COMPARATIVE EVALUATION OF NATIONAL HEALTH SERVICE CORPS ALUMNI RETAINED IN HEALTH MANPOWER SHORTAGE AREAS

RESEARCH DESIGN
DECEMBER 30, 1983

Submitted to:
Office of Evaluation and Analysis
OPEL/HRSA/DHHS
Parklawn Building, Room 14-36
5600 Fishers Lane
Rockville, Maryland 20856

Submitted by:
Mathematica Policy Research, Inc.
600 Maryland Avenue, S.W.
Suite 550
Washington, D.C. 20024

This report is made pursuant to Contract No. 240-83-0112 with the Health Resources and Services Administration. The amount charged to the Department of Health and Human Services for the work resulting in this report (inclusive of the amount submitted under the contract) is $8,081.90. The names of the persons employed or retained by the contractor, with managerial or professional responsibility for such work, or for the content of the report, are as follows:

Kathryn M. Langwell, Project Director
Shelly L. Nelson, Research Associate
Edward Lenk, Research Assistant
# TABLE OF CONTENTS

## I. INTRODUCTION
- A. Background ............................................. 1
- B. Purpose of this Report ............................. 2

## II. DETERMINANTS OF PHYSICIANS' LOCATION DECISIONS
- A. Overview ............................................. 4
- B. Individual Characteristics ...................... 5
- C. Community Characteristics ....................... 10
- D. Market Characteristics ............................. 18
- E. Location Decisions for shortage Areas and Decisions of NHSC Alumni ....................... 21
- F. Discussion ............................................ 28

## III. HYPOTHESES, RESEARCH ISSUES, AND DATA REQUIREMENTS
- A. Overview ............................................. 30
- B. Rural Choices ....................................... 31
- C. Shortage Area Choices ............................. 35
- D. Practice Characteristics ......................... 37
- E. General Hypotheses .................................. 38
- F. Hypotheses, Research Issues, and Data Requirements ......................... 39
I. INTRODUCTION

A. Background

The primary objectives of the National Health Service Corps Program are: (1) to induce physicians to locate in health manpower shortage area, through financial incentives and exposure to practice in such areas; and (2) to directly provide services to residents in health manpower shortage areas. The purpose of this study is to evaluate the retention of NHSC alumni in Health Manpower Shortage Areas, to document the distribution and practice characteristics of NHSC alumni, current PPOs, and non-NHSC physicians, and to examine the characteristics of rural communities which have attracted NHSC and non-NHSC physicians over the past decade. In addition, this evaluation will examine the effect of the NHSC experience on subsequent practice patterns (e.g. use of auxiliary personnel, fee structures, patient characteristics) of alumni.

It is anticipated that the results of this evaluation will be of considerable assistance to the Health Resources and Services Administration in its efforts to refine and refocus the NHSC program in the current market environment characterized by increasing physician supply and stronger competitive pressures influencing new physicians' location patterns. The focus of this evaluation is on identifying information which HRSA may use in selecting, placing, and monitoring the practice characteristics of NHSC physicians in order to increase retention and to provide services to areas least likely to obtain physicians services independently.
B. Purpose of this Report

The research to be conducted under this contract falls into three major categories:

- descriptive profiles of rural and shortage area communities which have lost, retained, and/or attracted new physicians between 1972 and 1981
- descriptive examination of the relationship between specific community characteristics and the probability of physicians' location
- descriptive and multivariate analysis of -- the urban-rural location choice of 1979 NHSC physicians
  -- the HMSA-non HMSA location choices of NHSC and non-NHSC physicians
  -- the practice characteristics of NHSC and non-NHSC physicians

This Research Design provides the foundation upon which the descriptive and multivariate analyses will be structured. In particular, the hypotheses, research issues and related data needs are specified. These identified data needs will, provide guidance to the development of the data collection instrument and protocol.

The process through which the Research Design has been prepared has included several steps:

- A search of the 1975 through present literature has been conducted using both computerized and manual search methods. This literature has been acquired, reviewed, and incorporated into this report.
- A set of hypotheses related to: (1) rural-urban location choices; (2) HMSA-non HMSA location choices; and (3) practice characteristics have been developed, drawing upon the findings of the literature and discussion with HRSA personnel.
Specific research issues within a specific hypothesis are have been elaborated.

Required data elements to examine the hypotheses and research issues of interest have been listed identified.

The anticipated source of each required data element is specified.

The hypotheses and research issues presented here will provide direction for the development of the Analysis Plans for the community profiles, community characteristics, and multivariate analyses which will be conducted.
II. DETERMINANTS OF PHYSICIANS’ LOCATION DECISIONS: A REVIEW OF THE EVIDENCE, WITH SPECIAL ATTENTION TO THE EFFECTS OF COMMUNITY CHARACTERISTICS AND OF MARKET FORCES

A. Overview

Physicians' location decisions and factors affecting those decisions have been studied and discussed intensively for the past two decades. As a result, there are literally hundreds of citations which are referenced in this literature. To provide a foundation for the design of a comparative evaluation of NHSC alumni retained in HMSAs, however, only a subset of this literature need be examined:

- studies of individual physician's decisions to locate in rural or shortage areas
- studies examining the distribution of the stock of physicians across rural and urban areas
- studies of flows of physicians into and out of rural and urban areas over time.

Research that focuses on intraurban distribution patterns or on the distribution of physicians by state, cross-sectionally or over time, is not of interest for this project.

The emphasis in this review of the literature is on three categories of factors which may influence location decisions:

1. Individual characteristics of the physician
2. Characteristics of the community
3. Market characteristics
In the sections which follow, we review the evidence on the factors, within each of these categories, which have been found to be associated with location decisions of physicians. A final section considers the evidence on factors influencing decisions by NHSC and non-NHSC physicians to locate in shortage areas and rural areas.

B. Individual Characteristics

Much of the research on physicians' location decisions has concentrated on identifying individual characteristics of the physician which are associated with the decision to locate in a rural or urban area. The major classes of individual characteristics investigated include:

- prior contact factors
- background traits
- professional factors
- spouse's background and other family influences

Each of these areas is discussed in this section.

Prior contact factors

A number of studies examine the relationships between physician location decisions and prior exposure to the area of choice. The basic hypothesis tested in these studies is that the greater the number of prior contacts with an area, the higher is the probability that a physician will locate an initial practice in that area. Prior contact events examined include birth, high school, medical school, and internship/residency. Results of these studies have indicated that prior contact factors do have a positive effect on the probabilities of location and that more recent
events (i.e. internship/residency) have a stronger effect than do more distant in time events (Held, 1973; Weiskotten et al., 1968; Fein and Weber, 1971; Yett and Sloan, 1974; Budde and Langwell, 1978; Cooper et al., 1975; Cordes, 1978; Grimes et al., 1977; Werner, Wendling, and Budde, 1979; Samuels, 1974); Korman and Feldman, 1977; Hynes and Givner, 1983. The available evidence suggests that the greater is the number and duration of prior contacts, the more likely is the physician to establish his/her practice there. While the prior contact research has focused on establishing the strength of the observed relationship, Yett and Ernst (1975) consider a number of avenues through which prior contact enters the location decision process:

- Due to the costs of obtaining information, the physician is able to be informed about the economic, medical, and social aspects of only a few locations, among them those with which he/she has had prior contact.
- Previous contact with an area may have a direct effect on the physician's income potential if professional relationships are of use in establishing a new practice.
- Prior contact may be closely related to the physicians' investment in family or social relationships.

Yett and Ernst also stress that the observed relationships between prior contact and location decision do not imply the direction of causality; physicians with strong location preferences may choose medical school and internship/residency location to facilitate the planned location decisions.

The major issue with respect to the prior contact hypothesis and rural/shortage areas is the fact that physicians choosing rural practice locations are more likely to have had prior contacts with the area, than are physicians choosing urban locations, and to have completed both medical
school and internship/residency in the state in which they eventually located.

**Background Traits**

Background characteristics of physicians include socioeconomic status of family, age, sex, nationality, marital status, place of rearing. The latter trait is clearly related to the prior contact hypothesis, while other factors may be associated with the physician's attitude toward locations of specific types.

Rural upbringing has been found in a number of studies to be strongly associated with rural location decisions (Hassinger, 1963; Schaupp, 1969; Champion and Olsen, 1971; Korman and Feldman, 1977; Hynes and Givner, 1983; Hassinger et al., 1979), although most of the studies conducted are descriptive in nature. Werner et al. (1979) found that rural rearing is strongly predictive of rural practice location, but less strongly associated with the decision to practice in shortage areas.

Family socioeconomic status has been examined, primarily descriptively, to determine whether physicians from upper middle class or professional families are more likely to choose urban practice locations. Hassinger (1963) reports that the occupational status of fathers of rural physicians was lower than for urban physicians; however, nearly 2/3 of physicians in most rural areas were from farm families. Other studies support this finding, indicating that physicians from lower socioeconomic background were less likely to specialize and enter urban practice (Champion and Olsen, 1971). Yett and Ernst (1975) suggest that the linkage between family socioeconomic background and location decision may be a consequence of the fact that professionals and high socioeconomic back-
grounds are more often found in urban areas; the causal relationship may be with place of rearing rather than family socioeconomic level. Additionally, physicians from families of high socioeconomic status may have sufficient sources of income to permit them to enter a subspecialty which is not ordinarily practiced in rural areas because it requires a substantial threshold population.

Little research has been conducted on the influence of the sex of the physician on location decisions. The general economic literature suggests that women professionals are less likely to locate in rural areas due to the necessity of selecting a location that maximizes a joint family utility function (Frank, 1975). Langwell (1980) reports that women physicians who entered a first year residency in 1968 were less likely to choose non-urban practice; only 6 percent of women physicians were located in non-SMSAs by 1975, compared with 12.6 percent of the men.

Foreign medical graduates' location decisions have been examined in a number of studies; in the 1970s they represented over 30 percent of new licentiates each year. Butter and Schaffner (1971) found that FMGs are more likely to locate in areas with relatively high physician-to-population ratios. Budde and Langwell (1977) report similar findings for new Illinois FMGs, but also report that new FMGs in Illinois were disproportionately likely to locate in rural areas and urban areas, but less likely to locate in the more attractive suburb and small town practices. Other studies have supported this tentative finding with respect to FMGs. Korman and Feldman (1977) collected data from physicians who recently located in three rural counties in New York. Of these 60 physicians, 31 were FMGs. Madison and Combs (1981) similarly report that FMGs were heavily represented among
young physicians who settled in the most rural communities between 1973 and 1976.

**Professional factors**

Included in this category are the physicians' specialty board certification status, and his/her attitude toward professional development and opportunities. Specialty of the physician is obviously strongly associated with location choices and constraints. Werner and Wendling (1979) use a simultaneous logit model to examine the interactions between location choices and specialty choices and find that, although the specialty choice is not significantly influenced by location choice, the location decision is significantly affected by the specialty choice. Langwell (1979) examines economic incentives to the joint specialty and location decision of physicians and reports that primary care specialists (i.e., internists and pediatricians) earn substantially higher lifetime earnings if they locate in rural areas. The choice of specialty, then, may affect the location decision through varying economic opportunities to specific specialties across urban and rural markets.

The physician's attitude toward professional opportunities has also been cited as an influential factor in location decisions. Cooper and Heald (1975) indicate that physicians who were very concerned about availability of continuing education opportunities were less likely to choose rural practice (where access to continuing education may be more difficult). Concern about excessively long work hours and the lack of other professional contacts and consultations has been cited as a particular concern for rural physicians (Bible, 1970; Heald et al., 1974). Similarly, interest in locating a practice close to a medical school suggests an
urban, rather than rural, decision (Steinwald and Steinwald, 1974; Heald et al., 1974).

**Spouses' Background Traits and Attitudes**

Several studies have examined the role of the spouse in the location decision of new physicians. In general, a positive relationship between spouse's place of rearing and the physician's choice of practice location has been observed (Schaupp, 1969; Taylor et al., 1973; Heald et al., 1974). Heald et al. report that among 144 physicians in rural practice in their sample, 44 percent had wives of rural upbringing. Most studies suggest that the wife's location preferences do not strongly influence the choice of a practice location (Charles, 1971; Cooper et al., 1975; Schaupp, 1969; Steward, Miller, and Spivey, 1980).

**C. Community Characteristics**

While it is evident that urban areas are more attractive to most physicians than are rural areas, there is a wide spectrum of community characteristics which make specific rural communities more or less attractive to physicians. These characteristics of non-metropolitan communities may be classified into several categories:

- professional characteristics
- socioeconomic characteristics
- recreational, cultural, and climatic characteristics.

Much of the research which has been conducted on physicians' decisions to locate in rural areas has been attitudinal; physician respondents rank community characteristics by level of influence on their decision or simply indicate whether the characteristic was or was not an influence on their
decision. A few studies have included specific area characteristics as variables in explanatory models; however, the absence of data to measure many community characteristics of interest severely restricted these approaches. The major problem with attitudinal research is that it offers no mechanism for measuring tradeoffs between different factors (e.g., how much income would the physician be willing to give up to gain additional cultural opportunities?) In addition, examining responses across surveys is difficult since the phrasing of alternatives, interpretations, and subjectivity of responses limits comparability.

Professional Characteristics

The professional characteristics of major interest to physicians considering rural practice are:

- opportunities for interaction and support with colleagues
- presence of hospital facilities and supporting services
- extent of unmet demand for health care in the area
- income opportunities

Colleagues. A number of studies (Bible, 1970; Heald et al., 1974; Steinwald and Steinwald, 1974; Werner et al., 1979) report that rural physicians or those considering rural practice are particularly concerned about professional isolation. The receptivity of established physicians to the possibility of a new entrant in the market may influence the decision to locate (Fein, 1956; Korman and Feldman, 1977; Parker and Sorenson, 1978).

1 Prior to development of the Area Resource File in its present form.
Interaction with colleagues is important for several reasons: maintaining knowledge of medical progress, securing practice coverage to permit uninterrupted leisure time, and availability of consultations on complex cases (Heald et al., 1974; Steinwald and Steinwald, 1974; Woolf et al., 1981; Evashwick, 1976).

Of particular significance for rural and shortage area practice is the recent trend toward group practice of physicians. Sloan (1974) indicates that physicians who join groups are strongly attracted by the regular hours, freedom from managerial tasks, and continual access to colleagues for referral and consultation. Heald, et al. (1974) report that the "opportunity to join a desirable partnership or group practice" was the most frequently cited factor influencing the location decisions of young physicians. Evashwick (1976) finds that a major contribution to explaining percentage change in the physician-to-population ratio in rural areas between 1960 and 1970 was the opportunity for group practice.

Facilities. Hospital facilities have been found to be strongly associated with the location decisions of specialists, but have less impact on location decisions of primary care practitioners. Thus, rural location decisions are affected by the presence or absence of hospital facilities, but the absence of a hospital does not prohibit physician location (Fein, 1956; Bible, 1970; Heald et al. 1974; Steinwald and Steinwald, 1974). Wacht (1972) estimates the impact of hospital facilities on rural physician location patterns and finds that general practitioners are not influenced by absence of hospital facilities. Yett and Ernst (1975) suggest that the Hill-Burton program may have had a role in attracting new physicians to rural areas, but evidence on this issue is mixed. They suggest, however,
that technological progress over the past two decades has been rapid, and young physicians, trained in this technology, may be more reluctant than were past graduates to choose rural practice without hospital facilities.

**Unmet Need.** Physicians choosing rural practice locations are more likely to indicate that they are interested in providing services to populations with unmet need for medical care (Heald et al., 1974, Stamps and Kurgier, 1983). Unmet need for services does not necessarily imply that adequate demand for services is present to support a physician's practice since the population may not have the financial resources to pay for needed services. Unmet demand, however, is difficult to disentangle from economic factors, since physicians locating in areas with high unmet demand are able to rapidly establish a full practice and generate a high volume of receipts. Werner et al. (1979) report a stronger association between interest in unmet need and rural practice than with shortage area practice location.

**Economic Factors.** Included within this category are such considerations as income opportunities, hours worked, the cost of establishing a practice, and related factors. A number of studies have focused on income opportunities of physicians in rural and urban areas. Langwell (1979) estimates rates of return to the joint specialty and location choice of physicians and reports that general/family practitioners' income opportunities are greatest in urban areas. Indeed, in urban areas GP-FPs exhibit greater earning potential than do specialists of all kinds. Since GP-FPs are expected to be the major source of medical services in rural areas, this finding is of concern. A related study of economic incentives facing GP-FPs making location decisions reports
substantially higher income opportunities for GP-FPs choosing the largest SMSA locations (Langwell and Budde, 1978). Werner et al. (1979) find no significant relationship between the physicians' expressed interest in income potential and the location decision for either shortage-nonshortage area choices or rural-urban choices. Other attitudinal surveys find that physicians acknowledge that income potential is an important factor in their location decision. Heald et al. (1974) report that nearly 20 percent of respondents ranked "income potential" among the three most important of all factors. Stamps and Kuriger (1983) report that, of current NHSC physicians, a significantly larger number of those planning to choose an urban location indicated that "income potential" was a factor in their decision. Korman and Feldman (1977) report that, of 60 settling in rural areas of New York, 52 percent were given income guarantees by the communities.

Several of the income studies cited above have included hours of work in the analyses reported. There is considerable evidence that physicians in rural practice work more hours per week than do physicians in urban areas (Yett and Ernst, 1975, Kehrer et al. 1982) Langwell and Werner (1980) examine, jointly, income and hours of work in rural and urban areas. They conclude that the current distributions of physicians among locations and specialists are more consistent with a decision to minimize hours worked than with a decision to select a location to maximize income. Attitudinal research findings indicate that the expectation of long hours and overwork influences physicians away from rural and shortage area practice. (Crawford and McCormack, 1971; Bible, 1970; Parker and Sorenson, 1978).
Overall, the evidence on the role of economic factors on location choices of new physicians is mixed with respect to rural choice incentives. While income potential may be relatively similar, after cost of living adjustment, hours of work and hours on call are greater. On the other hand, it is possible that in areas with unmet demand (assuming ability to pay as well as awareness of need), young physicians may be able to establish a mature practice in a much shorter time than in better-supplied areas.

Socioeconomic Characteristics of the Community.

The characteristics of the population in the geographic area being considered as a practice location site by a young physician are important from two perspectives:

1. These characteristics are associated with "tastes" for medical care, health status (need), and ability to pay for services obtained.

2. In rural areas, the physician is choosing both a practice location and a home for his/her family.

The practice location decision and personal location decision are more closely tied in rural areas than in urban areas where a physician may practice in an inner-city location but live in upper middle-class suburbs.

Socioeconomic characteristics which have been examined in studies of physician location include:

- population size
- per capita/per household income
- age distribution of the population
- educational level of the population
In the literature on demand for physicians' services, each of these characteristics has been found to be associated with demand. The aggregate demand for services should increase with population size, income, proportion of elderly and young, educational level, and proportion of whites in the population. Similarly, since physicians come from families which are disproportionately white, upper middle income, professional, and well educated (Hassinger, 1967) it is reasonable to assume that, on average, physicians will prefer to locate their homes in areas where the population has such characteristics.

The studies which have examined this issue quantitatively tend to support this view. Steele and Rimlinger (1965) report that population increase is one of the most influential factors in attracting new physicians; Marden (1966) reports similar results. Neither find that income, educational level, or racial composition of the population was a significant factor in explaining movement of physicians into areas over time. Dougharty (1970) finds physician income relative to average per capita income is a significant factor in explaining the distribution of physicians by county within a state. Hambleton (1971) reports that changes in per capita income are positively associated with changes in specialist and GP supply; GPs are attracted by a large over-65 population and are less likely to locate where the nonwhite population is large. Blair (1975) and Wacht (1972) report that physicians (except for GPs) are attracted both to areas with higher per capita incomes and areas with higher proportions of families below the poverty level. A recent study by Langwell et al. (1983) examined changes in the distribution of specialists over time among
services to the population in the market area and, therefore, competition among physicians for patients in these areas is not an issue of particular interest. The extent of competition among physicians in the health care system, as a whole, has substantial implications for location patterns of physicians who are now emerging from medical schools and residency training programs. During the 1960s, it appears that demand for physicians' services -- stimulated by growing third party payment for services -- was rising more rapidly than was the supply of physicians. Consequently, young physicians in most specialties could choose a practice location on the basis of factors other than competitive environment. While income potential was a consideration, there were a wide range of locations and practice alternatives which could be reasonably expected to yield an "acceptable" or "target" income level. Thus, competitive factors were weighted less heavily in the decision process.

The supply of physicians has increased dramatically during the past decade and is expected to grow by an additional 35 to 40 percent by 1990. As a result, competitive pressures on young physicians may be expected to affect their location decisions and shifts in these patterns may occur.

Early evidence that this is occurring is presented for the 1970-79 period by Newhouse et al. (1982). They find that, as the supply of physicians grew during the 1970s, physicians diffused into smaller communities. In their 23 state sample, by 1979, nearly every community with 2500 or more population had access to physicians. The diffusion effect was, in general, stronger for more generalized physicians, who could be regarded as being "pushed" out of more desirable areas by the competitive pressure generated by specialists who can provide specialized
services, in addition to primary care. Newhouse et al. conclude:

The data strongly suggest that competitive forces play a major role in determining where physicians choose to practice. As the pool of physicians expands during the 1980s, a wide range of services will become increasingly available to populations outside metropolitan areas.

A related study by Schwartz et al. (1980) examines the diffusion of board-certified physicians into smaller communities as the supply of board-certified physicians increases. Both the Newhouse et al. and Schwartz et al. studies are of limited usefulness for the current study, however, since both limit their examination to more populous rural areas. Newhouse et al. investigated the supply of physicians in towns of 2,500 or more population; Schwartz et al. (1980) looked at rural towns of between 10,000 and 20,000 population. Rural areas of this size have had relatively little difficulty attracting physicians in the past. The rural communities most likely to experience shortages are those which have not been included in these studies.

Another recent study by Langwell et al. (1983) provides supporting evidence for these observations. The changing location patterns by county of ophthalmologists and optometrists were examined for the 1972-1979 period to determine whether there was movement toward rural practice and whether competitive pressures could be observed in these patterns and, if so, the strength of this factor. Ophthalmologists (M.D.s) and optometrists (O.D.s) provide services which substantially overlap and, therefore, compete for patients over this range of similar services. In addition, both professions have substantially increased in numbers during the 1970s and there is evidence that an oversupply in some areas may have already existed.
in the 1970s. Findings reported by Langwell et al. indicate that the relationship between changes in the supply of ophthalmologists and the supply of optometrists were uniformly negative over this period, suggesting that competing professionals during the 1970s were affected by the degree of competition expected in location alternatives considered. The descriptive findings of this study also support the diffusion hypothesis with optometrists diffusing to more rural areas and ophthalmologists increasing their concentration in urban areas and less rural.

Although the evidence available is not extensive, it seems evident that the changing competitive environment within which new physicians are choosing practice locations will have substantial effects on those decisions. Consequently, the relative importance of the factors which were identified as influential during the 1950s and 1960s may change. The design of research to examine location patterns of NHSC alumni and other physicians should be conducted within a context which recognizes these changing market forces.
choice model is specified to explain the shortage-nonshortage choice and the urban-rural choice and is estimated using probit analysis. Results strongly support the authors' hypothesis. Rural choices were influenced by:

- Preceptorships
- Loan forgiveness
- Community recruitment efforts
- Specialty
- Rural rearing
- Prior contact
- High medical need of area
- Concern over CME opportunities
- Cultural advantages

By contrast, a much shorter list of factors influences the shortage area location decision:

- Specialty
- Rural rearing
- Concern over CME opportunities
- High medical need of area

Interestingly, programs designed to induce physicians into shortage area practices (i.e. preceptorships, loan forgiveness) are significant in the rural location decision but are nonsignificant in the shortage area location decision.

Madison and Combs (1981) examine the location patterns of young physicians who settled in rural communities between 1973 and 1976. They report that young physicians settling in rural areas are most likely to locate in towns where there is already a medical community. They note that young physicians avoid areas which have only 0 to 3 other physicians; indeed, over two-thirds settled in towns which already had 4 or more
physicians. When Madison and Combs look at the characteristics of NHSC communities, they find that few non-NHSC settlers locate in communities similar to these areas which have small population and lack a medical community.

HRRC (1975) provides a critical review of the evidence on the effectiveness of policies to influence physicians to locate in shortage areas. These policies include: (1) preferential admission to medical school for those students most likely to practice in medically underserved areas; (2) preceptorships; (3) loan forgiveness tied to service obligations; (4) decentralization and/or deurbanization of medical education; (5) the Hill-Burton Hospital Construction Act; and (6) recruitment efforts of communities. The evaluation of the effectiveness of loan forgiveness tied to service obligation programs is of particular interest for this effort.¹ Review of the findings of a number of pre-1975 studies (Consad, 1973; Mason, 1971; Michigan Medical Manpower Study, 1974) yields the following conclusions:

- Between 40 percent and 60 percent of loan recipients under state programs established practices in shortage areas in order to obtain forgiveness. Of these, "most" remained in practice in the shortage area after completion of this obligation.
- There was some evidence in the mid-1970s that a shift in demand from state loans (with mandatory forgiveness

¹At the time the HRRC review was underway, there were a number of state programs which offered loans to medical students which could be repaid (in most cases) or forgiven by establishing a private practice in a state-designated shortage area. These programs are comparable to the current Private Practice Option in the NHSC program. The federal program under the Health Professions Education Assistance Act had not been in existence for a sufficient period for its effectiveness in inducing physicians to settle in scarcity areas to be evaluated.
features and penalties) to HPEAA loans (with optional forgiveness and no penalties) was occurring.

- It is possible that physicians who achieved loan forgiveness under this program received windfall gains (i.e. they would have established practice in a shortage area without the program).

Overall, the review of the evidence suggests that the early PPO-type programs operated by states were quite effective in placing physicians in scarcity areas; less is known about retention rates over a longer period of time.

Other policies reviewed by HRRC indicate that individuals who locate in scarcity areas may have specific characteristics and experiences:

- Preferential admission to medical schools for individuals from medically underserved areas appears to be an effective mechanism (Mattson et al, 1974), providing support for the prior contact hypothesis.

- Medical students from urban areas who participate in a perceptorship in rural areas are more likely to locate in a rural community (Steinwald and Steinwald, 1973); but no information on shortage area practice location decisions is available.

- Efforts made by underserved communities to attract new physicians can be quite successful, especially those which include economic incentives such as an office and equipment and guaranteed income level. The evidence on these programs, however, is nearly all anecdotal — "success" stories.

The HRRC review concludes that the evidence on the effectiveness of policies designed to induce physicians to locate in scarcity areas is weak. This conclusion is consistent with the Werner et al. findings which suggest that these policies may induce physicians to practice in rural areas, but have no effect on the decision to locate in shortage areas.

GAO (1974) provides further evidence that decisions to locate in
shortage areas are not influenced by programs designed to affect these decisions. A survey of the 183 (of 30,000 loan recipients) physicians and dentists who located in shortage areas to obtain forgiveness of loans was conducted; 82 percent of respondents stated that they would have located in the shortage area without the loan forgiveness inducement. These physicians indicated that the most important factors influencing their decision to locate in a shortage area were (by rank):

1. Geographic preference
2. Desire to serve where most needed
3. Opportunity for experience
4. Influence of family or friends
5. Association with colleague
6. Availability of facilities
7. Loan cancellation
8. Financial attractiveness

Of the scholarship recipients who were repaying loans, the GAO survey asked that factors considered unattractive about rural shortage area practice be ranked. The respondents ranked these undesirable conditions in the following order:

1. Lack of CME opportunities
2. Long hours of practice
3. Distance to support facilities
4. Lack of consultative sources
5. Limited cultural and social activities
6. Preference for a large community
7. Necessity of engaging in general practice
8. Lack of desirable living conditions
9. Financially unattractive

It is interesting to note that financial attractiveness or unattractiveness of the area was not of great importance in the scarcity area decision for either group. GAO concludes that the HPSAP program was not effective in inducing physicians to locate in shortage areas; a finding clearly consistent with the respondents' self-reported lack of emphasis on financial incentives.

A subsequent GAO (1978) study of the effectiveness of the NHSC program in inducing physicians to permanently locate in shortage areas produced similar conclusions -- only 42 of 800 NHSC alumni had been retained in shortage areas as private practitioners by July 1976. Those NHSC alumni who were not planning on shortage area practice indicated that a desire for further education and training was the major reason for leaving shortage area practice. Other reasons for leaving included professional and social isolation, and personal, family, and financial needs.

Family Health Care, Inc. (FHC) (1977) reports on a study of retention and attitudes of NHSC physicians and spouses in first tours of duty and found that 38 percent intended to remain in the shortage areas for at least one year after completion of their obligation. Those intending to remain were most influenced by their spouses' opinions of the area, and by the high demand for services in the area observed during the NHSC service. On the other hand, those not planning to remain frequently
reported that low demand for services in the area was a factor in their
decision. This finding suggests that shortage areas with unmet demand may
be successful in retaining NHSC alumni; areas with relatively few
physicians but with low effective demand for additional services will be
perceived (appropriately) to be unable to support another private practice.

A recent study (Stamps and Kuriger, 1983) reports on a survey of
100 NHSC physicians in 10 East Coast states designed to obtain information
on their locational plans after completion of the NHSC obligation and on
the factors influencing their decisions. Results indicate that 56 planned
to locate in a rural area after completion of NHSC service. Those
prefering rural practice were more likely to be in primary care specialties
and more likely to rank personal and community factors highly than
professional factors as influences on the decision process. Physicians
originally from rural areas were more inclined to rural practice (76
percent versus 47 percent from urban areas).

In summary, evidence available on shortage area location decision
processes suggests that factors influencing this decision are different
than factors influencing rural location decisions. Policies designed to
influence the decision to locate in shortage areas may be effective in
inducing physicians into rural practice, but appear to be an ineffective
mechanism for eliciting shortage area practice decisions. There is some
evidence that many -- or most -- NHSC alumni who locate in shortage areas
did so because they had a prior preference for the area and were not
influenced by the program. In addition, there is some limited evidence
that not all shortage areas are identical -- some may have relatively few
physicians, but NHSC alumni are uninterested in locating permanently in areas which have insufficient demand to support a new practice. Other areas have both a need for and the ability to support additional practices; these communities may be expected to be more successful both in attracting nonNHSC physicians, and in retaining NHSC alumni.

F. Discussion

This review of the evidence on location decisions of physicians and the factors which influence them is intended to provide a framework for the development of hypotheses and research questions for the comparative evaluation of NHSC alumni retained in Health Manpower Shortage Areas. The findings of this literature review suggest the following major issues for the Research Design:

- The rural-urban location decision is a distinctly different one than the shortage-nonshortage choice. The research design should address this distinction.

- The physician choosing a rural and/or shortage location may have made this decision prior to involvement in NHSC. It will be important to compare the timing of the location decision for the NHSC and nonNHSC physicians and characteristics of these physicians to determine whether the physician participated in NHSC because of a prior decision/tendency or whether the decision was influenced by the NHSC program. If prior contact factors or other characteristics of the physician fully explain shortage area choices, this should be determined.

- Shortage area communities have different degrees of unmet demand. It is highly unlikely that physicians will locate in areas with need, but low effective demand. On the other hand, NHSC may be very effective as a means to acquaint physicians interested in rural practice with areas with high unmet demand and opportunities for rapid establishment of a new practice. An objective of this study should be to identify characteristics of communities with high unmet demand and communities with need but low demand in order to (1) facilitate retention by placing
NHSC physicians in sites which can absorb the services of an additional private practice physician; and/or (2) to identify the characteristics of communities which need physicians' services but are highly unlikely to attract a permanent physician in order to permit the NHSC to develop priorities for placement of personnel.

- Over the past decade, patterns of female work force participation and occupational choice have changed substantially. Consequently, spousal background, characteristics, and attitudes may be more important in the decisions of current medical school graduates than was the case in the past. This issue is reinforced by the fact that nearly 30 percent of new medical school entrants are women;¹ their location decision processes may be significantly differently from those of male physicians.

- The competitive environment facing new physicians establishing a practice is considerably different than that facing new market entrants prior to the mid 1970s when much of the earlier research on physician location decisions was conducted. Consequently, it will be important to focus attention in this study on the effect of market forces and competitive factors on the locations decisions of new entrants to the market.

These issues and the specific factors identified as influential on physician's location decisions provide the foundation upon which we have developed the hypotheses and research issues described in Chapter 3.

¹Over 90 percent of the physicians surveyed in the RAND-AMA study of 1965 graduates, for instance, were male.
III. HYPOTHESES, RESEARCH ISSUES, AND DATA REQUIREMENTS

A. Overview

The analyses to be conducted during this study focus on three specific areas:

(1) the rural-urban location decisions of 1979 NHSC physicians surveyed by MPR;

(2) the shortage-nonshortage area location decisions of all NHSC and non-NHSC physicians choosing a practice location between 1972 and 1981;

(3) the practice characteristics of NHSC and non-NHSC physicians located in rural areas.

To address these issues, data must be collected from NHSC alumni, current PPO physicians, and from non-NHSC physicians who have chosen rural practice locations between 1972 and 1981. The discussion of the literature presented in Chapter II suggests that there are specific factors which influence the rural location choices of physicians; the decision to locate in a rural shortage area is a subset of the rural decision but is influenced by a somewhat different set of factors. It is likely that the impact of certain factors on the location choices of NHSC alumni and other young physicians will vary in magnitude and significance. Based upon the literature review and the evidence presented there, it is evident that the rural location choice must be considered separately from the shortage area location choice. Within each of these decision categories, the individual characteristics of the physician and the characteristics of communities and markets will be expected to influence the decision process.
In this section, a set of hypotheses are presented for the analytic areas of interest:

- rural choices
- shortage area choices
- practice characteristics choices

It is emphasized that the major thrust of this evaluation is designed to obtain information on issues and experience that will be of assistance to HRSA in its future policy making. Thus, each major issue area below is briefly described with respect to the objective and potential usefulness of findings.

General hypothesis on the effect of current trends in physician supply on future distributional patterns is also stated here.

B. Rural Choices

The primary objective of the NHSC program is to provide services to areas with insufficient physician resources either temporarily, directly, or permanently, through retention of placed physicians. Thus, the focus of this evaluation is on the characteristics of physicians and communities which result in decisions to locate physician practices in shortage areas. The decision to locate in a rural health manpower shortage area, however, is a subset of the rural location choice; i.e. the physician
interested in rural shortage area practice will be interested in rural practice, generally. To examine the relationships among personal characteristics, community characteristics, and shortage area location choices, it is necessary to explore those factors which influence young physicians to locate in rural areas.

There are six major areas which distinguish rural-urban choices of young physicians:

**Timing of the location decision:**

If some physicians make permanent location decisions early in their training, subsequent actions by the NHSC designed to influence these location decision will be ineffective. Examination of the timing of decisions by physicians with different characteristics will permit HRSA to identify physicians who may be least likely to be induced to remain in shortage area practice.

**Prior contact factors:**

It is generally agreed that prior contact is an important factor in location choice. Information on the influence of prior contact on the rural and the shortage area choice, and the degree of this influence on these two separate decisions, will be of use to the Corps in recruitment and placement policy decisions.

**Spousal or family influence:**

Characteristics of the spouse, and family background, are expected to influence the physicians' location choice. Again, the degree of this influence on physicians with a particular set of characteristics may be useful information for placement decisions, depending upon the objectives of Corps' placements.
Personal characteristics:

Physicians with selected personal characteristics may be more or less likely to be retained in shortage areas. Identification of these factors, and the combinations of these factors, will allow assignment of those most likely to be retained to areas most in need of permanent physician resources.

Professional factors:

The physicians' training and professional orientation is expected to strongly influence location preferences. The strength of this influence and the particular professional factors which are most important to young physicians will determine which rural and shortage areas are able to attract and retain young physicians. Information on this issue will enable the Corps to identify communities which are more or less likely to attract permanent physician resources.

Community characteristics:

Among rural and shortage area communities there are wide variations in characteristics which cause the community to be more, or less attractive to young physicians. As the supply of physicians increases and diffusion into less populous areas occurs, those rural and shortage area communities with specific types of characteristics will attract new physicians. Other less attractive communities, however, will continue to experience a shortage of physician services. It is particularly important that the NHSC program have information which will permit it to identify the characteristics of communities which are expected to have long term need for medical services. With this information, the Corps can develop and implement placement policy to meet particular objectives with respect to both access to services and retention of alumni.

The research which is planned to examine the rural-urban location choices will be conducted using only the 1979 sample of NHSC physicians surveyed by MPR for the earlier NHSC evaluation study. Thus, these hypotheses are stated for NHSC physicians only. Hypotheses which distinguish among the characteristics of rural communities, on the other hand, will be examined using the entire sample of NHSC and non-NHSC physicians.
Timing of Decisions

- NHSC physicians in urban and rural locations will not differ in the reported timing of their location decisions.

Prior Contact Factors

- NHSC physicians with rural rearing will be more likely to choose rural locations.
- NHSC physicians with prior professional exposure to rural practice (i.e. through the NHSC service, residencies, preceptorship programs, or other mechanisms) will be more likely to choose rural practice.

Spouse's Background/Family

- NHSC physicians who are married will be more likely to choose rural practice if their spouse is from a rural area or has a preference for rural lifestyle.
- NHSC physicians who are married will be more likely to choose rural practice if their spouse is not concerned about career opportunities.
- Physicians with family ties to a specific area will be more likely to locate in that area.

Personal Characteristics

- Male NHSC physicians will be more likely to locate in rural areas than female NHSC physicians.
- NHSC physicians who are older than average at the time of an initial location decision will be more likely to locate in rural areas.
- U.S. medical graduates will be more likely to locate in more populous rural areas than foreign medical graduates; FMGs will be more likely to locate in least populated rural areas.

Professional Factors

- NHSC physicians who are less concerned about continuing medical education opportunities will be more likely to locate in rural areas.
- NHSC physicians who fulfill their NHSC service as PPOs in a private practice setting are more likely to be retained in a shortage area.
NHSC physicians who are able to join a group or partnership practice will be more likely to choose a rural location.

Community Characteristics

- Physicians will be more likely to choose a rural practice in a community that offers good quality educational resources.
- Physicians will be more likely to locate in rural communities which have adequate professional personnel and facilities.
- Physicians will be more likely to locate in rural communities that have sufficient unmet effective demand to ensure that an additional practice can be supported (i.e. that income potential is present).
- Physicians are more likely to locate in rural communities with population characteristics similar to socioeconomic background of the physician's parents.
- Physicians will be more likely to locate in rural communities which have relatively high per capita income levels.
- Physicians will be more likely to locate in a rural community which offers recreational, cultural, and/or geographic features that are generally attractive.

C. Shortage Area Choices

It is assumed for this study that the physician who chooses a rural shortage area practice will have made a prior commitment to rural practice. Therefore, the hypotheses related to rural location choices apply to the physician choosing a shortage area practice. This aspect of the study is of greatest interest and potential usefulness to Corps policy makers since the Corps' primary objectives are to provide services to communities with a shortage of physician resources and to place physicians in HMSAs where they will decide to remain after completing their
obligation. The diffusion of physicians to rural areas doesn't ensure that shortage areas will receive new physician resources. However, as the supply of physicians in the most attractive rural areas increases, competitive pressures may force new physicians into areas which are less attractive and which have been in shortage for some period. Some communities, however, may never attract a permanent physician even when substantial medical need exists; there may be insufficient effective demand to support a physician's practice, professional resources available may be inadequate to provide a foundation for a practice, or the community characteristics may be so uninviting that no one chooses to live there. Recognizing these problems, it remains important to identify factors that may influence young physicians to choose shortage area practice and/or to remain in an NHSC site after completion of an obligated service. Based upon prior literature, these factors are more often personal and professional than community characteristics. In addition, it is anticipated that the NHSC experience, and the type of NHSC experience (i.e. NHSC site or PPO placement) may be of importance in this decision. The hypotheses listed here focus on those research issues which are expected to distinguish the shortage area location decision from the rural location decision.

NHSC

- Physicians who are NHSC alumni will be more likely to choose a shortage area location as a result of contact with the area. PPOs who completed their obligation in a private practice setting will be more likely than other NHSC alumni to be retained.
Professional Factors

- Physicians who are least concerned about CME opportunities and collegial interaction will locate in a rural shortage area.

- Physicians who are primary care specialists will be less likely to locate in a shortage area than in a rural area.

Personal Factors

- Physicians who do not have a strong aversion to long hours and 24-hour on-call practice will be more likely to practice in shortage areas.

Prior Contact Factors

- Physicians who were reared in a shortage area (or whose spouse was) are more likely to choose shortage area practice.

D. Practice Characteristics

National Health Service Corps physicians, both volunteers and scholarship recipients, gain experience with the NHSC practice style during their service. Particular elements of this practice type may include the use of auxiliary personnel in practice, working with patients from lower socioeconomic backgrounds, use of a fee structure which is adjusted to the patient's ability to pay (Mathematica Policy Research, 1982). NHSC alumni may carry these experiences into their subsequent practices, regardless of whether they locate in a shortage or non-shortage area. If so, then they may fill unmet need even in overall non-shortage areas which still have gaps in physician services availability.

NHSC

- NHSC site alumni will be more likely to have a practice style similar to the style present in Corps sites than are non-alumni or alumni who served as a PPO.
Auxiliary Use

- NHSC site alumni will be more likely to use auxiliary personnel (e.g., PA, NP) in their practice than are non-NHSC site alumni.

Patient Characteristics

- The NHSC site alumni will have a patient population that is poorer, has lower socioeconomic status, or has other characteristics which are frequently associated with reduced access to or utilization of health services.

Fee Structures

- NHSC site alumni will provide proportionately more free care than non-alumni.
- NHSC site alumni will be more likely to accept assignment for Medicare patients.
- NHSC site alumni will have a higher proportion of Medicaid patients in their practice than non-alumni.
- NHSC site alumni will be more likely to have a sliding scale fee structure tied to patient income.

E. General Hypotheses

These general hypotheses require the examination of changes over time in the strength of the factors found to influence location behavior and will be tested by stratification of the sample by year of initial practice location decision. Examination of these issues will provide useful information to the National Health Service Corps in planning future policy direction during a period characterized by rapidly expanding physician supply and changing family structure and philosophy.

- Over time, the probability that a new physician will locate in a rural or shortage area will increase as physician supply increases and market forces lead to diffusion of generalists and specialists.
The probability of that a new physician will locate in a rural or shortage area will decrease as two-earner families become more common in the population.

F. Hypotheses, Research Issues, and Data Requirements

The hypotheses described above have been linked to research issues and data requirements, including indication of the source of data, in Table II.1. A key purpose of this table is to array data requirements and sources in order to identify specific data elements which must be collected through the 1984 survey of NHSC and non-NHSC physicians. Table II.2 summarizes the data needs which must be met by primary data collection through the survey. This list will serve as a guide for the development of the Draft Data Collection Plan and the survey instrument during the next phase of this project.
### TABLE III.1: HYPOTHESES, RESEARCH ISSUES, REQUIRED DATA ELEMENTS, AND DATA SOURCES MATRIX

<table>
<thead>
<tr>
<th>HYPOTHESES*</th>
<th>RESEARCH ISSUES</th>
<th>REQUIRED DATA ELEMENTS</th>
<th>DATA SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. RURAL CHOICES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A. Timing of Decisions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. NHSC and non-NHSC physicians will not differ in the reported timing of their location decisions.</td>
<td>o Do physicians who participate in the NHSC do so because of a prior decision or preference to locate in a rural and/or shortage area.</td>
<td>o Timing of general location decision</td>
<td>Survey of NHSC and non-NHSC physicians.</td>
</tr>
<tr>
<td></td>
<td>o Do physicians who locate in a rural and/or shortage areas do so as a result of participation in the NHSC, in spite previous location expectations?</td>
<td>o Timing of specific location decision</td>
<td>Survey of NHSC and non-NHSC physicians.</td>
</tr>
<tr>
<td><strong>B. Prior Contact Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Physicians with prior contact with an area will be more likely to locate in that area.</td>
<td>o Do physicians locate in communities in which they were born? reared?</td>
<td>o place of birth</td>
<td>NHSC Provider File, Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td></td>
<td>o place of rearing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Physicians with recent contact events will be more likely to choose that rural location than those with more distant contact events.</td>
<td>o Do physicians locate in communities in which they received their high school education?</td>
<td>o location of high school attended</td>
<td>NHSC Provider File, Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td></td>
<td>o location of college</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o location of medical school</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o place of residency training</td>
<td></td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td>3. Physicians with prior professional exposure to rural practice (e.g. through NHSC service, preceptorship programs, etc.) will be more likely to choose rural practice in the area of contact.</td>
<td>o Do physicians who locate in a rural and/or shortage area do so as a result of the NHSC program?</td>
<td>o location of NHSC site</td>
<td>NHSC Provider File</td>
</tr>
<tr>
<td></td>
<td>o Physician's ranking of the importance of existing professional relationships in an area.</td>
<td></td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td>4. Physicians with family or social relationships are more likely to locate in that area.</td>
<td>o Do physicians who locate in a rural area have family or social relationships in that area?</td>
<td>o Physician's ranking of the importance of existing family or social relationships.</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
</tbody>
</table>
### C. Spouse's Background

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Research Issues</th>
<th>Required Data Elements</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Married physicians will be more likely to choose a rural practice location if their spouse is either from a rural area or has a preference for a rural lifestyle.</td>
<td>Are married physicians influenced by the fact that their spouse is either from a rural area or has a preference for a rural lifestyle?</td>
<td>Spouse's birthplace/rearing, Physician's ranking of the importance of spouse’s location preference, Physician's marital status</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td>2. Married physicians will be more likely to choose rural practice if their spouse is not concerned about career opportunities.</td>
<td>Are married physicians influenced by their spouses' concern regarding career opportunities in their location decisions?</td>
<td>Physician's ranking of the importance of spouse’s career opportunities, Spouse’s education, Spouse’s occupation</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
</tbody>
</table>

### D. Personal Characteristics

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Research Issues</th>
<th>Required Data Elements</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Male physicians will be more likely to locate in rural areas than will female physicians.</td>
<td>Are female physicians less likely to locate in rural areas?</td>
<td>Sex of physician</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td>2. Physicians who are older than average at the time of an initial location decision will be more likely to locate in rural areas.</td>
<td>Are unmarried female physicians more likely to locate in rural areas?</td>
<td>Physician's marital status</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td>3. U.S. medical graduates will be more likely to locate in more populous rural areas than foreign medical graduates.</td>
<td>Are FMGs disproportionately attracted to rural practice?</td>
<td>Country of medical school graduation, Citizenship</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
</tbody>
</table>

### E. Professional Factors

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Research Issues</th>
<th>Required Data Elements</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Physicians in general/family practice will be more likely to choose rural practice than physicians in other primary care specialties.</td>
<td>Do general/family practitioners locate in rural areas disproportionately?</td>
<td>Physician's specialty</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td>2. Board certified physicians will be less likely to locate in rural areas.</td>
<td>Do board certified physicians choose rural locations disproportionately?</td>
<td>Board certification status of physician</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td>3. Physicians less concerned about continuing medical education opportunities will be more likely to locate in rural areas.</td>
<td>Are physicians who are less concerned about continuing medical education opportunities attracted to rural areas?</td>
<td>Physician's CME involvement in preceding year, Physician’s ranking of the importance of continuing medical education opportunities as an important determinant of location choice</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
</tbody>
</table>
### Hypotheses*

<table>
<thead>
<tr>
<th>Research Issues</th>
<th>Required Data Elements</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Physicians who are able to join a group or partnership practice will be more likely to choose a rural location.</td>
<td>o Are physicians who chose rural practice more likely to be in a group practice setting?</td>
<td>o Type of current practice of the physician</td>
</tr>
<tr>
<td></td>
<td>o Are physicians who rank the opportunity to join a group or partnership practice as an important determinant of location choice less likely to locate in shortage areas?</td>
<td>o Physician's ranking of the importance of opportunities to join a group or partnership practice.</td>
</tr>
<tr>
<td>5. Physicians who are less concerned about being overworked and working long hours are more likely to locate in rural areas.</td>
<td>o Are physicians who are concerned about excessively long work hours less likely to locate in rural areas?</td>
<td>o Physician's ranking of the importance of &quot;working long hours&quot;.</td>
</tr>
<tr>
<td></td>
<td>o Are physicians who are concerned about being overworked and working long hours less likely to locate in rural areas?</td>
<td>o Physician's ranking of the importance of relief from being &quot;on call&quot;.</td>
</tr>
</tbody>
</table>

### Community Characteristics

| 1. Physicians will be more likely to choose a rural practice in a community that offers high quality educational resources. | Do communities with high per capita expenditures for public education attract more physicians? | o County per capita expenditures for public education | Area Resource File |
| | Do physicians who rank educational quality as an important determinant of location choice choose rural practice? | o Physician's ranking of the importance of educational quality. | Survey of NHSC and non-NHSC physicians |
| | Do communities with institutions of higher education attract more physicians? | o Number of colleges, universities, and medical schools in county | Area Resource File |
| 2. Physicians will be more likely to locate in rural communities which have adequate professional personnel and facilities. | Do communities with para-professional and physician extender schools attract more physicians? | o Number of R.N. Schools | Area Resource File |
| | Do communities with relatively large R.N.-to-population ratios attract more physician? | o Number of registered nurses (R.N.) | Area Resource File |
| | Do communities with more hospital facilities attract more physicians? | o Number of short-term acute care general hospitals | Area Resource File |
| | Do physicians who rank the availability of professional personnel and facilities as an important determinant of location choice choose rural practice? | o Physician's ranking of the importance of the availability of professional personnel and facilities. | Survey of NHSC and non-NHSC physicians |
### Hypotheses

<table>
<thead>
<tr>
<th>Research Issues</th>
<th>Required Data Elements</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.a General family practitioners will be more likely than specialists to locate in rural communities which do not have hospital facilities.</td>
<td>Are general/family practitioners more likely to locate in communities without hospital services?</td>
<td>Physician's ranking of the importance of the availability of hospital facilities</td>
</tr>
<tr>
<td>2.b Young physicians will be more likely than older or past graduates to locate in rural communities that have hospital facilities equipped with advanced technology.</td>
<td>Do communities with hospital facilities equipped with advanced (or new) technology attract younger physicians?</td>
<td>Age of physician, Burn Care Unit - Beds, Neonatal ICU - Beds, Med/Surg ICU, CT Scanners, Megavoltage Radiation Units, Hosps with Radioisotope therapy, Hosps with Radioactive Implants</td>
</tr>
<tr>
<td>2.c Physicians who are not concerned about practicing near a medical school will be more likely to locate in rural communities</td>
<td>Do communities with medical schools attract more physicians?</td>
<td>MD Schools (1980-81), MD Schools (1974-75), Medical graduates, Physician's ranking of the importance of proximity to a medical school, Physician's current affiliation with a medical school or other teaching activities</td>
</tr>
<tr>
<td>3. Physicians will be more likely to locate in rural communities that have sufficient unmet effective demand to ensure that an additional practice can be supported (i.e. that income potential is present).</td>
<td>Do communities with low physician-to-population ratios attract more physicians?</td>
<td>County physician-to-population ratios</td>
</tr>
<tr>
<td></td>
<td>Do communities with low unemployment rates attract more physicians?</td>
<td>County unemployment rate</td>
</tr>
<tr>
<td></td>
<td>Do physicians who rank income potential as an important determinant of location choice avoid shortage area practice?</td>
<td>Physician's ranking of the importance of income opportunities.</td>
</tr>
<tr>
<td></td>
<td>Do communities with relatively high per capita income levels attract more physicians?</td>
<td>County per capita income</td>
</tr>
<tr>
<td></td>
<td>Are physicians who rank community per capita income levels as an important determinant of location choice less likely to practice in shortage areas?</td>
<td>County average household income</td>
</tr>
<tr>
<td>Hypotheses*</td>
<td>Research Issues</td>
<td>Required Data Elements</td>
</tr>
<tr>
<td>------------</td>
<td>----------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>3.a Physicians will be more likely to locate in rural communities that are experiencing population increases.</td>
<td>o Do communities experiencing significant population increases attract more physicians?</td>
<td>o Percent change in population 1975-1980</td>
</tr>
<tr>
<td>o Do physicians who rank community population growth as an important determinant of location choice more likely to choose shortage area practice?</td>
<td>o Physician's ranking of the importance of population growth in the community</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td>3.b General/family practice physicians will be more likely to locate in rural communities which have a large over-65 population.</td>
<td>o Do communities with a large over-65 population attract more practitioners?</td>
<td>o County age distribution</td>
</tr>
<tr>
<td>o Do physicians rank the age distribution of the population or the availability of Medicare reimbursement as an important determinant of location choice?</td>
<td>o Physician's attitude regarding the age distribution of the population in a community and/or availability of Medicare reimbursement</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td>o Medicare reimbursement under Part A and Part B in county</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Physicians are more likely to locate in rural communities with population characteristics similar to the socioeconomic background of the physician's parents.</td>
<td>o Are physician attracted to communities with socioeconomic and demographic characteristics comparable to those of the physician's family.</td>
<td>o Physician's family socioeconomic background: occupation and education level</td>
</tr>
<tr>
<td>o Are physicians who rank the socioeconomic characteristics of the community as an important determinant of location choice?</td>
<td>o Race</td>
<td>&quot; &quot;</td>
</tr>
<tr>
<td>o Ethnic group</td>
<td>&quot; &quot;</td>
<td></td>
</tr>
<tr>
<td>o Country of rearing</td>
<td>&quot; &quot;</td>
<td></td>
</tr>
<tr>
<td>o Physician's ranking of the importance of the socioeconomic characteristics of the community.</td>
<td>Survey of NHSC and non-NHSC physicians</td>
<td></td>
</tr>
<tr>
<td>5. Physicians will be more likely to locate in rural communities which offer recreational, cultural, and/or geographic features that are generally attractive</td>
<td>o Are physicians who rank community recreational and sports opportunities as significant determinants of location choice more likely to choose shortage area practice?</td>
<td>o Physician's ranking of the importance of recreational and sports opportunities.</td>
</tr>
<tr>
<td>o Are physicians who rank climatic (or geographical features) of the area as a major factor in their location decision more likely to choose shortage area practice?</td>
<td>o Physician's ranking of the importance of climate (or geographical features of the area).</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td>o Annual temperature</td>
<td>Area Resource File</td>
<td></td>
</tr>
<tr>
<td>o Annual precipitation</td>
<td>Area Resource File</td>
<td></td>
</tr>
<tr>
<td>o Are physicians who rank community cultural opportunities as a significant determinant of location choice less likely to locate in shortage areas?</td>
<td>o Physician's ranking of the importance of cultural opportunities in the community.</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td>o Metropolitan area with cultural opportunities in contiguous counties</td>
<td>Area Resource File</td>
<td></td>
</tr>
<tr>
<td>HYPOTHESES*</td>
<td>RESEARCH ISSUES</td>
<td>REQUIRED DATA ELEMENTS</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td>II. SHORTAGE AREA CHOICES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. NHSC IMPACT</td>
<td></td>
</tr>
<tr>
<td>1. Physicians who are NHSC alumni will be more likely to choose a shortage area location as a result of contact with the area.</td>
<td>o Do NHSC alumni locate in shortage areas as a result of this prior contact?</td>
<td>o NHSC site assigned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Are physicians who consider prior contact with an area as a result of NHSC service a significant determinant of location choices more likely to practice in shortage area?</td>
</tr>
<tr>
<td>2. NHSC alumni who were busy and enjoyed significant professional contact in that area are more likely to be retained in the specific shortage area assigned.</td>
<td>o Are NHSC alumni who report satisfaction with the NHSC experience more likely to be retained?</td>
<td>o Physician's satisfaction with &quot;business&quot; during the NHSC assignment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Are NHSC alumni who report satisfaction with the NHSC experience more likely to be retained?</td>
</tr>
<tr>
<td>3. PPO physicians who have completed a private practice option with a fee-for-service practice are more likely to be retained in the shortage area than are NHSC site alumni or PPOs who are &quot;grant hires&quot;.</td>
<td>o Are PPO physicians &quot;different&quot; from non-PPO NHSC alumni in their location patterns?</td>
<td>o PPO status</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Are PPO private practice physicians different from PPO &quot;grant hires&quot; in their location patterns?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. The longer the period served to fulfill the NHSC obligation, the more likely is the NHSC alumni to be retained in the shortage area.</td>
<td>o Are longer term NHSC alumni (site and PPO providers) more likely to be retained in a specific HMSA or in shortage areas?</td>
<td>o Number of years of NHSC service</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. The NHSC alumni who had a significant involvement in selecting the site in which the NHSC obligation was fulfilled is more likely to be retained.</td>
<td>o Are NHSC alumni assigned to sites they selected more likely to be retained in a particular site?</td>
<td>o NHSC alumni's first choice of service site</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o NHSC alumni's first choice of service site</td>
</tr>
</tbody>
</table>
## Hypotheses

### Research Issues

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Question</th>
<th>Required Data Elements</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. NHSC volunteers are more likely to be retained in shortage areas and in specific sites than are NHSC scholarship recipients.</td>
<td>o Are volunteers and NHSC scholarship recipients &quot;different&quot; in their likelihood of being retained?</td>
<td>o Volunteer status</td>
<td>NHSC Provider File</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>B. Professional Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Physicians who are least concerned about Continuing Medical Education opportunities and collegial interaction will locate in a shortage area.</td>
<td>o Are physicians who consider CME opportunities and collegial interaction to be important determinants of location choice less likely to locate in shortage areas?</td>
<td>o Physicians ranking of the importance of CME opportunities and availability of collegial interaction</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Are physicians who choose to locate in HMSAs least concerned about continuing medical education opportunities and collegial interaction?</td>
<td>o Availability of continuing medical education programs</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Physician-to-population ratio</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Physician's CME activity in previous year</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Physicians who are primary care specialists will be less likely to locate in a shortage area than in a rural area.</td>
<td>o Are primary care specialists less likely than general/family practitioners to locate in a shortage area?</td>
<td>o Specialty of physicians</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
<tr>
<td></td>
<td>o Do shortage areas attract more general/family practitioners than other physician specialties?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Number of physicians by specialty locating in HMSAs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Primary care specialists will not locate in an area where they are the only physician available.</td>
<td>o Do primary care specialists locate in counties with no other physicians?</td>
<td>o Number of physicians in county</td>
<td>Area Resource File</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Physicians who are less concerned about working long hours and having 24-hour in-call practice will be more likely to practice in shortage areas.</td>
<td>o Are physicians who rank the necessity to work long hours as being an important determinant of shortage area location choice less likely to choose shortage area practice?</td>
<td>o Physician's ranking of the importance of long work hours and 24-hour on-call practice.</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
</tbody>
</table>
## Hypotheses

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Research Issues</th>
<th>Required Data Elements</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Physicians who were reared in a shortage area (or whose spouse was) are more likely to choose shortage area practice.</td>
<td>o Do physicians who consider prior contact or exposure to a shortage area, either by themselves or their spouse, as important in location choices locate in shortage areas?</td>
<td>o Physician's ranking of the importance of prior contact (either themselves or their spouse) with a shortage area</td>
<td>Survey of NHSC and non-NHSC physicians</td>
</tr>
</tbody>
</table>

## III. Practice Characteristics

### A. Auxiliary Use

1. Physicians who served at NHSC sites are more likely to use auxiliary personnel than are PPOs and non-NHSC physicians.
   - o Do NHSC site alumni more often report that they use auxiliaries in current practice setting?
   - o Prior experience with auxiliaries in the NHSC site
   - o Current use of auxiliaries
   - MPR, 1979
   - Survey of NHSC and non-NHSC physicians

### B. Patient Characteristics

1. Physicians who served in NHSC sites are more likely to have current patients who are poor, less educated, receiving aid or assistance and/or otherwise disadvantaged than non-alumni.
   - o Are the patients of NHSC alumni disproportionately poor and/or disadvantaged?
   - o Socioeconomic status of the population in HMAAs.
   - o Socioeconomic status of current patients
   - Area Resource File
   - NHSC Site File
   - Survey of NHSC and non-NHSC physicians

### C. Fee Structure

1. NHSC site alumni will provide proportionally more free care than non-alumni.
   - o Do alumni provide free care more frequently?
   - o Proportion of patients seen annually who are not billed for services
   - Survey of NHSC and non-NHSC physicians

2. NHSC site alumni will be more likely to accept assignment for Medicare beneficiaries.
   - o Do NHSC alumni more frequently accept assignment?
   - o Proportion of Medicare patients for whom assignment is accepted
   - Survey of NHSC and non-NHSC physicians

3. NHSC site alumni will be more likely to accept Medicaid patients.
   - o Do NHSC alumni accept a higher proportion of Medicaid beneficiaries?
   - o Proportion Medicaid patients of total patients
   - Survey of NHSC and non-NHSC physicians

4. NHSC site alumni will be more likely to use a sliding scale fee structure.
   - o Do NHSC alumni more frequently report that a sliding fee schedule is used?
   - o Policy toward acceptance of new Medicaid patients
   - o Use of a sliding fee schedule
   - Survey of NHSC and non-NHSC physicians
### IV. TREND HYPOTHESES

<table>
<thead>
<tr>
<th>HYPOTHESIS</th>
<th>RESEARCH ISSUES</th>
<th>REQUIRED DATA ELEMENTS</th>
<th>DATA SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Over time, the probability that a new physician will locate in a shortage area will increase as the supply of physicians increases and market forces lead to diffusion. This effect will be strongest for general/primary care practice physicians, less strong for primary care specialists who are not board certified physicians, and weakest for board certified physicians.</td>
<td>o Are recent locaters more likely to choose rural and shortage practice than were locaters during the initial years studied?</td>
<td>o Probability of selecting a shortage or rural location, by specialty, board certification status, and time period.</td>
<td>AMA/AOA data NHSC alumni File MPR Impact Evaluation Data</td>
</tr>
<tr>
<td>B. Over time, the probability that a new physician will locate in a rural or shortage area will decrease as the two-earner family becomes more common.</td>
<td>o Are more recent locaters with spouses less likely to choose rural shortage practice than were locaters with spouses during the initial years studied?</td>
<td>o Probability of selecting a shortage or rural location by marital status and time period</td>
<td>AMA/AOA data NHSC Alumni File Survey of NHSC and non-NHSC physicians</td>
</tr>
</tbody>
</table>

*Note: Based on the assumption that a physician who chooses a rural shortage area practice will have made a prior commitment to rural practice, the hypotheses presented regarding rural location choices also relate to shortage area physician practice decisions. Since this is not always the case, two sets of hypotheses are presented: (1) hypotheses related to rural location choices which also apply to shortage area practice choices; and (2) hypotheses expected to distinguish the shortage area location decision from the rural location decision.*
REFERENCES


32. Flom, Penelope K. "Predictors of Rural Practice Location," Journal of Medical Education, LII (March, 1977), pp. 204-209.


60. Kleinman, J. and Wilson, R. "Are 'Medically Underserved Areas' Medically Underserved?" Health Services Research, 12;147-162, Summer, 1977.


91. Sax, Ellen, Review of Incentive Programs, p. 22.


103. Smith, S., "If an Apple a Day Keeps the Doctor... What Will Make One Stay?" Texas Hospital, volume 39 (June, 1983), pp. 26-7.


110. Swanson, A. G. "Editorial: Mandatory Requirement Versus Voluntary
Opportunity for Service in the National Health Service Corps," Jour-
111. Swearingen, C. M., and Perrin, J. M. "Foreign Medical Graduates in
Rural Primary Care: the Case of Western New York State," Medi-
cal Care, XV (April, 1977), pp. 331-7.
112. Taylor, M., Dickman, W., and Kane, R. "Medical Students' Attitudes
Toward Rural Practice," Journal of Medical Education, XLVII
(October, 1973), pp. 885-95.
113. U.S. General Accounting Office, Progress and Problems in Improving
the Availability of Primary Care Providers, Report to Congress
by the Comptroller General of the United States, HRD-77-135,
114. Way, Peter O. "Patterns in the Geographic Location of Physicians:
1968-1976," In Profiles in Medical Practice, by the AMA, 1979,
Edited by John Gaffney, pp. 29-54.
115. Wendling, W. R., Werner, J. L., and Budde, N. W. "Health Manpower
Programs to Affect Physicists' location: A Regional Analysis," Jour-
nal of Health Politics, Policy and Law, VI (Spring, 1981),
pp. 120-135.
116. Werner, J., Langwell, K., and Budde, N., "Designation of Physician
Shortage Areas and the Problem of Specialty Mix Variations," Inq-
iry, volume 16 (March, 1979).
117. West-Central Ohio Health Systems Agency, Physician Recruitment
118. Wiggins, W. S., Green, F., and Altenderfer, M.E. Trends in Medical
Practice--An Analysis of the Distribution and Characterisitics
of Medical College Graduates, 1915-1955. Chicago: American
Medical Association, 1970.
119. Williams, A. P. "Oversight Hearings on the National Health Service
Corps Program," Rand Corporation, Santa Monica, California,
(no. P-6556), September, 1980.
120. Williams, R. C., and Uzzell, W. E. "Attracting Physicians to
121. Wolinsky, F. D. "Why Physicians Choose Different Types of Practice
399-419.


