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LONG-TERM CARE SERVICE USE BY THE ELDERLY
IN RURAL AND URBAN AREAS--IMPLICATIONS
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Lea Anne Isgur

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Dr. Robert D. Stevens

Major professor

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LONG-TERM CARE SERVICE USE BY THE ELDERLY IN RURAL AND URBAN AREAS--IMPLICATIONS FOR PUBLIC POLICY

By

Lea Anne Isgur

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ABSTRACT

LONG-TERM CARE SERVICE USE BY THE ELDERLY
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An economic model of the demand for institutional and home health care for the elderly in rural and urban areas was developed. The analysis employed data from a study carried out in two urban and three rural Michigan communities involving a total of 448 persons. Using regression, twelve variables were evaluated for their effects on the use of long-term care services in the two areas. The following significant results were found: 1) Institutional nursing facilities were used more in rural areas for people more independent in physical functioning, but not for people who were more dependent in physical functioning. 2) In rural areas, a substitution of institutional care for non-institutional care with increasing age was observed. The results suggest a greater reliance in rural areas on Medicaid and Medicare for less-skilled home health services, and lacking this funding, a tendency to use more costly institutional facilities.

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To my parents for their patience and love

To my advisor for his encouragement

To my friends for their support

Thanks.

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CHAPTER I

INTRODUCTION AND BACKGROUND

The purpose of this paper is to study the use of health care and social services by chronically impaired[1] elderly[2] adults who are not mentally retarded or mentally impaired. The analysis will focus on the use of these services by elderly people in rural and in urban areas. Implications for public policy related to long-term care will be sought from the results of the study.

The general hypothesis about which the paper revolves is that differential structural elements affecting the obtaining of long-term care services in rural and urban settings create differing use patterns of services. In particular, based on microeconomic and social considerations, elderly people in rural areas who are chronically ill or functionally impaired are hypothesized as being significantly more likely than a similar group of people in urban areas to use institutionally-based[3] services. Elderly people in rural areas are also hypothesized as being less likely than elderly people in urban areas to use community-based services such as home health care.

Because large amounts of public resources are used to provide long-term care services, it is important that the most cost-effective mode for providing these services be used. Institutionally-based

services are often assumed to be the most cost-effective mode for providing services to people who are greatly impaired, and community-based services are assumed to be the most cost-effective when a person requires less intense care (U.S. GAO, 1977). Under these assumptions and assuming the same distribution of impairment, differences in the use of long-term care services in rural and urban areas raises the question of whether these resources are being used optimally. The constraints affecting use of long-term care services in rural and urban contexts will be analyzed here to ascertain their effects on use patterns of long-term care services. Implications in terms of the cost-effectiveness of the use of these services will also be examined.

Changes in Elderly Population

The elderly population is growing both absolutely and as a proportion of the total population. In 1950, the population 65 and older comprised about 8 percent of the total U.S. population, or about 12.3 million people. By 1978, this group made up 11 percent of the total, or about 22.8 million people (U.S. Census, 1950; Fisher, 1980). By the year 2035, an estimated 71 million people will be 65 years or older in the U.S., comprising about 23 percent of the total population (Fowles, 1978).[4]

In many rural areas, growth of the population 65 years and over has been more rapid than that which would occur due to the natural aging of the population. Data from Michigan revealed that the more rural counties in the state often had higher proportions of

elderly in the county than the proportion of elderly in the state as a whole (Isgur, 1981). Much of this is due to an increase in migration of people 65 years and over into non-metropolitan areas in the past decade (Coward, 1979). Wang and Beegle, analyzing the growth of non-metropolitan areas in Michigan, found the retirement function to be the most important factor in maintaining and promoting growth in the non-metropolitan areas (Wang, 1978). It is likely that the net growth in elderly population in other rural counties across the nation is also due to retirement, with older people moving into rural areas after retiring.

The Amount of Health Care Resources Used by The Elderly

Currently, people age 65 and over in the U.S. consume nearly one-third of all of the health care resources provided. In 1978, 29 percent of all dollars spent for personal health care in the U.S. were for care of people 65 years of age or older. The average medical care bill for an aged person reached $2,026 per person per year compared with $764 per person for those aged 19-64 and $286 per person for the young (Fisher, 1980). This high use of health care resources is not surprising in that limitations in major[5] activities due to chronic impairments have been found in 39 percent of non-institutionalized elderly people (NCHS, 1981a). Many of these persons are likely to require some assistance in carrying out daily activities. Elderly people are also found to be the highest users of nursing home services. Ninety-six percent of all adults who have

been in a nursing home for over 3 months[6] and 98 percent of those who have been in a nursing home for over six months are elderly.[7] This accounts for about five percent of the total elderly population (NCHS, 1979; Scanlon, 1979).

With respect to sources of payment, 58 percent of health care expenditures for the elderly came from the Medicare and Medicaid programs in 1977, with an additional 5.9 percent from other public funding. In contrast, in 1965, when the programs first became effective, only 29.9 percent of funding of health care for the elderly came from public funds[8] (Fisher, 1980). The Medicare program was developed as a federally administered insurance program for the aged to help them cope with the high cost of catastrophic acute care. The Medicaid program was developed as a program of medical assistance to the poor and medically indigent[9] of all ages, to be administered by States and financed jointly by Federal and State governments. Because the financing of health care for the elderly is different than for the rest of the adult population, discussion about health care for the elderly can be separated from discussions about care for chronically ill or impaired adults in younger age groups.

Since the major public programs to provide health and social services to elderly people have been established nationally, elderly people in all locales should be able to benefit from them. Unfortunately, having a financing mechanism to pay for health care is not always a sufficient condition for obtaining those services. From surveys of services to the elderly in upstate New York, for example, Taietz and Milton found significant increases in social services to

the elderly in rural counties in 1976 compared with 1967, but the urban counties in the sample still provided more services for the elderly than did their rural counterparts (Taietz, 1979). In a study of migration in rural areas in the Midwest, Glasgow reported that only 64 percent of elderly[10] migrants from metropolitan into rural areas were satisifed with the availability of medical care[11] (Glasgow, 1980).

Problems in Obtaining Health-Related Services in Rural Areas

People in rural settings, especially the elderly, face many problems in obtaining all types of health care or social services. Rural areas usually have a harder time attracting and keeping a full range of medical personnel. The availability of health resources is often severely limited and at times critical. For example, the most rural locations may have only 50 physicians per 100,000 population while the most urban settings have 150 physicians per 100,000 residents (Reynolds, 1976, p. 8). Analyzing data in Michigan, Stevens and Chapman found that non-SMSA counties had an average rate of 91 physicians per 100,000 persons compared with 166 in SMSA counties in 1976 (Stevens, 1979). Nurses, too, are in short supply in many rural areas, especially in counties with low physician-to-population ratios (Sloan, 1978, p. 10). Although the supply of hospital beds per 1,000 population is fairly equal between rural and urban areas,[12] the adequacy of hospital care in rural areas can be diminished by lack of medical and technical personnel and equipment.

Besides problems with supply of health services, other problems inhibit rural residents from obtaining care. Transportation is often cited as a major obstacle in obtaining health care in rural areas (U.S. Senate, 1978a, p. 7; 1978b, p. 42; 1980, p. 38). For example, emergency medical systems are often not well developed in rural areas. The long distances for ill people or physicians to travel can pose major difficulties in obtaining or giving health care in a timely fashion. For chronically ill people who require assistance a number of times a week, these problems are especially distressing. Glasgow's analysis of elderly migrants into rural areas showed that only 47 percent of elderly newcomers were satisfied with the availability of public transportation. Seventy-three percent of these people reported that they had been satisfied with public transportation in their previous (metropolitan) residence (Glasgow, 1980).

Income of rural elderly people is generally lower than for elderly people in urban areas (Youmans, 1977). Auerbach estimated that 82 percent of the rural elderly population relied on Social Security benefits for their main source of income as compared to 74 percent for their urban counterparts. Only 30 percent of rural elderly reported savings and investments, compared with 70 percent of the urban elderly (Auerbach, 1975). On the other hand, elderly migrants to rural areas, most of whom were in early retirement, were found to be better off financially than long-time residents in rural areas (Glasgow, 1980). Although this in-migration of elderly from metropolitan areas to rural areas may improve the financial averages

of rural elderly, the level of income is still less in rural than in urban areas.

However, approximately six percent of elderly people in either rural or urban areas reported receiving public assistance. Although the elderly in rural areas are less well off in terms of income than their urban counterparts, the rural elderly seem to be less willing to accept the philosophy of a social responsibility on the part of government to look after the welfare of its citizens (Coward, 1979). The concept of welfare seems to threaten their sense of independence, so they tolerate conditions which are not as easily tolerated by urban elderly people. Resistance to new social support agencies and services has been encountered from the elderly population in rural areas.[13] Thus, we find a population which may need comprehensive health and social services, but which is reluctant to accept these services from newly created agencies.

Organization of the Paper

The remainder of this thesis begins with an analysis of the structure of the long-term care environment for the elderly. Included are definitions, use of services, and funding of services for the elderly in the U.S. Where available, data on rural and urban use of and funding for long-term care services will be presented. Next, an economic model of the demand for nursing home and home health care for the elderly in urban and rural communities in the U.S. will be developed and presented. Then the hypothesized (relative) use of these services by rural and urban elderly people will be tested

using data from the Chronic Disease Module (C.D.M.) study (Papsidero, 1976). Discussion of the results of these tests and implications for appropriate placement and efficient use of resources follows.

FOOTNOTES

CHAPTER I

[1]Chronically impaired, as used here, means that the person has impairment in physical or mental functioning such that they are expected to require some type of assistance in their life's activities for an extended period of time.

[2]Elderly, unless otherwise specified, is defined as being 65 years or older.

[3]The institutionally based services which are referred to here include services in skilled nursing facilities and intermediate care facilities, two types of nursing homes.

[4]By the year 2000, this group is expected to comprise 12.2 percent of the total population (Fowles, 1978).

[5]In the survey, major activity referred to ability to work, keep house, or engage in school or preschool activities. Forty-six percent of non-institutionalized elderly people reported limitations in any activity due to chronic impairment.

[6]Only 88 percent of all non-mentally retarded or mentally-impaired adults in a nursing home at any given time are elderly. However, the total nursing home population accounts for many transitional patients recovering from illness and surgery, who are expected to fully regain functioning within a short period of time. Thus, by excluding the transitional patients, we can get a clearer picture of the population which is expected to require "long-term" care.

[7]Excluding those people who are mentally retarded or mentally impaired.

[8]Since these programs went into effect, expenditures for them have grown far beyond the amounts projected by their original advocates. For example, Medicare expenditures in 1977 totalled 379 percent more than in 1967, the program's first year of full-scale operation (Viscusi, 1979, p. 209).

[9]Eligibility for Medicaid is based on property and income considerations, but people who have relatively high incomes (i.e. non-poverty incomes) and who have become poor due to medical expenses may also be eligible for medical assistance payments under Medicaid.

[10]Elderly was defined as 60 years of age or older.

[11]Ninety-six percent of elderly migrants to rural areas from metropolitan origins reported satisfaction with the availability of medical care in their prior residence.

[12]This is a result of the operations of the federal-state hospital construction program launched under the Hill-Burton Act of 1946.

[13]Coward (1976) and Ginsberg (1971) have argued that the delivery of new services in rural areas might best be implemented through established groups such as the Cooperative Extension Service or church-affiliated groups rather than through new agencies.

CHAPTER II

FACTORS DETERMINING USE OF SERVICES

Introduction

A wide variety of services to care for people suffering from chronic illness or functional impairment fall under the general rubric of long-term care services. The services form a continuum of intensity of care, with an overlap between and among the categories, which include hospital-based chronic care units, services engendered in skilled and basic care nursing facilities, adult foster care and homes for the aged, adult day care centers; therapy, skilled nursing, personal, and chore services provided in the home; and home-delivered or community meals programs. Appendix A goes into more detail about these services. This study concentrated mainly on nursing care facilities and home health services, but excluded home meal programs.

Over the course of treating chronic illness or impairment, many health care resources are likely to be used. The current discussions about long-term care for the chronically ill or impaired elderly person centers around the question of cost-effectiveness in the provision of care. The question of efficiency in the provision of health related long-term care services enters when the cost of services obtained in the home exceeds that of an institutional facility. The amount, level and total array of nursing and

personal care services required will determine whether a nursing care facility or home-delivered health care will be more cost effective for caring for a chronically impaired person. The determination of services to be used by a given person with chronic disease or functional impairment depends on the degree of functional impairment, extent of social support, and funding for alternative services.

Functional Impairment As a Determinant of Long-Term Care Services

For many people who are only slightly impaired in functioning, the need for professional nursing is minimal, but they are unable to care for themselves in some basic activities such as meal preparation, bathing, or food shopping. Although the degree of functional impairment has been shown to be in part influenced by culture (Shanas, 1971), people with a low-level of need for professional health care and other services may have the needed array of services arranged for and provided in their own home at costs generally less than in a nursing care facility. Conversely, if the person needs hours of nursing care and other services or frequent attention, as is the case for people with certain impairments in mental functioning, a nursing care facility is more likely to cost less (U.S. GAO, 1977). Note that the presence or type of disease does not determine the need for institutionally-based or home health services. It is the impairment of functioning that creates a need for services.

Social Factors That Influence the Need for Long-Term Care Services

Given a certain level of impairment, the "optimal" use of institutional or home-delivered services also depends on social and economic factors. Studies indicate that in the U.S., 10-20 percent of people in skilled nursing facilities and 20-40 percent who are in intermediate care facilities are inappropriately placed, usually at too high a level of care. On the other hand, surveys have shown that between 5.2 and 5.7 percent of elderly people in the community suffer high levels[1] of disability (Baltay, 1977, p. 6).

Whether these people are inappropriately placed is highly dependent on their community support systems (both paid for and informal) as well as their health status. Availability of family or other close personal support in the community has been shown, as expected, to be negatively correlated with use of institutional services (U.S. GAO, 1977). Availability of community-based or home-delivered services at the times and in the amounts required by a chronically ill or functionally impaired older person is an important influence on the type of care chosen.

Because ours is a mobile society, it is difficult to judge the degree to which older people with chronic illness or functional impairment have the informal support they need to remain in their communities. The study of migration into rural areas by the North Central Regional Center for Rural Development showed that 17 percent of elderly migrants[2] reported having children living in the area they moved to. Forty-eight percent of elderly migrants reported

that other relatives lived within 30 miles and 65 percent reported that friends or acquaintances lived nearby (North Central, 1980, p. 162). However, proximity of a relative does not assure that the necessary support is available for an elderly person to remain in the community. Over 70 percent of elderly people in nursing homes in the U.S. have a relative living within 25 miles of the nursing home. About 63 percent of these people are visited at least once a week by relatives. Approximately half of these relatives are children of the elderly person (U.S. GAO, 1979, p. 48).

Alternative Financing of Long-Term Care Services

Finally, the ability to finance the services in alternative settings plays a major role in any decision about institutional nursing or community health services. Eligibility for federal and state programs to aide the elderly and poor in paying for health and social services depends on age or income. The major programs which provide funding for health services for the elderly are the Medicare and Medicaid programs. These programs, however, do not provide for all long-term care services equally.

Long-Term Care Under Medicare

Although 95 percent of the elderly population in the U.S. in 1979 were enrolled for both Hospital Insurance (HI) and Supplementary Medical Insurance (SMI) under Medicare[3] (Hatten, 1980), this program has not been a major source of financing for long-term care. Medicare will reimburse for stays in skilled nursing facilities

(SNF's), but not for stays in intermediate care facilities (ICF's). The recipient must have had a three-day hospital stay within two weeks of the nursing home placement and is only covered for up to 100 days per benefit period.[4] A daily deductible for the 21st through 100th day is also required. Consequently, less than 2 percent of Medicare reimbursement in 1979 went for care in a nursing care facility, comprising only 2 percent of all expenditures for nursing homes in 1979 (Gibson, 1980; HCFA, 1980).

Medicare paid for a slightly lower proportion of all expenditures spent on home health services, spending about 2 percent of its funds for this type of service (U.S. DHEW, 1979).[5] Home health is offered under both the HI and SMI parts of Medicare if the person is homebound and in need of skilled medical care. A three-day prior hospital stay is required under the HI part but not under SMI. Up to 100 visits per benefit period from nurses, therapists, aides, or providers of medical social services is allowed under each of these parts.

Long-Term Care Under Medicaid

The Medicaid program is more extensive than the Medicare program in its coverage of long-term care services. It has no prior hospitalization criteria or maximum length of benefit coverage as does Medicare. In addition, the Medicaid program covers care in intermediate care facilities (ICF's) as well as in skilled nursing facilities.

In fact, the Medicaid program is a major source of financing for nursing home services. Almost half (49.4 percent) of nursing home income in 1979 was from the Medicaid program, accounting for 41 percent of all Medicaid expenditures.[6] Nearly 75 percent[7] of expenditures by Medicaid for the elderly goes toward payment for nursing care facilities (Gibson, 1980; Fisher, 1980). Soon after the enactment of the Medicaid legislation, the number of beds in nursing homes increased substantially.[8] Although subsequent changes in these programs has resulted in a plateauing of this growth, the number of beds nationwide has nearly tripled, from 510,180 beds in 1963 to 1,402,400 beds in 1977 (Dunlop, 1977, p. 1; NCHS, 1979, p. 8). Of these, about 63 percent are located within standard metropolitan statistical areas (SMSA's) (NCHS, 1981b). Because of Medicaid's extensive coverage of care in nursing homes, nursing home care has been the fastest growing category of national health care expenditures in the past 15 years (Gibson, 1980). Total expenditures for nursing homes in current dollars increased from $2.1 billion in 1965 to $17.8 billion in 1979, at an average annualized rate of 16.6 percent per year.

Home health benefits, too, are more extensive under Medicaid than they are under Medicare, though the level of financing by the Medicaid program is also very low. Only about 1.2 percent of all Medicaid reimbursements in 1978[9] went towards home-health services, and not all of this was for care of elderly people (HCFA, 1980).

Figures on expenditures by Medicaid for home health care in urban and rural areas are not readily available. Hypothetically, we

would expect more of these services per capita to be available on a formal basis in urban areas than in rural areas. This expectation is based on the greater ease of urban areas in obtaining and keeping skilled medical personnel and the reduced travel costs[10] in a less dispersed area. However, expenditures for home health care by Medicaid in rural areas is probably higher than would be expected based solely on personnel and travel constraints. In Michigan, for example, each county has a department of public health which can serve as a home health agency if no private agency forms in the county. The public health nurse may provide home health services and be a supervisor and coordinator for home health services which do not require skilled care. Unfortunately, the extent to which Medicaid pays for home health care to elderly people in rural areas is not known.

Other Health Related Programs for the Elderly

In addition to Medicaid and Medicare, other public programs exist to provide health-related social services for elderly people. Title XX of the Social Security Act (as amended) is a means-tested[11] program which provides social services such as household chores, home maintenance, and food shopping for adults and children who are incapable of doing these things for themselves and who meet eligibility requirements. The degree to which Title XX funds is used by the elderly population, however, is unknown.

Elderly people who are ineligible for Medicaid or Title XX services because of income above poverty levels are still eligible

for some services offered through projects funded by grants under the Older American Act of 1965, as amended. These programs were developed to assist elderly people with transportation, health, nutrition, housing, and so forth.

Most other social services and health care for elderly people are paid for with private funds, usually their own or their family's. Approximately 27 percent of expenditures for all health care for the elderly is from private sources (Gibson, 1979). Much of this goes towards paying Medicare coinsurance and deductibles, but some is likely to be used in paying for care in nursing homes or home health care.

FOOTNOTES

CHAPTER II

[1]The definition of a high level of disability used by Nagi was "needs assisted living and has severe limitations in physical and emotional performance." In the NCHS survey, a high level of disability was defined as "confined to the house" (Baltay, 1977).

[2]Elderly migrants comprised 32 percent of the total metropolitan-to-rural migrant sample.

[3]Of the remaining 5 percent, some were enrolled under HI only and some were enrolled under the SMI part only.

[4]A new benefit period begins once a person has spent sixty consecutive days without being a patient in a hospital or any facility providing skilled nursing care.

[5]Note also that "Other Health Services" as the category of National Health Expenditures (which includes home health services) had less than a third of the expenditures of the "Nursing-Home Care" category in 1979, $5.2 billion and $17.8 billion, respectively.

[6]These figures include expenditures for facilities for the mentally handicapped. However, in 1978, 35% of expenditures by the Medicaid program went for care of non-mentally impaired persons in skilled nursing facilities and intermediate care facilities (HCFA, 1980).

[7]Sixty-three point six percent of Medicaid expenditures to intermediate care facilities and 79 percent of Medicaid expenditures to SNF's went toward care of persons eligible for Medicaid funding under the category of "aged" (Medicaid, 1979, p. 71).

[8]However, Dunlop also found that "growth in nursing home bed stock was more rapid before the implementation of Medicaid and Medicare than afterward, with the rapid growth which occurred in the mid-1960s (merely) a continuation of a pattern of increasing growth that appears to have begun with the adoption of federal vendor payment programs in the 1950s and early 1960s (Dunlop, 1977, p. 2).

[9]Three hundred seven million dollars for home health care, $16.8 billion for all reimbursements.

[10]Mostly in terms of travel time and the costs for fuel and upkeep on the cars.

[11]"Means tested" implies that eligibility is based on income or property.

CHAPTER III

ECONOMIC MODEL OF THE DEMAND FOR NURSING HOMES AND FOR HOME HEALTH SERVICES

Introduction

A general overview of the social and economic environment affecting the use of long-term care services has been presented. In this chapter, a more detailed economic model of the demand for both nursing home and home health services will be presented. Expected differences in factors influencing the use of long term care services in rural and urban areas will be highlighted.

Nursing Home Care, General Model

The demand for nursing home services (D_{NH})[1] is defined for this study as the number of days of nursing home care demanded per 1,000 elderly population in a given time period at each of different prices per day. An individual's demand for any good or service is a function of a) predisposing factors such as individual preferences and tastes; b) enabling factors including the price of the good or service in question relative to the individual's income level or ability to pay; and c) the price and substitutability of other goods or services.

In the case for the demand for nursing home services, these factors can be defined specifically as a) attitudes about nursing homes (ATT), functional ability (FNG), and perception of need (NEED);

b) ability to pay (PAY), which is related to the price of nursing home services (P_{NH}), income level (YN), and qualification for third party payments (TPP); and c) price of purchased home care faced by the individual (P_{HH}) and the extent of informal home supports (INF). In a functional equational form, we have:

$D_{NH} = f$ (ATT, FNG, NEED, PAY, P_{HH}, INF), where PAY = g (P_{NH}, YN, TPP). In comparing rural and urban locales, attitudes and extent of non-purchased home supports are assumed to be equal. The remaining factors will be discussed in more detail below.

The ability to pay is a highly influential factor determining demand[2] for nursing home services. Ability to pay is related to the person's need for skilled nursing care, qualifications for third party payment,[3] income level, and the price of nursing home services (P_{NH}). Elderly people who are disabled enough to require skilled care are generally able to have that care funded by the Medicare program initially. Once the Medicare benefits have run out, the person would have to "spend down" their income before the Medicaid program would assume payment for the remainder of their care.

If the disability did not require skilled care, then income would become the major factor determining ability to pay. If the person's income level is low enough for them to qualify for Medicaid, ability to pay is high since Medicaid will pay for the care. For people with high incomes relative to the P_{NH} care, the ability to pay is also high. Because most Medicaid programs allow a person to "spend down" their income to obtain nursing home care, even those

people whose income is in the middle ranges have a fairly high ability to pay for care in nursing homes. Due to the availability of Medicaid to pay for care in a nursing home, income level of the patient and price of the nursing home are less constraining than they would be if Medicaid were not available.

The demand for nursing home services is also a function of perceived need for care based on the physical and mental functioning of the person. Since the two major levels of nursing care can theoretically be separated based on whether an individual requires skilled care (obtained in a skilled nursing facility) or basic nursing (obtained in an intermediate care facility), the demand in each of these cases will be discussed separately.

Demand for Care in a Skilled Nursing Facility (SNF)

First, care in a skilled nursing facility is generally sought when intensive nursing care is required. Both Medicaid and Medicare reimburse to those eligible for this level of care. For this discussion, it will be assumed that only people requiring skilled nursing services are demanding care in a skilled nursing facility. Without any governmental subsidies or other insurance, we would expect the demand schedule (D-D' in Figure 1) to be mostly inelastic, with a change in slope at prices where the cost of substitute services would be competitive (at P_{HC}). If few substitute services exist for people needing the skilled level of care, people have little choice but to enter a skilled nursing facility, even when the price gets fairly high relative to their income.

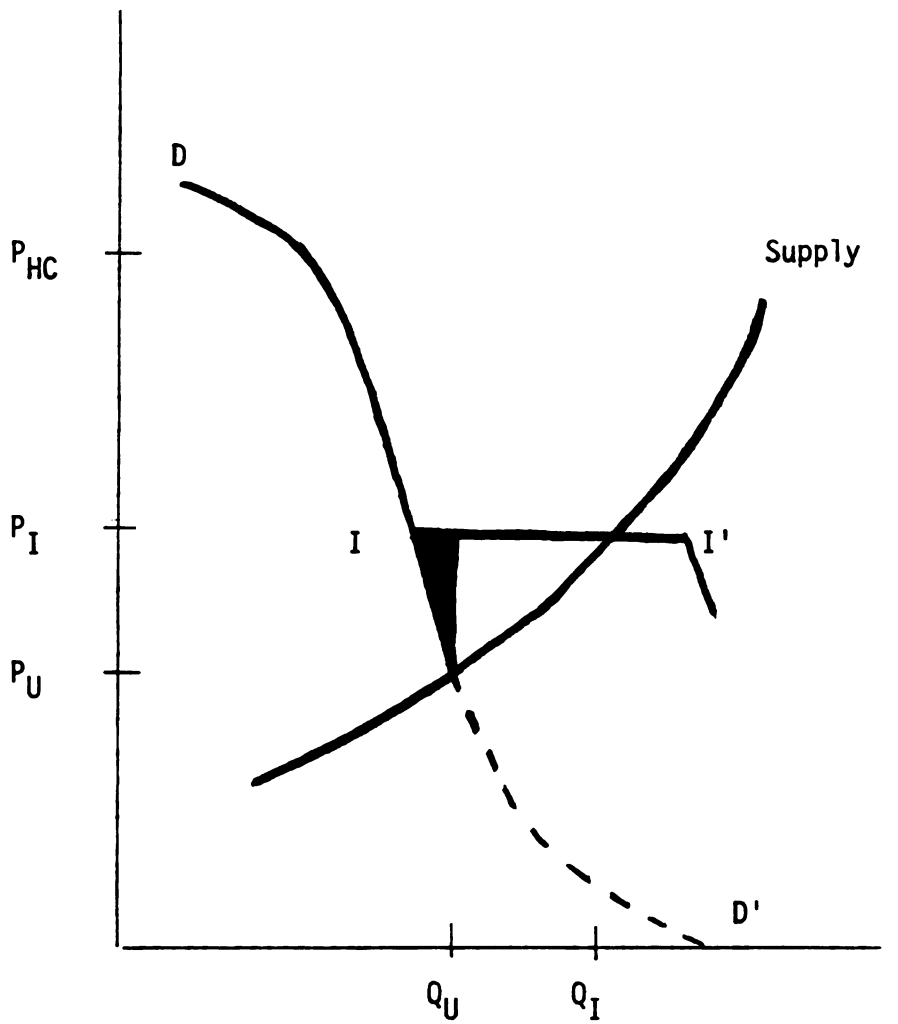

Figure 1.--Free Market and Insured Demand for Care in a Skilled Nursing Facility

The horizontal portion (I-I') at P_I in Figure 1 shows the effects of insurance on the market demand curve for SNF services. P_I is assumed to be the maximum level of reimbursement which the governmental or other insurance programs will allow. Those people who are eligible for the insurance and who were unable or unwilling to pay up to P_I without it are able to receive SNF services because of it. The line segment I-I' represents the change in the demand schedule due to the insurance. Supply is assumed to cross the uninsured demand curve at a point below[4] P_I. In Figure 1, this occurs at output Q_U and at price P_U. Because of the insurance, output expands to Q_I at P_I. The shaded area in Figure 1 represents a change in the make-up of demand, from private-market demand to subsidized demand. Although more people receive care due to the subsidy, the price is higher for private-pay patients.

In comparing rural and urban areas, demand for SNF services would be expected to be less in rural areas based on income, but higher when considering the supply of substitute services. Figure 2 shows the hypothetical demand curves for SNF services in rural and urban areas. For clarity in comparison, the rural and urban demand curves are presented on one graph. Two separate markets with identical supply functions are assumed.

Without the third-party payment, usage[5] would not be equivalent in the rural and urban areas. Because of the greater number of substitutes, demand for SNF services becomes less elastic in urban areas at prices above P_{CU}, the price where other services

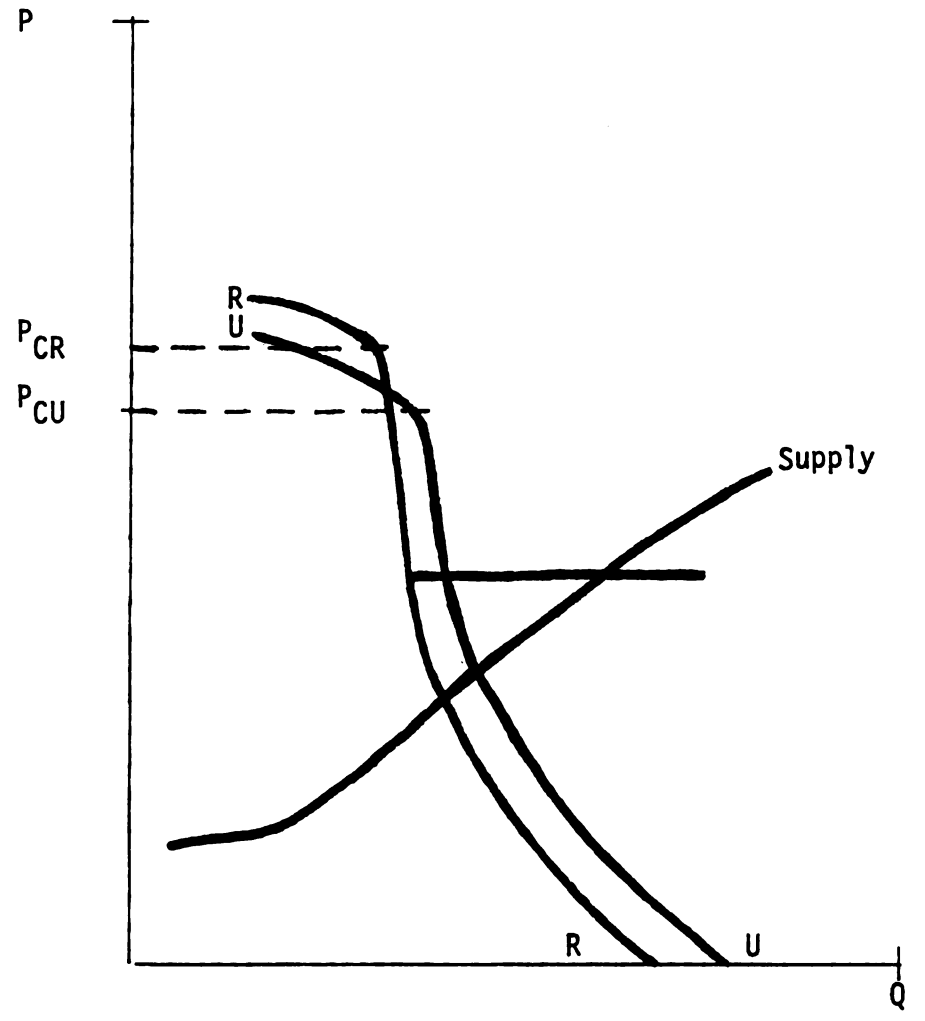

Figure 2.--Rural and Urban Demand Curves for Skilled Nursing Facility Services

become competitive in urban areas. The effect of lower income in rural areas, however, is greatly diminished by insurance programs. If payment by insurance is available, usage would become equal--where the supply surve in each market crosses the horizontal portion of each demand curve.

However, functioning ability of a person needing care in a SNF is assumed to be seriously impaired. The price of comparable services outside of the SNF would be very high. Thus, the effects on demand in either the rural or urban areas would likely be at prices exceeding the market clearing price for the uninsured or insured markets and would be of little practical interest.

Demand for Care in an Intermediate Care Facility (ICF)

Next we turn to long-term care in an intermediate care facility (ICF). Care in this type of facility is generally sought when some nursing, personal care, therapy, or protective services are needed by a person for physical or mental reasons. The Medicaid program reimburses for services provided in an ICF, but the Medicare program does not.

Figure 3a shows the rural (RR) and urban (UU) demand curves if all costs were paid out-of-pocket. Because long-term care outside of the nursing home is more available at this care level, the demand curve is much more elastic than in the skilled nursing facility case shown in Figure 2. At prices below the competitive price of substitute services,[6] each of the curves becomes more inelastic. As with

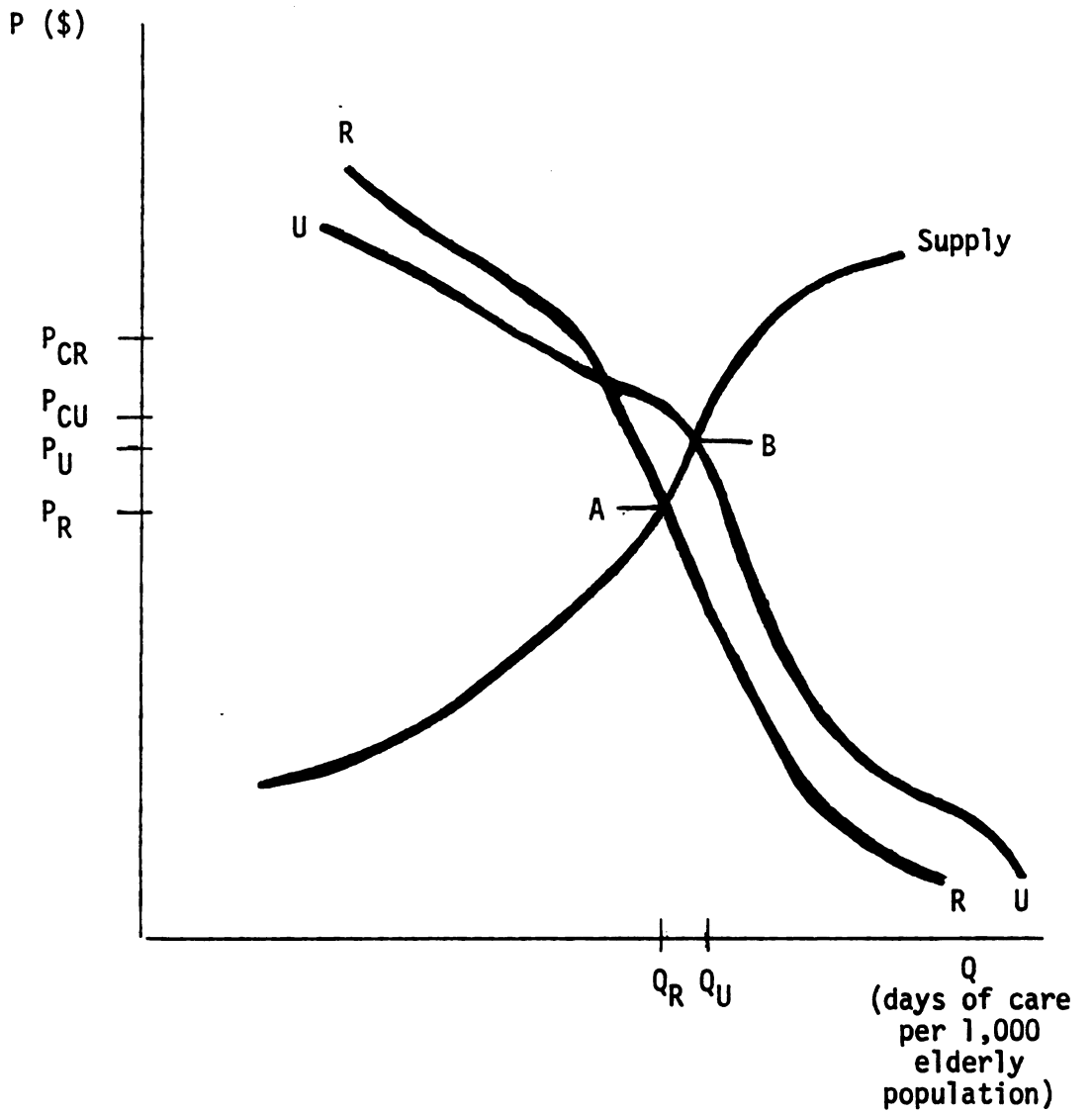

Figure 3a.--Rural and Urban Demand for Services in an Intermediate Care Facility - Out-of-Pocket Demand

the case of SNF's, the price where substitute services become competitive is likely to be lower in urban than in rural areas. This results in quantity demanded in urban areas becoming less than in rural areas in the region where substitutes are competitive (e.g. above P_{CU} in Figure 3a). At lower prices, people caring for elderly people at home would increasingly find it more worthwhile to have them cared for in an ICF. Differences in lifestyles in rural and urban areas would suggest that this would occur more often in urban areas.

Supply is assumed to cross the rural and urban demand curve at points A and B, respectively, in Figure 3a. Both output and price are higher in the urban than in the rural areas.

Figure 3b shows the insured market demand for ICF services, where P_I is the maximum level of reimbursement allowed by private and governmental insurance programs. In the diagram, U° to U' and R° to R' represent the insured demand in the urban and rural areas, respectively. U-U" and R-R" represent the two demand curves in the insured market. The dashed lines signify the demand without the insurance. Because of the insurance, quantity exchanged in the market increases to Q_I in both the rural and urban areas. Price for all units rises to the insurance reimbursement price P_I. Losses of consumer surplus and the changes in the make-up of the demanders are similar to those found in the case for SNF services.

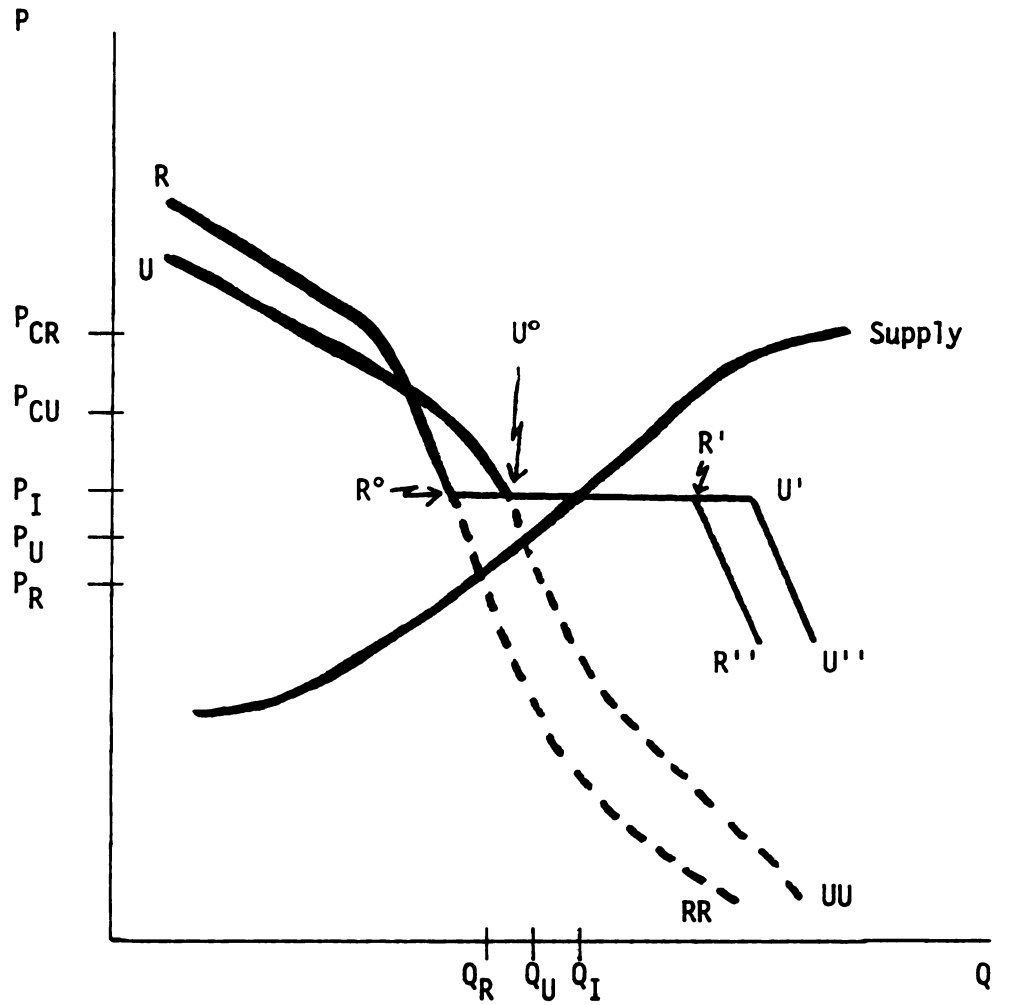

Figure 3b.--Insured Demand for Intermediate Care Facility Services in Rural and Urban Areas

The Demand for Home Based Long-Term Care Services

The demand for home based long-term care services can be thought of in terms of the quantity of services which chronically ill or disabled people are willing and able to obtain at various prices. The summation over all people within a geographic area will result in the demand curve for that area. The services in question include skilled nursing or therapy services, personal care services, homemaker services, social services, and other services required by an indidivual to maintain as independent an existence as they are capable of.

Difficulties in discussing the demand for community based long-term care arise because the amount of services demanded per time period per person can be highly variable. Whereas a person in a nursing care facility receives, at the minimum, constant custodial care for days or weeks, the person receiving home health care may demand some services on one day and none on the following days or weeks. Also, the role of family and friends are very important and so must be considered.

To define demand for home health services, a time frame has to be specified. For convenience in empirical testing, a six-month time period will be used. The quantity of services will be measured by the average number of visits at each price level of all personnel delivering paid for home health care services.

Many problems exist with this definition. First, a six-month time frame is an arbitrary figure, as any time period would be. It

would be expected that people with newly diagnosed chronic illness or impairment would need a fairly high level of services. Conversely, after the person had adjusted to her or his situation, or when an acute flare-up had subsided, far fewer services would be needed and hence demanded. Thus, a period long enough to dampen out the effects of initial illness or disability would be required. Summing over many people in a geographic location would minimize these types of effects.

Secondly, "visits" rather than hours of services is used as a matter of practicality. Visits by professionals such as registered nurses, licensed practical nurses, and therapists are generally reported to third party payors by home health agencies. These types of personnel are often salaried so actual hours of care provided may not even be recorded. On the other hand, unskilled personnel are usually hourly workers. Their work is likely to be recorded in both hours and visits.

In order to obtain a simplified, but fairly complete picture of the home care services demanded, a single measure was desired. Because both skilled and unskilled services are generally recorded in terms of number of visits, this measure is used here. In terms of resources used, the "visits" measure is inefficient in that a visit may take a few minutes or many hours. Thus, much information is lost and incorrect outcomes may result from comparisons. However, if we can assume that the average length of time per visit for skilled and unskilled health care personnel was approximately the

same in urban and rural settings, then outcomes from this comparison would be valid.

Finally, in summing up visits by paid for home health providers, each type of provider is given an equal weighting. However, it can be argued that use of skilled personnel represents a greater resource expenditure in that they have had years of special training and, in fact, provide a higher-priced service. Although a weighting of visits by professionals would better reflect the relative value of their visits, no reliable basis exists to determine the weights. Furthermore, the average length of time per visit by skilled health care professionals is probably considerably less than the average length of time spent per visit by unskilled providers.[7] This would tend to even out distortions caused by not giving a weight to skilled visits relative to unskilled visits.

We would expect that the demand curve for people needing home health services would be downwardly sloping, fairly inelastic at the high price range,[8] and fairly elastic at the low price ranges (Figure 4).

Because payment for substitute services is readily available and because income is lower in rural areas, the demand for paid-for home health services would be lower in rural than in urban areas. The dotted line in Figure 4 represents the hypothesized demand for paid-for home care services in rural areas.

Supply[9] would be expected to cross the demand for home health services at a point below the price[10] where nursing homes are

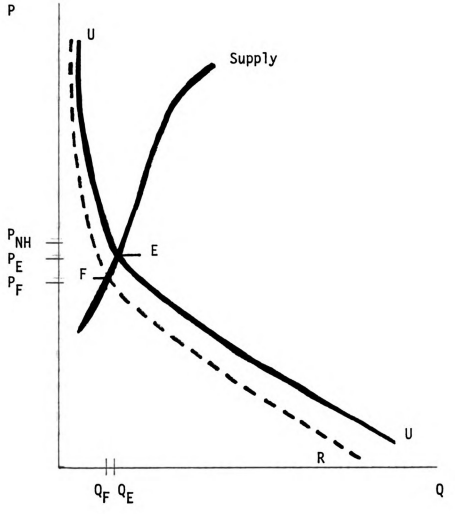

Figure 4.--Rural and Urban Demand for Home Health Services

competitive (P_{NH}). Hypothetically this would occur at point E on the urban and at point F on the rural demand curves in Figure 4.

Summary

The demand for nursing home services is a function of attitudes, functional ability, perception of need for care, ability to pay, and price of substitute services faced by the individuals. Assuming equivalent attitudes, functional ability and perception of need in rural and urban areas, the comparative demand for care in a nursing home was developed from the remaining economic variables.

Because third party payment through Medicare and Medicaid is readily available for care in a skilled nursing facility, the quantity of care demanded per 1,000 population 65 and older at the reimbursed price would be expected to be equivalent in rural and urban areas. The insurance would be expected to substantially reduce the possible effects attributable to a generally lower income level in the rural areas.

Similarly, the availability of Medicaid to pay for care in intermediate care facilities would tend to equalize the demand for this type of service in rural and urban areas. Without the insurance program, the demand curves would be more elastic than in the skilled nursing facility case, with a lower demand in rural areas at prices below the competitive price of substitutes because of the lower income level there. The insurance programs essentially change the constituency of the demanders at the insurance price.

The demand for paid for home-based long term care services would be expected to be lower in rural than in urban areas because of lower income and less availability of substitute services in rural areas. Assuming the same upwardly sloping supply function in the two areas, more of these services would be demanded at each price in the urban areas, and the market clearing price would be higher than in the rural areas.

FOOTNOTES

CHAPTER III

[1]For Medicaid clients these services include at least room and board, personal care services, laundry and linen services, and patent medicines. For simplicity, it shall be assumed that private pay patients and publicly supported patients in nursing homes are obtaining the same set of services.

[2]For example, in comparing estimates of demand for health services, and using a simplified (demographic variables only) versus a complex model, Newhouse concluded that insurance "exerts too great an influence over demand to exclude it from predictive equations" (Newhouse, 1974).

[3]These qualifications are based on need as defined by the person's physician and income if for welfare programs such as Medicaid.

[4]The industry supply curve represents the horizontal summation of the firms' marginal cost curves (adjusted for price-factor effects). If the supply curve crossed the "uninsured" demand curve above P_I, the insurance would create no change in quantity supplied because such an increase would result in a loss of producer surplus. Since empirically the insurance does seem to increase quantity supplied, supply is assumed to cross the uninsured demand curve at a point below P_I.

[5]Usage as derived from the crossing of supply and demand curves.

[6]At P_{CU} for the urban demand curve and at P_{CR} for the rural demand curve. Above these prices in each of the curves, alternative services through an agency or from the family or friends of the potential recipients of the ICF services are likely to be increasingly sought as providers of care. Below these prices, the substitute services are less competitive, so the demand for ICF services becomes more inelastic.

[7]This contention is based on conversations with providers of home health care from home health agencies in Lansing, Michigan.

[8]At prices where nursing home services become competitive substitutes, and where family and friends might be more actively urged to help provide care.

[9]Supply in rural and urban areas would probably be different. For simplicity of presentation, only one supply curve is used here.

[10]It is possible that the supply curve crosses the demand curve at a point above P_{NH} in Figure 4. This is not thought to be the case because it implies a very steeply sloped supply curve. There is no basis for believing the supply curve would be steeply sloped, so it is expected to cross the demand curves below P_{NH}.

CHAPTER IV

TESTING OF HYPOTHESIZED RELATIVE USE OF SERVICES

Introduction

Based on the different economic and social situations in rural and urban settings, it is hypothesized that the demand for care in institutional nursing facilities by elderly people with chronic illness or chronic impairment in functioning in rural areas would be greater than demand for such care in urban areas. Conversely, the same economic and social considerations lead to a hypothesis that the demand for home care services by these people would be lower in rural areas than in urban areas.

To test these hypotheses, data from the Chronic Disease Module Study (Papsidero, 1979) was used. Appendix B goes into more detail about the original purpose of that study.

METHODOLOGY

Selection of the Sample

Since the hypotheses relate to the elderly population, only cases where the participant was 65 years or older were selected. In addition, Katz's Index of Activities of Daily Living (ADL)[1] was used to divide the data according to whether the person had a high level of functional impairment (i.e. was dependent for help in

performing activities of daily living) or had a low level of functional impairment (i.e. was fairly independent).

A preliminary examination of the data revealed that one subgroup[2] of participants from the original study was represented in the urban but not in the rural localities, so this subgroup was excluded from the analysis here. In addition, the purpose of the Chronic Disease Module study was to test the differences in outcomes between a treatment group provided with comprehensive home care services and a control group which was limited to conventional community health care resources. Thus, the home health care resources to the treatment half of the sample in each of the rural and urban localities was extended by module health care providers. Although the goals of the current analysis would have been better served by using data from the control group only, the reduction in sample size would have hindered statistical analysis.

People who met eligibility criteria in the original Chronic Disease Module study were randomly assigned to control and treatment groups. However, selection of the sites used for comparison was not random. Participants were originally referred from selected ambulatory care facilities or hospitals in rural or urban[3] localities. They were then screened and were allowed into the study if they were in need of assistance for at least three months with regards to bathing, dressing, walking, or other similar types of care.[4] Because the comparison sites in this research paper were purposely chosen, the results may lack external validity.

The supply of health care facilities in the rural and urban areas was assumed to be equivalent. All of the localities where the Chronic Disease Module study was carried out were in Southern Lower Michigan. Although three of the localities were rural,[5] all were within about fifty miles of urban centers. Thus, the supply of nursing home care to the people in the rural and urban areas would likely be equivalent.

Home care providers for the control group would probably have been in less supply in the rural areas than in the urban ones. Since the study from which the data was taken was designed to provide and evaluate home care services, the supply of home care services for people in the treatment group was assumed to be equal in the rural and urban areas.

The Variables

The three dependent variables[6] used in hypothesis testing were days of care in nursing homes, number of visits by nurses outside of institutional facilities (non-institutional nursing services), and visits by other[7] health care providers outside of institutional facilities (other non-institutional services). The measures for these three variables were based on recall and were taken at a six-month[8] interview.

The independent variables measured levels of social, economic, and health functioning of participants in the study. They included age, the reporting of primary care giver as an indication of social support, Kahn's Mental Status Quotient (MSQ) as an index

of mental orientation, mobility,[9] seven variables indicating sources of pay for health care services,[10] and income level. Age, marital status and MSQ were measured at intake, while the other variables were from the six-month post-intake interview. Rural and urban location were considered as control variables or independent variables, depending on the statistical test being used.

Statistical Methods

First, T-tests were performed to ascertain differences in use of these health care services in rural and urban areas. The outcomes from the T-tests were compared with those hypothesized based on economic and social considerations. A probability of .05 or less was considered significant for rejecting the following null hypotheses:

(a) Use of nursing homes in rural areas was less than or equal to the use of nursing homes in urban areas for people with either low or high functioning ability;

(b) Use of non-institutional nursing care in urban areas was greater than or equal to use of such care in rural areas;

(c) Use of other non-institutional health care services in urban areas was greater than or equal to use of these services in rural areas.

The alternative hypotheses were that (a) use of nursing home services in rural areas was greater than use of nursing home services in urban areas; (b) use of non-institutional nursing care in rural

areas was less than its use in urban areas; and (c) use of other non-institutional health care services in rural areas was less than its use in urban areas.

After testing these main hypotheses related to use of services in rural and urban areas, T-tests were conducted to compare the levels of the independent social, economic, and functioning variables which could confound the effects of location (rural vs. urban) on use of services. Except for income, no differences by location were expected for these variables. Income in the rural areas was expected to be lower than in the urban areas. An α of .05 or less was considered significant for detecting differences in mean levels.

Next, regression was used to ascertain the importance of location and the social, economic, and functioning variables in explaining the variance in use of nursing homes, non-institutional nursing services, and other non-institutional health care services. Regression allows the effects of location per se to be distinguished from the effects of the other explanatory variables. A step-wise deletion method available with SPSS was used in the regression runs. Stepwise deletion allows a variable to be dropped if it has low explanatory value.[11]

For each of the dependent variables, two regressions were run. For the first equation, the dependent variables were converted into dummy variables. With this regression, the variables which contributed to explaining any use of service (at any level of use) could be identified and their contribution estimated.[12]

For the second regression, the dependent (service) variables were defined only for those cases where the use of the service was greater than zero. This regression reflects the contribution of variables in explaining increases in intensity in use of a service. By considering only the cases where the dependent service variable is greater than zero (for the service in question) the effects explained by the service being used at all are eliminated.

A variable was entered into the regression if the pre-entry F-value was 2.5 or more. It was considered a significant variable if the F-value for the coefficient for the variable had a significance level of 0.05 or less.

For the regression analysis, pairwise deletion was used in handling missing data. Under pairwise deletion, a case is omitted from the computation if the value of the dependent or independent variable under consideration is missing. "It has the advantage of utilizing as much of the data as possible, but may produce coefficients which are based on a different number of cases or even quite different sub-populations" (Nie, 1975). It was felt, however, that use of the more common "listwise deletion" of missing data would reduce the number of cases too much and totally invalidate the results.

RESULTS AND DISCUSSION

Because the sample was divided according to whether a person was fairly independent or more dependent in Activities of Daily

Living (ADL), the results for the two sub-samples will be persented separately.

For Those More Independent in Activities of Daily Living

Comparison of Social, Economic, and Health Functioning Variables in Rural and Urban Localities

The significant and interesting outcomes of T-tests to determine the existence of rural and urban differences in social, economic, and functioning variables are presented in Table 1. The variables included in the T-test were age, marital status, availability of a primary care giver, mental status,[13] mobility, seven source of pay variables, and income.

Most of these variables were at the same levels in rural and urban areas. Age was statistically higher in rural areas, but in absolute terms, the difference in mean age was only 1.7 years. Ability to leave the house without human assistance (mobility) was significantly lower in rural areas than in urban areas. A lower mobility level, if considered independent of location, would be likely to result in a higher use of all of the health care services discussed here. Income, as expected, was found to be lower in rural areas. Finally, Medicare as a source of pay was reported significantly more often in rural areas than in urban areas.

Use of Nursing Home Services

Table 2 represents the statistical results of the T-test comparing days of all types of nursing home care in rural and urban

TABLE 1.--Comparison[a] of Social, Economic, and Functioning Variables in Rural and Urban Areas for People More Independent in Activities of Daily Living

Variable	Mean Scores		2-Tailed Prob.	Interpretation Using .05 Significance Level
	Rural	Urban		
Age	75.5	73.8	.02*	R > U
Mobility	.74	.87	.002*	R < U
Insurance	.29	.25	.48	R = U
Medicare	.53	.41	.04*	R > U
Medicaid	.21	.25	.35	R = U
Public Asst.	.004	.036	.085	R = U
Income	1.87	2.14	.03*[b]	R < U

*Significant at $\alpha = .05$

[a]Using a T-test.

[b]This is one-tailed probability since it was hypothesized that income would be less in the rural than in the urban areas.

TABLE 2.--Comparison[a] of Rural and Urban, Days of Care in Nursing Homes for People More Independent in Activities of Daily Living

Null Hypothesis (Ho)	Expected Outcome (Ha)	Mean Number of Days		1-Tailed Prob.	Interpretation of Outcome for $\alpha \leq .05$
		Rural	Urban		
Rur $\leq$ Urb (Days of Care)	Rur > Urb (Days of Care)	5.9	1.5	.01*	Reject Ho

*Significant at $\alpha = .05$.

[a]Using a T-test.

settings. The hypothesis that days of nursing home care in rural areas would be greater than in urban areas is supported by the T-test. The mean number of days of care in nursing homes in rural areas was 5.9 days compared with 1.5 days in urban areas.

The question, then, was what factors contributed to these observed differences in rural and urban areas. It was thought that mobility and Medicare, being at different mean levels in the two localities, might provide clues for explaining the observed differences.

Further analysis showed that actual users of nursing home services in rural areas were not statistically more likely to report Medicare as a source of pay than their urban counterparts; in absolute terms, the rural users of nursing home services reported Medicare less often than the urban users. Thus, although differences existed in the reporting of Medicare as a source of pay in the two areas, it was not associated with a higher use of nursing homes in rural areas.

Tests controlling for mobility were also conducted. For people dependent in mobility, the mean number of days of nursing home care was still significantly higher in rural areas. No statistically significant differences for people with independent[14] mobility in rural and urban areas were detected.

In order to shed more light on the relationship of the days of care in nursing homes and location, social, economic, and health functioning variables, two regressions were run. The first regression was to answer the question of how well the specified social,

economic, personal health functioning variables and location contributed to predicting whether or not a person would enter a nursing home. The dependent variable was a dummy variable expressed as did (1) or did not (0) enter a nursing home during the six months of data collection. The outcome from this regression is presented in Table 3. The variables for the regression were defined as follows:

NH_{Du} = a dummy dependent variable whereby 1 indicated that nursing home days of care were used

Mobility = a dummy variable whereby 1 indicated that mobility was possible without human assistance

Age = age in years of respondent, including only those people 65 years and older

Medicare = a dichotomous variable whereby 1 indicated that Medicare was a source of pay for health care

R*MSQ = an interaction variable of location (=0 for urban and 1 for rural) with a mental status index; a high score indicated more independence

R*Medicaid=an interaction dummy variable whereby 1 indicated that the person was from the rural group and reported Medicaid as a source of pay

The figures in parentheses below the variables are the standard errors of the coefficients. All of the coefficients except the constant and R*MSQ were significant at $\alpha = .05$. The coefficients for each of these variables can be interpreted as the probability that the person would use nursing home services. Looking at the standardized β-coefficients, Mobility and R*Medicaid had the most impact in terms of this probability. Put more directly, the more independent the person was in mobility, the less likely s/he would be to enter a nursing home. If the person was on Medicaid and lived in a rural area, this probability increased. Since Medicaid as a

TABLE 3.--Regression of Use of Nursing Home Services on Social, Economic, Health Functioning, and Location Variables for People More Independent in Activities of Daily Living

Independent Variables[a]	Unstandardized β-Coefficients	Standardized β-Coefficients
Mobility	-0.19* (.03)[b]	-0.34
Age	0.004* (.002)	0.11
Medicare	0.05* (.03)	0.10
R*MSQ	-0.005 (.003)	-0.10
R* Medicaid	0.13* (.04)	0.19
Constant	-0.08 (.14)	
N = 296		
R^2 = .19		
$\bar{R}^2$ = .18		

*Significant at α = .05.

[a]See text for explanation of variables.

[b]Figures in parentheses indicate standard errors of the coefficients.

variable without the interaction term[15] did not appear as a significant variable, we would not expect Medicaid coverage in urban areas to increase the likelihood of a person entering a nursing home. Thus Medicaid appeared to have a greater effect as an enabling factor for people requiring nursing home care in rural areas than for people in urban areas. Based on the hypothesis that people in rural areas have problems with access to health care, people who were eligible for Medicaid coverage could be obtaining that care in the only setting able to meet their needs: the institutional nursing care facility. Note, however, that the explanatory value ($\bar{R}^2$) for the whole equation was only 0.18, indicating a high degree of unexplained variation.

The second regression was run to find out which variables would contribute to predicting the level of use for those people who used the nursing home services. The dependent variable was days of care in a nursing home. As seen in Table 4, Medicaid was the only variable to enter into the regression equation. This variable was defined as a dichotomous variable whereby 1 indicated that Medicaid was reported as a source of pay for health care. The explanatory value for the equation was 0.42, indicating that Medicaid was an important variable in predicting intensity of use. These figures must be approached with extreme caution because only seven persons in the subsample reported using nursing home services at all. Location did not appear to be a significant factor in explaining the number of days of nursing home services used.

TABLE 4.--Regression of Days of Nursing Home Care on Social, Economic, Health Functioning, and Location Variables for People who Used Nursing Home Services and were More Independent in Activities of Daily Living

	Dependent Variable = NH_{Days}	
Independent Variables[a]	Unstandardized β-Coefficients	Standardized β-Coefficients
Medicaid	76.22* (31.2)[b]	.71
Constant	36.5 (21.6)	
N = 7		
R^2 = .50		
$\bar{R}^2$ = .42		

*Significant at α = .05.

[a]See text for explanation of variables.

[b]Figures in parentheses indicate standard errors of the coefficients.

In summation, the mean number of days of care in nursing homes was greater in rural than in urban areas, as hypothesized. The difference was statistically significant at an $\alpha = .05$. In rural areas, having Medicaid as a source of pay was an indicator that nursing home services would be used. Dependence in mobility also indicated a higher probability that nursing home services would be used. Mobility was more dependent in rural areas. However, when mobility was controlled for, the differences in mean number of days of nursing home care in rural and urban areas were still statistically significant for people dependent in mobility. Once a person was using nursing home services, more days of care were likely to be used by those who had Medicaid as a source of pay, independent from location. However, all of this is based on a sample of seven who actually used nursing home services.

Use of Non-Institutional Nursing Services

Table 5 presents the statistical results of the T-test for comparing the number of non-institutional nursing visits for people more independent in functioning in Activities of Daily Living. It was expected that rural use of this type of service would be lower than urban use because funding overall for this type of service is not high so supply and hence use is probably lower in rural than in urban areas.

In light of the data, the null hypothesis that the number of non-institutional nursing visits in rural areas would be greater than in urban areas cannot be rejected at $\alpha = .05$. The mean number

TABLE 5.--Rural and Urban Comparison[a] of the Mean Number of Non-Institutional Nurse Visits to People More Independent in Activities of Daily Living

Null Hypothesis (Ho)	Expected Outcome (Ha)	Mean Number of Visits		1-Tailed Probability	Interpretation of Outcome for $\alpha \leq .05$
		Rural	Urban		
Rur > Urb ($\bar{visits}$)	Rur < Urb ($\bar{visits}$)	1.0	0.5	.89	Do not reject Ho.

[a]Comparison of the means using a T-test.

of non-institutional nursing visits in rural areas was 1.0 visits, which was more than the 0.5 visits for people in urban areas. These results did not change after controlling for mobility, which was lower in the rural areas.

Next, two regressions were run to see if the same factors were influencing the use and intensity of use of non-institutional nursing services in rural and urban areas. As above, the first regression used a dummy dependent variable. This variable was expressed as did (1) or did not (0) have visits from a nurse outside of an institutional setting. The coefficients for the independent variables indicated the probability that a person would obtain non-institutional nursing services. The results are presented in Table 6. The variables in the regression were defined as follows:

$Nurse_{Du}$ = a dummy dependent variable whereby 1 indicated that the respondent received non-institutional nursing visits.

Family & Friends Pay = a dichotomous variable whereby 1 indicated that family or friends were a source of pay for health care.

Income = family income of participant, defined as being in one of six income levels, whereby a value of 1 for the variable implied the family income was less than $3,000 per year and a value of 6 implied the family income was $15,000 or more per year.

Other Pay = a dichotomous variable whereby 1 indicated that source of pay for health care was other than insurance, Medicare, Medicaid, public assistance, self, or family and friends.

Own Money = a dichotomous variable whereby 1 indicated that the participant's own money was a source of pay for health care.

TABLE 6.--Regression of Use of Non-Institutional Nursing Visits on Social, Economic, Health Functioning, and Location Variables for People More Independent in Activities of Daily Living

Dependent Variable = $Nurse_{Du}$		
Independent Variables[a]	Unstandardized β-Coefficients	Standardized β- Coefficients
Family and Friends Pay	0.41* (.16)[b]	.142
Income	-0.05* (.02)	-.167
Other Pay	0.82* (.39)	.116
Own Money	0.08 (.05)	.095
Mobility	-0.07 (.05)	-.082
R*Age	0.002* (.0008)	.170
R*Insurance	0.17* (.06)	.181
R*Medicare	-0.37* (.09)	-.468
Medicare	0.21* (.07)	.279
Constant	0.18* (.08)	
N = 296		
R^2 = .134		
$\bar{R}^2$ = .107		

*Significant at α = .05
[a]See text for explanation of variables.
[b]Figures in parentheses indicate standard errors of the coefficients.

Mobility = a dummy variable whereby 1 indicated that mobility was possible without human assistance.

R*Age = an interaction variable of location (= 0 for urban and 1 for rural) with age in years.

R*Insurance=same as R*Age but with the dichotomous variable Insurance, whereby 1 indicated that the person was from the rural group and reported insurance as a source of pay.

R*Medicare= same as R*Insurance but with Medicare as a source of pay.

Medicare = a dichotomous variable whereby 1 indicated that Medicare was reported as a source of pay for health care.

Only Mobility and Own Money were not statistically significant variables at the 0.05 level. Comparing the standardized β-coefficients, Medicare and R*Medicare, having the largest absolute values, would have the greatest effect on the probability that a person would use non-institutional nursing services.

Since R*Medicare is an interaction variable, its coefficient may be added to that of Medicare to determine the effects of Medicare in rural areas. We find that the coefficient for R*Medicare (-0.37) is greater in absolute value and opposite in sign from that for Medicare (0.21). Thus having Medicare coverage in rural areas would reduce the probability of using non-institutional nursing services, while having it in urban areas is significantly likely to increase this probability. Insurance and Age would also contribute to the likelihood of a person using non-institutional nursing services in rural but not in urban areas. Income was negatively related, meaning that the more income the person had, the less likely s/he would use non-institutional nursing services. Although seven variables and

the constant term were significant, the $\bar{R}^2$ only reached 0.107, indicating a very low prediction ability using the regression equation.

The second regression was run to find out which variables would contribute to predicting the level of use for people who actually used the non-institutional nursing services. The results are presented in Table 7. Number of nurse visits outside of institutional settings was the dependent variable. The two variables which were significant at an $\alpha = .05$ were Mobility and R*Medicaid, an interaction variable of location (= 0 for urban and 1 for rural) with Medicaid as a source of pay. Because Mobility was a significant variable in predicting the number of non-institutional nursing visits, T-tests of the mean level of visits were conducted, controlling for Mobility.[16] These tests showed that the higher level of dependence in mobility in the rural group did not lead to a higher number of visits of non-institutional nursing services in rural compared with urban areas. Since Medicaid coverage was equally reported in the rural and urban areas, it is interesting that Medicaid was a significant variable in predicting intensity of use of the service only in rural areas. This could be a reflection of the Medicaid program's role as an enabling factor in the procurement of non-institutional nursing services in rural areas.

With the three variables in Table 7, the $\bar{R}^2$ reached 0.293, leaving a considerable amount of variance unexplained.

In summation, no statistically significant differences in the mean number of visits by nurses outside of an institutional

TABLE 7.--Regression of Non-Institutional Nursing Visits on Social, Economic, Health Functioning, and Location Variables for People Who Received Non-Institutional Nurse Visits and Who Were More Independent in Activities of Daily Living.

Dependent Variable = Nurse Visits		
Independent Variables[a]	Unstandardized β-Coefficients	Standardized β- Coefficients
Mobility	-4.67* (2.31)[b]	-.239
Own Money	-4.72 (2.99)	-.212
R*Medicaid	9.85* (3.62)	.368
Constant	10.74* (3.43)	
N = 52		
R^2 = .334		
$\bar{R}^2$ = .293		

*Significant at α = .05.

[a]See test for explanation of variables.

[b]Figures in parentheses indicate standard errors of the coefficients.

setting were detected. Seven variables entered the first regression for predicting whether or not non-institutional nursing services would be used. However, the very low $\bar{R}^2$ (0.107) indicates that much of the variance was not explained by these variables. As it stands, then, the first regression cannot be used for predicting whether or not non-institutional nursing services will be used. Intensity of use for those who used the service was likely to decrease if a person was independent in mobility and increase if they lived in a rural area and had Medicaid as a source of pay. This last finding indicates that Medicaid as a source of pay in rural areas has a strong effect on the use of non-institutional nursing services. Since the number of visits in rural areas was slightly (though not statistically significant) higher than in urban areas, the availability of nurses in rural areas was probably not as limiting a factor as originally thought. Thus the hypothesis that the use of non-institutional nursing services would be lower in rural areas because low public funding results in a low supply may not be correct.

Use of Other (Non-Nursing, Non-Physician) Non-Institutional Services

Table 8 presents the statistical results of the T-tests comparing the number of visits by other (non-nursing, non-physician) health care providers outside of institutional settings for people more independent in Activities of Daily Living. It was hypothesized that people in rural areas would use fewer of these types of services than people in urban settings. The difficulty in obtaining

TABLE 8.--Comparison[a] of the Mean Number of Other[b] Non-Institutional Health Care Provider Visits to People More Independent in Activities of Daily Living in Rural and Urban Areas

Null Hypothesis (Ho)	Expected Outcome (Ha)	Mean Number of Visits		1-Tailed Probability	Interpretation of Outcome for $\alpha < .05$
		Rural	Urban		
Rur $\geq$ Urb (visits)	Rur < Urb	1.4	2.1	.17	Do not reject Ho.

[a]Using a T-test.

[b]"Other" refers to non-nurse and non-physician visits.

public funding in general, it was thought, would lead to less availability of supply in rural areas than in urban areas. The table shows that the mean number of visits was less in rural areas but the difference between rural and urban areas was not statistically significant at $\alpha = .05$.

Two regressions were then run to obtain information on the variables useful in predicting whether or not a person would these other services and the level at which they would be used. The results of the first regression are presented in Table 9. The dependent variable is a dummy variable indicating whether or not these "other" non-institutional services were used at all. Only one variable, Medicaid as source of pay, was statistically significant at $\alpha = .05$. However, Medicaid explained only five percent ($R^2 = .046$) of the variance in the dependent variable. With such a low R^2, this regression cannot be used in prediction. We only know that having Medicaid as a source of pay indicated a probability that the services would be used, and that the other social, economic, and health functioning variables did not appear to be linearly related to the dependent variable.

The second regression was run in order to find out which variables would contribute to predicting the level of use. In this regression, only cases when the respondent used any of the "other" non-institutional services were selected. The results are presented in Table 10. The dependent variable was number of visits by other (non-nursing and non-physician) providers of health care outside of

TABLE 9.--Regression of Use of Other[a] Non-Institutional Provider Visits on Social, Economic, Health Functioning, and Location Variables for People More Independent in Activities of Daily Living

Dependent Variable = $Other_{Du}$		
Independent Variables[b]	Unstandardized β-Coefficients	Standardized β- Coefficients
Medicaid	0.22* (.06)[c]	0.22
Constant	0.16* (.03)	
N = 296		
R^2 = .05		
$\bar{R}^2$ = .046		

*Significant at α = .05.

[a]"Other" refers to non-nurse and non-physician visits.

[b]See text for explanation of variables.

[c]Figures in parentheses indicate standard errors of the coefficients.

TABLE 10.--Regression of Number of Other[a] Non-Institutional Health Care Provider Visits on Social, Economic, Health Functioning and Location Variables for People Who Used These Services and Who Were More Independent in Activities of Daily Living

Dependent Variable = Other Visits		
Independent Variables[b]	Unstandardized β-Coefficients	Standardized β- Coefficients
Mobility	-7.76* (2.64)[c]	-.345
R*Age	-0.11* (.03)	-.404
R*Medicaid	8.68* (3.14)	.370
Own Money	5.53* (2.52)	.276
Constant	3.63* (3.35)	
N = 61		
R^2 = .26		
$\bar{R}^2$ = .206		

*Significant at α = .05.

[a]"Other" refers to non-nurse and non-physician visits.

[b]See text for explanation of variables.

[c]Figures in parentheses indicate standard errors of the coefficients.

of the institutional setting. The independent variables were defined as follows:

Mobility = a dummy variable whereby 1 indicated that mobility was possibly without human assistance.

R*Age = an interaction variable of location (= 0 for urban and 1 for rural) with age, defined as being 65 years and older.

R*Medicaid= an interaction dummy variable whereby 1 indicated that the person was from the rural group and reported Medicaid as a source of pay for health care.

Own Money = a dichotomous variable whereby 1 indicated that the participant's own money was a source of pay for health care.

Two coefficients for variables in this regression are especially interesting. First, age in rural areas had a significant negative coefficient, indicating that number of visits declined as age increased. Recall that the likelihood of entering a nursing home[17] and of using non-institutional nursing services in rural areas rose with age. This suggests that a substitution of non-institutional nursing or nursing home services for other non-institutional services may have occurred as a person in a rural area got older.

The second interesting result is that Own Money has a positive coefficient in the regression. This may be partly explained by a lower degree of coverage for some of the services by Medicare. The result indicates that people (who were ineligible for Medicaid) used their own money in paying for the service, if it was not covered by Medicare.

Medicaid was also a statistically significant variable in rural but not in urban areas. This outcome suggests that Medicaid

coverage is an enabling factor in obtaining "other" non-institutional services in rural areas. It is likely that differences in supply factors in urban and rural areas resulted in a non-significance of the Medicaid variable in urban areas. For example, if more community agencies which provide "other" non-institutional health services existed in urban areas, then Medicaid coverage for health care might be inconsequential for obtaining the services in urban areas.

In summation, no statistically significant differences in the number of visits by "other" non-institutional health care providers in rural and urban areas were detected. Medicaid coverage was a significant variable for predicting whether or not other non-institutional services would be used, but the unexplained variance was large, so prediction error would be large. Medicaid coverage was associated with increased usage in rural but not in urban areas. Thus, Medicaid had a differential effect in the two types of locales. Age in rural areas was negatively associated with usage, possibly a result of substitution of nursing home and non-institutional nursing services for older people in rural areas.

For Those More Dependent in Activities of Daily Living

Testing of Hypotheses Relating to Relative Levels of Social, Economic, and Personal Functioning Variables in Rural and Urban Areas

The significant and interesting outcomes from T-tests for rural and urban differences in social, economic, and personal

functioning variables are presented in Table 11. The results are very similar to those previously reported for the group more independent in Activities of Daily Living. Income here is not significantly less (statistically) in rural areas but insurance is reported significantly more often as a source of pay in rural than in urban areas. However, actual users of any of the three types of health care services were as likely in urban and rural areas to report Medicare as a source of pay.[18]

Use of Nursing Home Services

Table 12 presents the statistical results of the T-test for comparing the days of nursing home care in rural and urban settings. The hypothesis that days of nursing home care in rural areas would be greater than days of care in urban areas cannot be substantiated statistically based on the data. The mean number of days of care in rural areas was 11.4 compared with 6.2 days in urban areas.

Two regressions were then run to obtain information about the effects of location and social, economic and personal health variables on the use of nursing home services. Table 13 presents the outcomes from the first regression. The dependent variable was a dummy variable expressed as did (1) or did not (0) enter a nursing home during the six months of data collection. The variables in the regression were defined as follows:

NH_{Du} = a dummy dependent variable whereby 1 indicated that nursing home days of care were used.

Mobility = a dummy variable whereby 1 indicated that mobility was possible without human assistance.

TABLE 11.--Comparison of Social, Economic, and Functioning Variables in Rural and Urban Areas for People More Dependent in Activities of Daily Living

Variable	Mean Scores		2-Tailed Prob.	Interpretation Using .05 Significance Level
	Rural	Urban		
Age	76.86	74.66	.008*	R > U
Mobility	.46	.66	.009*	R < U
Insurance	.47	.23	.001*	R > U
Medicare	.61	.37	.002*	R > U
Medicaid	.19	.23	.559	R = U
Public Asst.	0	.02	.283	R = U
Income	2.0	2.3	.07[b]	R = U

*Significant at $\alpha = .05$

[a]Using a T-test.

[b]This is a one-tailed probability since it was hypothesized that income in rural areas would be less than in urban areas. The differences are not statistically significant at $\alpha = .05$.

TABLE 12.--Comparison[a] of Rural and Urban Days of Care in Nursing Homes for People More Dependent in Activities of Daily Living

Null Hypothesis (Ho)	Expected Outcome (Ha)	Mean Number of Days		1-Tailed Probability	Interpretation of Outcome for $\alpha = .05$
		Rural	Urban		
Rur $\leq$ Urb	Rur > Urb	11.4	6.2	.13	Do not reject Ho.

[a]Using a T-test.

TABLE 13.--Regression of Use of Nursing Home Services on Social, Economic, Health Functioning and Location Variables for People More Dependent in Activities of Daily Living.

Dependent Variable = NH_{Du}		
Independent Variables[a]	Unstandardized β-Coefficients	Standardized β- Coefficients
Mobility	-0.19* (.04)[b]	-.349
Income	-0.03 (.02)	-.138
R*Family-Friend	0.83* (.28)	.23
Constant	0.25* (.05)	
N = 137		
R^2 = .19		
$\bar{R}^2$ = .173		

*Significant at α = .05.

[a]See text for explanation of variables.

[b]Figures in parentheses indicate standard errors of the coefficients.

Income = family income of participant, defined as being in one of six income levels, whereby a value of 1 for the variables implied that the family income was less than $3,000 per year and a value of 6 implied the family income was $15,000 or more per year.

R* Family-Friend = an interaction variable of location (= 0 for urban and 1 for rural) with a dichotomous variable indicating that family and friends were reported as a source of pay for health care.

The likelihood of entering a nursing home for people more dependent in Activities of Daily Living was reduced if the person was mobile without human assistance. Because of lower mobile ability in rural areas,[19] more people from rural than from urban areas would be likely to enter a nursing home. This likelihood increased if the person lived in a rural area and reported family and friends as a source of pay.[20] Income was not statistically significant, but it did raise the $\bar{R}^2$ explanatory value of the regression. The adjusted R^2 for the regression was .173, indicating a high degree of unexplained variation.

The second regression was run to find out which variables would contribute to predicting the level of use for those people who used the nursing home services. The dependent variable, NH_{days} was defined as days of care in a nursing home. The independent variables were defined as follows:

Insurance = a dichotomous variable whereby 1 indicated that insurance was a source of pay for health care.

Medicare = a dichotomous variable whereby 1 indicated that Medicare was a source of pay for health care.

Married = a dummy variable whereby 1 indicated that the person was currently married and 0 indicated that the person was widowed, never married or was divorced.

As shown in Table 14, Insurance was the only statistically significant explanatory variable, though Medicare and Married contributed to explaining the unexplained variance (i.e. increased the value of $\bar{R}^2$). Both Insurance and Married had negative coefficients, while Medicare had a positive association. Since the people in the sample were more dependent in Activities of Daily Living, they would be likely to require the skilled level of care for which the Medicare program reimburses.

Because Insurance was more often reported by rural areas,[21] the negative coefficient in the regression would suggest a lower number of days of nursing home care in rural than in urban areas. However, as Table 12 indicates, the mean number of days was actually higher, though not statistically significant. The negative relationship of insurance and days of nursing home care indicates that the insurance policies may provide very limited coverage for nursing home care. Thus, few days are used by people with insurance coverage and the coefficient is negative.

No effects specifically due to location appeared in the regression. Also, Medicaid did not appear as an important variable in the regression equation. This may reflect the fuller coverage by Medicare for people who require skilled care. The three variables which appeared in the regression explained nearly half of the variation in the dependent variable.

TABLE 14.--Regression of Days of Nursing Home Care on Social, Economic, Health Functioning, and Location Variables for People Who Used Nursing Home Services and Who Were More Dependent in Activities of Daily Living

	Dependent = NH_{days}	
Independent Variables[a]	Unstandardized β-Coefficients	Standardized β- Coefficients
Insurance	-94.93* (25.98)[b]	-1.008
Medicare	52.35 (25.64)	.564
Married	-28.07 (17.55)	- .298
Constant	86.94* (15.03)	
N = 15		
R^2 = .58		
$\bar{R}^2$ = .482		

*Significant at α = .05.

[a]See text for explanation of variables.

[b]Figures in parentheses indicate standard errors of the coefficient.

In summation, the number of days of care in nursing homes in rural areas was greater but not significantly (statistically) than in urban areas. This outcome was consistent with the demand for care in a skilled nursing facility, as hypothesized from the economic model. If the disability level of these people was such that they needed care in a skilled nursing facility, few substitute services in rural or urban areas would be available. Thus, rural and urban differences in use of nursing home services would be likely to be slight.

Mobility was the strongest indicator that nursing home services would be used at all. People in rural areas who reported family or friends as a source of pay for health care were also more likely to use nursing home services. This may be because people in rural areas generally have a lower average income than people in urban areas. They may be less able to pay for care of an elderly person than their urban counterparts. With public funding available for care in a nursing home for an elderly person with low ADL functioning, the incentive exists to put the elderly person in a nursing home.

Finally, for those who used the service, having insurance coverage or being married was associated with increased usage. No differences in the effects of these variables due to location were detected.

Use of Non-Institutional
Nursing Services

Table 15 presents the statistical results of the T-tests for comparing the number of non-institutional nursing visits for people more dependent in functioning in Activities of Daily Living. It was expected that rural use of this type of service would be lower than urban use because funding overall for this type of service is not high and so supply and hence use is probably lower in rural than in urban areas. In light of the data, the null hypothesis that the number of non-institutional visits by nurses in rural areas would be greater than in urban areas cannot be rejected. The mean number of visits was higher in rural areas,[22] indicating that the null hypothesis was misspecified.[23]

To gain insight about variables which might be affecting this outcome, two regressions were run. The first regression used a dummy dependent variable, expressed as did (1) or did not (0) have visits from a nurse outside of an institutional setting. The coefficients for the independent variables indicate the probability that a person will obtain non-institutional nursing services. The outcome is presented in Table 16. The variable in the regression were defined as follows:

$Nurse_{Du}$ = a dummy dependent variable whereby 1 indicated that non-institutional nursing visits were had.

Medicare = a dichotomous variable whereby 1 indicated that Medicare was a source of pay for health care.

R* Own Money = an interaction variable of location (= 0 for urban and 1 for rural) with Own Money, whereby

TABLE 15.--Rural-Urban Comparison[a] of the Mean Number of Non-Institutional Nurse-Visits to People More Dependent in Activities of Daily Living

Null Hypothesis (Ho)	Expected Outcome (Ha)	Mean Number of Visits		1-Tailed Probability	Interpretation of Outcome for $\alpha = .50$
		Rural	Urban		
Rur > Urb (visits)	Rur < Urb (visits)	2.4	1.2	.11	Do not reject Ho.

[a]Using a T-test.

TABLE 16.--Regression of Use of Non-Institutional Nursing Visits on Social, Economic, Health Functioning, and Location Variables for People More Dependent in Activities of Daily Living

Dependent Variable = $Nurse_{Du}$		
Independent Variables[a]	Unstandardized β-Coefficients	Standardized β- Coefficients
Medicare	.13* (.07)[b]	.161
R* Own Money	.31* (.08)	.343
R* Mobility	-.22* (.10)	-.200
Constant	.10* (.05)	
N = 137		
R^2 = .12		
$\bar{R}^2$ = .105		

*Significant at α = .05.

[a]See text for explanation of variables.

[b]Figures in parentheses indicate standard errors of the coefficients.

1 indicated that the person was from the rural area and reported that they paid for their health care from their own resources.

R* Mobility = an interaction variable of location with a dummy variable, Mobility, whereby 1 indicated that the person was from the rural area and was able to go outside without human assistance.

The effects of the variables were different for people in urban and rural areas. The reporting of an inability to leave the house without human assistance or the payment of health care with their own money were significant predictors of the use of non-institutional nursing visits in rural but not in urban areas.

The adjusted R^2 ($\bar{R}^2$) only reached 0.105, indicating that the regression variables explained only a small proportion of the variance in the dependent variable.

The second regression was run in order to find out which variables would contribute to predicting the level of use for people who actually received visits from nurses outside of the institutional setting. None of the social, economic, health functioning or location variables appeared as significant variables in the regression at $\alpha = .05$.[24] A sensitivity analysis showed that they were also not significant at $\alpha = .10$. This outcome indicates that important variables were not included or that missing data is a substantial problem.

In summation, the mean number of visits by nurses outside of an institutional setting was higher in rural than in urban areas, but the difference was not statistically significant. The likelihood of use of the service was increased if the person reported Medicare

as a source of pay. Rural people who paid for care with their own money or who were less mobile also had a higher likelihood of using the service. These two variables did not appear for the urban group. None of the social, economic, health functioning, or location variables appeared in a regression indicating intensity of use for those who received nurse visits outside of an institutional setting. This outcome suggests that important explanatory variables have been excluded or that missing data is a problem.

Use of Other (Non-Nursing, Non-Physician) Non-Institutional Services

Table 17 presents the statistical results of the T-tests comparing the number of visits by other (non-nursing, non-physician) health care providers outside of institutional settings for people more dependent in Activities of Daily Living. It was hypothesized that people in rural areas would use fewer of these types of services than people in urban settings. The difficulty in obtaining public funding in general, it was thought, would lead to less availability of supply in rural than in urban areas. The table shows that the mean number of visits was actually higher in rural areas and was statistically significant at $\alpha = .05$. The mean number of visits in rural areas was 6.3, while that in urban areas was 2.2. This outcome was the opposite from that hypothesized and was also opposite from the results for the people more independent in Activities of Daily Living, as reported in Table 8. The opposite results according to the ADL status could indicate that supply of other

TABLE 17.--Comparison of the Mean Number of Other[a] Non-Institutional Health Care Provider Visits to People More Dependent In Activities of Daily Living in Rural and Urban Areas

Null Hypothesis (Ho)	Expected Outcome (Ha)	Mean Number of Visits		1-Tailed Probability	Interpretation of Outcome for $\alpha \leq .05$
		Rural	Urban		
Rur $\geq$ Urb	Rur < Urb	6.3	2.2	.98	Rur > Urb

[a]"Other" refers to non-nurse and non-physician visits.

non-institutional services was relatively scarce or limited. Under conditions of limited supply, physicians would be likely to refer only their neediest patients to providers of the service. The average number of visits would be higher for people with low functioning ability and lower for people with more independence in functioning. From the data set, the mean number of visits for those with independence and those with dependence in ADL in urban areas was nearly equal. The same comparison for the rural areas showed a substantial difference. Thus, the data and the explanation appear to be consistent with each other.

Tests to see if the unexpectedly higher number of visits in rural areas could have been a result of the experimental treatment[25] were performed. The control group from the original study did not show statistically significant differences in the use of this type of service, though the mean number of visits for the rural group (3.5) was still higher than that for the urban group (2.2). Thus, part of the difference in number of visits in rural and urban areas appears to have been a result of the original experiment from which the data was taken.

Insight into the unexpected result was sought through running regressions to see if different variables for predicting use and extent of use of the services would appear for rural and urban areas. The results of the first regression are presented in Table 18. The dependent variable was a dummy variable indicating that "other" non-institutional services were (1) or were not (0) used. Only Location, a dummy variable, was significant at $\alpha = .05$. A value of 1 for

TABLE 18.--Regression of Use of Other[a] Non-Institutional Provider Visits on Social, Economic, Health Functioning, and Location Variables for People More Dependent in Activities of Daily Living

Dependent Variable = $Other_{Du}$		
Independent Variables[b]	Unstandardized β-Coefficients	Standardized β- Coefficients
Location	.15* (.07)[c]	.167
Mobility	-.13 (.07)	-.144
Constant	.26* (.07)	
N = 137		
R^2 = .06		
$\bar{R}^2$ = .044		

*Significant at α = .05.

[a]"Other" refers to non-nurse and non-physician visits.

[b]See text for explanation of variables.

[c]Figures in parentheses indicate standard errors of the coefficients.

Location indicated that the respondent was from a rural area. However, very little of the variance in the dependent variable was explained, as indicated by an adjusted R^2 of 0.04.

The second regression was run in order to find out which variables would contribute to predicting the level of use. In this regression, only cases where the respondent used any of the "other" non-institutional services were selected. The results are presented in Table 19. The dependent variable was number of visits by other (non-nursing and non-physician) providers of health care outside of the institutional setting. The independent variables were defined as follows:

Mobility = a dummy variable whereby 1 indicated that mobility was possible without human assistance.

R* Own Money = an interaction dummy variable whereby 1 indicated that the person was from the rural group and reported that they paid for their health care with their own money.

R* Married = an interaction dummy variable whereby 1 indicated that the person was from the rural group and was currently married.

Income = income of participant, defined as being in one of six income levels.

R* Own Money and R* Married were the only statistically significant variables, but Mobility and Income also contributed to the explanatory value of the regression. A higher use of other non-institutional services was associated with having a higher income level and being more dependent in mobility. The greater dependency in mobility in the rural sample, as reported in Table 11, could have

TABLE 19.--Regression of Number of Other[a] Non-Institutional Health Care Provider Visits on Social, Economic, Health Functioning and Location Variables for People Who Used These Services and Who Were More Dependent in Activities of Daily Living.

Dependent Variable = Other Visits		
Independent Variables[b]	Unstandardized β-Coefficients	Standardized β- Coefficients
Mobility	- 7.47 (4.66)[c]	- .271
R* Own Money	13.27* (4.62)	.470
R* Married	-12.86* (5.29)	- .418
Income	3.77 (2.02)	.333
Constant	9.05 (6.17)	
N = 31		
R^2 = .42		
$\bar{R}^2$ = .338		

*Significant at α = .05.

[a]"Other" refers to non-nurse and non-physician visits.

[b]See text for explanation of variables.

[c]Figures in parentheses indicate standard errors of the coefficients.

contributed in the higher intensity of use of "other" non-institutional services. In rural areas, being unmarried or reporting own money as a source of pay for health care were also associated with a higher use of other non-institutional services. These four variables explained about a third of the variance in the dependent variable. Neither Medicare nor Medicaid coverage for health care appeared as variables in this regression.

In summary, visits by other non-institutional health providers was greater in rural than in urban areas. The variable for rural location was statistically significant in predicting the probability that "other" services would be used, but the explanatory power of the regression was extremely low. Intensity of use in rural areas increased if the person was unmarried or paid for their own health care. Because dependency in mobility indicated a higher use of other non-institutional services, the greater dependency in mobility in the rural sample could possibly explain at least part of the higher number of visits in the rural areas. Effects due to the study from which the data were taken could also explain part of the higher number of visits in the rural areas. Finally, because rural people with a greater dependency in ADL received more visits while rural people with greater independency in ADL received fewer visits than their urban counterparts, the supply of non-institutional health care providers is hypothesized as having been more limited in rural areas.

Summary

Data from the Chronic Disease Module Study were used to test hypotheses about the relative amounts of nursing home and home care services used in rural and urban areas. The data were divided according to the respondents' level of dependence in Katz's Index of Activities of Daily Living (ADL). Using the Chronic Disease Module Study data, two regressions were run to ascertain the degree to which social, economic, health functioning, and location-related variables contributed to explaining a) whether the service was used and b) the intensity of use by those who used the service. Table 20 summarizes the main findings.

For people more independent in ADL functioning, the mean number of days of care in a nursing home was higher in rural than in urban areas. In rural areas, having Medicaid increased the likelihood that nursing home services would be used. No other variables indicated differences in likelihood or intensity of use of nursing home services in rural and urban areas.

For people more dependent in ADL functioning, no statistically significant difference in the mean number of days of care in a nursing home in rural and urban areas was observed. Family and friends paying for health care was an indicator that care in a nursing home was obtained in rural areas. This finding suggests a differential impact from social variables in the rural and urban areas. Because no data about income levels of the family and friends was available, however, this effect could not be further investigated.

TABLE 20.--Summary of the Main Findings from the Chronic Disease Module Study

A. For those More Independent in Functioning in Activities of Daily Living.

Type of service	Results of T-test comparing number of units of service	Variables in Regression on Use of Service	($\bar{R}$)	Variables in Regression on Intensity of Use for Those Who Used the Service	($\bar{R}$)
Nursing Homes	Rural > Urban	(-) R*MSQ Medicare* Age (-) Mobility* (-) R*Medicaid*	(.18)	Medicaid*	(.42)
Non-institutional Nursing Services	Rural $\geq$ Urban	Family & Friends* (-) Income* Other Pay* (-) Mobility R*Age* R*Insurance* (-) R*Medicare* Medicare*	(.11)	(-) Mobility* (-) Own Money R*Medicaid*	(.29)
Other Non-institutional Services	Rural = Urban	Medicaid*	(.05)	(-) Mobility* (-) R*Age* R*Medicaid* Own Money*	(.21)

B. For those More Dependent in Functioning in Activities of Daily Living.

Type of service	Result of T-test comparing number of units of service	Variables in Regression on Use of Service	($\bar{R}$)	Variables in Regression on Intensity of Use for Those Who Used the Service	($\bar{R}$)
Nursing Homes	Rural = Urban	(-) Mobility* (-) Income R*Family Friend*	(.17)	(-) Insurance* Medicare (-) Married	(.48)
Non-institutional Nursing Services	Rural $\geq$ Urban	Medicare* R*Own Money* (-) R*Mobility*	(.11)	None	
Other non-institutional Services	Rural $\geq$ Urban	Location* (-) Mobility	(.04)	(-) Mobility R*Own Money* (-) R*Married* Income	(.34)

*Significant at α = .05.

No other variables indicated differences in likelihood or intensity of use of nursing home services in rural and urban areas.

The number of visits by nurses outside of institutional settings for people more independent or more dependent in ADL functioning was not less in rural areas as hypothesized. Part of this outcome, however, may have been a result of the experimental nature of the original study from which the data used here was extracted. For people more independent in ADL functioning in rural areas, increasing age and having insurance coverage indicated a higher likelihood that the service would be used. Medicare coverage indicated a lower probability of use in rural than in urban areas. More visits were indicated for people in rural areas who used Medicaid to pay for their health care.

For people more dependent in ADL functioning, those in rural areas who reported paying for their own health care or who were dependent on human assistance to leave the house were more likely than their urban counterparts to use non-institutional nursing services. None of the social, economic, health functioning or location-related variables appeared in the regression on number of visits by nurses outside of institutional settings for people more dependent in ADL functioning. No other variables indicated differences in likelihood or intensity of use of non-institutional nursing services in rural and urban areas.

Finally, the number of visits by other non-institutional health care providers was slightly higher, but not significant statistically in urban than in rural areas for people independent

in ADL functioning. The opposite was true for those more dependent in ADL functioning. It was suggested that these two opposite outcomes indicate a more limited supply of the services in rural areas, with the available supply being used to help those people who are more dependent in functioning.

For people in rural areas who were more independent in ADL functioning, fewer visits by other non-institutional health care providers were received as age rose. More services were received if these people had Medicaid coverage. For people more dependent in ADL functioning, people in rural areas who were not married or who reported paying for their own health care received more visits.[26] No other variables indicated differences in likelihood or intensity of use of other non-institutional health care provider services in rural and urban areas.

Overall, Medicaid appeared as an enabling factor in the use or intensity of use of each of the services looked at in this study for people independent in ADL in rural areas. For people more dependent in ADL functioning, Medicare appeared as an enabling factor in use of non-institutional nursing services and in increasing the days of care in a nursing home. However, no differences in use or intensity of use due to Medicare was observed in rural and urban areas. Social factors such as family and friends paying for health care and not being married had differential effects on the use and intensity of use of the services in rural and urban areas for people more dependent in ADL.

FOOTNOTES

CHAPTER IV

[1]The ADL Index scores people on their ability to bathe, dress, use the toilet by themselves, transfer themselves from their bed to a chair or elsewhere, feed themselves, and if they are continent or not. Ability to perform these activities gives a score of one per activity, up to a total of six. A high score indicates a low level of impairment in performing activities of daily living and, hence, indicates a high level of independence. Scores of 4 to 6 were considered high, while those less than 4 were considered low. Katz contends that ability or inability to function in the activities his index measures is ordered for most elderly people. A person who is unable to perform a function lower down on the list is usually not able to perform the functions previously listed. Conversely, if they are able to perform a function on the list, they can usually perform all of the functions listed after that function. For example, if a person is unable to use the toilet by themselves, they are usually unable to bathe or dress themselves. Those able to dress themselves can usually use the toilet, transfer, feed themselves, and are continent.

[2]The subgroup was "Final Control Participant."

[3]Part of the original study design entailed data collection in five separate localities. Three of these were non-metropolitan and two were metropolitan. The data from the non-metropolitan areas were pooled together to form the "rural" group; that from the two metropolitan areas formed the "urban" group.

[4]Among other qualifications, such as age.

[5]Cass County, Manistee County, and Gratiot County, Michigan.

[6]All of the variables are defined in Appendix C.

[7]These included visits by nurses' aides, physical therapists, occupational therapists, health social workers, and health housekeepers (who were necessary only because of the participants' medical condition).

[8]The interview was six-months after entry into the study. The first six months of data collection was used rather than the first twelve months or longer because of the substantial amounts of

missing data from the twelve-month interview and after. It was felt that statistical inference would be substantially damaged by inclusion of data collected after the six-month time period.

[9]Defined as ability to go out of the house with no aid or with mechanical aid only versus being able to leave the house with human aid, with both mechanical andhuman aid, or not being able to leave the house at all.

[10]These variables included insurance, Medicare, Medicaid, Public Assistance, own money, family/friends pay, or other pay, and were 0-1 variables.

[11]For the case where the dependent variable was NH Days (days of care in a nursing home in the past six months), stepwise deletion should not have been used because the potential variables were more than the potential number of respondents. (Thanks to L. Manderscheid for this point).

[12]A major drawback exists in interpreting the results of this regression. The dependent variable, being a dummy variable, could have only two possible values: 0 or 1. This truncation results in a heteroscedasticity problem, which could be resolved using a logit-type model. Without using the logit model, the estimates of the regression parameters are unbiased but inefficient, while the estimates of the variances are biased.

[13]Marital status, availability of a primary care given at home and the mental status quotient were equivalent in the rural and urban areas and are not reported in Table I.

[14]Mobility which was independent of human assistance.

[15]Interaction with dichotomous variable "location," whereby 1 = rural and 0 = urban.

[16]Results are not presented here.

[17]In both rural and urban areas.

[18]This result is not shown in the table.

[19]See Table 11.

[20]This outcome suggests that differences in social or economic factors in rural and urban areas influence a person's entering a nursing home if they are highly dependent in functioning. Because the data set did not contain information on income of the family and friends who were paying for the study participants' health care, we do not know if the appearance of R* Family-Friend in the regression

on use of a nursing home was due to a financial inability to support the person outside of a nursing home or if it was due to social factors. In the former case, the family or friends would be able to relinquish their financial responsibility if the elderly person entered a nursing home and could receive public funding for their health care.

[21]See Table 11 for a comparison of Insurance reported as a source of pay in rural and urban areas.

[22]2.4 visits in rural vs 1.2 visits in urban areas.

[23]This effect was the same when the test was conducted on the control group (from the original study) only.

[24]This may be contrasted with the outcome in Table 7 for people who were more independent in Activities of Daily Living. In that table, Mobility and R* Medicaid were significant at $\alpha = .05$. These and Own Money as source of pay contributed to explaining 29 percent of the variance in the dependent variable.

[25]Results are not presented in the table.

[26]These results are likely to stem from the fact that visits by nurses and other home care personnel to people in the treatment group in the Chronic Disease Module Study were costless. Thanks to R. D. Stevens for bringing this to my attention.

CHAPTER V

SUMMARY AND CONCLUSIONS

Introduction

In this paper, the use of long-term care health services by chronically impaired elderly people in rural and urban areas has been explored. The types of services referred to included care in nursing homes, home nursing by professional nurses, home therapy services, homemaker services, and purchased personal care services at home for people needing the services due to their health status.

The rapid growth of the elderly population and the rise in post-retirement migration to rural areas suggests a need for policy markers to understand the use and factors affecting the use of health care resources by elderly people in rural areas. Three factors identified for the use of long-term care services by the elderly were health functioning, social support in the community, and the ability to finance health care.

Hypotheses About Factors Influencing Use of Services

The high availability of funding for nursing homes and the low funding for home health care, a lower income level in rural areas, and the higher difficulty of attracting and keeping health care professionals in rural areas were hypothesized as resulting

in different patterns of use of long-term care services in rural and urban areas.

Nursing Homes

Based on economic theory, demand for care in a nursing home without public funding was hypothesized as being higher in urban areas because of the higher income level there. The availability of Medicare and Medicaid funding for care in a nursing home, however, was hypothesized as increasing demand for days of care in a nursing home in both rural and urban areas. On the other hand, the availability of substitute services was assumed to be greater in urban areas. This greater availability was hypothesized as reducing the insured demand for nursing home services in urban areas relative to the demand in rural areas.

Using data from the Chronic Disease Module Study, more days of care in a nursing home were found to be used by people in the rural areas, though the difference was not statistically significant for people more dependent in functioning in Activities of Daily Living. Both Medicaid and Medicare coverage, as hypothesized, appeared as significant variables indicating a higher probability of use or increased use of nursing home services. Differential effects according to location were apparent for people more independent in functioning in Activities of Daily Living (ADL). Having Medicaid coverage or low mental functioning in rural areas indicated a higher likelihood that nursing home services would be used by people with more independence in ADL functioning. For people who

were more dependent in ADL functioning, family and friends paying for the respondent's health care was the only variable indicating different effects on the likelihood of using nursing home services in rural and urban areas.

Home Health Services

Based on economic theory, in general the lower availability of Medicare and Medicaid funding for home health services was hypothesized to result in a lower use of these services by rural people as compared to urban people. This hypothesis was developed based on the assumption of a lower income level in rural areas. Without public programs or other types of insurance, payment for home health would be paid out-of-pocket. Since income levels are lower in rural areas, demand for paid-for care would also be expected to be lower.

The results from the Chronic Disease Module Study were mixed. The number of visits by nurses outside of an institutional setting were slightly greater in rural than in urban areas, contrary to what was hypothesized. The greater dependency in mobile functioning in rural areas, though, may have obscured the differences in the use of services in rural and urban areas. Also, differences may have been obscured as a result of the experimental nature of the original study from which the data came. Nonetheless, Medicaid appeared to be an enabling factor in obtaining non-institutional nursing visits for people in rural areas who were more independent in functioning in Activities of Daily Living. Increasing age and having insurance

coverage also indicated a higher likelihood that the service would be used in rural areas. Although income per se did not appear as an important variable affecting the use of non-institutional nursing visits, people in rural areas who were dependent in ADL functioning and who reported paying for their own health care were more likely to use the service.

The number of visits by other non-institutional health care providers in rural compared with urban areas was slightly lower for rural people who were more independent in Activities of Daily Living (ADL) and significantly higher for rural people more dependent in ADL functioning. These opposite results indicate the possibility of large differences in the quantity of "other" non-institutional health care services being supplied and demanded at the going market rate in rural areas. In such a case, it is likely that people in greater "need" would be referred to the available providers. Those less disabled would probably be put on a waiting list or seek out family members or friends to provide the services without remuneration. For people more dependent in ADL functioning, people in rural areas who were not married or who reported paying for their own health care received more visits.

Conclusions and Policy Implications

The results from the Chronic Disease Module Study provide insight into the factors affecting the use of long-term care services in rural and urban areas. Public insurance programs were enabling variables in the use of institutional and non-institutional long-term

care services by the elderly in both rural and urban areas. Few rural-urban differences in the effect of these programs for people using days of care in nursing homes or receiving non-institutional nursing visits were apparent in the five communities studied. In addition, few of the other social or economic variables used in the regression analysis appeared as important variables in the use of nursing home days of care or non-institutional nursing visits.

However, for people who were independent in Activities of Daily Living and who received visits by other non-institutional health care providers, Medicaid appeared as an enabling factor only in rural areas. This suggests that these types of health care services may not be available to Medicaid recipients with independence in ADL functioning in rural areas except through Medicaid. In contrast, similar types of people in urban areas are likely to have other governmental or charitable programs available to provide these types of services. If such were the case, Medicaid coverage in the urban areas would play a less vital role for a person requiring other non-institutional health care services.

The other economic and socially-related variables which entered into regressions indicating the number of visits by other non-institutional health care providers support the hypothesis of a lesser ability of people in rural areas to finance these types of services without public support. Furthermore, the negative coefficient of age in years in rural areas as a variable in the use of other non-institutional services suggests a substitution of more institutional care as the person gets older.

With current public funding for heatlh care being reduced, it appears that those requiring less-skilled types of care in rural areas would become less able to obtain that care. It is likely that cut-backs in funding for non-institutional long-term health care services for the elderly would result in increases in the demand for institutionally provided services if funding for them were not also reduced. In rural areas, where problems in attracting and retaining health care professionals already exist, the quality of care in the institutional facilities would be likely to decline considerably in the short run because of the increased demand. Even without funding cutbacks, the migration of elderly people is likely to exacerbate the problems in obtaining long-term care services in rural areas.

In formulating health care policy which will affect the elderly, it will be important to consider the effects which cuts in funding for one type of service will have on other types of services. The differential ability of rural and urban elderly people to obtain long-term care services without public support should also be taken into account. In cases where public funding is available for the provision of long-term care services, administrators of those programs might consider the types of incentives necessary for families to continue to take care of an elderly person within the community.[1] Such an incentive would be likely to have more pronounced effects in rural areas, where social-related services are generally less available. Finally, if the migration trends continue, policies which

enhance the supply of long-term care services in rural areas might help avert a health care crisis situation in the rural areas.

FOOTNOTES

CHAPTER V

[1]Assuming the family members have the skill level necessary to do so.

APPENDICES

APPENDIX A

Description of Services Included as Long-Term Care Services

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Description of Services Included as Long-Term Care Services

Different types of services are referred to as "long-term care" services. However, the group of services are not homogeneous. They range from those provided in a hospital setting to those provided within the community. Moreover, the skill level and time required of the provider can vary substantially.

Services Provided in Institutional Settings

The major institutional settings for the provision of long-term care services for the elderly are hospital rehabilitation or chronic care units, skilled nursing and intermediate care facilities,[1] and non-nursing facilities such as homes for the aged and adult foster care facilities.

Services provided in the hospitals or skilled nursing facilities are generally the most intensive and are most likely than services provided in the other settings to include skilled nursing or intensive therapy. People in these institutional settings generally need constant supervision by professional nurses due to their physical or mental condition.

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[1]Skilled Nursing and Intermediate Care Facilities are types of nursing homes as defined by the Medicare and Medicaid programs.

When a person requires the skilled services provided in these long-term care institutional settings, Medicare may be used as a source of pay for up to 100 days per benefit period. For those who qualify, Medicaid may also be used as a source of pay for these types of services.

People who are not expected to need constant professional medical supervision, but who require some medical care, help with daily activities, and some supervision are likely candidates for an intermediate care facility.[2] These facilities are staffed with professional nurses at least during the day shift during the work week.[3] At other times, attendants supervise the residents. Meals, medical attention, housekeeping, and help with personal hygiene is the minimum that is provided by all of these institutional facilities. In addition to nursing staff, therapists and aides may also be employed by these nursing care facilities to provide therapy and personal care to residents of the facility. A physician may also be associated with the intermediate care facility.

Because no skilled care is required by residents in an intermediate care facility, Medicare will not reimburse for care

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[2]Skilled nursing facilities and intermediate care facilities are types "nursing homes".

[3]These are requirements for nursing homes to participate in the Medicare or Medicaid programs. An estimated 90 percent of nursing homes in the U.S. participate in these programs.

provided in them.[4] Medicaid, however, is available as a source of funding.

Finally, older people who can no longer fully care for themselves in the community and who do not need special medical attention may enter a home for the aged or an adult foster care facility. Often the elderly person must be ambulatory before being accepted into these types of facilities. Shelter, food and help with personal hygiene are generally provided. Although no nursing or medical care is provided by the facilities, people from community health care agencies (e.g. home health agencies) or personal health care providers may come to the facility and provide services.

Long-Term Care Services Provided in Non-Institutional Settings

Overlapping the set of services provided in institutional settings are those provided within the community. These include day care services, home care services offered through home-health agencies and state and county departments of public health and social services, and informal care provided by family members, friends, and neighbors.

Day care services for elderly people living within the community[5] are available in some communities. In the adult day care

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[4]Often facilities are licensed as both skilled nursing facilities and intermediate care facilities. The bed itself is designated as being used for skilled nursing care or for intermediate care. Medicare will pay for clients using those beds designated as "skilled".

[5]In their own home or another person's home.

centers, elderly people are supervised and a social environment is provided for them. Medical attention may also be provided and congregate meals are often available. Finally, an adult day care center may give a family who is taking care of an elderly person a respite from that person while still knowing that the person is being supervised. Currently, no source of public funding is available to pay for the supervisory services offered at the adult day care centers. Any medical care provided within the day care center to people eligible for Medicaid, though, would be paid for by the Medicaid program.

On the other hand, when an elderly person is unable to leave their home, are in need of less constant attention or help, or have no day care centers in their community, home health services may be provided to them in their homes. Among the services included as "home health services" are skilled nursing procedures, other nursing services, physical and occupational therapy, personal hygiene services (e.g. help with bathing), and homemaker-chore service. These services are often provided through home health agencies, or through county health or social services departments. The level and intensity of home health care provided to an individual depends on their physical and mental functioning, and on the amount of family or informal support they have. It will also be influenced by their ability to pay for the care.

Public payment for these types of services are available through both Medicare and Medicaid. Medicare will pay for specific skilled nursing and therapy procedures, and other services only if

they are a necessary part of a health care regimen including the skilled services. Medicaid is generally broader in its coverage, but the specific services vary by state.

Finally, family members, friends, and neighbors provide a vast quantity of informal health-related and social services to elderly people living in the community. In general, the more of this type of support available to an elderly person, the less purchased care that is likely to be needed.[6] Currently, public payment for the services provided by family and friends is limited. Some funds have been available for social services through Title XX of the Social Security Act (as Amended). However, the amount to go toward caring for elderly people is not believed to be large.

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[6]Up to a point. When a person needs skilled care that their informal social network is incapable of providing, they are likely to seek out providers who they will pay for those types of services.

APPENDIX B

Description of the Chronic Disease Module Study

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Description of the Chronic Disease Module Study

The purpose of the Chronic Disease Module[1] study was to evaluate the effects of an interdisciplinary team approach to long term health care using a new type of health assistant. Disabled persons were randomly assigned to control or treatment groups, stratified on the basis of age and sex. The treatment group received home care visits from a special team comprised of a half-time nurse or social worker, a part-time physician, and two full-time assistants who were specifically trained to deliver care in the person's home. Persons in the control group received only the usual health support services offered within the community. The module-provided services for the treatment group was free.

The samples were drawn from an acute care hospital and a community ambulatory clinic in the two urban locations.[2] They were drawn from a county health department, family health center, and county medical care facility in the three rural locations.[3] Subjects

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[1]Most of the information presented in this Appendix is directly from the book Chance for Change (Papsidero, 1979) which presents all aspects of the Chronic Disease Module Study.

[2]The urban locations had populations of 220,000 to 420,000.

[3]The rural locations had populations of 20,000 to 40,000.

were allowed into the study if they met the following criteria: 45 years of age or older; discharged to or living in a non-institutional setting within geographic access to module service unit; in need of assistance for at least three months with respect to either Activities of Daily Living, cardiopulmonary condition or arthritis; not in need of skilled nursing service, 24-hour a day supervision, or on kidney dialysis. A total of 874 people met these requirements.

The module service was provided for one year. Interviews were taken at intake into the study, at six months and at twelve months. Information about the participant's health functioning, social, mental, and economic status, and demographic characteristics were obtained at these interviews. Participants were also asked about the health care they had received within the past six months or during a shorter time period.[4] A sample of the responses to the questions about health services received by the treatment group were verified by comparing them with the records of the amount of services provided by the module team. These two sets of data appeared to be consistent.

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[4]To get around the problem of faulty recall, shorter time periods were used. For example, the participant was asked how many times they had seen a nurse outside of hospitals and nursing homes in the past month.

APPENDIX C

Definition of Variables Used in Empirical Study (Chapter IV)

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Definition of Variables Used in Empirical Study (Chapter IV)

A. Dependent Variables

NH_{Du} : A dummy variable whereby one (1) indicated that nursing home days of care were used in the past six months.

NH_{Days} : Days of care in a nursing home in the past six months. The information was obtained from participants in the study and was checked for reliability by contacting area nursing homes. Only cases where $NH_{DU} > 0$ were selected.

$Nurse_{Du}$: A dummy variable whereby one (1) indicated that the respondent received non-institutional nursing visits in the past month.

$Nurse_{Visits}$: Number of nurse visits outside of institutional settings in the past month. Only cases where $Nurse_{Du} > 0$ were selected.

$Other_{Du}$: A dummy variable whereby one (1) indicated that the respondent saw non-physician and non-nursing health care personnel outside of an institutional setting in the past month.

$Other_{Visits}$: Number of visits from non-physician and non-nursing health care personnel outside of an institutional setting in the past month. Only cases where $Other_{Du} > 0$ were selected.

B. Independent Variables

<u>Sociodemographic Variables</u>

Age : Age of participant, in years, as measured at first screening. Participants were

allowed into the original study only if they were forty-five years or older. For this research, cases were selected only if the participant was sixty-five years or older.

Primary Care Giver: Relationship of the person who gave the participant the most help with personal care and household tasks. This variable was transformed into a dichotomous variable indicating that the person did (1) or not (0) have a family member, friend, employee, or neighbor who helped take care of them at home.

Marital Status : A dichotomous variable whereby 1 indicated that the person was currently married and 0 indicated that the person was never married, was separated, divorced, or widowed.

Health Functioning Variables

Activities of Daily Living:

An index which scores people on their ability to bathe, dress, use the toilet by themselves, transfer themselves from their bed to a chair or elsewhere, feed themselves, and if they are continent or not. Ability to perform these activities gives a score of one per activity, up to a total of six. A high score indicates a low level of impairment in performing activities of daily living and, hence, indicates a high level of independence. Scores of four to six were considered high, while those less than four were considered low. Katz contends that ability or inability to function in the activities his index measures is ordered for most elderly people. A person who is unable to perform a function lower down on the list is usually not able to perform the functions previously listed. Conversely, if they are able to perform a function on the list, they can usually perform all of the functions listed after that function on the list. For example, if a person is unable to use the toilet by themselves, they are usually unable to bathe or dress themselves. Those able to dress themselves can usually use the toilet, transfer, feed themselves, and are continent.

Mental Status Quotient:

The quotient purports to measure orientation of the participant for person, place, and time. Scores ranged from zero to a high of ten.

Mobility:

A dichotomous variable derived from the response to a question coded as follows:

1 = requires no help in going outside.
2 = requires mechanical assistance in going outside.
3 = requires human help in going outside.
4 = requires both human and mechanical help in going outside.
5 = does not go outside.

Responses 1 and 2 were recoded 1 (one) and defined as being independent of human assistance in mobility. Responses 3, 4, and 5 were recoded 0 (zero) and defined as being dependent on human assistance to be mobile.

Economic Variables

Income: Family income of participant, defined as being in one of six income levels, whereby a value of 1 for the variable implied that the family income was less than $3,000 per year and a value of 6 implied that the family income was $15,000 or more per year.

All of the following variables are dummy variables derived from the response of participants to the following question:

"From which of these did you pay for your personal health care in the past month?"

The possible responses were:

a. Private Health Insurance
b. Medicare
c. Medicaid
d. Public Assistance
e. Own Money
f. Family or Friends Paid
g. Other Paid
h. None or no response (defined for this study as missing data)

Interaction Variables

All of the above independent variables were combined with a variable indicating location. The location variable was coded one (1) if the respondent was from a rural area and zero (0) if from an urban one. This location variable was then multiplied with each of the above

independent variables to form a matrix of variables whose non-zero values revealed effects due to the respondents being from a rural area. Appearance of any of the interaction variables in the regression indicated that differences according to locality (rural or urban) were indicated. The urban group was considered the baseline, with differential effects highlighted as the rural group being different from the urban group. It would have been equally appropriate to have used the rural group as the baseline and highlighted any differential effects as the urban group being different from the rural group.

BIBLIOGRAPHY

BIBLIOGRAPHY

Auerback, A. J., The Elderly in Rural Areas: Differences in Urban Areas and Implications for practice. In L. H. Ginsberg (Ed.), Social Work in Rural Communities. Council on Social Work Education, New York, 1976. Cited in R. T. Coward. Planning Community Services for the Rural Elderly. Gerontologist 19(3), p. 280, 1979.

Baltay, M., Long-Term CAre for the Elderly and Disabled, Congressional Budget Office, Washington, D.C., February 1977.

Beale, Calvin L., "The Revival of Population Growth in Non-Metropolitan America," in R. D. Rodefield, et al. (ed), Changes in Rural America-Causes, Consequences, and Alternatives, the C. V. Mosby Co., St. Louis, Mo., 1978.

Coward, cited in Coward, 1979, p. 280.

Coward, R. T., "Planning Community Services for the Rural Elderly: Implications from Research," Gerontologist 19(3): 275-282, June 1979.

Dunlop, B. D., The Growth of Nursing Home Care, the Urban Institute, D.C. Heath & Co., Lexington, MA, 1977.

Fisher, Charles R., "Differences by Age Groups in Health Care Spending," Health Care Financing Review 1(4): 65-90, Spring 1980.

Fisher, Charles R., p. 65, 74-8, 1980.

Fowles, Donald G., Some Prospects for the Future Elderly Population, DHEW Publ. No. (OHDS) 78-20288, January, 1978.

Gibson, R. M., "National Health Expenditures, 1979," Health Care Financing Review, 2(1): 1-36, Summer 1980.

Gibson, R. M. and C. R. Fisher, "Age Differences in Health Care Spending, F. Y. 1977," Soc. Sec. Bull. 42(1): 3-16, January 1979.

Ginsberg, L. H., "Rural Social Work" in Encyclopedia of Social Work-Volume 2, National Assoc. of Social Workers, Inc., N.Y., 1971 in Coward, 1979, p. 280.

Glasgow, Nina, "The Older Metropolitan Migrant As a Factor in Rural Population Growth," in A. J. Sofranko and J. D. Williams, ed., Rebirth of Rural America: Rural Migration in the Midwest, North Central Regional Center for Rural Development, Iowa State University, Ames, IO, June 1980, Chapter 9, pp. 153-170.

Hatten, J., "Medicare's Common Denominator: The Covered Population," Health Care Financing Rev. 2(2) 53-64, Fall 1980.

Health Care Financing Administration, "HCFA Program Statistics," Health Care Financing Review 2(2): 75-80, Fall 1980.

Isgur, Lea A. and R. D. Stevens, The Growing Importance of the Elderly in Michigan Counties, Michigan State University, Cooperative Extension Service, Extension Bullein E-1584, December 1981.

Kahn, R. L., A. I. Goldfarb, et al, "Brief Objective Measures for the Determination of Mental Status in the Aged," Am. J. Psychiatry, 117: 326-328, 1960 as cited in J. A. Papsidero, et al (ed.) Chance for Change: Implications of a Chronic Disease Module Study, Michigan State University Press, East Lansing, MI, 1979, p. 33.

Katz, S. and Akpom, C. A., "A Measure of Primary Sociobiological Functions," Int. J. Health Serv, 6: 493-508, 1976.

Long, Larry H. and D. DeAre, Migration to Non-Metropolitan Areas: Appraising the Trend and Reasons for Moving, U.S. Department of Commerce, Bureau of the Census, CDS-80-2, November, 1980.

Medicaid/Medicare Management Institute, Data on the Medicaid Program: Eligibility, Services, Expenditures, DHEW Publ. No. (HCFA) 79-20005, Baltimore, MD, 1979.

Nagi, Z., "An Epidemiology of Disability Among Adults in the U.S.," Milbank Memorial Fund Quarterly 54(4): 439-67, Fall, 1976.

National Center for Health Statistics, "Inpatient Health Facilities Statistics, U.S. 1978," Vital and Health Statistics, Series 14, No. 24, DHHS Publ. No. (PHS) 81-1819, Hyattsville, MD, March 1981.

National Center for Health Statistics, "Current Estimates From the Health Interview Survey," U.S. 1979 Vital and Health Statistics, Series 10 No. 136, DHHS Publ. No. (PHS) 81-1564, Hyattsville, MD, April 1981.

National Center for Health Statistics, Limitations of Activity and Mobility Due to Chronic Conditions, U.S. 1972 Vital and Health Statistics, Series 10, No. 96, DHEW Publ. No. (HRA) 75-1523, Rockville, MD, November 1974.

Newhouse, J. P., Forecasting Demand for Medical Care for the Purpose of Planning Health Services, Rand Corp., Santa Monica, CA., #R-1635-OEO, December 1974.

Nie, Norman, H., et al. Statistical Package for the Social Sciences, McGraw-Hill Book Co., New York, Second Edition, 1975.

National Center for Health Statistics, The National Nursing Home Survey: 1977 Summary for the U.S., Vital and Health Statistics Series 13, No. 43 DHEW Publ. No. (PHS) 79-1794, Washington, D.C., July 1979.

North Central Regional Center for Rural Development, 1980, p. 162, Sofranko, A. J. and J. D. Williams (ed.), Rebirth of Rural America: Rural Migration in the Midwest, North Central Regional Center for Rural Development, Iowa State University, Ames, IO, June 1980.

Papsidero, Joseph A., S. Katz, et al. (ed.), Chance for Change: Implications of a Chronic Disease Module Study, Michigan State University Press, East Lansing, MI, 1979.

Reynolds, R. C., S. A. Banks, and A. H. Murphee. The Health of a Rural County, University of Florida, Gainesville, FL, 1976.

Scanlon, W., E. Difederico, and M. Stassen, Long-Term Care: Current Experience and a Framework for Analysis, The Urban Institute, Washington, D.C., February 1979.

Scanlon, Wm. J., "A Theory of the Nursing Home Market," Inquiry 17 (1): 25-41, 1980.

Shanas, E., "Measuring the Home Health Needs of the Aged in Five Countries," JI Gerontology 26(1): 37-60, 1971.

Sloan, Frank A., Equalizing Access to Nursing Services: The Geographic Dimension, DHEW Publ. No. (HRA) 78-51, March 1978.

Stevens, Robert D. and J. A. Chapman, Changes in the Distribution and Availability of Medical Services in Michigan Counties and Regions, 1961-1977. Michigan State University, Agricultural Experiment Station, Technical Information Research Paper No. 373, Development and Public Affairs, February 1979.

Taietz, as cited in Coward, 1979: Same as below.

Taietz, P. and S. Milton, "Rural-Urban Differences in the Structure of Services for the Elderly in Upsate New York Counties," JI Gerontology 34: 429-37, May 1979.

U.S. Census Bureau, 1950 Census of the Population, U.S. Department of Commerce, U.S. Government Printing Office, 1952.

U.S. Census Commerce Bureau - Current Population Reports, Series P-23, Vol. 69, U.S. Department of Commerce, August 1978.

U.S. Congress, 1977, Public Law 95-210, Rural Health Care Act, Washington, D.C.

U.S. Department of Health, Education and Welfare, Home Health Services Under Titles XVIII, XIX, and XX. Report to the Congress Pursuant to P. L. 95-142, April 1979.

U. S. General Accounting Office, Entering a Nursing Home - Costly Implications for Medicaid and the Elderly, Comptroller General of the U.S. Report to the Congress, PAD-80-12, November, 1979.

U.S. General Accounting Office, Home Health - The Need for a National Policy to Better Provide for the Elderly, Comptroller General of the U.S. Report to the Congress. NRD-78-19, December 1977.

U.S. Senate, Health Services to Older Americans, Committee on Finance, Ninety-Sixth Congress, April 1980, U.S. Government Printing Office, Washington, 1980.

U.S. Senate, Rural Health Care Delivery, Committee on Finance, Ninety-Fifth Congress, January 1978, U.S. Government Printing Office, Washington, 1978 (Y4-F49:H34/12).

U.S. Senate, Rural Health Care - Problems and Prospects, 1977, Committee on Human Resources, Ninety-fifth Congress, Bangor, ME, Aug. 1977, U.S. Government Printing Office, Washington: 1978 (Y4.H88:R88).

Viscussi, W. K. P., Welfare of the Elderly: An Economic Analysis and Policy Prescription, John Wiley & Sons, N.Y. 1979.

Wang, Ching-li and J. Allan Beegle, "Retirement Function and Community Growth in Michigan Non-Metropolitan Areas," paper presented at the Rural Sociological Society Annual Meeting, 1978.

Youmans, E. G., "The Rural Aged" Annals of the American Adademy of Political and Social Science 429: 81-90, January 1977.