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Abt Associates Inc.

**Evaluation of
the Program of
All-Inclusive
Care for the
Elderly
Demonstration**

**A Comparison
of the PACE
Capitation Rates
to Projected
Costs in the
First Year of
Enrollment**

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Executive Summary

Providing affordable and efficacious acute and long-term care services for the frail elderly is one of the major challenges facing the nation's health care system, particularly as the elderly segment of the population continues to grow. Yet this challenge is even more compelling for the dually eligible elderly population as the costs of their care represent a disproportionate share of Medicare and Medicaid expenditures. The 1998 Medicare Chart book reported that in 1995 the six million[1] dually eligible beneficiaries accounted for 30 percent of Medicare spending, though they represented only 16 percent of the Medicare population. The dually eligible accounted for 35 percent of Medicaid spending, though they only made up 17 percent of the Medicaid population.[2]

Integration across the continuum of primary, acute and long term care services for vulnerable populations has gained attention in recent years as an approach that could produce both cost efficiencies and more appropriate decisions on the settings in which care is delivered. Evidence to date on programs that have attempted to integrate acute and long-term services is mixed, especially when one tries to balance cost considerations with quality of care. Among the more well-known initiatives, such as S/HMOs, the Arizona LTC system (ALTCS), and, more recently, Medicare and Medicaid managed care, no studies have clearly demonstrated that the integration of acute and long-term care services will lead to overall higher quality care delivered at lower costs to the public. Even when effects on patient outcomes were positive, significant cost savings did not typically follow — primarily because the impacts on more costly service utilization, such as hospitalizations and nursing home placements, did not result in decreased use *or* lower intensity of that care.

The program of All-Inclusive Care for the Elderly (PACE) is an innovative model that seeks positive outcomes and cost savings by providing a range of integrated preventative, acute care, and long-term care services to manage the often complex medical, functional, and social needs of the frail elderly. Thus, the evaluation of the PACE program provided an opportunity to re-examine this link between quality, utilization, and the costs of care for services targeted to the frail elderly.

This study compares the expected medical and program costs of PACE Demonstration enrollees in their initial year of participation to the actual payments made by the government, under the fixed Medicare and Medicaid capitation rates. There is no fee-for-service (FFS) data for PACE enrollees after they enter the program. Consequently, medical expenditures were projected using a multivariate regression model. Conceptually, costs are projected for each enrollee by taking the actual medical costs incurred before entering PACE, and adding an increment based on the before and after experience of a comparison group. The comparison group included individuals who expressed a similar interest in PACE and who had the same application screening process as enrollees, but who ultimately did not enroll in the program.

Before summarizing the results, the following study limitations are noted:

- Cost projections are only made for new enrollees. The projection method could not be used for existing enrollees, or for new enrollees beyond the first year of participation in PACE.

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[1]   This figure includes the disabled and ESRD, as well as the elderly.

[2]   "A Profile of Medicare: Chart Book", Health Care Financing Administration, 1998, p. 30.

$ Higher end of life costs and long term care nursing home and other institutionalization costs that are incurred after the one year projection period are absent from the cost projection. Non-covered services, such as preventative and restorative interventions, are also excluded from the cost projections.

- Since the research design is quasi-experimental, the proof that PACE has had impacts is less persuasive than it would have been had the subjects of this evaluation been randomly assigned to enrollment and non-enrollment status.

- PACE sites differ with respect to local practice patterns, how the PACE model was implemented, and other area-specific factors. Therefore, it would have been desirable to estimate separate models for each PACE site. Such an approach was not feasible, given the relatively small sample size available for the evaluation. Instead, all sites were pooled together in a single set of models, which included a set of site indicators intended to adjust for differences across sites that were associated with cost differences.

- These study limitations and the resulting effect on the precision of the models and the great variability of the data precludes making strong statements about the adequacy of the rates, for both Medicare and Medicaid.

In a participant's first year of enrollment, our best estimate is that projected total Medicare and Medicaid costs at the 11 PACE sites were $3,010 per month[3], about 10 percent lower than the combined Medicare and Medicaid capitation payments. However, excluding two non-representative sites, the Bronx (having an extraordinarily high Medicaid rate and projected costs) and On Lok (the most mature and original site), the projected costs of the replication sites were almost equal to the capitated payment rates, i.e., 4 percent lower than payments. In the first year of enrollment, the Medicare portion of the capitation rate was 42 percent less than projected Medicare costs (across all sites), while the Medicaid portion of the capitation rate was 86 percent higher than projected Medicaid costs.

Limited data permitted cost projections only for the first year following enrollment, so it was not possible to project the time trajectory of costs beyond these twelve months. However, both the PACE enrollees and the comparison group exhibited higher Medicare costs at the time of their interest in joining PACE than in the prior 12 months. The comparison group had lower costs 12 months after expressing an interest. This suggests that individuals may be most interested in joining PACE after some precipitating medical event. If this trajectory is applicable to PACE enrollees, expected Medicare costs may be lower after the initial enrollment year. In contrast, the comparison group experienced steadily increasing Medicaid costs in the same time period. Assuming this trajectory for PACE enrollees, it is likely that Medicaid costs of PACE enrollees would increase after the initial enrollment year.

In a capitated rate environment, profit-maximizing providers have an economic incentive to seek out individuals who require few medical services. In the PACE demonstration, this incentive effect appears to be lessened or absent, as sites were enrolling a high cost frail population. The Medicare costs of participants exceeded the Medicare capitation rate prior to enrollment. After enrollment

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[3] This projected cost estimate was based on Model 2 (see description in the Methodology section).

PACE, the projected Medicare costs in the initial year were substantially higher than the capitated payment levels.

Because this study compares costs to payments, an obvious application of this work is to use it to assess the adequacy of the Medicare and Medicaid rates. Unfortunately, we are reluctant to recommend using the information provided in this report for this purpose because only the first year of participation was considered and the projected costs had a large statistical tolerance (margin of error). Further investigation of the predicted costs and service usage after the initial enrollment years should be considered before altering payment policies.

The remainder of this report presents a more complete discussion of the evaluation findings.

1.0 Introduction

Providing affordable acute and long-term care services for the frail elderly is one of the major challenges facing the nation's health care system. This population often experiences difficulty in obtaining access to and paying for needed community-based care. Lack of coordination of needed medical services can lead to unnecessary use of more costly inpatient or institutional care. The Program of All-Inclusive Care for the Elderly (PACE) represents an innovative approach to caring for frail elders, by providing them with the support they need to avoid nursing home placement.

The PACE program has received widespread attention from policymakers and health care providers seeking cost-effective options for meeting the needs of the nursing home eligible population. A premise of PACE is a belief that the costs of providing a comprehensive package of services that includes all Medicare and Medicaid-covered benefits and also the additional services provided by the sites may be offset by the reduced utilization of more expensive hospital and nursing home services. A separate study conducted by Abt Associates Inc. for the PACE evaluation found participation in PACE to be associated with a large decrease in the number of inpatient hospital and nursing home admissions and days (Chatterji, Burstein, Kidder and White, 1998), which suggests that the preventative and rehabilitative services emphasized by PACE providers reduce the need for hospitalization and nursing home placement.

The purpose of this report is to determine if and to what extent Medicare and Medicaid had monetary savings as a result of the PACE program. To estimate these savings, we compared the capitation payments received by PACE sites to an estimate of what costs would have been in the first year of enrollment had participants remained in the fee-for-service (FFS) system. Since there is no comparable FFS cost data for PACE participants, these estimates were based in part on the costs incurred by a comparison group that included individuals who went through the initial application for PACE, but who ultimately decided not to enroll in the program.

1.1   Background

The PACE approach was conceived and refined at On Lok, an organization founded in 1971 in the Chinese community of San Francisco. By the end of the decade, the program began providing coordinated and integrated long-term care to frail elderly in the Chinatown community of San Francisco. On Lok participants were among the most frail elderly in the community, those considered most at risk of otherwise needing institutional placement to receive long-term care services. Coordination of services was a priority, with care plans created by interdisciplinary teams and centered around adult day health care. Although Medicare and Medicaid funding for services continued to be provided on a fee-for-service basis under the respective programs (90 percent of the clients were both Medicare- and Medicaid-eligible), this creativity of the On Lok team produced a *de facto* merger of Medicare and Medicaid funding for the integrated services. In 1983, funding followed suit as Medicare and Medicaid payments each were capitated. Capitation had the effect of pooling the funds of the two programs, since payments now were automatically made on the basis of enrollment and were no longer attached to the delivery of specific services. At the same time, capitation created incentives for cost-effective care, since the program was now at risk for the costs of all medical care participants needed. The introduction of capitation completed the basic structure of the On Lok model.

The Omnibus Reconciliation Act (OBRA) of 1986 mandated replication of the On Lok model at a maximum of ten sites, setting the stage for the PACE demonstration. Legislation in 1990 increased the limit on replication to 15 sites. In 1991, the Health Care Financing Administration awarded a contract to Abt Associates Inc. to evaluate the PACE replications. In total, eleven PACE programs, operating under dual capitation, participated in the evaluation:

- the original PACE program:
  - On Lok Senior Health Services in San Francisco, California.

- ten PACE replication sites operating under capitation by the end of CY 1992:

  - Elder Service Plan in East Boston, Massachusetts
  - Providence ElderPlace in Portland, Oregon
  - Palmetto SeniorCare in Columbia, South Carolina
  - Community Care for the Elderly in Milwaukee, Wisconsin
  - Total Longterm Care in Denver, Colorado
  - Comprehensive Care Management in Bronx, New York
  - Independent Living for Seniors in Rochester, New York
  - Sutter SeniorCare in Sacramento, California
  - Bienvivir Senior Health Services in El Paso, Texas.
  - Center for Elders Independence in Oakland, California.

The 1997 Balanced Budget Agreement established PACE as a permanent provider under Medicare and allows states the option to pay for PACE services under Medicaid. This legislation allows the PACE model to evolve into a more dynamic version of the original program. Today, there are some important differences across sites with respect to the climate in which each developed (i.e., state support, existence and relative support of a sponsor) and the adaptation of various concepts within the basic model. Nevertheless, the distinguishing features of the PACE approach remain and center around the model that maintains the health and functional status of participants by integrating a range of preventative, acute care, and long-term care services.

The population served by PACE consists of impaired and frail elders who, despite living at home, is nursing home eligible and likely to require custodial care for the rest of their lives. At the heart of the PACE model is an interdisciplinary team, consisting of many professionals, including physicians, nurse practitioners, social workers, nutritionists, and therapists, as well as health and transportation workers. The team works together to coordinate and provide medical and social services across the acute and long-term settings. These services are provided in an adult day health center, which also services as a social center for participants. The PACE model attempts to maintain and improve health by integrating a range of preventative, acute care, and long-term care services and providing most of these services in an adult day health center.

PACE services are financed by combined Medicare and Medicaid prospective capitation payments, and, in some instances, through private premiums. Providers receive a capitated monthly fee for each participant, and combine these funds into a common pool from which providers pay health care expenses. Sites assume financial risk for the costs of all medical care (including inpatient hospitalization, nursing home, adult day health, home health, rehabilitation, and physician visits) for

their clients. To date, PACE is the only permanent Medicare program targeted solely to frail and impaired elders in which providers assume full financial risk.

The Medicare capitation rate for PACE is based on 95% of the local Adjusted Average per Capita Cost (AAPCC) multiplied by a "frailty adjustment" of 2.39 that reflects the higher costs of caring for the community dwelling frail elderly in the fee-for-service (FFS) system (see Gruenberg, Thompkins and Frank, 1989; Gruenberg, Rumishkaya, Kaganova, 1993). The same frailty adjustment is used across all sites, and the payment does not vary based on severity or on the services used by individual clients. Most PACE participants are dually eligible, as a goal of the program is to reduce the fragmentation of services and effectively integrate acute and long-term care into a "single, seamless system" (Vladek, 1996). States pay Medicaid's share of capitated rates based on an estimate of how much Medicaid would pay for PACE participants in alternative settings, such as nursing homes. While these estimates vary across states, the rates generally range between 85 and 95 percent of the estimated payments for skilled care, and little recognition of home and community-based service payments.

1.2 Technical Approach

Ideally, a randomized design approach would have been used for evaluating the PACE program. By design, such an approach would have controlled for issues of self selection, thereby ensuring that members of the treatment group (enrollees) and comparison group (non-enrollees) would have been the same, on average, with respect to observable and unobservable variables (such as demographic and service area characteristics).

The preferential approach could not be used because adequate PACE enrollment levels were not achieved and HCFA was concerned about access to care. The constraints of a geographically-confined service area and the restrictive eligibility requirements for enrollment both contributed to lower than projected participation in PACE. With a randomized design, access to care would have been denied to a proportion of applicants in need of and eligible for PACE services. Given the frailty of the target population, this was considered highly inappropriate and potentially detrimental to increasing PACE participation rates, given the voluntary process of program enrollment. Therefore, HCFA, Abt Associates Inc., and PACE program staff agreed to abandon a randomized controlled trial.

Faced with the challenge of identifying a quasi-experimental design approach, the issue of self-selection and the identification of an appropriate comparison group were brought to the forefront. To address the issue of selection, evaluators considered an identification-by-design model that draws on the development of instrumental variables. In this design, a sample of frail elderly would be randomly drawn from a PACE site's service area and a second sample from a comparison area similar in characteristics to the PACE service area. Using the appropriate statistical techniques, one can then estimate PACE treatment effects by comparing differences in outcome measures between the two samples. The statistical power to detect effects with the identification-by-design approach depends on the catch rate, or the ratio of the number of PACE participants in the service area to the total sample size of the service area. In pursuing this approach, it was concluded that PACE enrollment rates were too low to estimate catch rates sufficiently high to support this approach.

To estimate the effects of PACE, the evaluation used a **concurrent comparison design,** drawing on data from an in-person survey of PACE applicants, to compare the experiences of the treatment group

(or enrollees) and a comparison group. The analysis sample of applicants included all individuals who made an initial application to PACE, who were found by the sites to meet initial eligibility criteria, and who had a home visit between January, 1995, and September, 1997.[4] During this period, 3,009 individuals met these criteria. The treatment group included individuals who expressed an interest in PACE, had a home visit, decided to enroll in PACE, and were accepted into the PACE program prior to the collection of follow-up data. The comparison group consisted of individuals who had the same application screening process as enrollees and went through initial application procedures before deciding not to enroll. In order to control for the potential distortions due to measured and unmeasured factors resulting from the voluntary enrollment decision, multivariate statistical techniques were used to explain the enrollment decision and to adjust the impact measures. However, we acknowledge that the quasi-experimental design precludes us from controlling for all unobserved factors that affect PACE enrollment and outcomes.

In the absence of a randomized design, selection bias arising from differences between enrollees and comparison group members that affect costs, is a concern. To adjust for observable differences between enrollees and comparison group members, multivariate regression techniques were used to analyze the relationship between baseline characteristics and subsequent Medicare and Medicaid reimbursement for comparison group members. The regression coefficients were combined with information on the baseline characteristics of enrollees to estimate projected Medicare and Medicaid costs for enrollees. An implicit assumption underlying this approach is that the cost relationships experienced by comparison group members were the same as the cost relationships for enrollees (in the absence of PACE). Estimates of the impacts of PACE on government costs (under the current capitation rates) were produced by comparing predicted costs to the actual payments incurred by the government, under the fixed Medicare and Medicaid capitation rates.

Medicare and Medicaid reimbursement data were aggregated into 12-month periods corresponding to the 12 months prior to and following the initial home visit. The actual number of months for which data were available varied, depending on when the home visit occurred, as the data covered the period only through June 30, 1997 (six months after the final home visit in the study period). Thus, the minimum period for estimating impacts was six months. The maximum period, for a few respondents interviewed early in January 1995, was thirty months. Data from the first two six-month periods was then combined into one 12-month period following enrollment. Because cost data beyond month 12 was observed for only a small number of comparison group members, it was not possible to develop reliable cost estimates beyond the 12-month period.

1.3   Overview of Results

The combined Medicare and Medicaid payments made to PACE programs were higher than our best estimate of costs had participants not enrolled in PACE. For periods of enrollment in the first 12 months following the initial home visit, projected costs for dually eligible enrollees were $3,010 per month.[5] The PACE sites received an average capitated payment of $3,301 per month during this

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[4]   PACE eligibility criteria require that the applicant be at least 55 years of age; reside in the catchment area served by the site; be Medicare and Medicaid eligible or willing to pay the monthly cost of participation; be certified as meeting state skilled level of care requirements; and have the potential to remain in the community with assistance.

[5]   This projected cost estimate was based on Model 2 (see description in the Methodology section).

period, which was approximately ten percent higher than projected in the initial enrollment year. However, excluding two non-representative sites, the Bronx (having an extraordinarily high Medicaid rate and projected costs) and On Lok (the most mature and original site), the projected costs of the replication sites were almost equal to the capitated payment rates, i.e., 4 percent lower than payments.

Impacts on Medicare and Medicaid were different. For this 12-month study period, PACE represented savings for the Medicare program at the formula-determined AAPCC rates. In the first twelve months following enrollment, the Medicare capitation rate was 42 percent lower than projected Medicare payments in the absence of PACE. This result indicates that payments by Medicare were lower than our best estimate of what payments would have been had PACE enrollees remained in the FFS setting in the first year of enrollment.

In contrast, the Medicaid capitation rate was higher than projected Medicaid costs in the first year of enrollment. In fact, our analysis shows that this was already the case in the period preceding application to PACE for both enrollees and comparison group members. Average monthly Medicaid costs for enrollees in the year preceding enrollment were less than half as high as the subsequent Medicaid capitation payments made to PACE. The following table summarizes projected costs and capitated payments for each government payer.

Medical Costs of PACE

		Medicare		Medicaid	
		$	% Cost	$	% Cost
Baseline 12 months prior to decision to participate					
1	**Actual Cost per month**	1,396		914	
	Future capitated payments	1,072		2,249	
	Difference	(324)	-23%	1,335	146%
Projected 12 months cost after enrollment					
2	**Basic regression: gender, age, site indicator**				
	Projected cost per month	1,844		1,211	
	Actual capitated payments	1,072		2,249	
	Difference	(772)	-42%	1,038	86%
3	**Full regression: basic plus surveyed medical conditions**				
	Projected cost per month	1,921		1,193	
	Actual capitated payments	1,037		2,176	
	Difference	(884)	-46%	983	82%

Note: a smaller sample size is used in the full regression, which results in different capitated payment figures, as they are site dependent.

Conceptually, costs are projected for each enrollee by taking the actual medical costs incurred before entering PACE, and adding an increment based on the before and after experience of a comparison group. The comparison group included individuals who expressed a similar interest in PACE and who had the same application screening process as enrollees, but who ultimately did not enroll in the program. The comparison group exhibited higher Medicare costs at the time of their interest in joining PACE than 12 months before and after. If this trajectory is applicable to PACE enrollees, expected Medicare costs may be lower after the initial enrollment year.

In contrast, the comparison group experienced steadily increasing Medicaid costs in the same time period. Assuming this trajectory for PACE enrollees, it is likely that Medicaid costs of PACE

enrollees would increase after the initial enrollment year. The following table illustrates the observable cost trends of the two groups.

Trajectory of 6 Month Costs During Study Period
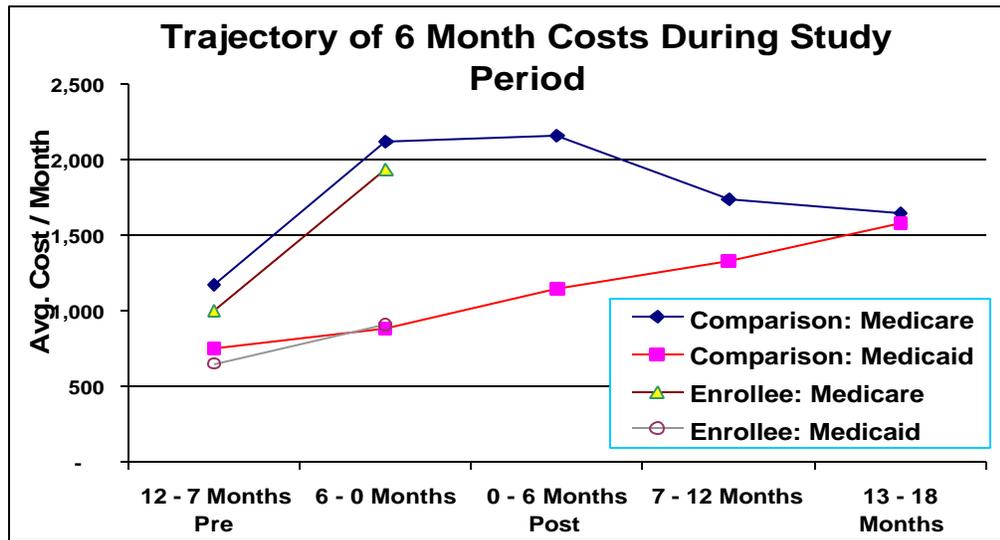
Note: There is no fee-for-service (FFS) data for PACE enrollees after they enter the program.

Sources: Medicare and Medicaid claims data.

We underscore that these findings do not measure the true cost-effectiveness of the PACE model. The analysis compares Medicare and Medicaid capitation payments to an estimate of projected costs for enrollees in the absence of PACE rather than an estimate of the actual costs incurred by the sites in providing care to these individuals. As such, these results simply represent the gap between the payment rates and our best estimate of what costs would have been in the absence of PACE. They do not reflect any operational effects of PACE, other than our observation that the PACE sites were able to operate within the capitated payment received. Our earlier examination of site's cost and revenue experiences indicates that, on average, service revenues exceeded expenditures by less than 10 percent across more mature PACE sites.[6] These surpluses were generally re-invested subsequently in internal operations or program expansion, resulting in decreases in the level of financial surpluses over time.

Finally, to evaluate the effectiveness of the PACE model, one must consider not only the financial implications of the program, but also the outcomes associated with participation in PACE. We found that participation in PACE was associated with improvements in several measures of health status and quality of life, including increased life expectancy, fewer hospital and nursing home days, better (self-reported) health status, higher general satisfaction with life, and greater satisfaction with overall care arrangements (see Chatterji, Burstein, Kidder and White, 1998). Achievement of these outcomes for the vulnerable, frail population targeted by PACE providers is a major accomplishment, especially given the largely small and mixed effects of other home and community-based service programs (see Weissert et al., 1988, Weiner and Skaggs, 1995), even if these accomplishments were not costless. Whether the positive outcomes associated with PACE are worth the costs associated with the program

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[6]   These figures are based on service cost and revenue data reported on site cost reports submitted between calendar years 1992 and 1995. For the purposes of this discussion, our estimate of surplus across sites includes sites with more than two years of operating experience and excludes outlier sites with particularly low or high surpluses.

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is a normative question that is beyond the scope of this report, and ultimately depends on the value placed by members of society in improving the health status and quality of life for the frail elderly population.

2.0 Data and Analysis Sample

The analysis sample for this report includes all individuals who made an initial application to the PACE site, were found to be eligible by the site, and who had a home visit between early January 1995 and September 1997. PACE eligibility standards require that the applicant be at least 55 years of age; reside in the catchment area; be Medicare and Medicaid eligible, or Medicare eligible and willing to pay the monthly costs of participation; be verified by the state as meeting the SNF level of care requirements; and have the potential to remain in the community with assistance.[7]

Applicants were referred to the program by providers, referral agencies, social service agencies, caregivers, and family and friends. The latter group, along with word-of- mouth, has become an increasingly important source of referrals (see Zimmerman et al., 1997). During the study period, after the PACE site received a referral, staff contacted the potential client and verified that the individual was eligible and interested. The applicant was then asked to participate in the survey process, and, if consent was obtained, the baseline interview was conducted in the home. This process of referral, home visit, and request for survey consent was similar across the sites. Note that this process may precede the actual determination of the eligibility by a state at the time of the home visit. Consequently, it is possible that some portion of the sample includes individuals determined to be ineligible on the basis of need, if that determination was made late in the application and enrollment process. We attempted to eliminate non-NHC eligible persons in the comparison group by asking sites to identify such cases regardless of the individual's survey participation status. However, it is still possible that not all sites rigorously identified such individuals, and hence, the comparison sample may not be pure.

During the study period, we recorded 3,009 individuals who met the eligibility criteria as having applied to the PACE program. Medicare data were available for 2,712 of these individuals, and we were able to identify 1,989 individuals with Medicaid data. Since Medicare ESRD beneficiaries are not paid on a capitated basis, these individuals were excluded from Medicare cost analyses, but were included in the Medicaid cost analysis.

The following data sources were used for this report.

2.1   Abt Survey of PACE applicants

A survey of applicants to On Lok and the ten PACE demonstration sites began in early January 1995 and continued through February 1997. The survey was conducted by Abt Associates for HCFA. The survey was administered as an in-person interview at the applicant's home, shortly after the individual

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[7]   PACE providers may choose not to enroll applicants whose condition is such at the point of enrollment that their health and safety would be jeopardized by remaining in their home and community. In our evaluation design, such individuals would be considered ineligible for PACE and would not be classified as comparison group members.

made an initial application to the local PACE site and the site made an initial determination that the applicant was eligible. The survey included both those who enrolled in PACE and those who decided against enrolling after receiving a home visit.

All applicants who received a home visit during the study period were asked to participate in the baseline survey. The purpose of the initial home visit was to explain the program to the prospective beneficiary and to verify the proper level of care (LOC) requirements for PACE eligibility/ enrollment. The selection of the initial home visit as the anchor point for the data collection had been discussed with the PACE organizations and the National PACE Association. Collection of data began with a baseline in-person interview soon after the initial in-home eligibility assessment and before the enrollment decision was made and in some cases before a finding if nursing home certifiable (NHC) eligibility was made by a state. Identical follow-up data collection was undertaken for both enrollees and comparison group members to supplement the baseline interview, with follow-up in-person interviews occurring at six-month intervals.

In addition to general demographic information, the survey collected information on the following topics:

- Health status: self-reported health status and the presence of particular medical conditions;

- Vision, hearing, and cognitive impairment;

- Limitations in Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs) and use of assistive devices;

- Medical care utilization patterns (hospital, nursing home, physician, home health) in the six months prior to the survey;

- Client satisfaction with and access to medical services; and

- Quality of life.

The comprehensive baseline interview was administered early in the application process and was followed by six-month follow-up interviews (also done in-person) until the respondent died or the June 1997 end of the data collection period was reached.

For the survey, proxies responded to survey questions for living clients who were unable to respond, and closeout surveys with proxies were conducted for deceased clients whose deaths occurred between surveys. Specifically, proxy responses instead of client responses were used in the following cases: (1) if participant responses were not available and a proxy had been interviewed; and (2) if a participant died between surveys and a closeout survey completed by a proxy was available. The use of proxy information was essential in this study because many PACE participants were too cognitively impaired to be directly interviewed. In general, a proxy was sought for a living participant in the following cases: (1) the participant responded incorrectly to five or more items on the Short Portable Mental Status Questionnaire; (2) the participant showed signs of dementia; or (3) the participant was unavailable for an extended period of time (e.g., long hospital stay).

Only 44% of applicants completed the baseline interview (see Appendix 1 for information on response rates by site). The response rate to the baseline survey was 47% for enrollees and 41% for comparison group members. As a result, we estimated a more limited model for the sample of non-respondents, based on data on Medicare and Medicaid costs in the pre-visit period, indicators of the site to which the individual applied, and a limited set of demographic variables from HCFA's Enrollment Database. This model, which we refer to as Method 2, is described in more detail below.

Appendix 4-b compares the characteristics of the enrollees to the comparison group. The following table summarizes key characteristics:

Key Characteristics of Enrollees and Comparison Group Members		
Characteristic	Enrollee Mean (n=697)	Comparison Mean (n = 322)
Female	72.7%	68.1%
12 + years education	76.2%	70.5%
# ADL Limitations	2.7	2.3
Alzheimer's disease	17.5%	15.2%
Monthly Medicare costs prior to home visit	$1,396	$1,603
Medicaid eligible	95%	78%

Source: Abt Survey of PACE applicants

Given similar population characteristics and intake processes, it is not unreasonable to assume that the comparison group was similar enough to the enrollee group for the analytic purposes required in this evaluation. Regression models were used to adjust for measurable demographic and other differences between the two groups, i.e., those related to gender, site, etc. In essence, costs prior to enrollment are increased by the experience of the comparison group, holding demographic and other variables constant. An increase in medical costs is anticipated given that a precipitating event is thought to trigger interest in PACE.

2.2   Medicare claims data

Claims data from HCFA were collected for all PACE applicants. The data covered the year preceding the home visit and covered the post-home visit period through June 30, 1997. To correspond to the periods covered by the survey data, Medicare reimbursement data were aggregated into six-month periods prior to and following the home visit date.[8] These dates correspond with the periods covered in the baseline and follow-up surveys. Claims that spanned more than one period were apportioned across periods based on the proportion of the claim that fell within each period.[9] For nursing home claims, which typically represent a single month of billing rather than an entire stay, overlapping claims were converted into a single stay.

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[8]   For the small number of cases that had missing home visit date information, this date was assumed to be the date that the individual enrolled in PACE or declined to enroll.

[9]   For example, if 2/3 of a claim fell into the first six-month period (based on admission and discharge dates), then 2/3 of the dollars associated with that claim would be assigned to the first six-month period.

The Medicare claims data include information on reimbursement levels for the following types of service:

- Long and short-stay inpatient
- Skilled nursing facility[10]
- Ambulatory services[11]
- Home health care[12]
- Other[13]

2.3   Medicaid Claims Data

Medicaid claims data for PACE applicants were received from all states with a PACE provider except for Oregon. The period covered by the data varied by state, but in general cover the year preceding the home visit and at least the period through the June 30, 1997 point covered by the Medicare data.

The methods used to process the Medicaid claims were similar to those used with the Medicare data. All claims were aggregated into six-month periods prior to and following the home visit date. Claims that spanned more than one period were apportioned across periods based on the proportion of the claim that fell within each period. Because nursing home records typically represent a month of billing, rather than a given stay, claims were converted into stay records, by linking claims that covered contiguous stays.

While the exact services included in the Medicaid data varied by state, the Medicaid claims data include information on costs for the following types of service:

- Hospital stays
- Nursing home stays
- Home health service
- Physician services
- Outpatient hospital services
- Drugs/pharmacy
- Durable medical equipment
- Ambulance/ transportation

Note that for managed care enrollees (in every state except for California), Medicaid reports the amount of the capitated payment made to the managed care plan, but has no information on costs by

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[10]   Includes Part B and durable medical equipment charges with place of service of skilled nursing facility or nursing home.

[11]   Ambulatory services are determined by the place of service on Part B claims. This included place of service in: office, emergency room, psychiatric facility partial hospitalization, community mental health center, ambulatory surgical center, comprehensive outpatient rehabilitation, state or local public health clinic, or independent lab.

[12]   Includes Part B and durable medical equipment claims with place of service of "home".

[13]   Includes Part B claims with place of service of "ambulance" or "other", outpatient claims with an ambulance procedure, and durable medical equipment claims with place of service of "other".

claim type. Because no Medicaid expenditure information was available for managed care enrollees in California, we excluded periods of Medicaid managed care enrollment for California beneficiaries from the calculations of Medicaid costs.

Claim lags for Medicaid data

Because of the time lag between when services are received (i.e., the date of service on the claims record) and when the claim for the service is reported in the Medicaid data, the Medicaid data were incomplete for months near the end of the study period, when many claims with a date of service in a given month presumably are not yet included in the data.

Failure to adjust for the claims lag would result in an underestimate of the Medicaid costs incurred by comparison group members, resulting in lower projected Medicaid costs for PACE enrollees. As a result, we adjusted Medicaid claims by a lag adjustment factor. For all states except for South Carolina and New York, we had available data on both the date of service and the date that the claim was paid (we used the date paid as a proxy for when the claim would be reported in the state's Medicaid file). The lag adjustment factor was based on how quickly claims were paid in the state:

$$lag_{(T-t)_i} = \frac{(total\ allowed\ charges_{T\,i})}{(total\ allowed\ charges\ reported\ by\ month\,t\,)_i}$$

$$lag_{(T-t)_i} = \frac{(total\ allowed\ charges_{T\,i})}{(total\ allowed\ charges\ reported\ by\ month\,t\,)_i}$$

where total allowed charges are the total allowed charges with a date of service in a month T (regardless of when the claim was paid) for state i and t is the number of months elapsed since the date of service. The lag adjustment factor gives the cumulative percentage of claims that have been paid within t months of the date of service. As t increases, the lag adjustment factor approaches 1. State-specific lag adjustment factors were calculated based on a subset of claims with a date of service at least two years before the last month covered by the data, under the assumption that virtually 100 percent of claims would be paid within two years.

The lag adjustment factors were used to adjust Medicaid claims that occurred within two years of the last date covered by the data (this date varied by state). The adjusted Medicaid cost variables were calculated as:

$$Medicaid_{adjusted_{(T-t)}} = Medicaid_{unadjusted_{(T-t)}} * lag_{(T-t)}$$

$$Medicaid_{adjusted_{(T-t)}} = Medicaid_{unadjusted_{(T-t)}} * lag_{(T-t)}$$

where unadjusted Medicaid claims are the actual dollars recorded within (T - t) months of the date of service.

Since data on the date that claims were paid was not available for New York and South Carolina, it was not possible to calculate lag adjustment factors using the methods described above. Instead, the lag adjustment factors for these states were imputed based on the mean lag adjustment factors observed across the other states.

2.4   Capitated payments to PACE sites

For program years 1995, 1996, and a portion of 1997, we calculated the actual per member per month (PMPM) Medicare and Medicaid portion of the capitation payment received by On Lok and each of the ten PACE demonstration sites (see Appendix 1). For each of the PACE sites, these rates were consistently calculated using the total Medicare and Medicaid revenue reported on audited financial reports in each program year and dividing by the corresponding cumulative member months for that same year. These financial reports were based on audited financial statements certified by an executive from a PACE site. To verify our interpretations of the financial data, we had extensive discussions with PACE financial officers. Audited financial information was not available for the On Lok site. Capitated payment rates for this site were calculated using dollar amounts from site-prepared financial statements, balance sheets, or budget reports. Census figures from DataPACE were used to calculate cumulative member months when site enrollment data was not available. For example, census figures were used for the member months from January through June 1997, as site cost reports were not yet completed at the time. We note that monthly census information was not available beyond June 1997; for this reason, we estimated total member months for program years that span beyond June by applying each site's average monthly census increase to the appropriate number of additional months. Since we needed to apply these estimates only to the last quarter of the evaluation data collection period (July-September 1997), any effect on the calculation of capitation payments is minimal.

The quoted Medicare capitation rate that is determined at the beginning of each calendar year is based on the Adjusted Average Per Capita Cost (AAPCC) for Medicare Part A and Part B. HCFA calculates a rate for each PACE site that is 2.39 times 95% of the AAPCC, reflecting estimated costs given the frail health of enrollees. Calculating the audited rates from actual Medicare revenue reported during a program year reflects the actual amount that was spent by HCFA for PACE participants at each site.

2.5   HCFA's Enrollment Database (EDB)

Through HCFA's Enrollment Database, we collected information on Medicare eligibility, date of death, and some limited demographic information (age and gender). This information was used to estimate reimbursement regression equations for individuals who did not respond to the baseline survey.

3.0 Methodology

The evaluation uses a concurrent comparison study design. The *treatment group* consists of those who enrolled in PACE during the January 1995- February 1997 data collection period. The *comparison group* consists of individuals who likewise expressed an interest in PACE and had a home visit during the study period. Comparison group members ultimately did not enroll in PACE, at least up to the time of collection of follow-up data.[14]

This design, from an analytical perspective, is not as rigorous as a randomized, controlled trial, in which frail, elders would have been randomly assigned to PACE and to a control group. A randomized controlled trial was considered for the study, but eventually HCFA, the evaluator, and the sites made a joint decision not to pursue this approach. Randomization was rejected for a variety of reasons, including concerns about potentially denying needed health services, identifying appropriate comparison groups for each PACE catchment area, and enrollment rates that were lower than originally projected. Ultimately, it was decided that a suitable comparison group would be individuals who, like all applicants, showed an interest in PACE and went through initial application procedures but then decided not to enroll. In some cases, comparison group members may have been determined subsequently to not be nursing home eligible.

3.1   Analytic methods

Three analytic methods were used to measure the impact of PACE on costs to Medicare and Medicaid:

Method 1: Descriptive analyses.
The first method of analysis compared enrollee costs in the pre-enrollment period to the PACE capitation payment. While no costs are projected using this method, it serves to establish a baseline to assess the reasonableness of the costs projected in Methods 2 and 3, which are described below. We also analyzed the change in comparison group Medicare and Medicaid costs in the pre- and post-enrollment periods, which allowed us to measure the change in costs between the pre- and post-application periods.

Methods 2 and 3: Regression Models.
Comparison group members may differ from enrollees with respect to characteristics (other than the enrollment decision itself) that are related to costs. The purpose of the multivariate regression models was to control for the differences in the baseline characteristics of enrollees and comparison group members that might cause projected costs for enrollees to be different from the actual costs incurred by comparison group members. Failure to take these initial differences into account could result in incorrect inferences about the level of costs for enrollees had they not participated in PACE.

Multivariate regression models were used for Methods 2 and 3. The dependent variables in these models were monthly Medicare and Medicaid costs in the period following application to PACE. Because these costs were not observed for enrollees, only comparison group members were included

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[14]   Clients who decided at the time of home visit that they definitely would not enroll in PACE are excluded from the comparison group.

in these models. Projected costs for enrollees were estimated using the regression coefficients from these models and information on the characteristics of enrollees (i.e., their values of the independent variables in the regression models).   An implicit assumption underlying this approach is that the increase in Medicare and Medicaid costs incurred by comparison group members are representative of the costs that would have been incurred by PACE enrollees had they not participated in the program.

Method 2: Basic regression.
This set of regression models (estimated using both survey respondents and non-respondents) included a limited set of independent variables. These included age and gender, which were derived from HCFA's Enrollment Database, pre-baseline Medicare or Medicaid reimbursement levels, and PACE site indicators. The advantage of this approach was that more data observations were available, since it did not depend on data from the Abt survey.

Method 3: Regression with Abt survey data.
A set of regression models was estimated for only the survey respondents. For these models, a broad range of covariates were selected with the intent of describing the baseline situation of applicants as completely and compactly as possible, reducing the probability that there are substantial differences in health status between enrollees and decliners with respect to characteristics that could affect subsequent reimbursement levels (see Appendix 3 for more detail on the variable selection process for this model). One goal in the selection of independent variables for this model was to have a statistically powerful model, as a model with higher predictive power should produce more accurate estimates of what costs for enrollees would have been had they not participated in PACE. The disadvantage of this model was its dependence on participation in the survey, which, with a 44 percent response rate, reduced the amount of data observations available for analysis.

Some factors that affect enrollment into PACE and/or costs were not measurable, either because we are unaware of their impact or because the data are simply not available. Neither the Medicare nor Medicaid models were able to account for more than 47 percent of the variance in costs, suggesting that there are unmeasured factors related to costs that are omitted from the regression models. Both the Method 2 and Method 3 models adjusted for reimbursement in the pre-application period, a strong predictor of reimbursement in the subsequent period, reducing the risk that results are biased due to selection. The Method 3 model also included a detailed set of measures of health and functional status, in addition to lagged Medicare and Medicaid costs, reducing the probability that selection bias seriously affected cost estimates.

3.2   Specification of Medicare and Medicaid cost variables

For Methods 2 and 3, the dependent variables were defined based on monthly Medicare and Medicaid reimbursement levels in the first 12 months following the home visit. Monthly Medicare reimbursement was calculated by dividing total Medicare reimbursement (in either the 12 months preceding or the 12 months following application to PACE) by the total number of months in the period that individuals were eligible for Medicare and not enrolled in a risk-based Medicare managed care plan. Individuals who were enrolled in risk-based managed care plans were excluded because claims data do not reflect costs incurred for periods of enrollment in those plans. Costs for the Medicaid models were calculated only for the proportion of the period that the individual was Medicaid eligible (with the exception of Medicaid managed care enrollees in California, for whom no

cost data was reported). The Medicare regression models were weighted based on the proportion of the period for which Medicare claims were observed; a similar weight was used for the Medicaid models.

Medicare costs for ESRD patients enrolled in PACE were not paid on a capitated basis. As a result, these patients were excluded from the Medicare cost analyses. ESRD patients were included in the Medicaid cost analyses since they were paid on a capitated basis for Medicaid. Medicare copayments and deductibles[15] were not considered in the Medicare portion of the PACE capitation rate. For the 95 percent of enrollees who were dually eligible, the costs of Medicare copayments and deductibles were covered by Medicaid, subject to the reimbursement methodologies of each state. As a result, the combined Medicare and Medicaid cost projection is the only analysis that considers the impact of copayments and deductibles.

Both Medicare and Medicaid costs were calculated only for that portion of the study period that individuals were alive. Because enrollment into PACE was associated with a lower mortality rate (see Chaterji et al., 1998), this specification does not capture the total cost implications of PACE, as it implicitly ignores any effects on mortality rates associated with PACE. For policy purposes, the relevant comparison is between the capitated payment rate and a measure of projected cost that does not consider any mortality effects associated with PACE.

Costs for comparison group members from On Lok were much lower than for other sites. Given the unique nature of the community served by On Lok, the site may not be an accurate reflection of cost patterns that would be observed as PACE expands. Both Medicaid costs and the Medicaid capitation rate were much higher for the Bronx site than for any other site. For these reasons, we analyzed the sensitivity of cost analyses to the exclusion of these two sites.

3.3   Risk of long term nursing home care

Eligibility for PACE requires enrollees to be certified by a state Medicaid agency as eligible for a nursing home level of care. In defining this eligibility, most states consider not only functional limitations, but also the availability of community supports, such as informal caregivers, and the safety of their physical environment. A person may be eligible for a nursing home level of care, but may reside in the community if adequate supports are available. Such a person may be at lower risk for nursing home placement. In contrast, a person lacking an adequate support structure may be at higher risk for nursing home placement.

The projection methods do not reflect the costs associated with the risk for nursing home placement, except to the extent that the comparison group was institutionalized during the cost projection year. Because only the first year of participation is projected, this method understates longer term nursing home costs, which may increase as participant's age and become higher risk for nursing home placement.

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[15]   Medicare rules for patient cost sharing liability are complicated, but for outpatient services (Part B) include a nominal deductible along with a 20 percent copayment for approved charges. Inpatient (Part A) services require a deductible which approximates the allowed charge for the first inpatient day. Additional cost sharing requirements accrue for hospital stays longer than 60 days.

3.4　Specification of regression models

Because the PACE sites may differ with respect to local practice patterns, how the PACE model was implemented, and with respect to other area-specific factors, it would have been desirable to estimate separate models for each PACE site. The small sample size, however, did not support this approach. Across the eleven sites, the comparison group includes a total of 671 individuals, 341 for which baseline survey data were available. There were 381 comparison group members for whom Medicaid data were available, 202 of whom were also survey respondents.

The basic assumption underlying this approach is that the cost experience for comparison group members can be used to estimate projected costs for enrollees (adjusted for observable differences between enrollees and comparison group members). Comparison group members were used to model separately Medicare and Medicaid reimbursement in the 12 months following the initial home visit.

For Method 2, independent variables included pre-baseline Medicare or Medicaid reimbursement levels and a limited set of demographic variables (age and gender) that were taken from HCFA's Enrollment Data Base. The independent variables used in the Method 3 regressions included measures of demographic and socioeconomic status, pre-baseline Medicare or Medicaid reimbursement levels, measures of health and functional status, medical conditions present as of the home visit, information on self-reported quality of life, and PACE site indicators. The same independent variables were used in both the Medicare and Medicaid models, except for the lagged reimbursement measure.

Regression coefficients and information on enrollee characteristics to estimate projected costs for PACE enrollees if they had remained in the FFS system. These projected cost estimates were not based on the actual utilization of medical services by PACE participants, but represented the best estimate of the costs to Medicare and Medicaid had these individuals remained in the FFS system. Even if comparable cost data for enrollees were available, these data could not be used to estimate costs in the absence of PACE (i.e., because these costs may be affected by participation in PACE).

Since this paper uses data that differ from other reports produced as part of Abt Associates' evaluation of PACE, the means reported in Appendices 4-A and 4-B are slightly different from those reported in other reports produced as part of Abt's evaluation of PACE. This paper includes only individuals who could be linked to Medicare or Medicaid claims data and excludes all individuals from the Portland site since no Medicaid data were available from Oregon.

4.0 Medicare Cost Analyses

In this section, we present comparisons of projected Medicare costs for PACE enrollees (in the absence of PACE) to the Medicare portion of the capitated payments received by PACE sites. Using Method 1, the Medicare capitation rate was 23 percent less than the mean Medicare costs incurred by enrollees in the year prior to enrollment. In both Methods 2 and 3, the Medicare capitation rate was lower than projected costs to the Medicare program in the first enrollment year. The results of the regression models used to generate estimates of projected costs are not reported in this section, but can be found in Appendix 5.

4.1 Method 1: Descriptive analyses

Enrollees costs in pre-enrollment period and PACE capitated payment. Average Medicare costs for PACE enrollees in the year preceding enrollment was higher than the Medicare capitation rates reported in Appendix 2. Medicare costs for the population targeted by PACE were high, reflecting the frail health of the population targeted by PACE. Average monthly Medicare reimbursement in the year preceding enrollment was $1,396 (Table 1, all sites). Median costs were $725, showing the skewed distribution of Medicare costs. Nearly 60 percent of Medicare costs were for inpatient services. Nursing home costs were $155 per month, about 11 percent of the total, while average reimbursement for home health services was $258. The average Medicare portion of the PACE capitation rate was $1,072, more than 20 percent less than average Medicare costs for enrollees in the year prior to enrollment.

The On Lok site differs from the replication sites in the number of enrollees, maturity of the site, and funding authority. We examined how results were affected by the exclusion of this site. Medicare costs for On Lok enrollees, however, were higher than for enrollees from other sites, as was the Medicare portion of the capitation rate for the site. The exclusion of On Lok had only a very small effect on the comparison between enrollee's pre-enrollment costs and capitated payment.

Comparison group costs in pre- and post-application periods. Medicare reimbursement for comparison group members was higher in the year following application to PACE than in the preceding year, suggesting that application to PACE may sometimes be triggered by an adverse health event. Across the comparison group, average Medicare costs in the year prior to application was $1,603 (Table 2). Medicare costs for comparison group members were about $200 per month higher than those of enrollees in the year preceding application to PACE (based on comparison to figures in Table 1), suggesting that enrollees tended to be somewhat healthier (and less costly) than comparison group beneficiaries. The projected costs derived using Methods 2 and 3 both adjust for the difference in pre-baseline costs between enrollees and comparison group members.

Mean comparison group costs increased from $1,603 to $1,970 in the year following application, an increase of 23 percent. Median costs increased from $796 to $997. Most of the increase was due to higher nursing home and home health reimbursement. Average nursing home reimbursement increased from $145 to $315, and home health reimbursement increased from $296 to $415. Comparison group costs in the post-application period were much higher than the Medicare capitation rate ($1,076, from Table 1). These cost figures were slightly higher when the On Lok site was excluded, reflecting the lower Medicare reimbursement of On Lok comparison group members.

Distribution of Medicare costs: Especially in the post-application period (for which Medicare costs were observed only for comparison group members), the distribution of Medicare costs was skewed, with a relatively small number of individuals accounting for a disproportionate share of costs. In the pre-application period, 2.6 percent of comparison group members had Medicare costs of $12,000 or higher (Figure 2). This increased to more than 5 percent in the year following application (Figure 3). Many of the high cost individuals died within a year of applying to PACE. In the year prior to enrollment, 44 percent of enrollees had Medicare costs of less than $500 per month (Figure 1), compared to 36 percent of comparison group members in the same period (Figure 2).

Figure 1: Distribution of Medicare Costs for Enrollees in Pre-Enrollment Period
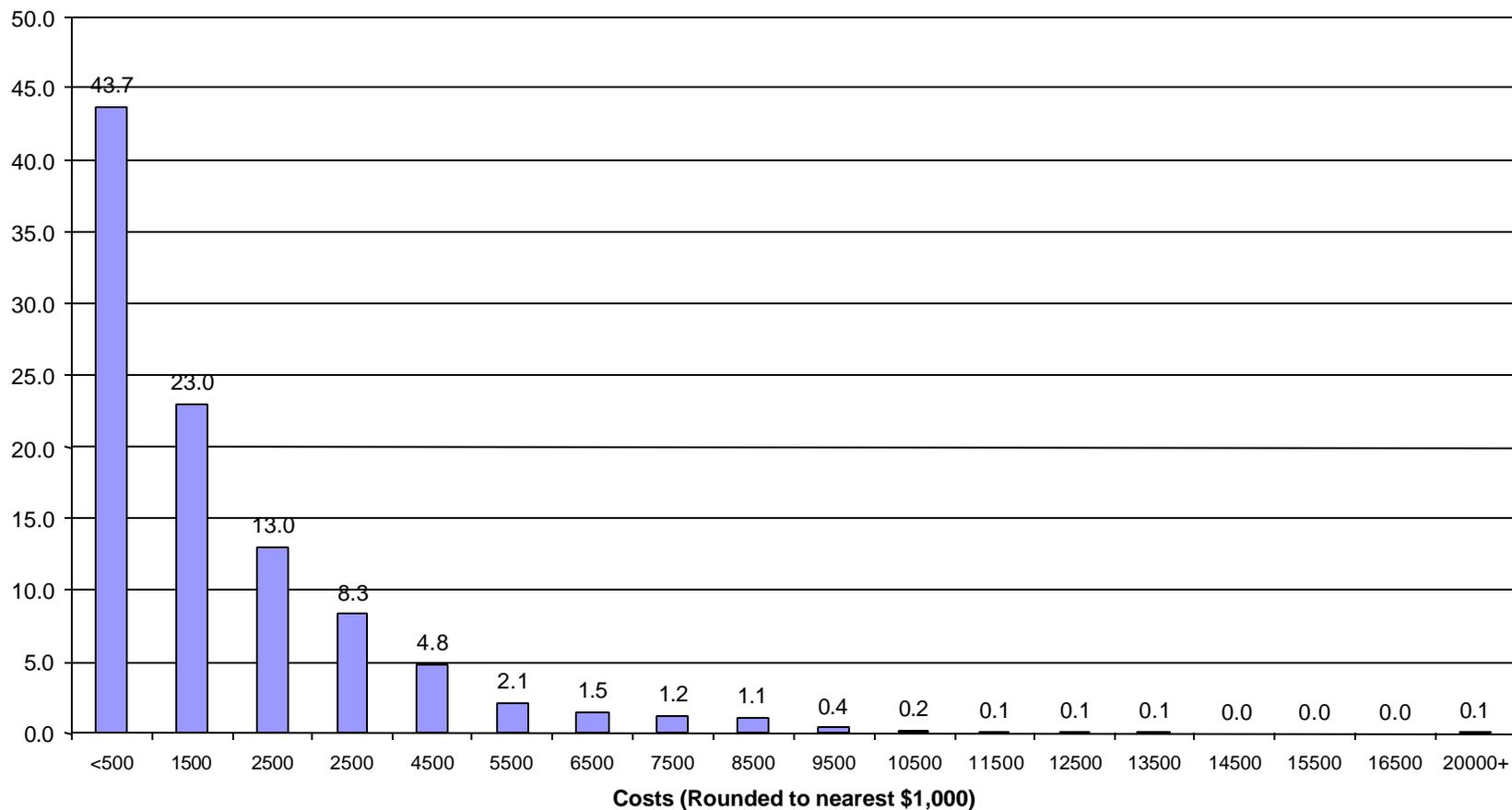
N=1,367. ESRD program beneficiaries excluded. Note that the Portland site was excluded from analyses, as no Medicaid data were available from Oregon.

Data source: Medicare claims data,

Figure 2: Distribution of Medicare Costs for Comparison Group in Pre-Application Period
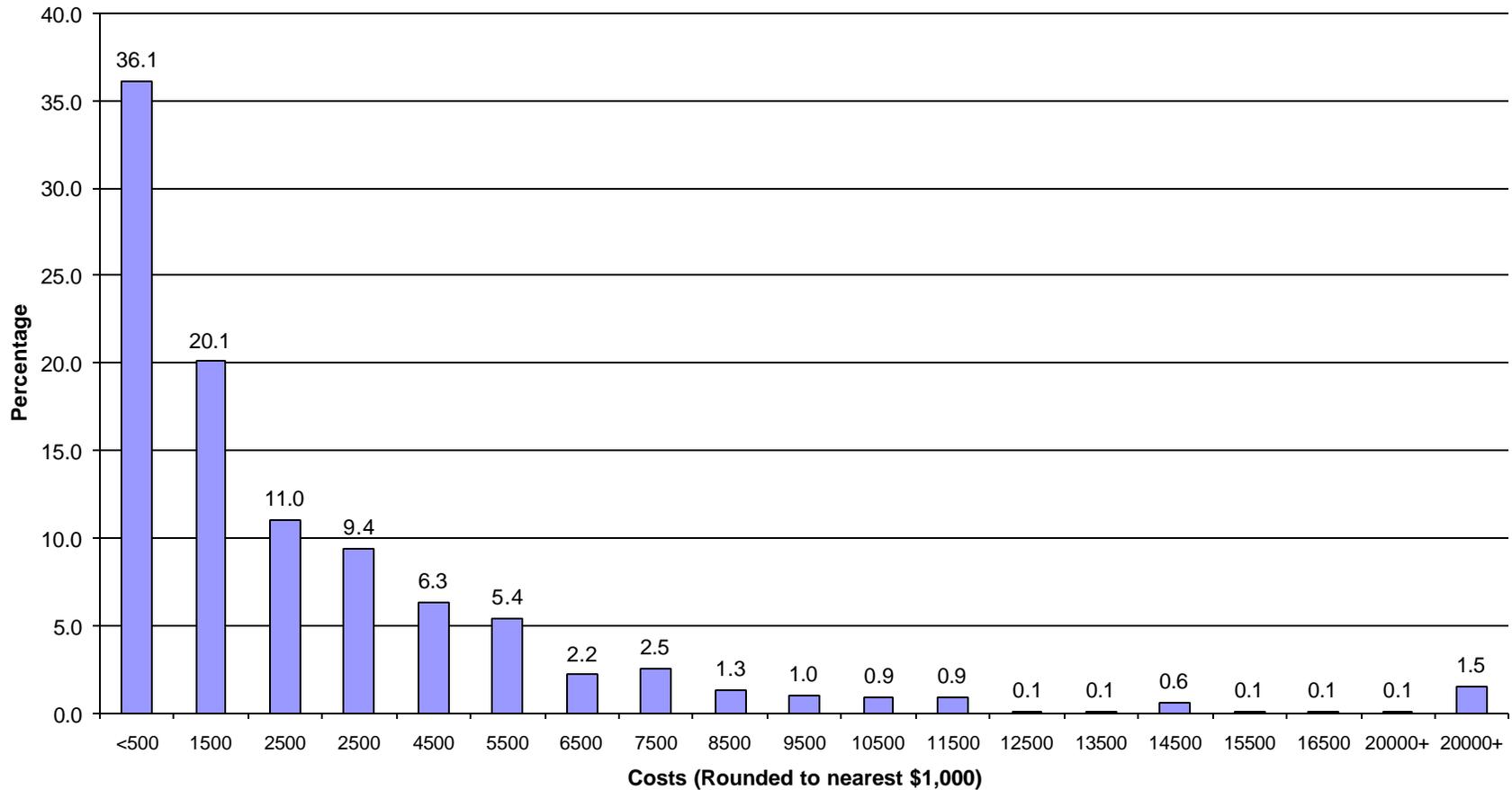
N=671. ESRD program beneficiaries excluded. Note that the Portland site was excluded from analyses, as no Medicaid data were available from Oregon.

Data source: Medicare claims data,

Figure 3: Distribution of Medicare Costs for Comparison Group in Post-Application Period
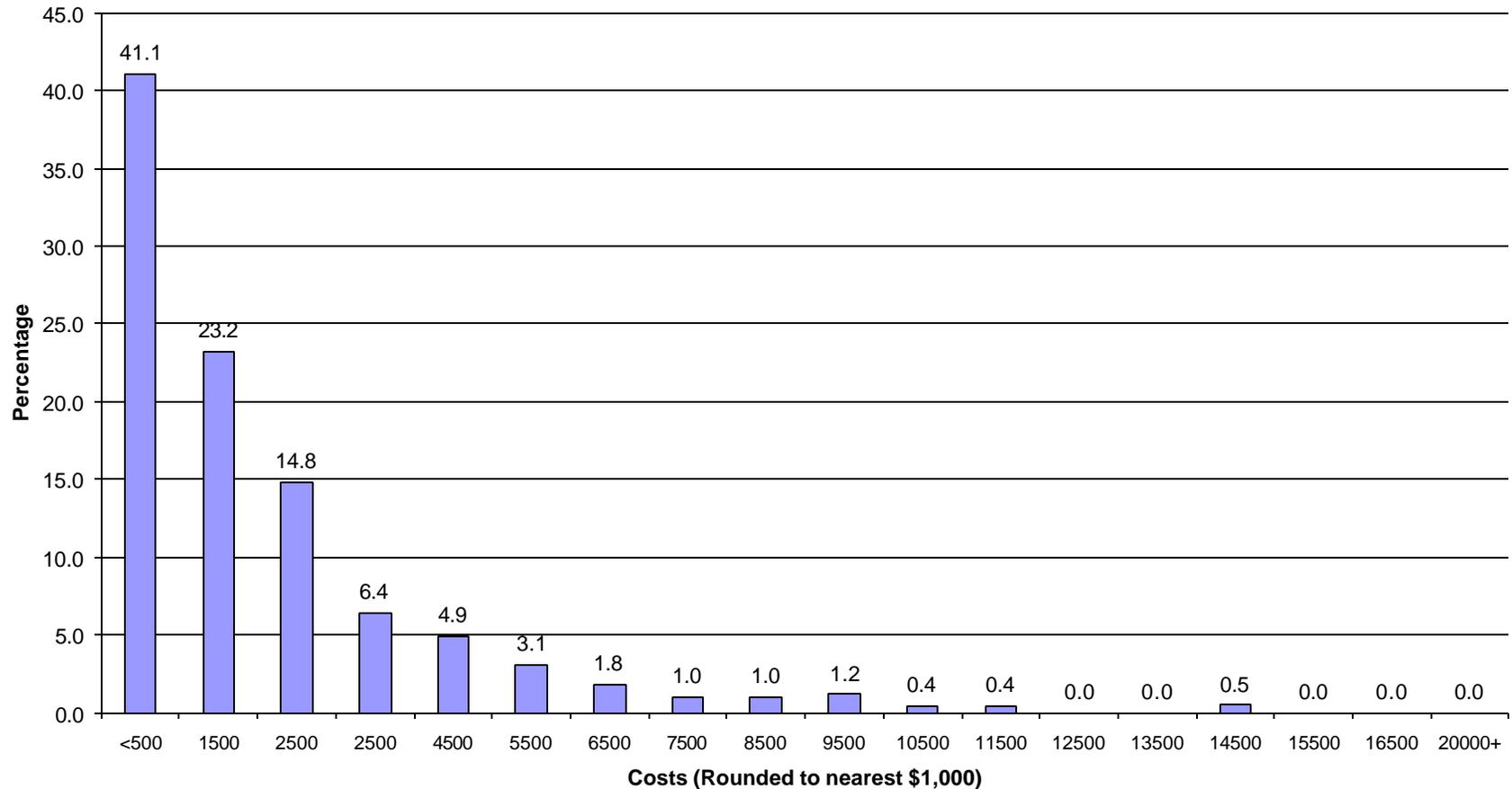
N=671. ESRD program beneficiaries excluded. Note that the Portland site was excluded from analyses, as no Medicaid data were available from Oregon.
Data source: Medicare claims data,

Table 1
Descriptive Analysis
Monthly Medicare Costs in Pre-Enrollment Period and Capitated Payment in Year Following Enrollment for PACE Enrollees

Category:	Mean Medicare costs in 12 months preceding enrollment (per month)[1]						Medicare capitated payment in 12 months following enrollment (per month)	Capitated payment- pre-enrollment costs	
	Total (median)	Inpatient	Nursing home	Ambulatory	Home health	Other		Amount	Percent^
All sites	$1,396 ($725)	$809	$155	$151	$258	$22	$1,072	-$324	-23.2%
All sites excluding On Lok	$1,386 ($708)	$798	$151	$154	$262	$21	$1,061	-$325	-23.4%

N= 1,367; 1,178 excluding On Lok

1:    Includes months in the period that the individual was enrolled in Medicare FFS, but not months in which the person was deceased, not covered by Medicare or was enrolled in a risk-based HMO.

Note that the Oregon site is excluded from analyses, as no Medicaid data was available from Oregon. ESRD program beneficiaries were also excluded.

Source: Medicare claims data

Table 2
Descriptive Analysis
Monthly Medicare Costs in Pre- and Post-Application Period for Comparison Group Members

Category:	Mean Medicare costs in 12 months preceding enrollment (per month) [1]					Mean Medicare costs in 12 months following enrollment (per month)[1]				
	Total (median)	Inpatient	Nursing home	Ambulatory	Home health	Total	Inpatient	Nursing home	Ambulatory	Home health
All sites	$1,603 ($796)	$966	$145	$171	$296	$1,970 ($997)	$966	$315	$227	$415
All sites excluding On Lok	$1,625 ($796)	$977	$147	$173	$302	$1,991 ($997)	$979	$315	$226	$425

N= 671; 641 excluding On Lok

The total is greater than the sum of the columns, because Aother® Medicare costs, which averaged about $25 in the pre-period and $45 in the post-period are not reported in the table, but were included as part of total Medicare costs.

1:    Includes months in the period that the individual was enrolled in Medicare FFS, but not months in which the person was deceased, not covered by Medicare or was enrolled in a risk-based HMO.

Note that the Oregon site is excluded, as no Medicaid data were available from Oregon. ESRD program beneficiaries were also excluded.

Source: Medicare claims data

4.2 Comparison of projected Medicare costs to capitated payments

The multivariate regression techniques described in Section 3 were used to estimate Medicare reimbursement for enrollees had they not participated in PACE. Comparison of projected costs for enrollees, derived using either Method 2 (Basic regression) or Method 3 (Regression with survey data), to the Medicare capitation rate suggests that the total costs in the initial enrollment year to Medicare under PACE were less than they would have been had enrollees not participated in the demonstration.[16]

Method 2: Basic regression. In the first year following enrollment, projected Medicare reimbursement for PACE enrollees was $1,844 per month (across both survey responders and non-responders) (Table 3). The Medicare portion of the capitation rate was $1,072. Across all sites, projected costs were $773 per month higher than the capitated payment, a difference of nearly 42 percent. The difference between projected costs and capitated payment was slightly larger when the On Lok site was excluded, mainly due to higher costs of their new participants in the year preceding enrollment (see Table 1).

Method 3: Regression with Abt survey data. Projected Medicare reimbursement for the subset of PACE enrollees for whom survey data were available was $1,921 (Table 4). The Medicare portion of the capitation rate for this group was $1,037, nearly $900 less (46 percent) than the projected Medicare capitated payment.

Confidence in the estimate. The results of the regression models are impacted by 1) the small numbers of observations (comparison group and enrollees), 2) variability within the data. In the Method 2 model, the cost projection is based on 662 comparison group members, whereas, the number of observations is 341 in the Method 3 model. With half as many comparison group members and more variables, Method 3 has less precision than Method 2. The standard error of the mean predicted value measures the variability of an estimate.   Using this measure, the variability computed for Method 2, $ 405, is much lower than the $724 computed for Method 3.

Lower variability allows stronger statements to be made about a true mean, which can be stated in terms of a statistical range or confidence interval. Using Method 2, the true predicted mean lies between $ 1,050 and $2,638 at a 95% confidence interval (predicted mean of $ 1,844 +/- 1.96 x standard error $405). With Method 3, the true predicted mean lies between $ 476 and $ 3,369 at a 95% confidence interval (predicted mean of $ 1,921 +/- 1.96 x standard error $724). The statistical confidence interval implies nothing about the underlying prediction assumptions of the models, i.e., costs will continue at their enrollment levels plus an increment associated with the cost behavior observed for the comparison group.

Using Method 2, the lowest level of projected costs, $1,050, is slightly lower than the Medicare capitated payment level of $1,072. Under Method 3, the lowest level of projected costs, $476, is about half the capitated payment level. Conversely, the upper ranges of projected costs, i.e., $2,638

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[16] Note that, for purposes of this discussion, we assume that the capitated payment is the only cost incurred by Medicare for the PACE demonstration.

and 3,369 far exceed the $1,072 capitated rate. Because of the variation exhibited in the data, it is statistically possible that projected costs in the first year were less than the capitated payments.

Table 3
Method 2 (Survey Respondents and Non-Respondents)
Comparison of Projected Medicare Monthly Costs and Capitated Payments

Category:	Projected Medicare cost in 12 months following enrollment (per month) (standard error)[^]	Medicare capitated payment in 12 months following enrollment (per month)	Capitated payment-projected costs	
			Amount	Percent[i]
All sites	$1,844 ($405)	$1,072	-$773	-41.9%
All sites excluding On Lok	$1,875 ($389)	$1,061	-$814	-43.4%

N = 1,307 PACE enrollees; 1,178 excluding On Lok. Projected Medicare reimbursement figures were based on a regression estimated for comparison group members. There were 662 comparison group members used in this regression; 633 excluding On Lok.

Projected Medicare costs are the predicted values implied by the appropriate regression model coefficients and the characteristics of PACE enrollees. The total capitation payment for each period is determined by the appropriate capitation rate, and the number of months that participants were actually enrolled in PACE during each period. Enrollees who were in risk-based HMOs during the entire baseline period were excluded from the analysis. The Oregon site was excluded, as no Medicaid data were available from Oregon. ESRD program beneficiaries were also excluded.

[^] : Standard error of mean predicted value.
[i] : Percentage difference is expressed relative to projected costs.

Sources: Medicare claims data, HCFA Enrollment Database

Table 4
Method 3 (Survey Respondents Only)
Comparison of Projected Medicare Monthly Costs and Capitated Payments

Category:	Projected Medicare cost in 12 months following enrollment (per month) (standard error)^	Medicare capitated payment in 12 months following enrollment (per month)	Capitated payment-projected costs	
			Amount	Percent[i]
All sites	$1,921 ($724)	$1,037	-$884	-46.0%
All sites excluding On Lok	$1,940 ($713)	$1,033	-$907	-46.7%

N = 697 PACE enrollees; 676 excluding On Lok. Projected Medicare reimbursement figures were based on a regression estimated for comparison group members. There were 341 comparison group members in this regression; 334 excluding On Lok. Note that the Oregon site is excluded from analyses, as no Medicaid data were available from Oregon. ESRD program beneficiaries were also excluded.

^: Standard error of mean predicted value.
[i] : Percentage difference is expressed relative to projected costs.

Sources: Medicare claims data, HCFA Enrollment Database

5.0 Medicaid Cost Analyses

This section reports results from our comparisons of projected Medicaid reimbursement levels for PACE enrollees to the Medicaid portion of the capitation rate. The regression coefficients underlying the cost estimates are reported in Appendix 5.

5.1   Method 1: Descriptive analyses

Enrollee costs in pre-enrollment period and capitated payment. Medicaid costs for enrollees in the year preceding enrollment were considerably lower than the Medicaid portion of their capitated payment in the year following enrollment. For enrollees across all sites, average monthly Medicaid reimbursement was $914 in the year <u>before</u> enrollment, less than half as high as the Medicaid capitated payment in the year <u>following</u> enrollment ($2,249) (Table 5). Median Medicaid costs for enrollees during this period were $225 per month.

Both Medicaid costs and Medicaid capitation rates were much higher for the Bronx site than for any other site. In the year prior to enrollment, mean Medicaid costs for the Bronx enrollees were $8,288 per month, more than five times higher than Rochester, the site with the second highest average.[17] In contrast, average Medicaid costs for enrollees from the On Lok and El Paso sites were less than $200 per month. The Medicaid capitation rate for the Bronx was around $4,000, almost twice the average for other sites ($2,117) (see Appendix 2). Excluding enrollees from the Bronx and On Lok, mean Medicaid costs were $650, less than one-third as high as the Medicaid portion of the capitation rate.

Comparison group costs in pre- and post-application periods. For comparison group members, Medicaid costs were 50 percent higher in the year following application to PACE than in the previous year. Average monthly costs increased from $765 in the year preceding application to PACE to $1,151 in the following year (Table 6). Because it was not possible to break down Medicaid costs by type of service, we could not determine how much of this increase was due to higher reimbursement levels for nursing home stays versus other Medicaid-covered services. Comparing figures from Tables 5 and 6, Medicaid costs for comparison group members were about $150 per month lower in the year preceding application than Medicaid costs for enrollees. This difference fell to $15 when the Bronx and On Lok sites were excluded.

Distribution of Medicaid costs. In the pre-baseline period, more than 65 percent of both enrollees and comparison group members had Medicaid costs of less than $500 per month (Figures 3 and 4). Among enrollees, 85 percent had monthly Medicaid costs of $1,500 per month or less (Figure 3), and about 90 percent had Medicaid costs below the average Medicaid capitated payment of $2,249 listed in Table 5. There were very few applicants (either enrollees or comparison group members) who had Medicaid costs greater than $5,000 per month. In the year following application, only 15 percent of comparison group members had Medicaid costs over $2,500 per month (calculated from Figure 6), and 41 percent had Medicaid costs of less than $500 per month.

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[17]   The Bronx site included the two enrollees with the highest Medicaid costs in the pre-enrollment period. Montlhy Medicaid costs for these individuals were $44,000 and $38,000.   No site had monthly Medicaid costs higher than $14,000. Even if these two outliers were excluded; however, mean Medicaid reimbursement for Bronx enrollees was $3,840, considerably higher than those of enrollees from other sites.

Table 5
Descriptive Analysis
Monthly Medicaid Costs in Pre-Enrollment Period and Capitated Payments for PACE Enrollees

Category:	Mean monthly Medicaid costs in 12 months preceding enrollment (per month) (median)	Medicaid capitated payment in 12 months following enrollment (per month)	Capitated payment- pre-enrollment costs= Program costs	
			Amount	Percent[i]
All sites	$914 ($225)	$2,249	$1,335	+146.1%
All sites excluding On Lok and Bronx	$650 ($207)	$2,069	$1,419	+218.3%

N = 931; 709 excluding Bronx and On Lok

[i] : Percentage difference is expressed relative to Medicaid costs in the 12 months preceding enrollment.

Note that the Oregon site is excluded from analyses, as no Medicaid data were available from Oregon.

Source: Medicaid claims data

Table 6
Descriptive Analysis
Monthly Medicaid Costs in Pre- and Post-Application Period for Comparison Group Members

Category:	Mean monthly Medicaid costs in 12 months preceding enrollment (median)	Mean monthly Medicaid costs in 12 months following enrollment (median)
All sites	$765 ($312)	$1,151 ($687)
All sites excluding On Lok and Bronx	$665 ($303)	$1,080 ($665)

N=381; 333 excluding Bronx and On Lok.

Note that the Oregon site is excluded from analyses, as no Medicaid data were available from Oregon.

Source: Medicaid claims data

Figure 4: Distribution of Medicaid Costs for Enrollees in Pre-Enrollment Period
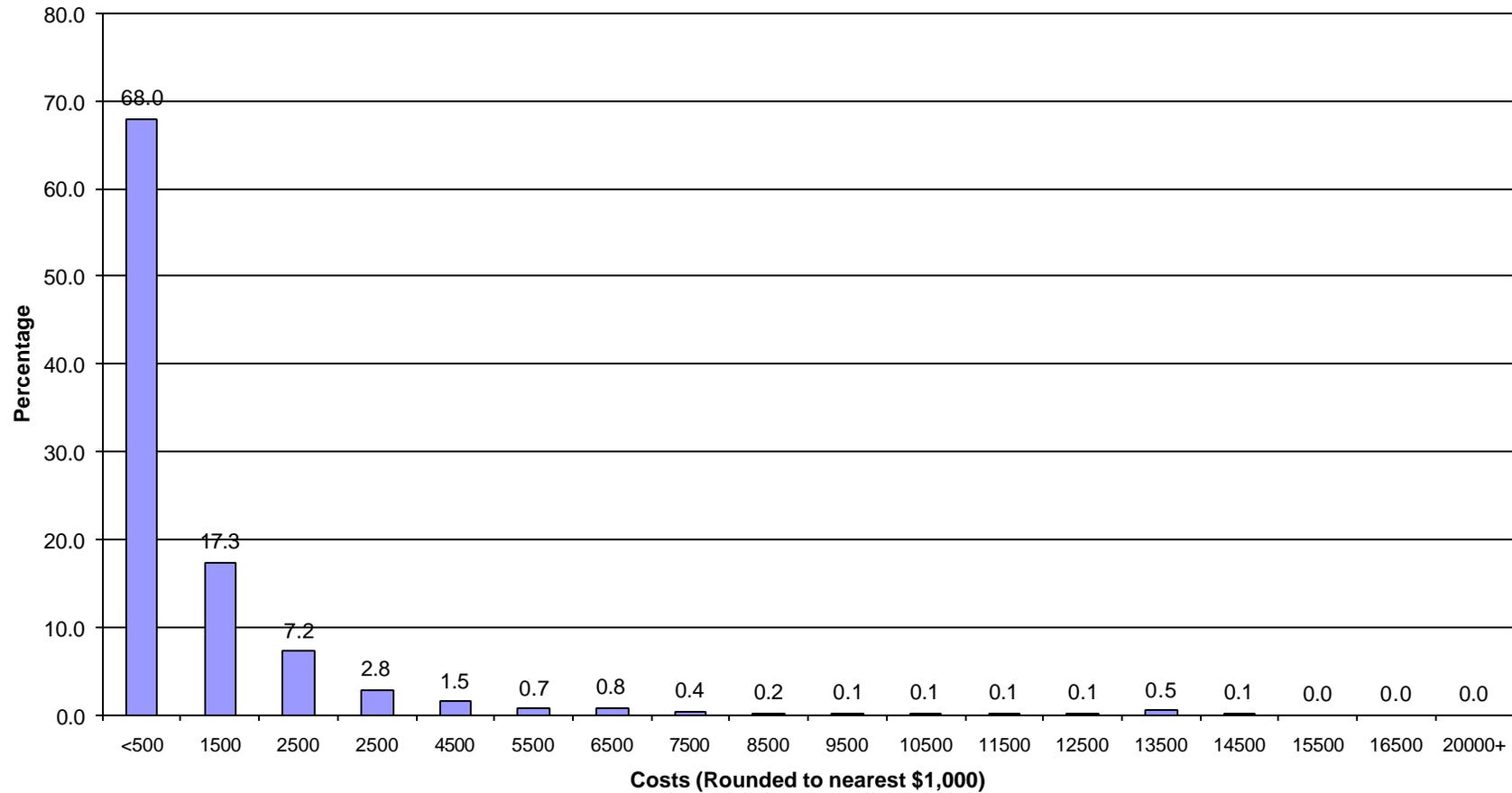
N=851. Note that the Portland site was excluded from analyses, as no Medicaid data were available from Oregon.
Data source: Medicaid claims data

Figure 5: Distribution of Medicaid Costs for Comparison Group in Pre-Application Period
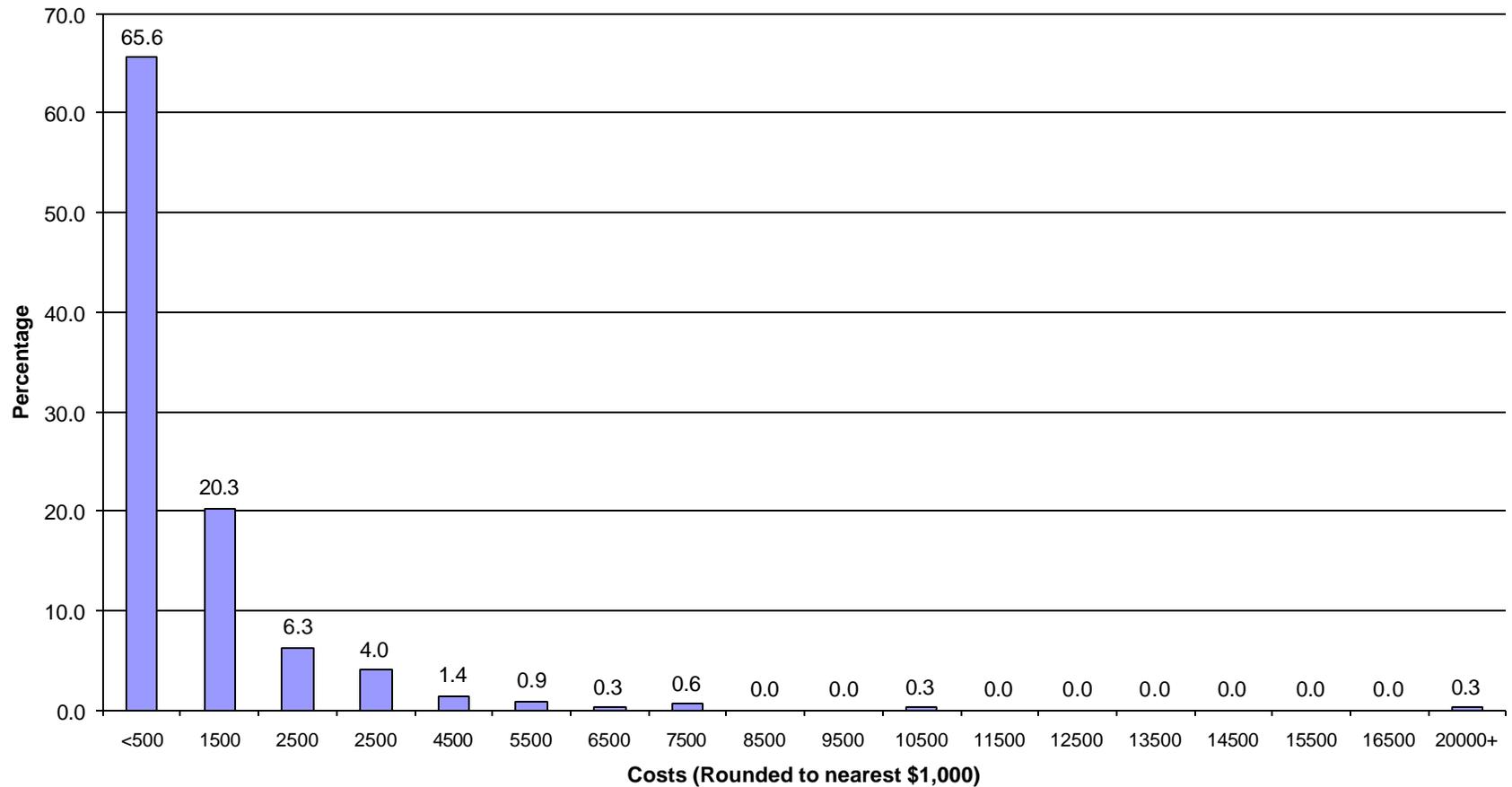
N=349. Note that the Portland site was excluded from analyses, as no Medicaid data were available from Oregon.

Data source: Medicaid claims data

Figure 6: Distribution of Medicaid Costs for Comparison Group in Post-Application Period
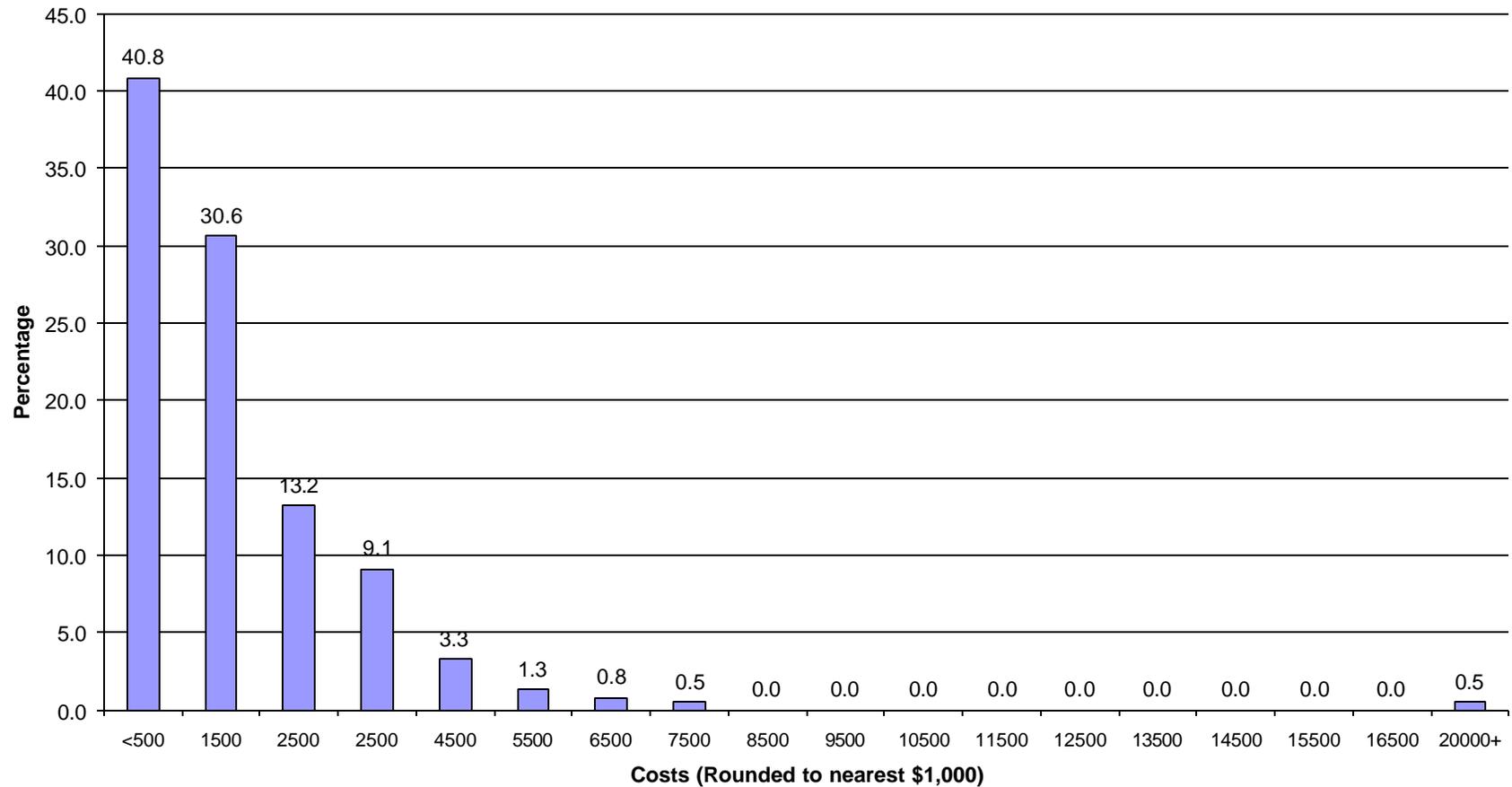
N=349. Note that the Portland site was excluded from analyses, as no Medicaid data were available from Oregon.
Data source: Medicaid claimsdata

5.2   Comparison of projected Medicaid costs to capitated payments

Average Medicaid costs for comparison group members were higher in the post-application period than in the preceding year. Reflecting this increase, projected Medicaid costs for enrollees were higher than Medicaid costs in the pre-enrollment period.

Method 2: Basic regression. Using Method 2, across all sites, the projected Medicaid costs of PACE enrollees were $1,211 per month. This was $1,038 less than the average portion of the Medicaid capitated payment (Table 7). Excluding enrollees from On Lok and the Bronx, projected Medicaid costs were $1,032, less than half as high as the Medicaid portion of the PACE capitation rate.

Method 3: Regression with Abt survey data. Results based on Method 3 (i.e., survey respondents only) were similar to those derived using Method 2 (Table 8). Projected Medicaid costs were $1,193 across all sites and $930 excluding enrollees from the On Lok and Bronx sites. The Medicaid capitation rate was $2,176 across all sites and $1,993 excluding On Lok and the Bronx.

Confidence in the estimate. The Medicaid regression models exhibited less variability than the Medicare models. Not only were the explanatory power of the models higher, approaching 50%, but the variability was lower. At a 95% confidence level, the true mean of predicted costs in Method 2 is between 1,679 and $ 743. At the upper range of the estimate, $1,679, predicted costs are still less than the average capitated payment of $2,249. Consequently, it is likely that projected Medicaid costs in the initial year exceeded payment rates.

It is beyond the scope of this report to analyze the process by which Medicaid capitation rates were set by states. While states differed in their rate setting methodology, they based the capitated payments on an estimate of how much Medicaid would have paid for PACE participants in alternative settings:

$ In California, the Medicaid capitation rate is based on 85 percent of the average cost of caring for the frail elderly who are eligible for a skilled nursing or intermediate care facility, based on costs for five Bay-area counties (for the Oakland and On Lok sites) and in Sacramento County for the Sacramento site.

$ The South Carolina Medicaid capitation payment is based on 95 percent of the average cost of care for nursing home residents in Richland County.

$ The capitation rate paid to the Denver PACE site is based on 88 to 95 percent of the composite costs of nursing home and home and community-based services.

$ In Milwaukee, the capitated payment was determined based on 95 percent of the weighted average of nursing home costs (less the patient=s contributions) plus the costs of all other care.

•   In New York, PACE rates were set so that they were competitive with other state programs; consequently, the rates were intended to reflect the price of alternatives in a uniquely rich environment.

An assumption that seems to be implicit in the rate setting methodology used by all of the PACE sites is that, in the absence of PACE, a high proportion of enrollees would have required nursing home care, a source of high expenses for state Medicaid programs. Based on self-reported nursing home utilization data, comparison group members had an average of only 23 nursing home days in the first six months following application to PACE and 38 days in months 7-12 (Appendix 4-C).

Table 7
Method 2 (Survey Respondents and Non-Respondents)
Comparison of Projected Medicaid Monthly Costs and Capitated Payment

Category:	Projected Medicaid cost in 12 months following enrollment (per month) (standard error)^	Medicaid capitated payment in 12 months following enrollment (per month)	Capitated payment-projected costs	
			Amount	Percent[i]
All sites	$1,211 ($239)	$2,249	$1,038	+85.7%
All sites excluding On Lok and Bronx	$1,032 ($222)	$2,069	$1,037	+100.5%

N = 931; 709 excluding Bronx and On Lok. Projected Medicaid reimbursement figures were based on a regression estimated for comparison group members. There were 380 comparison group members in this regression; 332 excluding On Lok and Bronx.

Projected Medicaid costs are the predicted values implied by the appropriate regression model coefficients (see regression coefficients in Appendix 2) and the characteristics of PACE enrollees. Note that the Oregon site is excluded from analyses, as no Medicaid data were available from Oregon.

[i] : Standard error of mean predicted value.
^ : Percentage difference is expressed relative to projected Medicaid costs.

Sources: Medicaid claims data, HCFA Enrollment Database.

Table 8
Method 3 (Survey Respondents)
Comparison of Projected Medicaid Monthly Costs Levels and Capitated Payments

Category:	Projected Medicaid cost in 12 months following enrollment (per month) (standard error)^	Medicaid capitated payment in 12 months following enrollment (per month)	Capitated payment-projected costs	
			Amount	Percent[i]
All sites	$1,193 ($333)	$2,176	$984	+82.4%
All sites excluding On Lok and Bronx	$930 ($293)	$1,993	$1,063	+114.2%

N = 512; 451 excluding Bronx and On Lok. Projected Medicaid reimbursement figures were based on a regression estimated for comparison group members. There were 202 comparison group members in this regression; 183 excluding On Lok and Bronx. Note that the Oregon site is excluded from analyses, as no Medicaid data were available from Oregon.

^ : Standard error of mean predicted value.
[i] : Percentage difference is expressed relative to projected Medicaid costs.

Projected Medicaid costs are the predicted values implied by the appropriate regression model coefficients (see Appendix 5) and the characteristics of PACE enrollees.

Sources: Abt Associates survey of PACE applicants, Medicaid claims data

6.0 Comparison of total costs to total capitated payments

A basic premise of the PACE model is that the costs of providing comprehensive services, which include not only all Medicare and Medicaid-covered services, but also the preventative and social services that are emphasized under PACE, can be more than offset by the reduced utilization of expensive nursing home and inpatient hospital services that was predicted under the PACE model.[18] A comparison of total projected reimbursement (across both Medicare and Medicaid) to the total PACE capitation rate permits analysis of the overall budgetary implications of PACE.

6.1 Method 1: Descriptive analyses

Enrollee total costs in pre-enrollment period and PACE capitated payment. Across all sites, the monthly combined (Medicare and Medicaid) capitated payment was $2,275, more than $1,000 higher than average monthly Medicare and Medicaid costs in the year preceding enrollment (Table 9). The difference changed little when enrollees from the On Lok and Bronx sites were excluded.

Comparison group total costs in pre- and post-application periods. Combined Medicare and Medicaid costs were considerably higher in the year following application than in the preceding year. Across all sites, mean total costs were $2,402 in the year preceding enrollment (Table 10). Mean costs increased to $3,181 in the year following application. A potential explanation for the increase in costs is that application to PACE may occur around the same time as an adverse health event associated with high medical expenses. Part of the increase is also due to the high medical costs incurred by those who died within a year of applying to PACE. Average Medicare costs in the year following application for comparison group members who died within 3 months of application to PACE were $10,846, much higher than the $1,351 average for comparison group members who did not die within 3 months of application.

Distribution of total costs. The distribution of total costs was skewed. About 50 percent of both enrollees and comparison group members had total costs of less than $1,500 per month, but costs for a few applicants were higher than $20,000 per month (Figures 7 and 8). Among comparison group members, in the year following application the proportion with total costs less than $500 fell from 26 to 14 percent (Figures 8 and 9). There was a marked increase in the proportion with costs greater than $5,500, which increased from 21 to 31 percent (calculated from Tables 8 and 9).

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[18] Indeed, participation in PACE was associated with a large decrease in the number of inpatient and nursing home days (Chatterji, Burstein, Kidder and White, 1998), suggesting that the preventative services emphasized under PACE reduced the need for nursing home placement and hospitalization.

Table 9
Descriptive Analysis
Total Monthly Medicare and Medicaid Costs in Pre-Enrollment Period and Capitated Payments for PACE Enrollees

Category:	Mean monthly Medicare and Medicaid costs in 12 months preceding enrollment (per month)	Total capitated payment in 12 months following enrollment (per month)	Capitated payment-projected costs	
			Amount	Percent[i]
All sites	$2,275	$3,301	+$1,026	+45.1%
All sites excluding On Lok	$2,320	$3,316	+$997	+43.0%
All sites excluding On Lok and Bronx	$2,044	$3,099	+$1,055	+51.6%

N = 815; 701 excluding On Lok; 642 excluding Bronx and On Lok

In this table, mean costs do not equal the sum of projected Medicare and Medicaid costs from Tables 1 and 5 because different samples were used for the separate analysis of Medicare and Medicaid costs. The Medicare analysis includes some individuals for whom no Medicaid data were available. ESRD program beneficiaries were included in the Medicaid analysis, but not in the analyses of Medicare or total costs. Note that the Oregon site is excluded from analyses, as no Medicaid data were available from Oregon.

[i]: Percentage difference is expressed relative to total Medicare and Medicaid costs in the pre-enrollment period.

Sources: Medicare and Medicaid claims data.

Table 10
Descriptive Analysis
Total Medicare and Medicaid Costs in Pre- and Post-Application Period for Comparison Group Members

Category:	Mean monthly Medicare and Medicaid costs in 12 months preceding enrollment	Mean monthly Medicare and Medicaid costs in 12 months following enrollment
All sites	$2,402	$3,181
All sites excluding On Lok	$2,448	$3,317
All sites excluding On Lok and Bronx	$2,325	$3,181

N = 367; 337 excluding On Lok; 323 excluding Bronx and On Lok.

In this table, mean costs do not equal the sum of projected Medicare and Medicaid costs from Tables 2 and 6 because different samples were used for the separate analysis of Medicare and Medicaid costs. The Medicare analysis includes some individuals for whom no Medicaid data were available. ESRD program beneficiaries were included in the Medicaid analysis, but not in the analyses of Medicare or total costs. Note that the Oregon site is excluded from analyses, as no Medicaid data were available from Oregon.

Sources: Medicare and Medicaid claims data.

Figure 7: Distribution of Total Costs for Enrollees in Pre-Enrollment Period
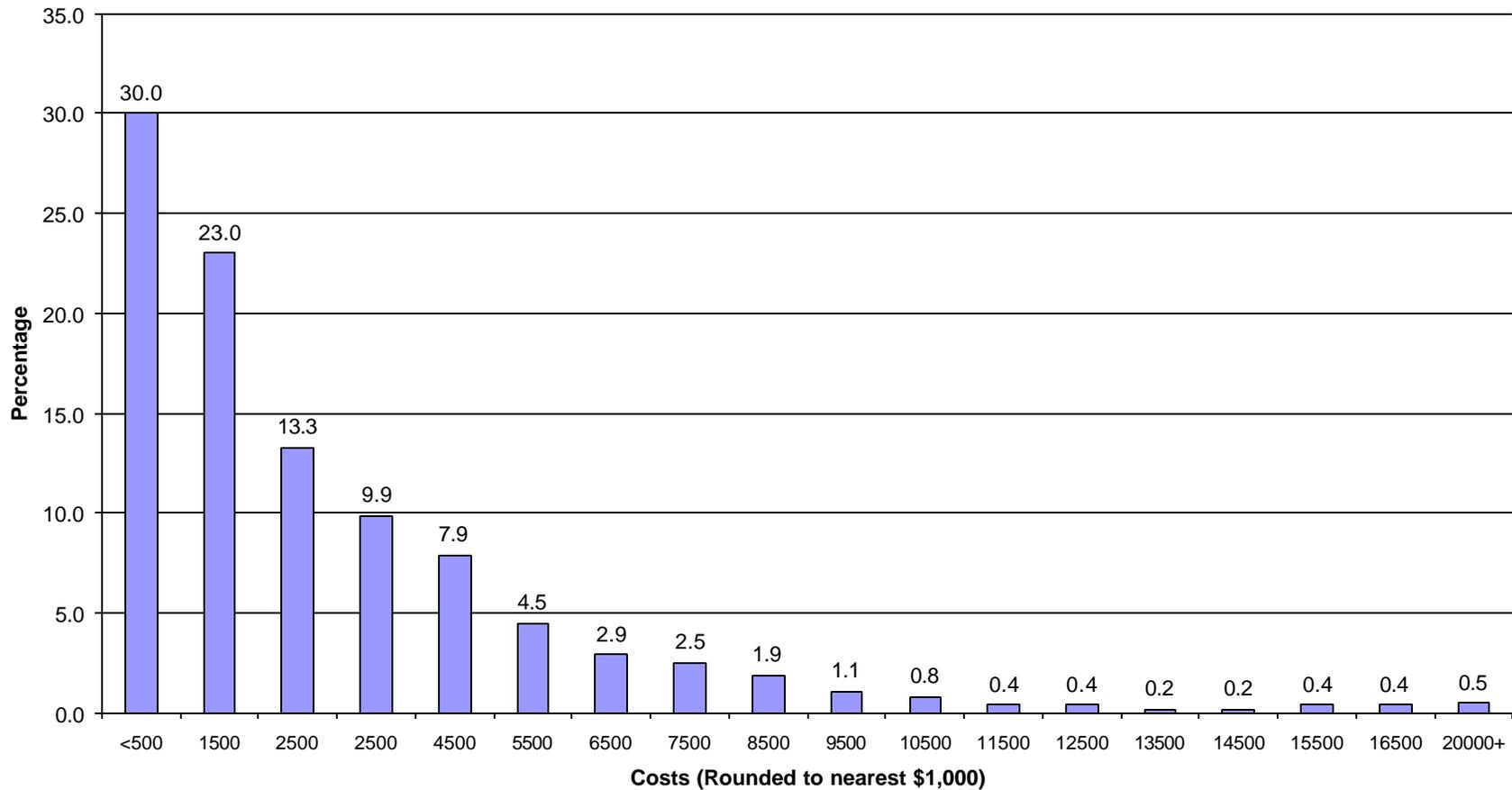
N=851. ESRD program beneficiaries excluded. Note that the Portland site was excluded from analyses, as no Medicaid data were available from Oregon.

Data sources: Medicare and Medicaid claims data

Figure 8: Distribution of Total Costs for Comparison Group in Pre-Application Period
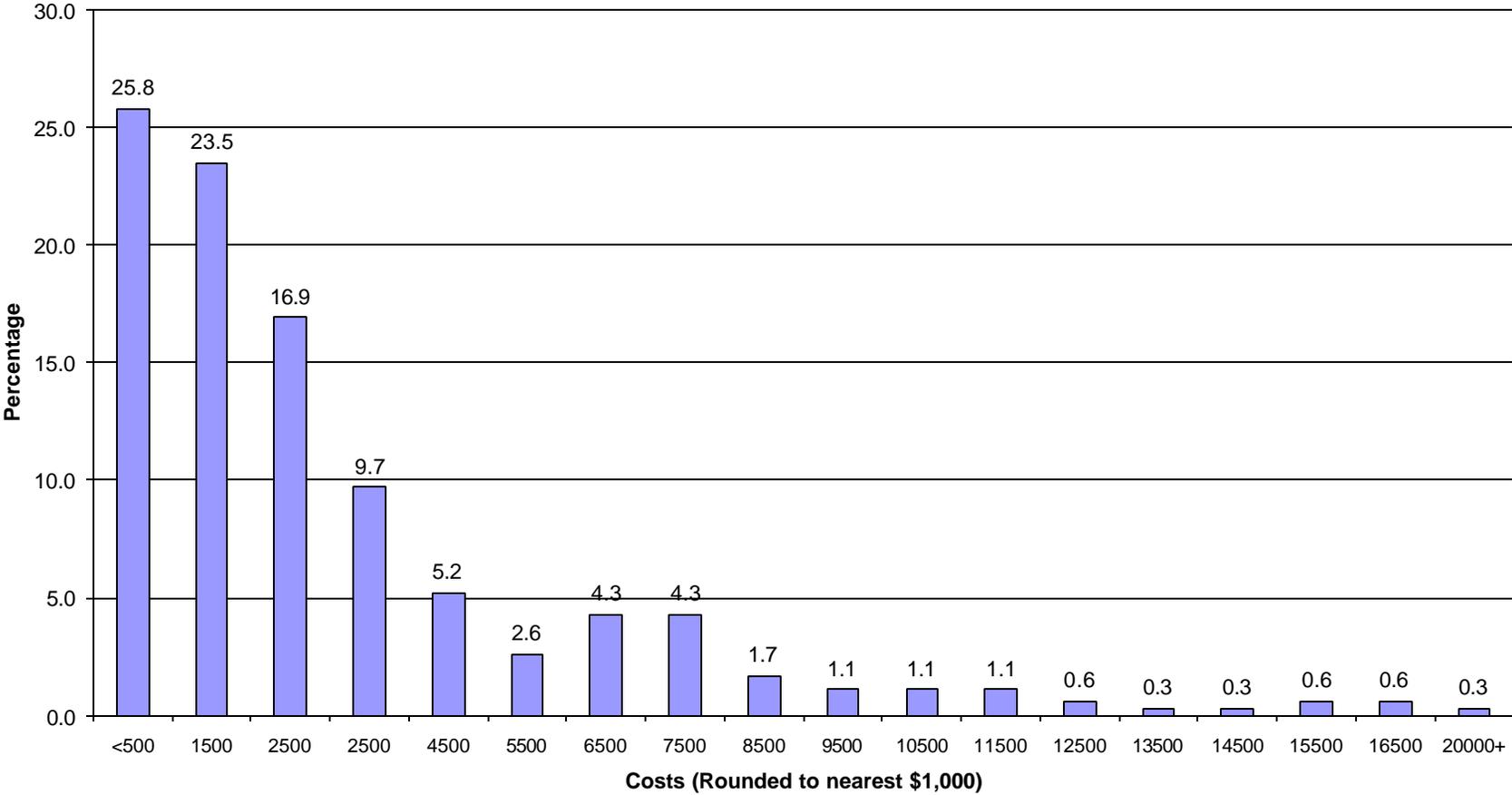
N= 349. ESRD program beneficiaries excluded. Note that the Portland site was excluded from analyses, as no Medicaid
data were available from Oregon.
Data sources: Medicare and Medicaid claims data

Figure 9: Distribution of Total Costs for Comparison Group in Post-Application Period
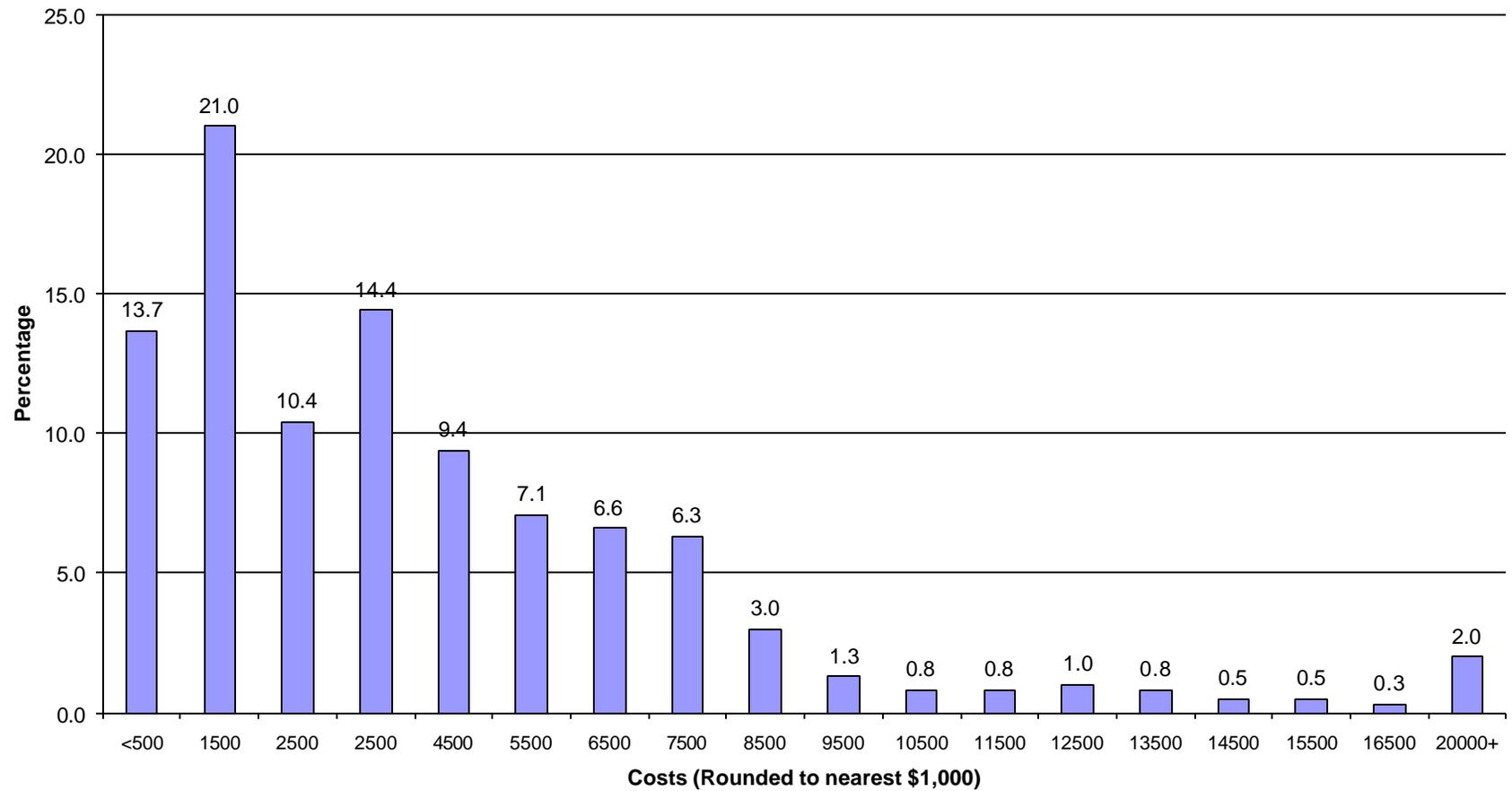
N= 349. ESRD program beneficiaries excluded. Note that the Portland site was excluded from analyses, as no Medicaid
data were available from Oregon.
Data sources: Medicare and Medicaid claims data

6.2 Comparison of projected total costs to total capitated payments

Total projected costs were calculated as the sum of projected Medicare and Medicaid costs. Total projected costs for enrollees were somewhat lower than the (combined) capitation rate.

Method 2: Basic regression. Across all sites, projected total costs were $3,010 per month for the first year following enrollment. Reflecting the increased cost trends for comparison group members in the post-application period, projected costs for enrollees were higher than the $2,402 average in the year preceding enrollment (from Table 9). The capitated payment was $3,301, about 10 percent higher than projected costs (Table 11). The difference between capitated payment and projected costs was considerably smaller excluding those from the On Lok and Bronx sites-- projected costs for enrollees in other sites were $2,991, about 4 percent lower than the capitated payment amount ($3,099).

Method 3: Regression with Abt survey data. Among survey respondents, the difference between total capitated payments and total projected costs was somewhat larger. Across all sites, projected costs were $2,957, about $200 less than the $3,184 capitated payment amount (Table 12). This difference was smaller when those from the On Lok and Bronx sites were excluded.

Table 11
Method 2 (Survey Respondents and Non-respondents)
Comparison of Projected Total Medicare and Medicaid Monthly Costs and Capitated Payments

Category:	Projected Medicare and Medicaid cost in 12 months following enrollment (per month)	Total capitated payment in 12 months following enrollment (per month)	Capitated payment-projected costs	
			Amount	Percent[i]
All sites	$3,010	$3,301	+$292	+9.7%
All sites excluding On Lok	$3,100	$3,316	+$216	+7.0%
All sites excluding On Lok and Bronx	$2,991	$3,099	+$108	+3.6%

N = 815; 701 excluding On Lok; 642 excluding Bronx and On Lok

[i] : Percentage difference is expressed relative to projected total Medicare and Medicaid costs.

In this table, mean costs do not equal the sum of projected Medicare and Medicaid costs from Tables 3 and 7 because different samples were used for the separate analysis of Medicare and Medicaid costs. The Medicare analysis includes some individuals for whom no Medicaid data were available. ESRD program beneficiaries were included in the Medicaid analysis, but not in the analyses of Medicare or total costs. Note that the Oregon site is excluded from analyses, as no Medicaid data were available from Oregon.

Sources: Medicare and Medicaid claims data, HCFA Enrollment Database.

Table 12
Method 3 (Survey Respondents Only)
Comparison of Projected Total Medicare and Medicaid Monthly Costs and Capitated Payments

Category:	Projected Medicare and Medicaid cost in 12 months following enrollment (per month)	Total capitated payment in 12 months following enrollment (per month)	Capitated payment-projected costs	
			Amount	Percent
All sites	$2,957	$3,184	+$217	+7.7%
All sites excluding On Lok	$2,948	$3,183	+$234	+8.0%
All sites excluding On Lok and Bronx	$2,824	$2,998	+$174	+6.2%

N = 453; 436 excluding On Lok; 407 excluding On Lok and Bronx

In this table, mean costs do not equal the sum of projected Medicare and Medicaid costs from Tables 4 and 8 because different samples were used for the separate analysis of Medicare and Medicaid costs. The Medicare analysis includes some individuals for whom no Medicaid data were available. ESRD program beneficiaries were included in the Medicaid analysis, but not in the analyses of Medicare or total costs. Note that the Oregon site is excluded from analyses, as no Medicaid data were available from Oregon.

Sources: Abt Associates survey of PACE applicants, Medicare and Medicaid claims data.

6.3   Comparisons by site

Because of the relatively small sample sizes, and the large variation in projected cost levels, site-specific differences between projected costs and capitated payments may not be meaningful, although they are presented here for informational purposes. For many sites, there are not enough comparison group members in the sample to develop reliable estimates of projected costs for enrollees in the absence of PACE, and the data do not permit site-specific comparisons because of the imprecise estimates of projected costs at some sites. For example, the Rochester site had only 11 comparison group members for whom Medicaid data were available. Site-specific comparisons can be useful, however, in determining whether the results of the analysis are sensitive to results from one or two sites.

There was considerable across-site variation in projected cost levels, and this variation did not appear to be strongly related to the AAPCC-based capitation rates, or to the formulas and assumptions used in deriving Medicaid capitation rates. Projected Medicare costs for all sites were higher than the Medicare capitation rate, while projected costs were lower than the Medicaid capitated payment for every site. The Bronx PACE site had the highest projected Medicaid costs, but projected costs were

still $800 less than the capitated payment.[19]   Several sites, including East Boston, Denver, Sacramento, and El Paso had total projected costs that were higher than the total capitated payment (Table 13).

Table 13
Comparison of Monthly Projected Combined Cost Levels and Capitated Payments by PACE Site: Method 2 (Survey Respondents and Non-Respondents)

		Total		Medicare		Medicaid	
Site	**N^**	**projected costs**	**capitated payment**	**projected costs**	**capitated payment**	**projected costs**	**capitated payment**
San Francisco, CA	114	$2,491	$3,211	$1,598	$1,169	$893	$2,042
East Boston, MA	47	$4,413	$3,411	$2,911	$1,351	$1,502	$2,060
Columbia, SC	137	$2,677	$2,914	$1,738	$860	$939	$2,054
Milwaukee, WI	82	$2,609	$3,104	$1,565	$1,005	$1,044	$2,101
Denver, CO	47	$2,960	$2,687	$1,656	$1,174	$1,304	$1,513
Bronx, NY	59	$4,198	$5,585	$1,771	$1,542	$2,426	$4,043
Rochester, NY	82	$3,531	$3,731	$1,532	$920	$2,000	$2,811
Sacramento, CA	67	$2,604	$2,835	$1,830	$1,073	$774	$1,762
El Paso, TX	120	$2,865	$2,822	$2,237	$962	$628	$1,860
Oakland, CA	60	$3,052	$3,588	$2,575	$1,371	$477	$2,217

Notes: ^: N is based on the number used in the total cost model; i.e., excluding ESRD program beneficiaries and those without Medicaid data.

ESRD program beneficiaries excluded from all analyses presented in this table. The Oregon site is excluded from analyses, as no Medicaid data were available from Oregon.

Sources: Medicare and Medicaid data.

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[19]   In the Bronx, both enrollees and comparison group members had above-average Medicare reimbursement levels in the pre-baseline period. Mean monthly reimbursement was $2,538 for enrollees and $3,685 for decliners. In the first six months following their decision not to enroll, however, actual Medicare reimbursement for Bronx comparison group members was only $1,423 per month. This resulted in lower projected cost estimates for Bronx enrollees.   Underlying the non-random evaluation design, the Bronx site was relatively aggressive at referring non-enrollees to other providers. The lower post-home visit costs incurred by Bronx comparison group members may be partly attributable to these other providers, who may be effective in controlling costs relative to the pre-application period.

6.4 Comparison of projected costs and capitated payment for specific subgroups

While the methodology used to set the Medicare portion of the PACE capitation rate does not vary based on enrollee characteristics, the regression models indicated that several measures of baseline utilization and functional status were related to subsequent reimbursement levels. To show how projected costs compared to capitated payments for patients with different baseline characteristics, we stratified the enrollee sample based on the following factors:

$ Whether average monthly Medicare reimbursement in the year preceding application to PACE was greater than $3,941 (i.e., in the top decile)

$ Whether average monthly Medicaid reimbursement in the year preceding application to PACE was greater than $2,150 (i.e., in the top decile)

$ The enrollees age group (<70, 70-75, 76-80, 81-85, 85+)

$ Gender

$ Whether the enrollee was cognitively impaired

$ The enrollee's ADL status with or without cognitive impairments.

Method 2 was used for all of these analyses except for those that required Abt survey data. Given the strong relationship between Medicaid and Medicare costs in the period preceding enrollment and the subsequent period, it was not surprising that projected costs were much higher for enrollees who had high Medicare or Medicaid costs in the year preceding enrollment than for other enrollees. For those in the top decile of Medicare costs, projected total costs were more than twice as high as for other enrollees; results were similar for those in the top decile of Medicaid costs (Table 14).

There was little relationship between age and costs, and projected costs were actually somewhat higher for enrollees age 70 and under than for their older counterparts. For example, projected total costs were $3,326 for applicants under the age of 70, compared to $2,956 for those over age 85. Projected costs were more than $800 higher for male enrollees than for females. The Method 2 model did not include indicators of health and functional status (other than the lagged Medicare and Medicaid reimbursement variables), and the higher projected costs for males may reflect the effects of unmeasured characteristics correlated with gender rather than the effects of gender *per se*.

Differences in projected costs based on mortality were derived using a slightly different version of the Method 2 model that also included an indicator for whether the individual died within three months of application to PACE. Reflecting the high medical costs typically incurred in the last few months of life, projected costs were much higher for those who died within three months of enrollment than for other enrollees. Projected total costs for those who died within 3 months of enrollment were $12,572, compared to $2,952 for other enrollees. Most of the increase was due to higher projected Medicare costs, which were $11,043 for those who died within three months of enrollment but only $1,823 for other enrollees.

We compared projected costs based on functional status using Method 3. Due to lower Medicaid costs, projected costs for those with a cognitive impairment were about $180 lower than for those with no cognitive impairment.   Virtually all of this difference was due to lower projected Medicaid costs among cognitively impaired enrollees. For enrollees with no cognitive impairment, total projected costs were $2,750 for those with 0-1 ADL limitation, $2,944 for those with 2-3 ADL limitations, and $3,658 for those with 4 or more ADL limitations (Table 15). Among cognitively impaired enrollees, total projected costs ranged from $2,767 for those with 0-1 ADL limitations to $2,926 for those with 4 or more ADL limitations.

Table 14
Method 2 (Survey Respondents and Non-Respondents)
Total Monthly Projected Costs for Specific Subgroups:

Enrollee characteristic	N	Projected Costs		
		Total	**Medicare**	**Medicaid**
Monthly Medicare expenditures in 6 months prior to enrollment^				
Top decile[1] (> $3,940)	725	$2,963	$1,640	$1,053
Not top decile[1](#$3,940)	90	$5,824	$4,093	$1,731
Monthly Medicaid expenditures in 6 months prior to enrollment^				
Top decile[1] (> 2,150)	736	$2,721	$1,847	$873
Not top decile[1](#$2,150)	79	$5,966	$2,309	$3,567
Age category^				
<70	128	$3,326	$1,915	$1,411
70-75	175	$3,112	$1,958	$1,154
76-80	148	$2,790	$1,879	$911
81-85	163	$2,915	$1,812	$1,103
> 85	201	$2,956	$1,884	$1,072
Gender^				
Female	579	$2,769	$1,761	$1,008
Male	236	$3,595	$2,198	$1,397
Mortality-- Died within 3 months of application to PACE^				
Lived	792	$2,952	$1,823	$1,130
Died	23	$12,572	$11,043	$1,528

Notes: [1]: Decile thresholds were defined based on costs for the 12 months preceding enrollment, across both enrollees and comparison group members.

^: The mortality cost projections were based on a slightly different regression model from that used for other cost projections. It included as an independent variable a binary indicator for whether the individual died within three months of application to PACE.

Due to the different analytic sample, the Medicare and Medicaid capitation rates differ slightly from those listed in other tables in this report. The Medicare rate applicable to this group was $1,090 per month, and the Medicaid rate was $2,211.

ESRD program beneficiaries excluded. The Oregon site is excluded from analyses, as no Medicaid data was available from Oregon.

Sources: Medicare and Medicaid claims data, HCFA Enrollment Database.

Table 15
Method 3 (Survey Respondents Only)
Total Monthly Projected Costs for Specific Subgroups:

Enrollee characteristic	N	Projected costs		
		Total	**Medicare**	**Medicaid**
Cognitive impairment[i]				
No cognitive impairment	270	$3,027	$1,979	$1,047
Enrollee cognitively impaired	183	$2,848	$1,975	$873
Functional status[i]				
No cognitive impairment; 0-1 ADLs	126	$2,750	$1,829	$921
No cognitive impairment; 2-3 ADLs	64	$2,944	$1,919	$1,025
No cognitive impairment; 4+ ADLs	76	$3,658	$2,343	$1,315
Cognitive impairment; 0-1 ADLs	42	$2,767	$2,069	$698
Cognitive impairment; 2-3 ADLs	40	$2,802	$1,915	$887
Cognitive impairment; 4+ ADLs	99	$2,926	$1,977	$949

Notes: [1]: Decile thresholds were defined based on costs for the 12 months preceding enrollment, across both enrollees and comparison group members.

ESRD program beneficiaries excluded. The Oregon site is excluded from analyses, as no Medicaid data was available from Oregon.

Sources: Abt Associates survey of PACE applicants, Medicare and Medicaid claims data.

7.0 Discussion of Study Limitations

A previous Abt study entitled, "The Impact of PACE on Participant Outcomes (1998)" found many benefits associated with PACE enrollees relative to the comparison group including: lower mortality rates, better health status, lower rates of nursing home utilization and inpatient hospitalization, and higher rates of ambulatory service utilization. The benefits of PACE appeared to be higher for participants with higher levels of functional impairments.

This analysis focuses on what the Medicare and Medicaid programs would have paid in their traditional programs during the enrollee's first year of enrollment. It is not an assessment of overall program cost effectiveness, and it does not consider costs related to improvements in longevity, better health outcomes, enrollee satisfaction, quality of wellbeing, and unmet needs in existing patterns of care.

The cost of non-covered services, which are integral to the PACE delivery approach, and costs used to support community placement are absent from the cost projection. Non-covered services, such as preventative and restorative interventions, may help improve awareness and help identify previously undiagnosed medical conditions, which result in better outcomes for participants.

There are several limitations, which must be considered in interpreting the study findings:

- A non-randomized study design was used in both the intervention (PACE enrollees) and the comparison groups. Thus, self selection into either group may bias the findings.

- This evaluation is based on costs predicted by existing patterns of community care and treatment.

- $ Only the first year of participation of new enrollees was studied. Increased longer term cost and service usage trends, which may be associated with older age and death, are absent from the cost projections, except to the extent that they were experienced by the comparison group during the study period.

- Great variability in the data and the small number of observations preclude making strong statements about the projected costs.

8.0 Conclusions

To evaluate the net cost effectiveness of PACE, any additional costs must be weighed against the benefits associated with participation. Enrollment in PACE was associated with improvements in several measures of health status and quality of life, including increased life expectancy, lower utilization of nursing home and hospital services, better (self-reported) health status, higher general satisfaction with life, and greater satisfaction with overall care arrangements (Chaterji, 1998). Achievement of these outcomes for the vulnerable, frail population that is targeted by PACE providers was a major accomplishment, given the small, mixed outcomes reported for most other home and community-based programs. Whether the positive outcomes associated with PACE are worth the costs associated with the program is a normative question that is beyond the scope of this report, and ultimately depends on the value placed by members of society in improving the health status and quality of life for the frail elderly population.

The study investigates the participant's first year costs to Medicare and Medicaid associated with PACE for providing care to the frail elderly population. The capitated payments made to PACE providers were compared to an estimate of what costs to Medicare and Medicaid would have been if PACE enrollees had been cared for in traditional fee-for-service settings. PACE represented a source of savings for the Medicare program in the first year of enrollment, as the Medicare portion of the PACE capitation rate ($1,072 per month) was 42 percent less than projected Medicare costs in the absence of PACE (an average of $1,844 per month). Projected Medicare costs were higher than the Medicare capitation rate across all 11 sites. While PACE represented a source of savings for Medicare, projected Medicaid reimbursement was well below the Medicaid portion of the capitation rate. The Medicaid capitation rate during the first year of enrollment was $2,249 per month, more than $1,000 per month higher than the $1,211 projected Medicaid costs.

In the initial enrollment year, combined (Medicare and Medicaid) capitation payments were $3,301 per month, about 8 percent higher than projected total costs, $3,010, from Table 11 (Method 2)). The difference narrowed to less than 4 percent after excluding participants from the On Lok and the Bronx sites. Thus, total capitated payments to PACE were only slightly higher than our estimate of initial enrollment year costs to Medicare and Medicaid had enrollees been cared for in traditional fee-for-service settings.

In a capitated rate environment, profit-maximizing providers have an economic incentive to seek out individuals who require few medical services. In the PACE demonstration, this incentive effect appears to be lessened or absent, as sites enrolled a high cost frail population. Participants had above average Medicare costs prior to enrollment, and substantially higher projected Medicare costs in the initial year, which in both cases exceeded capitated payment levels.

Because this study compares costs to payments, one tendency would be to use this work to assess the adequacy of the Medicare and Medicaid rates. We are reluctant to recommend using the information provided in this report for this purpose because of the following reasons:

- The cost projection represents only the first year of participation and does not consider higher institutional expenses and end of life expenses that may occur in subsequent years.

- The great variability of the data and the small number of observations included in the analysis has resulted in regression estimates that have a large statistical range.

$ Costs are projected for existing fee for service delivery structures. They do not reflect services provided by PACE organizations that are needed to maintain persons in community settings or are not covered under traditional fee-for-service arrangements.

Further investigation of the predicted costs and service usage after the initial enrollment years should be considered before altering payment policies.

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Appendix 1
Survey Response Rates by Site

Site	# of applicants (% of total)	# of survey respondents (% of total)	Response rate	Enrollment rate	
				Respondents	Non-respondents
San Francisco, CA	300 (10.0%)	42 (3.1%)	14.0%	78.6%	74.8%
East Boston, MA	194 (6.4%)	94 (7.0%)	48.5%	73.4%	57.0%
Portland, OR	367 (12.2%)	57 (4.3%)	15.5%	71.9%	64.2%
Columbia, SC	383 (12.7%)	349 (26.1%)	91.1%	73.1%	41.2%
Milwaukee, WI	303 (10.0%)	196 (14.7%)	64.7%	56.6%	47.7%
Denver, CO	272 (9.0%)	104 (7.8%)	38.2%	53.8%	45.8%
Bronx, NY	150 (5.0%)	75 (5.6%)	50.0%	74.7%	84.0%
Rochester, NY	394 (13.1%)	39 (2.9%)	10.0%	69.2%	64.2%
Sacramento, CA	236 (7.8%)	80 (6.0%)	33.9%	66.3%	46.8%
El Paso, TX	286 (9.5%)	241 (18.0%)	84.3%	66.8%	48.9%
Oakland, CA	124 (4.1%)	59 (4.4%)	47.6%	79.7%	64.6%
	3,009 (100.0%)	1,336 (100.0%)	44.4%	68.0%	60.9%

Source: Abt Associates

Appendix 2
Monthly Medicare and Medicaid Capitated Payments by Site and Fiscal Year

Site	Fiscal year 1995 (audited rate)		Fiscal year: 1996 (audited rate)		Fiscal year: 1997 (unaudited rate[1])	
	Medicare	**Medicaid**	**Medicare**	**Medicaid**	**Medicare**	**Medicaid**
San Francisco, CA	$1,029	$2,007*	$1,164	$2,085*	$1,198	$2,006*
	(7/94-6/95)		(7/95-6/96)		(7/96-6/97)	
East Boston, MA	$1,239	$2,056	$1,387	$2,155*	$1,317	$1,903*
	(6/94-5/95)		(10/95-9/96)		(10/96-10/97)	
Portland, OR	$880	$1,704	$925	$1,702	$921	$1,581
	(1/95-12/95)		(1/96-12/96)		(1/99-9/97)	
Columbia, SC	$782	$2,167	$833	$2,143	$881	$1,922
	(10/94-9/95)		(10/95-9/96)		(10/96-9/97)	
Milwaukee, WI	$951	$2,129	$1,011	$2,078	$1,039	$2,131
	(1/95-12/95)		(1/96-12/96)		(1/97-12/97)	
Denver, CO	$994	$1,484	$1,110	$1,487	$1,254	$1,537
	(7/94-6/95)		(7/95-6/96)		(7/96-6/97)	
Bronx, NY	$1,443	$4,010	$1,627	$4,089*	$1,478	$3,993
	(1/95-12/95)		(1/95-12/95)		(1/95-12/95)	
Rochester, NY	$958	$2,657	$849	$2,932	$1,050	$2,688
	(1/95-12/95)		(1/96-12/96)		(1/97-12/97)	
Sacramento, CA	$1,057	$1,874	$1,074	$1,669	$1,131	$1,717
	(1/95-12/95)		(1/96-12/96)		(1/97-12/97)	
El Paso, TX	$866	$1,799	$976	$1,844	$1,066	$1,989
	(10/94-9/95)		(10/95-9/96)		(10/96-9/97)	
Oakland, CA	$1,361	$2,169*	$1,375	$2,280*	$1,369	$2,178
	(10/95-9/95)		(7/95-6/96)		(7/96-6/97)	

Sources: Abt Associates analysis of PACE Cost Reports and DataPACE census data (figures derived using DataPACE are indicated by *.

Appendix 3: Technical Appendix

Lagged costs and two demographic variables (age and gender) were the only independent variables available for Method 2 (the basic regression model that included survey non-respondents), so there were few model selection choices available. This section applies to only Method 3 of evaluating the impact of PACE on costs.

A goal in the selection of independent variables for the Method 3 regressions was to identify a "best" model for estimating projected Medicare and Medicaid costs. Model selection involved a combination of hypothesized effects about the impact of covariates on costs and statistical techniques that identified the subset of independent variables that maximized the predictive power of the regression models. The "best" model for determining the projected costs for enrollees, however, is not necessarily the one that is most predictive for comparison group members, since the results of the comparison group regression models may not generalize to enrollees.

We used stepwise techniques to identify measures of health status and medical conditions that were associated with significant differences, but did not include all of the variables identified by the stepwise techniques in the regression models. Steps involved in model selection process are described below.

Step 1: Identify all measures hypothesized to be related to Medicare costs, general health status, or demand for medical services

We first identified all variables from the survey and the claims data that were hypothesized to be related to Medicare and Medicaid costs, either directly or indirectly through their influence on general health status or the demand for medical services. These included measures of demographic and socioeconomic status, pre-baseline Medicare and Medicaid reimbursement levels, measures of health and functional status, medical conditions present as of the home visit, information on self-reported quality of life, and PACE site indicators.

Step 2: Identify the subset of variables that maximize the adjusted R^2 statistic

One of the goals in the model development process was to maximize the adjusted R-squared.[20] The better the model is able to explain variation in reimbursement levels for comparison group members, the better it should be able to estimate what costs for enrollees would have been had they not participated in PACE. As a rule, we excluded measures of medical conditions present at baseline and health and functional status indicators where the *coefficient value was less than the standard error* (i.e., the t-test score was less than one), even if "theory" suggested that the variables should be included in the model.

Step 3: Check for validity

Adjusted R^2 maximization was not the only criterion used in the model selection process, since the model is more likely to replicate to enrollees if independent variables make sense clinically as well as

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[20] The adjusted R-squared measure corrects the R^2 for degrees of freedom (i.e., based on the number of independent variables in the model). If an additional covariate accounts for very little of the unexplained variation in the dependent variable, the adjusted R^2 falls even though the unadjusted R^2 increases.

statistically. Model selection was guided by a set of hypotheses about factors related to Medicare and Medicaid costs and the demand for medical care, to assure that the model made sense from a theoretical perspective.

Baseline medical condition covariates that had a negative coefficient estimate were dropped from the final model, regardless of how this exclusion affected R-squared. From a clinical perspective, it was difficult to understand why costs should be higher for an individual without a given medical condition than for an otherwise identical individual that does have the condition (i.e., holding all other factors constant), especially since the medical conditions included in the survey tended to be the more serious conditions. It seemed obvious that in these cases, the medical condition was proxying for some unobserved variable in the comparison group sample. This accidental relationship was unlikely to hold for PACE enrollees. We believed that our estimates of projected costs for PACE enrollees would be more accurate if these relationships were excluded from the final model. This rule reduced the sensitivity of model specification to chance relationships among comparison group members.

The dependent variables in the regression models were average monthly Medicare and Medicaid costs in the year following the home visit date. These costs were not observed for PACE enrollees, so the regression models were estimated only for comparison group members.

Independent variables

Based on the three-step model selection process described above, the following baseline measures of applicant characteristics were included in the models estimated for survey respondents. The same specification was used for both the Medicare and Medicaid regressions.

- **$** **Demographics**
  - Gender is female
  - 12 or more years of schooling

- **$** **Reimbursement levels in the 12 months preceding the home visit**
  - Average reimbursement per month in the 12 months preceding the home visit (Medicare reimbursement for Medicare model; Medicaid reimbursement for Medicaid models).[21]

- **•** **Reimbursement levels in the 12 months preceding the home visit**
  - Average reimbursement per month in the 12 months preceding the home visit (Medicare reimbursement for Medicare model; Medicaid reimbursement for Medicaid models)[22]

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[21] Baseline Medicaid expenditures were not included in the Medicare cost regressions because this information was missing for a relatively large number of comparison group individuals, so that its inclusion would have resulted in the loss of an unacceptable number of observations. Baseline Medicare expenditures did not meet the statistical criteria described above for selection of independent variables. There was no relationship between baseline Medicare reimbursement and Medicaid costs in any of the three periods analyzed.

[22] Baseline Medicaid expenditures were not included in the Medicare cost regressions because this information was missing for a relatively large number of comparison group individuals, so that its inclusion would have resulted in the loss of an unacceptable number of observations. Baseline Medicare expenditures did not meet the statistical criteria described above for selection of independent variables.

- **Health, functional abilities, and quality of life**
  - Expect good or excellent health one year from the survey date[23]
  - Cognitively impaired[24]
  - Number of ADL limitations (0-7)[25]

- **Medical conditions**
  - Alzheimer's Disease
  - Asthma
  - Ulcers of the digestive system
  - Liver disease
  - Kidney disease or failure

- **Site indicators**
  - On Lok (omitted category)
  - Boston
  - Columbia
  - Milwaukee
  - Denver
  - Bronx
  - Rochester
  - Sacramento
  - El Paso
  - Oakland

There was no relationship between baseline Medicare reimbursement and Medicaid costs in any of the three periods analyzed.

[23] Those who reported that they could not see the regular print in a newspaper (with glasses/with contact lenses) or who usually wear a hearing aid were defined as having a visual/hearing disability.

[24] Cognitive impairment was determined based on the Pfeiffer Short Portable Mental Status Questionnaire (MSQ) administered before beginning the interview. The interviewer scored responses to the ten questions included in the MSQ to determine whether the applicant was capable of continuing with the interviewer or whether a proxy respondent should be sought. Applicants who missed at least half of the MSQ questions, or who were not administered the test because they were aphasic were assumed to be cognitively impaired, as were those reported by their proxy as having Alzheimer's Disease.

[25] Activities of daily living include eating, walking inside, grooming, bathing, dressing, transfer, and toileting. The number of ADL limitations is based on how many of these activities the individual cannot perform without help from others. Information on functional status was not included in the close-out interview attempted for applicants that died prior to a scheduled follow-up interview. For our analyses of functional status outcomes, we assigned decedents the maximum ADL limitation score.

Exhibit 4-A

Baseline Characteristics of PACE enrollees and comparison group members in the Medicare analysis sample: **Method 2 (Survey respondents and non-respondents)**

Variable	PACE mean (n=1,307)	Comparison group mean (n=671)
Demographics		
Female	69.1%	67.6%
Age	78.7 years	78.5 years
PACE site indicators:		
San Francisco, CA (On Lok)	9.9%	3.6%
East Boston, MA	8.0%	8.9%
Columbia, SC	15.1%	0.5%
Milwaukee, WI	10.8%	17.7%
Denver, CO	8.0%	15.8%
Bronx, NY	5.6%	2.4%
Rochester, NY	17.6%	12.8%
Sacramento, CA	6.8%	9.0%
El Paso, TX	13.7%	15.4%
Oakland	4.6%	3.9%

Sources: Abt Associates survey of PACE applicants, Medicare claims data.

Appendix 4-B
Baseline Characteristics of PACE enrollees and comparison group members in Medicare analysis sample: Method 3 (Survey respondents)

Variable	Enrollee mean (n=697)	Comparison group mean (n=322)
Demographics		
Female	72.7%	68.1%
12+ years of education	76.2%	70.5%
Baseline health, functional abilities and quality of Life		
Cognitively impaired	40.5%	33.1%
Mean number of ADL limitations (0-7)	2.7	2.3
Alzheimer's Disease	17.5%	15.2%
Asthma	6.6%	8.3%
Ulcers of the digestive system	6.0%	8.9%
Liver disease	1.1%	1.6%
Kidney disease or failure	5.4%	7.1%
PACE site indicators:		
San Francisco, CA (On Lok)	3.0%	1.8%
East Boston, MA	7.4%	6.4%
Columbia, SC	26.7%	17.8%
Milwaukee, WI	14.6%	22.8%
Denver, CO	6.0%	13.1%
Bronx, NY	4.9%	3.4%
Rochester, NY	4.3%	3.4%
Sacramento, CA	5.4%	3.9%
El Paso, TX	23.3%	24.3%
Oakland, CA	4.3%	4.1%

Note: Because no Medicaid data were available for any applicants to the Portland Oregon site, this site was excluded from these analyses.

Sources: Abt Associates survey of PACE applicants, Medicare claims data.

Appendix 4-C: Self-Reported Nursing Home Days in Pre- and Post- Application Periods

	Enrollees	Comparison Group
6 months prior to home visit	7.42	8.58
6 months after home visit	6.52	22.66
12 months after home visit	15.03	38.04

Notes: These utilization statistics include both post-acute and long-term care. It was not possible to identify the payor source for this care. For more details, see Chaterji, et al., 1998.

Source: Abt Associates Survey of PACE applicants.

Appendix 5: Performance of the regression models

Given our goal of estimating as accurately as possible the level of Medicare and Medicaid reimbursement that enrollees would have incurred if they did not participate in PACE, the ability of the regression models to explain variation in the reimbursement levels of comparison group members is an important criterion for the validity of the results presented in this study. There was large variation in the level of both Medicare and Medicaid reimbursement levels within the study population (for both groups, the standard deviation of costs in all periods is larger than the standard deviation), and the regression models were not able to capture all sources of this variation.

R-squared is a statistic that measures how close a particular classification system comes to the ideal. This statistic is estimated routinely and reported by most statistical software as part of ordinary least squares (OLS) regression output. In the context of our models, R-squared is a measure of how much of the variance in Medicare or Medicaid reimbursement observed in the data can be predicted by our models. It gives the percentage of the variation of the dependent variable (cost) explained linearly by variation in independent variables. Formally, this equals the sum of squared deviations of the predicted values of the dependent variables about their mean (i.e., the explained variation from the OLS regression) divided by the total variation of the dependent variable about its mean (the total sum of squares).

The regression models, particularly those estimated for Medicaid reimbursement, performed reasonably well in accounting for the sources of variation in reimbursement.   The Medicare model that was estimated for survey respondents only performed better than the basic model that included both respondents and non-respondents, but the performance of both Medicaid models was similar. The R-squared was considerably higher for the models of Medicaid reimbursement than for the Medicare models:

- The basic Medicare model (Method 2) that included both survey respondents and non-respondents, and only a limited set of independent variables, accounted for 13.5 percent of the variance in costs (Table 5-1). The model that included only survey respondents (Method 3) was more accurate, accounting for 24.5 percent of the variance in Medicare costs. The statistical performance was essentially the same when On Lok comparison group members were excluded.

- The basic Medicaid model (Method 2) accounted for 47 percent of the variance in Medicare costs. The model that was based only on survey respondents was actually less precise, accounting for 45 percent of the variance in Medicaid costs (Table 5.2). Excluding comparison group members from the On Lok and Bronx sites, the Medicaid models predicted 44 percent of the variance in costs using Method 2 and 33 percent using Method 3.

For all of these models, statistical power was driven by the measure of reimbursement in the12 months prior to the home visit (i.e., baseline reimbursement). The lagged cost variable is responsible for much of the statistical power of the regression models that included both survey respondents and non-respondents. Even among survey respondents, however, the predictive power of the models was due primarily to the strong relationship between reimbursement in the 12 months prior to the home visit and subsequent reimbursement levels.

Table 5-1
Predictive power of Medicare regression models: R-squared

	R-squared for model of Medicare cost in:	
Model:	All sites	Exclude On Lok
Method 2 (Survey respondents and non-respondents)	13.5%	13.5%
Method 3 (Survey respondents only)	24.8%	24.8%

Table 5-2:
Predictive power of Medicaid regression models: R-squared

	R-squared for model of Medicaid cost in:	
Model:	All sites	Exclude On Lok and the Bronx
Method 2 (Survey respondents and non-respondents)	47.2%	43.6%
Method 3 (Survey respondents only)	45.3%	33.3%

Medicare regression models

Method 2. Most of the predictive power of this model was due to the strong relationship between Medicare costs in the year preceding application to PACE and costs in the subsequent period.[26] Each $1 increase in monthly Medicare reimbursement in the year preceding the home visit was associated with an additional $0.46 in monthly costs in the year following the home visit, holding other factors constant (Table 5.3). Neither gender nor age had a significant relationship to Medicare costs, and only one site (East Boston) had Medicare costs that were significantly different than On Lok, the omitted category. Results were relatively invariant to the exclusion of On Lok comparison group members.

Method 3. The model included several measures of baseline health and functional status, in addition to lagged Medicare costs and site indicators. As in the Method 2 model, the strongest predictor of Medicare costs was the lagged Medicare cost measure. Survey respondents who anticipated their health status to be good or excellent one year from the survey date had significantly (at the 10 percent level) lower Medicare costs than those who anticipated their future health to be fair or poor (Table

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[26]   Without the lagged Medicare reimbursement variable, the R-squared of this model would have been only 0.026.

5.4). Medicare costs for those with cognitive impairments (at baseline) were, on average, more than $800 higher than those without cognitive impairments. Although ESRD program beneficiaries were excluded, Medicare reimbursement was much higher for those reporting kidney disease.

Table 5-3:
Method 2: Basic RegressionB Monthly Medicare costs

Variable	All sites		Exclude On Lok	
	Coefficient	Std error	Coefficient	Std error
Intercept	157.72	1,250.91	1,269.60	1,188.00
Demographics				
Female	-171.72	234.11	-187.79	240.94
Age	10.318	13.52		
Baseline Medicare cost				
Monthly Medicare reimbursement in pre- home visit period	0.458***	0.051	0.454***	0.051
PACE site				
East Boston, MA	1,263.26*	675.42	313.02	663.88
Columbia, SC	411.29	660.17	-543.60	645.70
Milwaukee, WI	74.16	624.74	-882.65	608.56
Denver, CO	237.03	630.63	-717.09	616.80
Bronx, NY	-298.29	898.72	-1,251.24	892.75
Rochester, NY	103.30	642.95	-845.37	636.46
Sacramento, CA	191.03	677.70	-2.1.79	616.52
El Paso, TX	754.62	635.17	-20.79	616.52
Oakland, CA	963.66	793.80	(reference category)	
R-squared	**13.5%**		**13.5%**	

N=662; 633 excluding On Lok.

***: Coefficient is statistically significant at the 1% level.
** : Coefficient is statistically significant at the 5% level.
* : Coefficient is statistically significant at the 10% level.

Note that the Portland site was excluded from the models, since no Medicaid data was available from Oregon. ESRD program beneficiaries were also excluded.

Sources: Abt Associates survey of PACE applicants, HCFA.

Table 5-4
Method 3: Regression with Abt survey data Monthly Medicare costs

Variable	All sites		Exclude On Lok	
	Coefficient	Std error	Coefficient	Std error
Intercept	283.95	1,291.01	1,506.43*	888.97
Demographics				
Female	-70.90	359.51	-97.90	362.84
12+ years of education	-90.99	396.75	-94.43	402.14
Baseline Medicare cost				
Monthly Medicare reimbursement in pre- home visit period	0.422***	0.075	0.419***	0.076
Baseline health, functional abilities and quality of life				
Anticipate good or excellent health 1 year from survey date	-733.12*	375.75	-746.63*	380.67
Cognitively impaired	837.42**	392.03	831.11**	398.41
Number of ADL limitations (0-7)	127.02	79.57	143.28*	81.08
Baseline medical conditions				
Alzheimer's Disease	701.00	490.48	68.22	493.16
Asthma	682.37	614.94	612.24	619.63
Ulcers of the digestive system	1,334.56	587.16**	1361.78**	598.99
Liver disease	704.37	1373.39	678.40	1,380.46
Kidney disease	2,453.74***	678.71	2,452.38***	681.93
PACE site				
East Boston, MA	1,567.90	1,376.19	373.79	1,055.79
Columbia, SC	357.34	1,266.96	-881.49	960.32
Milwaukee, WI	427.27	1,252.77	-791.86	909.00
Denver, CO	667.56	1,283.31	-534.41	946.29
Bronx, NY	361.19	1,516.24	-874.20	1,234.80
Rochester, NY	39.04	1,593.48	-1,180.44	1,330.20
Sacramento, CA	-687.41	1,465.14	-1,912.57	1,183.37
El Paso, TX	943.09	1,244.93	-282.65	910.05
Oakland, CA	1,196.96	1,461.72	(reference category)	
R-squared	**24.8%**		**24.8%**	

N = 341; 334 excluding On Lok

***: Coefficient is statistically significant at the 1% level;
 ** : Coefficient is statistically significant at the 5% level.
 * : Coefficient is statistically significant at the 10% level.

Note that the Portland site was excluded from the models, since no Medicaid data was available from Oregon. ESRD program beneficiaries were also excluded.

Sources: Abt Associates survey of PACE applicants, HCFA.

Medicaid regression models

Method 2. Comparison group members who had high Medicaid reimbursement levels in the year prior to the home visit also tended to have high reimbursement levels in the subsequent period. Each additional Medicaid dollar in the pre-application period was associated with an additional $0.60 in Medicaid costs for the year following application (Table 5.5). Relative to On Lok, Medicaid costs were significantly higher for comparison group members from the East Boston and Denver sites.

Method 3. As for the simple regression model, lagged Medicaid costs were the strongest predictor of Medicaid costs in the year following the home visit each additional dollar of Medicaid reimbursement in the pre-application period was associated with an additional $0.52 in monthly Medicaid costs for the subsequent period (Table 5.6). Medicaid reimbursement was also significantly higher for those with a cognitive impairment, more ADL limitations, and liver disease.   In the model that excluded Bronx and On Lok comparison group members, the East Boston and Denver site indicators were statistically significant (relative to the Oakland site).

Table 5-5
Method 2: Basic Regression Monthly Medicaid Costs

Variable	All sites		Exclude On Lok and Bronx	
	Coefficient	Std error	Coefficient	Std error
Intercept	262.44	616.20	-108.14	588.01
Demographics				
Female	-250.69*	137.62	-251.75*	146.30
Age	6.34	6.87	6.16	7.14
Baseline Medicaid cost				
Monthly Medicaid reimbursement in pre- home visit period	0.599***	0.039	0.586***	0.042
PACE site				
East Boston, MA	634.44*	364.54	1,024.72***	389.88
Columbia, SC	191.80	313.37	586.25*	344.19
Milwaukee, WI	156.55	286.05	549.62*	322.05
Denver, CO	520.01*	282.27	916.28***	320.52
Bronx, NY	364.64	391.86	(excluded)	
Rochester, NY	247.33	397.28	668.14	433..07
Sacramento, CA	-169.70	296.09	222.48	331.34
El Paso, TX	-206.16	281.48	185.82	318.60
Oakland, CA	-390.38	381.15	(reference category)	
R-squared	**47.2%**		**43.6%**	

N = 380; 332 excluding On Lok and Bronx.

***: Coefficient is statistically significant at the 1% level.
** : Coefficient is statistically significant at the 5% level.
* : Coefficient is statistically significant at the 10% level.

Note that the Portland site was excluded from the models, since no Medicaid data was available from Oregon.

Sources: Abt Associates survey of PACE applicants, HCFA.

Table 5-6
Method 3: Regression with Abt survey data Monthly Medicaid costs

Variable	All sites		Exclude On Lok and Bronx	
	Coefficient	Std error	Coefficient	Std error
Intercept	799.16	488.79	35.91	326.61
Demographics				
Female	-218.74	166.70	-162.05	162.81
12+ years of education	-277.32	188.02	-199.83	183.13
Baseline Medicaid cost				
Monthly Medicaid reimbursement in pre- home visit period	0.523***	0.079	0.0485***	0.094
Baseline health, functional abilities and quality of life				
Anticipate good or excellent health 1 year from survey date	-12.26		11.14	163.72
Cognitively impaired	434.46**	175.13	335.78*	172.67
Number of ADL limitations (0-7)	96.84***	35.72	66.99	35.34
Baseline medical conditions				
Alzheimer's Disease	29.00	220.55	-11.48	209.82
Asthma	166.13	271.70	172.81	252.14
Ulcers of the digestive system	207.19	244.14	287.27	245.66
Liver disease	1,113.94**	496.92	1,122.60**	461.65
Kidney disease	368.06	295.75	393.05	284.34
PACE site				
East Boston, MA	369.64	544.10	1,114.87**	432.07
Columbia, SC	-258.10	464.82	595.41	381.59
Milwaukee, WI	30.67	450.27	786.76**	342.73
Denver, CO	77.32	456.66	827.60**	347.51
Bronx, NY	354.00	514.09	(excluded)	
Sacramento, CA	-119.70	520.70	699.10	409.52
El Paso, TX	-421.44	440.49	333.89	337.22
Oakland, CA	-731.71	532.70	(reference category)	
R-squared	**45.3%**		**33.4%**	

N = 202; 183 excluding On Lok and Bronx

***:   Coefficient is statistically significant at the 1% level;
 ** :   Coefficient is statistically significant at the 5% level.
 * :   Coefficient is statistically significant at the 10% level.

Note that the Portland site was excluded from the models, since no Medicaid data was available from Oregon.
Sources: Abt Associates survey of PACE applicants, HCFA.