	1984	813	36.3	-21.4
Govt.	1353	1270	134	51	9.9	-6.1
Metropolitan	6568	5425	1972	829	30.0	-17.4
Non-Metropolitan	756	656	158	58	20.9	-13.2
Small Urban	1956	1754	354	152	18.1	-10.3
Rural	473	422	85	34	18.0	-10.8
NE	450	382	108	40	24.0	-15.1
Mid Atlantic	629	580	98	49	15.6	-7.8
ENC	1427	1278	306	157	21.4	-10.4
WNC	1080	949	222	91	20.6	-12.1
SATL	1102	1044	205	147	18.6	-5.2
ESC	591	550	71	30	12.0	-6.9
WSE	2768	2182	979	393	35.4	-21.2
Mountain	726	567	231	72	31.8	-21.9
Pacific	980	725	349	94	35.6	-26.0
* Excludes Alaska						

TABLE 4: Comparisons of Percent of HHAs that Closed in 1996-1999 and the Corresponding Percent of Total Users They Served in 1996		
	Percent Agency Closing	**Percent of Total Users**
All HHAs	26.2%	14.0%
Voluntary	15.2	8.9
Proprietary	36.3	22.7
Govt.	9.9	5.8
Metro	30.0	15.2
Non-Metro Urban	20.9	9.6
Small Urban	18.1	10.0
Rural	18.0	9.0
NE	24.0	12.2
MA	15.6	6.7
ENC	21.4	11.2
WNC	20.6	15.7
SATL	18.6	11.1
ESC	12.0	6.2
WSC	35.4	26.5
Mountain	31.8	12.4
Pacific	35.6	12.1

	Model by Definition of Closure		
TABLE 5: OLS Estimates of the Effect of Closures on Change in Use Rate Between 1996 and 1998 (Test-statistics in Parentheses)	**Percent Agency Closures**[1]	**Percent of Users Served by Closed Agency**[2]	**Net Change in Agencies**[3]
Percent Agency Closures[1]	-0.103* (-7.33)		
Percent of Users Served by Closed Agency[2]		-0.097* (-7.38)	
Net Change in Agencies[3]			0.114* (16.3)
County Characteristics			
Age distribution of enrollees:			
% 65-74	-0.067 (-0.69)	-0.056 (-0.57)	-0.024 (-0.25)
% 75-84	0.228 (1.66)	0.257 (1.87)	0.289* (2.17)
% 85 plus	0.285 (1.34)	0.306 (1.44)	0.353 (1.72)
% Female enrollees	-0.194 (-1.40)	-0.228 (-1.64)	-0.319 (-2.37)
% White enrollees	0.054* (2.22)	0.054* (2.23)	0.053* (2.26)
Urban	0.786 (1.19)	0.681 (1.03)	0.253 (0.39)
Region:			
Northeast	9.38* (5.13)	9.17* (5.01)	9.45* (5.34)
Mid Atlantic	8.81* (6.17)	8.86* (6.21)	9.02* (6.54)
East North Central	2.61* (2.49)	2.55* (2.44)	2.65* (2.62)
West North Central	-0.457 (-0.43)	-0.606 (-0.56)	0.321 (0.31)
South Atlantic	3.92* (3.73)	4.28* (4.09)	3.90* (3.85)
East South Central	1.46 (1.31)	1.74 (1.56)	1.51 (1.41)
Mountain	0.908 (0.77)	0.820 (0.70)	0.501 (0.44)
Pacific	5.63* (3.84)	5.21* (3.56)	5.58* (3.94)
Characteristics of Agencies in 1996 Serving 20 or More Enrollees			
% For-profit	-0.013 (-1.12)	-0.017 (-1.47)	-0.003 (-0.23)
% Non-profit	0.008 (0.82)	0.007 (0.80)	0.013 (1.45)
% Certified since 1992	-0.015 (-1.30)	-0.019 (-1.67)	-0.018 (-1.71)

TABLE 5 (*continued*)			
	Model by Definition of Closure		
	Percent Agency Closures[1]	**Percent of Users Served by Closed Agency**[2]	**Net Change in Agencies**[3]
# HHAs in 1996	0.010 (0.42)	0.009 (0.40)	0.016 (0.72)
Use rate in 1996	-127.3* (-14.8)	-127.0* (-14.7)	-125.0* (-15.0)
Constant	-12.2 (-1.52)	-11.8 (-1.48)	-10.2 (-1.32)
Number of observations	2977	2977	2977
R-squared	0.21	0.21	0.26

* Statistically significant at the 0.05 level.

1. Percent of agencies (serving 20+ users in 1996) that closed between 1996 and 1999.
2. Percent of users in 1996 served by agencies (serving 20+ users in 1996) that closed between 1996 and 1999.
3. Net change in the number of agencies (serving 20+ users) between 1996 and 1999.

	Model by Definition of Closure		
TABLE 6: Two-Stage Least Squares Estimates of the Effect of Closures on Change in Use Rate Between 1996 and 1998 (Test-statistics in Parentheses)			
	Percent Agency Closures[1]	**Percent of Users Served by Closed Agency[2]**	**Net Change in Agencies[3]**
Percent Agency Closures[1]	-0.176* (-2.64)		
Percent of Users Served by Closed Agency[2]		-0.210* (-2.55)	
Net Change in Agencies[3]			0.194* (2.40)
County Characteristics			
Age distribution of enrollees:			
% 65-74	-0.037 (-0.36)	0.007 (0.06)	0.036 (0.31)
% 75-84	0.208 (1.49)	0.258 (1.85)	0.313* (2.28)
% 85 plus	0.325 (1.49)	0.400 (1.75)	0.432 (1.86)
% Female enrollees	-0.206 (-1.47)	-0.290 (-1.96)	-0.413* (-2.42)
% White enrollees	0.052* (2.14)	0.051* (2.07)	0.052* (2.16)
Urban	0.952 (1.42)	0.799 (1.20)	0.084 (0.12)
Region:			
Northeast	9.17* (4.88)	8.56* (4.35)	9.43* (5.14)
Mid Atlantic	8.60* (5.74)	8.57* (5.65)	9.10* (6.37)
East North Central	2.86* (2.76)	2.91* (2.78)	3.01* (2.94)
West North Central	-0.437 (-0.40)	-0.741 (-0.67)	0.941 (0.82)
South Atlantic	3.53* (2.93)	4.10* (3.69)	3.61* (2.99)
East South Central	0.906 (0.65)	1.17 (0.87)	1.16 (0.85)
Mountain	1.20 (0.99)	1.22 (1.00)	0.479 (0.41)
Pacific	5.99* (4.07)	5.29* (3.58)	5.98* (4.13)
Characteristics of Agencies in 1996 Serving 20 or More Enrollees			
% For-profit	0.001 (0.07)	0.002 (0.10)	0.019 (0.68)
% Non-profit	0.010 (1.03)	0.011 (1.11)	0.019 (1.74)
% Certified since 1992	*a*	*a*	*a*
# HHAs in 1996	*a*	*a*	*a*

TABLE 6 (*continued*)			
	Model by Definition of Closure		
	Percent Agency Closures[1]	**Percent of Users Served by Closed Agency**[2]	**Net Change in Agencies**[3]
Use rate in 1996	-123.4* (-13.1)	-120.1* (-11.9)	-119.6* (-11.7)
Constant	-13.0 (-1.63)	-12.7 (-1.58)	-10.0 (-1.27)
Number of observations	2977	2977	2977
R-squared	0.20	0.19	0.23

* Statistically significant at the .05 level.

1. Percent of agencies (serving 20+ users in 1996) that closed between 1996 and 1999.
2. Percent of users in 1996 served by agencies (serving 20+ users in 1996) that closed between 1996 and 1999.
3. Net change in the number of agencies (serving 20+ users) between 1996 and 1999.

a. Instrument assumed to predict closures, but not change in use rate.