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THE DISABLED ELDERLY IN MANAGED CARE:  
USE AND COST OF MEDICAL, HOME, AND  
COMMUNITY CARE IN THE SOCIAL HEALTH  
MAINTENANCE ORGANIZATION DEMONSTRATION

**by**

MARTIN A. LYNCH

**DISSERTATION**

**Submitted in partial satisfaction of the requirements for the degree of**

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**in**

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**of the**

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**San Francisco**

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By

Martin Anthony Lynch

To Eileen, Colin, and Ryan  
Lillian, Leatha, Helene, Lorna, Eugenia, and Charlotte

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**THE DISABLED ELDERLY IN MANAGED CARE: USE AND COST OF  
MEDICAL, HOME, AND COMMUNITY CARE IN THE SOCIAL HEALTH  
MAINTENANCE ORGANIZATION DEMONSTRATION**

Martin A. Lynch

Current health policy debate centers on the use of managed care to control costs in the Medicare and Medicaid program. Little is known about how disabled elders fare in managed care nor about integrating medical and chronic care. This study built on the Andersen behavioral model and health care supply and demand models to examine utilization and expenditures for the disabled members of the Social HMO demonstration between 1985 and 1989.

Data were collected on a sample of 1,868 impaired members of the four SHMO sites. A two stage regression model was used to identify factors predicting any use of hospital, physician, skilled and intermediate care facility, adult day care, home health, and personal care services and the amount of use and total cost for members with some use.

For stable members site of enrollment explained most variance in use of chronic care suggesting that health plan discretion, geographic and market area differences were more important than individual needs in predicting utilization.

The Andersen behavioral model is no longer adequate in explaining utilization when disabled elders are enrolled in large HMOs. The identification of health plan discretion as a key predictor means that quality assurance and practice guidelines, in addition to consumer involvement, must be developed to assure equitable access to care.

Only 65% of the impaired SHMO members received any homecare in the first year. This was an improvement over the community at large but still raised questions about whether care was adequate. Cognitive problems and functional disabilities were important predictors of use and cost and should be used by HMOs to target special services. The SHMOs did not clearly substitute chronic care for high cost hospital use, perhaps because they did not integrate medical and chronic care. Integration is critical for serving disabled elders. Heavily disabled members were less likely to receive physician and hospital services. Low income members were more likely to use nursing home care raising questions for future research about special problems they face in remaining in the community. SHMOs experienced favorable disenrollment in the impaired group. Managed care offers some possibilities for caring for disabled elders but improvements are needed.

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# **CHAPTER 1**

## **INTRODUCTION**



Current debate on Medicare and Medicaid policy changes relies heavily on managed care. It is unclear how the disabled elderly will fare in managed care systems and how managed care will offer the range of medical, home and community care required by those who have functional disabilities as well as complex medical problems.

The great majority of older Americans indicate that their preference is to remain at home even if they are faced with severe disabilities. None the less, over 80% of dollars spent on long term care in the United States is spent on institutional care (Levit, et al., 1991). With the aging of the population and the growing number of people over age 85 with high levels of disability, it can be expected that issues related to the provision of long term care will become more prominent in national policy discussions. It will be important to understand the dynamics of the market for community based long term care services if responsive public policy is to be developed and the preferences of growing numbers of the elderly are to be met.

Long term care services are often considered to include health, social, housing, transportation, and supportive services for people with disabilities. Disabilities may include physical, mental, or cognitive impairments (Harrington, et. al., 1992). Long term care includes help with basic activities of daily living (ADLs) such as eating, getting in or out of a bed or chair, toileting, bathing,

dressings, and other instrumental activities of daily living (IADLs) required for independence such as meal preparation, grocery shopping, transportation, financial management, taking medications, telephoning and housekeeping (Katz, 1963; Pepper Commission, 1990).

The existing emphasis of our health care system is on acute medical care; practitioners and systems of care have great difficulty adapting to the long term trajectory of chronic health and disability problems (Strauss and Corbin, 1988). Reimbursement mechanisms like Medicare, aimed specifically at the elderly and disabled, provide financing for medically oriented care related to acute health problems. To date, there has been limited federal policy response to growing long term care needs and private long term care insurance has not provided coverage for the great majority of Americans (Ball and Bethell, 1989). This may be changing as the recent national health reform debate included discussion of some coverage of home and community care. Some state reform proposals also include expanded roles for non-institutional services. Clearly issues related to long term care policy as well as questions related to the utilization of chronic care services and expenditures for these services are being pushed into a more prominent place for U.S. families and policy makers (Harrington, et al., 1992). Long term care issues are also becoming increasingly important in the field of health services research as we strive for information and answers

that will help develop future policy responses (Rowland, 1991).

This study examines data from a large national evaluation of the initial years of the Social Health Maintenance Organization (SHMO) projects. Specifically it explores the utilization and expenditures for a range of health and chronic care services for impaired elders in four managed care settings over a four year time period from 1985 through 1989. The larger SHMO evaluation studied data on comparative health status, morbidity, mortality, satisfaction, utilization and expenditures for medical care, and other issues related to this national demonstration project. Findings from the evaluation are summarized in the literature review section of Chapter 2.

The goal of this study is to understand the factors related to utilization and expenditures for community based long term care services in managed care settings and whether these services substitute for high cost acute medical services. The study applies conceptualizations from behavioral and economic models to the study of long term care service utilization and expenditures. It also attempts to go beyond behavioral models in explaining critical differences in utilization and expenditures related to geographic areas, practice patterns, and health plan strategies.

A framework and model for this examination will be

developed from previous behavioral and economic models which have attempted to predict health and long term care service utilization and expenditures. This framework will also be discussed within a broader context of some of the key political issues which shape current U.S. long term care policies.

A number of studies are available which discuss the health care utilization of the elderly from the point of view of the Andersen (1968) behavioral model. Some studies also directly apply behavioral models to home care services. Several of these studies include data on community care services as well. They also help us to understand out-of-pocket costs faced by consumers of home and community care.

Economic models for predicting utilization and expenditures provide a related but somewhat different perspective. A basic model of health care utilization developed by health economist Paul Feldstein (1988) will be discussed with applications to home and community care. Economic models examining nursing home and home health markets and factors affecting supply and demand in these markets will be reviewed in an effort to draw implications for non-institutional long term care. Supply and demand factors specifically affecting the home and community care market will be integrated into a model designed to predict community based long term care utilization and expenditures.

## **I. IMPORTANCE OF THE STUDY:**

### **A. Health Reform, Managed Care, and Home and Community Care:**

Current national health reform discussions are considering managed care as a favored type of financing and delivery mechanism for the United States health care system. Reform discussions have also included the possibility of additional coverage for community based long term care services. The SHMO data set provides one of the first opportunities to study utilization and expenditures for an expanded range of chronic care services in a managed care setting. Previous studies of the use of HMOs by the elderly have typically focused on TEFRA Medicare HMOs which have not offered expanded home and community care services as a covered benefit. As managed care and long term care delivery strategies are merged it will be of critical importance to understand the factors associated with utilization and expenditures for these services as well as how managed care organizations substitute home and community care services for acute care. This study focuses on the impaired elderly who can be expected to be the highest users of chronic care services under any expanded long term care coverage plan.

This study also offers a unique opportunity to examine utilization under managed care. Data from On Lok's (Zawadski and Eng, 1988) PACE replication project are now being gathered and other demonstrations combining managed care and long term care are being designed (e.g. Robert Wood Johnson Foundation

Chronic Care Initiative, 1992). Evaluation of data from these projects will not be available for several years, despite rapidly moving policy and delivery system initiatives. Initial findings from the SHMO evaluation presented in this study will help to inform the development of these new managed care initiatives.

**B. Home and Community Care Utilization:** Data from this study provide an opportunity to compare SHMO Demonstration findings with the findings from other long term care utilization and expenditures studies such as the National Long Term Care Survey (NLTC) (e.g. Liu, et al., 1985). Although the SHMO data set does not provide a nationally representative sample like the NLTC, it does provide a broad range of data from four very distinct geographical areas around the country, and should offer some generalizability to other U.S. long term care markets as well. This study will not directly compare SHMO and NLTC data, but will make SHMO findings on home and community care more readily available for such comparisons.

**C. Community Based Long Term Care Market Area Variations:**

The inclusion of four distinct geographic market areas in the study allowed for some qualitative comparisons of possible effects of supply factor differences from site to site. Basic information on market area differences, the background of the SHMO sponsors, and practice patterns at the different sites are available from the overall SHMO evaluation to help inform conclusions being drawn from utilization and expenditure

modelling in this study.

**D. LONGITUDINAL DATA:** Many studies using behavioral models to predict utilization have been based on cross-sectional data. The SHMO evaluation provided a valuable data set to test predictive models on a longitudinal data set over a minimum two year period.

The remainder of this introduction will discuss the aging of the population, the current long term care system, U.S. health expenditures, the income and asset position of the elderly, and expenditures specifically related to elders, including those for long term care.

## **II. AGING AND DISABILITY IN THE UNITED STATES: WHO USES LONG TERM CARE?**

The percent of people over 65 is growing rapidly in the United States. That sector of the aged over 85 is growing most rapidly of all. In 1980 there were 2.4 million of the oldest old, those over 85. Conservative estimates are that there will be 5.2 million people over 85 by the year 2000 and 13.1 million by the year 2040 (U.S. Bureau of the Census, 1984).

To understand the tremendous growth of the long term care industry, which these population figures imply, we must look

at the rates of elders with disabilities. In 1980 only 5.3% of all elders over 65 years of age were institutionalized in a nursing home; 23.2% of the oldest old were in nursing homes (U.S. Bureau of the Census, 1984). Moreover, the percentage of those of the oldest old in nursing homes was increasing while the percentage of the young old in such institutions was remaining relatively constant (Rosenwaike, 1985). Of those 65-74 living in the community, 11.4% were limited in their major activity, 48.0% of those over 85 were limited in their major activity (Rice and LaPlante, 1988).

Estimates of those with severe disabilities, as defined by needing assistance with 3 of 5 ADLs or requiring substantial supervision because of cognitive impairments or behavioral problems, include 4.1 million people (Pepper Commission, 1990). Of these severely disabled, 3.3 million are elders and .8 million are under 65 years of age (Ibid.). About 2.4 million of these severely disabled elders are estimated to live at home (Ibid.). Other estimates (Liu, et al., 1985) indicate that there are 4.6 million elders living in the community with some limitations in ADLs or IADL's.

Long term care is not just an issue for the elderly. Although estimates of the number of disabled people in the U.S. population vary according to different definitions of disability, it appears that at least 14% of the total population or approximately 36 million people are limited in certain activities (LaPlante, 1991). 47% of the disabled are



below the age of 65 (Rice and LaPlante, 1988). The prevalence of limitations of activities in the population also increased from the 1970's to the 1980's (Ibid.). The growth in the numbers of the elderly in general, in the oldest old in particular, and in the prevalence of disability indicate that there will be a tremendous increase in the demand for long term care services.

### **III. UNITED STATES HEALTH AND LONG TERM CARE EXPENDITURES:**

**Total U.S. Health Expenditures:** Long term care expenditures should be placed in the framework of overall U.S. health expenditures and total health expenditures for the elderly. The Health Care Financing Administration (Levit, et al., 1991) reported total 1990 national health expenditures to be \$666.2 billion. This was 12.2% of the Gross National Product (GNP). Expenditures averaged \$2,556 per person with \$2,255 for personal health care (Ibid.). Hospital care and physician care made up the largest portions of these expenditures at \$256 billion and \$125.7 billion respectively. Nursing home expenditures totalled \$53.1 billion and home health care \$6.9 billion (Ibid.). Home health expenditures include medical care services delivered in the home but do not include a broader definition of home health services which are not currently reimbursed under Medicare.

In 1990, government sources provided 42% of health care expenditures for all ages. Medicare provided 17%, Medicaid 11%, and other government programs 14% (Levit, et al., 1991). Private health insurance funded 33% of health care expenditures. Out-of-pocket payments covered 20% of overall health care dollars spent. Out-of-pocket spending paid for 45% of all nursing home costs in 1990 and Medicaid financed 45.6%. Of the limited home care expenditures included, Medicare and Medicaid paid for approximately 74% and out-of-pocket payments covered approximately 11.6% (Levit, et al., 1991).

**HEALTH CARE SPENDING FOR THE ELDERLY:** Using estimated data Waldo, et al. (1989), place personal health expenditures for the elderly in 1987 (the last year for which information is available) at a total of \$162 billion or 36% of total personal health expenditures for the whole population. The elderly made up approximately 12% of the total population. Expenditures for health care for the elderly grew at an average annual rate of 13.6% between 1977 and 1987. Public sources paid for 63% of expenditures for the aged versus 26% for those under age 65 (Ibid.).

Per capita expenditures for the elderly averaged \$5,360 per year. Those from 65 to 69 years of age averaged \$3,728 in expenditures; the 85 years and over age group averaged \$9,178 per year. For all elderly hospital expenditures consumed the

largest portion of the total equalling \$2,248 per capita per year; physicians' services accounted for \$1,107 per capita, nursing home care \$1,085, and other personal health care \$920. For those over 85 nursing home care made up the largest portion of the total per capita cost, accounting for \$3,738 as compared to \$3,231 for hospital care, \$1,262 for physicians' services and \$947 for other personal care (Waldo, et al., 1989).

Waldo and Lazenby, (1984) describe the sources of funds for health expenditures specifically for the elderly as being 48.8% from Medicare, 25.2% from out-of-pocket spending, 12.8% from Medicaid, 7.2% from private insurance, 5.6% from other government sources, and .4% from other private sources. Out-of-pocket sources paid for only 3.1% of hospital care, 29.1% of physician care, 50.1% of nursing home care, and 59.9% of other care for the elderly (Ibid.).

#### **ECONOMIC STATUS OF THE ELDERLY:**

In recent years there has been a growing perception that the economic status of the elderly has improved significantly and that they no longer need the level of governmental support associated with Social Security and Medicare spending. This perception is supported by the significant decrease in the percentage of elders living below the poverty level from almost 30% in the 1960's to approximately 12% today, a figure very close to that for younger adults (U.S. Bureau of the

Census, 1990a). In fact, elderly median cash income is still well below that of younger adults, at about 63% for families and 46% for single individuals of the equivalent levels for adults 25-64 (U.S. Bureau of the Census, 1990b).

Perhaps more important is the wide diversity among subgroups of the elderly in income. Poverty rates may be similar to younger adults but a much greater percentage of the elderly live near poverty levels with about 27.2% of elderly within 150% of poverty (U.S. Bureau of the Census, 1990a). Elders living alone have significantly lower incomes than those in families with those over 85 years of age have much lower incomes than their young old counterparts. Those over 85 and living alone have a median income of \$7,947 per year versus a median income of \$24,868 for those in families between the ages of 65 and 74 (U.S. Bureau of the Census, 1990b). Women are also poorer than men with a median income of only 58% that of men, and an overall poverty rate of 14% compared to 7.8% for men (Ibid.).

Minority elders are also significantly poorer than Whites. In 1989, the poverty rate among African-American elders was 30.8%, as compared to 20.6% for Hispanics and 9.6% for Whites. Elders who combine several of the risk factors for poverty, African-American women, living alone, have a 60.6% poverty rate (Ibid.).

Elders rely on government sources, pensions and assets for 81% of their income (Grad, 1990). Poor elderly are much

more dependent on Social Security with 30% relying on social security for 80% or more of their income (Ibid.). Social Security makes up 79.3% of the earnings of those below poverty level versus 17% of the income of those above 500% of the poverty level (U.S. Bureau of the Census, 1990b).

People over 65 have greater assets than younger adults, with a median net worth of \$73,471 in 1988 versus a median of \$35,752 for all households (U.S. Bureau of the Census, 1990c). There is also a wide disparity in asset distribution among subgroups of the elderly. 25% had a net worth below \$25,000 (less than the cost of one year in a nursing home) and 14% had a net worth below \$5,000. About two thirds of total elderly net worth come from home ownership (Ibid.). In a similar pattern to elderly income, those living alone, women and minorities have fewer assets than those who are married and White. African-American elders had a net worth of \$22,210 versus \$81,648 for White elders (Ibid.).

Although poverty rates for all elders have declined significantly over the last 25 years, more elders continue to be near poor. Groups such as women, those living alone, and minorities also have lower incomes and assets available for health and long term care expenditures.

#### **LONG TERM CARE EXPENDITURES AND SOURCES OF FUNDS: WHO PAYS?**

Any discussion of long term care expenditures and who pays for them, must take into account the fact that the

majority of long term care services are provided by informal providers and it is difficult to assess the cost of this informal care. 70% of disabled elders rely exclusively on help from spouses, children, or other informal sources (Liu, et al., 1985). According to 1982 Long Term Care Survey (LTCS) data, 81% of elders with only IADL limitations relied only on informal care; 65% of those with 5 or 6 ADL limitations used unpaid help exclusively (Ibid.). The burden and indirect cost of this informal care falls heavily on women with 75% of informal caregivers being women and many of these elderly themselves (Pepper Commission, 1990; England, et al., 1991). 35% of informal caregivers are over 65 years of age, a third are in poor health and 10% have given up employment to provide care in the home (Pepper Commission, 1990). Caregivers themselves, employers and society all experience costs due to lost productivity, income and tax revenue associated with informal caregiving.

The Pepper Commission (1990) uses Health Care Financing Administration data from 1988 to estimate total national expenditures on long term care at \$52.8 billion. This figure includes \$43.1 billion for nursing home care and \$9.7 billion for in-home care. Only 18% of 1988 long term expenditures were going to home care despite the fact that most disabled people live at home (Pepper Commission, 1990). By 1990, expenditures for nursing home care (\$53.1 billion) and home health care (\$6.9 billion) alone totalled \$60 billion (Levit,

et al., 1991). Rivlin and Wiener(1988) in their projections of long term care spending state that current expenditures for nursing home care will rise to \$98 billion (in 1987 dollars) by 2020. Expenditures for home care services are expected to grow to \$21.9 billion by 2020 (Ibid.).

The bulk of current spending and projected spending is in nursing home care despite the preference of most elderly to remain in their own home. Society is faced with the problem of both assuring that long term care services are delivered as efficiently as possible and designing new services which will meet the preferences of its elders and their families. In addition, equitable methods of financing must be found to pay for the increased supply of long term care services required. Major challenges face the United States in developing non-institutional alternatives which both respond to consumer preference and minimize the cost burden to society.

The Senate Special Committee on Aging (1990) lists six primary sources of current long term care financing. In addition to Medicaid and out-of-pocket payments these include, Medicare, Social Services Block Grants, the Older Americans Act, and private long term care insurance. Medicare, private insurance and other public and private payments make very small contributions to paying for nursing home care. 1988 estimates (Pepper Commission, 1990) suggest that 34% of home care expenses (more broadly defined) are paid by Medicaid, 27% by Medicare, and 22% through out of pocket payments. Other

federal programs like the Older Americans Act and the Social Services Block Grant program contribute 6% and other state programs pay another 5%. Private insurance and other private organizations pay 6% (Pepper Commission, 1990). These spending estimates do not include costs associated with informal care although two-thirds of severely disabled elders receive no paid assistance. Liu, et al. (1990) estimate that it would cost approximately an additional \$8 billion in 1989 dollars to provide paid community care to those elders who need assistance with two activities of daily living but are not now receiving it.

Medicaid pays for 90% of all public expenditures on nursing home care paying for many low income elders. Davis and Rowland (1986) discuss the substantial share of Medicaid spending devoted to the elderly with chronic care needs. Because of the high cost of nursing home care, in 1981 the average per capita expenditure per aged beneficiary was \$2,921 compared to \$930 per capita for the Medicaid population under 65. Medicaid also provides some coverage of home and community based care primarily through Section 2176 waivers aimed at helping disabled elders avoid skilled nursing care.

Medicare pays only for nursing home care related to acute health problems. It does not pay for custodial care in a nursing home. Medicare in both Part A and B also covers home health care related to acute medical problems. The emphasis of covered home care services is on skilled nursing care,



physical and other therapies and some medical social services, but not on custodial care (Commerce Clearing House, 1990).

Title XX of the Social Security Act, through the Social Services Block Grant, provides a limited amount of homemaker, chore worker, and home management services to all ages of recipients in 42 states. Title XX also supports adult day care services in 26 states. Eligibility and services vary by state (Feder, 1991).

Older Americans Act Funds provide minuscule amounts of home and community based care to both poor and near poor elders. The Senate Committee on Aging (1990) reports that in 1989, \$11.4 million was spent on chore services, \$19.4 million on housekeeping, \$17.5 million on personal care, \$687,000 on shopping and \$3.5 million on friendly visiting. Additional funds are spent on home delivered meals for disabled elders.

Private long term care insurance carriers to date cover only 5% of elders according to the most liberal estimates (Pepper Commission, 1990). Insurers have had difficulty developing products that protect elders against the effect of inflation, are within the price range of many older Americans, and can provide the home and community based care desired by many consumers (Senate, 1990; Ball, 1989). Private insurance and small federal programs like the Older Americans Act and the Social Services Block Grant program help to round out a picture of fragmented long term care financing in the United States, but are relatively insignificant in terms of overall

financing.

#### **IV. PUBLIC LONG TERM CARE POLICY:**

The financing of U.S. long term care indicates that public policy relies extensively on the provision of unpaid care by family members and other informal caregivers (Pepper Commission, 1990, Liu, et al., 1985; England, et al., 1991). Although employers, government, and society may bear some of the burden of this approach in lost productivity, the bulk of the cost is borne by individual families and especially by women caregivers (England, et al., 1991). Significant out-of-pocket costs borne by the family and the individual user (Levit, et al., 1991; Families USA, 1992) also support the view of a long term care policy approach which relies on families and individuals rather than employers or government. Individual and family oriented policies also involve support for family financing options like Individual Retirement Accounts, sometimes with accompanying tax advantages for those who can afford to use them.

Medicaid and Medicare, the two major reimbursement related public policies, are focused primarily on acute medical care, although Medicaid funds an increasing portion of formal long term care services (Levit, et al., 1991). Medicare provides for small amounts of long term care funding, but is not intended to provide long term chronic or custodial care. Other public funding policies include categorical

programs which provide a relatively small amount of public support for home and community care (Senate, 1990). A small number of demonstration or waiver programs (2176 Medicaid Waivers, On Lok, Social Health Maintenance Organizations, etc.) also provide new models and information on long term care delivery options and policies (Pepper Commission, 1990; Leutz, et al., 1985; Zawadski and Eng, 1988). Many of these models attempt to develop non-institutional community based long term care models as well as innovative financing mechanisms.

Recent long term care policy discussions have also considered government support for the development of private long term care insurance. Supporters suggest that private insurance could significantly reduce the number of users who are impoverished by long term care expenses and also reduce the volume of government sponsored coverage required for those who currently spend down to Medicaid levels. Private insurance would be part of an overall financing approach to long term care (Meiners and McKay, 1990). Critics (Rivlin and Wiener, 1988; Ball and Bethell, 1989; Estes, 1990) have pointed out that private long term care insurance is too costly for most of the people who need it and often has numerous coverage restrictions that severely limit the type and amount of coverage. Others (Harrington, et al., 1992) call for the development of a publicly funded universal long term care coverage policy that would be part of a national health program for all Americans. Such a program would cover

people with disabilities regardless of age. Although there is not consensus on future long term care policy directions, there appears to be agreement on the need for improvement in existing fragmented policies.

Recently President Clinton (1993) included in his Health Security Act proposal limited coverage for home and community based care to be phased in by 2002. Although this proposal did not include a full range of long term care coverage, it is a signal that home and community care will be on the policy agenda in coming years and that adequate data will be needed to both inform the development of policy and assure that both younger and older disabled are treated equitably.

This study attempts to add to the limited data available on home and community care as well as examine theoretical models which will improve our understanding of the home and community care market. Chapter 2 discusses findings from previous studies using the Andersen behavioral model and economic models to examine utilization of health and long term care services by the elderly. Findings from community based long term care demonstrations are discussed as well as findings from the SHMO demonstration evaluation. Chapter 3 explains the methodology used in this study as well as proposed hypotheses. Chapter 4 reviews data from the analysis including descriptive data and results of logistic and ordinary least squares regression analyses. Chapter 5 offers conclusions and discussion of the findings of the study.

## **CHAPTER 2**

### **PREDICTING HEALTH AND LONG TERM CARE UTILIZATION AND EXPENDITURES FOR DISABLED ELDERERS: WHAT WE KNOW**

## **I. UNDERLYING POLITICAL ISSUES**

### **A. ASSUMPTIONS UNDERLYING CURRENT LONG TERM CARE POLICIES:**

Predictive factors related to community based long term care utilization and expenditures exist in a broader political, economic, and cultural context. Andersen's (1968) model acknowledges these by including enabling factors which relate to user income, insurance coverage, and availability of services. Economic models, discussed later, (Scanlon, 1980; Paringer, 1985; Miller, et al., 1992) directly include state policies related to reimbursement and regulation as factors affecting long term care supply and demand. Economic models also acknowledge broader societal and market issues such as the number of women in the work force and concentration in particular service delivery industries.

It is also critical to acknowledge broader societal trends which affect the development of long term care policy itself and, therefore, utilization and expenditure issues in the community based care arena. While the 1960's were marked by the expansion of Federal programs which increased expenditures for health care through the establishment of Medicare and Medicaid (Meyer, 1986), the 1980's and early 1990's have seen no comparative expansion of long term care

coverage. In fact, for older people, this period has been characterized by a significant increase in the costs borne by individuals and families for health and long term care costs (Families USA, 1992; House, 1990).

Some background assumptions underlying federal policy development during this period help to explain both the existing shape of the long term care system and the large cost burdens for chronic care services borne by the old old, single women, and minorities. These assumptions, although not measured directly by behavioral or economic models, help shape the utilization and expenditure decisions made by users and providers of services, as well as the development of long term care policy.

#### **FISCAL CRISIS AND BLAMING THE ELDERLY:**

The 1980's have been marked by growing concerns over economic recession, federal deficits and government fiscal crises. Estes (1986) distinguished between the objective and subjective aspects of crisis and government austerity. The objective aspect concerns the fiscal crisis in national, international and local economic systems which results in a tightening of available resources. O'Connor (1973) described the inability of government expenditures to keep up with increased costs associated with assuring a profitable economy and at the same time providing for the social needs of those unsupported by that economy. The subjective aspect was the

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blaming of federal spending on the poor and elderly for the fiscal crisis defined as the growing national deficit (Estes, 1986). Social welfare programs became, in a sense, scapegoats for the economic crisis of the federal government (Marmor, et al., 1990). Welfare programs come to be seen as a primary cause of societal economic problems (Ibid.).

Estes (1986, 1990) claimed that this economic crisis was socially constructed and defined by policy makers and politicians who chose programs for older people and the poor to blame, while ignoring the effect of tax cuts for the wealthy, increases in defense spending, and the flight of U.S. capital to other countries. Marmor (1990) reviewed the claims that place welfare spending in the role of scapegoat and found little evidence that would link increased welfare spending to limited economic growth.

Reagan-Bush era assumptions about the causes of slow economic growth and growing federal deficits may be socially constructed on empirically shaky ground. They have, none the less, led to serious public debate and concerns about expenditures on the elderly. Americans for Generational Equity (AGE) (Hewitt and Howe, 1988) raised the claim that America is saddling future generations of children and younger working people with unfair economic burdens by continued spending on the elderly. AGE assumed a process of apocalyptic demography (Robinson, 1991) where the growing number of older people in society will place unbearable strain on the economy

and resources of the government. AGE also helped develop the image of the "greedy geezer" taking resources from the struggling young to give a more than comfortable lifestyle to the growing number of elderly (Hewitt and Howe, 1988). The specter was raised of growing dependency ratios where a shrinking number of working age adults would be responsible for supporting more and more elders (Ibid.). Estes (1988) pointed out that this concept is used by economists to pit the generations against each other and suggested that if the number of dependents includes both children and elders the dependency ratio will remain very close to the current level for many years to come, despite the growing proportion of elders in the population.

Critics of an aged based fiscal crisis, claimed that the image painted by AGE and others of all elders as well off financially fails in a fundamental way in that it does not distinguish elders in different class, race and gender positions (Binney & Estes, 1990, Minkler, 1991). Despite improvements in the financial position of the young old and married couples, older women, minorities and the oldest old, those over 85, continue to have higher levels of poverty than the elderly in general. Over 40% of elders of all ages live below 200% of the federal poverty level and they pay three times as much for out-of-pocket medical expenses as younger adults (Holden and Smeeding, 1990).

The construction of a fiscal crisis has been linked to

government spending on older people. This linkage has made it difficult to expand government spending on long term care by developing a public long term care entitlement program which would provide universal access and limit out-of-pocket costs (Harrington, et al., 1992).

#### **NEW FEDERALISM:**

The 1980's and 90's once again brought to the fore the policy of New Federalism first developed during the Nixon years. New Federalism attempted to shift responsibility for domestic social programs to state and local levels and out of federal hands (Estes, 1990). While unable to make some of the major shifts, they proposed, New Federalism advocates succeeded in reducing funds to categorical programs funded at the federal level which helped provide social services to poor elders (Meyer, 1986). New Federalism advocates also consistently questioned federal involvement in domestic social programs (Ibid.).

Critics of the New Federalism approach (Estes & Gerard, 1983) raised two concerns about this decentralization process. The first concern was the individual states' commitments to equity, social justice and racial equality. Implementation of the Medicaid program indicated the broad range of eligibility and benefit standards implemented from state to state. The same poor person might be treated very differently in Mississippi versus New York. The second concern was over the

states' fiscal capacity and the availability of a resource base required to support the variety of welfare and social programs formally supported at the federal level (Estes & Gerard, 1983).

The Reagan-Bush-Gingrich commitment to the decentralization of the New Federalism approach was a second assumption which mitigated against an increased federal involvement in long term care coverage.

#### **INDIVIDUALISM:**

A third assumption underlying policy development in recent times was an emphasis on individual and private responsibility versus government responsibility for meeting social needs (Estes, 1990). Under the market based reforms of the health care system proposed by conservative thinkers, there was a renewed emphasis on the individual as the purchaser of goods and services. Market based pro-competitive measures assumed that health care and social services should be treated like any other good responding to supply and demand forces in the open market. Services are purchased by individuals rather than being received as entitlements provided by the government (Estes, 1986). For chronic care this approach meant the promotion of private insurance models (Ball and Bethell, 1989), emphasis on individual savings for old age, and continued reliance on women caregivers for unpaid assistance for disabled elders (England, et al., 1991).

This individualistic approach to caring for older people left poor and near-poor elders who had to purchase uncovered services or pay high out-of-pocket costs in a difficult position. Critics identified a built in class, race and gender bias against women (Arendell & Estes, 1991, Stone, 1989), minorities and other elders who have had fewer economic resources when they were younger and consequently have lower incomes and fewer assets as elders (Minkler, 1991). Poor and near poor elders, particularly those who did not qualify for Medicaid, paid close to 20% of their income for health care costs while those who were well-to-do paid only 2% (Smeeding, 1990).

The individualistic market driven ideology of health and long term care affected women in a second way. As the primary caregivers for disabled elders in a system that relies on unpaid help, women are forced to give up productive years of earnings which help recreate a cycle of poverty in their own later years. When coupled with the typically lower wages that they receive as compared to men, lower social security and pension benefits becomes a second way that women pay for the lack of a public system of long term care (Stone, 1989; Older Women's League, 1990; England, et al. 1991).

**PRIVATIZATION:**

A fourth policy assumption operating in the 1980's and 90's also mitigated against the development of a public long

term care policy. Government increasingly turned away from the non-profit and public sector as the provider of health and social services and encouraged the growth of the private for-profit sector to deliver government supported services (Estes and Wood, 1986, Estes, 1990). In the long term care arena, the Reagan-Bush Administrations voiced support for private long term care insurance development versus the development of social insurance coverage (Ball and Bethell, 1989). Health care services were increasingly provided by the private sector in what has been described as a "medical-industrial complex" (Relman, 1986).

The expenditure of 82% of public long term care funds for institutional care (Pepper Commission, 1990) was consistent with this approach since 75% of nursing homes were owned by for-profits (National Center for Health Statistics, 1989). Despite some in-roads into the human services industries by for-profits (Estes and Wood, 1986), the community based sector of the long term care delivery system does not yet show the amount of private investment evident in nursing homes.

Taken together, a perceived government fiscal crisis related to expenditures for the elderly, federal government efforts to decentralize services, promotion of individual responsibility for basic services, and the shift to private for-profit service delivery systems, have mitigated against increased federal involvement in developing policies for long

term care services and coverage. Long term care programs do not fall within categories of government expenditures clearly required to support profitable workings of the economy. They are a potential social expense, for the most part required by those no longer in the work force, without clear payoffs in economic terms (O'Connor, 1973; Offe, 1984). In the absence of broad based government long term care coverage, enabling factors such as income, assets, and insurance coverage identified in behavioral models, and demand and supply factors related to ability to pay for services and outside reimbursement for services, have continued to be major issues affecting utilization and expenditures for community based long term care services.

**FUTURE LONG TERM CARE POLICY:**

Combining findings from behavioral and economic studies (discussed in detail later in this chapter) indicates a combination of factors which influence utilization, expenditures and out-of-pocket cost burdens for community based long term care services. Need factors explain a great deal of the variance associated with utilization, but utilization also varies on certain predisposing and enabling factors. Elders over 75 years of age, women and those living alone showed greater use of formal home and community care services (Liu, et al., 1985). Income and insurance coverage also had an effect on the volume of services used. The poor

and near poor elderly were more likely to have high out-of-pocket costs (Smeeding, 1990) and the old old, women, minorities and those living alone were more likely to be poor (Minkler, 1991). This constellation of factors related to utilization, expenditures and out-of-pocket costs indicates that a part of the elderly population are in double jeopardy, being more likely to require formal home and community care while, at the same time, having high out-of-pocket cost burdens. Available research does not indicate whether these elders, the old old, women, minorities, and those living alone, do without needed care, are forced into nursing homes, or make some other trade-offs in response to this jeopardy. Several studies do suggest that income did not significantly predict contacts with formal care but did predict volume of care used (Bass and Noelker, 1987; Miller and McFall, 1991), implying that poor elders may go without the needed hours of care because of lack of resources.

Future long term care policy will be challenged to address the equity questions raised by these findings as well as gender justice issues related to informal caregiving burdens (England, et al., 1991). Several proposals for federal long term care programs have been put forward (Pepper Commission, 1990; Harrington, et al., 1992; Clinton, 1993). Harrington, et al., (1992) suggested a set of principles which should characterize a national long term care program for the United States. These included: long term care as a right



available to all instead of a commodity for the very well off or poorest of the poor; universal access; a continuum of social and medical services aimed at maximizing independence; coordinated long term care and acute medical care; development of accessible, efficient and innovative delivery systems; quality services in the least restrictive environment; progressive financing across the whole population; support for informal care; and a range of consumer choices that are culturally appropriate.

Long term care policies reflecting these principles would be necessary to assure equitable access to community based long term care services for those elders now placed in greatest jeopardy by their efforts to remain at home despite chronic care needs. The behavioral and economic modeling of health and long term care utilization and expenditures, discussed in the next four sections, as well as the findings of this study, may help to inform the development of such policy.

## **II. PREDICTIVE MODELS OF HEALTH CARE SERVICES UTILIZATION**

Two principal models have been developed to examine and predict health care utilization and expenditures. One is a behavioral model (Andersen, 1968) and one an economic model (Feldstein, 1988). Economic models focus on consumer decision making and analysis of factors effecting demand for health services. They emphasize issues of income, insurance coverage and price of services. Behavioral models include economic factors but give more weight to social, cultural and psychological factors which influence utilization and expenditures. This section examines the Andersen behavioral model and subsequent attempts to test and improve its application to health services for the elderly.

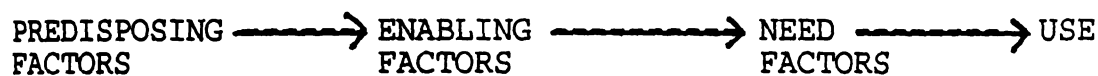
### **A. THE ANDERSEN BEHAVIORAL MODEL**

Behavioral models include social cultural and psychological factors which affect health care utilization. Andersen, (1968), built upon earlier work (Weeks, 1961; Rosenthal, 1964, Stoekle et al, 1963; Suchman, 1965; and

Theodore, 1966) to develop an important behavioral model of the use of health services. This model has formed the theoretical basis for many subsequent studies on health services utilization. The Andersen model consists of three theoretical components: predisposing, enabling, and need factors (Andersen, 1968). Use was considered dependent on the predisposition to use the services, the ability to secure services (enabling factors), and the need for services. Each of these factors was considered to make an independent contribution to explaining overall use.

Andersen's model makes several assumptions. These include an emphasis on the family as the unit of analysis; separation of economic from social factors, analysis of different types of health services; inclusion of perceptions of health and illness; and specification of causal paths leading to service use (Andersen, 1968, 14). Use is dependent on the predisposition of the family to use services, the family's ability to secure services; and the need to use services. A sequence of these three conditions contributes to the use of services. The components of the model can be broken down into sub-components. A diagram of the model is attached.

**Figure 2.1. The Andersen Behavioral Model:**



**PREDISPOSING FACTORS:** Families have predispositions to use more or less health services before the onset of any specific health need or illness (Andersen, 1968). These predispositions can be broken down into several sub-components. They include family composition factors such as age, sex, family size, and marital status. People in different age groups have different patterns of utilization of medical care. A second sub-component is social structure in which Andersen includes employment, social class, occupation, education, race and ethnicity. These factors are correlated with certain enabling conditions such as income but precede them in time and are more stable. A final sub-component is health beliefs. These include beliefs about medical care, physicians, and disease. These beliefs are not a direct cause for using services but result in differences in inclination of families to use services. (Ibid., 15)

**ENABLING CONDITIONS:** Enabling conditions make health resources available to a family and include family means to attain services and geographic availability (Andersen, 1968). Family resources include economic resources and sources of care. Measures include family income, savings, health insurance, regular source of care and welfare care. Community resources refer to characteristics of the community where the family lives which can be related to services. These include availability and convenience as well as the health education level and level of scientific versus folk medicine. Measures include physician/population ratios, hospital bed/population ratios, residence and region. (Ibid. 16-17)

**NEED COMPONENT:** Need represents the most immediate cause of health service use and refers to the perception of illness by the family and how they respond to the perception. Measures of need used by Andersen (1968) are self-reports of physical condition which he considers less than optimal. They include health level, symptoms, disability days, and free care for major illnesses. Response is the second sub-component of need and refers to how the family reacts to a perception of illness. The two measures of response are physician visits for symptoms and regular physical examinations. (Ibid. 17)

**USE AND DISCRETION:** The final component of Andersen's model is the utilization of health services, the outcome of

previous factors (Andersen, 1968). Family behavior is divided between discretionary and non-discretionary. Discretionary use involves substantial choice by family members. Non-discretionary use is dictated by physical condition and often determined by physicians. Predisposing and enabling factors are seen to have significant influence on discretionary use. Need is the most important factor for non-discretionary use. Of the services examined by Andersen, discretion is considered lowest for hospital services, moderate for physician services and high for dental services.

**HYPOTHESES:** The Andersen model includes three basic hypotheses which he derived and tested. These include: Hypothesis I. The amount of health services used by a family will be a function of predisposing and enabling characteristics of the family as well as its need for care. Each component will make an independent contribution to the understanding of differences in use of services.

Hypothesis II. The explanatory components of the model will vary in their contribution to the explanation of total use. Need will be more important than predisposing and enabling factors since it represents factors most directly related to use.

Hypothesis III. The contribution of each component will vary with the type of health services. The contribution of need will be greatest for hospital services since these are the

least discretionary. The contribution of predisposing and enabling factors will be largest for dental services because these are least necessary. All three components will contribute to an understanding of physician services since they involve a moderate amount of discretion. (Ibid., 19-20)

Andersen (1968) confirmed his model in a study of the use of health services from survey data on families from the National Opinion Research Center collected in the 1960's. More recently Andersen and his colleagues (1987) utilized the model to examine ambulatory care and insurance coverage using five different data sets on individuals collected in 1981-82. This later study identified two key factors in explaining utilization and access to care: source of health care and insurance coverage. The study found that most Americans had a regular physician as a primary source of care. Ten percent did not have a regular source and used hospital outpatient service and emergency rooms. This group and especially those without insurance, tended to have less convenient care, lower rates of ambulatory service use, high hospitalization rates, and paid less out of pocket for care. The uninsured poor had the poorest health and the greatest difficulty with access to services. The source of care and insurance coverage were major predictors of access.

### III. STUDIES OF UTILIZATION BY THE ELDERLY BASED ON THE ANDERSEN MODEL

A number of studies have applied the Andersen model to utilization of health services by the elderly. The remainder of this section will discuss results of principal studies in this area. They will be reviewed first chronologically and then summarized in a review of the implications for each predictive factor in the Andersen model. These studies focus on physician and hospital utilization but also may include other health services. They attempt to explain some of the basic issues raised by application of this model to elderly utilization. The next section will review studies which apply the behavioral model more specifically to long term care issues.

Ward (1977) reviewed literature on aging and social gerontology to apply the Andersen model specifically to health care utilization of the elderly. He suggested that several issues of the model deserve special emphasis in relating to the elderly. Organizational characteristics were important because older people had increased difficulty penetrating bureaucratic organizations and utilizing fragmented services. Ward (1977) suggested that more information is needed on the elderly's use of social networks in deciding whether to utilize care and that studies of older people must include



both the examination of utilization effects based on different age cohorts and distinguish them from utilization based on intrinsic changes in the aging process. Ward (1977) did not test his findings with additional data, but he did provide some early conceptual approaches to applying the Andersen model to the elderly.

Snider (1980) interviewed 428 white, non-institutionalized elders selected by a systematic probability sample in Edmonton, Alberta. Need factors, income factors and awareness of health services were examined as predictors of health care use. Awareness of health services was determined to be the most significant positive predictor of utilization. This finding contradicted almost all other studies which show need factors explaining the greatest amount of variance in service use. Snider's 1980 study did not include all predictive variables in the Andersen model but did emphasize the enabling factor of service awareness. The author suggested that other studies may have paid inadequate attention to this factor.

Wan and Odell (1981) applied the Andersen model to the health and social service use of a quota sample of 1,182 older residents of Baltimore County, Maryland. Need variables, measured by ADL scores, IADL scores, a psychological depression score and perceived service needs, were the best

positive predictors of physician and hospital use although only 9.1% and 6.6% of variance for each type of use was predicted by all variables. Lack of knowledge of social services was also a predictor of physician use suggesting that elders may use physicians as counselors for non-medical problems. Use of dental care was best predicted by enabling factors such as economic dependency, and predisposing factors such as age and educational level.

Survey data was collected from a predominantly white suburban community making it difficult to generalize findings to minority inner city communities or rural areas. A relatively small amount of overall variance of medical service use was predicted, but the researchers found the Andersen model to be conceptually helpful.

Branch, et al. (1981) reported on the use of a range of health services in a statewide area probability sample of 1,625 non-institutionalized elderly in Massachusetts. Regression analysis was used to study the effects of predisposing, need and enabling factors on physician, hospital, dental, home care and ambulatory care (physical therapy, etc.) use. Indicators of need included perceived health status, ADL scores, health problems, and ability to perform several physical activities. Need factors accounted for most of the predicted variance in physician and hospital use. The model explained 27% of the variance in physician

visits and 15.2% in hospital days. Family income had a positive effect on dental care. Income level produced a positive effect for those services not normally covered by insurance. The effect of income and insurance coverage on medical service utilization may have been mitigated by the almost universal coverage of respondents by Medicare. Branch, et al. (1981) suggested that the Andersen model makes only a modest contribution (27% for physician use) to understanding variance in health use. This study included only some of the factors in the Andersen model and did not include characteristics of the delivery system. Operational definitions of the variables should also be improved including further categorization of the need variables. Physician visits might be subdivided by purpose of the visit: prevention, illness detection, treatment, and custodial care.

Wan (1982a) studied 1,987 elders in a probability sample of five low income communities. Number of acute illnesses and level of chronic disability were the most important positive predictors of physician utilization. Insurance coverage, family income, and regular source of care were also significant positive predictors. 15.3% of variance in physician visits was explained. Medicaid recipients and users of neighborhood health centers were the highest users of medical visits. Poor elderly Blacks had higher number of physician visits but less hospital use. This study focused on

a relatively small number (five) of predictors of health care use but did attempt to examine variance based on income and race.

Stoller (1982) tested the Andersen model by examining data obtained from 753 in-depth personal interviews of non-institutionalized elders concerning physician utilization. The combination of need, predisposing, and enabling factors explained only 13% of the variance related to contact with a physician and 22.3% of the variance in the volume of physician visits. The most important positive predictors of volume of use were insurance factors, whether the respondent had Medicare Part B or Medicaid coverage. Several of the need and predisposing factors were also significant in predicting volume. Stoller (1982) stated that these results are consistent with other multivariate analysis of data from large-scale surveys, but that additional efforts are needed to modify the method of measuring independent variables and to find additional predictive factors.

Coulton and Frost (1982) studied 1,834 non-institutionalized elders in Cleveland, Ohio. The Andersen model was used to examine predictors of utilization of medical, mental health, personal care, and recreation services. The model predicted 12% of the variance in physician use, and 26% of mental health use. Need factors and

perception of need were strong predictors of medical service use. Sex differences had an impact on perceived need with women showing a higher perceived need for mental health services. Utilization in the prior year was shown to be a positive predictor for all services with the strongest impact on physician utilization where physician practice patterns may have a strong influence. Socially isolated elders also appeared to have lower utilization of all services.

Wolinsky, et al. (1983) applied the Andersen model to a randomly selected group of 401 elderly persons in St. Louis. They attempted to make several changes in the measurement of independent and dependent variables with special emphasis on health beliefs and health status as well as on use of informal services versus professional services. Informal service use was measured by number of bed days and number of days with limited activities. Andersen's model worked well in predicting this informal health service use including 26% to 29% of the variance. The model predicted 23% of the variance in physician visits and lesser amounts of preventive medical contacts, emergency room visits and hospital episodes. Need factors were the most powerful positive predictors of use. Predisposing and enabling factors had relatively small impact on utilization except for having a regular source of care. Having a regular source of care was an important positive predictor of the use of preventive medical and dental

services. Inequities existed among the elderly in having a regular source of care. Nutritional risk also proved to be the most effective need predictor of physician utilization. Wolinski, et al. (1983) in providing more comprehensive measures of the variables improved the level of variance predicted by the Andersen model. They also introduced the use of more specific measures of utilization into the model.

Wan and Arling (1983) studied a sample of 772 elderly Virginians with one or more activity limiting chronic condition and applied the Andersen model to predict 14% of the variance in use of physician services. Predisposing and enabling factors predicted a relatively small amount of the variance although age was negatively related to the use of physician visits. Numbers of psychological symptoms and illness episodes had a strong positive influence on physician visit use. This association raised questions about the appropriateness of the use of physician services to respond to psychological needs. Use of physician services and social services were positively related among this group of disabled elderly.

Wan and Arling (1983) suggested a pattern of use positively relating elders with a multitude of psychological and physical health problems to heavy physician use. The factors in this model predicted a similar amount of variance in physician utilization as previous studies.

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Evashwick, et al. (1983) used Andersen model factors to predict utilization prospectively for a group of 1317 elders in Massachusetts. Respondents were interviewed once and then re-interviewed 15 months later to determine utilization. Need factors were significantly and positively related to use of physicians services, hospital care, ambulatory care, and inversely related to use of dental services. Enabling factors were not significant predictors of service use except dental care. There were significant correlations, however, between transportation and utilization variables. Overall 23.6% of the variance related to physician visits was explained. Less hospital use (6.2%) and nursing home use (3.5%) were explained by the model. Data was available only for individual enabling factors in the Andersen model and not for system resources. Evashwick, et al. (1983) suggested that predisposing and enabling factors would have been more important predictors of use when Andersen first conceptualized the model. Access to services was a more important issue before the impact of Medicare and Medicaid policies was felt and might become a more important predictor of care as policies are enacted which raise barriers to care. The study attempts to examine the effect of race on use but suffered from lack of adequate numbers as only 1% of the sample were non-white.

Wolinsky and Coe (1984) applied the Andersen model to 15,899 randomly selected elderly respondents from the 1978



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national Health Interview Survey. The use of a large national sample did not appreciably change the amount of variance explained by the predictors in the model. Statistical adjustment of non-normally distributed health utilization measures did, however, provide significant increase in the amount of variance explained. Only physician and hospital use were examined in the study. Variance of physician visit utilization explained by transformed data in the model was 21.3% as compared to 3.9% for untransformed data. Variance explained by the model for hospital use increased from 5.1% to 9.4% with transformed data. Predisposing and enabling factors also improved as predictors of use in this study. The authors suggest that the Andersen model may be a better predictor of moderate users' behavior than that of heavy service users. Different models may be necessary to predict different levels of utilization.

Arling (1985) examined physician utilization by older people in a statewide cross-sectional survey of 2,146 Virginia elderly. Need factors in the Andersen model were once again shown to be the best positive predictors of use. Significant interaction effects were observed for economic status, education and age. Those with poorer economic status, lower educational level, and increased age were less likely to visit a physician when health status and other variables were held constant. These findings contradicted earlier studies which

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suggested that health care use is equitably distributed among the elderly based on need alone. Elders with functional impairments were more likely to visit a physician when social support was available to help facilitate access. Psychologic and emotional distress were also important predictors of physician use. Interaction effects beyond the additive effects hypothesized by Andersen were shown to be significant. Studies used to validate the Andersen model are criticized for inadequate delineation of independent and dependent variables. The Arling study provides an example. The sources of medical care variable was dichotomized into either having a private physician or having no source of care, or using a clinic, hospital emergency room or other source. Having no source of care is equated with using a neighborhood or public health center, at best a simplification of one of the independent variables.

Cafferata (1987) examined marital status and living arrangements as predictors of physician and hospital use in a sample of 4,560 elders taken from the 1977 National Medical Care Expenditure Survey. Living arrangement was a significant predictor of physician use with those living alone likely to have higher levels of use. Marital status did not have a significant effect beyond that of living arrangement. Effects attributed to marriage may be the result of the fact that married persons are more likely to live with others.

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Levekoff, et al. (1987) used the Andersen model to examine physician use among the middle-aged and the elderly. Data was drawn from a probability sample of 460 individuals from a town in central Wisconsin. For both age groups need factors as well as prior utilization predicted the most variance in physician use. For elderly the presence of medical conditions was less important than physical, pain, disability or discomfort accompanying them. The middle aged sought care based on diagnosis. The aged attributed minor problems to other causes such as aging and did not seek care until problems were more disabling. Loss of function or permanent impairment may have been preventable if elders sought primary care early in the progress of a condition. Data for this study was cross-sectional and came from a single geographic area limiting generalizability.

Mutran and Ferraro (1988) examined the effect of gender on the use of physician and hospital services by older men and women. Data on 3,150 elders from the 1973 Current Population Survey was used and an Andersen model applied to a multivariate analysis of use. Gender differences in physician use were not significant once medical need was considered. Given equal levels of disability and overall health status, however, older men were found to be hospitalized more often. It was unclear whether these differences were due to the nature of men's illnesses (e.g. cardiovascular and

respiratory) versus women's (musculoskeletal and sensory) or differences in physicians' perceptions of men and women. Physicians may have believed that men would not care for themselves at home but that women would.

Wan (1989) reviewed a number of articles which report findings on health service utilization of older people and evaluate the utility of the Andersen model. Several areas for further attention were highlighted with the following recommendations for future research related to the behavioral model and the elderly. These included the need for longitudinal studies of health service use and predictors. These should include testing the concomitant effects of aging and increasing chronicity on the health service use of elders. Need factors should be measured by multiple correlated measures including both subjective and objective measures of need. Barriers related to professional, organizational and social perspectives should be considered. These include ethnic and cultural values related to health care, supply and availability of services, and knowledge of health insurance coverage. Researchers must also reach some agreement on classification and measurement of predictor variables. Both independent and dependent variables need further refinement. Models need to examine the health use of different age cohorts within the elderly population as well as the overall heterogeneity of the elderly. The relationship between

informal and formal support must also be explored in examining service use by the elderly.

Rivnyak, et al. (1989) interviewed 335 elders drawn from a random sample of poor urban service users in Richmond, Virginia to examine predictors of ambulatory care use. An Andersen model was used to predict physician use. 28.5% of variance was explained with physical dysfunction having the strongest direct positive effect on predicting use. Mental dysfunction was identified as having a negative influence on service use. Smaller positive effects for social support and education were identified. Males and the very old were less likely to use services. The study did not distinguish among types of practitioners nor among different types of ambulatory visits such as preventive, follow-up, emergency, and rehabilitative. The sample is a small one drawn from disadvantaged urban elderly which also may limit generalizability. Results are consistent with other tests of the Andersen model which focus on need variables as the strongest predictors of use.

Strain (1991) studied a random sample of 743 elders in Winnipeg, Canada to examine the influence of health beliefs on physician, hospital and overall health service utilization. As in other studies need remained the greatest predictor of utilization. Skepticism about medicine did show a significant



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negative effect on physician visits accounting for about 3% of 24% total explained variance. Beliefs played much less of a role in predicting hospitalization accounting for only 1% of a 29% total explained variance. For overall health use, belief in health maintenance activities played a significant positive role accounting for about 4% of 31% of total explained variance. Many other studies of the Andersen model have not examined health beliefs in detail despite their inclusion in the original model. Strain's model did not measure volume of overall health service use but only the range of health services used.

Wolinsky and Johnson (1991) used 1984 baseline data from Longitudinal Study on Aging, taken from the Health Interview Survey. They examined health care utilization for randomly selected households with elders over 70 years of age. Utilization variables included physician and hospital services. Additional refinements were made to the predisposing, enabling and need variables to differentiate between kin and non-kin informal support, upper and lower body disabilities, and others. The model explained 17.3% of the variance in physician visits. 25.2% of the variance for bed disability days was explained. Despite refinements the model did not increase substantially the amount of variance explained by previous Andersen model studies (Ibid.).

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use needs to be incorporated into the model. Use was much more constrained by need factors alone for minority elders. Other important findings included the importance of non-kin informal support in substituting for formal services, the positive effect of lower body disabilities (vs. upper body) on utilization, and the positive effect on cognitive problems on predicting utilization. Follow up surveys have been performed every two years, through 1990, on the study group allowing for future longitudinal analysis of the Andersen model.

#### **SUMMARY OF BEHAVIORAL MODEL RESEARCH ON ELDERLY MEDICAL USE**

Many studies have applied the Andersen behavioral model to the utilization of health services in the elderly. These studies have included an examination of the types of utilization originally studied by Andersen: physician, hospital, and dental utilization as well as other health services. The operational definitions of the predisposing, enabling and need factors which predict utilization in the Andersen model have also been expanded to take into account specific issues related to the elderly. Listed below are some of the important issues raised for each predictive factor in the Andersen model when applied to health care use of the elderly.

**NEED FACTORS:** Many studies (Wan and Odell, 1981; Branch, et

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al., 1981; Wan, 1982a; Coulton and Frost, 1982; Wolinsky, et al., 1983; Wan and Arling, 1983; Evashwick, et al., 1983; Arling, 1985; Levekoff, et al., 1987; Rivnyak, et al., 1989) report that need is consistently the strongest predictor of elders utilization of physician, hospital and other health services. Explained variance attributed to need in these studies ranged from 8% to 20% for physician utilization and from 3% to 26% for hospital services.

Some of the important need factors related to predicting elderly health care utilization have been functional status as defined by ability to perform Activities of Daily Living and Instrumental Activities of Daily Living (Wan and Odell, 1981; Branch, et al., 1981; Wan and Arling, 1983; Wolinsky, et al., 1983; Evashwick, et al., 1984; Soldo, 1985; Wolinsky and Johnson, 1991) mental status and psychological needs measures (Wan and Arling, 1983; Arling, 1985; Rivnyak, 1989). Activities of Daily Living have also been further broken down to basic and advanced and measures of disability related to upper and lower body functioning (Wolinski and Johnson, 1991). Measures of chronic health problems (Snider, 1980; Wan, 1982; have also been shown to be important need factors as have nutritional risk (Wolinsky, et al, 1983; and prior utilization of services (Coulton and Frost, 1982).

There was some indication that particular need factors may be more important in predicting different dependent variables. Psychological problems were sometimes correlated

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with increased elderly use of physicians services (Wan and Arling, 1983). Functional measures such as ADLs, IADLs and other activity measures, nutritional risk measures, and cognitive and psychological need measures all appear to be important refinements of need factors when applying the Andersen (1968) model to the elderly.

**ENABLING FACTORS:** Overall, enabling factors explained much less variance in utilization than need. Explained variance ranged from less than 1% to 6% for physician services, from less than 1% to 8.6% for hospital services, and from 1% to 21% for dental services.

Insurance Coverage/ Income: As predicted by Andersen (1968), enabling factors such as income level and insurance coverage play an important role in predicting dental utilization or utilization of other uncovered services. For the elderly, enabling factors might be expected to have an important predictive power for uncovered long term care services, dental care, pharmacy services and other social services. Most of the elders studied would have been covered by Medicare during this time period mitigating the impact of coverage issues for hospital and physician services (Branch, et al., 1981).

Some studies (Stoller, 1982) found insurance coverage to be a more important predictive factor for the volume of physician services. Income was also a more important predictor for non-covered services such as dental care (Branch, et al.,



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1981). The literature, in general, does not adequately delineate different types of insurance coverage such as Medicare, Medicaid, and private supplemental insurance although Medicaid coverage is examined by several studies (Stoeler, 1982; Wolinsky, et al., 1983; Evashwick, et al., 1984). Assets are also not adequately delineated from income measures.

**Other Enabling Factors:** The literature examines several other enabling factors such as having a regular source of care (Branch, et al, 1981; Wan, 1982; Wolinsky, 1983; Evashwick, 1984), the availability of transportation (Wan and Odell, 1981; Evashwick, 1984), the availability of social support (Saldo, 1985; Arling, 1985), and the awareness of services (Wan and Odell, 1981; Snider, 1982). These factors generally showed a positive effect on utilization.

**PREDISPOSING FACTORS:** Overall, predisposing factors explained relatively small amounts of variance as compared to need factors. Explained variance ranged from 1% to 10% for physician services with most studies in the 1% to 2% range. Explained variance for hospital services ranged from less than 1% to 3% and from 1% to 8% for dental services. Studies show that there are several predisposing factors which are important in examining elderly health service use.

**Age:** Age is an important predictor (Wan and Odell, 1981; Coulton and Frost, 1982; Wan and Arling, 1983; Wolinsky and

Coe, 1984; Arling, 1985), especially in so far as it correlates with increased chronicity (Wan, 1989). Because predisposing factors, taken together, add little explained variance beyond need, it is difficult to distinguish an independent effect for age. It is also important to distinguish different age cohorts and to break out cohort effects from general processes of aging (Ibid.).

**Living Alone:** Cafferata (1987) examined the effect of marital status and living arrangement on utilization of physician and hospital care and found living alone to be a significant predictor of physician use. Others have found social isolation (Coulton and Frost, 1982) and living with others (Soldo, 1985) to be important predisposing factors in examining elderly health utilization.

**Gender:** Mutran and Ferraro (1988) found gender differences to be significant only in use of hospitalization where men were more likely to be hospitalized than women given equal levels of disability. Coulton and Frost (1982) found a higher perceived need for mental health services for women.

**Other Predisposing Factors:** Andersen (1968) includes other factors such as race, ethnicity, class, education, occupation and health beliefs in his classification of predisposing factors. Several studies examine the effect of race on utilization (Wan, 1982a) or draw their samples from poor urban areas (Rivnyak, et al., 1989). There is some indication that poor Black elders receive more physician

visits but less hospital services than Whites (Wan, 1982a). There are also data which suggest that the enabling factor, having a regular source of care, is positively correlated with the use of preventive and dental services and that Blacks are less likely to have a regular source of care (Wolinsky, et al., 1983). Minority elders utilization may also be more constrained by and sensitive to need characteristics alone (Wolinsky and Johnson, 1991). There is also evidence that elders with poorer economic status and lower educational level have lower physician utilization rates (Arling, 1985) suggesting that services may not be equitably distributed.

In summary, most studies of health service utilization based on the Andersen model indicate that need plays the most important predictive role. Some argue that if need is the principal determinant of utilization (Aday and Andersen, 1975) then health care can be considered to be equitably distributed. For the elderly it appears that the effect of predisposing factors such as insurance coverage and income level on medical services are mitigated by the availability of Medicare for almost all elders studied. Several studies have questioned the assumption of equitable distribution and suggest that although need may be the principle factor predicting utilization in the Andersen model, that the overall variance explained is so low that we cannot be sure what other factors may be involved (Wolinsky and Johnson, 1991). It clearly seems that utilization of services lacking public

insurance coverage, such as dental care and long term care will be effected more seriously by variance in insurance, income and asset factors.

**METHODOLOGY ISSUES:** Many studies use data ranging from one city or neighborhood, to state level surveys and large national data sets. Findings do not appear to be significantly different with need factors consistently explaining the most variance in use. Most studies employ some type of multivariate statistical methods to examine the contribution of the different predictive factors in explaining utilization. There are several methodological areas of concern. Most studies use either cross-sectional data on utilization or data from a short period of time. Longitudinal studies may have better success in explaining greater amounts of variance in utilization. Some studies do not use the full range of predictive factors discussed in the model. Most use the basic concepts of predisposing, enabling and need factors but operationalize each subset somewhat differently suggesting that there are in fact many different variations of the model suggested by Andersen (1968).

Measures of need and utilization are often subjective and would benefit from being validated with objective measures such as prior service utilization or Medicare use data records. Utilization variables may not be adequately subdivided to show different patterns of predictive variables.

Physician variables could be subdivided into prevention, detection, treatment and custodial care visits. Need factors also could be subdivided, for example into short term problems with ADL's versus chronic ADL problems. One study (Wolinsky and Johnson, 1991) divided ADLs into basic and advanced categories and physical disabilities into those affecting the upper body versus the lower body. Wan (1989) suggests that efforts to improve utilization research should focus on improving measurement of both independent and dependent variables and conducting longitudinal studies. Other issues for additional research include examination of the heterogeneity of the older population including differences in utilization among different age cohorts, relationships between informal and formal service use, and examination of other personal and societal determinants of utilization. These societal determinants include understanding the differences in geographic areas, market issues, and health plan behavior. Research is also needed on the impact of direct costs to elderly patients on the utilization of those services not covered by Medicare.

#### IV. PREDICTORS OF LONG TERM CARE UTILIZATION

Variants of the Andersen behavioral model, some including economic model data as well, have been used to study the utilization of long term care services including in-home and community care. This section describes studies specifically examining predictors of non-institutional long term care service use. The previous section includes a broad description of what we have learned about behavioral model factors which affect elderly health service use. This section narrows the focus to long term care services in general and home and community based care in particular.

Several of the studies discussed in the previous section also included long term care services as dependent variables. Some of the important findings related to home and community care services are reviewed below. Descriptions of the studies can be found in the previous section.

Andersen model factors explained a range of 13.5% (Evashwick, et al., 1983) to 43% (Coulton and Frost, 1982) of the variance related to home care services. The model appeared to do a better job of predicting home care use with explained variance generally being greater than for medical services. Need factors, especially measures of functional ability, predicted the most variance in utilization (Branch, et

al., 1981; Coulton and Frost, 1982; Wan and Arling, 1983; Evashwick, et al., 1983). Enabling factors such as income and insurance coverage had a positive effect on home care use, as well as other services which are typically uncovered by insurance (Branch, et al., 1981; Wan and Odell, 1981; Stoller, 1982). Having a regular source of care was negatively related to home care utilization (Branch, et al., 1981) suggesting that use of home care may reduce the need for medical care.

Predisposing factors such as living alone (Wan and Odell, 1981) had a positive effect on formal home care use. Men were also more likely to use personal care services than woman (Coulton and Frost, 1982). Findings from studies in the previous section, related to long term care services, were consistent with those for medical services with the exception that enabling variables explained more variance for uncovered long term care services.

Findings from studies using the Andersen model are consistent with other long term care studies which predict that functional ability is the key to defining the need for long term care (Kane & Kane, 1987; Weissert, 1982; Eustis, et al., 1984; Katz, et al., 1963). Functional ability has often been measured by limitations in Activities of Daily Living (ADL) (Katz, et al., 1963) but other more elaborate measures such as the OARS Multi-Dimensional Functional Assessment Questionnaire (Duke University, 1978) have also been used. Use of services has also been predicted by extrapolating from



prior utilization, however, caution is indicated as both demographic projections and rates of disability in the population may vary over time (Kane & Kane, 1987).

A number of long term care studies have also attempted to identify risk factors for entering a nursing home. These may be similar to predictors of home and community care use. Branch and Jette (1982) suggested that those over 80 years of age, living alone, using ambulation aids, the mentally disoriented, and those needing IADL assistance are at risk. Soldo and Manton's (1985) Grade of Membership technique identified IADL dependency versus ADL dependency as a significant risk, with unmarried women of advanced age most at risk. Shapiro and Tate (1985) identified advanced age, living arrangements, mental problems, ADL dependency, senior citizen apartment residence as important risk factors for institutionalization. Weissert (1985) used data from five national surveys to estimate the long term care population. The dependent population in the United States was estimated according to levels of functional need. Activities of Daily Living (ADL) data and Instrumental Activities of Daily Living (IADL) data were broken down into several subcategories which described the institutionalized population and those living in the community. Those elders dependent in personal care versus mobility were much more likely to be institutionalized. Among those dependent in toileting or eating, 51.5% were in nursing homes; among those dependent in bathing and dressing, 29.5%

were in nursing homes. Only 2-3% of those dependent in mobility, either inside or outside their house, were in nursing homes (Weissert, 1985). Data was not included on the utilization of in-home or community based services, but only on projected dependency levels in the community. Weissert (1985) provided a useful sub-categorization of the functional need factors described by the Andersen model and a more detailed description of the needs of the institutionalized population. Other predictive factors were not analyzed.

The following studies specifically review predictors for home and community care service use. They are, by no means an all inclusive list, but do include a significant number of the important studies completed since 1985 indicating predictors of home and community care. They are reviewed chronologically.

Soldo (1985) used data from the Home Care supplement of the 1979 National Health Interview Survey to examine determinants of use and predictors of demand for in-home services. 1430 cases of respondents over 65 years of age and in need of home care were analyzed. An economic model of decision making was set up to understand the role of income, price and out-of-pocket costs on the use of formal in-home services. Other predictive factors examined were similar to

those used by Andersen (1968). Overall the model explained 26.2% of the variance associated with in-home services use with ADL and IADL needs, medical needs, incontinence and supervision needs providing the most important positive effects. A logistic regression analysis found that the probability of formal service use responded directly to the severity and type of care needs and indirectly to the availability of informal providers. Use of formal services was more probable for frail elders living alone or with non-relatives at a lower level of need. Use was associated with high levels of need for those who lived with a spouse or other relative. Household income had only a trivial effect. Soldo (1985) concluded that at extreme levels of need frail elders and their caregivers overcome financial barriers and secure some level of outside services. The study did not examine the possibility that frail elders with few resources may be forced into long term care institutions sooner and thus were already absent from the study population. Data were cross-sectional and did not provide a longitudinal examination of home care use.

Liu, et al. (1985) analyzed home care expenses for the disabled elderly. They found that need indicators such as frail health status, prior medical service use, and poor cognitive status were directly related to utilization and expenditures. Activities of Daily Living scores, Instrumental

Activities of Daily Living scores, senility, need for assistance for taking medicine, and previous nursing home stays were all important factors in predicting home based use. A number of socio-demographic factors were also important. These included age, sex, marital status, race, and family support. Resources such as income and Medicaid coverage were also important with high risk non-institutionalized elders requiring higher comparative income levels to remain in the community.

Bass and Noelker (1987) expanded the concept of the Andersen model by including predisposing, enabling and need factors for primary and secondary caregivers as predictors of in-home service use for frail elders. 614 caregiving households in Cleveland, Ohio were studied representing quota samples of geographic areas, racial groups, and generational configurations. Findings indicated that elder and caregiver need factors were significant predictors of whether or not in-home nursing or aide services were used, and that enabling factors, particularly household income, predicted the amount of services used. Lower income households were more likely to have service contacts; higher income households had more hours of in-home service use. Many elders with need for intensive, unskilled, and long duration care, received in-home services only when they or their family could assume the cost of such care (Ibid.). Family characteristics defined by increased

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caregiver stress effects, and greater numbers of family-assisted tasks had a positive effect on use of in-home services. Household income, however, had the most significant positive effect on the amount of services used (Ibid.).

Branch, et al. (1988) studied the Medicare covered home care use of a sample of 3,706 East Boston elders. Predictive factors included demographic characteristics, informal support networks, and need factors including functional status, mental status and health care status. Functional status and mental health status were the most important predictors of use of skilled home care. There was some association with lack of informal support network and utilization. Living alone, by itself was not a significant predictor of use of medical home care. This study lends support to the role of need factors as primary predictors of utilization. The use of a small geographically separated community in Boston makes generalizability of the results questionable. The study did not address whether specific ethnic identities in this community may be related to outcomes.

Liu, et al. (1990a) examined several groups of characteristics as predictors of community care costs in the Channeling long term care demonstrations. These included socio-demographic characteristics, financial status, health conditions, functional and cognitive status, and

characteristics of settings. Socio-demographic characteristics included age, race, sex, and marital status. Financial status included income as well as assets. Functional status included measures of Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL). Cognitive status divided persons into severely or moderately impaired and not impaired. Characteristics of setting included market area characteristics including supply of nursing home beds and utilization of Medicare covered home health care services. Level of disability was a very strong predictor of all types of community care costs studied. Women and the oldest old also were more likely to have personal care costs. Living alone was a predictor of higher costs for all types of in-home services. Medicaid eligibility was a predictor of medically related home health care. Those with higher monthly income had higher personal care costs.

Liu, et al. (1990b) attempted to analyze bioactuarial data from several nationally representative surveys to predict use of community and institutional long term care services for insurers. They suggested that the relationship between functional ability and long term care use was mediated both by health and socio-demographic characteristics of disabled persons and by other more complex factors. Substitution may take place between use of formal services and the availability of an informal care network and economic resources. Intensity

and duration of long term care services were related to intensity of functional disability. Liu, et al. (Ibid.) use a Grade of Membership analysis to characterize intensity of impairment as well as the presence of limitations in activities of daily living. The Grade of Membership approach identifies both health and functional status profiles and measures the degree that the profiles characterize individuals. Liu, et al. (1990b) also attempted to measure the importance of the presence of different diseases as a need factor in predicting differential long term care use over time. They emphasized the changing status of disabled elders over time, including possibilities of improved functioning, greater disability, institutionalization, and death.

Short and Leon (1990) examined 1987 National Medical Expenditure Survey data on use of home and community services by elders. They found differences in service use closely linked to need and functional status. Need was indicated by IADL and ADL problems with level of need predicting utilization of services. Use of formal services increased from those with IADL limitations only to those with ADL limitations, with highest use for those with three or more ADL difficulties. Age and sex were also important indicators with more utilization linked to the oldest old and to women versus men of comparable age. Living arrangement was also an important predictor with those living alone twice as likely to



use services although those with three or more ADL problems were likely to need both formal and informal support.

Insurance and veteran status were examined with Medicaid coverage correlated with use. Medicaid participants were also more likely to have other characteristics of service users so that higher use could not be attributed to Medicaid alone (Short and Leon, 1990). Region of the country and place of residence were also examined with living in the South related to receiving fewer formal services. Living in a large metropolitan area did not affect use of services except shopping and transportation services. Women, over 85, living alone, covered by Medicaid, and with several ADL problems were most likely to use home and community services (Ibid.).

Frederiks, et al. (1990) surveyed an age stratified sample of elders in the Netherlands, through the mail, on their use of formal home care services. Use of formal care increased with need as indicated by formal limitations. People living alone were also more likely to use formal care. For seriously limited elders use of combined informal and formal care was far more frequent than the use of formal care only suggesting that the presence of informal care is complementary to the use of formal care. The study was limited to elders in the Netherlands and did not gather data on a wide range of possible predictive factors because of the limitations of a mail questionnaire. Biases may also have

been present in those elders who chose to respond to the survey since elders with severe ADL problems or cognitive and mental health problems would be less likely to respond. Elders with formal or informal support may also have been able to respond more readily than those with no assistance.

Kempen and Suurmeijer (1991) interviewed a matched sample of 52 elderly users and non-users of home care services to examine factors predicting home care utilization in the Netherlands. The study examined "person-bound" variables and "environmental" variables independent of functional ability. Person-bound variables included socio-demographic variables such as sex, age, and income, and psychological factors related to a persons feeling of well being. Environmental variables included health care system issues such as accessibility, admission criteria and distance as well as the social network of the person. Person-bound variables were roughly similar to Andersen's predisposing factors and environmental variables included some of Andersen's enabling factors. The user group was shown to comprise significantly more women and low income users. Non-users received more help from informal care givers. Social network variables and system variables showed little difference between the two groups. This study provided data on characteristics of new users of home care services and suggested that many of the Andersen model studies do not distinguish between new and long

term users. Sample size was small and groups were not randomly selected. Factors such as insurance coverage are also different in the Netherlands and the United States.

Miller and McFall (1991) used data drawn from the 1982-84 National Long Term Care Survey and a companion Informal Caregivers Survey to examine factors predicting utilization of formal home care services. Data on 640 caregivers and elders was examined with the elders re-interviewed after a two year period. In addition to other predisposing, enabling and need factors taken from the Andersen model, the study examined the effect of caregivers burden and the elders informal support network on increased utilization of formal care over the two year period. Data was collected for the week just prior to the interview so that full longitudinal data was not available for the two year period. The strongest predictors of increased use of formal services were age, ADL limitations, and prior hospitalization. These all had strong positive effect on utilization. Age was seen as a need factor as well as a predisposing factor. Enabling factors of income (positive) and size and change in the informal network (negative) were also significant predictors given similar levels of need. Income level was positively associated with amount of formal service use rather than contact with formal care. Caregiver burden also positively influenced increased use of formal help once other need factors were present.

Miller and McFall (1991) added important information on caregiver issues to the Andersen model when applied to utilization of home care services. The study's utility was limited by the lack of availability of longitudinal data on caregivers. The two year period between interviews of elders provided some measure of temporal effect but was limited by the collection of data on only a one week period each time. Utilization was probably understated and the effect of continuous changes over time could not be tracked. A full longitudinal study over the two year period would have provided additional useful data.

#### **SUMMARY OF FINDINGS REGARDING PREDICTORS OF NON-INSTITUTIONAL LONG TERM CARE SERVICES**

**NEED FACTORS:** Consistent with previously discussed studies on medical care utilization, need factors are consistently the most important predictors of in-home service use by elders (Soldo, 1985; Liu, et al., 1985; Bass and Noelker, 1987; Branch, et al., 1988; Short and Leon, 1990; Miller and McFall, 1991). Important need factors in these studies included ADL's and IADL's as well as health status (used in almost all studies), mental health (Branch, et al., 1988) cognitive status (Liu, et al., 1990a), incontinence (Bass and Noelker, assistance needed with medication (Liu, et al., 1985), prior

in-home, nursing home (Liu, et al., 1985), and hospital (Miller and McFall, 1991) utilization. Manton (Manton and Soldo, 1985; Manton, 1989) and Liu, et al. (1990b) also suggested that a more detailed analysis of differing disease diagnoses may predict long term care use over extended time periods. Manton and Soldo (1985) found that certain specific diagnoses were associated with types of health service use and levels or types of functional disability identified by subgroupings in a "grade of membership" analysis.

Several studies (Miller and McFall, 1991; Bass and Noelker, 1987) have made an important conceptual contribution by also including needs of caregivers as positively related predictive factors for in-home service use. Caregiver need studies included measures of caregiver health status, caregiver stress and caregiver burden. Age was also sometimes defined directly as a need factor (Miller and McFall, 1991) as well as a predisposing factor with increased age seen as another positive indicator of need.

There was also evidence that dependency and use of formal services increased as need represented first by IADL problems and then greater numbers of ADL problems grew (Short and Leon, 1990; Liu, et al., 1990b). Dependency and utilization of formal long term care services also increased with certain types of ADL dependencies (Weissert, 1985). Those with personal care needs such as toileting, eating, bathing, and dressing were more likely to require services than those with

mobility needs (Ibid.).

In general, need factors continued to be the single most important set of predictors for utilization of formal home care services. However, predisposing and enabling factors played a more significant role in predicting long term care service use as compared to physician or hospital utilization.

**PREDISPOSING FACTORS:** Age, sex, and living alone are also important predisposing factors in predicting use (Liu, et al., 1985; Branch, et al., 1988; Short and Leon, 1990; Miller and McFall, 1991). Higher utilization was linked to the oldest old and women versus men of comparable age (Liu, et al., 1990a; Short and Leon, 1990). Those living alone were more likely to utilize formal services at a lower level of need (Soldo, 1985).

**ENABLING FACTORS:** Insurance coverage, income and assets were more important positive predictors for formal home care use than for medical care. Andersen (1968) predicted that these factors would be more important for typically uncovered services (such as dental care). Most home and community care services other than skilled home health services, were not typically covered by Medicare or private insurance. Income was particularly important in predicting formal service use. Those with higher levels of need required higher income levels to remain in the community (Liu, et al., 1985; Short and Leon, 1990). As many or more elders with low income may have used

formal services, but elders with high income had more hours of service use (Bass and Noelker, 1987; Miller and McFall, 1991). Findings suggest that low income might not prohibit minimal contact with formal services, but that it will be an increasing barrier as need levels increase. Elders on Medicaid were also more likely to use formal in-home services (Liu, et al., 1985; Short and Leon, 1990; Liu, et al., 1990a) indicating a positive effect of insurance coverage on service utilization.

The presence of informal care and issues related to the informal care network were also important enabling factors in predicting utilization (Liu, et al., 1985; Soldo, 1985). There was evidence that formal care seems to complement informal support for those with high levels of functional disability, while for lower levels of need formal care is more likely to be required by those who have no informal help available to them and thus is substituted for informal care (Soldo, 1985; Short and Leon, 1990; Liu, et al., 1990b).

Predisposing and enabling factors may be more important in predicting formal in-home services use than medical use since only a small portion (home health services) are covered by insurance for most elders. It is also possible that elders with high levels of need, lower incomes, and no informal support may be forced into institutions earlier and, therefore, may not be adequately represented in the groups

studied. A summary of significant predictors for home and community care utilization is presented in Figure 2.2.



**Figure 2.2. Significant Predictors Associated with Higher Use of Home and Community Care (As Identified in Various Studies).**

**PREDISPOSING FACTORS**

Age, 85+  
Sex, Female

**ENABLING FACTORS**

Medicaid Eligibility  
Higher Income (with volume of formal service use)  
Living Alone  
Lack of Informal Caregiver  
Presence of Caregiver (with higher level of need)

**NEED FACTORS**

ADL and IADL Needs  
    Personal Care Needs  
        Toileting  
        Eating  
        Bathing  
        Dressing  
  
Prior Hospital or In-Home Service Use  
Caregiver Stress  
Medical Needs/ Certain Diagnoses  
Incontinence  
Requires Supervision

**METHODOLOGY ISSUES:** Studies of home and community care have generally used multivariate analysis to identify predictors of utilization. As with medical care utilization research, there are few longitudinal studies which allow for examination of significant temporal effects. For those which do include time as a factor, attrition can be a significant problem as study participants die, move or drop out of the study, increasing the opportunity for biased results.

Many of the studies identified in this chapter are based on the Andersen model and attempted to examine a range of behavioral predictors of utilization. Others were simply descriptive of the factors associated with utilization without attempting to identify an overall model. Most studies did not examine a full range of primary medical services, in-home medical and support services, and community-based long term care services. It is, therefore, difficult to get a comprehensive picture of non-institutional long term care use patterns as well as predictors which might be related to other types of utilization.

There remains a need for a significant amount of research in utilization of community based long term care services. Future studies should attempt to examine longitudinal study data and include measures of utilization for the full range of care required by those elders who reside in the community. Research is also needed on the effect of geographic and market area differences, as well as health plan

strategies and ownership on the use of home and community services.

## **V. ECONOMIC MODELS**

In addition to behavioral models, economic models have been used to conceptualize issues related to service utilization and cost. Paul Feldstein (1988) presents one such economic model. This section will summarize some of the key issues related to health care utilization, broadly defined, in the Feldstein economic model. As with work on behavioral models, much of work done with economic models emphasizes the utilization of medical care but can be extrapolated to help conceptualize long term care utilization including home and community care. We will also review some of the key economic approaches to the long term care market (Scanlon, 1980; Paringer, 1985; Swan and Benjamin, 1990; Miller, et al., 1992). Most of these focus on the nursing home market but again there are implications for the home and community care market.

### **FELDSTEIN'S DEMAND ANALYSIS**

Feldstein (and most economists) distinguish between the need for medical care and the demand for care. Need is defined as the amount of medical care that medical experts

believe a person should have to remain as healthy as possible, given current medical knowledge (Feldstein, 1988). Planning based solely on need may result in the use of too few or too many resources. Demand on the other hand refers to how much medical care consumers are willing to purchase and includes analyses of price, income, insurance coverage and other factors. Economic models also explain the relationship among demand, supply and price in predicting medical utilization. In a market oriented economy, the patient is expected to use medical services to the point where the marginal benefit of the last unit of services equals the amount paid for that service. Economists acknowledge that the market for medical care is not a perfect market and consumer sovereignty in that market is questioned. Physicians and other suppliers have an important impact on the services delivered (Ibid.).

Determinants of a patient's demand for care include illness or need, certain cultural or demographic factors, and economic factors. Illness and cultural factors are related to families' perceptions of medical problems and their belief in the utility of medical treatment. Their desires for care are also limited by the availability of resources. Age, sex, marital status, family size and education all effect demand (Feldstein, 1988). These factors are important in predicting medical utilization, but they are not subject to sudden change. Economic factors have a more immediate value for predicting use and allowing policy change. Economic factors

include income, prices, and the value of the patient's time.

Economic demand analysis is consistent with behavioral models in recognizing a range of factors which effect medical care demand. Demand analysis, however, takes as a given the relatively unchangeable need and predisposing factors and concentrates on economic factors as being those which are most impacted by potential health policy interventions.

Family medical consumption is determined by the expected normal level of income. The impact of income level is mitigated by third party insurance coverage which pays for medical care. Insurance reduces the price faced by consumers and must be taken into account (Feldstein, 1988). Net out-of-pocket costs is a key element in predicting demand. Consumer time costs are also important, particularly as insurance pays more of the dollar cost of services. Physicians also play an important role in predicting utilization since they prescribe and control use of many medical services. Physicians are guided not only by their judgements of the medical needs of the patient, but by costs to the patient and by economic implications for themselves (Ibid.). Some economists support the concept of physician induced demand where physicians increase the volume and intensity of services in response to their own economic need for a certain income. Consumers can protect against unwanted services by becoming better educated and/or seeking second opinions. Health systems can use utilization review processes and financial incentives to guard

against physicians over prescribing costly procedures and services.

**INCOME:** Families with higher income have been shown to have greater expenditures on medical care although a smaller percentage of their income is spent on care. According to Feldstein, (1988) the income elasticity, or the rate at which medical care use increases with income, is less than 1 for medical care expenditures. Income effects are determined by permanent or normal levels of income as opposed to temporary increases or decreases. Out-of-pocket expenditures for higher income people may also be lower if they have insurance coverage which pays for a higher percentage of medical expenditures. Feldstein (1988) suggests that once survey data, such as that collected in the 1977 National Medical Care Expenditure Survey (NMCES), are corrected for temporary changes in income and for employer-paid health benefits, income elasticity of medical care expenditures is closer to 1, that is, a certain percentage increase in income will lead to a similar percentage increase in expenditures for care.

Income issues for the elderly present certain special problems. Does an older consumer of medical care services demand care based on lifetime income levels even though retirement income may be lower? Do savings and other assets of the elderly make a significant impact on demand versus income level alone?

**PRICE:** Classical economic theory would suggest that as price of a good decreases, utilization will increase (Newhouse, 1978). Medical care has been seen as relatively unresponsive to price changes with illness and provider advice playing a more important part in determining utilization (Rossiter and Wilensky, 1984). For medical care, part of the price is usually paid by government or private insurance. The price faced by the consumer, therefore, is the out-of-pocket cost rather than the full price charged by the supplier.

Despite the predominant role of illness and physician advice, the existence of health insurance can cause a shift in the demand of the patient. Consumers over 65 are usually covered by Medicare. Some low income elders are also covered by Medicaid and many other elders purchase supplemental insurance to cover costs uncovered by Medicare. Prices faced by elderly users will change dramatically depending on available insurance coverage.

Feldstein (1988) suggests that a demand analysis must also include the out-of-pocket cost of substitutes and complements to the type of care being predicted. Utilization of home care will be effected not only by the out-of-pocket costs faced by the user but the out-of-pocket cost for a substitute such as nursing home care. A disabled elder or a family caring for the elder may demand nursing home care which would be covered by Medicaid with no-out-of pocket cost over a relatively less expensive personal care service at home

which would be paid for out-of-pocket.

**TIME COSTS:** The value of the consumer's time also effects demand for medical care. As the amount of time required to obtain a medical service increases we should expect utilization to decrease (Newhouse, 1978). When out-of-pocket costs are relatively low, time costs becomes a more important factor in assessing demand. The opportunity costs associated with time also vary with income level; consumers with high income levels usually also have high time costs. When time costs contribute a large portion of the total price, the impact of out-of-pocket costs on demand decreases. Conversely, out-of-pocket costs have a much heavier demand effect for those with low time costs (Feldstein, 1988). Copayments, deductibles, and uncovered services will reduce utilization of those consumers with lower incomes and lower time costs more than higher income individuals. It is unclear whether time costs for older consumers who are not in the workforce vary as directly with income as for working age adults. Time costs could also be seen differently for physician services which require time away from normal activities versus time costs for personal care services which are required to carry out normal activities of daily living. Services which assist with activities of daily living carry a time benefit rather than a time cost.



## **SUPPLY ISSUES**

In an ideal market situation, consumers are assumed to come to a market with well defined preferences. They attempt to maximize utility by finding the lowest cost supplier of the desired good or service. Suppliers are expected to attempt to maximize profit and produce the quality of goods desired by the consumer. They must also produce goods at the minimum possible cost or another supplier may take business away by under selling them. If there are not adequate goods or suppliers are inefficient, it is assumed that other firms will enter the market and assure that goods most desired by consumers are produced at minimum cost (Newhouse, 1978).

The medical care market differs from the market for other goods and services in several ways. One of the most important is that the supplier the physician, often controls utilization (Newhouse, 1978; Rossiter and Wilensky, 1984; Feldstein, 1988). The patient often does not determine the course of treatment. The physician recommends treatment and utilization of services based on an assessment of the patient's needs, the patient's insurance coverage/ ability to pay, and other factors such as the physician's economic interests. Many economists (Rossiter and Wilensky, 1984; Reinhardt, 1985; Feldstein, 1988) discuss the concept of physician induced demand to indicate the control which the physician exerts over utilization.

This may show itself in practice variations from area to

area as well as variations in demand for hospital beds seeming to follow the available supply. Provider impact on demand analysis will differ among service types. Consumers may be more reliant on providers for decisions related to physician or hospital care versus personal or social service care. Other supply issues may also effect demand in the area of long term care services. Some geographical areas may have a shortage of nursing home beds; most areas will have a shortage of community based long term care providers. Personal care providers may be difficult to recruit and retain. An economic model of service utilization and cost of health care must take into account the interpenetration of both demand and supply issues.

#### **LONG TERM CARE DEMAND**

Feldstein (1988) also discusses an economic model for predicting demand for long term care services. He suggests that a strong predictor of demand is the availability of non-market or informal long term care services usually provided by a family member. For those requiring personal care services in the home, only 11% of the care days are provided through formal arrangement (Doty, et al., 1985). These non-market services have significant emotional, physical health and economic costs for the caregiver which are not easily measured.

Income is more important as a predictor of long term care

service use than for medical care use because of the high amount paid out-of-pocket. Older people pay 45% (Levit, et al., 1991) of the cost of nursing home care directly and 12% to 40% (Levit, et al., 1991, Price and O'Shaughnessy, 1990) of home care. Income should also include the effect of assets owned by elderly. Sex, race and disability are also important predictors of income and long term care utilization, with women, minorities and disabled elders having lower incomes. Income among the elderly is very unevenly divided with 20% of the elderly controlling 41.8% of the disposable income and the bottom 60% unable to pay for catastrophic long term care costs (Feldstein, 1988). Government and private insurance coverage for services is also an important predictor of utilization, but the impact of private long term care insurance is negligible and Medicaid is the primary public payer for long term care services (Levit, et al., 1991). Consumer ignorance, difficulty in finding appropriate services and uncertainty over physical condition make long term care an even more imperfect market than that for medical care. Demand for long term care is also altered when Medicaid subsidizes the cost of nursing home care but does not subsidize the cost of community alternatives. Supply or shortage of private pay versus Medicaid eligible nursing home beds will also have an impact on long term care demand (Feldstein, 1988).

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**OTHER LONG TERM CARE MODELS:**

**THE NURSING HOME MARKET:** Specific issues related to the market for nursing home care have been discussed by several authors (Paringer, 1985; Scanlon, 1980; Miller, et al., 1992).

Scanlon (1980) presented a comprehensive review of the nursing home market including an analysis of the demand and supply sides of the market and the role of government policies. He suggests that the nursing home market is more like the one for standard economic goods than other types of health care because consumers face high out-of-pocket costs (they are not shielded by insurance coverage) and do not rely as heavily on doctors to make decisions regarding nursing home care.

Third party coverage still plays an important part in the demand for nursing home use. Medicare covers short stay patients only (4.7% of total expenditures) and private insurance covers only 1% of nursing home costs (Levit, et al., 1991). Medicaid however is an important payer covering 45% of nursing home costs, (Ibid.). Scanlon (1980) suggested that because Medicaid usually pays less than the private pay rate and less than the marginal cost of increased nursing home bed supply, the nursing home market exists in equilibrium with an excess demand condition. He saw private pay users being able to purchase nursing home services and Medicaid users facing a shortage of available beds. According to his theory, states

could either increase reimbursement rates (and therefore the supply of beds) or reduce eligibility in order to lessen the shortage. Raising reimbursement rates is mitigated against by other budgetary needs. Reducing the number of eligibles may have undesirable political consequences (Scanlon, 1980). Excess demand could also be lowered by subsidizing alternatives to nursing home care (Ibid.). For Medicaid eligibles, Scanlon (1980) found that increasing income makes demand decrease since more desirable alternatives could be purchased, while quantity of nursing home care able to be purchased remained the same, with the price faced by the user fixed at his or her income level.

Under conditions of excess demand, liberalizing eligibility would have no significant effect on utilization, but would increase the shortage of beds (Ibid.). Actual nursing home utilization is thus heavily dependent on supply, Scanlon (1980) suggested, with the probability of a person being in a nursing home being equal to the probability of a person demanding care times the probability of being able to find an available bed. He also suggested that in a condition of excess demand, homes are more likely to refuse Medicaid patients and might discriminate against the most severely impaired in order to minimize costs (Ibid.).

Paringer (1985) discussed the impact of state Medicaid policies on supply and demand issues in the nursing home

market. She suggests that there are two interrelated nursing home markets, private pay and Medicaid supported. She includes Medicare reimbursed (higher than Medicaid) patients in the private pay market. According to Paringer factors affecting demand for nursing home services included health status, socioeconomic and demographic factors, price, price and availability of substitutes and complements, individual resources and preferences (Ibid.). Supply of nursing home beds was affected by industry factors like ownership, size, and concentration, as well as labor and construction costs, other cost issues, reimbursement policies, and regulations like licensing and certificate of need (Ibid.). Paringer suggested that by varying policies such as reimbursement rates, Medicaid eligibility standards, and reimbursement for substitute services, the state could effect supply and demand issues (utilization) and thus the nursing home market. All things being equal, nursing home firms would attempt to maximize financial returns based on market factors including state policies (Ibid.)

Miller, et al (1992) suggested that the nursing home market consists of overlapping Medicaid, Medicare, and private pay markets and is in disequilibrium with demand often exceeding supply but with occasional excess supply. Using 1978-88 state nursing home survey data, they examined categories of factors that effect demand: demographic and socioeconomic factors, state policies, and availability of

substitute and complementary services, and other categories which effect supply: cost factors, policies, and substitute services.

Several factors showed important effects in the Miller, et al. (1992) study. Age over 85 was the most important demographic determinant of demand with a strong positive effect. Increased percentage of women in the labor force and increased percentage of population living in metropolitan areas also showed positive effects on demand. Per capita income had a negative effect on demand. Higher Medicaid spend-down eligibility levels had a positive effect on demand; intensive nursing home admission screening programs have a modest negative effect. Higher Medicare SNF payments leading to increased spend-down had a positive effect as did increased Medicaid hospital use. Medicare and Medicaid home health use per capita and office-based physicians per capita all had a significant negative effect on demand (Ibid.).

Several factors also had significant effect on nursing home supply. Unionization and higher nursing pay had negative effects on supply. Facility size and higher Medicaid reimbursement rates had a positive effect on supply. Medicare SNF use had a negative effect on Medicaid supply (Ibid.)

**HOME HEALTH MARKET:** The Medicare home health care market was examined by Swan and Benjamin (1990). They examined a variety of demand and supply factors which effect home health use with



a special focus on the function of nursing home market factors. State by state home health data from 1978 to 1984 were analyzed year by year and across the entire time period. The number of Medicare home health visits were negatively related to total nursing home beds but positively related to Medicaid access to beds(Ibid.). Number of home health agencies had a positive effect on utilization as did percentage of the population over 85 years old. Over time, they found that the percentage of women in the labor force had a negative effect on home health utilization reflecting the importance of the informal caregiving role of women. Increase in Medicaid spend-down eligibility level had a positive effect on utilization as did per capita income (Ibid.) Scarcity of nursing home beds and greater access to those beds by Medicaid recipients was a key factor in increasing demand for Medicare home health services (Ibid.).

#### **ECONOMIC FACTORS INFLUENCING THE COMMUNITY BASED LONG TERM CARE MARKET**

Economic models for predicting utilization of home and community services for the disabled elderly have grown from studies of medical care, nursing home and home health care utilization. Economists focus on analysis of supply and demand factors and their effects on the market for these services. It is clear (Feldstein, 1988; Evans, 1984; Miller,

et al. 1992; Paringer, 1985;) that supply and demand issues are interrelated in the health and long term care markets and any comprehensive analysis of utilization must take both into account. We can build on the analyses of the nursing home and home health care markets (Scanlon, 1980; Paringer, 1985, Miller, et al., 1992; Swan and Benjamin, 1990) to propose a range of demand and supply factors that must be taken into account in examining utilization issues in the home and community care market.

#### **FACTORS INFLUENCING DEMAND FOR COMMUNITY BASED LONG TERM CARE**

##### **DEMOGRAPHIC AND SOCIOECONOMIC FACTORS:**

AGE: It is clear that age is associated with higher demand for long term care services (Liu, et al, 1985; Weissert, 1985; Short and Leon, 1990; Miller, et al., 1992). Demand increases significantly over 75 years of age and even more dramatically over 85 years of age. It is unclear whether age has a significant effect once disability levels are controlled.

SEX: Older women are more likely to use formal community care resources (Liu, et al., 1985, Short and Leon, 1990). This may reflect the fact that men are less likely to live alone and therefore receive informal help from other family members. Older men may also have illness problems (cardiovascular and

respiratory versus women's musculoskeletal and sensory) which require more acute intervention and hospital services (Mutran and Ferraro, 1988).

**LIVING ARRANGEMENT:** Those elders living alone or with non-relatives are more likely to require formal home and community care services since informal care is not as available to them (Soldo, 1985; Liu, et al, 1990a; Short and Leon, 1990).

**INCOME:** Increased income is clearly linked with the ability to purchase more home and community care services. High risk elders require higher income levels to be able to remain in the community (Liu, et al., 1985). However, some data (Bass and Noelker, 1987) would indicate that low income households may be more likely to have more service contacts, but that higher income household have more hours of in-home services. Lack of adequate personal income or sufficient reimbursement for home and community care under Medicaid or other public programs (such as Medicare and the Older Americans Act) may force low income elders out of the home and community care market and into nursing homes where Medicaid will reimburse for care.

**ASSETS:** The asset base of elders enables them to purchase long term care services. Assets must be spent down before Medicaid will pay for nursing home services. Assets serve as

an additional resource to purchase home and community care although their use may be mitigated against by the non-liquid nature of assets like personal homes and by the "rainy day factor" (Lynch, 1991). Many poor to middle income elders who have saved for a "rainy day" may resist spending modest savings for home care even when it appears to health professionals that they are in crisis and it is "storming" outside (Ibid.).

**WOMEN IN THE LABOR FORCE:** Informal caregivers are usually women, many of whom are not working (Stone, et al., 1987). Higher numbers of women in the labor force should increase the demand for home and community care. We can expect this effect to vary, however, based on level of disability. It should hold for elders with moderate (1-2 IADL or ADL) levels of disability but may have a negative effect for elders with heavy disability (3+ ADLs) levels who may require both informal and formal help to remain at home (Short and Leon, 1990).

**INSURANCE COVERAGE:** Since insurance coverage decreases the out-of-pocket costs and thus the price faced by consumers of home and community care, it should increase the demand. Because private insurance coverage is now paying only approximately 1% of the total US long term care costs (Levit, et al., 1991), private coverage is a relatively insignificant

factor effecting demand.

**POLICY ISSUES:**

**MEDICAID COVERAGE:** Medicare covers only limited amounts of long term care services. It is not designed to cover chronic care needs. Medicaid is the principal payer for long term care services covering 45.4% of nursing home costs (Levit, et al., 1991) and 22% of home care costs including home health (Feder, 1991). Home health benefits are mandatory under Medicaid and must be provided by the states. Personal care is not a mandated service and is provided by about 1/2 of the states under Medicaid (Ibid.). Medicaid may also cover adult day health care as an optional benefit. Case management may be covered under Medicaid waiver programs as well. In 1986, 32 states had Medicaid community based care waivers covering a variety of home and community services (Ibid.). Demand for these services will be increased if Medicaid coverage is available. Demand is also effected by eligibility levels and target populations set on a state by state basis.

**SOCIAL SERVICES BLOCK GRANTS AND OLDER AMERICANS ACT:** States receive federal Social Services Block Grant Funds to provide for a number of service needs including personal care needs. Coverage of personal care varies widely from state to state and will impact demand based on coverage (Feder, 1991; Pepper Commission, 1990). The social services block grant program

and the Older Americans Act are both grant programs with limited dollars available. Title III of the Older Americans Act pays for a small amount of home and community care services (Pepper Commission, 1990) through grants made to states, Area Agencies on Aging, and local sub-contractors. Dollars spent are small relative to Medicaid but should also increase demand. Eligibility standards are more liberal for block grant and Older Americans Act funds (Feder, 1991) so that a few middle income elders are also effected.

**SUBSTITUTE AND COMPLEMENTARY SERVICES:**

**NURSING HOME SERVICES:** Nursing home services should theoretically serve as a substitute for home and community care (Swan and Benjamin, 1990). Additional nursing home beds should lower demand for community-based care. Because of existing consumer preference for remaining in their home, nursing home beds may not effect demand for home and community care. Shortages of nursing home beds may, however, increase demand for formal home care. This effect is complicated by the fact that the shortage of beds may affect Medicaid eligibles (vs. private payers) (Scanlon, 1980) who may or may not live in a state where Medicaid will pay for home or community services.

**MEDICARE AND MEDICAID HOME HEALTH SERVICES:** The availability of formal home health services may serve as a substitute or a

complement for other types of community care. For elders with acute medical as well as disability problems, skilled nursing services may complement other levels of care. For those without resources or coverage for other home and community care, there may be an attempt to substitute skilled home health services as the only care available which will be paid for. This effect would be mitigated, at least for low income elders without Medicaid, by coverage limitations on Medicare home health services.

**INFORMAL CARE:** Informal care is the major substitute for paid home and community care. 70% of those with severe levels of disability rely on informal caregivers alone. About 25% use both formal and informal care and only 3% rely only on paid care (Liu, et al., 1985). For those with severe levels of disability, informal care may also serve as a necessary complement to paid care (Short and Leon, 1990).

**PHYSICIAN VISITS:** Doctor visits may complement the use of paid home and community care for disabled elders. Physician services may serve as a necessary part of the service package needed to keep a severely disabled elder at home and out of a nursing home (Zawadski & Eng, 1987; Leutz, et al., 1985) although informal support may also be required by functionally impaired elders to take advantage of physician services (Arling, 1985).

## **FACTORS INFLUENCING SUPPLY OF COMMUNITY BASED LONG TERM CARE**

**COST FACTORS:** Miller, et al. (1992) identify a variety of cost factors effecting nursing home supply. We can hypothesize several cost issues which will effect supply in home and community care. Personal care is typically poorly paid work with few opportunities for career advancement. Labor market characteristics which promote a large supply of unskilled, unemployed workers may increase demand. These may include high unemployment rates and large numbers of immigrant or undocumented workers in the area. Adult day health care supply may be effected by some of the same cost factors as nursing homes, i.e. availability of nurses, facility and supply costs, and unionization rates. Case management costs may be effected by the supply of social workers in the area and the wage rate. Policy and reimbursement practices are likely to have a much more serious effect on case management services than cost factors. The private market for case management is not widely developed.

**POLICY ISSUES REGARDING SUPPLY:** Available reimbursement through Medicaid, Social Services Block Grant, and Older Americans Act funds will have the most significant effect on supply of home and community care. Increased total dollars (and dollars per capita), and reimbursement rates should



increase supply of services like personal care, adult day health care, and case management. State policies regulating licensure of agencies providing home and community care services can also provide barriers to suppliers entering the market and/or limitations on service delivery practices. Regulations would most typically effect adult day health centers and personal care provided through licensed home health agencies. Independent personal care providers or attendants and case managers are unlikely to face regulation barriers. The potential largest impact from policy issues would be the development of a national long term care coverage package (Harrington, et al., 1992).

**SUBSTITUTES:** Higher rates of Medicare and Medicaid home health reimbursement, may lead home health agencies providing skilled nursing services and personal care to emphasize skilled care which has a better reimbursement stream associated with it. Reimbursement policies related to skilled home health care should not have as heavy an effect on supply as would the development of policies allowing for the direct reimbursement of home and community care.

**PRIVATE INSURANCE COVERAGE OF HOME AND COMMUNITY CARE:** Although private long term care insurance coverage for home and community care is now inconsequential, growth of the number of people insured privately for home and community care

should positively effect the supply of these services. If there is growth in private insurance coverage it will provide for an additional revenue stream for providers.

**SUMMARY OF DEMAND AND SUPPLY FACTORS:** A number of authors have analyzed demand and supply factors in the nursing home market (Scanlon, 1980; Paringer, 1985; Miller, 1992) and in the home health market (Swan and Benjamin, 1990). Studies of community based long term care demonstrations (Kemper, et al.,1987; Weissert, et al.,1988) have provided some data on the home and community care market. It is important to develop an economic model for predicting the utilization of home and community care which reflects the complex range of supply and demand factors discussed above. Application of such a model will allow us to better understand the community based long term care market. Increased aging and disability of the population will lead to increased demand for community based long term care services. Existing supply is not adequate to meet increased demand nor to lessen reliance on nursing home care which can be a less desirable and sometimes more expensive substitute. Adequate understanding of this market will help to inform policy discussion and decision making related to the growing needs of the elderly and disabled.

Figures 2.3 and 2.4 list demand and supply factors

hypothesized to influence this market and the direction of their effect. Figure 2.5 builds on a graphic framework for analyzing long term care developed by Paringer (1985) and Newcomer (1992) and summarizes the interaction among these factors.

**Figure 2.3. Suggested Demand Factors Influencing Home and Community care.**

DEMOGRAPHIC/ SOCIOECONOMIC	INCREASED AGE	+
	SEX, FEMALE	+
	LIVING ALONE	+
	WOMEN IN WORK FORCE	-
	INCOME	+
	ASSETS	+
	INSURANCE COVERAGE	+
POLICY ISSUES	MEDICAID	
	-PERSONAL CARE COVERED	+
	-INCREASED 2176 WAIVER \$'S	+
	SOCIAL SERVICES BLOCK GRANT AND OLDER AMERICANS ACT \$'S INCREASED	+
SUBSTITUTES AND COMPLEMENTS	INFORMAL CARE AVAILABILITY	
	-FOR MODERATE DISABILITIES	-
	-FOR SEVERE DISABILITIES	+
	NURSING HOME BEDS	-
	SKILLED HOME HEALTH	
	-FOR MODERATE DISABILITY	-
	-FOR SEVERE DISABILITY	+
MD VISITS	+	

**Figure 2.4. Suggested Supply Factors Influencing Home and Community Care.**

COST FACTORS	HIGH LEVEL UNSKILLED WORKERS/UNEMPLOYMENT	+
	IMMIGRANT/UNDOCUMENTED WORKFORCE	+
	NURSE AVAILABILITY	+
	SOCIAL WORKER AVAILABILITY	+
	HIGH WAGES/ UNIONIZATION LEVEL	-
POLICY ISSUES	AVAILABLE REIMBURSEMENT MEDICAID/SOCIAL SERVICES BLOCK GRANT/OLDER AMERICANS ACT	+
	LICENSURE/REGULATIONS	-
	NATIONAL LONG TERM CARE COVERAGE	+
SUBSTITUTES	HIGHER SKILLED HOME HEALTH REIMBURSEMENT	-
	SUPPLY OF COMPETING ALTERNATIVES	-
PRIVATE INSURANCE	IMPROVED COVERAGE FOR HOME AND COMMUNITY CARE	+

**VI. COMMUNITY CARE DEMONSTRATION PROJECTS AND THE  
SOCIAL HEALTH MAINTENANCE ORGANIZATION DEMONSTRATION**

**COMMUNITY CARE DEMONSTRATIONS:**

A series of demonstration projects were conducted in the 1970's and 80's to test the effects of a variety of community based care interventions. These demonstrations did not depend on any one model for predicting utilization and expenditures, but rather were designed to test the effectiveness of the provision of certain home and community care services. The demonstrations also attempted to measure overall health expenditures and the effects of substituting community based care for nursing home care. Some of the demonstrations also measured the substitution effect of the projects on other types of utilization and expenditures such as hospital care. These projects supply some of the available data on community based care expenditures and are important to review as background for examining community based care long term care utilization, expenditures and out-of-pocket costs in the Social Health Maintenance Organization demonstration.

These demonstration projects differed in their

intervention strategies, but most offered some combination of case management services, home care services and sometimes adult day health care. They differed significantly from the SHMO model in that sponsoring organizations typically did not provide primary and acute medical care with chronic care and were not financially at risk for providing needed services within set capitated rates. The one exception to this difference was the On Lok program which did manage both medical and long term care services and was financially at risk for these services (Zawadski, et al, 1983).

Community care demonstrations, examining the effect of providing a broad package of case managed community services, followed earlier more limited demonstrations which examined first the provision of skilled home care (Hammond, 1979) and later the effect of personal care as a substitute for nursing home care (U.S. General Accounting Office, 1977). Among the more comprehensive demonstrations were Georgia Alternative Health Services Program (1977-80), ACCESS in Monroe County, New York (1977-80), On Lok (1979-83), Wisconsin Community Care Organization (1978-80), California Multipurpose Senior Service Program (MSSP) (1978-81), New York City Home Care (1980-83), Nursing Home Without Walls (1980-83), San Francisco Project OPEN (1980-83), South Carolina Community Long-Term Care (1980-84), San Diego Long Term Care (1980-84), and the National Channeling Demonstration's Basic and Financial Models (1980-85) (Weissert, et al., 1988; Kemper, et al., 1987).

Many of these demonstrations were funded under Medicare Section 222 waivers or, beginning in 1982, Medicaid Section 2176 waivers which encouraged substitution of community-based services for institutional services. By 1990, states spent over \$1 billion on 2176 waiver programs (Miller, 1990) as compared with \$53.1 billion total (from all sources) spent on nursing home care and \$6.9 billion spent on home care (Levit, et al., 1991).

The community care demonstrations emphasized the provision of case managed community care to elders with some of the projects providing additional home care services. Several of the projects introduced cost caps on expenditures allowed for individual participants. Because many of the earlier demonstrations were limited in their scope of services, caseloads and geographic areas, the National Channeling demonstration was designed to provide a broader test of the effects of case management services (basic model) and expanded service coverage (financial control model) (Carcagno & Kemper, 1988).

Overall results from the community care demonstrations were fairly consistent. The demonstrations often focused on their ability to substitute community based case management and care for nursing home services. For the most part the demonstrations did not prove to be cost effective with the additional cost of case management and other community interventions more than offsetting any savings achieved in



nursing home use (Weissert et al., 1988). Reductions in nursing home use were small, except for the South Carolina Community Long Term Care program which was integrated with a nursing home pre-admission screening program. Nursing home use in this program was reduced by 31% with reductions maintained over a three year period ( Kemper, et al., 1987).

Most of the community care demonstrations did not concentrate on reducing hospital expenditures, although slight reductions were achieved by many of the projects (Ibid.). By 1987, the On Lok project reported that its principal savings were in reduction of hospital costs ( 2,204 days per 1,000 enrollees per year vs. over 3,000 days per 1,000 for fee for service Medicare enrollees prior to Medicare's prospective payment system) allowing for substitution of home and community care (Zawadski and Eng, 1988). On Lok was also one of the few community care demonstrations which reported overall savings, although these results have been called into question because of the methodology used for selecting a control group (Weissert, et al., 1988).

In general, the community care demonstrations were found to improve the quality of clients' lives and to provide support for informal caregivers without replacing them (Kemper, et al., 1987). The value of case management service including assessment of needs, development of care plans, arrangement of services, and ongoing monitoring of services

has been documented (Capitman, et al., 1986). Because the community care demonstrations were generally based on fee-for-service systems and did not reduce or control long term care costs, there were suggestions that capitated programs might be able to reduce use and control overall costs (Zawadski, 1983; Kemper, et al., 1987; Weissert, et al., 1988). Two demonstration programs were established to examine managed care approaches to providing chronic care: the Social Health Maintenance Organization (SHMO) (Leutz, et al., 1985) and the Program of All Inclusive Care for the Elderly (PACE) (Zawadski and Eng, 1988) based on the On Lok program.

**PROGRAM OF ALL INCLUSIVE CARE FOR THE ELDERLY:** The PACE demonstration was developed in 1991 to replicate the On Lok program in San Francisco. PACE has the following characteristics: 1) it is targeted at poor aged and disabled who met the criteria for nursing home certification; 2) the provider organizations are capitated and at full risk for all Medicare and Medicaid costs, including community based long term care and extended nursing home costs; 3) Medicare capitation payments are based on approximately 2.3 times the AAPCC for the institutionally placed population; 4) membership is largely (although not restricted to) Medicaid/Medicare eligibles; 5) case management and primary health care are tightly integrated using multi-disciplinary assessments, care plans and service delivery; 6) services are

adult day health center based (Zawadski and Eng, 1987). Twelve PACE sites are currently being developed around the country by independent providers with the assistance of On Lok. Evaluation data on the PACE project is not yet available.

**SOCIAL HEALTH MAINTENANCE ORGANIZATIONS:** Since 1985, the SHMO demonstration has combined Medicare HMO coverage of hospital and physician services with chronic care benefits. The SHMO demonstration tested the delivery of a broad range of medical, social and chronic care services to older enrollees in capitated at-risk delivery systems. Unlike other community care demonstrations discussed above, the SHMO's were designed to serve a cross-section of the elderly population including both disabled and healthy elders. A single organization provided acute and chronic care services to members who enrolled on a voluntary basis and paid a monthly premium. Home health, homemaker, nursing home, transportation, drugs and other services were offered beyond the basic Medicare covered services. Case management services were offered to members who met specific disability criteria. Case managers coordinated and authorized chronic care services up to an annual limit of from \$6,250 to \$12,000. They also attempted to improve access and appropriateness of services. Financing was provided through prepaid capitation of pooled Medicare, Medicaid and premium funds. HCFA shared the risk for the

first 30 months of a start-up period, with the SHMO sites being at full financial risk for delivering the agreed upon package of services after that time (Leutz, et al., 1985). The SHMOs also offered optional expanded benefits such as pharmaceutical coverage, dental services and vision care.

SHMO demonstration projects became operational in 1985 in four different sites. These organizations were awarded SHMO contracts at a fixed annual capitation rate for Medicare of 100 percent of the adjusted average per capita cost (AAPCC) with Medicaid rates negotiated by states (Harrington and Newcomer, 1991). The SHMO's were developed by two different types of organizations, established HMO's and long term care organizations. Kaiser Permanente Northwest, an HMO in Portland, Oregon developed Medicare Plus II. Group Health, Inc. in partnership with the Ebenezer Society, a long term care provider, developed Seniors Plus in Minneapolis. Metropolitan Jewish Geriatric Center, a long term care provider, established Elderplan in Brooklyn, N.Y. Senior Care Action Network (SCAN), a long term care service broker, established SCAN Health Plan in Long Beach, California (Harrington and Newcomer, 1991).

**SHMO EVALUATION RESULTS TO DATE:**

The SHMO evaluation examined issues related to the demonstrations ability to break even financially, control of hospital and chronic care costs, selection bias, patient

satisfaction, disenrollment rates and health outcomes (Harrington & Newcomer, 1991; Manton, et al., 1992a; Newcomer, et al., 1992). Evaluation data was collected from 1985 through 1989, although the demonstration sites have continued to evolve and provide services since 1989. Most of the findings from the demonstration are based on data collected during the evaluation period.

A primary goal of the SHMO's was to control service utilization and expenditures and to develop a financially viable product which could sustain itself in the long run. Despite high initial start-up costs, three of the four demonstration sites broke even or showed a net gain after five years (Harrington and Newcomer, 1991). Difficulty in reaching break-even points was attributed to slow enrollment growth, high start-up costs including marketing costs, and difficulty in the long term care organization sites with controlling acute medical costs including hospitalization (Ibid.). Certain sites also suffered from specific market related problems such as strong competition from other existing Medicare HMOs or geographically lower capitation rates paid by Medicare.

Aggregate data were evaluated by site to determine major utilization and expenditure outcomes. Hospital costs represented 29 to 40% of overall SHMO budgets in 1989, with the HMO sponsored sites typically able to attain lower numbers of hospital days per 1,000 member months and lower average

hospital lengths of stay (Ibid.). Average hospital days rose in all sites as members aged. Medicare covered ambulatory care services, skilled nursing facility days and home health services varied from site to site over the first five years of the SHMO implementation. Difficulty in controlling these costs may have added to overall financial problems at Elderplan.

SHMO chronic care costs varied considerably from site to site. In part these differences could be attributed to differences in benefits structures, the proportion of disabled members, and eligibility criteria for services. Total chronic care expenditures ranged from \$19 to \$44 per member per month in 1989. These expenditures represented from 5 to 11 percent of total SHMO expenditures (Ibid.). Case management costs were relatively small ranging from 2 to 3 percent of SHMO budgets in 1989, or \$7 to \$11 per member per month (Ibid.). Overall the SHMO's were able to control their chronic care costs through a combination of methods including total dollar limits on benefits, copayments, using case managers to limit chronic care service use, reducing administrative costs and signing contractual arrangements for services (Ibid.).

Despite overall positive development of the SHMO model, several problems have been identified in the evaluation. Selection bias was of particular concern in the evaluation study (Newcomer, et al., 1992). There may have been differences in health status, income level, prior service use

and other important variables. There were several potential sources of bias. There was a self-selection process that lead participants to enroll or not enroll in the SHMO project. Disenrollment, death and movement from the study area also affected bias. Bias was also introduced through the methods and criteria used by the projects to select or reject potential enrollees or include them in the group eligible for chronic care services. Some of these biases can be measured directly, others are more subtle such as concerns related to selection of physicians or attitudes towards HMO's in general.

There is evidence (Brown, R. et al, 1993) that Medicare HMOs in general have experienced favorable selection, enrolling members who were lower users of care than the general population. The evaluation of the overall SHMO demonstration provides evidence that the SHMOs also experienced favorable selection both through favorable enrollment and favorable disenrollment (Manton, K., et al., 1994a). The SHMO's experienced favorable selection in terms of members' prior utilization of health care services and in terms of their health status (measured by health condition and functional status) in comparison to those individuals who remained in fee-for-service care (Manton, et al., 1991a). This finding although consistent with other evaluations of HMOs serving a Medicare population proved controversial. Representatives of the SHMOs have challenged the findings of the evaluators (Leutz, et al., 1995) claiming that differences

in the Health Status Forms used for the SHMO and the comparison groups caused disability levels to be overstated in the FFS group when compared to SHMO enrollees. The evaluators, in turn, have claimed that such differences in the HSF were required, approved by SHMO representatives, and accounted for in the analysis (Manton, et al., 1994b). The originators of the SHMO concept as well as the operators of the demonstration are understandably concerned about this issue since the findings of the evaluation helped determine requirements for the second generation of SHMO demonstration sites and may weaken arguments for improvement or maintenance of current reimbursement rates. SHMOs currently receive 100% of the Average Adjusted Per Capita Cost (AAPCC) rate as compared to 95% of the AAPCC for most Medicare HMOs.

Another concern was that SHMO's were found to have had favorable disenrollment and attrition after controlling for health status case mix in contrast to those individuals who were in the fee-for-service system (Manton, et al., 1992b). SHMO members who had acute illnesses, neurological disorder, and impairment were more likely to disenroll or die than FFS members.

SHMO satisfaction was found to be generally high, but impaired SHMO members were statistically more dissatisfied with most aspects of the SHMO model (although not the case management program) and particularly dissatisfied with the interpersonal relationships with physicians (Newcomer, et al.,



1992). The evaluators suggested that a impaired members may have had fewer options which would allow them to express satisfaction by disenrolling from the SHMO.

Manton, et al. (1992c) examined health outcomes (i.e. mortality rates) from the SHMO demonstration over a three year period. After controlling for differences in health status (physical health and health conditions), SHMO members had significantly higher mortality rates than those individuals in FFS care over the three year study period. In addition to controversy over differences in instruments used to identify impaired sample members in the SHMO and FFS samples which some claim understate disability in the SHMO sample, the evaluators have also been criticized for using a classification of impairment analysis which combines a number of measures and is not readily replicable.

Another major problem was the difficulty coordinating care between the acute and chronic care service systems. The primary care physician involvement in the case management and coordination activities for SHMO members was minimal in comparison to the effort and activities of the case managers (Yordi, 1992). The model also, for the most part, did not emphasize the development of specialized geriatric physician care and did not involve physicians in day to day coordination of chronic and acute care (Harrington, et al., 1993b). Recommendations for improved coordination between physicians and case managers, as well as increased emphasis on geriatrics

have also been criticized by the developers of the SHMO models (Leutz, et al., 1995) as outside the original scope of the demonstration objectives and potentially too costly to be supported in the SHMO financing model. SHMO medical directors (Schwab & von Steinberg, 1995), on the other hand, have claimed that geriatric models have been developed since the evaluation ended in 1989 and that indeed services are appropriately integrated.

Other researchers (Hallfors, et al., 1994) have also examined SHMO data to examine the stability of frailty in the demonstration. They have found that many members classified as impaired in fact do not remain disabled over a long period. This is particularly true for those who have entered the impaired classification following an acute hospitalization. The SHMO, unlike certain other demonstrations (such as the PACE model), allows for chronic care services to be provided on an as-needed basis. Members can shift between well and impaired status as needed, allowing appropriate treatment, as well as more appropriate payments from Medicare.

In summary, the SHMO demonstration findings indicated that after a costly start-up experience, it was financially viable for most of the sites to provide a package of chronic care services, combined with medical care services, in a capitated delivery system. In order to be viable, it was necessary to limit the enrollment of impaired elders and put dollar limitations on dollars spent per year on chronic care.

For the most part the SHMO sites were able to control acute and chronic care expenditures. There were problems, however, related to favorable selection and attrition, as well as higher disenrollment and mortality rates for SHMO members, although some of these findings have been disputed by the originators of the SHMO concept and operators of the demonstration. There were also problems related to members' dissatisfaction with physician services. Nevertheless, the SHMO demonstration has provided a valuable model in consolidating medical and long term care services, including community-based services, while controlling costs. The demonstration sites have provided findings related to integrating a chronic care benefit into a Medicare HMO and have shown that valuable home and community care services can be provided within a manageable budget limit in that setting. Findings related to favorable selection are consistent with evaluations of other Medicare HMOs. It is expected that these and other problems, such as further integration of medical and chronic care services, will be addressed in the second generation of the SHMO demonstration or in the further development of Medicare's use of the HMO model for a greater number of beneficiaries.

**OUT-OF-POCKET COSTS IN MEDICARE HMO'S, IMPLICATIONS FOR THE SHMO:**

The SHMO demonstration was not designed primarily to

examine effects on out-of-pocket costs for home and community care. Andersen (1968) also did not delineate the predictive effects of different types of insurance coverage or delivery systems on utilization or costs. Since the development of the behavioral model, however, HMO's have become important providers of care (Luft, 1988) and HMO's may have a significant impact on their elderly members' out-of-pocket costs. The SHMO, therefore, in so far as they deliver community based long term care services in a capitated, at risk, setting may significantly impact out-of-pocket expenditures for these services.

Sofaer and Kenney (1989) projected the out-of-pocket costs for Medicare enrollees receiving traditional fee-for-service care in the community versus those enrolled in Medicare risk based health maintenance organizations. They examined costs across thirteen illnesses of varying severity in the two reimbursement settings. Illnesses ranged from hypertension to lung cancer to stroke. Services covered were the traditional Medicare service packaged and did not include non-medical chronic care services. Findings may be relevant to judging the impact of delivering other services such as in-home and community care in a prepaid capitated setting versus on a fee-for-service basis.

Sofaer and Kenney (1989) projected that enrollment in an HMO would reduce out-of-pocket costs substantially across the entire range of illnesses studied. Reductions in financial

vulnerability ranged from 20% to 99% depending on illness. Some of the factors in this reduction of patient costs were generous benefit structures such as the elimination of Part A and B deductibles, lower copayments, elimination of excess charges by community physicians not accepting assignment, and additional benefits such as prescription drug coverage in the HMO settings. The authors assumed the same service delivery in both settings, but acknowledged that HMO's traditionally decrease some services like hospital days and increase others like outpatient care (Luft 1980). They also questioned the ability of HMO's to maintain as generous a benefit package over time as operating margins are reduced. Their model supported the concept that HMO's have the potential to generate significant out-of-pocket savings for their users. These savings may be eroded if premium levels rise, copayments are increased, and certain benefits capped with dollar limits.

Sofaer and Kenney (1989) have examined out of pocket costs in fee-for-service vs. HMO settings in a single market, Los Angeles, for Medicare covered services only. Given the benefit structure of Medicare risk based HMO's, it is likely that similar savings in out-of-pocket costs would be obtained elsewhere. It is harder to predict whether the effect would hold for long term care services provided in the community on a fee-for-service basis versus in a capitated HMO package. Further research is needed to examine long term care service

use in an HMO setting. This study uses evaluation data from the Social Health Maintenance Organization demonstration (Harrington & Newcomer, 1991) to provide some information on the effect of membership in an HMO on out-of-pocket costs for chronic care services. Unfortunately comparison data for fee-for-service users in the SHMO market areas is not available due to the lack of reliability of the data.

## **VII. SUMMARY AND CONCLUSIONS**

Review of prior research and efforts at modelling elderly service discussed in this chapter allow for the development of an ideal theoretical model building on earlier work. That theoretical model and hypotheses related to it are presented below.

### **THEORETICAL MODEL:**

Understanding and predicting community based long term care utilization and expenditures is a complex and, as yet, poorly developed subject of health services research. Community based long term care modeling and research must be improved if long term care policy is to be developed which allows disabled people to remain as independent as possible and avoids inequitable out-of-pocket cost burdens on some groups of elders. This chapter combined behavioral and economic model findings to help develop a theoretical background for the examination of utilization and expenditure data for community based long term care services in the SHMO demonstration evaluation. Although SHMO data is not available to test all aspects of the proposed model, it is important to understand what an ideal model, as suggested by prior research

findings, would include.

Studies using the Andersen behavioral model to predict utilization and expenditures related to services for the elderly have consistently predicted 10 to 25% of the variance associated with such use. The conceptualization offered by the behavioral model applications have been helpful in understanding some of the factors which influence utilization and expenditures, but have been by no means adequate in fully explaining such utilization.

**THE ROLE OF NEED:** It is clear that among the factors considered by the behavioral models that need consistently plays the strongest predictive role explaining up to 26% of variance. There have been some distinctions made in how to define need, but for the most part, it appears that need for an elderly disabled population must include not only health status and specific medical diagnosis, but also functional status usually measured by ADL's and IADL's. Cognitive status, incontinence, the presence of dementia and the need for supervision and assistance with taking medications are also important need indicators for elders use of services. ADL's have been subdivided into basic and advanced and physical disabilities into those affecting the upper body versus lower body. Prior use of hospital and/or nursing home service may also represent need. Some studies go so far as to



use old age (over 75 years) as a need factor rather than as a traditional predisposing factor.

Some behavioral studies have also broadened both the conceptualization and measurement of need by adding factors related to caregivers of disabled elders. Issues related to caregiver stress and health status give depth to need factors and allow need to be viewed in terms of the family system (if there is one) rather than in simple individual terms. This broader view of need factors is consistent with the concept of a shift in care paradigms required by chronic health problems and disabilities to a more team focused approach over a long period of time.

A model for predicting community based long term care use will rely on these expansions of the conceptualization of need. It is clear that, of the factors we understand to date, that need, broadly defined, will be the most important predictor of community based long term care utilization.

**DEMAND AND SUPPLY FACTORS:** The behavioral model has attempted to include in its enabling category several factors which could be related to economic demand and supply issues. These include income, insurance coverage, availability of services, and local development of the delivery system. The economic models developed to examine nursing home and home care do a more complete job of discussing factors in this area and can be drawn upon to develop a more appropriate model for

community based long term care.

Behavioral model studies consistently suggest that while enabling factors have a relatively small effect on services typically covered by insurance, i.e. physician and hospital services, they have a much more important effect on uncovered services such as dental care and personal care. Community based long term care services, because of their poor existing coverage under public and private insurance programs, clearly fall into the later category. It is, therefore, more important to be able to analyze and understand the so-called enabling factors which will effect utilization and expenditure. In economic terms, these uncovered services are more likely to react like competitive market goods because the consumer is not shielded from the true cost of the service by extensive insurance coverage.

Given the potential impact of market factors on community based long term care, it is important to understand more fully issues related to demand and supply. Some of the factors considered by the economic models as affecting demand, such as age, sex, living alone, informal care availability, income and insurance coverage are considered as predisposing or enabling factors in the behavioral model. Many other demand factors including policy issues, and the role of substitutes and complements, as well as most supply factors are substantially ignored by behavioral model studies. The addition of a more complete set of demand and supply factors (as listed in

Figures 2.3 and 2.4) to a community based long term care model should allow for the prediction of additional variance above current behavioral models studies. This hypothesis is consistent with the expanded role predicted by Andersen for enabling variables in uncovered care.

**DISCRETIONARY AND NON-DISCRETIONARY CARE:** Certain types of care used by community dwelling elders can be seen as more or less discretionary. Hospital utilization, specialty medical services, physician care (beyond the initial contact), and skilled home care ordered by a physician, can all be considered to be non-discretionary types of care determined primarily by the physician versus the user or family (usually with need factored in). Of course, in any specific instance, the individual patient may affect the utilization of these non-discretionary services, but certainly less so than the decision to use personal care services, for example.

On the other hand, the majority of community based long term care services are more discretionary in nature. The user is much more likely to determine if personal care, adult day care or case management services will be utilized and how much. In addition to retaining more decision making control over these services, these are also the services, noted above, which are least likely to be covered by insurance. In these two ways the user faces much more of a market decision in determining utilization and expenditures for services. Demand

and supply factors again become critical in understanding and predicting utilization and expenditures. These demand and supply factors should explain additional variance in discretionary versus non-discretionary services, with discretionary defined as those services where the user or family retains primary purchasing control and decision making power.

**DEPENDENT VARIABLES:** Behavioral models have traditionally been used to predict specific types of utilization such as physician services, hospital services, or other discrete services. There have been some recommendations that in fact definitions of the dependent variable should be refined even further, e.g. perhaps we should divide physician visits into those for prevention, detection, treatment, or custodial care. When examining community based care for disabled elders, there is need for an opposite movement in terms of redefining the dependent variable. Because elders and caregivers must put in place a package of services in order to maintain health and independent living status, it makes little sense to subdivide services into very discrete categories. Rather a study which will understand and predict community based long term care utilization and expenditures, including out-of-pocket costs must examine the whole continuum of services required. This package should include at a minimum personal care in the home, skilled home care, adult day care, case management, primary

physician care, pharmaceuticals, nutrition services, transportation, specialized housing assistance, and durable medical equipment.

Certain of the specific services within this package may substitute for one another, such as adult day care for physician visits. Others may complement each other, such as transportation and physician care or case management and personal care. Most important to both the consumer of services and policy makers is the overall utilization and expenditure for care in the community. Need factors should continue to be the most important predictor for this broadly defined community based long term care service but demand and supply factors should allow for the explanation of additional variance beyond that explained for specific services by the behavioral model alone.

**THE COMMUNITY BASED LONG TERM CARE MARKET:** Using a combined behavioral and economic model to examine this market assumes that we can model critical demand and supply factors in this market and understand something about market equilibrium in an area which has had little attention to date. It is helpful to draw on Paringer's (1984), Miller and his colleagues' (1992) and Swan and Benjamin's (1990) analyses of the nursing home and home care markets to develop a model of the community based long term care market. This analysis focuses on the home and community care aspects of the proposed community

based long term care package. It is beyond the scope of this study to examine all of the relevant markets such as that for physician care, durable medical equipment, pharmaceuticals, etc.

Demand factors should include demographic and socioeconomic factors, policy issues, and substitutes and complements. Supply factors include cost factors, policy issues related to reimbursement and entry into the market, and availability of substitutes. Additional study is necessary to understand the workings of the community based long term care market and whether equilibrium can be said to exist. A parallel study to Scanlon's (1980) article on the theory of the nursing home market is needed in the community based long term care arena.

**TIME FACTORS:** To date the great majority of behavioral model research studies have provided cross sectional data at one moment in time or at best from several discrete time points. Examination of community based long term care utilization should provide data over a several year period. Long term care is precisely that, "long term". It takes place in a process and has been conceptualized by Strauss as a trajectory. Single point in time measures do not allow for a full understanding of the dynamics of this process, nor for the interaction and substitution of different types of services over time. Utilization and expenditure data on

community based long term care services should be available over a minimum of a two year period from the Social Health Maintenance Organization evaluation to provide for a longitudinal assessment of utilization and expenditures.

**ROLE OF OUT-OF-POCKET COSTS:** Existing behavioral model studies have not specifically examined out-of-pocket costs as a dependent variable. Consumer groups and policy makers are concerned about the size of out-of-pocket cost burdens for community based long term care and questions of equity related to these costs. To date there is little available data which would allow predictions or explanation of out-of-pocket cost burdens for disabled elders attempting to remain at home. There is significant awareness of out-of-pocket cost burdens related to nursing home use and the problem of formerly middle class elders impoverishing themselves in order to pay for catastrophic nursing home costs.

Out-of-pocket cost burdens should be predicted to a useful extent by using a model which combines both behavioral and economic supply and demand factors. Because out-of-pocket costs can be expected to make up a significant percentage of community based long term care expenditures and insurance coverage is inadequate, out-of-pocket costs will be indicated by total utilization and expenditures. The burden of out-of-pocket costs will also be inversely predicted independently by factors such as income, assets and insurance coverage for the

services in question and these factors are correlated with certain demographic factors.

Out-of-pocket costs can thus be seen as another dependent variable of the model. These costs also, however, may act as a separate independent variable in so far as out-of-pocket cost burden dampens an elders ability and willingness to pay and therefore reflects back on demand and utilization. A complete model would examine both those factors which predict high out of pocket cost burdens for community based long term care and attempt to explain how out-of-pocket costs dampen demand and thus equitable utilization of these services. Some of the same predictive factors, including old age (over 75), being a woman and living alone may produce both high levels of demand for services and also high out-of-pocket cost burdens creating a double jeopardy situation for a sector of the population. Members of this sector with limited income, assets and insurance coverage may receive significantly fewer community based long term care services than others with higher income, asset, and insurance coverage levels.

Membership in an HMO is projected to decrease out-of-pocket costs for elders receiving medical services when compared to those elders in a fee for service system. This effect may carry over to chronic care services as well; functionally impaired SHMO members may have significantly lower out-of-pocket costs for CBLTC services than comparable elders in the fee-for-service system.



**SUMMARY:** To adequately conceptualize and predict utilization, expenditures, and out-of-pocket costs related to community based long term care, a multi-dimensional model is required. This model would draw both on existing behavioral models and economic models. Need factors as broadly defined in behavioral model studies of elderly service use will predict the most variance in all three dependent variables. However, for services which are both discretionary and typically not covered by insurance a full listing of factors affecting supply and demand may predict significantly more variance than found in behavioral models. This combined model can be applied to predicting utilization and expenditures for a full package of community based long term care services as well as for discrete services. The model may be more meaningful if applied to longitudinal data over several years.

A major purpose of developing this model is to understand the workings of the community based long term care market, a market of growing importance which has not been fully studied or understood. Another major purpose is to understand the burden placed on the elderly by out-of-pocket costs related to receiving care in the community, how some sectors of elderly population are affected inequitably by these costs, and whether the SHMO model can be expected to reduce this burden.

Figure 2.2 graphically illustrates and summarizes the various behavioral and economic factors considered by the proposed model. This illustration is a further development of

graphic depictions of the nursing home market by Paringer (1984) and the chronic care market by Newcomer (1992). It is hoped that application of as many aspects as possible of this model to data generated by the SHMO demonstration will make a significant contribution to our understanding of the community based long term care market and the role of out-of-pocket costs in that market.

**ASSUMPTIONS AND THEORETICAL HYPOTHESES GENERATED FROM A  
COMBINED ECONOMIC AND BEHAVIORAL MODEL**

Assumptions: 1) A thorough analysis of the community based long term care market is not yet available, but is needed.

2) The long term process of chronic care service delivery requires the use of longitudinal data rather than cross-sectional data.

3) Out-of-pocket costs for community based long term care services can be predicted by an expanded behavioral and economic model.

Hypotheses: Based on the proposed model, several hypotheses should be tested: 1) The addition of a more complete set of demand and supply factors to an explanatory model for community based long term care services will explain additional variance in utilization as compared to a simple behavioral model.

2) Demand and supply factors will explain more variance for discretionary services than for non-discretionary services. Discretionary services are defined as those over which the user and family retain primary purchasing and decision making power.

3) A model for predicting community based long term care utilization should define the dependent variable as a broad continuum of services required to maintain the user in the community. These services should include personal care, case management, primary physician care, skilled home care, adult day care, pharmaceuticals, nutrition services, transportation, specialized housing assistance, and durable medical equipment. Supply and demand factors will define more variance for this broadly defined CBLTC service than for any one specific service.

4) Those elders most likely to require formal CBLTC services are also most likely to be poor, underinsured and bear a heavier out-of-pocket cost burden.

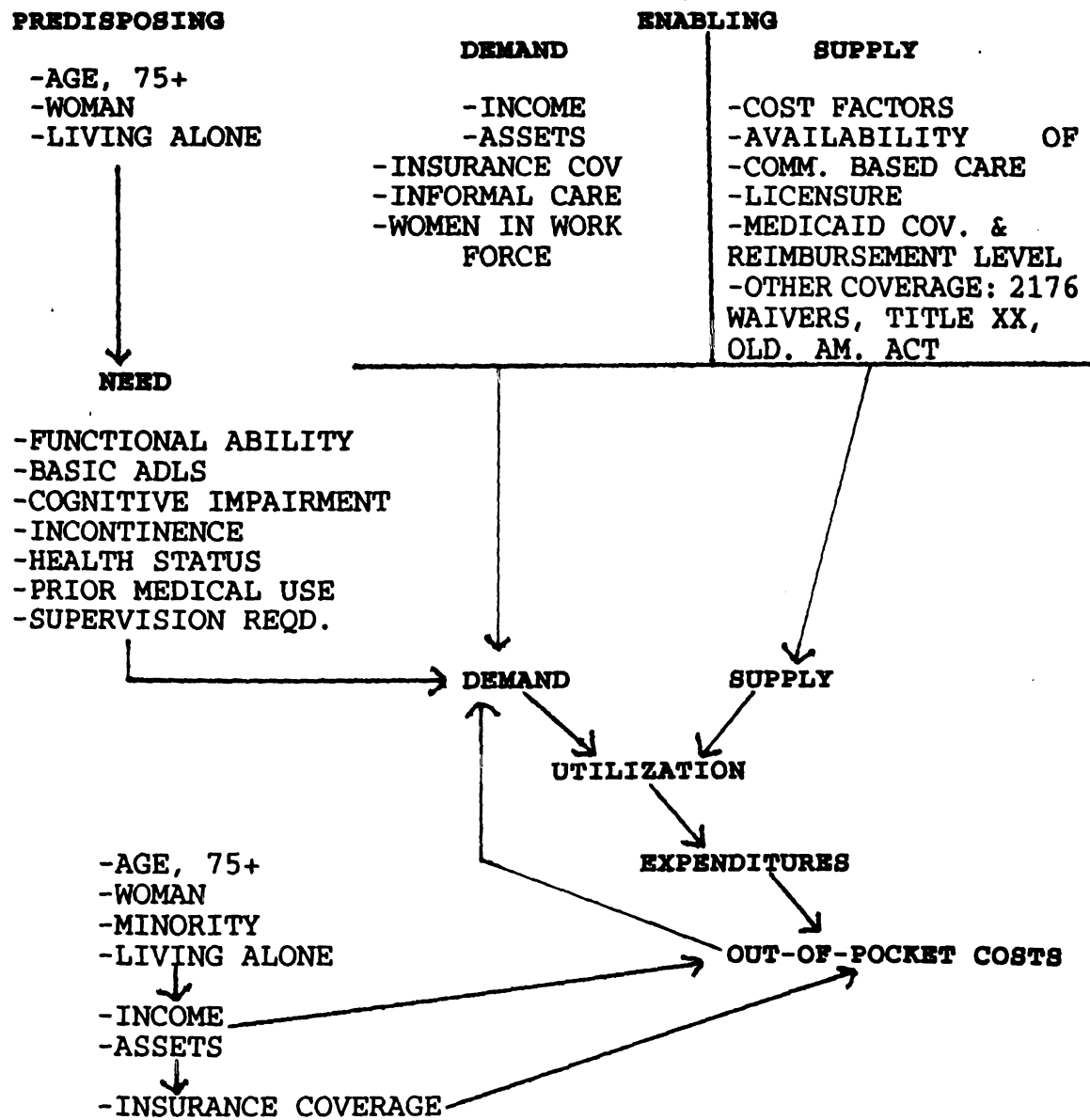
5) Elders with limited insurance, income and assets will receive significantly fewer CBLTC services than comparable high income elders.

6) Elders in the SHMO will have lower out-of-pocket cost burdens for CBLTC services than comparable elders in the fee-for-service system. This effect may be confounded in one direction by the additional access to services provided through the presence of SHMO case managers, and in the other

by specific dollar benefit limitations at the SHMO demonstration sites.

The above hypotheses are based on a theoretical model developed from a review of the literature. This study will examine a set of hypotheses based on data available on health and community-based long term care utilization and expenditures in the SHMO evaluation. These are discussed in detail in the next chapter. Because of inherent limitations (also discussed in the next chapter) in the data all of the hypotheses suggested above could not be tested but are presented as a guide to future research efforts in the community based long term care market.

**Figure 2.5. Predicting Community Based Long Term Care Utilization, Expenditures and Patient Out-of-Pocket Costs.**



## **CHAPTER THREE**

### **HYPOTHESES, MODELS, AND METHODOLOGY**

## **I. AIMS OF THE STUDY**

This study was designed to examine the use of medical and chronic care services by the moderately and severely disabled members in the Social Health Maintenance Organization (SHMO) demonstration. The principal aims of the study were as follows:

- 1) Describe the utilization and costs of medical and chronic care services used by SHMO impaired members. This study builds on existing Andersen behavioral model and an economic model, to identify factors associated with use and costs of chronic care services in an HMO setting.
- 2) Identify factors which would help policy makers and HMOs providers understand risk, adverse selection, and potential benefits associated with medical and chronic care utilization and costs in an integrated managed care setting.
- 3) Understand differences in utilization and cost for these services at the four demonstration sites, and among those who remained alive and enrolled, those who died, and those who disenrolled. Identify differences in behavior of the four sites based on their history, market area, or practice

patterns.

4) Understand whether the SHMO sites substituted chronic care services for hospital care, and if so, how.

5) Examine the role played by beneficiary costs in encouraging or discouraging use of chronic care services and in access to services.

6) Identify potential policy issues and future research issues regarding the delivery of integrated medical and chronic care in HMOs.

## **II. HYPOTHESES:**

1. In a behavioral model (see equation 2 below), independent variables representing functional ability, i.e. ADLs and IADLs are expected to predict the largest amount of variance in utilization and expenditures for chronic care services in the SHMO demonstration. Functional ability is expected to predict greater variance than predisposing factors, enabling factors, or other need variables such as health status or prior hospital and nursing home use. This hypothesis is consistent with previous Andersen model studies reviewed earlier.

2. The likelihood of use (Equation 1) of any chronic care services will increase as impairment level increases from IADL



impairments only to high levels of ADL impairments when other factors are held constant. Amount of use (Equation 2) will also increase as impairment level increases over time. This relationship will allow an HMO to predict expected utilization if a benefit plan includes certain impairment levels.

3. The Site variable will predict a significant level of variance in use of chronic care services (Equation 2) second only to need variables. This variable captures the market differences, practice pattern differences, and benefit variations among the four demonstration sites. The appearance of Site as a significant predictor will indicate that need although primary does not alone assure equitable distribution of services even when all disabled elders are enrolled in a managed care system with some community based long term care coverage.

4. Using a behavioral model, the prior hospitalization variable will predict a greater amount of variance in the amount of chronic care use (Equation 2 below) in the mature HMO sites (Portland and Minneapolis) than in the new HMOs (Brooklyn and Long Beach) when holding other factors constant. This result is expected because the traditional HMOs are expected to be more sophisticated in using alternate services to replace hospital days.

5. In the behavioral model, enabling factors such as income and site variables are expected to predict more variance in utilization and expenditures (Equation 2) for chronic care services at the site with high chronic care \$ benefit maximums (Portland) as compared to those with low \$ benefit maximums (Minneapolis, Brooklyn, Long Beach) when holding other factors constant.

**ADDITIONAL HYPOTHESES RELATED TO BEHAVIORAL MODEL FACTORS:**

This study tested a modified behavioral model's ability to predict utilization and expenditures related to health and community based long term care in the SHMO demonstration. The model included many (but not all) of the factors discussed in the theoretical model suggested in the last chapter. Table 3.6 summarizes the independent variables and the hypothesized direction of their effect on the range of dependent variables studied within the study model. Discussion of the variables and their hypothesized direction of effect is grouped into the behavioral model categories of predisposing, enabling and need variables as discussed below.

**PREDISPOSING VARIABLES:** Overall, predisposing variables were expected to predict relatively small amounts of variance as compared to need factors. Several predisposing variables can, however, be important in predicting elderly service use. **Age** was expected to be a positive predictor of most types of

services use (Wan and Arling, 1983; Wolinsky and Coe, 1984; Liu, et al., 1985; Short and Leon, 1990). **Gender:** Women were expected to have higher utilization of chronic care (Liu, et al., 1990a; Short and Leon, 1990) while men may have higher hospital utilization (Mutran and Ferraro, 1988). **Living Alone** was expected to predict higher utilization of chronic care (Soldo, 1985) although its effect on medical utilization was less clear. Being **married** (living with spouse) was expected to be associated with lower use of formal chronic care services (Kemper, 1992).

**ENABLING VARIABLES:** Like predisposing variables, enabling variables were expected to explain less variance than need variables. Enabling factors like income and insurance coverage are more important predictors for services which are typically uncovered (Andersen, 1968). Home and community care services typically fit into this category. However, because this study compared impaired enrollees in the SHMO demonstration, all studied services were covered to some extent as part of the basic package of benefits. Hypotheses related to site differences, experience levels and benefit variations at the sites were critical to understanding utilization and expenditures for chronic care in managed care settings. They are listed separately above.

Income level may still have been an important predictor of utilization in so far as copayments (10 to 20%) were required for home and community care services. **Income** was

expected to be positively associated with amount of homemaker services (Liu, et al., 1985; Short and Leon, 1990) but was not expected to be an important factor in regard to medical service use where major costs were paid for by Medicare as part of the benefit plan. The effect on medical services may even be expected to be negative in so far as higher levels of income are associated with better health status.

**Site** variables were expected to predict utilization in so far as differences in practice patterns or market characteristics could be observed. In earlier evaluation studies, the Portland site had lower home health and hospital utilization, but higher skilled nursing facility use (Harrington & Newcomer, 1991). Lower hospital utilization at in both Portland and Minneapolis could be expected given the sponsorship of these sites by mature HMOs with a positive history of controlling hospital utilization (Harrington & Newcomer, 1991). Likewise, Brooklyn and Long Beach were not experienced HMOs and had difficulty controlling overall hospital use. Minneapolis overall utilization patterns showed lower homemaker use but higher home health and adult day care use (Harrington & Newcomer, 1991;). Brooklyn operated in a relatively rich New York State home care environment with higher aggregate use of homemaker services. These site and market supply characteristics were expected to help predict individual utilization as well.

**NEED VARIABLES:** Need variables were expected to be the greatest predictors of variance associated with utilization and expenditures for services. **Perceived good or excellent health status** (Branch, et al., 1981; Wolinsky, et al., 1983) was expected to have a negative effect on all utilization. **ADLs and IADLs** were expected to be one of the strongest positive predictors (Wan and Odell, 1981; Branch, et al., 1981; Wan and Arling, 1983; Soldo, 1985; Wolinsky and Johnson, 1991) of utilization of all services except physician services; disability status may serve as a barrier to gaining access to physician services.

**Speech and hearing** problems were expected to be negative predictors of services except SNF/ICF insofar as these needs may also present barriers to full utilization. **Incontinence** (Bass and Noelker, 1987; Soldo, 1985) was expected to predict positively all studied service utilization and expenditures. **Cognitive impairment** was expected to be negatively associated with MD and homemaker use since obtaining such services may be less likely for those with cognitive problems, but positively associated with other service use and overall costs (Wan and Arling, 1983; Arling, 1985; Rivnyak, 1989). **Prior use of hospital or nursing home** services could be expected to positively predict overall utilization and costs (Coulton and Frost, 1982). Overall prior studies would predict that need variables would predict the greatest amount of variance in the model.

### III. STUDY DESIGN

This study examined the use of, and expenditures for, home, community care, and related medical services for impaired members of the SHMO demonstration over a 24 month period beginning at the time they were confirmed as impaired by completion of a comprehensive assessment form (CAF). Data were collected during the SHMO demonstration evaluation from 1985 to 1989. A behavioral model was used to test the predictive ability of a variety of predisposing, enabling and need variables on personal care use, home health use, combined homecare use, adult day care, skilled and intermediate care facility use, physician visits, and hospital use. The model was also used to predict costs related to these services. These analyses examine only SHMO participants.

Representatives of the SHMOs (Schwab & von Steinberg, 1995) have pointed out that the plans have continued to evolve beyond the point of the demonstration evaluation. This study uses data collected during the evaluation from 1985 through 1989. Given the lack of available data on chronic care delivery in managed care settings, findings from this period were expected to be valuable in understanding such delivery systems. The author understands that the SHMOs have developed further in the ensuing period, and hopes that future research will examine chronic care use for the post-evaluation period.

**A. STUDY SAMPLE:**

The sample for this analysis consists of the universe of impaired members who had enrolled at the four SHMO demonstration sites between 1985 and 1989. Analyses are limited to impaired enrollees (either severely impaired or moderately impaired, depending on the site) since these were the only SHMO participants eligible to receive chronic and long term care services funded by the plans. This group was chosen so that long term care service utilization and related costs could be studied in the population most at-risk for needing services. Impaired members were also considered to be potentially high users of medical services.

Data on a total of 2,175 functionally impaired members were available. This group was screened to eliminate those individuals who joined the impaired group too late in the demonstration to gather a minimum of 12 months of utilization data before the end of data collection in 1989. Also eliminated were any members who did not meet the criteria for severe or moderate impairment. The final study sample of 1,868 was analyzed for periods of 12 (n = 1868) and 24 months (n = 1523) from baseline. This includes members who were alive and enrolled at the end of each period as well as those who died or disenrolled during the period. The 24 month sample was further reduced to eliminate those who joined or became impaired too late in the demonstration period to accumulate 24 months of utilization data.

All of these impaired members received a baseline comprehensive assessment form (CAF) (described below) to confirm their impaired status. The baseline impaired sample numbers and their enrollment by site are listed in Table 3.1. Portland provided almost twice the number of any other site to the impaired sub-sample. This was due to the sponsor's (Kaiser) ability to transfer SHMO members from their already existing HMO and resulting achievement of targeted enrollment goals much more quickly than the other three sites.

Some level of comparison of the SHMO impaired sample to other groups is provided by examining it in relationship to other available research on community dwelling elderly with impairments. Tables 3.2 and 3.3 provide comparisons of several independent variables from the impaired population in this study with similar descriptors in the 1982 National Long Term Care Survey and from the PACE/On Lok demonstration (Branch, et al. 1995). The SHMO population is roughly comparable to the NLTCs impaired group although slightly older and with a higher level of ADL difficulties. The SHMO impaired sample is also similar to On Lok members in ADL and IADL deficiencies when measured in terms of the presence of any ADL or IADL problem. On Lok has higher overall ADL scores and a higher rate of reported cognitive problems than SHMO impaired members. This could be expected given On Lok's requirement that members must be nursing home certifiable (Zawadksi and Eng, 1988) versus the SHMO impaired sample's



inclusion of the "moderately" impaired.

**DEFINITION OF IMPAIRMENT:** Because different states have differing criteria for Medicaid nursing home certifiability (need for admission to a nursing home), the SHMO demonstration evaluation imposed a standard definition of impairment across all four sites. This definition was similar to ones used in national studies such as the 1982 National Long Term Care Survey. Disability criteria as well as other sample selection criteria are defined in Figure 3.1.

A member with one or more ADL (Katz, 1963) limitations was defined as severely impaired while a member with two or more IADL limitations, but no ADL limitations, was considered to be moderately impaired. This standardized definition avoided the problem of different impairment definitions from site to site. The criteria for impairment included both severely impaired persons who were not nursing home certifiable and moderately impaired persons, as well as those who were nursing home certifiable in a given state. The demonstration sites varied as to whether they offered chronic care benefits to severely impaired members only or to severely and moderately impaired members.

**IDENTIFICATION OF IMPAIRED SAMPLE MEMBERS:** Each new enrollee

into the SHMO demonstration was required to complete a mailed Health Status Form (HSF) with their enrollment forms. HSF's were mailed to unimpaired participants on an annual basis to identify those members whose status had changed. If the HSF indicated some level of impairment, a Comprehensive Assessment Form (CAF) was completed in-person in the participant's home by a SHMO case management staff member for those identified as severely impaired, or by evaluation staff for those identified as moderately impaired. Impaired individuals could also be identified through direct referral to case managers by other SHMO staff members or by self referral. A CAF would then be completed at the time of referral and the participant placed in the impaired category if appropriate. Other SHMO participants were assigned an unimpaired status unless there was evidence to the contrary obtained in one of the steps described above.

Health status, disability, service use and expenditure data were collected semi-annually on impaired participants from January, 1985 through October, 1989. Anyone identified as impaired after the baseline CAF were included in the study panel. Any member subsequently identified as having at least two IADL limitations or one ADL limitation after an annual reassessment or other clinical encounter would qualify as a newly impaired case after a CAF. Severely impaired (one or more ADL impairments) members received a semiannual reCAF. Moderately impaired members were given semi-annual health

screeners and a recaf only if their status changed to severely impaired. Health status among the moderately impaired was assumed to remain unchanged unless there was a reCAF which defined a new status.

**C. RESPONSE RATES AND ATTRITION:**

The response rate on the initial Health Status Form was 98.7%. Non-responders included cases lost due to disenrollment, or who were ineligible because they were found to reside outside of the target area, or they enrolled after the target period. Eighty percent of members identified as impaired in the HSF were confirmed as impaired in the in-home comprehensive assessment process. Table 3.4 (Newcomer, et al., 1992) shows the total number of cases in each site defined at some time during the overall study as functionally impaired, the number of reCAFs completed, and the refusal rates after the baseline CAF. Refusals could occur during a reCAF or other semi-annual health screener. Any refusal has been tabulated and included here. Overall, the rate of cooperation with these recontacts and reCAFs was extremely high.

**Attrition:** Of the impaired members included in the study for the 24 month period, 125 (8%) disenrolled before the end of the study period. During the 24 months after baseline, 378 members (25%) included in the study died.

#### **IV. DATA SOURCES**

Data for this study come from three sources: the Health Status Form (HSF) or interview, the Comprehensive Assessment Form (CAF), and Utilization and Expenditure (U&E) data on service use and costs reported by the SHMO sites. A list of dependent and independent variables and data sources is attached as Figure 3.2. Descriptions of specific independent and dependent variables and manipulations performed in the analysis follow discussions of the three sources below.

##### **A. HEALTH STATUS FORMS:**

Each SHMO demonstration project collected annual health status information in a self-report mail survey on all unimpaired enrollees as well as at baseline. Those participants who were identified as impaired received a Comprehensive Assessment (described below) performed either by SHMO case management staff or by evaluation project staff. Several socio-demographic variables unavailable in the CAF were taken from HSF baseline for impaired participants of the study (See Figure 3.2).

##### **B. COMPREHENSIVE ASSESSMENT FORMS:**

The CAF was the primary instrument for gathering health, functional status, and informal support on the functionally impaired groups. Initial CAF's were administered by SHMO case

managers in home interviews at two times: at enrollment for those members who met nursing home certification guidelines or other guidelines for chronic care benefits; and after a change in health status as identified in an annual reHSF, referral from SHMO provider staff, or by self referral. To assure uniformity among the SHMO sites, any SHMO member who was severely impaired (one or more ADL's or bed bound) at any time during the project received a baseline CAF from SHMO case management staff. Any SHMO member who was moderately impaired (e.g. two or more IADL's) at baseline or became so later received a CAF from the evaluation project's nurse assessors.

Reassessments (reCAF's) were completed every six months by SHMO case managers on NHC members or others receiving chronic care benefits. Moderately impaired SHMO members received semi-annual phone screening interviews to determine any change in status. If their status had changed from moderate to severe, they were given a complete reCAF by evaluation staff and then referred to SHMO case managers for on-going tracking.

In the SHMO sites, cases lost between HSF and CAF were primarily in the moderately impaired group who were included in the impaired sample only after the evaluation had begun, with a long lag period between HSF and initial CAF. All cases qualifying after the baseline CAF were included in the overall study as were members later defined to have at least two

IADL's limitations when reassessed. Those with severe impairments (one or more ADL) received a semi-annual reCAF. The moderately impaired were only given a reCAF if their status changed after a semi-annual health screen. Their status was assumed to be unchanged unless a recaf was completed. All cases identified as either severely or moderately impaired were included in this analysis

Table 3.4 (Newcomer, et al., 1992) reports the total number of cases, by site, defined as impaired, the number of recafs and refusals after baseline.

**RELIABILITY:** Instrument and inter-rater reliability of the CAF in-person assessments were tested by Brandeis University in the development process. Minimum standard for site case managers was 85% agreement. This rate was usually achieved or exceeded after a few days of training. On-going meetings and conference calls helped maintain this level of agreement.

Several steps were taken to assess and increase inter-rater reliability for SHMO staff and evaluation staff. Each rater taped one interview per week for the first two months which was then reviewed for errors in interviewing technique and form completion. Each rater also listened to and coded at least five other interviews from other raters. This double coding allowed the resolution of problems in inter-rater reliability. This process continued for the first six months of the project and for new staff brought on at a later date.

SHMO members were not re-interviewed by other raters because of logistical, cost and respondent burden difficulties.

**C. UTILIZATION AND EXPENDITURES DATA:**

Each of the four SHMO demonstration sites was required to develop information systems that could generate client level claims and encounter for each plan member. Since the sites were not required to submit Medicare claims, data were submitted directly from the SHMOs and were not subject to reliability and validity checks. These systems were required to contain, at a minimum, information on the use of ambulatory care, hospitals, all chronic care, expanded benefits, and vendor charges for any services provided outside of the SHMO itself.

Brooklyn and Long Beach developed new information systems especially for their plans. The established HMOs, Portland and Minneapolis, had existing systems in their parent organizations. They attempted to modify these existing systems to collect additional necessary claims .

The systems varied in when they became operational, the completeness of the compiled, and in the nomenclature used to define and tabulate services. Figure 3.7 lists the type of files received from each site and the time periods covered by these.

The SHMO evaluators compiled an integrated file among

all the sites making necessary adjustments to the site to allow for comparability (Newcomer, et al., 1992). The common file created uniformity in variable names, variable definitions, and variable formatting; and replacement of missing . Evaluation staff also created a common client identification system including site ID numbers and common identifiers such as the Medicare HIC number; evaluation staff also established edit systems to correct simple mistakes. Data entry problems at individual sites did not appear to be the cause of any systematic bias.

The common file also matched identifiers and claims data. Reimbursement within the SHMOs were designed so that cost records, typically kept on a per member per month basis, could provide a charged, billed or paid indicator for each patient encounter. For this project, it was important to collect specific encounter and cost information.

Evaluation staff cleaned data to assure that home health care use could be broken into skilled care, a Medicare benefit, or unskilled care typically funded as a chronic care benefit. Skilled care units were converted to visits and homemaker services to hours at all sites. Ancillary services like lab, x-ray, or durable medical equipment were coded as either inpatient or outpatient services so that costs could be assigned properly. Evaluation staff also eliminated any redundant encounters.



**MISSING DATA:** It was necessary to make certain adjustments for data that were missing. **Shadow pricing** was required for some services at some sites due to a lack of cost data. Shadow prices for all encounters were created from payment records for each site or, average costs reported by the site for that type of unit, or, if no payment were available for a type of encounter for a site, from average cost for that type of encounter across the other sites in the demonstration. If an amount paid was present in the SHMO file, it was retained. If there was no billing record for a service record, the shadow price was substituted. Portland did not attach specific dollar costs to much of its reported utilization data. Average unit costs reported by the site were substituted for missing cost data, or, for outpatient physician expenses, average physician costs from all other sites were substituted since Portland did not report an average site cost for physician visits. Some physician data from Long Beach were not reported for 1988 and cases involving this data were eliminated from regression analyses of physician use.

Initial functional and demographic data were projected to later time periods if there was not a reCAF. Some CAF data at Brooklyn were simply not provided when reCAFs were not performed on a timely basis. In this case, baseline functional status was assumed to continue until changed status was reported. For the regression analysis, cases with missing

data for the independent variables were eliminated from the analysis, except in the case of specific functional or medical conditions, where missing data were interpreted conservatively to assume that the condition or disability was not present. Several variables were dropped either from study (race) or from the regression analyses (higher education) because data were missing.

**CONSOLIDATION OF DATA:** Inconsistencies in claims categories were resolved by assuring that service unit types such as visit, day or hour, and unit cost were consistent with the type of service to which the claim had been coded. Claims data were grouped into major expenditure categories. These included inpatient, outpatient/MD, skilled nursing facility, intermediate care facility, Medicare home health, non-Medicare home care, durable medical equipment (DME), and other (including day health and transportation). These categories are summarized in Figure 3.

Utilization data were further simplified for this analysis by identifying key encounter indicators such as non-Medicare in-home support "hours", Medicare skilled nursing "visits", or adult day health "days", within each major expenditure category. Only these key indicators were used in testing the study model as it related to utilization. All reported costs in major categories were retained in examining the ability of the model to predict and model expenditures.

**D. INTEGRATION OF U & E WITH FUNCTIONAL DATA:** For testing of the behavioral model, all U & E data were first integrated with functional and health status data from the CAF. This integration organized the data into quarterly episodes linked to the most current needs data. In the final regression analyses, data were further consolidated into 12 and 24 month periods with independent variables represented by baseline needs data.

Needs information was assumed to reflect the functional status of the baseline CAF until a change was reported in subsequent reCAFs. The severely impaired were scheduled to receive a recaf every six months. For the moderately impaired, health screening occurred semi-annually. ReCAFs were completed only if the screener indicated the possibility of a changed status. The presence of a recaf by itself does not indicate the presence of a health status change. In some cases (particularly at the Brooklyn site), there were delays in completing recafs.

All data related to ADLs, IADLs, Sensory Impairment, Incontinence, and Cognitive Status were updated as necessary when a recaf was completed. Other predisposing and enabling variable data were presumed to have remained the same as at baseline.

**V. DEFINITION OF VARIABLES:**

**A. DEPENDENT VARIABLES:** All dependent variable data were taken from the Utilization and Expenditure file.

**HOSPITAL DAYS** indicates total hospital days as reported in SHMO claims data.

**MD VISITS** indicates outpatient physician visits.

**SNF/ICF DAYS** indicates total skilled nursing facility or intermediate care facility days.

**ADULT DAY CARE DAYS** indicates total adult day care days used by impaired members.

**HOME HEALTH** indicates skilled nursing visits or home therapy visits provided by SHMOs to impaired members. Data reported in hour units were adjusted to a standard visit unit to allow comparison from site to site.

**PERSONAL CARE** indicates homemaker or personal care hours. All data reported in visit or days were converted to hour units to allow comparison from site to site.

**HOME CARE** includes both home health visits and personal care hours adjusted to visits and added together.

**TOTAL COSTS** included all chronic costs plus all costs associated with hospital and outpatient physician use. Cost data include all reported expenses related to these services, not simply costs attached to the units (e.g. hospital days) analyzed in the utilization model. Total costs do not include ancillary costs such as pharmacy and dental benefits, or administrative costs. The total cost variable, therefore, can

not be considered to indicate the total costs faced by the SHMO for impaired sample members.

Definitions of dependent variables are summarized in Figure 3.4.

**B. INDEPENDENT VARIABLES:** Independent variables were grouped according to behavioral model categories of predisposing, enabling and need variables. Source of data and manipulation of specific variables is described below.

**PREDISPOSING:** **AGE** was taken from the CAF data listing date of birth and calculated as age at the date of the baseline CAF. **FEMALE** was also taken from CAF data with male coded as 0 and female as 1.

**LIVE ALONE, LIVES WITH SPOUSE, AND LIVES WITH OTHERS** were taken from CAF data and 1 indicates the enrollee's positive status in that category at baseline, 0 otherwise.

**SOME COLLEGE** was taken from HSF data and indicates that the enrollee completed some college (1) or not (0). Descriptive data was gathered on this variable but it was dropped from the regression analyses because of missing data from the Brooklyn site.

**ENABLING:** **LOW INCOME** was taken from HSF data and indicates personal income alone or with spouse at baseline. Income was

coded 1 for income below \$10,000/year and 0 for income greater than \$10,000

**SITE:** Each site was coded as a dummy variable and summarizes the range of benefit, eligibility, practice patterns and market area variations associated with that site. Minneapolis was used as the referent variable for logit and multiple regression models used in the analysis.

**NEED: POOR HEALTH STATUS** was a self reported assessment of health status on the HSF coded as excellent, good, fair and poor. Poor health status was coded 1 if the member rated their health as fair or poor, and 0 if rated good or excellent.

**TOTAL ADL AND IADL** scores were calculated by combining the presence of impairment in single measures with each impairment given a score of 1 up to a maximum of 7. For example, a total ADL score of 3 indicated impairment in three ADLs. Missing data on any single measure making up these total scores were assumed to mean that no impairment was present. Total scores were, therefore, assumed to be conservative measures of impairment.

**IADLs** indicate the sum of instrumental activities of daily living (Lawton & Brody, 1969) for which the enrollee requires assistance as assessed in the CAF (from 0 to 7). IADLs measured included the preparation of meals, shopping, performing housework, managing money, doing laundry, taking medications, and using the phone.

**ADLS** indicates the sum of activities of daily living (Katz, 1963) in which the enrollee is impaired (from 0 to 7). ADLS measured included transferring in and out of bed, bathing, dressing, eating, toileting, walking indoors, travelling.

**SENSORY IMPAIRMENT** indicates the presence of impairment in sight, hearing, speech as assessed in the CAF. Sensory impairment was coded 1 for any impairment in speech, hearing, or sight and 0 for no impairment.

**INCONTINENCE** indicates bowel and bladder accident problems as assessed in the CAF. Incontinence was coded as 0 for not incontinent, 1 for any incontinence problem.

**COGNITIVE IMPAIRMENT** (coded as 1) indicates the presence of cognitive problems as measured by 5 or more questions (of 10) answered wrong or not responded to on a mental status exam performed during the CAF.

**PRIOR HOSPITAL** indicates that the enrollee was hospitalized in the 12 months previous to baseline CAF. Prior hospital was coded as 1 for any prior hospitalization and 0 for none.

**PRIOR SNF** indicates whether an enrollee was admitted to a skilled nursing facility in the twelve months before baseline CAF. No admission was coded as 0 and any admission as 1.

**DIED** indicates whether the member died during the 12 or 24 month period of the analysis, coded as 1 for died 0 for remained alive.

**DISENROLLED** indicates whether the member disenrolled during the study period, coded as 1 for disenrolled, 2 for remained

enrolled.

**MEDICAL PROBLEMS:** There were 23 health problems reported on the CAF. Health problems included in the CAF were diabetes, high blood pressure, heart trouble, stroke, lung problems, chronic cough, cancer, circulatory problems, urinary problems, arthritis or rheumatism, amputation, skin disorders, fracture, parkinsons, alzheimers, glaucoma, cataracts, chest pain, shortness of breath, dizziness, fainting, headache, and recent falls. These were grouped into eight categories based on existing ICD9 categories of diagnoses. The resulting categories were Circulatory, Respiratory, Musculoskeletal, Nervous System/Sense Organs, Endocrine/ Diabetes, Cancer, Genito-urinary, and Skin Disorders. Figure 3.2 indicates how the original 23 health problems were assigned to the ICD9 categories. Each category was coded 1 if at least one of the included medical conditions was present.

The definitions of independent variables are summarized in Figure 3.4. Means, standard deviations, and coding algorithms for independent variables at baseline are listed in Table 3.5.

#### **VI. LIMITATIONS OF THE DATA:**

**INDEPENDENT VARIABLES:** There are a number of independent variables discussed in the literature which have been used in



other behavioral model studies and have some predictive ability. These include attitudes toward care, race, Medicaid eligibility, proximity to services, caregivers status, and others. This study used those predisposing, enabling and need variables for which data were available in the SHMO evaluation and which fit the theoretical approach of the study model. A variable indicating that the participant had completed some college was dropped from the regression analysis due to missing data from the Brooklyn site.

**CONTEXTUAL MARKET RELATED DATA:** The Site variable was used to represent, in a summary fashion, market area differences as well as practice and benefit package variations among the four sites. Limited data concerning supply of certain chronic care services in each market area were available. For example, available data on the supply of personal care/homemaker services and adult day care services were limited. State and local policies which may have affected the development of the markets in the four sites were examined in interviews by evaluation staff. This qualitative data was used to inform the analysis of the Site variable.

#### **VII. METHOD OF ANALYSIS:**

**Descriptive statistics** were examined for dependent and independent variables on a site by site basis for the total sample using SPSS. These included measures of central tendency and variability as well as frequency distributions.

Utilization variables were described in terms of mean use per member per year, per member month, and enrollment day. Number and percent of users versus non-users and amount of use for users only was also described. Chi-square and one way analysis of variance testing was performed to identify significant differences among groups, such as across the four sites or among those enrollees who were alive, dead, or disenrolled after 12 and 24 months. Tables summarizing these findings are presented in Chapter 4.

**A two stage multiple regression analysis** using SPSS was performed to examine the predictive ability of the model and the relative contribution of each independent variable on utilization and expenditure data. The two part model (described below) attempts to account for the large number of non-users for each service which skews the distribution. In the first step, logistic regression is used to model use versus non-use. In the second step, Ordinary Least Squares (OLS) regression is used to model amount of use for those with some use (Miller, 1992; Duan, et al., 1982). The regression model used data for 12 and 24 month periods following the baseline CAF for each impaired enrollee.

Multiple regression was the preferred analytical technique for the study because it has the ability to link multiple independent variables to a single dependent variable in development of explanatory equations. Quantitative or

qualitative independent variables could be linked to a quantitative dependent variable (Cohen and Cohen, 1983). Multiple regression allowed for both description and examination of the relationship between one variable and another. The relationship between independent and dependent variables could also be examined both individually and in groups. This study was interested in testing a model that allowed variables to be grouped according to a behavioral model including predisposing, enabling and need variables.

A **logistic regression analysis** was used to test the model in a first part designed to predict whether a given participant used or did not use services in the time period studied. Logistic regression was appropriate for use in this case because the dependent variable is expressed in non-interval dichotomous data (use or non-use). Equations were generated to predict seven dependent variables, i.e. to predict use or non-use of six single services and one combined service: personal care, home health, adult day care, skilled or intermediate nursing facility use, outpatient physician visits, hospital care, and any home care (home health or personal care).

In the second part **ordinary least squares (OLS) regression** was the specific regression technique used for predicting amount of utilization and expenditures. OLS multiple regression was appropriate to use since dependent

variables are interval level measurements and independent variables are interval data or, when nominal data, such as sex and marital status, could be represented through the use of dummy variable coding. Site identification variables were also transformed into dummy variables.

**Hierarchical regression** was used in the second stage of the model which allows the entering, in order, of predisposing variables, enabling variables, and need variables. Prior use of hospital enters the model as an indication of need, but is also examined as a possible indicator of service substitution for subsequent chronic care service use.

Hierarchical entry of variables was used in the testing of all hypotheses. This approach is consistent with past behavioral model studies (Strain, 1991; Arling, 1985; Coulton and Frost, 1982; Wolinsky, et al., 1983) and arguments that this sequence reflects a logical decision making process (Stoller, 1982). Use is dependent on: 1) the predisposition to use services; 2) the ability to secure services; and 3) the need for such services (Andersen, 1974).

Seven equations were developed to predict number of units of service used, assuming some service use, for each of the seven types of services tested in the first part of the analysis noted above. An additional equation was generated to predict the natural log of total costs including chronic care costs, MD costs, and hospital costs. The natural log of total costs was used to adjust for the non-normal distribution

caused by the relatively large number of high cost users in this sample of impaired SHMO members, including those who died and disenrolled. The regression coefficients related to ADL need level in these equations were examined to test Hypothesis 2.

The study also examined potential substitution of chronic care for hospital care by examining covariates in the model. Prior hospitalization, for example was expected to play a stronger role in predicting utilization, when controlling for other factors, in certain sites (Hypothesis 4), where chronic care utilization may substitute for hospital services. This can be written as:

$$Y_{util} = f(X_{hosp}) + f(X_{p,e,n})$$

where Y is the dependent variable utilization of chronic care,  $f(X_{hosp})$  is a function of use or non-use of hospital days, and  $f(X_{p,e,n})$  is a function of the other predisposing, enabling, and need (independent) variables in the model.

Results of the regression models run on the first 12 month period versus the total 24 month period were also examined to help understand any differences related to time.

The **regression equations** used in the model are listed below.

**First Part:**

$$Y_1 = a_0 + b_p X_p + b_e X_e + b_n X_n + e_1$$

Where  $Y_1$  = the likelihood of any service use in a particular period by an impaired SHMO participant, i.e. within the 12 or 24 month period,  $a_0$  = the Y intercept, b's = partial regression coefficients associated with each set of independent variables,  $X_p$  = the set of predisposing independent variables,  $X_e$  = the set of enabling independent variables,  $X_n$  = the set of need independent variables, and  $e_1$  is an error term. Specific variables included in each subset are listed in Table 3.5. The first part equation is used to test Hypotheses 2 and to predict use or non-use prior to testing other hypotheses related to amount of use.

**Second Part:**

$$Y_2 = a_0 + b_p X_p + b_e X_e + b_n X_n + e_2$$

Where  $Y_2$  = number of units of a specific service used, or the dollar amount of expenditures for a specific service, the total amount of dollar expenditures for chronic care

services, or the total amount of dollar expenditures for chronic and medical services used by an impaired SHMO participant in the studied time period,  $a_0$  = the Y intercept, b's = partial regression coefficients associated with each set of independent variables,  $X_p$  = the set of predisposing independent variables,  $X_e$  = the set of enabling independent variables,  $X_n$  = the set of need independent variables, and  $e_2$  is an error term.

This second stage equation was identical for predicting all dependent utilization and expenditure variables except use or no use and is used in testing hypotheses 1 through 5 as well as additional hypotheses related to specific behavioral model factors.

**ATTRITION:** Due to the impaired nature of the study sample, attrition was a problem in maintaining sample size. In this study, U & E data were standardized on a per enrollment day basis for those members who were lost from the sample due to death or disenrollment during the first or second 12 month period. In the analyses using the total sample, data for those who remained alive and enrolled were also standardized on a per enrollment day basis. The per member per day adjustments approach maximized the study sample and allowed for an analysis which included end of life utilization. The 12 month analysis used all enrollees with a baseline CAF

except those who entered or became impaired too late in the study to have accumulated 12 months of utilization data or those with questionable impairment status.

To further understand issues related to those who died or disenrolled, these were added to the analysis of the total sample as additional indicators of need. Although unusual in Andersen model studies, the use of death as an independent variable is consistent with studies of cost of care for other high cost populations (Fleishman, et al., 1995).

Analyses run only using those who remained alive and enrolled for 12 or 24 months were run on a per member per year basis. When appropriate the results of both types of analyses were adjusted to a per member month basis to allow ready comparison to other utilization studies reporting data in that format.

Regression models were run both including and excluding those who died and disenrolled during the first 12 months or first 24 months after baseline. Examining the results of these two different analyses as well as descriptive data on those enrollees who died and disenrolled during the study year provided information on end of life utilization and disenrollment to help describe the bias involved in their attrition from the larger sample.

**Standardization of Cost Data:** Costs were adjusted to a 1985 base year by applying a CPI (Consumer Price Index) adjuster to



cost data for later years. This adjustment was necessary because study periods differ in calendar years based on when the enrollee entered the impaired classification and had a baseline CAF completed.

**Qualitative data** available from the SHMO evaluation project were also used to inform the analysis and help explain market differences and site practice variations at the demonstration sites. Qualitative data were collected by SHMO evaluation project staff through numerous site visits and interviews with key informants at each site. These data are summarized in a number of published studies (Harrington, et al., 1993; Newcomer, et al., 1993; Newcomer, et al., 1990) and help explain differences in medical and chronic care service coordination, benefit levels, HMO experience, HMO marketplace characteristics, enrollee satisfaction, and other site related factors.

**OTHER SITE FACTORS:** Some of the important site differences included site sponsorship and ownership of or financial interest in related service agencies. The Portland and Minneapolis sites had mature HMO sponsors. Minneapolis also had an experienced long term care provider as a co-sponsor. The Brooklyn site was sponsored by a long term care service provider. Long Beach was sponsored by a senior organization which brokered long term care services and partnered with a large medical center and its physician group. The medical

center also owned a skilled nursing center used by the Long Beach site. The Brooklyn SHMO sponsor also owned a nursing home and a home care agency which delivered home health and personal care to SHMO members. Financial interest in service delivery agencies versus outside contract arrangements could influence decisions made about type and level of service to provide.

It was expected that the different levels of experience managing acute medical care, long term, and chronic care would cause differences in practice patterns. For example it was expected that Portland and Minneapolis would be better able to control hospital days given their HMO background.

The four sites were in HMO markets that were at different levels of development. Minneapolis and Long Beach were in competitive markets and had to compete for senior members with other HMOs. Minneapolis had approximately 60% senior market penetration by HMOs. Long beach had 24% of its elderly population in HMOs (Harrington & Newcomer, 1990). Portland had 16% market penetration and Brooklyn only 7%. It was expected that the more competitive markets would require lower premiums, increased benefit levels, and liberal eligibility for services. The two sites in more competitive markets, Minneapolis and Long Beach, also suffered greater disenrollment in their overall membership (Harrington, et al., 1993a) and could be expected to see a similar process within the impaired sample.

There were other important market area differences. Use of certain services differed based on geographic area. Brooklyn was expected to have a much higher community standard for hospital days than Long Beach based on geographic variations in hospital use between the east and west coast. Occupancy of nursing home beds was much higher in New York than in California or Oregon, which might affect use of nursing homes by the SHMOs in those states. New York had much higher levels of use of all kinds of home care than other areas of the country.

Policy issues also were expected to affect plan decisions. The most basic of these was the difference in Medicare capitation rates (AAPCC) received by each plan based on their geographic location. Brooklyn and Long Beach received relatively high rates and Minneapolis a low rate. Total revenue per member per month was almost 50% higher at Long Beach as compared to Minneapolis. Medicaid policy was also an important difference which influenced enrollment and revenues. Portland only had a contract for medical services with its state Medicaid agency. Medicaid eligible members who required long term care services had to disenroll. Long Beach's Medicaid contract required disenrollment from the SHMO if the member reached the chronic care benefit limit. Minneapolis's ability to enroll Medicaid members was held up by delays in local County approvals. New York state allowed certain Medicaid recipients to join the Brooklyn SHMO and

guaranteed six months of eligibility and a negotiated rate. State Medicaid policies affected enrollment and disenrollment. The plans enrolled many fewer Medicaid recipients than planned (Harrington, et al., 1990).

Eligibility for chronic care benefits differed among the sites as well. Portland offered benefits to only the severely impaired. Brooklyn and Long Beach offered chronic care to both moderately and severely impaired but changed eligibility to serve only severely impaired during the evaluation period. Minneapolis offered services based on need rather than disability level. These included both the moderately and severely impaired as well as those at risk of increasing disability. For the purposes of this study, members who did not meet the moderately or severely impaired guidelines were dropped. In general the highest percentage of Minneapolis members received chronic care services (about 13%) as compared to the other sites (2 to 12%) (Harrington & Newcomer, 1990).

Benefit levels for non-Medicare covered chronic care services also varied from site to site. Portland had a \$12,000 limit for home and community care throughout the evaluation period. The other sites had dollar maximums of \$6,250 to \$7,500 per year. Long Beach changed its home and community care benefit limit to \$625 per month in 1988 and Minneapolis increased its limit slightly to \$7,200 in the same year. The sites also had copayments for home care of \$5 per visit (Long Beach) or 10% (Brooklyn and Portland) to 20%

(Minneapolis) of charges. All sites also had annual or lifetime limits on chronic nursing home care as well as 10 to 20% copayments. It was expected that different benefit levels or copays would influence use of home and community care and nursing home care.

**VIII. SUMMARY:** This study is a subset of the overall Social Health Maintenance Organization (SHMO) evaluation and was designed to test the comparative utilization and expenditures for a broad range of health and chronic care services for impaired elders in four managed care settings. The study provides one of the first opportunities to examine home and community care use and related health care use in a managed care setting. This is a timely and important subject given the emphasis in current U.S. health reform discussions on managed care delivery systems as well as concerns regarding the provision of home and community care services to the severely disabled in managed care systems which integrate acute and long term care.

The study builds on the Anderson behavioral model for predicting health care utilization and expenditures and also takes into account other economic model considerations (See Figure 3.8). The study sample included all severely and moderately impaired enrollees in the SHMO demonstration sites. Regression analysis was applied to examine the predictive

ability of key independent predisposing, enabling, and need variables on a range of dependent chronic care and medical care utilization variables. Research questions concerning differences in benefit levels, eligibility requirements for chronic care, market area, site practice patterns, and maturity of the site sponsors were also explored. Chapter 4 presents data findings from this analyses.

**FIGURE 3.1. IMPAIRMENT CLASSIFICATION CRITERIA.**

**Severe Functional Impairment:**

- Must stay in bed all or most of the time; and/or
- Unable to perform one or more activities of daily living (ADL) without assistance (e.g., eating, getting in or out of chairs, toileting, dressing or bathing)

**Moderate Functional Impairment**

Individuals not classified in the severe group, but having one or more of these conditions:

- Unable to perform three or more instrumental activities of daily living (IADLs) without assistance (e.g. prepare meals, do laundry, light housework, shop for groceries, manage money, take medicine, make telephone calls);
- Unable to perform two or more IADLs without assistance and having limitations in mobility (e.g. must stay in the house all or most of the time, or needs the help of another person in getting around inside or outside the house);
- Unable to do at least two of the following: light housework, shop for groceries, prepare meals, or unable to take medications or make telephone calls without assistance; or unable to get around inside the house without assistance;
- Problems with severe memory loss, if so reported by a proxy respondent;
- Using a wheelchair or walker;
- All cases considered by the SHMO as impaired on a basis other than the health status form. Health status assessments occur at time of enrollment. This status may change over time and is not reflected in the health plan's HSF set. Consequently, any other available within the SHMO to reflect the health status of its members at a given time are also considered to be an appropriate basis for health status classification.

**Unimpaired**

- All those not identified as severely or moderately impaired.
- Source: Newcomer, et al., 1992.

**FIGURE 3.2. STUDY VARIABLES AND SOURCE OF DATA.**

INDEPENDENT VARIABLES:	DATA SOURCE:
<u>PREDISPOSING</u>	
AGE	CAF
FEMALE	CAF
LIVES ALONE	HSF/CAF
LIVES W. SPOUSE	HSF/CAF
LIVES W. OTHERS	HSF/CAF
<u>ENABLING/SUPPLY</u>	
INCOME	CAF
SITE OF ENROLLMENT	U & E
<u>NEED</u>	
ADL'S	CAF
IADL'S	CAF
SENSORY IMPAIRMENT	CAF
COGNITIVE PROBLEMS	CAF
INCONTINENCE	CAF
POOR HEALTH STATUS	CAF
PRIOR HOSPITAL USE	HSF/U & E
PRIOR SNF USE	HSF/U & E
MEDICAL PROBLEMS	CAF
DEPENDENT VARIABLES:	
<u>UTILIZATION AND COST VARIABLES</u>	
HOSPITAL DAYS	U & E
PHYSICIAN VISITS	U & E
SNF/ICF DAYS	U & E
SKILLED HOME HEALTH VISITS	U & E
HOMEMAKER/ PERSONAL CARE HOURS	U & E
ADULT DAY CARE DAYS	U & E
TOTAL COSTS	U & E



**FIGURE 3.3. SKILLED AND CHRONIC CARE SERVICES MONITORED FOR USE AND EXPENDITURES.**

<b>INPATIENT</b>	<b>MD/OUTPATIENT CARE</b>	<b>MEDICARE HOME CARE</b>
Hospital Days Procedures	Physician Visits	Skilled Nursing Physical Therapy Occupational Therapy Speech Therapy Respiratory Therapy Home Health Aide
<b>OTHER HOME CARE</b>		<b>MEDICARE NURSING HOME</b>
Homemaker		Skilled Nursing Facility
<b>OTHER NURSING HOME</b>		<b>OTHER SERVICES</b>
Intermediate Care Facility		Adult Day Care Home Delivered Meals N o n - A m b u l a n c e Transportation Durable Medical Equipment

**FIGURE 3.4. Definition of Dependent Variables.**

VARIABLE	DEFINITION
<b>UTILIZATION</b>	
PERSONAL CARE	Number of hours of homemaker services used by enrollee in a given period.
HOMEHEALTH	Number of skilled nursing or home therapy visits used by enrollee in period.
ADC	Number of adult day care days used by enrollee in period.
SNF/ICF	Number of skilled or intermediate care facility days used by enrollee in period.
MD	Number of outpatient physician visits used by enrollee in period.
HOSPITAL	Number of days enrollee was hospitalized in period.
HEALTHCARE	Combined home health and personal care visits.
<b>EXPENDITURES</b>	
TOT COST	Total of all costs included in study for an enrollee in 12 month period. Includes costs related to hospital, outpatient/MD, skilled and intermediate care facilities, home health care, homemaker/ chore worker services, adult day care, durable medical equipment, medical and non-medical transportation. Also includes costs reported for these services apart from visit, hourly, or daily rates. Does not include vision or dental care, outpatient lab and pharmacy.

**FIGURE 3.5 Listing of ICD 9 Classifications Used and Medical Problems Included in Each Classification.**

**ICD 9 CLASSIFICATIONS:**

**CIRCULATORY**

- High Blood Pressure
- Heart Trouble
- Stroke
- Circulatory Probs.
- Chest Pain

**RESPIRATORY**

- Lung Problems
- Chronic Cough
- Shortness of Breath

**NERVOUS SYSTEM/SENSE ORGAN**

- Parkinsons
- Alzheimer
- Glaucoma
- Cataract
- Dizzy
- Fainting
- Headache
- Recent Falls

**MUSCULOSKELETAL**

- Arthritis/Rheumatism
- Amputation
- Fracture Injury

**NEOPLASM**

- Cancer

**ENDOCRINE**

- Diabetes

**GENITO-URINARY**

- Urinary Problems

**SKIN**

- Skin Disorders

**FIGURE 3.6. Definition of Independent Variables.**

<b>VARIABLE</b>	<b>DEFINITION</b>
<b>PREDISPOSING</b>	
AGE	Age in years at baseline assessment.
FEMALE	Gender of enrollee. 0 = male. 1 = female.
LIVE ALONE	Enrollee lived alone at baseline. Yes or no.
LIVE SPOUSE	Enrollee living with spouse at baseline. Yes or no.
LIVE OTHERS	Enrollee living with others at baseline. Referent.
<b>ENABLING</b>	
LOW INCOME	Household income per year of enrollee (and spouse if applicable) at baseline. Less than or equal to \$10,000/yr = yes, more than \$10,000+/yr = no.
PORTLAND	Enrollee was a member of Kaiser, Portland demonstration site. Yes or no.
LONG BEACH	Enrollee was a member of SCAN Health Plan in Long Beach, California. Yes or no.
MINNEAPOLIS	Enrollee was a member of Group Health in Minneapolis. Referent variable.
BROOKLYN	Enrollee was a member of Elderplan in Brooklyn. Yes or no.
<b>NEED</b>	
POOR HLTH STAT	Health Status as reported by enrollee at baseline.
IADL	Total number of Instrumental Activities of Daily Living in which enrollee was impaired at baseline, and as reassessed throughout study.
ADL	Total number of Activities of Daily Living in which Enrollee was impaired at baseline, and as reassessed throughout study.
SENS IMPAIR	Presence of speech, hearing or vision impairment, at baseline and reassessed.
INCONTINENCE	Presence of bowel or bladder incontinence measured at baseline and reassessed.
COG IMPAIR	Enrollee cognitive impairment as measured by more than 3 items wrong or unanswered on a mental status questionnaire at baseline and reassessed throughout the study.
USED HOSP.	Enrollee was hospitalized in 12 months prior to baseline. Yes or No.
USED SNF	Enrollee was in skilled nursing facility in 12 months prior to baseline. Yes or No.
MEDICAL PROBS.	Eight ICD9 disease categories including 23 health problems measured in baseline CAF.
DIED	Died during study period. Yes or No.
DISENROLLED	Disenrolled during study period. Yes/No.

**FIGURE 3.7. SHMO Data Files and Dates of Coverage.**

**BROOKLYN**

Files:	Claims	1985-	August, 1989
	Encounters	1985-	August, 1989

**PORTLAND**

Files:	Claims	1985-	September, 1986
		1987-	September, 1989
	Claims Procedures	1987-	September, 1989
	Outpatient	1987-	September, 1989
	Home Health	1985-	September, 1989
	Medicare SNF	1985-	December, 1988
		1989-	September, 1989
	Chronic Care	1985-	September, 1989
	Hospital	1985-	September, 1989
			Strike Data, 1988
	Emergency Room	1985-	September, 1986
	and After Hours Care	1987-	September, 1989

**MINNEAPOLIS**

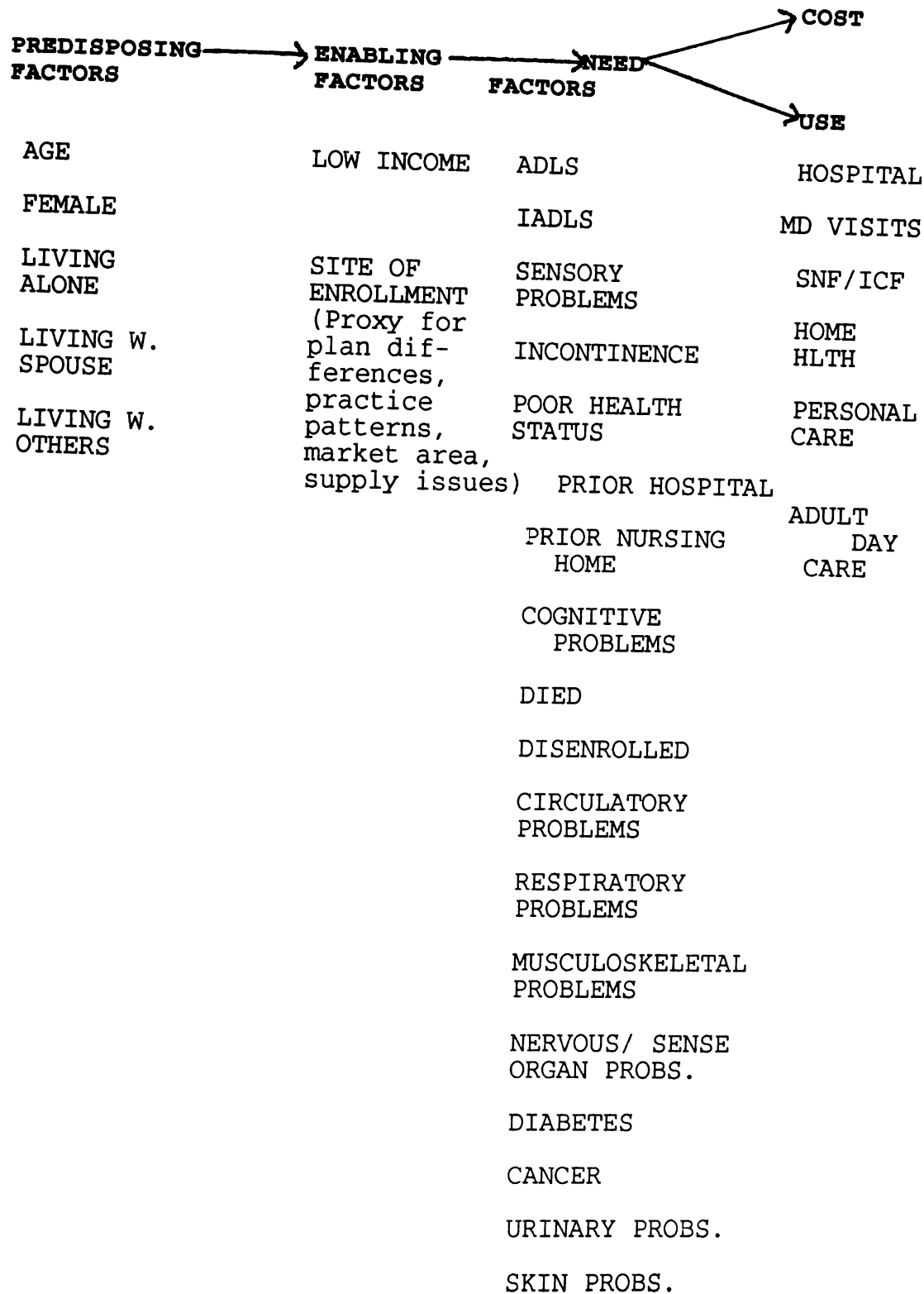
Files:	Claims	1985-	September, 1989
	Chronic Care	1985-	September, 1989
	Encounters	1985-	September, 1989
	Dental	1985-	September, 1989
	Optical	1985-	September, 1989

**LONG BEACH**

Files:	Hospital	1985-	September, 1987
		1988-	September, 1989
	Referrals		
	Header	1985-	September, 1987
	Detail	1985-	September, 1987
	Clinic Encounters		
	Header	1985-	September, 1987
	Detail	1985-	September, 1987
	Outside Services	1985-	September, 1987
		1988-	September, 1989
	Case Management	1985-	September, 1987
		1988-	September, 1989

Source: Newcomer, et al., 1992.

Figure 3.8. Predictive model for medical, home and community care use and total expenditures for SHMO Impaired sample.



**Table 3.1. Total SHMO Members and Impaired Members, by Site.**

SITE	TOTAL ENROLLMENT*	IMPAIRED**
BROOKLYN ELDERPLAN	5,082	356
LONG BEACH SCAN	2,824	442
MINNEAPOLIS SENIORS PLUS	3,256	478
PORTLAND MEDICARE PLUS II	5,412	899
TOTAL	16,574	2175

\*Total enrollment figures based on 1989 figures.

\*\*Impaired figures based on all members designated as impaired after receiving CAF, from 1985 to 1989.

**Table 3.2. Comparison of Selected Data from the Impaired SHMO sample and the National Long Term Care Survey 1982 Sample.**

VARIABLE	SHMO IMPAIRED	NLTCS 1982
N	1868	5714
FEMALE	66%	63.8%
AGE	79.9	77.0
SOME COLLEGE	25%	12%
INCOME UNDER \$10K	52%	50%
POOR HEALTH STATUS	57%	57%
# OF ADLS REQUIRING ASSISTANCE (OF 7)	2.64	1.87

\*N = 1558 for Some College for SHMO Impaired Sample. Data was missing from one of the four SHMO sites.



**TABLE 3.3. Comparison of Several Independent Variables in the SHMO Impaired Sample and On Lok Population.**

VARIABLE	SHMO IMPAIRED	ON LOK* 1992	PACE 92** RANGE	ON LOK*** 1987
N=	1868	357	888	324
% AT LEAST ONE ADL NEED	85.5%	84%	79-92%	
% AT LEAST ONE IADL	95.9	98%	98-100%	
MENTAL DISORDER	14.5	57%	52-74%	
<b>M E D I C A L PROBS.</b>				
CARDIOVASC	69.8			74
NERVOUS SYS.	75.1			62
MUSCULOSKEL	66.1			45
MENTAL	14.4			39
NEOPLASM	17.0			27
SKIN	26.6			23
ENDOCRINE	14.0			22
RESPIRATORY	47.3			17
G E N I T -	29.7			14
URINARY	34.3			94
VISION	25.6			57
HEARING	5.2			29
SPEECH	33.2			77
BLADDER	21.3			48
BOWEL				
ADLS	57.8			75
BATHING	39.1			53
DRESSING	23.9			47
TOILETING	22.3			58
TRANSFER	77.5			55
WALKING	26.3			18
EATING				

\*Branch, et al., 1995

\*\* Range from PACE Replication Sites in Branch, et al., 1995

\*\*\*Zawadski, R. and Eng, C., 1988

**TABLE 3.4. Response Rates and Impaired Sample Attrition from Baseline to End of Study.\***

	BROOK LYN	LONG BEACH	MINNE APOLI S	PORT LAND	TOTAL
BASELINE CAF	205	290		485	1242
LATER CAF	196	199	262	502	1144
TOTAL CAF	401	489	247	987	2386
ALL RECAFS	245	812	509	1727	4009
MEAN # RECAFS	.61	1.66	1225	1.75	1.68
% DECEASED	42	45	2.41	49	45
% REFUSALS**	9	6	38	4	5
% OTHER***	4	1	5	1	2
			2		

\*All cases qualifying as impaired after the baseline CAF were included in the demonstration evaluation's longitudinal study panels as impaired. Anyone subsequently defined as having at least two IADL limitations after study baseline has been counted here as a later CAF. Persons defined as severely impaired (i.e. with one or more ADL impairments) were reCAF'd semi-annually, all others were given semi-annual health screeners only, unless there was a change to severely impaired status. Then a reCAF would also occur. All percentages have been rounded to the nearest whole number.

\*\*This table shows the response rates after baseline for those qualified as impaired after their initial CAF. Refusals as tabulated here include refusals to either a reCAF or other semi-annual health screener. Plan case managers were responsible for reassessments with the severely impaired cases. The evaluation's assessors were responsible for reassessments with the moderately impaired.

\*\*\*This category includes persons lost to follow up, moved from area, language problems, or unable to locate a proxy respondent. Table does not show those who disenrolled.

Source: Newcomer, et al., 1992.

**TABLE 3.5. Means, Standard Deviations, and Coding Algorithms of Independent Variables at Baseline. N = 1868.**

VARIABLE	M	SD	CODING ALGORITHM
<b>PREDISPOSING</b>			
AGE	79.93	7.38	
FEMALE	.66	.47	Female=1, Male=0.
LIVE ALONE	.35	.48	No=0, Yes=1.
LIVE W. SPOUSE	.32	.47	No=0, Yes=1.
LIVE W. OTHERS	.34	.47	No=0, Yes=1.
SOME COLLEGE	.25	.43	No=0, Yes=1.
<b>ENABLING</b>			
INCOME UNDER \$10K	.52	.50	No=0, Yes=1.
PORTLAND	.41	.49	Enrolled at Portland site=1.
LONG BEACH	.21	.41	Enrolled at Long Beach=1.
MINNEAPOLIS	.22	.41	Enrolled at Minneapolis=1.
BROOKLYN	.17	.37	Enrolled at Brooklyn=1.
<b>NEED</b>			
POOR HLTH STATUS	.57	.49	Good, excellent = 0, poor, fair = 1.
IADL	4.52	1.92	No IADL impairment=0, Maximum=7, Sum of IADLs.
ADL	2.64	2.12	No ADL impairment=0, Maximum=7, Sum of ADLs.
SENS IMPAIR	.52	.50	No impairment=0, Impaired in sight, hearing, or speech =1.
INCONTINENCE	.39	.49	Incontinence problems = 1.
COGNITIVE PROB	.14	.35	1 = more than 3 wrong answers on mental status questionnaire.
PRIOR HOSP	.46	.50	Hospitalized in 12 mos. prior to baseline, 0=no, 1=yes.
USED SNF	.16	.36	In SNF in last 12 mos. 1=Yes.
DIED			Died during first 12 mos. 1=Yes.
DISENROLLED			Disenrolled during first 12 mos. of study. 1=Yes.
CIRCULATORY PROBS	.70	.46	1 = at least one of high blood pressure, heart trouble, stroke, circulatory probs., chest pain.
RESPIRATORY PROBS	.47	.50	1 = at least one of lung prob., chronic cough, short of breath.
MUSCULOSK PROB	.66	.47	1 = at least one of arthritis rheumatism, amputation, fracture injury.
NERVOUS/SENSE	.75	.43	1 = at least one of parkinsons, alzheimers, dizzy, headache, recent falls, glaucoma, cataract.
DIABETES	.14	.35	1 = Diabetes
CANCER	.17	.38	1 = Cancer
GENITO-URINARY	.30	.46	1 = Urinary Problems
SKIN	.27	.44	1 = Skin Problems

**TABLE 3.6. Behavioral Model Hypotheses.**

<b>DEPENDENT INDEPENDENT</b>	<b>PERSO NAL CARE</b>	<b>HOME HLTH</b>	<b>ADC</b>	<b>SNF/I CF</b>	<b>MD</b>	<b>HOSP</b>	<b>TOT COST</b>
<b>PREDISPOSING</b>							
AGE	+	+	+	+	0	+	+
FEMALE	-	-	-	+	+	+	+
LIVE ALONE	+	+	+	+	-	0	+
LIVE SPOUSE	-	-	-	-	+	-	-
LIVE OTHERS	+	+	-	+	-	+	+
<b>ENABLING</b>							
LOW INCOME	+	+	+	-	-	-	-
PORTLAND	0	-	0	+	0	-	-
LONG BEACH	0	-	0	+	+	+	+
MINNEAPOLIS	-	+	+	0	0	-	-
BROOKLYN	+	-	-	-	+	+	+
<b>NEED</b>							
POOR HLTH STAT	-	-	-	-	-	-	-
IADL	+	+	+	+	-	+	+
ADL	+	+	+	+	-	+	+
SPEECH/HRNG	-	-	-	+	-	-	-
INCONTINENT	+	+	+	+	+	+	+
COG. IMPAIR	-	+	+	+	-	+	+
USED HOSP.	+	+	+	+	+	+	+
USED SNF	+	+	+	+	+	+	+
CIRCULATORY	-	+	-	+	+	+	+
RESPIRATORY	-	+	-	+	+	+	+
MUSCULOSKEL	+	-	+	+	-	-	+
NERVE/SENSE	+	-	+	+	-	+	-
DIABETES	+	+	-	+	+	+	+
CANCER	-	+	-	+	+	+	+
URINARY	+	+	-	+	-	-	+
SKIN	+	+	-	+	+	+	+

## **CHAPTER 4**

### **DATA FINDINGS THE SHMO IMPAIRED POPULATION, 1985-89**

## **I. DESCRIPTIVE DATA**

This section provides descriptive data on the SHMO impaired population including independent variables categorized as predisposing, enabling and need variables, as well as dependent variables describing utilization and costs for 12 months after the baseline Comprehensive Assessment (CAF) was performed. Additional descriptive data on the 24 month period following baseline is included in the Appendix. Data were collected during the period of 1985 through 1989 as part of the overall SHMO evaluation funded by the Health Care Financing Administration (HCFA).

### **I. A. INDEPENDENT VARIABLES**

Tables 4.1 and 4.2 list the mean values for all independent variables for those alive after 12 months (n = 1526) and for the total sample (n = 1868). Table 4.1 breaks down those alive after 12 months by site. Table 4.2 breaks down the total sample by those alive after 12 months, those who died during that period and those who disenrolled.

### **DIFFERENCES AMONG SITES**

There were significant differences (at the  $p < .05$  level) among the four sites for all independent variables except gender, living with spouse, and the presence of diabetes and cancer (Table 4.1). Site differences could be expected given the different geographic areas, markets, histories, premium

levels, and marketing practices of the four plans.

**Predisposing Variables:** The Minneapolis impaired sample was almost 2 years younger than the next youngest site (Brooklyn). Minneapolis also had a higher proportion of members with some college, the highest percentage living with spouse (35.5%), and a lower percentage of low income members. The lower percentage of low income members is consistent with the very low enrollment (22 members during the first 22 months) of Medicaid recipients (Harrington, et al., 1987). The more affluent membership may also reflect the presence of a more competitive market with higher income seniors being able to afford the higher premiums charged by the SHMO plan.

Long Beach had the oldest group and the highest percentages of women and those living alone. Brooklyn had the highest percentage living with others.

**Enabling Variables:** The overall impaired sample had a high number (52%) of low income (income under \$10,000/yr) members. A higher percentage of the impaired sample were women, old (almost 80 years old on average), and unmarried (67.9%), all factors associated with lower incomes. Long Beach had the highest number of members with income below \$10,000 per year (60.2%). This is consistent with relatively high Medicaid enrollment (11%) and old age of Long Beach members. It also is consistent with the higher percentage of women and members living alone at Long Beach. Long Beach had to compete in a highly developed HMO market where younger healthier members

could choose a lower cost plan.

The impaired sample was heavily weighted toward Portland with 40% of the total members enrolled at that site. This reflected the fact that Portland also reached its overall enrollment goals much more quickly than the other sites and was able to transfer existing enrollees from their other Medicare HMO products.

**Need Variables:** The Minneapolis site showed the lowest scores on many of the need variables. Minneapolis had the lowest average ADL and IADL scores. It also had the smallest percentage of members with sensory problems, incontinence, poor health status, circulatory problems, respiratory problems, musculoskeletal problems, diabetes, urinary problems, and skin disorders. These differences do not reflect eligibility standards, but rather differences in health status measures for Minneapolis members. All of the impaired sample had to meet minimum standards for inclusion. It appears that despite complaints about adverse selection and eventual closing of the SHMO plan, Minneapolis had relatively favorable enrollment among its impaired members, when compared to the other sites.

Brooklyn members had the highest average number of ADL and IADL problems, as well as a greater percentages with poor health status and cognitive problems. This probably reflects the attractiveness of the chronic care benefit as a reason to switch from fee-for-service Medicare. Brooklyn also



experienced community groups encouraging more disabled elders to enroll in the plan.

Portland had the highest proportion of members with sensory problems, incontinence, prior hospital and nursing home use, and a number of medical problems (circulatory, musculoskeletal, nervous system, urinary, and skin). Although Portland members were not necessarily the most functionally disabled, they did appear to be the sickest.

In general it appeared that Minneapolis enrolled a younger, somewhat healthier, and more affluent and educated impaired population. Brooklyn's impaired population had heavy functional impairment and poor perceived health status. Long Beach's impaired sample was older, had more women and less income. The Portland sample had a high percentage of medical problems as well as more members with recent hospital and nursing home use. Enrollment was shaped by the market situation of each plan as well as the way each plan chose to position itself through its marketing and premium structure.

#### **DIFFERENCES AMONG THOSE ALIVE, DIED AND DISENROLLED AFTER 12 MONTHS**

**Predisposing Variables:** There were significant differences across groups (Table 4.2) for two of the predisposing variables, Female (.01) and Live Alone (.05). As expected,

men were more likely to die and women were more likely to disenroll. A smaller percentage than the mean number who lived alone died during the first 12 months. This may reflect the fact that more men died and men were more likely to be living with a spouse (married) than women.

**Enabling Variables:** There were significant differences across groups for Long Beach and Portland members. Long Beach members appeared more likely to disenroll and Portland members were more likely to die. These sites also reported the highest percentage of deaths and disenrollment for the overall SHMO population (Manton, et al., 1993). The high number of deaths at Portland is consistent with high degree of medical complexity of its impaired population noted above.

In the overall evaluation of SHMO disenrollment (Harrington, et al. 1993) Long Beach and Brooklyn members were more likely to disenroll and express dissatisfaction with physician relationships. This may reflect that these two sites were new HMOs with no prior medical delivery experience. Long Beach faced the added problem of being in a very competitive market where a member might disenroll because of the high cost of the SHMO versus competing HMO plans.

Long Beach also held a Medicaid contract which automatically disenrolled Medicaid covered members (of which Long Beach had the highest percentage) once they reached their chronic care benefit limit. All sites but Portland also had annual benefit limits of \$6,250 to 7,500. Long Beach created

a monthly benefit limit in 1988. Members who reached their benefit limit would have to pay remaining costs out-of-pocket and may have been encouraged to disenroll.

Portland's Medicaid contract only covered medical care and not long term care services. Those who wished to receive Medicaid coverage of long term care services had to disenroll from the SHMO. Given the number of low income members (52% of the impaired sample), many using chronic care services, may have been able to spend down to Medicaid coverage to avoid paying premiums to the SHMOs. Long Beach also did not have a Medicaid contract beyond the SHMO benefit limit. Unfortunately Medicaid contracts with the sites did not typically allow for a smooth relationship between the SHMO and Medicaid program for those with long term care needs.

**Need Variables:** There were significant differences across groups for 10 of the 16 need variables. As expected those who died scored higher on almost all need variables. The exceptions were Poor Health Status, musculoskeletal problems, and diabetes.

Those who disenrolled had a lower level of ADL and IADL problems than those who remained enrolled and alive. They also had a higher percentage with poor health status, recent hospital use and diabetes. Previous studies have suggested that impaired members faced fewer alternatives for disenrollment (Harrington, et al. 1993). Those with fewer ADL and IADL scores were least likely to need chronic care

services. Those with poor health-status and hospitalization experience may have experienced access and physician satisfaction problems present in the younger plans (Brooklyn and Long Beach).

#### **I. B. DEPENDENT VARIABLES**

Tables 4.3 through 4.6 list dependent variables by total, site, and alive, died, and disenrolled for the first 12 months after baseline. Additional Tables listing dependent variables for the 24 month period and for those alive and enrolled after 12 and 24 months are located in the Appendix.

Service units and costs were measured in units per user per year for those who remained alive and enrolled. In order to adjust for varying enrollment lengths, units were figured per day of exposure or enrollment in the plan to examine the sample including those who died and disenrolled. When comparing with outside standards, these figures are converted to days/1000 members (for hospital) per year in the narrative. Units were also listed in per member per month (PMPM) figures to facilitate comparison.

**HOSPITAL DAYS:** Total hospital days per 1,000 members per year for the impaired study sample were 4,100 over the first 12 months (Table 4.3) and 3,480 over the first 24 months from baseline (Appendix). 36% of impaired members had hospital use

in the first 12 months and 53% had some use over the first 24 months. Those with hospital use averaged 11.45 days per user over 12 months and 13.14 days over 24 months.

There were significant differences ( $p < .01$ ) across sites for hospital days per 1000 for all time periods. Brooklyn had 6,310 days/1000 for those alive at the end of the first year vs. 3,280 days/1000 for Long Beach. Portland and Minneapolis reported 3,570 and 4,180 days/1000 respectively for this period. As expected, the hospital days for the impaired study sample were substantially higher than the reported figures for the total SHMO population which ranged from 1,785 to 2,225 days/1000 in 1987 (Harrington & Newcomer, 1991).

Brooklyn and Minneapolis had the highest hospital rates for the larger health plans as well. This suggests that a substantial part of the difference in hospital days was due to the geographic location of each health plan, particularly for Brooklyn. Brooklyn's average overall Medicare hospital days/1000 in 1984 were 3,667 as compared to 3,185/1000, 2,685/1000, and 2,581/1000 at Portland, Long Beach, and Minneapolis respectively. Minneapolis's position relative to the other plans improved in 1988 and 1989. The Minneapolis SHMO's relatively high days/1000 for the impaired sample given the relatively low days in the area, suggests that the SHMO had more difficulty managing hospital care for the impaired than expected, despite its mature HMO status. The relatively high days/1000 for the overall Medicare population in the

Portland area underscores Portland Kaiser's skill in controlling hospital utilization. Brooklyn and Portland were also the two geographic areas with the least HMO penetration, suggesting an additional reason for high area hospital days beyond geographic area practice pattern differences.

The percentage of impaired members with some use (Table 4.4) did not vary significantly across sites although Portland reported the highest proportion of members with some use, 35% for those alive after 12 months. There were significant differences, however, in the days of use per user with Portland reporting 9.25 days in the first year versus 17.47 days for Brooklyn. Portland consistently reported lower number of days per user across both time periods and including alive, died, and disenrolled members. This finding was consistent with Portland Kaiser's experience as a mature HMO and the expectation that it would control hospital utilization better than the inexperienced sites. Given the relatively low number of days per user at Long Beach (10.55) and Minneapolis (11.97), geographic differences also played an important role here with Brooklyn representing a much higher use area and an inexperienced HMO site. Long Beach had to compete with many other HMOs, but also contracted with physicians who were familiar with area managed care standards. Brooklyn was in a high use, non-competitive area, and attempted (at first) to set up its own physician practice with no prior managed care experience.

There were also significant differences ( $p < .01$ ) in hospital days among those who were alive, died, and disenrolled in the first 12 months (Table 4.5). When adjusted for days of exposure, those who died used 1.964 days per member per month versus .3010 PMPM for those who lived and .8664 for those who disenrolled. During the first 12 months, 59% of those who died had hospital use compared to 29% of those who disenrolled and 32% of those who lived (Table 4.6). Mean use per exposure day for users was .1064 days for those who died in the first 12 months versus .0310 days for those who lived. Additional use for those who died was a factor of both a higher percentage of users and more days per user. For those who disenrolled, the percentage of users was similar to those who lived, but the days per users were much greater accounting for the relatively high mean use for the total disenrolled group. This pattern is consistent for several services (see below) and suggests a dichotomy between high users and low users who disenrolled. High users included those who reached their benefit maximum. Low users probably included those who were dissatisfied with premiums or with physician access. The overall effect of disenrollees representing relatively high use meant that the SHMOs experienced favorable disenrollment within their impaired members.

**PHYSICIAN VISITS:** Because of missing data from the Long Beach

site for 1988, those who enrolled in that year were eliminated from the 12 month analysis of physician visits. Those who enrolled at Long Beach in 1987 were also eliminated from the 24 month analysis due to missing data for the second half of this period.

The mean number of physician visits was 6.72 for 12 months for the total study sample (Table 4.3). There were no significant differences among the sites in terms of visits per member. There were significant differences ( $p < .05$ ) among the sites for the 24 month period with Brooklyn reporting the highest number of visits at .8846 PMPM and Long Beach the lowest at .5502 (Appendix).

There were significant differences ( $p < .01$ ) among the sites in percentage of users with physician visits with Long Beach reporting 85% and Minneapolis only 58% (Table 4.4). Minneapolis reported a mean of 12.15 visits per user in the first year while Long Beach reported 7.46. The lower percentage of impaired members with physician use in Minneapolis may reflect the relatively younger and healthier status discussed above.

There were significant differences among the alive, died, and disenrolled groups for the 12 month period (Table 4.4). When adjusted for number of exposure days, utilization was 1.00 PMPM for those who died, .6300 PMPM for those who disenrolled, and .6050 PMPM for the 12 month period. There were also significant differences ( $p < .01$ ) in the percentage



of those who had any physician visits. During the first 12 months, 73% of those who lived had visits, versus 61% for those who died and 58% for those who disenrolled. Findings that fewer members who disenrolled used physician services may simply reflect the shorter time period in which to have use or it may reflect dissatisfaction with physician services or access as expressed by those who disenrolled from the total SHMO study (Harrington, et al., 1993b). In general, use of physician services reflected relatively little change from site to site and only the expected differences among the alive, died, and disenrolled group.

**SKILLED AND INTERMEDIATE CARE FACILITY DAYS:** Use of skilled and intermediate care facility days of all types averaged 1.915 days PMPM for the first 12 months.

There were significant differences across sites (Table 4.3) Use was 2.541 days PMPM at Long Beach compared to a low of 1.380 days PMPM at Brooklyn. There was a significant difference in the percentage of those using skilled and intermediate care days with a high of 29% of the sample at Portland and a low of 14% at Brooklyn (Table 4.4). Users at Long Beach and Brooklyn averaged 98 days and 94 days compared to 46 days at Minneapolis and 55 days at Portland.

Supply factors may have been extremely important in understanding differences in nursing home use. Greater number of days per user at Long Beach and Brooklyn may have been

influenced by both practice differences and by existing relationships with nursing homes owned by sponsors or partners. Both the Brooklyn site and the hospital partner of the Long Beach site owned nursing facilities. However, nursing home occupancy in New York was very high (99%) and relatively low in California and Portland (DuNah, et al., 1995). This may account for the high percentage of users in Portland. The high overall use of SNF/ICF days in Long Beach may have reflected both the low occupancy rate in the market and the ownership of SNF beds by the sponsors partner. This favorable arrangement was also supported by high SNF costs paid by the Long Beach SHMO as compared to other sites (Harrington, et al., 1989). Although one of the Minneapolis sponsors was a long term care agency, the SHMO was still able to control nursing home days as well as most other utilization.

When utilization of SNF/ICF days was examined among those who lived, died, or disenrolled (Table 4.5), there were significant differences ( $p < .05$ ) among the groups with those who died averaging 6.959 days PMPM in the first 12 months. Those who disenrolled used 3.268 days PMPM. Those who lived through each period averaged 1.243 days PMPM. 45% of those who died had skilled and intermediate care facility use vs. 21% and 22% for those who lived and disenrolled respectively (Table 4.6). A greater percent of users among those who died was an expected finding. The days per user for the

disenrolled group were 25% higher than the died group and 150% higher than the alive and enrolled group. This may reflect the inclusion in the disenrolled group of those who disenrolled because they reached their chronic care benefit limit and were forced out because of state Medicaid policy (at Long Beach) or dissatisfaction with costs. At Portland, disenrollees may have used up Medicare covered SNF days before being forced to disenroll in order to qualify for chronic SNF coverage under Medicaid.

**HOME HEALTH VISITS:** Home health visits including both skilled nursing and home therapy visits averaged 8.01 visits during the first 12 months (Table 4.3).

There were significant differences among the four sites with Brooklyn reporting 21.39 visits per member in the first year compared to a low of 3.51 visits at Minneapolis and 6.00 and 6.02 at Long Beach and Portland. Brooklyn, however, reported the lowest percentage of members with some use at 25% compared with 69% at Long Beach and 51% and 33% at Portland and Minneapolis (Table 4.4).

Brooklyn reported many more visits per user compared with the other sites at 86.10 visits for 12 months. Portland reported 11.77, Minneapolis 10.54, and Long Beach 11.77 visits per user for the 24 month period. The combination of market differences and health plan characteristics is important here, as it was for SNF/ICF days. New York generally had high use

of home care for its Medicaid population (Feder, 1991) which may have resulted in high patient and provider expectations. At the same time, the Brooklyn SHMO sponsor also owned a home care agency and used it to provide all types of skilled and chronic home care services. Portland owned a home health agency and Minneapolis's partner also owned a home health agency but also contracted with outside vendors to achieve cost savings. Long Beach may have substituted high SNF/ICF use for home health use while Brooklyn appeared to use higher amounts of home health to substitute for SNF/ICF services. The combination of supply differences related to the market area and health plan interests mean that SHMO members received a very different mix of services depending upon which site they were enrolled at.

Members who died used 3.326 home health visits PMPM, those who disenrolled used 1.289, compared to those alive and enrolled who used .6141 home health visits PMPM during the first 12 months (Table 4.5). There were also significant differences ( $p < .01$ ) among these groups in percent of users during the 12 month period. 59% of those who died used home health vs. 45% of those who lived and 32% of those who disenrolled (Table 4.6). Of those members who used home health, those who disenrolled were heavier users than those who lived at .1554 per exposure day vs. .0732 per exposure day. The heaviest users, as expected, were those who died at .1857 visits per exposure day. The disenrolled again appear

to represent a dichotomy between high users and low users who disenrolled consistent with other services discussed above.

**PERSONAL CARE HOURS:** Personal care use averaged 12.04 PMPM hours for the whole sample in the first 12 months (Table 4.3).

There were significant differences among the sites in both number of hours and percent of members who used any hours. Brooklyn averaged more than twice the amount (24.60 PMPM) of the next highest plan, Portland (11.26 hours PMPM). Long Beach and Minneapolis reported 8.42 and 7.46 hours PMPM. Despite having the highest number of hours per member, Brooklyn reported the smallest percentage of users (37%) compared to Minneapolis with 60%, Long Beach 58%, and Portland 43% (Table 4.4). Mean hours per user at Brooklyn were also much higher than any other site at 712.89 hours for the first 12 months compared to 231.40 hours at Portland, 159.28 hours at Long Beach, and 114.98 hours at Minneapolis.

The high use of personal care hours in Brooklyn reflects some of the same market issues as Home Health care. New York had extremely high usage of all types of home care creating much higher standards in the Brooklyn market than any other site. In addition, the SHMO sponsor provided personal care services itself and used them liberally. All other sites contracted out for these services. Minneapolis showed a very high percentage of users reflecting its policy of providing

chronic care services based on need rather than strict eligibility standards. The number of hours provided per user, however, were lower than any other site as Minneapolis spread personal care over more users. This approach may reflect a more preventive approach to chronic care at Minneapolis, but also may reflect the fact that Minneapolis impaired members were generally healthier with lower levels of functional disability. A more preventive approach at Minneapolis may have corresponded to the presence of greater involvement of a geriatric care principals in the delivery of physician care at Minneapolis as compared to other sites (Harrington, et al., 1993b). Given the apparent interest in a geriatric model and the ability of the Minneapolis site to control costs for its impaired members (see below), it is ironic that Minneapolis was the only SHMO site to terminate its SHMO project after the end of the demonstration period.

In contrast to the Minneapolis approach, Brooklyn appeared to target its personal care to relatively few users with high levels of disabilities and provide them with large numbers of hours. This would support the notion that Brooklyn was using home care to substitute for skilled nursing care which was unavailable given the high SNF occupancy in New York. Given the high levels of home care in New York, and resulting high expectations which may have driven up demand by patients, it also may have been difficult for Brooklyn to provide small amounts of home care to a broad population as

Minneapolis did. This approach most probably would have lead to dissatisfaction of members getting less care than their neighbors in the local community. One of the positive aspects of the SHMO demonstration was that sites could use a flexible approach to providing care to match needs and market conditions in their community. A drawback of this approach is that sites also had a significant amount of discretion over how they would structure the benefit. This "plan discretion" could as easily be based on financial considerations of the sponsor or its partner as the needs of members. Without some standards, there are justified concerns about equity among plans and quality assurance protections in chronic care delivery. These concerns would be even more justified after the demonstration period is over, if SHMOs continue to operate with less scrutiny and monitoring.

There were also significant differences ( $p < .01$ ) across groups for those who lived, died and disenrolled in the first 12 months. Those who died used 18.83 hours of personal care PMPM, those who disenrolled used 14.48 and those who lived used 10.70 hours PMPM (Table 4.5). There was not a significant difference in the percentage of members with any use during this period (Table 4.6). For members with some personal care use, those who died used 36.18 hours PMPM, those who disenrolled used 33.14, and those who lived 22.06 hours PMPM. Relatively small amounts of personal care use are consistent with home health services discussed above with

disenrollees having a smaller percent of use, with somewhat greater use than the alive and enrolled group. This trend is not as pronounced as it was for SNF/ICF days. It may also be that the use of personal care hours caused benefit limits to be reached as they were though use of SNF/ICF days. Given the relatively low cost of personal care hours, these were an easier chronic care benefit to manage if an impaired member could be kept in the community. Chronic nursing home use, on the other hand, could quickly force the benefit limit to be reached and disenrollment to be encouraged. Given available data it cannot be determined if nursing home use may have been promoted for certain heavy use patients in order to encourage disenrollment. This is a concern that should be carefully examined in a capitated program with a limited dollar benefit available for either home care or nursing home care.

**HEMOCARE VISITS:** Home health visits and personal care hours were also combined into a homecare variable. For the first 12 months the total sample averaged 4.05 home health and personal care visits PMPM with Brooklyn reporting 8.17 and Minneapolis 2.39 (Table 4.3). Percent of members with some homecare varied from 82% at Long Beach to 43% at Brooklyn (Table 4.4).

Relatively low use per user at Long Beach may indicate that it used a combination of home health and personal care in an approach similar to that of Minneapolis for personal care, that is to spread a small amount of care across a large



percentage of users. Long Beach did target services to the moderately impaired as well as the severely impaired, at least in its early years.

Amount of home care across the alive, died, and disenrolled was also significantly different and was roughly comparable to personal care hours (Tables 4.5 & 4.6).

**ADULT DAY CARE:** Adult day care use was heavily skewed toward the Minneapolis site and the overall number of users was very small compared to other services studied. Mean use for the total sample in the first 12 months was 3.50 days (Table 4.3).

On a PMPM basis, Minneapolis had the highest use of adult day care at .7448 days while Brooklyn used only .0304 days PMPM. 12% of impaired members had adult day care use in Minneapolis compared with 3% in Portland and Long Beach and 2% in Brooklyn (Table 4.4). There was a high mean days per user of 147.67 at Long Beach and 75.88 at Minneapolis. Portland and Brooklyn had 48.10 and 18.50 respectfully. Because of the relatively small amount of use of adult day care, it is difficult to generalize about its effect on overall service use. Adult day care of all types, (social, health, Alzheimers), were less developed at the time of the study. Future studies may indicate whether adult day care can be used to substitute for other chronic care or medical care services in capitated settings. The On Lok demonstration (Zawadski & Eng, 1988) relied much more heavily on the use of adult day

health care than any of the SHMO sites.

Those who died in the first 12 months had very little use of adult day care and those who disenrolled had none. Those who lived had .3496 days PMPM and those who died had .0699 days PMPM (Table 4.5). 5.5% of the alive group, and 1.5% of those who died had some use (Table 4.6). Over the 24 month period there was some additional use as 9.1% of the alive group, 2.5% of those who died, and 2.4% of those who disenrolled had some adult day care use (Appendix). The amount of use for users during this longer period was not significantly different among groups. Adult day care appears to have been primarily used to manage those who remained enrolled and somewhat stable.

**TOTAL COSTS:** This study measured costs for the types of utilization listed above as well as related costs. Costs on pharmacy, dental, optometry, administrative costs and several other categories were not collected. The figures discussed here represent a substantial portion of actual costs faced by the four demonstration sites but not the total costs. Mean costs for the entire sample for the first 12 months was \$5,181 (Table 4.3) and \$10,640 for the first 24 months (Table 4.4) as measured in 1986 dollars.

There were significant differences among the sites in both periods with Long Beach and Portland registering the highest costs. The Long Beach sample averaged \$6,381 for the

first 12 months and \$11,660 for 24 months. Portland reported costs of \$5,085 for the first 12 months and \$12,165 for 24 months. Minneapolis reported the lowest costs at \$3,339 for 12 months and \$6,816 for 24 months. Brooklyn reported \$4,728 and \$10,541. When adjusted for number of exposure days, Portland reported costs of \$1049 PMPM during the first 12 months and \$1194 PMPM for 24 months. Long Beach ranked second with \$869 and \$939 PMPM for 12 and 24 months. Minneapolis had the lowest PMPM costs at \$565 and \$659. Brooklyn reported \$579 and \$731 PMPM for 12 and 24 months. There was not a significant difference in the percent of members with some costs with approximately 90% of members having some costs at all sites in the first 12 months and 96 to 98% of members having costs in the 24 month period.

The relative costs associated with impaired members in this study are somewhat different than in the overall SHMO evaluation of costs for all members where Brooklyn had the highest PMPM cost until the last year of the evaluation (1989) when Long Beach costs were slightly higher (Harrington & Newcomer, 1988). Brooklyn not only had most difficulty in controlling utilization, but also was located in a very high Medicare rate area. It was able to almost break even by 1989. The relatively low costs per member at Minneapolis both for the impaired members and the total SHMO membership not only reflected the ability to control all types of utilization and costs and a healthier population, but also responded to the

lowest Medicare rate of the four sites. Long Beach had the highest overall expenditures by 1989 (for all SHMO members) and the oldest and poorest impaired members, but was able to break even because it received a high Medicare capitation rate.

Portland had a medically complex impaired population, high costs for impaired members, and a relatively low capitation rate, resulting in large losses despite experience as a mature HMO and expected ability to control utilization and costs. These losses came despite Portland's lack of marketing problems and ability to control hospital utilization. Earlier findings indicated that 30% of Portland's losses were due to chronic care losses and the remainder to Medicare covered services (Harrington & Newcomer, 1991). The evaluators suggested that the Medicare related losses were due to premium waivers planned by the Portland site. Findings from this study suggest that Portland also had difficulty controlling costs for impaired members, possibly because chronic care services were not well integrated with medical care (Harrington, et al., 1993b) and Portland members were sicker than average.

Wide variation in Medicare capitation rates as well as market area and plan differences all contributed to the substantially different service packages received by the impaired members from site to site. As Medicare emphasizes the use of capitated systems to deliver care, these market and

plan differences raise equity and quality issues, especially for chronic care users, for whom fewer well established quality standards or practice guidelines exist. Issues include whether Medicare beneficiaries with the same conditions but living in different geographical areas or enrolled in different HMOs will receive equivalent care. It is unclear whether health plan interests will outweigh patient needs as determinants of medical and chronic care services delivered.

There were significant differences ( $p < .01$ ) among those alive, died, and disenrolled during 12 and 24 month periods. In the first 12 months costs were \$3,235 PMPM for members who died, \$1,101 for those who disenrolled, and \$384 for those who were alive and enrolled (Table 4.5). These figures support the expectation that those who died would use additional services at high cost. Those who disenrolled also were relatively high cost users. This effect was mitigated slightly over time as mean PMPM figures for the 24 month period dropped somewhat (Appendix) as costs were spread across a longer time period. The high PMPM cost for those who disenrolled emphasizes again the favorable disenrollment within the impaired sample experienced by the SHMOs. Cost figures are consistent with almost all utilization figures for the disenrolled group (reported above).

## **II. RESULTS OF REGRESSION ANALYSIS**

Utilization and cost data were examined using a two stage regression analysis. Logistic regression was used to determine factors predicting use or non-use of specific services. Ordinary Least Squares (OLS) regression was used to examine predictors of the amount of use if a given member had any use. Regression analysis was performed on the total sample for 12 (n = 1868) and 24 month (n = 1523) periods as well as for those who were alive and enrolled after 12 (n = 1526) months and 24 months (n = 1020). The 24-month total sample was reduced by those who entered in 1988 or 1989 and did not have a full period of utilization. Hospital, physician, skilled and intermediate care facility, home health, personal care, homecare (combining home health and personal care), and adult day care use were examined using the two step model. Total costs were examined using the OLS analysis only.

#### **HOSPITAL USE:**

Table 4.7 lists results of logistic regression analyses of any hospital use for the total sample for 12 months. Additional tables showing results for 24 months and for those who were alive and enrolled after the same periods are located in the appendix. Both the 12 and 24 month analyses show three positive predictors of any use for the study sample. These were prior hospital use, respiratory problems, cancer ( $p < .01$ ), and cognitive problems ( $p < .05$ ). In addition IADL

needs was a positive predictor of use over the 24 month period ( $p < .01$ ). Over the 24 month period enrollment in the Long Beach site, ADL needs ( $p < .05$ ), and circulatory problems ( $p < .01$ ) were negative predictors of any hospital use.

The presence of cognitive problems as a significant predictor of any hospital use would allow HMOs to target special services toward members with dementia. Prior hospital use and certain medical problems were expected predictors and are currently used as targeting mechanisms. HMOs have less experience serving elders with chronic dementia.

Activity of daily living limitations as a negative predictor of hospital use probably reflects access problems to medical services for those with severe disabilities. This factor could also represent a more conservative use of medical services for members who already had significant functional disability. This finding is in conflict with many of the earlier Andersen model studies, ADLs were likely to be a positive predictor of elderly hospital use (Wan and Odell, 1981; Wolinsky, et al., 1983; Evashwick, et al., 1983). These studies often examined a cross section of the elderly versus an impaired population where all members had some disability and those with high ADL needs would have been extremely disabled.

Results of OLS regression analyses of the amount of hospital use for those who had any use are listed in Table 4.8. Results are listed in days per enrollment day in order to

adjust for varying periods of membership for those who died and disenrolled. For the total sample the only significant positive predictors of amount of use are IADL needs ( $p < .05$ ) and death or disenrollment ( $p < .01$ ). Enrollment in the Portland site is a negative predictor of amount of use given any use ( $p < .01$ ). Over the 24 month period, enrollment at the Long Beach site and cognitive problems were also negative predictors of amount of use ( $p < .01$ ) and cancer was a positive predictor ( $p < .01$ ). For those who remained alive (Appendix), enrollment at the Brooklyn site ( $p < .01$ ) was a positive predictor of amount of use for both periods. Circulatory problems ( $p < .05$ ) was also a positive predictor for 12 months as was prior hospital use for the 24 month period. The presence of musculoskeletal problems was a negative predictor ( $p < .05$ ) for 12 months as was living alone ( $p < .05$ ) for 24 months.

The finding that amount of use was likely to be lower at Portland and higher at Brooklyn is consistent with Portland's history as an experienced HMO versus Brooklyn's history as a long term care organization learning management of hospital utilization. It also reflects geographical area differences in use patterns (discussed above) between the East and West Coast.

The positive relationship between IADL needs and amount of hospital use points toward the potential to target services towards elders with these problems in order to minimize



hospital use. Cognitive problems was a negative predictor of amount of use and positive predictor of some use indicating that length of stay was probably short once members with cognitive problems were admitted. Proper targeting could probably reduce some admissions for this group. This kind of targeting would have been difficult for the early SHMOs given the lack of coordination between the medical and chronic care service components but will be more important as HMOs, in general, begin to enroll a larger cross-section of the elderly.

The positive effect of having died or disenrolled on hospital use is consistent with earlier discussions (see above) about the expected high use of those who died and the favorable disenrollment experienced by the SHMOs.

The overall model predicted 20 to 24% of the variance for the entire sample. This is within the range of variance predicted by Andersen model studies in the past (Wan, 1989). The difference in predictive ability for the total sample is explained by the addition of the variables representing died and disenrolled status in that model.

#### **PHYSICIAN VISITS:**

Results of logistic regression analyses of any use of physician visits are listed in Table 4.9. Enrollment at Brooklyn, Long Beach, and Portland were all positive significant predictors of some use ( $p < .01$ ). Descriptive

data discussed earlier showed that a much lower percentage of members at Minneapolis, the referent site, used physician services. Of the sites with more likelihood of use, Long Beach had an odds ratio of almost twice that of Portland and Brooklyn. Living alone was also a positive predictor of use ( $p < .05$ ) as expected. Living alone was also a positive predictor of physician use in earlier Andersen studies (Cafferata, 1987) and suggests that those who live alone may be more isolated and use physician contact for social and emotional reasons.

ADL needs was a negative predictor ( $p < .01$ ). The presence of ADL needs as a negative factor indicates access problems faced by the heavily disabled in finding physician care. It also indicates a problem in targeting primary services to members who were potentially high cost users. It is also possible that the heavily disabled elderly face attitudinal barriers from providers who do not see potential cures. This is consistent with earlier studies showing that physician visits and procedures decline in very old age despite the increase in medical and disability problems (Wolinsky, et al, 1988; Radecki, et al., 1988).

Results of OLS analyses of amount of physician use given some use are listed in Table 4.10. For the first 12 months, ADL needs, died ( $p < .01$ ), and disenrolled ( $p < .05$ ) were significant positive predictors. Enrollment at Portland and Long Beach were negative and significant as was IADL needs ( $p$

< .01). For the 24 month period, died and disenrolled continued to be positive and significant and enrollment at Long Beach was a negative predictor. A number of medical conditions were positive predictors as well for the longer period.

The findings that ADL needs were positive predictors of the amount of use indicates that although the heavily disabled may have had difficulty getting access to services, they were heavy users when they did receive physician visits. IADL problems were negatively associated with physician visits. Given earlier findings that IADLs were positively associated with number of hospital days, the SHMOs may have been paying inadequate attention to potential users of high cost services.

The model predicted a relatively small amount of variance in amount of physician use for the total sample (6 to 8.9%). This was the smallest amount of variance predicted by the model for any of the services studied. The addition of the died and disenrolled variables to the total sample analysis did not have a large impact on the amount of variance explained as it did for the analysis of hospital use. The small amount of physician variance explained may be related to the similar patterns of physician use through the whole impaired population. Andersen model factors, especially need factors, may have explained more variance in a population with a more normal distribution of physical disabilities.

#### **SKILLED AND INTERMEDIATE CARE FACILITY DAYS:**

Results of the logistic regression analyses for use or non-use of and skilled or intermediate care facility days are listed in Table 4.11. This study included all facility days covered either under the normal Medicare benefit or under the SHMO chronic care benefit. Overall 24.4% of the sample used nursing facility days in the first 12 months.

Logit analysis of the total sample indicated five positive significant predictors of use for the 12 month period. These were ADL needs, prior nursing home use, cognitive problems ( $p < .01$ ), age, and low income status ( $p < .05$ ). Cancer was also a positive predictor ( $p < .01$ ). Being enrolled at Brooklyn, ( $p < .01$ ) was a negative predictor of any use.

ADL needs, prior nursing home use, and cognitive problems were all expected use of nursing home services. Cancer appears to be associated with the use of nursing home services related to acute episodes of illness. Low income status serving as a positive predictor may indicate that it was more difficult for low income people to stay in the community, given the premiums and the copays in the SHMO for chronic care services. Low income members may also have had greater difficulties paying for or coordinating other needs required to remain at home. If this is the case, it raises an equity question concerning limited choices faced by those with lower incomes, even given the presence of some type of long term

care insurance in the SHMOs and suggests a two-tier system of long term care services based on income.

The negative effect of Brooklyn enrollment on nursing home use is consistent with the discussion above suggesting that New York's high occupancy rate for nursing home beds made it difficult for Brooklyn to place members even though the site sponsor owned a nursing home.

OLS analysis of amount of use when some use occurred (Table 4.12) indicates that, for the total sample, several factors were predictive. Prior nursing home use ( $p < .05$ ), died, and disenrolled status ( $p < .01$ ) were positive predictors of the amount of days used for the 12 and 24 month periods.

In general it appears that enrollees at Brooklyn were less likely to use skilled and intermediate facility days than other sites. When they did use them, however, a greater number of days were used. It also appears that the pattern of use for those who died and disenrolled at Brooklyn and Long Beach changed after the initial period. These sites were significant positive predictors for both periods for the alive group but only for the first 12 months for the total sample.

Nursing homes appeared to be used by older members with ADL and/or cognitive problems, as well as a past history of nursing home use. Those who died and disenrolled had more use. Coefficients for disenrolled were higher than for died which supports the idea that the disenrolled group included

members who reached their benefit maximum through chronic nursing home use.

The model predicted 23.3 to 23.8% of variance for the total sample. For skilled and intermediate facility days, as well as other long term care services (see below) the model predicted much more variance than for physician and hospital use in the alive and enrolled group. This may result from the significantly different practice patterns among the four sites and the relatively large percentage of variance accounted for by site in this part of the analysis.

**ADULT DAY CARE USE:**

Results of logistic regression analysis are listed in Table 4.13. IADL needs and cognitive problems were significant positive predictors of any use for the total sample ( $p < .01$ ). Membership at Brooklyn, Long Beach, and Portland were negative predictors, as were poor health status and cancer ( $p < .01$ ).

Adult day care was most likely to be used at the Minneapolis site with cognitive and IADL needs associated with use. Adult day care appeared to be used to maintain members with cognitive problems and lower levels of disability. For the small group with some use, ADL needs, cognitive problems, and the presence of diabetes were associated with a greater number of days used (Table 4.14). Adult day care provided one relatively low cost chronic care service necessary to maintain

some impaired members in the community. The model predicted 40.7 to 47.5% of variance in adult day care use.

**HOME CARE USE:**

Results of the logit analysis of any home care use are presented in Table 4.15. The variable "home care" includes both skilled home health and personal care services and is intended to allow for a combined analysis of any type of services in the home. Both were converted to visit units for the analysis. Analyses of each type of home care was also performed separately and are included below.

Living alone, being enrolled at Long Beach, ADL and IADL needs ( $p < .01$ ) were all significant positive predictors of some homecare use for the total sample in both the 12 and 24 month periods. Enrollment at Brooklyn, ( $p < .01$ ), was the only consistent negative predictor.

The negative effect of Brooklyn enrollment on home care use was consistent with descriptive data discussed above indicating that a small number of members received many services. The positive effect of living alone, ADL and IADL needs are consistent with earlier studies of chronic care use (Branch, et al., 1988; Liu, et al., 1985; Short & Leon, 1990).

Results of the OLS analysis of amount of use are listed in Table 4.16. Given some homecare use, enrollment at Brooklyn, ADL needs, died, and having cancer ( $p < .01$ ), and poor health status ( $p < .05$ ) positively predicted amount of

use for both 12 and 24 month periods. For those who remained alive and enrolled, age was also a positive predictor of amount of use.

The site a member was enrolled at significantly determined both the likelihood and amount of home care use, with Long Beach users being twice as likely to have some use. This reflected both plan differences such as use of sponsor owned home health agencies and market area differences such as heavy homecare use in New York. When members had some use, Brooklyn members used a larger number of visits than other sites. Age, sex, and living status also were important predictors both of use and the amount of use. Need variables were also important predictors, especially ADL needs, the presence of cancer, and dying during the study. All of these predisposing and need characteristics are consistent predictors in period Andersen model studies of home care use. The OLS models predicted 19.1 to 19.5% of variance for the total sample and 26.7 to 27.7% of variance for the alive and enrolled group (Appendix). The model predicted relatively large amounts of variance for the alive group as compared to the models for physician and hospital services, perhaps reflecting the more discretionary use of homecare services by recipients as well as more significant practice and market differences from plan to plan.

**HOME HEALTH VISITS:**



Logit results of the analysis predicting any skilled home health use are listed in Table 4.17. Enrollment at Long Beach or Portland, ADL needs, prior hospital use, low income, and cancer were all significant positive predictors for the total sample for both periods ( $p < .01$ ). Enrollment at Brooklyn ( $p < .01$ ) was a negative predictor of any home health use for the total sample.

Site variations indicate the different ways in which each SHMO used its benefit package. Given the positive role of prior hospital use, it is likely that Portland and Long Beach used home health care to help control amount of hospital use. It was more likely that low income members would be able to use Medicare covered home health services than chronic home care for which there was a copayment. It is also possible that low income members had more health problems and therefore would have been higher users of home health care.

OLS analysis of the amount of use shown in Tables 4.44 and 4.18 indicates that enrollment at Brooklyn, died and having cancer ( $p < .01$ ) were positive predictors for the total sample while cognitive problems was a negative predictor ( $p < .05$ ).

Enabling variables were critical to predicting use or non-use. Although enrollment at Brooklyn meant less likelihood of use, it also meant greater number of visits for those who did have some use. Large amounts of use is consistent with the home care market in New York as well as

the sponsor's ownership of a home health agency.

The presence of cancer as a significant predictor for the total sample (versus the analysis of the alive and enrolled group) in both logit and OLS analyses may indicate that an acute problem like cancer was associated with home health use in the died and disenrolled population and not in those that lived. Home health for those two sub-groups may have been primarily the extension of a package of acute care. The predictive ability of prior hospital use in all of the logit analyses may indicate that SHMOs used home health care as a substitute for hospital care or it may only indicate the presence of a constellation of services that includes both hospital and home health services.

**PERSONAL CARE HOURS:**

Personal care hours serve in the analysis as the principal means for examining non-institutional long term care (given the limited amount of adult day care used) in the SHMOs. Logit analysis of any personal care use is presented in Table 4.19. The presence of ADL and IADL needs are significant positive predictors. ( $p < .01$ ). Enrollment at Brooklyn and Portland were negative predictors. Urinary problems and living alone was also a positive predictor.

ADL and IADL needs were expected positive predictors of any personal care use. The negative role of enrollment at Brooklyn and Portland suggests that members at these sites

were less likely to receive personal care services than at Minneapolis, the referent site. We know from descriptive statistics that Minneapolis and Long Beach users were most likely to get some chronic care service as services were provided to broader categories of members. The presence of urinary problems as a positive predictor indicates that the SHMOs may have used personal care to help manage care of members with incontinence problems. The positive effect of living alone was consistent with earlier studies. Members without informal care were more likely to require formal personal care in order to remain at home.

OLS results for the personal care hours equation predicting amount of personal care use given some use are listed in Table 4.20. Enrollment at Brooklyn and ADL needs were significant positive predictors ( $p < .01$ ) for both the total sample and those who remained alive, for both periods. Overall the model explained 16.5 to 17.9% and 26.9 to 28.5% of variance for the total sample and alive and enrolled group (see appendix) respectively.

Minneapolis was more likely to involve some personal care use. Brooklyn enrollees were much less likely to have any personal care use, but when they had use it was likely to be a high amount. These differences most probably reflect significant market area and practice pattern differences. Brooklyn especially was in a geographical area with a rich Medicaid homecare benefit and the SHMO sponsor owned and used

its own home care agency to provide personal care services. ADL needs, as expected, was also an important need variable for predicting both any use and amount of use of personal care. There was no relationship between personal care use and prior hospital or acute medical problems, and therefore, no indication that the sites were substituting personal care for acute care services.

**TOTAL COST:**

OLS analysis was performed on the amount of cost for those with some cost (Table 4.21). Given the high percent of users with some cost, logit analysis was not used on the Total Cost variable. For the total sample, for both periods, ADL and IADL needs, prior hospitalization, problems, enrollment at Portland, and died during the study period were significant positive predictors when controlling for other differences. The overall model explained 24.2 to 27.8% of the variance in total cost for the total sample.

These results indicate the importance of targeting those with ADL and IADL problems in order to control costs. They also indicate that other problems, often thought of as chronic, such as cognitive problems can be important targeting factors to control HMO costs in addition to traditional factors like prior hospitalization. The early SHMOs were unable to fully integrate their chronic care and medical components (Harrington, et al., 1993b) and thus could

not take full advantage of the special services they had available for those with disabilities. Despite its historical ability to control hospital use, a mature HMO like Portland still had difficulty controlling costs for the impaired sample. Long Beach enrollment was also a positive predictor of total cost in the first 12 months, but the SHMO was able to break even over time.

### III. FINDINGS RELATED TO HYPOTHESES:

1) It was hypothesized that need variables, consistent with past Andersen model studies (Wan and Odell, 1981; Branch, et al., 1981; Wan and Arling, 1983; Soldo, 1985; Wolinsky and Johnson, 1991) would produce the greatest variance in the OLS models predicting chronic care use. OLS findings indicate that, in fact, the enabling variables indicating site accounted for greater amounts of variance than need variables in an impaired sample when predicting the amount of chronic care use (Table 4.50) for those who remained alive and enrolled after 24 months. This trend was reversed for hospital days, skilled and intermediate care facility days, and home health visits (and mitigated somewhat for personal care hours) for the total sample especially when died and disenrolled status were included as need variables. Given the apparent high need and utilization levels for those who died and disenrolled, need factors appear to have played a more important role for this group. For the sample who remained

alive and enrolled, site practice patterns and market area differences appeared to be a stronger influence especially on SNF/ICF, home health and personal care services. At least in the initial years of the SHMO demonstration, this indicates that practice differences and market area differences were more important predictors than traditional need factors expected by the Andersen model for the already seriously impaired.

For example, greater personal care use at the Brooklyn SHMO may be related to practice style but also to factors such as the generous Medicaid coverage of home care in the New York market area leading to increased expectations among both providers and users.

Overall the experience of the total sample was consistent with the hypotheses if those who died and disenrolled were included. The experience of those who remained alive and enrolled bears out the Andersen model notion that enabling variables may play a more important role for discretionary services, assuming that chronic care services involved more discretion than medical care services. This reversal of predictive ability of enabling and need factors held true for SNF/ICF and home health visits, both more closely linked to medical services in acute episodes, and for personal care hours. Personal care hours are both less medically linked and more discretionary for patient and case managers.

2. It was hypothesized that use of chronic care services would be predicted by increasing levels of IADL and ADL impairments. It was also hypothesized that amount of use would increase with impairment level. Number of ADLs and IADLs were generally positive predictors of use or non-use of chronic and long term care such as home health, personal care, SNF/ICF days, and adult day care (See Tables 4.22 through 4.47). These factors were also significant predictors of the amount of use, although site related predictors were also important. It is safe to say that ADLs and IADLs continue to be important predictors of use even within the SHMO impaired sample where all members had some functional problems. Managed care organizations which add a chronic care service can expect ADLs and IADLs to be important factors.

3. It was hypothesized that site variables would predict a significant amount of variance in use second only to need variables. As indicated above, findings indicated that site variables played the primary predictor role for the impaired members in the SHMO demonstration who remained alive and enrolled. For those who died or disenrolled site variables were important but secondary to need factors. This is an indication that equitable distribution of chronic care services is not automatically assured once services become part of a covered benefit package especially for those with less acute medical problems. The plan that a disabled person

enrolls in, where the plan is located, and plan ownership may play a significant role in determining the type and adequacy of service provision. It is also possible that different plans may use different combination of services to accomplish the same ends. A study of health related and functional outcomes would be required to assess overall plan effectiveness with disabled members. This is beyond the scope of this study but indicates a direction for future research. It is quite possible that the effect of site differences is mitigated as acuity level increases, thus the greater importance of need variables when those who died or disenrolled are included.

4. It was hypothesized that prior hospitalization would be a more important predictor of chronic care use in the more mature HMO sites, Portland and Minneapolis because it was expected that they would more effectively substitute other services for hospital days. In the Logit analysis for each site in year one, prior hospitalization, as expected, was a significant positive predictor of use of home health care in the Portland and Minneapolis sites (the mature HMOs). It was not however a significant predictor of other chronic care use. Prior hospitalization was also, however, a significant predictor at the Brooklyn site (a site with no former HMO experience) for home health care use. Prior hospitalization was not a significant predictor of amount of chronic care use



for any variable at any of the sites. It was close to significant ( $p < .07$ ) for amount of personal care at only one site, Minneapolis. These findings suggest that the mature sites were unable to use personal care or adult day care as substitutes for hospital care as well as the long term care sponsored SHMOs. Home health care may have been used however as both a complement to hospital care and a substitute at both the experienced HMOs and the Brooklyn site. A more detailed analysis would be required to examine fully the issue of substitution of chronic care services for hospital care. This issue will be a critical one for other HMOs which consider the addition of a home and community care benefit for an impaired population.

Findings from the On Lok demonstration (Zawadski & Eng, 1988) indicated that On Lok has been able to control hospital costs by providing a range of other home, community, and primary care services. Earlier findings from the SHMO evaluation (Harrington & Newcomer, 1991) suggested that the experienced HMOs were able to control hospital utilization for their overall membership. The On Lok experience indicates that controlling hospital costs for impaired members and substitution of other services is a key to health plan success in working with a heavily disabled population. For the SHMO impaired sample, sites may have controlled hospitalization, but it is not clear whether this control was at all related to chronic care use other than home health visits. The

relationship between personal care use and hospital use is not clear and indicates another future research need. Early SHMOs clearly did not take advantage of fully integrating their medical and chronic care service delivery structures (Harrington, et al., 1993b) in a way that would have optimized care for the impaired.

5. It was hypothesized that an enabling variable such as income would be a more important predictor of chronic care use and expenditures at the low benefit sites (all but Portland). Findings of the logit analysis showed that low income was positively associated with skilled and intermediate care facility use at Portland and Long Beach. The low income factor was also a significant predictor for home health visits but not for other chronic care benefits. In the total alive and enrolled group for the first 12 month period, low income was a significant negative predictor of personal care use in the logit analysis. In the OLS analysis by site, low income was a significant predictor of amount of personal care use at the Brooklyn site where it was a positive predictor, perhaps indicating higher level of need associated with lower socioeconomic status. Low income was also almost a significant negative predictor ( $p < .08$ ) at the Portland site which had the highest overall benefit levels. It does not appear that benefit levels at the various sites had a consistent significant impact on how chronic care benefits were used.

The overall analysis does suggest that it may be more likely for low income members to use nursing home services and Medicare covered home health services. Copayment requirements for personal care benefits most likely served as a barrier for low income members and reduced their utilization. Low income appeared to limit the choice of impaired members in their use of chronic care services. Lack of income most probably caused difficulty in members ability to access services and coordinate all of the necessary services to remain at home.

#### **ADDITIONAL HYPOTHESES RELATED TO BEHAVIORAL MODEL FACTORS**

Tables 4.53 and 4.54 present the percent of variance in the OLS models explained by predisposing, enabling and need variables. In general predisposing variables accounted for a small amount of the explained variance in the overall models as hypothesized. The enabling site variables accounted for the majority of the variance in the models for hospital, SNF/ICF, home health and personal care services for those who remained alive and enrolled. Need variables had been hypothesized to account for most of the variance. They accounted for substantially less variance than expected in the models for home and community care service use for the alive group who were already severely impaired. Need variables accounted for the majority of explained variance for the total sample for hospital, physician, SNF/ICF, and home health use as hypothesized. It appears that need variables played a more

important predictive role when the sample included those who died and disenrolled and were, therefor, expected to have higher utilization and more acute medical needs. Utilization would be more discretionary for the alive and enrolled group. The larger role played by enabling variables is consistent with earlier Andersen model theorizing which suggests enabling variables to be more important as service use becomes more discretionary. Market area differences and SHMO site practice pattern differences may create more variance for discretionary non-acute services.

Table 3.6 summarizes expected direction of effects for specific predisposing, enabling, and need variables on certain types of utilization and cost variables. The direction of effects found in the logit and OLS analyses are listed in Table 4.24 and 4.25.

This chapter has presented descriptive data as well as findings from logit and OLS regression modeling of utilization of chronic care and medical services for impaired members of the SHMO demonstration. In general site characteristics, either practice patterns, market variations, or ownership issues, proved to be a stronger predictor of chronic care service use than expected, especially for those alive and enrolled over a long period. Further discussion of the implications of these findings are presented in the next chapter.

**TABLE 4.1. Means of Predisposing, Enabling and Need Variables by site for those Alive after 12 Months.**

	TOTAL	BROOKLY N	L O N G BEACH	MINN.	PORTLAND
N	1526	258	314	349	605
<b>PREDISPOSING</b>					
Age	79.99**	80.24	80.70	78.31	80.49
Female	68.3%	67.7%	72.0%	68.5%	66.9%
Some College	21.5%**	na	24.8%	35.2%	21.0%
Live Alone	35.5%*	29.1%	40.8%	37.8%	34.2%
Live w. Spouse	32.1%	32.6%	27.7%	35.5%	32.2%
Live w. Others	32.4%*	38.4%	31.5%	26.6%	33.6%
<b>ENABLING</b>					
Income under \$10k	52.0%**	56.6%	60.2%	35.8%	55.2%
Brooklyn	17%	--	--	--	--
Long Beach	20%	--	--	--	--
Minneapolis	23%	--	--	--	--
Portland	40%	--	--	--	--
<b>NEED</b>					
ADL Needs(of 7)	2.46**	2.92	2.25	1.77	2.78
IADL Needs(of 8)	4.43*	5.07	4.1	3.87	4.66
Sensory Problems	50.2**	47.7%	51.0%	29.5%	62.8%
Incontinence Prob.	36.6%**	38.4%	33.4%	26.9%	43.1%
Poor Hlth. Status	55.7%**	71.7%	58.9%	45.6%	53.1%
Prior Hospital	43.8%*	37.6%	42.4%	41.8%	48.3%
Prior Nursing Home	15.5%*	9.7%	16.6%	14.0%	18.2%
Cognitive Problems	14.4%**	19.8%	8.6%	14.9%	14.7%
Medical Problems					
Circulatory	69.1%**	65.9%	71.0%	62.8%	73.1%
Respiratory	44.4%**	47.3%	49.7%	31.8%	47.6%
Musculoskeletal	67.9%*	65.1%	64.6%	64.5%	72.7%
Nervous System	75.2%**	74.4%	68.2%	73.4%	80.2%
Diabetes	13.8%	17.4%	13.1%	10.3%	14.7%
Cancer	13.1%	10.9%	13.4%	14.0%	13.4%
Genito-urinary	28.6%**	25.6%	23.9%	19.2%	37.9%
Skin	26.5%**	25.6%	27.7%	15.2%	32.7%

\* Significant at  $p < .05$  on the chi square test for differences across all plans.

\*\* Significant at  $p < .01$  for differences across all plans.

**TABLE 4.2. Means of Predisposing, Enabling and Need Variables for those Alive after Year 1, Died during Year 1, and Disenrolled during Year 1 after Baseline CAF.**

	TOTAL	ALIVE	DIED	DISEN ROLL
N	1868	1517	270	81
<b>PREDISPOSING</b>				
Age	79.93	80.00	79.66	79.84
Female	.66**	.68	.54	.72
Some College	.21	.21	.18	.19
Live Alone	.35*	.41	.32	.40
Live w. Spouse	.32	.34	.35	.22
Live w. Others	.34	.30	.37	.39
<b>ENABLING</b>				
Income under \$10k	.52	.52	.47	.60
Brooklyn	.17	.17	.13	.29
Long Beach	.21**	.20	.17	.39
Minneapolis	.22	.23	.19	.15
Portland	.41**	.40	.51	.18
<b>NEED</b>				
ADL Needs(of 7)	2.64**	2.47	3.70	2.28
IADL Needs(of 8)	4.52**	4.44	5.12	4.18
Sensory Problems	.52**	.50	.61	.56
Incontinence Prob.	.39**	.37	.50	.36
Poor Hlth. Status	.57**	.56	.65	.66
Prior Hospital	.46**	.44	.57	.53
Prior Nursing Home	.16	.15	.17	.15
Cognitive Problems	.14	.14	.16	.10
Medical Problems				
Circulatory	.70	.69	.75	.65
Respiratory	.47**	.44	.64	.51
Musculoskeletal	.66**	.68	.56	.67
Nervous System	.75	.75	.76	.73
Diabetes	.14	.14	.14	.19
Cancer	.17**	.13	.40	.14
Genito-urinary	.30*	.29	.36	.28
Skin	.27	.26	.29	.26

\* Significant at  $p < .05$  on the chi square test for differences across all plans.

\*\* Significant at  $p < .01$  for differences across all plans.

**Table 4.3. Means per Member of Utilization and Cost Data for First 12 Months from Baseline for Total Sample. Per Member per Day of Exposure Means of Utilization and Cost Data during First 12 Months from Baseline.**

VARIABLES N	TOTAL	BROOKLYN	L O N G BEACH	MINN.	PORT LAND
	1868	310	389	412	757
MEAN HOSPITAL DAYS/ MEMBER	4.10**	6.31	3.28	4.18	3.57
/EXPOSURE DAY	.0187*	.0257	.0142	.0225	.0159
/PMPM	.5685*	.7813	.4317	.6840	.4834
MEAN MD VISITS/MEMBER	6.72	6.83	6.37	7.05	6.66
/EXPOSURE DAY	.0220	.0251	.0189	.0239	.0210
/PMPM	.6688	.3012	.5746	.7266	.6384
(N) <sup>1</sup>	1808	310	329	412	757
MEAN SKILLED/INTERMED. CARE FACILITY DAYS	15.82**	13.05	22.61	11.18	15.99
/EXPOSURE DAY	.0630*	.0454	.0836	.0492	.0672
/PMPM	1.915*	1.380	2.541	1.496	2.043
MEAN HOME HEALTH VISITS	8.01**	21.39	6.00	3.51	6.02
/EXPOSURE DAY	.0341**	.0666	.0185	.0172	.0380
/PMPM	1.037**	2.025	.5624	.5229	1.155
MEAN PERSONAL CARE HRS.	119.02**	266.76	91.72	68.65	99.96
/EXPOSURE DAY	.3961**	.8092	.2769	.2454	.3703
/PMPM	12.04**	24.60	8.418	7.460	11.26
MEAN ADULT DAY CARE DAYS	3.50**	.36	4.56	8.84	1.33
/EXPOSURE DAY	.0097**	.0010	.0125	.0245	.0037
/PMPM	.2949**	.0304	.3800	.7448	.1125
MEAN HOMECARE VISITS	37.76**	88.08	28.93	20.67	31.01
/EXPOSURE DAY	.1331**	.2689	.0877	.0786	.1305
/PMPM	4.046**	8.175	2.666	2.389	3.967
MEAN COSTS/MEMBER	5181**	4728	6381	3339	5752
/EXPOSURE DAY	27.19	19.04	28.60	18.57	34.50
/PMPM	827	579	869	565	1049

<sup>1</sup> = MD Visits for Long Beach site were eliminated from analysis for 1988 due to missing data.

\*Significant at p < .05 on one way analysis of variance for difference among plans.

\*\*Significant at p < .01 on one way analysis of variance.

**Table 4.4 Number and Percent of Total Sample with Specific Service Utilization or Any Costs during First 12 Months from Baseline by Site. Mean Use or Cost for Sample Members with some Use or Cost during First 12 Months.**

VARIABLES N	TOTAL	BROOKLYN	L O N G BEACH	MINN.	PORT LAND
	1868	310	389	412	757
# AND % WITH HOSPITAL DAYS	669	112	121	144	292
MEAN/USER	35.8%	36.1%	31.1%	35.0%	38.6%
USE/EXP DAY FOR USERS	11.45**	17.47	10.55	11.97	9.25
	.0521**	.0712	.0457	.0645	.0413
# AND % WITH MD VISITS					
	1315**	227	281	239	568
MEAN VSTS/USER	72.7%	73.2%	85.4%	58.0%	75.0%
USE/EXP DAY FOR USERS	9.24	9.33	7.46	12.15	8.87
(N) <sup>1</sup>	.0302**	.0342	.0222	.0412	.0280
	1808	310	329	412	757
# A N D % W I T H SKILLED/INTERMED. CARE FACILITY DAYS	455**	43	90	100	222
MEAN # DAYS/USER	24.4%	13.9%	23.1%	24.3%	29.3%
USE/EXP DAY FOR USERS	64.95**	94.07	97.72	46.08	54.51
	.2589**	.3274	.3613	.2028	.2293
# AND % WITH HOME HEALTH VISITS	870**	77	269	137	387
MEAN VSTS/USER	46.6%	24.8%	69.2%	33.3%	51.1%
USE/EXP DAY FOR USERS	17.20**	86.10	8.68	10.54	11.77
	.0732**	.2683	.0267	.0517	.0743
# AND % WITH PERSONAL CARE HRS.	913**	116	224	246	327
MEAN HRS/USER	48.9%	37.4%	57.6%	59.7%	43.2%
USE/EXP DAY FOR USERS	243.51**	712.89	159.28	114.98	231.4
	.8105**	2.1625	.4809	.4111	.8572
# AND % WITH ADULT DAY CARE DAYS	87**	6	12	48	21
MEAN DAYS/USER	4.7%	1.9%	3.1%	11.7%	2.8%
USE/EXP DAY FOR USERS	75.11**	18.50	147.67	75.88	48.10
	.2086**	.0515	.4046	.2129	.1318
# AND % WITH HOMECARE VISITS					
MEAN VSTS/USER	1216**	134	318	279	485
USE/EXP DAY FOR USERS	65.1%	43.2%	81.7%	67.7%	64.1%
	58.01**	203.76	35.39	30.52	48.40
# AND % WITH SOME COSTS	.2045**	.6222	.1073	.1160	.2037
MEAN COST/USER	1684	277	354	368	688
COST/EXP DAY FOR USERS	90.3%	89.4%	91.0%	89.3%	90.9%
	5737**	5292	7012	3738	6329
	30.11	21.31	31.43	20.79	37.96

<sup>1</sup> = MD Visits for Long Beach site were eliminated from analysis for 1988 due to missing data.

\*Significant at  $p < .05$  on one way analysis of variance for difference among plans.

\*\*Significant at  $p < .01$  on one way analysis of variance.



**Table 4.5. Means per Member of Utilization and Cost Data for First 12 Months from Baseline. Total, for those Alive, Died, and Disenrolled after 12 months. Per Member per Day of Exposure Means of Utilization and Cost Data during First 12 Months from Baseline.**

VARIABLES N	TOTAL	ALIVE	DIED	DISEN ROLL
	1868	1526	270	72
HOSPITAL DAYS (/MEMBER)	4.10**	3.62	6.94	3.67
/EXPOSRE DAY	.0187**	.0099	.0646	.0285
/PMPM	.5685**	.3010	1.964	.8664
MD VISITS	6.72*	7.26	4.45	3.65
/EXPOSURE DAY	.0297**	.0199	.0329	.2071
/PMPM	.9029**	.6050	1.000	6.296
(N) <sup>1</sup>	1808	1473	258	77
SKILLED/INTERMED. CARE FACILITY DAYS	15.82	15.10	19.79	16.24
/EXPOSURE DAY	.0710**	.0409	.2289	.1075
/PMPM	2.158**	1.243	6.959	3.268
HOME HEALTH VISITS	8.01	7.36	12.06	6.55
/EXPOSURE DAY	.0341**	.0202	.1094	.0424
/PMPM	1.037**	.6141	3.326	1.289
PERSONAL CARE HRS.	119.02*	127.9	80.33	75.23
/EXPOSURE DAY	.3961**	.3521	.6195	.4762
/PMPM	12.04**	10.70	18.83	14.48
ADULT DAY CARE DAYS	3.50*	4.19	.52	.00
/EXPOSURE DAY	.0097*	.0115	.0023	.00
/PMPM	.2949*	.3496	.0699	.00
HOMECARE VISITS	37.76	39.35	32.14	25.35
/EXPOSURE DAY	.1331**	.1083	.2643	.1614
/PMPM	4.046**	3.292	8.035	4.907
TOTAL COST	5181**	4605	8319	5616
/EXPOSURE DAY	27.19**	12.62	106.4	36.21
/PMPM	827**	384	3235	1101

<sup>1</sup> = MD Visits for Long Beach site were eliminated from analysis for 1988 due to missing data.

\*Significant at  $p < .05$  on one way analysis of variance for difference among plans.

\*\*Significant at  $p < .01$  on one way analysis of variance.

**Table 4.6. Number and Percent of members with Utilization and Cost for First 12 Months from Baseline. Total, for those Alive, Died, and Disenrolled after 12 months. Use and Cost per Exposure Day for those with use.**

VARIABLES	TOTAL	ALIVE	DIED	DISENROL
N	1868	1526	270	L 72
# AND % WITH HOSPITAL DAYS	669** 35.8%	489 32.0%	159 58.9%	21 29.4%
MEAN USE/DAY OF EXPOSURE FOR USERS	.0521**	.0310	.1097	.1064
# AND % WITH MD VISITS USERS	1315** 72.7%	1112 72.8%	164 60.7%	39 58.0%
MEAN VSTS/EXPOSURE DAY (N) <sup>1</sup>	.0302** 1808	.0266 1473	.0518 258	.0448 77
# AND % WITH SKILLED/INTERMED.CARE DAYS. MEAN DAYS/EXP DAY/USER	455** 24.4%	319 20.8%	121 44.8%	15 22.2%
	.2589**	.1989	.3883	.4900
# AND % WITH HOME HEALTH VISITS	870** 46.6%	690 45.2%	159 58.9%	21 32.1%
MEAN VSTS/EXP DAY/USER	.0732**	.0447	.1857	.1554
# AND % WITH PERSONAL CARE HRS. MEAN HRS/EXP DAY/USER	913 48.9%	738 48.5%	141 52.2%	34 45.7%
	.8105**	.7258	1.19	1.09
# AND % WITH ADULT DAY CARE DAYS MEAN DAYS/ EXP DAY/USER	87** 4.7%	83 5.5%	4 1.5%	0 0%
	.2086	.2111	.1571	0
# AND % WITH HOMECARE VISITS MEAN VSTS/EXP DAY/USER	1216** 65.1%	976 64.0%	199 73.7%	41 56.9%
	.2045**	.1688	.3585	.3057
# AND % WITH ANY COST MEAN COST/EXP DAY/USER	1687** 90.3%	1362 89.3%	267 98.9%	58 81.5%
	30.11**	14.17	107.6	47.85

<sup>1</sup> = MD Visits for Long Beach site were eliminated from analysis for 1988 due to missing data.

\*Significant at  $p < .05$  on one way analysis of variance for difference among plans.

\*\*Significant at  $p < .01$  on one way analysis of variance.

**TABLE 4.7. Logistic Regression of Any Hospital Use during 12 Months after Baseline CAF for All Members. N = 1868.**

VARIABLE	ESTIMATE	S.E.	ODDS RATIO
Intercept	-1.66**	.61	
<b>PREDISPOSING</b>			
Age	.004	.01	1.00
Female	-.07	.11	.93
Live Alone	.05	.13	1.05
Live w. Spouse	-.04	.13	.96
<b>ENABLING</b>			
Income under \$10k	.14	.11	1.15
Brooklyn	-.10	.17	.91
Long Beach	-.23	.16	.79
Portland	-.01	.14	.99
<b>NEED</b>			
ADL Needs	.01	.03	1.01
IADL Needs (of 7)	.04	.03	1.04
Sensory Problems	.01	.11	1.01
Incontinence Prob.	.06	.11	1.07
Poor Hlth. Status	.10	.10	1.11
Prior Hospital	.55**	.11	1.73
Prior Nursing Home	-.22	.15	.80
Cognitive Problem	.37*	.15	1.45
<b>MEDICAL PROBLEMS</b>			
Circulatory	-.08	.12	.93
Respiratory	.29**	.11	1.34
Musculoskeletal	.12	.11	1.13
Nervous System	.03	.12	1.03
Diabetes	.07	.14	1.07
Cancer	.37**	.13	1.45
Genito-urinary	.001	.12	1.00
Skin	-.05	.12	.95

Model chi-square 74.83\*\*

Degrees of Freedom 24

\* p < .05

\*\*p < .01

**Table 4.8. Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of Hospital Days per day of enrollment for total sample with some Hospital Use during the first 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS B	SE	24 MOS B	SE
N =	669		806	
<b>PREDISPOSING</b>				
Age	-.0005	.0004	-.0006	.0003
Female	.0038	.0067	-.0014	.0055
Live Alone	-.0064	.0076	-.0107	.0061
Live w. Spouse	-.0022	.0079	-.0040	.0064
<b>ENABLING</b>				
Income und.10K	.0027	.0067	.0021	.0054
Brooklyn	.0046	.0104	-.0001	.0085
Long Beach	-.0184	.0098	-.0173*	.0081
Portland	-.0257**	.0086	-.0225**	.0069
<b>NEED</b>				
ADLNeeds	-.0016	.0017	-.0018	.0015
IADLNeed	.0047*	.0021	.0041*	.0017
Sensory Prob.	-.0040	.0064	.0010	.0053
Incontinence	-.0013	.0067	.0037	.0054
Cognitive	-.0097	.0083	-.0152*	.0068
Prior Hospital	.0033	.0065	.0064	.0053
Prior nurs hm	-.0078	.0086	-.0044	.0069
PoorHlth Stat	.0038	.0064	.0015	.0052
Died	.0841**	.0074	.0573**	.0054
Disenrolled	.0642**	.0176	.0337**	.0101
<b>MEDICAL PROBS.</b>				
Circulatory	-.0015	.0070	-.0046	.0057
Respiratory	-.0021	.0064	.0043	.0051
Musculoskel	.0062	.0066	.0074	.0054
Nerve/Sense	.0038	.0074	.0028	.0060
Diabetes	-.0128	.0084	-.0098	.0067
Cancer	.0082	.0076	.0174**	.0064
Urinary	-.0040	.0069	-.0019	.0057
Skin	-.0024	.0068	-.0045	.0055
INTERCEPT	.0587	.0361	.0578*	.0283
R <sup>2</sup>	24.2%		20.1%	

\* p < .05  
 \*\* p < .01

**TABLE 4.9. Logistic Regression of Any Physician Use during first 12 Months after Baseline CAF for All Members. N = 1808.**

VARIABLE	ESTIMATE	S.E.	ODDS RATIO
Intercept	-.54	.66	
<b>PREDISPOSING</b>			
Age	.01	.01	1.01
Female	-.15	.13	.86
Live Alone	.29*	.14	1.33
Live w. Spouse	.17	.14	1.18
<b>ENABLING</b>			
Income under \$10k	-.15	.12	.86
Brooklyn	.92**	.18	2.50
Long Beach	1.58**	.20	4.84
Portland	.94**	.15	2.57
<b>NEED</b>			
ADL Needs	-.12**	.03	.896
IADL Needs (of 7)	-.01	.04	.99
Sensory Problems	-.05	.12	.95
Incontinence Prob.	-.05	.12	.91
Poor Hlth. Status	-.10	.12	.90
Prior Hospital	.23	.12	1.26
Prior Nursing Home	.05	.17	1.05
Cognitive Problems	.20	.16	1.22
<b>MEDICAL PROBLEMS</b>			
Circulatory	.10	.13	1.11
Respiratory	.13	.12	1.14
Musculoskeletal	.02	.12	1.02
Nervous System	.22	.13	1.24
Diabetes	.05	.16	1.05
Cancer	-.07	.15	.93
Genito-urinary	-.10	.13	.91
Skin	.07	.13	1.07

Model chi-square 114.93\*\*

Degrees of Freedom 24

\* p < .05

\*\*p < .01

<sup>1</sup> Data for MD visits in 1988 were unavailable for Long Beach site. Cases for this period were eliminated from analysis of MD visits.

**Table 4.10. Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of Physician Visits per enrollment day for total sample with some Use for 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS B	SE	24 MOS B	SE
N =	1315		1245	
<b>PREDISPOSING</b>				
Age	-.0004	.0003	-.0005**	.0002
Female	-.0028	.0039	-.0009	.0028
Live Alone	-.0005	.0043	-.0023	.0030
Live w. Spouse	.0040	.0045	-.0045	.0032
<b>ENABLING</b>				
Income und.10K	.0005	.0038	-.0005	.0027
Brooklyn	-.0062	.0060	.0038	.0041
Long Beach	-.0177**	.0056	-.0109**	.0040
Portland	-.0144**	.0050	-.0052	.0034
<b>NEED</b>				
ADLNeeds	.0025*	.0010	.0011	.0007
IADLNeed	-.0031**	.0011	-.0004	.0008
Sensory Prob.	-.0008	.0037	.0017	.0026
Incontinence	-.0022	.0039	-.0037	.0027
Cognitive	.0051	.0051	-.0092*	.0036
Prior Hospital	.0049	.0037	.0010	.0026
Prior nurs hm	.0065	.0051	.0005	.0036
PoorHlth Stat	.0037	.0036	.0010	.0025
Died	.0231**	.0053	.0172**	.0029
Disenrolled	.0220*	.0102	.0136**	.0047
<b>MEDICAL PROBS.</b>				
Circulatory	.0028	.0040	.0007**	.0028
Respiratory	.0041	.0036	.0050*	.0025
Musculoskel	.0061	.0038	.0059*	.0027
Nerve/Sense	.0046	.0042	.0006	.0029
Diabetes	-.0025	.0049	.0019	.0034
Cancer	.0037	.0047	.0129**	.0034
Urinary	.0030	.0041	.0008	.0028
Skin	.0024	.0039	-.0003	.0027
INTERCEPT	.0585**	.0208	.0568**	.0142
R <sup>2</sup>	6.0%		8.9%	

\* p < .05  
 \*\* p < .01

**TABLE 4.11. Logistic Regression of Any Skilled or Intermediate Care Facility Use during 12 months after Baseline CAF for All Members. N = 1868.**

VARIABLE	ESTIMATE	S.E.	ODDS RATIO
Intercept	-3.80**	.72	
<b>PREDISPOSING</b>			
Age	.02**	.01	1.02
Female	-.22	.14	.80
Live Alone	.29*	.15	1.34
Live w. Spouse	-.13	.16	.88
<b>ENABLING</b>			
Income under \$10k	.33*	.13	1.40
Brooklyn	-1.24**	.23	.29
Long Beach	-.29	.18	.75
Portland	-.15	.16	.86
<b>NEED</b>			
ADL Needs(of 7)	.20**	.03	1.22
IADL Needs(of 7)	.01	.04	1.01
Sensory Problems	-.03	.13	.97
Incontinence Prob.	.09	.13	1.09
Poor Hlth. Status	.10	.12	1.10
Prior Hospital	-.16	.13	.85
Prior Nursing Home	.91**	.15	2.48
Cognitive Problems	.82**	.16	2.27
<b>MEDICAL PROBLEMS</b>			
Circulatory	-.20	.13	.82
Respiratory	.01	.12	1.01
Musculoskeletal	-.14	.13	.87
Nervous System	.16	.15	1.17
Diabetes	-.13	.18	.88
Cancer	.35*	.15	1.41
Genito-urinary	.16	.14	1.18
Skin	-.05	.14	.95

Model chi-square 235.51\*\*  
 Degrees of Freedom 24

\* p < .05  
 \*\*p < .01

**Table 4.12. Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of Skilled and Intermediate Care Facility Days per enrollment day for all Members with some Use for 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS B	SE	24 MOS B	SE
N =	455		554	
<b>PREDISPOSING</b>				
Age	-.0006	.0017	-.0014	.0218
Female	.0466	.0271	.0284	.0187
Live Alone	-.0012	.0280	-.0084	.0193
Live w. Spouse	.0268	.0320	-.0131	.0218
<b>ENABLING</b>				
Income und.10K	.0092	.0263	.0191	.0181
Brooklyn	.1083*	.0459	.0429	.0314
Long Beach	.1401**	.0371	.0476	.0258
Portland	-.0045	.0330	-.0315	.0222
<b>NEED</b>				
ADLNeeds	.0137*	.0064	.0051	.0045
IADLNeed(of 7)	-.0192**	.0065	-.0063	.0052
Sensory Prob.	.0323	.0247	.0337	.0172
Incontinence	.0442*	.0256	.0259	.0180
Cognitive	-.0060	.0278	.0178	.0195
Prior Hospital	-.0143	.0258	.0148	.0052
Prior nurs hm	.0731*	.0286	.0517*	.0205
PoorHlth Stat	.0128	.0244	-.0094	.0168
Died	.1940**	.0278	.1283**	.0178
Disenrolled	.2045**	.0671	.1640**	.0340
<b>MEDICAL PROBS.</b>				
Circulatory	.0187	.0262	.0279	.0177
Respiratory	-.0226	.0248	.0113	.0169
Musculoskel	-.0439	.0250	-.0528**	.0173
Nerve/Sense	.0076	.0299	.0217	.0202
Diabetes	.0080	.0350	-.0196	.0233
Cancer	.0039	.0299	.0418	.0215
Urinary	-.0370	.0258	-.0401*	.0183
Skin	-.0042	.0266	-.0112	.0179
INTERCEPT	.0933	.1455	.1872	.0955
R <sup>2</sup>	23.8%		23.3%	

\* p < .05

\*\* p < .01



**TABLE 4.13. Logistic Regression of Any Adult Day Care Use during first 12 Months after Baseline CAF for All Members. N = 1868.**

VARIABLE	ESTIMATE	S.E.	ODDS RATIO
Intercept	-2.78	1.49	
<b>PREDISPOSING</b>			
Age	-.002	.02	1.00
Female	-.09	.27	.91
Live Alone	-.68	.36	.51
Live w. Spouse	-.07	.30	.93
<b>ENABLING</b>			
Income under \$10k	-.47	.29	.63
Brooklyn	-2.35**	.48	.10
Long Beach	-1.33**	.37	.26
Portland	-1.78**	.32	.17
<b>NEED</b>			
ADL Needs	.06	.07	1.06
IADL Needs(of 7)	.35**	.10	1.42
Sensory Problems	-.36	.26	.70
Incontinence Prob.	-.18	.28	.83
Poor Hlth. Status	-.69**	.29	.50
Prior Hospital	-.33	.28	.72
Prior Nursing Home	.39	.33	1.48
Cognitive Problems	.83**	.28	2.29
<b>MEDICAL PROBLEMS</b>			
Circulatory	-.19	.26	.82
Respiratory	-.26	.26	.77
Musculoskeletal	-.13	.25	.88
Nervous System	.40	.33	1.49
Diabetes	.34	.36	1.40
Cancer	-1.82**	.60	.16
Genito-urinary	-.10	.30	.90
Skin	.41	.29	1.51
Model chi-square	164.65**		
Degrees of Freedom	24		

\* p < .05

\*\*p < .01

**Table 4.14. Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of Adult Day Care Days per enrollment day for all Members with some Use for 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS B	SE	24 MOS B	SE
N =	89		104	
<b>PREDISPOSING</b>				
Age	-.0033	.0033	-.0017	.0021
Female	-.0880	.0478	-.0237	.0369
Live Alone	-.0357	.0677	-.0718	.0436
Live w. Spouse	-.1120*	.0540	-.1276	.0412
<b>ENABLING</b>				
Income und.10K	-.0242	.0533	-.0084	.0384
Brooklyn	-.0913	.0858	-.1250	.0639
Long Beach	.1775*	.0753	.0815	.0502
Portland	-.0120	.0634	-.0395	.0410
<b>NEED</b>				
ADLNeeds	.0254*	.0115	.0094	.0086
IADLNeed	-.0091	.0151	.0094	.0110
Sensory Prob.	-.0347	.0449	-.0379	.0323
Incontinence	.0368	.0494	.0727*	.0344
Cognitive	.1000*	.0462	-.0008	.0316
Prior Hospital	-.0352	.0524	.0370	.0367
Prior nurs hm	-.0036	.0579	-.0190	.0443
PoorHlth Stat	.0112	.0504	.0063	.0353
Died	-.0329	.1042	.0056	.0581
Disenrolled	--	--	.0178	.0943
<b>MEDICAL PROBS.</b>				
Circulatory	.0401	.0475	.0087	.0336
Respiratory	.0146	.0526	-.0274	.0368
Musculoskel	.0260	.0450	.0040	.0319
Nerve/Sense	-.0001	.0642	.0225	.0399
Diabetes	.1777**	.0656	.0660	.0443
Cancer	.0718	.1105	-.0804	.0638
Urinary	-.1277*	.0584	-.0670	.0382
Skin	-.0681	.0617	-.0063	.0431
INTERCEPT	.4892	.2676	.2664	.1761
R <sup>2</sup>	47.5%		40.7%	

\*P < .05

\*\*P < .01

**TABLE 4.15. Logistic Regression of Any Home Health or Personal Care Use during first 12 Months after Baseline CAF for All Members. N = 1868.**

VARIABLE	ESTIMATE	S.E.	ODDS RATIO
Intercept	-.80	.65	
<b>PREDISPOSING</b>			
Age	-.002	.01	1.00
Female	.27*	.12	1.30
Live Alone	.41**	.13	1.51
Live w. Spouse	.16	.14	1.18
<b>ENABLING</b>			
Income under \$10k	.05	.12	1.06
Brooklyn	-1.49**	.18	.23
Long Beach	.69**	.18	2.00
Portland	-.55**	.15	.58
<b>NEED</b>			
ADL Needs	.18**	.03	1.20
IADL Needs	.15**	.03	1.16
Sensory Problems	-.23	.11	.79
Incontinence Prob.	.09	.12	1.10
Poor Hlth. Status	.20	.11	1.22
Prior Hospital	.32**	.11	1.38
Prior Nursing Home	.10	.17	1.11
Cognitive Problems	-.03	.16	.97
<b>MEDICAL PROBLEMS</b>			
Circulatory	-.05	.12	.95
Respiratory	.15	.11	1.16
Musculoskeletal	.09	.12	1.09
Nervous System	.11	.13	1.12
Diabetes	-.12	.15	.89
Cancer	.19	.14	1.20
Genito-urinary	.19	.13	1.21
Skin	.15	.12	1.16

Model chi-square 274.04\*\*  
 Degrees of Freedom 24

\* p < .05  
 \*\*p < .01

**Table 4.16. Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of Home Health and Personal Care Visits per enrollment day for all Members with some Use for 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS B	SE	24 MOS B	SE
N =	1216		1135	
<b>PREDISPOSING</b>				
Age	.0010	.0016	-.0015	.0013
Female	.0048	.0261	.0280	.0223
Live Alone	.0069	.0278	-.0246	.0236
Live w. Spouse	.0399	.0295	-.0177	.0249
<b>ENABLING</b>				
Income und.10K	.0059	.0246	-.0106	.0212
Brooklyn	.4302**	.0439	.2586**	.0353
Long Beach	-.0140	.0330	-.0392	.0291
Portland	.0147	.0323	.0197	.0274
<b>NEED</b>				
ADLNeeds	.0233**	.0066	.0186**	.0057
IADLNeed	.0088	.0080	.0135*	.0067
Sensory Prob.	-.0143	.0237	.0111	.0205
Incontinence	.0107	.0244	.0165	.0210
Cognitive	-.0478	.0331	-.0211	.0279
Prior Hospital	.0321	.0242	.0262	.0207
Prior nurs hm	.0299	.0311	-.0675*	.0272
PoorHlth Stat	.0095	.0232	.0089	.0199
Died	.1260**	.0316	.0580**	.0222
Disenrolled	.0681	.0625	.0820*	.0379
<b>MEDICAL PROBS.</b>				
Circulatory	-.0297	.0256	-.0385	.0218
Respiratory	-.0021	.0234	.0384	.0199
Musculoskel	-.0059	.0242	-.0141	.0210
Nerve/Sense	-.0148	.0275	.0012	.0227
Diabetes	.0309	.0325	.0243	.0271
Cancer	.0810**	.0302	.1329**	.0258
Urinary	.0360	.0256	.0461*	.0221
Skin	.0229	.0251	.0057	.0217
INTERCEPT	-.0718	.1344	.0968	.1115
R <sup>2</sup>	19.5%		19.1%	

\* p < .05

\*\* p < .01

**TABLE 4.17. Logistic Regression of Any Home Health Use during first 12 Months after Baseline CAF for All Members. N = 1868.**

VARIABLE	ESTIMATE	S.E.	ODDS RATIO
Intercept	-1.31*	.62	
<b>PREDISPOSING</b>			
Age	-.01	.01	.99
Female	.09	.12	1.09
Live Alone	.24	.13	1.27
Live w. Spouse	.08	.14	1.09
<b>ENABLING</b>			
Income under \$10k	.27*	.12	1.31
Brooklyn	-.72**	.19	.49
Long Beach	1.48**	.16	4.41
Portland	.48**	.14	1.62
<b>NEED</b>			
ADL Needs	.21**	.03	1.23
IADL Needs	.05	.03	1.05
Sensory Problems	-.20	.11	.82
Incontinence Prob.	-.15	.12	.86
Poor Hlth. Status	.19	.11	1.21
Prior Hospital	.54**	.11	1.72
Prior Nursing Home	-.02	.15	.98
Cognitive Problems	-.27	.16	.76
<b>MEDICAL PROBLEMS</b>			
Circulatory	-.06	.12	.94
Respiratory	.09	.11	1.10
Musculoskeletal	.17	.11	1.18
Nervous System	.03	.13	1.03
Diabetes	-.09	.15	.92
Cancer	.50**	.14	1.64
Genito-urinary	.07	.12	1.07
Skin	.14	.12	1.15

Model chi-square 334.25  
 Degrees of Freedom 24

\* p < .05  
 \*\*p < .01

**Table 4.18 Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of Home Health Visits per enrollment day for all Members with some Use for 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS B	SE	24 MOS B	SE
N =	870		872	
<b>PREDISPOSING</b>				
Age	-.0009	.0009	-.0012	.0006
Female	-.0089	.0149	.0137	.0107
Live Alone	.0068	.0159	-.0057	.0113
Live w. Spouse	.0399*	.0170	.0218	.0120
<b>ENABLING</b>				
Income und.10K	.0036	.0140	-.0029	.0101
Brooklyn	.2086**	.0279	.0935**	.0197
Long Beach	-.0067	.0205	-.0052	.0148
Portland	.0058	.0201	.0119	.0143
<b>NEED</b>				
ADLNeeds	.0060	.0037	.0045	.0027
IADLNeed	.0072	.0045	.0054	.0032
Sensory Prob.	-.0039	.0135	.0004	.0098
Incontinence	.0005	.0139	.0157	.0101
Cognitive	-.0511*	.0201	-.0423*	.0141
Prior Hospital	-.0015	.0139	.0026	.0098
Prior nurs hm	.0271	.0174	-.0150	.0129
PoorHlth Stat	-.0001	.0134	-.0050	.0096
Died	.1101**	.0177	.0718**	.0105
Disenrolled	.1129**	.0418	.0171	.0186
<b>MEDICAL PROBS.</b>				
Circulatory	.0089	.0148	-.0092	.0106
Respiratory	.0037	.0133	.0117	.0095
Musculoskel	.0030	.0141	-.0074	.0102
Nerve/Sense	-.0167	.0155	.0023	.0109
Diabetes	.0114	.0184	.0168	.0130
Cancer	.0528**	.0166	.0684**	.0120
Urinary	-.0037	.0145	.0010	.0105
Skin	-.0018	.0140	.0003	.0102
INTERCEPT	.0358	.0756	.0616	.0532
R <sup>2</sup>	21.5%		20.6%	

\* p < .05

\*\* p < .01

**TABLE 4.19. Logistic Regression of Personal Care Use during first 12 Months after Baseline CAF for All Members. N = 1868.**

VARIABLE	ESTIMATE	S.E.	ODDS RATIO
Intercept	-.45	.60	
<b>PREDISPOSING</b>			
Age	-.01	.01	.99
Female	.17	.11	1.18
Live Alone	.29*	.12	1.34
Live w. Spouse	.16	.13	1.18
<b>ENABLING</b>			
Income under \$10k	.02	.11	1.02
Brooklyn	-1.31**	.17	.27
Long Beach	-.19	.15	.82
Portland	-1.06**	.14	.35
<b>NEED</b>			
ADL Needs	.11**	.03	1.12
IADL Needs	.13**	.03	1.14
Sensory Problems	-.05	.11	.95
Incontinence Prob.	.21	.11	1.23
Poor Hlth. Status	.13	.10	1.14
Prior Hospital	.01	.11	1.01
Prior Nursing Home	.11	.15	1.12
Cognitive Problems	.04	.15	1.04
<b>MEDICAL PROBLEMS</b>			
Circulatory	-.12	.11	.88
Respiratory	.13	.10	1.14
Musculoskeletal	-.12	.11	.89
Nervous System	.21	.12	1.23
Diabetes	-.02	.14	.99
Cancer	.03	.13	1.03
Genito-urinary	.31**	.12	1.36
Skin	.06	.11	1.06

Model chi-square 176.02\*\*  
 Degrees of Freedom 24

\* p < .05  
 \*\*p < .01

**Table 4.20. Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of Personal Care Use per enrollment day for all Members with some Use for 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS B	SE	24 MOS B	SE
N =	913		891	
<b>PREDISPOSING</b>				
Age	.0105	.0065	-.0020	.0056
Female	.0951	.1060	.0680	.0950
Live Alone	-.0032	.1161	-.0821	.1024
Live w. Spouse	.0283	.1202	-.2247*	.1061
<b>ENABLING</b>				
Income und.10K	.0013	.1016	-.0597	.0917
Brooklyn	1.4716**	.1729	.8919**	.1432
Long Beach	-.0022	.1342	-.1154	.1255
Portland	.2040	.1342	.1251	.1165
<b>NEED</b>				
ADLNeeds	.0833**	.0273	.0623*	.0251
IADLNeed	.0096	.0339	.0479	.0300
Sensory Prob.	-.0591	.0983	.0673	.0880
Incontinence	.0168	.0995	.0562	.0896
Cognitive	-.0488	.1329	.0137	.1171
Prior Hospital	.1488	.1002	.1473	.0899
Prior nurs hm	.0490	.1276	-.2858*	.1175
PoorHlth Stat	.0348	.0959	.0423	.0858
Died	.2857*	.1323	.0542	.0962
Disenrolled	.0870	.2473	.3948*	.1668
<b>MEDICAL PROBS.</b>				
Circulatory	-.1461	.1037	-.1335	.0923
Respiratory	-.0355	.0958	.1201	.0844
Musculoskel	.0355	.0980	-.0128	.0890
Nerve/Sense	-.0586	.1167	-.0589	.1001
Diabetes	.0912	.1326	-.0093	.1126
Cancer	.1539	.1258	.3755**	.1130
Urinary	.1459	.1049	.1529	.0947
Skin	.1502	.1056	.0394	.0942
INTERCEPT	-.7549	.5420	.2519	.4731
R <sup>2</sup>	17.9%		16.5%	

\* p < .05

\*\* p < .01



**Table 4.21 Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of the Natural Log of Total Cost per Enrollment Day for all Members with some Use for 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS B	SE	24 MOS B	SE
N =	1684		1474	
<b>PREDISPOSING</b>				
Age	-.0056	.0059	-.0086	.0057
Female	-.0261	.0927	-.0018	.0931
Live Alone	.2651**	.1011	.0537	.1000
Live w. Spouse	.0651	.1069	-.1593	10.70
<b>ENABLING</b>				
Income und.10K	.0588	.0895	.1128	.0896
Brooklyn	-.1680	.1393	-.1255	.1398
Long Beach	.3618**	.1271	.1465	.1291
Portland	.2832**	.1271	.2682*	.1139
<b>NEED</b>				
ADLNeeds	.1377**	.0238	.0761**	.0242
IADLNeed	.0790**	.0262	.1076**	.0262
Sensory Prob.	.0434	.0868	.0124	.0869
Incontinence	.1393	.0906	.1097	.0902
Cognitive	.2799*	.1186	.2134	.1180
Prior Hospital	.3660**	.0867	.5098**	.0865
Prior nurs hm	.2705*	.1163	.1553	.1188
PoorHlth Stat	.0850	.0841	.0425	.0426
Died	1.8505**	.1157	1.1572**	.0956
Disenrolled	.5380*	.1163	-.0409	.1557
<b>MEDICAL PROBS.</b>				
Circulatory	-.1734	.0923	-.2569**	.0914
Respiratory	.1324	.0854	.1975*	.0843
Musculoskel	-.0733	.0874	-.1073	.0879
Nerve/Sense	.1295	.0980	.1273	.0958
Diabetes	.0614	.1154	.2019	.1140
Cancer	14.55	.1090	.2435*	.1097
Urinary	-.0042	.0948	-.0358	.0949
Skin	-.0550	.0923	-.0027	.0916
INTERCEPT	.5619	.4870	1.4060**	.4707
R <sup>2</sup>	27.8%		24.2%	

\* p < .05  
 \*\* p < .01

**Table 4.22. Amount of Variance Contributed by Predisposing, Enabling and Need Variables in OLS Hierarchical Regression Models, Total Sample and those Alive after 24 Months.**

VARIABLE TYPE	HOSP	MD	SNF/ICF	HOME HLTH	PERS CARE	ADULT DAY CARE
<hr/>						
PREDIS POSING						
TOTAL	.022	.014	.012	.031	.013	.118
ALIVE	.023	.008	.032	.012	.028	.139
ENABLING						
TOTAL	.012	.006	.029	.045	.095	.160
ALIVE	.037	.005	.088	.121	.201	.101
NEED						
TOTAL	.046	.039	.094	.118	.052	.132
ALIVE	.027	.051	.060	.025	.042	.121
TOTAL						
TOTAL	.080	.059	.135	.163	.160	.409
ALIVE	.087	.064	.180	.158	.271	.412

**Table 4.23. Percent of Total Explained Variance Contributed by Predisposing, Enabling and Need Variables in OLS Hierarchical Regression Models, Total Sample after 24 Months.**

VARIABLE TYPE	HOSP	MD	SNF/ ICF	HOME HLTH	PERS CARE	ADULT DAY CARE
<hr/>						
PREDIS POSING						
TOTAL	28%	24%	9%	19%	8%	29%
ALIVE	26	13	18	8	10	34
ENABLING						
TOTAL	15	10	21	28	59	39%
ALIVE	43	8	49	77	74	25
NEED						
TOTAL	58	66	70	72	33	32
ALIVE	31	80	33	16	15	29
TOTAL	100	100	100	100	100	100

Table 4.24. Behavioral Model Hypotheses, Direction of effects in Logit Regression Models, Year One.

<u>DEPENDENT</u> <u>INDEPENDENT</u>	PERS CARE	HOM HLTH	ADC	SNF/I CF	MD	HOSP
<b>PREDISPOSING</b>						
AGE	+	+	+	+	+	-
FEMALE	+	+	-	-	-	-
LIVE ALONE	+*	+***	-	+	+	+
LIVE SPOUSE	+	+*	-	-	+	-
LIVE OTHERS	ref	ref	ref	ref	ref	ref
<b>ENABLING</b>						
LOW INCOME	-	+*	-	+	-	+
PORTLAND	-**	+***	-**	+	+***	+
LONG BEACH	-	+***	-**	-	+***	-
MINNEAPOLIS	ref	ref	ref	ref	ref	ref
BROOKLYN	-**	-**	-**	-	+***	-
<b>NEED</b>						
POORHLTHST	+	+	-**	+	-	+
IADL	+***	+	+***	+	-	+
ADL	+***	+***	+	+	-**	+
SPEECH/HRNG	-	-	-	+	-	+
INCONTINENT	+	-	-	+	-	+
COG. IMPAIR	+	-	+***	+*	+	+*
USED HOSP.	-	+***	-	+***	+	+***
USED SNF	+	-	+	-	+	-
CIRCULATORY	-	-	-	-	+	-
RESPIRATORY	+	+	-	+***	+	+***
MUSCULOSKEL	-	+	-	+	+	+
NERV/SENSE	+	+	+	+	+	+
DIABETES	-	-	+	+	+	+
CANCER	+	+***	-*	+***	-	+***
URINARY	+	+	-	+	-	+
SKIN	+	+	+	-	+	-

**Table 4.25. Behavioral Model Hypotheses, Direction of Effects in OLS Hierarchical Regression Models Predicting Amount of Utilization or Cost, Year One.**

<b>DEPENDENT INDEPENDENT</b>	<b>PERS CARE</b>	<b>HOM HLTH</b>	<b>ADC</b>	<b>SNF/I CF</b>	<b>MD</b>	<b>HOSP</b>	<b>TOT COST</b>
<b>PREDISPOSING</b>							
AGE	+	+	-	-	-	-	-
FEMALE	+	-	-	+	-	+	-
LIVE ALONE	-	+	-	-	+	-	+
LIVE SPOUSE	+	+	-	-	+*	-	-
LIVE OTHERS	ref	ref	ref	ref	ref	ref	ref
<b>ENABLING</b>							
LOW INCOME	+	+	-	+	-	+	+
PORTLAND	+	+	-	+	-*	-**	+
LONG BEACH	-	-	+*	+**	-*	-	+
MINNEAPOLIS	ref	ref	ref	ref	ref	ref	ref
BROOKLYN	+**	+**	-	+*	-	-	-
<b>NEED</b>							
POORHLTHST	+	+	+	+	+	+	-
IADL	+	+*	-	-**	-**	+**	-
ADL	+**	+	+*	+*	+	0	+**
SPEECH/HRNG	-	-	-	+	+	-	-
INCONTINENT	+	+	+	+*	-	+	+**
COG. IMPAIR	-	-	+*	-	+*	-	-
USED HOSP.	+	-	-	-	+*	+	+
USED SNF	+	+	-	+	+	-	-
CIRCULATORY	-	+	+	+	+	+	-
RESPIRATORY	-	+	+	+	-	+	+
MUSCULOSKEL	+	-	+	-*	+	+	-
NERVE/SENSE	-	-	-	-	+	-	-
DIABETES	+	+	+*	+	-	-	-
CANCER	+	+**	+	+	-	+	+
URINARY	+	-	-*	-	+	-	+
SKIN	+	-	-	-	+	-	-

## **CHAPTER 5**

### **INTERPRETATION AND CONCLUSIONS**

Although current policy direction emphasizes the use of managed care to help control costs in the Medicare and Medicaid programs, there is still little experience in applying managed care to long term care or to the integration of medical, home and community care for the disabled.

The two best known examples continue to be the Social HMO demonstration and the On Lok Program of All-inclusive Care for the Elderly (PACE) replication project. Other managed care approaches are currently being designed in state Medicaid programs. Perhaps the most prominent example is in Minnesota where Medicaid and Medicare funds are being combined in a program to serve the disabled elderly under managed care. Some Medicare Risk HMOs may also choose to add home and community care as an additional benefit in the future and second generation SHMOs are now being planned which will allow chronic care benefits to be added on to existing HMOs.

Study of the first round of the SHMO demonstration, from 1985 to 1989, has provided us with early data to help build an understanding of utilization and expenditure experience for integrated systems of medical, home and community care. It provides some basis both for the understanding of home and community care policy as well as offering predictive data to assist health plans in understanding potential risk and how to target services to those most likely to be high utilizers of costly services.

## **I. THE ANDERSEN MODEL**

This study attempted to build on a number of studies using the Andersen behavioral model to examine medical and long term care services use by the elderly (See Chapter 2). The study also built on economic models which make important contributions to understanding supply and demand for elderly services. Given available data in the SHMO evaluation, it was necessary to use the Site of enrollment as a proxy for supply side issues like market area, practice pattern differences, and ownership issues. Practice patterns, in turn, could be related to specific characteristics of the health plan or geographic variations in the delivery of services.

The most important contribution made by this study to the question of modeling utilization and expenditures was the key role played by enabling variables and by site in an impaired population. The amount of overall variance explained by the model was consistent with the range of variances explained by previous models. The model explained a low of 4.8% of variance in physician visits to highs of 27.8% and 47.5% of variance in personal care and adult day health use. In general the model performed better for chronic care services and less well for physician and hospital service utilization for the alive and enrolled group. The addition of died and disenrolled variables to the model for the total sample



increased explained variance greatly for acute medical service use.

The prominent role played by the site variable was an important finding. Site may have been more important given that all members of the study sample were disabled and had a high level of need. Theorizing by Andersen about the behavioral model (1968) as well as most previous behavioral model studies would suggest that need variables would predict the most variance in service use. Andersen had predicted, however, that the role of enabling factors would be greater in modeling services of a more discretionary nature. That is, enabling factors would play a more important role where the patient or family member had a greater amount of discretion over their use and where insurance coverage was lacking (Ibid.). In this study, need variables were indeed more important predictors for acute medical services and tended to be more important for the sample which included those who died and who disenrolled. For these high users with more acute problems and for use of medical services, use, even given practice pattern and market area differences, was more responsive to need.

The increased role that enabling factors play for the alive and enrolled sample indicates that indeed personal or family discretion, as described in earlier Andersen model studies, may be involved. Given, however, that these services were all covered in the SHMO benefit package, even with per-

visit copayments which may have been problematic for low income members, patient discretion including available income was not the major factor operating. Future research is needed to examine the precise role of copayments for chronic care services in limiting access and/or controlling utilization. Given the amount of variance predicted by site, it is very likely that for chronic care services used by impaired SHMO members with a relatively stable level of need, that a new factor, "Health Plan Discretion", in conjunction with geographic area practice patterns, market supply, and ownership issues played an important role in explaining differences in use.

The role played by plan, market, and geographic related issues raises questions about the basic premise of the Andersen model. The Andersen model assumes that health services utilization can be predicted primarily from factors related to individual patient characteristics. A small amount of attention is given to market factors through the examination of enabling factors. This study suggests that in an era of market reform and managed care, structural market issues dominate individual factors. Issues related to specific market forces in a given geographic area, practice pattern differences, either geographic or health plan based, and plan differences related to organizational structure, history, ownership, and business strategies substantially reduce the significance of individual factors including need.

The Andersen model, which has, in fact, explained relatively small amounts of variance in use, is clearly inadequate in a period of market domination by large HMOs and insurance companies.

This study begins to examine the importance of breaking down market factors beyond the single site variable which serves as a proxy for a range of supply factors. It is time to move on from the Andersen model and develop models for predicting health service utilization and cost which take into account both a full range of individual factors, but at the same time, fully recognize the importance of market and health plan issues in understanding variations in health care use.

## **II. HEALTH PLAN DISCRETION**

Andersen suggested that individual or family discretion might be important in predicting utilization for certain health services. Health plans in the early SHMO demonstration had significant discretion over which chronic care services to use and under what conditions to use them. For example, we know that the Long Beach site began providing chronic care to moderately impaired members but later cut back based on budgetary considerations. Long Beach also made heavy use of nursing home care as a result of both its hospital partner's ownership of SNF beds and low occupancy of beds in the geographic area. Brooklyn used much more home care than any

other site. It was both located in a high utilization geographic area (New York) and the SHMO sponsor owned the home care provider. It is difficult to know how much of this behavior can be attributed to market and geographic issues. It certainly appears that plan discretion and economic interests played an important role in decisions about care.

In the area of chronic care delivery, where there were few clear guidelines, the sites exercised a great deal of discretion, through their case management function, over how many impaired members received chronic care services and how much they received. Minneapolis, for example, provided almost 60% of its impaired members with some personal care in the first year while Brooklyn offered personal care to only 37% of members. On the other hand the amount of use at Brooklyn, given some use, was 2 to 3 times the amount at any other site (Tables 4.3, 4.4). It is unclear whether Brooklyn did an excellent job of targeting services to those most in need or restricted access to disabled members who should have received them.

It is difficult to say whether these differences in utilization were due to market area differences such as the rich home care environment supported by New York's Medicaid program, high (New York) or low (California and Oregon) nursing home occupancy, health plan strategies to emphasize certain services, varying approaches to targeting care, budget concerns, economic interests of sponsors or partners, or other

unknown variables. What is clear, however, is that the service experience of an impaired SHMO member would vary greatly based on the particular site in which they were enrolled.

Perhaps this variation by site is to be expected given the demonstration nature of the SHMOs and the relative underdevelopment of models which provide medical, home, and community care in a single health plan. It is also cause for serious concern as to whether beneficiaries with similar levels of disability and health problems will receive equitable treatment from one plan to another. In capitated at-risk HMOs, there is incentive to limit treatment based on the fixed availability of dollars. From a consumer and policy perspective, it is important to be able to differentiate the use of different practice strategies to achieve necessary care, or differing community standards, from care decisions that are made strictly to benefit the plan.

The study of health plan discretion within managed care plans and methods to assure equitable and high quality services to disabled populations across plans requires additional research, particularly as health plans begin to consider adding chronic care services outside of the highly scrutinized framework of a demonstration setting. Past studies (Miller & Luft, 1994) indicate that there is a scarcity of research on HMOs which link outcomes and costs. Utilization models will be more useful in the future if they

attempt to differentiate supply side factors related to market, aspects of plan behavior, ownership issues, and regional policy variations.

### **III. CHRONIC CARE DELIVERY IN MANAGED CARE**

Managed care plans, understandably want to be familiar with the risks involved in providing chronic care within a managed care setting before adding a long term care benefit. Risks include understanding both the utilization and cost of the additional covered services as well as potential adverse selection effects of enrolling a disabled population on more costly medical care use. It is also important to understand whether chronic care benefits can be expected to serve as a substitute for some higher cost acute benefits, as proposed by early findings from the On Lok demonstration (Zawadski & Eng, 1988), and how to best target chronic care services in order to reduce hospitalization.

**INTEGRATION OF SERVICES AND SUBSTITUTION OF CHRONIC CARE FOR HOSPITAL SERVICES:** Findings from this study indicate that impaired SHMO members on average used 1 1/2 to 2 times the number of hospital days as the total membership (3,080 to 5,280 days/1000 versus 1,785 to 2,225 days/1000). Within the four SHMO sites, it was not clear, however, whether chronic care was used at all, or how much it was used, as a substitute

for hospital care. At the Minneapolis site, prior hospital use was a positive predictor of personal care use ( $p < .07$ ), but hospital use was second highest of the four sites. There was no conclusive evidence that home and community care services, in fact, reduced, hospital or other acute care use.

It is quite possible that the lack of day to day integration between medical services and chronic care services reported in the earlier SHMO evaluation (Harrington, et al., 1993b), prevented the SHMOs from gaining the benefit of using chronic care services as a substitute for hospital use. Much closer integration was present in the On Lok model given the presence of a multi-disciplinary team and team care planning (Zawadski & Eng, 1988). HMOs which take on a disabled population must closely integrate their medical and chronic care services if they are to experience a beneficial substitution and cost reduction effect. Management of members who have functional disabilities as well as complex medical problems, as almost all of the study sample did, requires the delivery of a package of services. Study of chronic care must include the understanding of how acute and chronic care services substitute for and complement one another and how outcomes resulting from this total package can be measured.

**INTEGRATION OF MEDICARE AND MEDICAID:** The SHMO model had the potential to test the effect of the integration of Medicare covered acute medical services with Medicaid covered chronic

care services. This opportunity was lost when plans had difficulty negotiating arrangements with state Medicaid agencies and enrolled very small numbers of Medicaid recipients. At two sites (Portland and Long Beach) Medicaid members with long term chronic care needs could not integrate their SHMO and Medicaid benefits. These two reimbursement sources must be integrated at both the policy and delivery level if low income disabled elders are to receive an integrated package of medical and long term care which takes advantage of full substitution and complementarity of services.

**PREDICTING HOSPITAL USE FOR THE IMPAIRED POPULATION:** In addition to prior hospital use, cancer, and respiratory problems, IADL needs and cognitive problems were also significant positive predictors of some hospital use. Although IADL problems predicted a relatively small additional likelihood of use (odds ratio of 1.10), cognitive problems increased the likelihood of hospital use as much or more than any medical condition, including cancer (odds ratio of 1.45 to 1.66). It was second only to prior hospital use in its strength of prediction. IADL needs were also significant positive predictors of amount of hospital use when those who died and disenrolled were included. IADL needs were a negative predictor of amount of use for those who remained alive and enrolled. Number of ADL needs were a negative



predictor of any hospital use for the 24 month total sample. This was surprising given the likelihood that heavily disabled elders also had serious medical problems and raises questions regarding adequate access to care for these elders. These results could reflect success of the SHMOs in reducing hospital use for those with heavy disabilities, reflect access problems, or indicate that given the disabled status of the whole study sample, further refinements in ADL levels were not related to variations in care.

The above results indicate that HMOs clearly need to target special services to elders with dementias and other cognitive problems, if they are to control utilization. Cognitive problems were at least as important in predicting hospital use, for an impaired elderly population, as any specific medical problem, except perhaps cancer. HMOs have had some difficulties in delivering high quality mental health services (Miller & Luft, 1994). It is unclear whether cognitive problems will also prove to be an area of difficulty.

IADL needs also are an important indicator of potential hospital users. The negative effect of IADLs on amount of hospital use for the alive and enrolled group over 24 months may indicate that there are two general groupings of members, one with IADL difficulties who are relatively stable, and a second with IADL problems compounded by more acute episodes of medical problems.

The negative effect of ADLs on any hospital use for the full 24 month period was somewhat surprising but consistent with the significant negative effect of ADL needs on physician use. Elders with heavier disability levels have a harder time physically accessing medical care services. It is also possible that physicians order fewer interventions given existing disabilities, or that certain medical problems receive less attention when heavy functional disability is also present. Despite these problems, ADL needs were still a significant positive predictor of total cost, perhaps being driven by chronic care costs in this impaired population. If the above interpretations regarding hospital and physician care are accurate, they indicate serious questions about equitable distribution of medical care to the heavily disabled. Further research should examine access problems for the disabled in HMO settings.

In addition to supporting existing research which indicates the importance of prior hospitalization and presence of certain medical conditions in predicting high hospital (Pecala, et al., 1995) and, therefore, high cost users, this study supports the inclusion of cognitive problems and IADLs as important targeting criteria for primary and preventive services in managed care settings. It also raises serious concerns about equitable distribution of medical care in health plans, to those with serious functional disabilities and emphasizes the importance of developing quality of care

standards, including practice guidelines, and consumer involvement for HMOs serving the disabled.

**PREDICTING CHRONIC CARE USE:** We use home care, including both home health and personal care, as a proxy for overall chronic care use. The most important predictor of any home care use and the amount of use, given some use, in the SHMOs was the particular health plan in which a member was enrolled. This factor is discussed above as related to market differences, practice patterns, and health plan discretion, all of which are important in understanding chronic care use.

In addition to site differences, being female, living alone, having ADL or IADL needs, and prior hospitalizations all predict use of chronic care services. These predictors are consistent with many previous studies of chronic care use (Soldo, 1985; Liu, et al., 1985; Branch, et al., 1988; Short and Leon, 1990; Miller and McFall, 1991). ADL needs were also a positive predictor of amount of use, as was age. IADL needs were not as constant a predictor as ADLs in examining chronic care use. The presence of cancer was also a positive predictor of amount of use of home care for the total sample.

Although differences in the four health plans and their market areas were most important in predicting chronic care use, findings from this study indicate that HMOs which add a chronic care benefit can expect that gender, living situation, and ADL needs will be consistent predictors of those who will

need formal chronic care services. Age and number of ADLs will also be likely predictors of amount of chronic care required. Given the positive association of IADLs and hospital use, additional targeting of home care integrated with medical care to those with IADL problems only, the so-called moderately disabled, may have positive beneficial results in controlling hospital use and costs.

**OVERALL COSTS:** The total costs of those who died during the study period was by far the highest when we compared those who remained alive and enrolled, those who disenrolled, and those who died. The dollar amount per exposure day for those who died went down substantially for the 24 month period as compared to the 12 month period (\$76 versus \$106/day). This probably indicates that costs incurred close to the time of death were averaged over a longer period of enrollment. It also indicates that plans may recoup the cost of the very high users, if they are enrolled in the same plan over a long period of time.

Site differences reflecting market areas and practice patterns were also most important in predicting overall cost. In addition, however, ADL needs were consistent positive predictors of cost in both the model for those alive and enrolled, as well as the model for the total sample. For those who remained alive and enrolled, prior hospital use, cognitive problems and diabetes were also positive predictors

of total costs.

These findings reinforce the importance of HMOs targeting care to those with cognitive problems and moderate disability if they are to reduce hospital use. ADLs and diabetes were not necessarily associated with high hospital days, but they are still important factors, given high overall costs, for HMOs serving a disabled population to use for targeting purposes.

The SHMOs were for the most part able to use the combination of a benefit limit for chronic care services and a case management approach to control costs for disabled members while providing valuable services. Other HMOs should be able to do the same. The more important concern, from the standpoint of health plan financial success, is the control of overall costs and hospital use for this population. Early findings from the On Lok demonstration indicate that control of hospital days is possible for a heavily disabled population. Reported hospital days were 2,200/1000 at On Lok (Zawadski & Eng, 1988) versus 3,000 to 5,000/1000 for the SHMO sites during approximately the same period. This suggests that the SHMOs did not optimally manage hospital use of their impaired members.

Overall hospital rates in the U.S. for the elderly have dropped since the time of the evaluation due to the impact of the Prospective Payment System, Medicare HMOs, and greater penetration of managed care into the U.S. health system as a

whole (2,474 days/1000 nationally in 1993, with a low of 1,585 days/1000 in the western part of the country (Health Care Financing Administration, 1995)). HMOs which take on a chronic care population (including second round SHMO sites) should be able to benefit both from overall reduction of days in the market and from findings at On Lok and from the SHMO evaluation presented here.

#### **IV. THE QUESTION OF FAVORABLE DISENROLLMENT**

Several studies have documented favorable enrollment in Medicare HMOs in general (Brown, et al., 1993), and in the SHMO demonstration, in particular (Manton, et al., 1993; Harrington, et al. 1993a). There have also been findings concerning favorable disenrollment in the overall SHMO evaluation. Findings in this study indicate that the SHMOs experienced favorable disenrollment for their impaired populations as well.

For all types of utilization studied, except adult day care, those who disenrolled, on average had greater use than those who remained alive and enrolled (Tables 4.12 to 4.15). Utilization levels for the disenrolled group fell between the rates for those who died and those who remained alive. The percentage of those who disenrolled and had some use was, however, smaller than either the alive and enrolled group or the group who died. Use for those who disenrolled and had use was very high (Tables 4.13 and 4.15). These findings point to

a dichotomy between those who disenrolled and, for the most part, did not use services and those who were very heavy users. Overall the effect of disenrollment in the impaired sample was to remove heavy users from membership.

The dichotomy between users and non-users suggests that disenrollment may have been for different reasons, inability to obtain services or dissatisfaction with physicians, services, or premium levels for non-users, and dissatisfaction with or inability to gain appropriate or adequate quantity of services for the users. Earlier studies (Harrington, et al., 1993) also found that sites in more competitive market areas (Long Beach and Minneapolis) experienced greater disenrollment. Some of those who disenrolled may also have reached the limit of their nursing home benefit and disenrolled for that reason.

At Long Beach, the SHMO Medicaid contract required disenrollment once the chronic care benefit limit was reached. At Portland the SHMO had no Medicaid contract for members who needed long term care services. The number of Medicaid members was small across sites, but other members who reached their benefit limit may have also chosen to disenroll or been counseled to disenroll. Whatever the reasons, disenrollment from the impaired group during the 24 month period from baseline assessment was favorable for the health plans.

Additional qualitative research to study disabled members who disenroll from a SHMO or other Medicare HMOs would be

helpful in understanding more clearly issues related to disenrollment and the disabled.

#### **V. OUT-OF-POCKET COSTS, EQUITY QUESTIONS**

Due to unreliable data on out-of-pocket costs for chronic care services in the fee-for-service comparison group, this study was limited to examining the four SHMO sites where chronic care services were a covered benefit up to established policy limits. All plans had some kind of copayment for home care and nursing home care ranging from 10 to 20% or \$5 per visit. There were a small number of Medicaid eligible members who did not have to make copayments (1% at Portland, 2.5% at Minneapolis, 4% at Brooklyn, and 11% at Long Beach). Portland did not have a Medicaid contract for long term care services. Long Beach Medicaid members were automatically disenrolled when they reached the chronic care benefit limit (\$7,500/yr).

The lack of reliable data on out-of-pocket costs was a serious shortcoming of the study since 52% of the study sample had incomes below \$10,000 per year. This could be expected given the number of women (69%), the advanced age (80), and the number who were unmarried (68%) in the impaired sample.

Effects of income level were not consistent in the models for utilization or costs. Low income was positively associated with skilled and intermediate care use at Portland and Long Beach. It was not significant for other groups or



for the 24 month period. In the OLS model low income positively predicted amount of personal care use at Brooklyn and was a negative predictor ( $p < .08$ ) at Portland. Low income may have been a significant predictor with larger sample sizes in each site. Low income was, however, a significant positive predictor of any skilled and intermediate care facility use and home health services. It is likely that lack of disposable income made it more difficult for impaired SHMO members to remain at home versus being placed in a nursing home. Home health was more likely to be a Medicare covered service without copayment rather than a chronic care service. The potential economic access problem would be most pronounced for personal care services.

Given the lack of data on the comparison group, and the different direction of effects on chronic care at different sites, we cannot say that low income created an access problem to chronic care for SHMO members. All members, except a very small number of Medicaid beneficiaries (who had no premiums), were able to pay the premiums required by the plans, and, at best, some of the required copayments.

Continued research is needed on the effect of out-of-pocket costs and income level on access to chronic care. One could expect, according to the Andersen model, that the enabling factor of income (or assets) would be an important predictor if these services were not covered by insurance. This effect would be weaker if services were covered with a

small copayment as in the SHMO demonstration. Further research should examine the specific problems faced by low income elders in securing home and community care, especially on the role played by copayments for covered services.

#### **VI. UNDER UTILIZATION OF SERVICES BY THE IMPAIRED POPULATION**

Theoretically all members of the sample should have been eligible for at least minimal chronic care services since they all had some level of impairment as documented in a comprehensive assessment. Amounts of use would be expected to vary based on disability level and related medical problems. This study assumed that personal care services were the basic building block of chronic care. In the first year only 48.9% of the disabled members received personal care. If home health services were included, 65.1% of members received some services. Site to site differences were large. At Long Beach 81.7% of members received either personal care or home health. At Brooklyn on 43.2% of members received these services.

Studies of other Medicare HMOs suggest problems caused by under utilization of Medicare covered home health services (Schlenker, et al, 1995), with resulting quality concerns. Given the possibility that other services may have been substituted for personal and home health care, it is impossible to state definitively whether there was under utilization of chronic care services. There still remains a

question as to whether the SHMOs could have provided better quality care, or more effectively controlled costs for the disabled population, if they had provided services to all disabled members. From a larger perspective the SHMOs improved services considerably. Since, in the general population, approximately 70% of the disabled requiring assistance receive only informal care (Liu, et al., 1985), the SHMO was able to reverse this proportion and provide formal care to the majority of disabled members. This study examined utilization in the early period of the SHMOs. Improvements made since the evaluation and in the second round of demonstrations will, hopefully, also allow for continued improvements in providing appropriate care to the disabled. Continued research will be required to understand how the disabled elderly fare in Medicare risk HMOs in general.

## **VII. POLICY IMPLICATIONS OF THIS STUDY**

The theoretical background for this study provided in Chapters 1 and 2, acknowledged the larger reality in which health and long term care services are delivered. Policy differences in the four market areas were one of the factors subsumed in the site variable which proved to be so important in this study. Most of the basic assumptions which have supported policy making in the Reagan-Bush-Gingrich era are still in place. As discussed in Chapter 2, these include: the

presence of a fiscal crisis and the blaming of the elderly for a significant portion of that crisis (Marmor, et al.,1990) ; new federalism which shifts responsibility for health and social programs from the federal level to the state and local level (Estes, 1990); promoting an ideology of individual and private responsibility vs. government responsibility for meeting social needs, including the promotion of private long term care insurance purchase (Ball and Bethell, 1989); and the privatization of service delivery, especially in the for-profit arena (Estes, 1990). Blaming the elderly, at least partially, for a fiscal crisis, is reflected in legislative attempts to cut funds to Medicare, Medicaid, and Social Security in order to resolve the federal budget deficit.

Efforts to block grant the Medicaid and welfare programs with the elimination or reduction of federal standards continues the decentralization approach of New Federalism. Greater reliance on market driven responses to human need as well as movement toward greater individual responsibility also characterize current policy discussion.

It is unlikely, given this political climate, that there will be a major expansion of public coverage of home and community care or nursing home care. There is however, a growing movement, (discussed above) in state Medicaid programs to promote managed care options for delivering integrated medical and chronic care services to older and younger disabled people. There is also increased development of home

care services, both medical and non-medical, by private home health and long term care providers. This expansion reflects increased knowledge among many chronic care providers about federally supported demonstrations like the SHMO and On Lok PACE programs, as well as an understanding that disabled consumers prefer to avoid nursing home use if at all possible.

Given the policy climate and the increased interest in managed care as a preferred delivery system for many kinds of services, findings from this study are critically important. Of particular importance in a market driven managed care approach to serving the disabled, is the understanding that health plan discretion, market area differences, and practice patterns explain a large amount of variation in how chronic care services are delivered.

It is critical for quality assurance standards including baseline practice guidelines to be developed in the delivery of home and community care. These standards must combine protections for consumers with enough flexibility for plans to respond to varying disabilities and medical conditions, as well as to the preferences of different consumers and communities for a variety of approaches to care. Standards should also assure consumers a role in planning their own use of services within benefit limitations as well as involvement in providing advice and governance to health plans.

Study of the SHMO impaired population has not provided clear findings on the problematic role of low income status in

gaining access to chronic care services. Additional research is required in this area.

Policy makers must continue to be aware of the impact of 75 to 80% of long term care dollars being spent on nursing home care and the relative paucity of support for home and community care. Fiscal crises may mitigate against spending additional public dollars to add coverage at this time. It is possible, however, to consider shifting dollars from the nursing home sector to home and community care services. This will clearly not be easy politically, given the established nursing home industry and its lobbying influence.

Changes in reimbursement policies are also needed to integrate Medicare and Medicaid funding for the disabled. Separation of reimbursement for acute care in the Medicare program while chronic care services are paid for by Medicaid, if at all, assures that it will be difficult for service delivery organizations to fully integrate home and community care with medical care. Without full integration of Medicare and Medicaid, it won't be possible to maximize substitution of low cost primary and chronic care for high cost acute services. Their separation is highly problematic both for disabled consumers and for policy makers who wish to control health care costs.

Much of the policy debate concerning adding a public long term care coverage program has centered on the concern that it would be impossible to control expenditures. The SHMO

evaluation indicates that it is possible to provide a meaningful chronic care benefit to most disabled elders within set dollar limits. Implementing public long term care coverage at federal or state levels would not necessarily be an open-ended commitment to profligate spending. The SHMO demonstration provides one model of how to provide home and community care services while controlling costs.

#### **VIII. SUMMARY**

The major conclusions of this study of medical, home, and community care use in the SHMO demonstration are as follows:

1) **Plan discretion makes quality assurance and consumer protections critical.** The Andersen behavioral model is valuable in helping to understand medical and chronic care use. For chronic care services the variation in service use and cost from site to site was extremely important. Site served as a proxy for economic supply side factors such as market area variations, public policy differences, professional practice patterns, and health plan discretion. Understanding that plan discretion is important to consider as a factor when examining different managed care plans expands the concept of discretionary use in behavioral models. Previous theorizing (Andersen, 1968) had assumed that patient or family discretion was an important factor in predicting use

of services not covered by insurance. We propose that, in managed care settings, the health plan also has considerable discretion in allowing or arranging for service use (and costs), especially for non-acute chronic care services. Plan discretion may include economic issues, such as decisions made to maximize return (or in the SHMO to limit losses), emphasizing the use of plan or sponsor owned businesses, plan response to geographic factors (such as heavy home health supply and demand in New York), or specific approaches to care delivery. This plan discretion, in conjunction with geographic market factors, explained a significant amount of variance in the study. Because of the possible inequity of service availability from plan to plan, establishment of quality assurance standards and consumer involvement are critical.

**Under current policies which are shifting health care delivery to insurance company sponsored HMOs operating under market conditions, the Andersen model is no longer adequate. An improved model must examine supply factors such as geographic area, state health policies, plan ownership and discretion, as well as economic and care delivery strategies in order to better understand utilization and expenditures. The health plan rather than the individual is now the appropriate level of analysis.**

2) Integrated medical, home, and community care are required to control hospital use and overall costs for the



**disabled in HMOs. Cognitive problems and moderate disability are important for targeting special services.** HMOs are concerned about additional risks associated with providing chronic care benefits and adverse selection which may accompany such benefits. Study of the SHMO impaired members indicates that hospital use, a principal high cost service, is predicted by some of the same factors as for the elderly population at large, i.e. prior hospital use and the presence of certain medical conditions. In addition this study points to the importance of cognitive problems or dementia and IADL needs as important predictors of use of hospital. In addition the findings suggest that ADL problems, cognitive problems, and the presence of diabetes are predictors of overall higher cost. Medicare HMOs can expect similar predictors of high cost users across their population. They may wish to target special preventive services to older people with cognitive problems, diabetes and ADL or IADL needs. Integration of medical and home and community care services, beyond those available in the early SHMOs are required to adequately control hospital use by disabled members. Creation of multi-disciplinary geriatric teams including, at a minimum, physician, social worker, and nurse would greatly facilitate appropriate targeting of services to the disabled elderly.

3) **Heavily disabled elders have difficulty gaining access to medical care in HMOs.** Findings that the presence of serious functional disabilities, ADL needs, negatively

predicted use of physician and hospital services, raises concerns about equitable access to medical care for the disabled in managed care plans. These findings emphasize the importance of developing quality standards and guarantees for consumer involvement as discussed in # 1 above. The use of multi-disciplinary geriatric teams including the use of home visits when necessary would help provide integration, medical awareness of functional problems, and assure physical access to appropriate medical care.

4) **The SHMOs did experience favorable disenrollment of impaired members during the evaluation period, but impaired members who remained were also high cost users.** Those who disenrolled were split into two groups, those who were extremely high users, and those who used few, if any, services. Some of the high users who disenrolled may have done so because they reached the maximum amount of their chronic care benefit or were forced out by their Medicaid status. Despite the favorable effect of disenrollment, impaired members who remained were, none the less, high users of hospital days and high cost users as compared to the overall SHMO population.

5) **Low income members were more likely to be placed in nursing homes. Understanding the impact of low income on access to home and community care will require further research.** Findings on the role of out-of-pocket costs in deterring access to chronic care services were not clear.

Chronic care services were covered up to established limits with 10 to 20% copayments. These copays may have had a limiting effect on the amount of personal care used by low-income members at the Portland SHMO. On the other hand, low income members at the Brooklyn site received a greater amount of personal care. Low income members were more likely to be placed in skilled and intermediate care facilities. This suggests that it was more difficult for low income members to arrange necessary home and community care. More research is needed on this area, including the effect of income on those who have no coverage, and comparison of chronic care delivered in HMO versus fee-for-service settings.

6) **Not all impaired members received chronic care services in the SHMO. About 65% of impaired members received some formal home care in the first 12 months.** Others may have received some other chronic care. This is a significant improvement over the disabled population at large where 70% receive only informal care. Unanswered questions remain as to whether quality or cost control would have been improved if a larger percent received services beyond the comprehensive assessment provided to all impaired members.

7) **HMOs are currently in vogue in U.S. health policy. They can successfully provide chronic care to disabled elders if they fully integrate medical, home and community care, build on the successes of On Lok, and learn from the failures of the early SHMOs.** Given the favorable climate in U.S.

health policy for all types of managed care, study of utilization and costs for the SHMO impaired members provides valuable initial data on the provision of chronic care to the disabled in HMO settings. These findings along with initial findings from the On Lok PACE demonstration should encourage and inform the development of additional managed care approaches to delivering integrated medical, home and community care under capitated at-risk financing.

The second generation SHMO project has already selected six new HMOs to plan improved delivery and financing models for the elderly. They are expected to offer improved multi-disciplinary geriatric care targeted at their disabled members. Findings from the overall SHMO evaluation and from this study will improve the health plans' chances of success and, more importantly, improve disabled members access to high quality appropriate care.

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**APPENDIX I**

**THE OVERALL SHMO EVALUATION STUDY**

This study used data from a larger evaluation study of the SHMO demonstration projects. The SHMO demonstrations were dependent on voluntary enrollment and were subject to financial pressures to enroll members as quickly as possible in a competitive environment of emerging Medicare HMO's and competing fee for service providers. The SHMO sites were at financial risk for operational losses after the first 30 months of the demonstration period. These competitive pressures made random assignment to the demonstration projects impossible.

Since random assignment was not possible, the larger evaluation study used a comparison group of similar individuals who were chosen from Medicare beneficiaries in each of the demonstration service areas. A variety of design and analytic methods were used to control for selection bias between the two groups (Newcomer, et. al., 1992).

**POPULATIONS STUDIED:** The larger evaluation study drew its sample from the population of elders, 65 years of age or older, who resided in the SHMO demonstration site market areas. These four areas included Portland, Oregon (Kaiser, Medicare Plus II), Minneapolis, Minnesota (Group Health/Ebenezer, Seniors Plus), Brooklyn, New York (Metropolitan Jewish Geriatric Center, Elderplan), and Long Beach, California (Senior Health Action Network, SCAN Health

Plan).

**EVALUATION SAMPLE:** The overall SHMO evaluation included all enrollees in the four SHMO demonstration sites as well as a comparison sample randomly drawn from the universe of Medicare eligibles in the demonstration site market areas. This study examined an impaired sub-sample (described below) of SHMO enrollees from the four demonstration sites.

In the original demonstration design, each SHMO site planned to enroll 4,000 persons including a nursing home certifiable (NHC) population of approximately 200 persons with severe impairments. Another 100 people were expected to become severely impaired during the data collection period. The total enrolled NHC sample at all sites was expected to initially be 800 persons with an additional 400 persons later becoming NHC. Criteria for impairment are shown in Figure 1. Enrollment of NHC members was limited to approximately 5% of the total to protect the SHMO's from the effect of adverse selection on their total risk and expenditures (Harrington & Newcomer, 1991). Because of the specific design of these SHMOs, the conclusions from this study cannot be generalized to a large population which may join a SHMO in the future or to current HMOs in the United States.

**Attrition:** Only 5% of the SHMO sample withdrew from the

study. 2% of the SHMO group were lost to the study because they moved from the area. Some members were lost due to disenrollment. The largest factor in attrition was mortality as almost half of the SHMO impaired participants died during the 36 month overall study period.

## **APPENDIX II**

### **ADDITIONAL RESULTS**

**TABLE A.1. Means of Predisposing, Enabling and Need Variables by Site for Members Who Died During First 12 Months After Baseline CAF.**

	TOTAL	BROOK LYN	LONG BEACH	MINN.	PORTL AND
N	270	34	46	52	138
<b>PREDISPOSING</b>					
Age	79.66	81.68	82.29	77.00	79.30
Female	.54*	.32	.61	.62	.55
Some College	.18**	na	.30	.17	.19
Live Alone	.32*	.21	.50	.33	.29
Live w. Spouse	.35*	.24	.20	.38	.42
Live w. Others	.37*	.62	.30	.35	.34
<b>ENABLING</b>					
Income under \$10k	.47*	.44	.61	.33	.49
Brooklyn	.13	--	--	--	--
Long Beach	.17	--	--	--	--
Minneapolis	.19	--	--	--	--
Portland	.51	--	--	--	--
<b>NEED</b>					
ADL Needs(of 7)	3.70*	4.68	3.07	2.42	4.14
IADL Needs(of 8)	5.12*	5.79	4.61	4.56	5.33
Sensory Problems	.61**	.76	.52	.37	.70
Incontinence Prob.	.50*	.68	.48	.37	.52
Poor Hlth. Status	.65	.68	.54	.69	.67
Prior Hospital	.57	.41	.54	.56	.62
Prior Nursing Home	.17	.15	.20	.21	.16
Cognitive Problems	.16	.26	.11	.08	.17
Medical Problems					
Circulatory	.75	.65	.78	.73	.77
Respiratory	.64	.50	.59	.62	.70
Musculoskeletal	.56	.62	.57	.58	.53
Nervous System	.76	.85	.78	.71	.74
Diabetes	.14	.18	.09	.15	.15
Cancer	.40**	.29	.20	.56	.43
Genito-urinary	.36**	.26	.28	.17	.49
Skin	.29*	.26	.26	.13	.36

\* Significant at  $p < .05$  on the chi square test for differences across all plans.

\*\* Significant at  $p < .01$  for differences across all plans.



**Table A.2. Means of Utilization and Cost Data for First 12 Months from Baseline. Total and Site for those Alive after 12 months. Means of Utilization and Cost per Day of Exposure.**

VARIABLES N	TOTAL	BROOKLYN	L O N G BEACH	MINN.	PORT LAND
	1526	258	314	349	605
HOSPITAL DAYS /EXPOSURE DAY	3.62** .0099	5.28 .0145	3.08 .0085	3.71 .0102	3.14 .0086
MD VISITS /EXPOSURE DAY (N) <sup>1</sup>	7.26 .0199 1482	6.72 .0184 258	7.17 .0198 270	7.44 .0204 349	7.43 .0203 605
SKILLED/INTERMED. CARE FACILITY DAYS /EXPOSURE DAY	15.10* .0416	12.45 .0341	22.53 .0625	10.78 .0297	14.86 .0408
HOME HEALTH VISITS /EXPOSURE DAY	7.37** .0202**	20.24 .0555	6.75 .0187	3.66 .0100	4.32 .0118
PERSONAL CARE HRS. /EXPOSURE DAY	127.93** .3510**	289.06 .7931	103.86 .2855	73.69 .2025	103.00 .2822
ADULT DAY CARE DAYS /EXPOSURE DAY	4.19** .0115**	.42 .0011	5.64 .0155	10.06 .0276	1.66 .0046
HOMECARE VISITS /EXPOSURE DAY	39.35** .1080**	92.50 .2538	32.72 .0901	22.08 .0607	30.07 .0824
TOTAL COST /EXPOSURE DAY	4605** 12.65**	4261 11.68	5758 15.87	2990 8.21	5085 13.94

1 = MD Visits for Long Beach site were eliminated from analysis for 1988 due to missing data.

\*Significant at  $p < .05$  on one way analysis of variance for difference among plans.

\*\*Significant at  $p < .01$  on one way analysis of variance.

**Table A.3. Number and Percent of Sample with Specific Service Utilization or Any Costs during First 12 Months from Baseline. Total and Site for those Alive and Enrolled after 12 months. Mean Use or Cost for Sample Members with some Use or Cost during First 12 Months.**

VARIABLES	TOTAL	BROOKLYN	L O N G BEACH	MINN.	PORT LAND
N	1526	258	314	349	605
# AND % WITH HOSPITAL DAYS	489 32.0%	83 32.2%	87 27.7%	110 31.5%	209 34.5%
MEAN # OF DAYS/USER	11.29**	16.43	11.10	11.77	9.08
# AND % WITH MD VISITS	1112** 75.0%	192 74.4%	242 89.6%	200 57.5%	478 79.0%
MEAN VSTS/USER (N) <sup>1</sup>	9.68 1473	9.03 258	8.00 264	12.98 348	9.40 603
# AND % WITH SKILLED/INTERMED. CARE FACILITY DAYS	319** 20.9%	30 11.6%	63 20.1%	76 21.8%	150 24.8%
MEAN # DAYS/USER	72.22**	107.07	112.31	49.51	59.93
# AND % WITH HOME HEALTH VISITS	690** 45.2%	62 24.0%	231 73.6%	111 31.8%	286 47.3%
MEAN VSTS/USER	16.28**	84.23	9.18	11.51	9.14
# AND % WITH PERSONAL CARE HRS.	738** 48.4%	86 33.3%	189 60.2%	210 60.2%	253 41.8%
MEAN HRS/USER	264.52**	867.17	172.55	122.47	246.29
# AND % WITH ADULT DAY CARE DAYS	83** 5.4%	5 1.9%	12 3.8%	46 13.2%	20 3.3%
MEAN DAYS/USER	77.05**	21.60	147.67	76.30	50.25
# AND % WITH HOMECARE VISITS	976** 64.0%	103 39.9%	267 85.0%	236 67.6%	370 61.2%
MEAN VSTS/USER	61.52**	231.71	38.48	32.66	49.17
# AND % WITH SOME COSTS	1362 89.3%	229 88.8%	287 91.4%	308 88.3%	538 88.9%
MEAN COST/USER	5160**	4801	6300	3388	5718

1 = MD Visits for Long Beach site were eliminated from analysis for 1988 due to missing data.

\*Significant at  $p < .05$  on one way analysis of variance for difference among plans.

\*\*Significant at  $p < .01$  on one way analysis of variance.

**Table A.4. Means per Member of Utilization and Cost Data for First 24 Months from Baseline for Total Sample. Per Member per Day of Exposure Means of Utilization and Cost Data during First 24 Months from Baseline.**

VARIABLES	TOTAL	BROOKLYN	L O N G BEACH	MINN.	PORT LAND
N	1523	241	308	332	642
MEAN HOSPITAL DAYS/ MEMBER	6.96**	10.05	5.35	7.37	6.35
/EXPOSURE DAY	.0199**	.0290	.0138	.0240	.0174
/PMPM	.6050**	.8816	.4195	.7296	.5290
MEAN MD VISITS/MEMBER	11.72*	13.08	10.29	10.16	12.57
/EXPOSURE DAY	.0221*	.0291	.0181	.0208	.0218
/PMPM	.6718*	.8846	.5502	.6323	.6627
(N) <sup>1</sup>	1469	241	254	332	642
MEAN SKILLED/INTERMED. CARE FACILITY DAYS	29.65**	28.61	41.91	25.88	26.11
/EXPOSURE DAY	.0666*	.0490	.0871	.0609	.0662
/PMPM	2.025*	1.49	2.65	1.85	2.01
MEAN HOME HEALTH VISITS	11.01**	22.69	9.66	4.93	10.42
/EXPOSURE DAY	.0310**	.0447	.0180	.0174	.0390
/PMPM	.9424**	1.36	.5472	.5290	1.19
MEAN PERSONAL CARE HRS.	234.53**	541.55	149.54	129.99	214.11
/EXPOSURE DAY	.4346**	.9074	.2575	.2719	.4263
/PMPM	13.21**	27.58	7.83	8.27	12.96
MEAN ADULT DAY CARE DAYS	6.70**	.61	9.15	15.56	3.23
/EXPOSURE DAY	.0096**	.0012	.0125	.0231	.0045
/PMPM	.2918**	.0365	.38	.7022	.1368
MEAN HOMECARE VISITS	69.64**	158.08	47.04	37.43	63.95
/EXPOSURE DAY	.1396**	.2716	.0824	.0853	.1456
/PMPM	4.24**	8.26	2.50	2.59	4.43
MEAN COSTS/MEMBER	10640**	10541	11660	6816	12165
/EXPOSURE DAY	31.33	24.03	30.89	21.67	39.28
/PMPM	952	731	939	659	1194

<sup>1</sup> = MD Visits for Long Beach site were eliminated from analysis for 1988 due to missing data.

\*Significant at  $p < .05$  on one way analysis of variance for difference among plans.

\*\*Significant at  $p < .01$  on one way analysis of variance.

**Table A.5. Number and Percent of Total Sample with Specific Service Utilization or Any Costs during First 24 Months from Baseline by Site. Mean Use or Cost for Sample Members with some Use or Cost during First 24 Months.**

VARIABLES	TOTAL	BROOKLYN	L O N G BEACH	MINN.	PORT LAND
N	1523	241	308	332	642
# AND % WITH HOSPITAL DAYS	806**	131	137	172	366
MEAN # OF DAYS/USER	52.9%	54.4%	44.5%	51.8%	57.0%
USE/EXP DAY FOR USERS	13.14**	18.48	12.04	14.23	11.13
	.0377**	.0534	.0311	.0463	.0305
# AND % WITH MD VISITS	1245**	214	233	243	555
MEAN VSTS/USER	84.8%	88.8%	91.7%	73.2%	86.4%
USE/EXP DAY FOR USERS	13.82	14.73	11.22	13.88	14.54
(N) <sup>1</sup>	.0261*	.0328	.0198	.0284	.0252
	1469	241	254	332	642
# A N D % W I T H SKILLED/INTERMED. CARE FACILITY DAYS	554**	54	109	128	263
MEAN # DAYS/USER	36.4%	22.4%	35.4%	38.6%	41.0%
USE/EXP DAY FOR USERS	46.55**	50.09	70.84	35.37	41.19
	.1759*	.1586	.2365	.1552	.1645
# AND % WITH HOME HEALTH VISITS	872**	80	267	132	393
MEAN VSTS/USER	57.3%	33.2%	86.7%	39.8%	61.2%
USE/EXP DAY FOR USERS	19.23**	68.35	11.14	12.40	17.02
	.0541**	.1347	.0208	.0437	.0638
# AND % WITH PERSONAL CARE HRS.	891**	137	196	217	341
MEAN HRS/USER	58.5%	56.8%	63.6%	65.4%	53.1%
USE/EXP DAY FOR USERS	400.88**	952.65	235.00	198.88	403.10
	.7429**	1.5963	.4046	.4160	.8025
# AND % WITH ADULT DAY CARE DAYS	104**	8	13	52	31
MEAN DAYS/USER	6.8%	3.3%	4.2%	15.7%	4.8%
USE/EXP DAY FOR USERS	98.10**	18.38	216.85	99.33	66.81
	.1412**	.0347	.2968	.1477	.0926
# AND % WITH HOMECARE VISITS	1135**	149	279	241	466
MEAN VSTS/USER	74.5%	61.8%	90.6%	72.6%	72.6%
USE/EXPDAY FOR USERS	93.45**	255.68	51.93	51.56	88.10
	.1873**	.4393	.0909	.1176	.2006
# AND % WITH SOME COSTS	1474	231	295	317	631
MEAN COST/USER	96.8%	95.9%	95.8%	95.5%	98.3%
COST/EXP DAY FOR USERS	10994**	10998	12174	7138	12377
	32.37	25.07	32.25	22.69	39.97

1 = MD Visits for Long Beach site were eliminated from analysis for 1988 due to missing data.

\*Significant at  $p < .05$  on one way analysis of variance for difference among plans.

\*\*Significant at  $p < .01$  on one way analysis of variance.

**Table A.6. Means per Member of Utilization and Cost Data for First 24 Months from Baseline. Total, for those Alive and Enrolled after 24 months. Per Member per Day of Exposure Means of Utilization and Cost Data during First 24 Months from Baseline.**

VARIABLES N	TOTAL	BROOKLYN	L O N G BEACH	MINN.	PORT LAND
	1020	156	195	245	424
MEAN HOSPITAL DAYS/ MEMBER /EXPOSURE DAY	6.22**	8.83	4.91	6.43	5.75
	.0085**	.0121	.0067	.0088	.0079
MEAN MD VISITS/MEMBER /EXPOSURE DAY (N) <sup>1</sup>	13.59** .0186** 982	14.48 .0198 156	12.25 .0168 157	10.86 .0149 245	15.34 .0210 424
MEAN SKILLED/INTERMED. CARE FACILITY DAYS /EXPOSURE DAY	29.33 .0402	33.83 .0463	37.38 .0512	26.96 .0369	25.34 .0347
MEAN HOME HEALTH VISITS /EXPOSURE DAY	10.37** .0142**	22.60 .0309	10.91 .0149	4.26 .0058	9.16 .0125
MEAN PERSONAL CARE HRS. /EXPOSURE DAY	279.32** .3824**	691.54 .9467	187.41 .2566	144.86 .1983	247.64 .3390
MEAN ADULT DAY CARE DAYS /EXPOSURE DAY	9.53** .0130**	.45 .0006	14.46 .0198	19.73 .0270	4.71 .0064
MEAN HOMECARE VISITS /EXPOSURE DAY	80.20** .1098**	195.49 .2676	57.76 .0791	40.47 .0554	71.07 .0973
MEAN COSTS/MEMBER /EXPOSURE DAY	10770** 14.74**	11368 15.56	10904 14.93	6656 9.11	12865 17.61

<sup>1</sup> = MD Visits for Long Beach site were eliminated from analysis for 1988 due to missing data.

\*Significant at  $p < .05$  on one way analysis of variance for difference among plans.

\*\*Significant at  $p < .01$  on one way analysis of variance.

**Table A.7. Number and Percent of Sample with Specific Service Utilization or Any Costs during First 24 Months from Baseline. Total and Site for those Alive and Enrolled after 24 months. Mean Use or Cost for Sample Members with some Use or Cost during First 24 Months.**

VARIABLES	TOTAL	BROOKLYN	L O N G BEACH	MINN.	PORT LAND
N	1020	156	195	245	424
# AND % WITH HOSPITAL DAYS	505 49.5%	75 48.1%	83 42.6%	120 49.0%	227 53.5%
MEAN # OF DAYS/USER	12.57**	18.36	11.54	13.13	10.74
# AND % WITH MD VISITS	878** 89.4%	145 92.9%	151 96.2%	181 73.9%	401 94.6%
MEAN VSTS/USER	15.20	15.58	12.74	14.70	16.22
(N) <sup>1</sup>	982	156	157	245	424
# AND % WITH SKILLED/INTERMED. CARE FACILITY DAYS	330* 32.4%	35 22.4%	57 29.2%	88 35.9%	150 35.4%
MEAN # DAYS/USER	43.91**	51.66	72.82	31.73	38.26
# AND % WITH HOME HEALTH VISITS	568** 55.7%	53 34.0%	180 92.3%	89 36.3%	246 58.0%
MEAN VSTS/USER	18.62**	66.53	11.82	11.72	15.78
# AND % WITH PERSONAL CARE HRS.	609** 59.7%	87 55.8%	133 68.2%	164 66.9%	225 53.1%
MEAN HRS/USER	467.84**	1240.00	274.77	216.40	466.67
# AND % WITH ADULT DAY CARE DAYS	93** 9.1%	5 3.2%	13 6.7%	47 19.2%	28 6.6%
MEAN DAYS/USER	104.52**	14.00	216.85	102.87	71.29
# AND % WITH HOMECARE VISITS	756** 74.1%	96 61.5%	183 93.8%	178 72.7%	299 70.5%
MEAN VSTS/USER	108.21**	317.67	61.55	55.71	100.78
# AND % WITH SOME COSTS	993 97.4%	152 97.4%	189 96.9%	235 95.9%	417 98.3%
MEAN COST/USER	11063**	11667	11250	6939	13081

1 = MD Visits for Long Beach site were eliminated from analysis for 1988 due to missing data.

\*Significant at  $p < .05$  on one way analysis of variance for difference among plans.

\*\*Significant at  $p < .01$  on one way analysis of variance.

**Table A.8. Means per Member of Utilization and Cost Data for First 24 Months from Baseline. Total, for those Alive, Died, and Disenrolled after 24 months. Per Member per Day of Exposure Means of Utilization and Cost Data during First 24 Months from Baseline.**

VARIABLES N	TOTAL	ALIVE	DIED	DISEN ROLL
	1523	1020	378	125
HOSPITAL DAYS (/MEMBER) /EXPOSRE DAY /PMPM	6.95** .0199** .6050**	6.22 .0085 .2584	9.47 .0494 1.502	5.32 .0241 .7326
MD VISITS /EXPOSURE DAY /PMPM (N) <sup>1</sup>	11.72** .0221** .6718** 1469	13.59 .0186 .5654 982	8.01 .0299 .9090 369	7.68 .0271 .8238 118
SKILLED/INTERMED. CARE FACILITY DAYS /EXPOSURE DAY /PMPM	29.65 .0666** 2.025**	29.33 .0402 1.222	29.02 .1272 3.867	34.18 .0989 3.007
HOME HEALTH VISITS /EXPOSURE DAY /PMPM	11.01 .0310** .9424**	10.37 .0142 .4317	14.03 .0786 2.389	7.09 .0237 .7205
PERSONAL CARE HRS. /EXPOSURE DAY /PMPM	234.53** .4346* 13.21*	279.3 .3824 11.62	147.4 .5432 16.51	132.3 .5325 16.19
ADULT DAY CARE DAYS /EXPOSURE DAY /PMPM	6.70** .0096** .2918**	9.53 .0130 .3952	.80 .0023 .0699	1.44 .0033 .1003
HOMECARE VISITS /EXPOSURE DAY /PMPM	69.64** .1396** 4.24**	80.20 .1098 3.34	50.89 .2144 6.52	40.18 .1569 4.77
TOTAL COST /EXPOSURE DAY /PMPM	10640* 31.33** 952**	10770 14.74 448	11217 76.26 2318	7835 30.84 938

1 = MD Visits for Long Beach site were eliminated from analysis for 1988 due to missing data.

\*Significant at  $p < .05$  on one way analysis of variance for difference among plans.  
\*\*Significant at  $p < .01$  on one way analysis of variance.

Table A.9. Number and Percent of members with Utilization and Cost for First 24 Months from Baseline. Total, for those Alive, Died, and Disenrolled after 24 months. Use and Cost per Exposure Day for those with use.

VARIABLES	TOTAL	ALIVE	DIED	DISENROL
N	1523	1020	378	L 125
# AND % WITH HOSPITAL DAYS	806**	505	251	50
MEAN USE/DAY OF EXPOSURE FOR USERS	52.9% .0521**	49.5% .0172	66.4% .1201	40.0% .0602
# AND % WITH MD VISITS USERS	1245**	878	277	90
MEAN VSTS/EXPOSURE DAY (N) <sup>1</sup>	72.7% .0261** 1469	72.8% .0208 982	60.7% .0399 369	58.0% .0356 118
# AND % WITH SKILLED/INTERMED.CARE FACILITY DAYS. MEAN DAYS/EXP DAY/USER	554** 36.4% .1830**	330 32.4% .1241	189 50.0% .2543	35 28.0% .3531
# AND % WITH HOME HEALTH VISITS	872**	568	247	57
MEAN VSTS/EXP DAY/USER	57.3% .0541**	55.7% .0255	65.3% .1203	45.6% .0521
# AND % WITH PERSONAL CARE HRS.	891*	609	224	58
MEAN HRS/EXP DAY/USER	58.5% .7429**	59.7% .6404	59.3% .9166	46.4% 1.15
# AND % WITH ADULT DAY CARE DAYS	104**	93	8	3
MEAN DAYS/ EXP DAY/USER	6.8% .1412	9.1% .1431	2.5% .1202	2.4% .1393
# AND % WITH HOMECARE VISITS	1135**	756	301	78
MEAN VSTS/EXP DAY/USER	74.5% .1873**	74.1% .1481	79.6% .2692	62.4% .2514
# AND % WITH ANY COST	1474**	993	374	107
MEAN COST/EXP DAY/USER	96.8% 32.37**	97.4% 15.14	98.9% 77.07	85.6% 36.03

1 = MD Visits for Long Beach site were eliminated from analysis for 1988 due to missing data.

\*Significant at  $p < .05$  on one way analysis of variance for difference among plans.

\*\*Significant at  $p < .01$  on one way analysis of variance.



**TABLE A.10. Logistic Regression of Any Hospital Use during 24 Months after Baseline CAF for All Members. N = 1523.**

VARIABLE	ESTIMATE	S.E.	ODDS RATIO
Intercept	-.37	.64	
<b>PREDISPOSING</b>			
Age	-.003	.01	1.00
Female	-.11	.13	.90
Live Alone	.09	.14	1.09
Live w. Spouse	-.15	.14	.86
<b>ENABLING</b>			
Income under \$10k	.13	.12	1.14
Brooklyn	-.01	.19	.99
Long Beach	-.34*	.17	.71
Portland	.05	.15	1.05
<b>NEED</b>			
ADL Needs	-.08*	.03	.92
IADL Needs(of 7)	.10**	.04	1.10
Sensory Problems	.07	.12	1.07
Incontinence Prob.	-.03	.12	.97
Poor Hlth. Status	-.02	.11	.98
Prior Hospital	.76**	.12	2.13
Prior Nursing Home	-.08	.16	.92
Cognitive Problem	.51**	.16	1.66
<b>MEDICAL PROBLEMS</b>			
Circulatory	-.33**	.12	.72
Respiratory	.33**	.11	1.39
Musculoskeletal	.08	.12	1.08
Nervous System	.05	.13	1.05
Diabetes	.26	.16	1.30
Cancer	.23	.15	1.26
Genito-urinary	.16	.13	1.18
Skin	.05	.12	1.04

Model chi-square 105.45\*\*

Degrees of Freedom 24

\* p < .05

\*\*p < .01

**TABLE A.11. Logistic Regression of Any Hospital Use during 12 and 24 Months after Baseline CAF for Members Alive at End of Each Year.**

VARIABLE	12 MOS O D D S RATIO	24 MOS ODDS RATIO
N	1526	1020
<b>PREDISPOSING</b>		
Age	1.00	.99
Female	.94	.98
Live Alone	1.20	1.19
Live w. Spouse	1.14	.92
<b>ENABLING</b>		
Income under \$10k	1.11	1.05
Brooklyn	.92	.81
Long Beach	.80	.74
Portland	1.03	1.02
<b>NEED</b>		
ADL Needs (of 7)	1.02	.93
IADL Needs (of 7)	1.01	1.08
Sensory Problems	1.00	1.07
Incontinence Prob.	.97	1.02
Poor Hlth. Status	1.17	1.05
Prior Hospital	1.85**	2.62**
Prior Nursing Home	.74	.79
Cognitive Problems	1.65**	1.90**
<b>MEDICAL PROBLEMS</b>		
Circulatory	.89	.70*
Respiratory	1.19	1.33*
Musculoskeletal	1.16	1.07
Nervous System	1.12	1.17
Diabetes	1.09	1.51*
Cancer	1.22	1.31
Genito-urinary	.98	1.17
Skin	1.02	1.07
Model chi-square	54.07**	86.75**
Degrees of Freedom	24	24

\* p < .05  
 \*\*p < .01

**Table A.12. Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of Hospital Days for Members with some Hospital Use, Alive and Enrolled at end of 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS		24 MOS	
	B	SE	B	SE
N =	489		505	
<b>PREDISPOSING</b>				
Age	-.12	.09	-.12	.08
Female	2.62	1.35	.98	1.31
Live Alone	-.68	1.51	-2.80*	1.39
Live w. Spouse	-.02	1.58	-1.13	1.49
<b>ENABLING</b>				
Income und.10K	-.54	1.33	.99	1.25
Brooklyn	5.96**	2.00	5.89**	1.94
Long Beach	-.35	1.90	-1.35	1.82
Portland	-1.47	1.66	-2.21	1.53
<b>NEED</b>				
ADLNeeds	-.15	.36	.26	.35
IADLNeed	-.35	.42	-.75	.39
Sensory Prob.	-1.43	1.28	-1.02	1.23
Incontinence	.23	1.32	-.88	1.24
Cognitive	1.22	1.64	.82	1.64
Prior Hospital	.30	1.31	2.49*	1.21
Prior nurs hm	.59	1.75	-.01	1.58
PoorHlth Stat	-.005	1.25	-.65	1.19
<b>MEDICAL PROBS.</b>				
Circulatory	3.48*	1.36	.55	1.28
Respiratory	-1.70	1.25	-.90	1.19
Musculoskel	-2.63*	1.33	-1.32	1.28
Nerve/Sense	.05	1.46	.77	1.38
Diabetes	-.37	1.67	-.90	1.52
Cancer	-1.77	1.67	-.92	1.66
Urinary	.23	1.39	.38	1.31
Skin	1.28	1.36	1.73	1.28
INTERCEPT	21.33**	7.19	24.84**	6.65
R <sup>2</sup>	8.1%		8.2%	

\* p < .05

\*\* p < .01

**TABLE A.13. Logistic Regression of Any Physician Use during first 24 Months after Baseline CAF for All Members. N = 1469.**

VARIABLE	ESTIMATE	S.E.	ODDS RATIO
Intercept	.93	.90	
<b>PREDISPOSING</b>			
Age	.01	.01	1.01
Female	-.25	.18	.78
Live Alone	.67**	.20	1.95
Live w. Spouse	.32	.19	1.38
<b>ENABLING</b>			
Income under \$10k	-.01	.17	.99
Brooklyn	1.54**	.27	4.66
Long Beach	1.62**	.28	5.06
Portland	1.16**	.20	3.18
<b>NEED</b>			
ADL Needs	-.19**	.05	.83
IADL Needs (of 7)	.01	.05	1.01
Sensory Problems	-.09	.17	.92
Incontinence Prob.	-.28	.17	.75
Poor Hlth. Status	-.42*	.17	.66
Prior Hospital	-.07	.17	.93
Prior Nursing Home	.31	.23	1.37
Cognitive Problems	.17	.23	1.19
<b>MEDICAL PROBLEMS</b>			
Circulatory	.18	.18	1.20
Respiratory	-.16	.16	.85
Musculoskeletal	.16	.17	1.17
Nervous System	.14	.19	1.15
Diabetes	.03	.22	1.03
Cancer	-.55**	.19	.58
Genito-urinary	.10	.18	1.11
Skin	.12	.19	1.13

Model chi-square 119.16\*\*

Degrees of Freedom 24

\* p < .05

\*\*p < .01

<sup>1</sup> Data for MD visits in 1988 were unavailable for Long Beach site. Cases for this period were eliminated from analysis of MD visits.

**TABLE A.14. Logistic Regression of Any Physician Use during first 12 and 24 Months after Baseline CAF for Members Alive at End of Each Period.<sup>1</sup>**

VARIABLE	12 MOS O D D S RATIO	24 MOS ODDS RATIO
N	1482	982
<b>PREDISPOSING</b>		
Age	1.01	1.00
Female	1.01	1.00
Live Alone	1.32	1.71
Live w. Spouse	1.36	1.63
<b>ENABLING</b>		
Income under \$10k	.88	1.22
Brooklyn	2.51**	5.37**
Long Beach	7.04**	8.84**
Portland	3.03**	6.36**
<b>NEED</b>		
ADL Needs(of 7)	.96	.95
IADL Needs(of 7)	.96	1.02
Sensory Problems	.89	.76
Incontinence Prob.	.89	.77
Poor Hlth. Status	1.01	.76
Prior Hospital	1.47**	1.30
Prior Nursing Home	.98	1.31
Cognitive Problems	1.15	1.27
<b>MEDICAL PROBLEMS</b>		
Circulatory	1.18	1.68*
Respiratory	1.29	1.01
Musculoskeletal	.94	1.08
Nervous System	1.22	.89
Diabetes	1.04	.81
Cancer	1.19	.91
Genito-urinary	.92	1.14
Skin	1.16	1.56
Model chi-square	127.22**	94.70**
Degrees of Freedom	24	24

\* p < .05

\*\*p < .01

<sup>1</sup> Data for MD visits in 1988 were unavailable for Long Beach site. Cases for this period were eliminated from analysis of MD visits.

**Table A.15. Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of Physician Visits for Members with some Use, Alive and Enrolled at end of 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS		24 MOS	
	B	SE	B	SE
N =	1112		878	
<b>PREDISPOSING</b>				
Age	-.13	.10	-.13	.08
Female	-1.33	1.49	-.39	1.36
Live Alone	1.40	1.61	.49	1.41
Live w. Spouse	2.87	1.71	.65	1.52
<b>ENABLING</b>				
Income und.10K	-.44	1.44	-.07	1.29
Brooklyn	-3.38	2.23	1.16	1.93
Long Beach	-4.51*	2.08	-2.50	1.89
Portland	-4.04*	1.88	.21	1.59
<b>NEED</b>				
ADLNeeds	.63	.40	-.65	.36
IADLNeed	-1.38**	.43	-.11	.39
Sensory Prob.	.55	1.37	2.42*	1.23
Incontinence	-.45	1.47	-3.44**	1.28
Cognitive	4.28*	1.95	-2.49	1.78
Prior Hospital	2.89*	1.38	3.68**	1.24
Prior nurs hm	2.87	1.89	.66	1.68
PoorHlth Stat	1.75	1.34	.67	1.18
<b>MEDICAL PROBS.</b>				
Circulatory	1.67	1.48	1.59	1.29
Respiratory	.52	1.35	1.47	1.21
Musculoskel	1.18	1.42	1.22	1.30
Nerve/Sense	2.44	1.56	.75	1.36
Diabetes	-.66	1.87	2.57	1.65
Cancer	-1.53	1.87	-.22	1.76
Urinary	1.56	1.54	1.96	1.36
Skin	1.43	1.45	.78	1.28
INTERCEPT	19.49*	7.91	22.13**	6.80
R <sup>2</sup>	4.8%		6.4%	

\* p < .05

\*\* p < .01

**TABLE A.16. Logistic Regression of Any Skilled or Intermediate Care Facility Use during 24 months after Baseline CAF for All Members. N = 1523.**

VARIABLE	ESTIMATE	S.E.	ODDS RATIO
Intercept	-2.90**	.69	
<b>PREDISPOSING</b>			
Age	.02*	.01	1.02
Female	-.18	.14	.83
Live Alone	.27	.15	1.30
Live w. Spouse	-.12	.16	.88
<b>ENABLING</b>			
Income under \$10k	.39*	.13	1.47
Brooklyn	-1.35**	.22	.26
Long Beach	-.35	.18	.71
Portland	-.25	.16	.78
<b>NEED</b>			
ADL Needs(of 7)	.15**	.03	1.17
IADL Needs(of 7)	.08*	.04	1.08
Sensory Problems	-.04	.13	.96
Incontinence Prob.	-.07	.13	.93
Poor Hlth. Status	-.03	.12	.97
Prior Hospital	-.01	.13	.99
Prior Nursing Home	.81**	.17	2.24
Cognitive Problems	.95**	.17	2.58
<b>MEDICAL PROBLEMS</b>			
Circulatory	-.39**	.13	.68
Respiratory	.03	.12	1.03
Musculoskeletal	.002	.13	1.00
Nervous System	.10	.14	1.11
Diabetes	.004	.17	1.00
Cancer	.05	.16	1.06
Genito-urinary	.05	.14	1.05
Skin	.10	.13	1.10

Model chi-square 221.34\*\*  
 Degrees of Freedom 24

\* p < .05  
 \*\*p < .01

**TABLE A.17. Logistic Regression of Any Skilled or Intermediate Care Facility Use during first 12 and 24 Months after Baseline CAF for Members Alive at End of Each Period.**

VARIABLE	12 MOS O D D S RATIO	24 MOS ODDS RATIO
N	1526	1020
<b>PREDISPOSING</b>		
Age	1.03**	1.02
Female	.90	.99
Live Alone	1.37	1.24
Live w. Spouse	1.04	1.05
<b>ENABLING</b>		
Income under \$10k	1.33	1.52*
Brooklyn	.28**	.30**
Long Beach	.73	.61*
Portland	.78	.68
<b>NEED</b>		
ADL Needs	1.25*	1.23**
IADL Needs	1.01	1.05
Sensory Problems	.96	1.06
Incontinence Prob.	.93	.82
Poor Hlth. Status	1.10	.91
Prior Hospital	.89	1.06
Prior Nursing Home	2.40**	2.15**
Cognitive Problems	2.27**	3.16**
<b>MEDICAL PROBLEMS</b>		
Circulatory	.84	.71*
Respiratory	.87	.82
Musculoskeletal	.93	1.13
Nervous System	1.44*	1.54*
Diabetes	.90	1.23
Cancer	1.23	.87
Genito-urinary	1.36	1.13
Skin	1.06	1.11
Model chi-square	183.81**	167.71**
Degrees of Freedom	24	24

\* p < .05  
\*\*p < .01



**Table A.18. Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of Skilled and Intermediate Care Facility Days for Members with some Use, Alive and Enrolled at end of 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS B	SE	24 MOS B	SE
N =	319		330	
<b>PREDISPOSING</b>				
Age	-.25	.68	.98	.78
Female	16.96	9.66	-7.84	12.47
Live Alone	-12.74	9.88	-23.85	12.59
Live w. Spouse	-14.56	11.54	-18.74	14.24
<b>ENABLING</b>				
Income und.10K	-5.45	9.31	-6.41	11.89
Brooklyn	58.65**	15.99	71.92**	19.37
Long Beach	56.75**	12.89	47.64**	16.40
Portland	-.03	11.57	-9.24	14.08
<b>NEED</b>				
ADLNeeds	1.96	2.32	1.63	3.03
IADLNeed(of 7)	-2.87	2.43	-.53	3.05
Sensory Prob.	20.46*	8.62	34.90**	10.94
Incontinence	11.53	9.26	-6.98	11.87
Cognitive	2.15	9.71	12.82	12.70
Prior Hospital	-8.83	9.35	-10.00	11.52
Prior nurs hm	15.35	10.15	10.94	12.86
PoorHlth Stat	-7.50	8.65	-4.61	10.89
<b>MEDICAL PROBS.</b>				
Circulatory	9.32	8.91	9.87	11.02
Respiratory	-8.27	8.80	4.36	11.42
Musculoskel	-9.08	9.10	-25.85*	11.74
Nerve/Sense	-11.68	10.91	-6.29	13.64
Diabetes	-3.39	12.48	-3.38	14.71
Cancer	-9.17	11.63	14.18	16.54
Urinary	6.85	9.23	-9.41	11.77
Skin	1.41	9.44	5.72	11.73
INTERCEPT	82.90	54.70	20.77	64.28
R <sup>2</sup>	19.1%		18.0%	

\* p < .05

\*\* p < .01

**TABLE A.19. Logistic Regression of Any Adult Day Care Use during first 24 Months after Baseline CAF for All Members. N = 1523.**

VARIABLE	ESTIMATE	S.E.	ODDS RATIO
Intercept	-1.43	1.31	
<b>PREDISPOSING</b>			
Age	-.01	.02	.99
Female	.05	.25	1.05
Live Alone	-.27	.31	.77
Live w. Spouse	.25	.28	1.28
<b>ENABLING</b>			
Income under \$10k	-.09	.26	.92
Brooklyn	-1.97**	.42	.14
Long Beach	-1.34**	.35	.26
Portland	-1.39**	.28	.25
<b>NEED</b>			
ADL Needs	.02	.06	1.02
IADL Needs(of 7)	.29**	.08	1.33
Sensory Problems	-.17	.24	.85
Incontinence Prob.	.04	.25	1.04
Poor Hlth. Status	-.60**	.23	.55
Prior Hospital	-.25	.25	.78
Prior Nursing Home	.07	.31	1.07
Cognitive Problems	.75**	.26	2.11
<b>MEDICAL PROBLEMS</b>			
Circulatory	-.09	.24	.92
Respiratory	-.46	.24	.63
Musculoskeletal	-.17	.23	.84
Nervous System	.14	.28	1.15
Diabetes	.36	.32	1.44
Cancer	-1.19**	.44	.30
Genito-urinary	-.01	.27	.99
Skin	.10	.27	1.11
Model chi-square	131.01**		
Degrees of Freedom	24		

\* p < .05

\*\*p < .01

**TABLE A.20. Logistic Regression of Any Adult Day Care Use during first 12 and 24 Months after Baseline CAF for Members Alive at End of Each Period.**

VARIABLE	12 MOS O D D S RATIO	24 MOS ODDS RATIO
N	1526	1020
<b>PREDISPOSING</b>		
Age	.99	.99
Female	.93	1.10
Live Alone	.51	.74
Live w. Spouse	.84	1.06
<b>ENABLING</b>		
Income under \$10k	.54*	.80
Brooklyn	.09**	.09**
Long Beach	.27**	.31**
Portland	.16**	.25**
<b>NEED</b>		
ADL Needs	1.08	1.04
IADL Needs	1.45**	1.38**
Sensory Problems	.73	1.00
Incontinence Prob.	1.02	1.18
Poor Hlth. Status	.52*	.59*
Prior Hospital	.72	.96
Prior Nursing Home	1.42	.87
Cognitive Problems	2.12*	2.60**
<b>MEDICAL PROBLEMS</b>		
Circulatory	.92	.93
Respiratory	.86	.62
Musculoskeletal	.79	.84
Nervous System	1.37	.90
Diabetes	1.37	1.45
Cancer	.24*	.56
Genito-urinary	.95	1.04
Skin	1.42	1.20
Model chi-square	151.30**	118.32**
Degrees of Freedom	24	24

\* p < .05  
 \*\*p < .01

**Table A.21. Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of Adult Day Care Days for Members with some Use, Alive and Enrolled at end of 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS		24 MOS	
	B	SE	B	SE
N =	83		93	
<b>PREDISPOSING</b>				
Age	-1.18	1.20	-.95	1.59
Female	-33.60	17.72	-30.76	27.96
Live Alone	-14.69	25.86	-61.51	34.01
Live w. Spouse	-37.49	20.20	-104.08**	31.90
<b>ENABLING</b>				
Income und.10K	-3.28	20.03	-5.19	30.49
Brooklyn	-21.56	33.75	-61.10	53.16
Long Beach	70.47*	28.02	72.90	37.76
Portland	.55	23.87	-10.66	32.30
<b>NEED</b>				
ADLNeeds	8.62*	4.25	7.07	6.62
IADLNeed(of 7)	-4.40	5.63	2.12	8.63
Sensory Prob.	-8.41	17.28	-19.03	25.94
Incontinence	13.68	18.36	56.00*	26.36
Cognitive	41.14*	17.54	5.03	24.77
Prior Hospital	-11.63	19.37	29.00	27.81
Prior nurs hm	-.90	21.50	-27.10	33.63
PoorHlth Stat	7.63	19.03	2.51	27.45
<b>MEDICAL PROBS.</b>				
Circulatory	13.22	17.53	4.66	25.90
Respiratory	-.52	20.28	-32.43	29.60
Musculoskel	7.36	17.16	-10.01	25.06
Nerve/Sense	-8.41	17.28	16.61	29.67
Diabetes	53.67*	25.40	43.94	35.08
Cancer	31.85	40.70	-62.32	47.52
Urinary	-46.61*	21.45	-60.68*	30.18
Skin	-23.95	22.81	-2.01	33.22
INTERCEPT	180.17	98.39	212.82	135.33
R <sup>2</sup>	46.3%		40.9%	

\* p < .05  
 \*\* p < .01

**TABLE A.22. Logistic Regression of Any Home Health or Personal Care Use during first 24 Months after Baseline CAF for All Members. N = 1523.**

VARIABLE	ESTIMATE	S.E.	ODDS RATIO
Intercept	-.98	.74	
<b>PREDISPOSING</b>			
Age	.01	.01	1.01
Female	.21	.14	1.23
Live Alone	.55**	.16	1.73
Live w. Spouse	.18	.16	1.20
<b>ENABLING</b>			
Income under \$10k	-.01	.14	.99
Brooklyn	-.80**	.20	.45
Long Beach	1.21**	.24	3.35
Portland	-.24	.17	.78
<b>NEED</b>			
ADL Needs	.14**	.04	1.15
IADL Needs	.13**	.04	1.14
Sensory Problems	-.27	.14	.76
Incontinence Prob.	.05	.14	1.05
Poor Hlth. Status	.11	.13	1.11
Prior Hospital	.26	.14	1.30
Prior Nursing Home	.18	.21	1.20
Cognitive Problems	.003	.19	1.00
<b>MEDICAL PROBLEMS</b>			
Circulatory	.04	.14	1.04
Respiratory	.06	.13	1.06
Musculoskeletal	.12	.14	1.13
Nervous System	.01	.15	1.01
Diabetes	.02	.18	1.02
Cancer	.21	.17	1.23
Genito-urinary	.16	.15	1.17
Skin	-.01	.15	.99
Model chi-square	152.36**		
Degrees of Freedom	24		

\* p < .05  
 \*\*p < .01

**TABLE A.23. Logistic Regression of Any Home Health or Personal Care Use during first 12 and 24 Months after Baseline CAF for Members Alive at End of Each Period.**

VARIABLE	12 MOS O D D S RATIO	24 MOS ODDS RATIO
N	1526	1020
<b>PREDISPOSING</b>		
Age	1.01	1.01
Female	1.33*	1.39
Live Alone	1.62**	1.85**
Live w. Spouse	1.16	.97
<b>ENABLING</b>		
Income under \$10k	.95	.79
Brooklyn	.17**	.38**
Long Beach	2.46**	5.29**
Portland	.49**	.66*
<b>NEED</b>		
ADL Needs	1.31**	1.36**
IADL Needs	1.10*	1.07
Sensory Problems	.78	.75
Incontinence Prob.	1.19	1.31
Poor Hlth. Status	1.33*	1.30
Prior Hospital	1.51**	1.36
Prior Nursing Home	1.14	1.31
Cognitive Problems	.96	.94
<b>MEDICAL PROBLEMS</b>		
Circulatory	.94	1.05
Respiratory	1.18	1.04
Musculoskeletal	1.13	1.42*
Nervous System	1.16	1.03
Diabetes	1.01	1.15
Cancer	.82	.81
Genito-urinary	1.27	1.24
Skin	1.12	.87
Model Chi-square	307.06**	179.80**
Degrees of Freedom	24	24

\* p < .05

\*\*p < .01

**Table A.24. Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of Home Health and Personal Care Visits for Members with some Use, Alive and Enrolled at end of 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS		24 MOS	
	B	SE	B	SE
N =	976		756	
<b>PREDISPOSING</b>				
Age	1.40**	.51	1.75*	.84
Female	-15.92	8.22	8.68	14.12
Live Alone	5.20	8.63	-23.76	14.39
Live w. Spouse	-9.03	9.28	-30.46*	15.47
<b>ENABLING</b>				
Income und.10K	3.29	7.67	3.65	13.14
Brooklyn	178.05**	13.65	228.06**	21.34
Long Beach	1.37	10.05	-2.06	17.23
Portland	2.53	9.89	19.82	16.34
<b>NEED</b>				
ADLNeeds	8.58**	2.03	8.20*	3.61
IADLNeed	-.67	2.46	4.76	4.01
Sensory Prob.	-11.59	7.35	5.63	12.52
Incontinence	6.26	7.62	15.50	12.76
Cognitive	-3.70	10.32	11.41	17.97
Prior Hospital	4.44	7.54	2.56	12.73
Prior nurs hm	10.11	9.62	-16.63	16.39
PoorHlth Stat	14.24*	7.19	16.27	12.06
<b>MEDICAL PROBS.</b>				
Circulatory	-5.53	7.85	-6.12	13.02
Respiratory	-13.97	7.27	2.70	12.32
Musculoskel	-10.73	7.63	-39.53**	13.30
Nerve/Sense	2.66	8.56	12.73	13.91
Diabetes	9.19	10.10	23.69	16.96
Cancer	-5.61	10.28	8.60	18.25
Urinary	3.82	7.98	17.18	13.58
Skin	7.02	7.85	-2.61	13.51
INTERCEPT	-77.60	41.63	-106.56	69.18
R <sup>2</sup>	27.7%		26.7%	

\* p < .05

\*\* p < .01

**TABLE A.25. Logistic Regression of Any Home Health Use during first 24 Months after Baseline CAF for All Members. N = 1523.**

VARIABLE	ESTIMATE	S.E.	ODDS RATIO
Intercept	-.98	.69	
<b>PREDISPOSING</b>			
Age	-.01	.01	.99
Female	.08	.14	.92
Live Alone	.42**	.15	1.52
Live w. Spouse	.17	.15	1.82
<b>ENABLING</b>			
Income under \$10k	.18	.13	1.19
Brooklyn	-.52**	.20	.60
Long Beach	2.30**	.21	10.00
Portland	.66**	.16	1.94
<b>NEED</b>			
ADL Needs	.18**	.04	1.20
IADL Needs	.03	.04	1.03
Sensory Problems	-.23	.13	.79
Incontinence Prob.	-.14	.13	.87
Poor Hlth. Status	.05	.12	1.05
Prior Hospital	.57**	.13	1.77
Prior Nursing Home	-.08	.18	.93
Cognitive Problems	-.13	.17	.93
<b>MEDICAL PROBLEMS</b>			
Circulatory	.03	.13	1.03
Respiratory	-.02	.12	.98
Musculoskeletal	.19	.13	1.21
Nervous System	.10	.14	1.10
Diabetes	-.10	.17	.90
Cancer	.46**	.16	1.68
Genito-urinary	.22	.14	1.24
Skin	.01	.14	1.01
Model chi-square	328.66		
Degrees of Freedom	24		

\* p < .05

\*\*p < .01



**TABLE A.26. Logistic Regression of Any Home Health Use during first 12 and 24 months after Baseline CAF for Members Alive and Enrolled at end of 12 and 24 Months.**

VARIABLE	12MO O D D S RATIO N	24MO ODDS RATIO 1020
<b>PREDISPOSING</b>		
Age	1.00	1.00
Female	1.07	.99
Live Alone	1.32	1.53*
Live w. Spouse	1.08	1.07
<b>ENABLING</b>		
Income under \$10k	1.24	1.20
Brooklyn	.48**	.64
Long Beach	5.69**	21.81**
Portland	1.46*	1.86**
<b>NEED</b>		
ADL Needs	1.33**	1.37**
IADL Needs	.97	.98
Sensory Problems	.81	.73
Incontinence Prob.	.90	.95
Poor Hlth. Status	1.16	1.08
Prior Hospital	1.94**	1.93**
Prior Nursing Home	.92	.88
Cognitive Problems	.74	.71
<b>MEDICAL PROBLEMS</b>		
Circulatory	1.00	1.16
Respiratory	1.06	.85
Musculoskeletal	1.26	1.38
Nervous System	1.01	1.22
Diabetes	1.07	.97
Cancer	1.15	1.18
Genito-urinary	1.10	1.31
Skin	1.12	.92
Model chi-square	324.23**	304.97**
Degrees of Freedom	24	24
* p < .05		
**p < .01		

**Table A.27. Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of Home Health Visits for Members with some Use, Alive and Enrolled at end of 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS		24 MOS	
	B	SE	B	SE
N =	690		568	
<b>PREDISPOSING</b>				
Age	.12	.27	-.17	.26
Female	-9.54*	4.55	7.45	4.41
Live Alone	2.44	4.77	-7.82	4.53
Live w. Spouse	-2.02	5.20	-1.59	4.91
<b>ENABLING</b>				
Income und.10K	3.67	4.23	2.25	4.14
Brooklyn	70.27**	8.29	49.11**	7.77
Long Beach	-.75	6.05	-2.30	5.77
Portland	-2.13	6.01	-.44	5.66
<b>NEED</b>				
ADLNeeds	1.25	1.10	.21	1.11
IADLNeed	.79	1.32	.55	1.26
Sensory Prob.	-4.95	4.04	2.20	3.89
Incontinence	.63	4.21	5.10	4.05
Cognitive	-6.56	6.07	-1.49	6.10
Prior Hospital	2.87	4.17	8.02*	3.97
Prior nurs hm	10.69*	5.24	-1.21	5.07
PoorHlth Stat	5.12	3.98	.83	3.81
<b>MEDICAL PROBS.</b>				
Circulatory	3.69	4.39	.27	4.19
Respiratory	-3.29	3.99	1.73	3.86
Musculoskel	2.97	4.33	-3.53	4.30
Nerve/Sense	-2.78	4.67	-.75	4.45
Diabetes	1.31	5.45	10.61*	5.31
Cancer	.73	5.43	-.91	5.51
Urinary	-5.35	4.40	-4.98	4.22
Skin	-1.50	4.24	3.62	4.17
INTERCEPT	-4.55	22.64	16.57	21.36
R <sup>2</sup>	19.3%		15.2%	

\* p < .05  
 \*\* p < .01

**TABLE A.28. Logistic Regression of Personal Care Use during first 24 Months after Baseline CAF for All Members. N = 1523.**

VARIABLE	ESTIMATE	S.E.	ODDS RATIO
Intercept	-.88	.64	
<b>PREDISPOSING</b>			
Age	.01	.01	1.01
Female	.25	.13	1.28
Live Alone	.27	.14	1.30
Live w. Spouse	.16	.14	1.18
<b>ENABLING</b>			
Income under \$10k	.04	.12	1.04
Brooklyn	-.65**	.19	.52
Long Beach	-.19	.18	.83
Portland	-.78**	.16	.46
<b>NEED</b>			
ADL Needs	.08*	.03	1.09
IADL Needs	.10**	.04	1.11
Sensory Problems	-.05	.12	.95
Incontinence Prob.	.02	.12	1.02
Poor Hlth. Status	.15	.11	1.16
Prior Hospital	-.13	.12	.88
Prior Nursing Home	.20	.17	1.22
Cognitive Problems	.05	.16	1.05
<b>MEDICAL PROBLEMS</b>			
Circulatory	-.07	.12	.93
Respiratory	.07	.11	1.07
Musculoskeletal	-.07	.12	.94
Nervous System	.17	.13	1.19
Diabetes	.28	.16	1.33
Cancer	-.01	.15	.99
Genito-urinary	.30*	.13	1.35
Skin	.01	.12	1.01
Model chi-square	83.02**		
Degrees of Freedom	24		

\* p < .05

\*\*p < .01

**TABLE A.29. Logistic Regression of Any Personal Care Use during first 12 and 24 months after Baseline CAF for Members Alive and Enrolled after 12 and 24 Months.**

VARIABLE	12MO O D D S RATIO 1526	24MO ODDS RATIO 1020
PREDISPOSING		
Age	1.00	1.01
Female	1.12	1.36
Live Alone	1.48**	1.42*
Live w. Spouse	1.12	.94
ENABLING		
Income under \$10k	.91	.84
Brooklyn	.19**	.42**
Long Beach	.84	.88
Portland	.30**	.38**
NEED		
ADL Needs	1.20**	1.18**
IADL Needs	1.11**	1.09
Sensory Problems	.96	.95
Incontinence Prob.	1.35*	1.34
Poor Hlth. Status	1.29*	1.18
Prior Hospital	1.02	.95
Prior Nursing Home	1.10	1.06
Cognitive Problems	.97	.99
MEDICAL PROBLEMS		
Circulatory	.88	1.04
Respiratory	1.19	1.10
Musculoskeletal	.82	.92
Nervous System	1.26	1.15
Diabetes	.97	1.56*
Cancer	.82	.77
Genito-urinary	1.39	1.34
Skin	1.10	1.05
Model chi-square	208.33**	100.98**
Degrees of Freedom	24	24

\* p < .05  
\*\*p < .01

**Table A.30. Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of Personal Care Use for Members with some Use, Alive and Enrolled at end of 12 and 24 Months After Baseline CAP.**

INDEPENDENT VARIABLES	12 MOS B	SE	24 MOS B	SE
N =	738		609	
<b>PREDISPOSING</b>				
Age	7.45**	2.16	9.14*	3.69
Female	-21.09	34.79	11.41	63.86
Live Alone	3.21	37.88	-84.11	65.82
Live w. Spouse	-48.56	39.88	-160.57*	70.32
<b>ENABLING</b>				
Income und.10K	6.27	33.47	10.50	60.29
Brooklyn	657.37**	57.06	884.66**	91.86
Long Beach	19.83	43.22	13.08	78.77
Portland	67.43	43.25	135.41	73.18
<b>NEED</b>				
ADLNeeds	32.14**	8.85	33.16*	16.55
IADLNeed	-8.69	10.94	22.01	18.64
Sensory Prob.	-43.47	32.12	30.06	57.23
Incontinence	16.23	32.59	51.21	57.40
Cognitive	21.66	43.96	58.01	79.36
Prior Hospital	8.92	32.58	3.96	57.68
Prior nurs hm	8.13	41.63	-61.77	75.40
PoorHlth Stat	44.92	31.44	78.72	54.96
<b>MEDICAL PROBS.</b>				
Circulatory	-41.43	33.78	-64.67	59.12
Respiratory	-67.36*	31.41	-10.51	55.22
Musculoskel	-31.84	32.33	-125.70*	58.89
Nerve/Sense	14.62	38.24	46.05	64.50
Diabetes	55.89	43.80	27.36	73.81
Cancer	-38.49	45.03	53.94	84.85
Urinary	30.05	34.14	81.63	61.50
Skin	52.35	34.52	-37.17	61.67
INTERCEPT	-438.45*	177.76	-570.39	307.16
R <sup>2</sup>	28.5%		26.9%	

\* p < .05

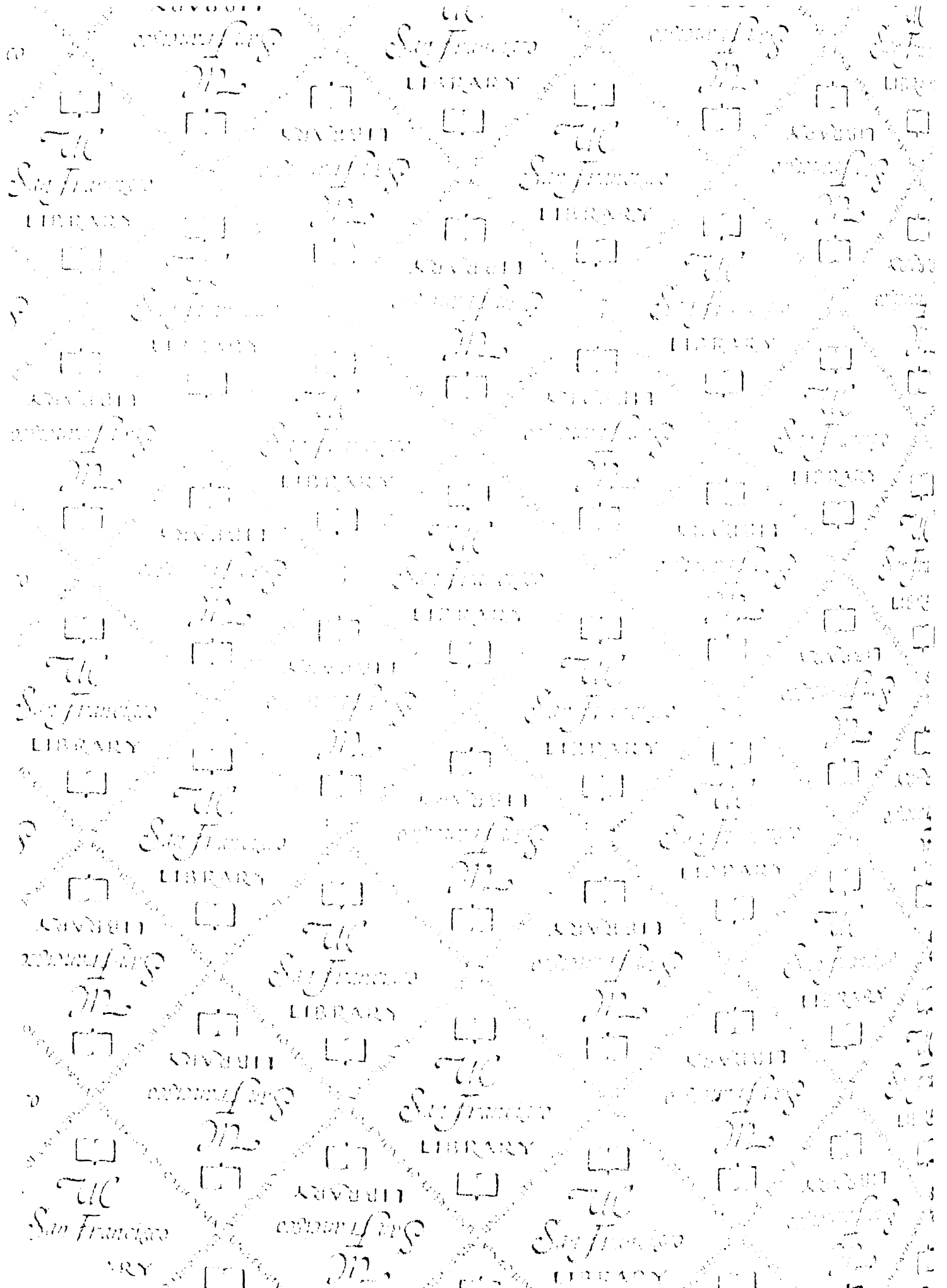
\*\* p < .01

**Table A.31. Unstandardized Coefficients Obtained from the Final Stage of the Hierarchical OLS Regression Modeling of the Natural Log of Total Cost for Members with some Use, Alive and Enrolled at end of 12 and 24 Months After Baseline CAF.**

INDEPENDENT VARIABLES	12 MOS B	SE	24 MOS B	SE
N =	1362		993	
<b>PREDISPOSING</b>				
Age	-.0015	.0067	-.0020	.0070
Female	-.0626	.1055	-.0357	.1162
Live Alone	.2762*	.1133	.0587	.1209
Live w. Spouse	.0118	.1213	-.2584*	.1290
<b>ENABLING</b>				
Income und.10K	-.0237	.1009	.0337	.1101
Brooklyn	-.0218	.1529	.0511	.1653
Long Beach	.4444**	.1413	.2589	.1532
Portland	.3347**	.3347	.4276**	.1337
<b>NEED</b>				
ADLNeeds	.1511**	.0272	.0879**	.0305
IADLNeed	.0426	.0303	.0787*	.0320
Sensory Prob.	.0854	.0971	.0696	.1042
Incontinence	.0929	.1026	.0973	.1098
Cognitive	.3814**	.1334	.3694*	.1495
Prior Hospital	.4106**	.0973	.5559**	.1052
Prior nurs hm	.2552	.1315	.0710	.1436
PoorHlth Stat	.1120	.0936	.0874	.1000
<b>MEDICAL PROBS.</b>				
Circulatory	-.1260	.1019	-.2004	.1081
Respiratory	.0447	.0960	..0378	.1034
Musculoskel	-.1059	.0995	-.1577	.1092
Nerve/Sense	..2350*	.1094	.2524*	.1156
Diabetes	.1135	.1305	.2955*	.1419
Cancer	-.0908	.1319	-.1749	.1491
Urinary	.0485	.1074	.0447	.1159
Skin	.0303	.1037	.0400	.1121
INTERCEPT	6.1591**	.5484	7.4484**	.5751
R <sup>2</sup>	12.6%		14.9%	

\* p < .05

\*\* p < .01



# For reference

Not to be taken  
from the room.



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