

11-1982

## B789: A Breakeven Analysis of Two Rural Health Maintenance Organization Models

Steven P. Skinner

Brenda S. Bridges

Stephen D. Reiling

Dennis A. Watkins

Follow this and additional works at: [https://digitalcommons.library.umaine.edu/aes\\_bulletin](https://digitalcommons.library.umaine.edu/aes_bulletin)

 Part of the [Health and Medical Administration Commons](#), and the [Health Economics Commons](#)

---

### Recommended Citation

Skinner, S.P., B.S. Bridges, S.D. Reiling, and D.A. Watkins. 1982. A breakeven analysis of two rural health maintenance organization models. Maine Agriculture Experiment Station Bulletin 789.

This Report is brought to you for free and open access by DigitalCommons@UMaine. It has been accepted for inclusion in Bulletins by an authorized administrator of DigitalCommons@UMaine. For more information, please contact [um.library.technical.services@maine.edu](mailto:um.library.technical.services@maine.edu).

# **A BREAKEVEN ANALYSIS OF TWO RURAL HEALTH MAINTENANCE ORGANIZATION MODELS**

by

**Steven P. Skinner, Brenda S. Bridges,  
Stephen D. Roiling and  
Dennis A. Watkins**

**MAINE AGRICULTURAL EXPERIMENT STATION  
UNIVERSITY OF MAINE AT ORONO**

**Experiment Station Bulletin 789**

**November 1982**

A BREAKEVEN ANALYSIS OF TWO RURAL  
HEALTH MAINTENANCE ORGANIZATION MODELS

by

*Steven P. Skinner, Brenda S. Bridges,  
Stephen D. Reiling and  
Dennis A. Watkins*

MAINE AGRICULTURAL EXPERIMENT STATION  
UNIVERSITY OF MAINE AT ORONO

EXPERIMENT STATION BULLETIN 789

November 1982

## PREFACE

This report uses breakeven analysis to assess the financial feasibility of two health maintenance organization (HMO) models which have received considerable support from health-care professionals as potentially viable organizations **in** rural areas. The two models analyzed, the individual practice association and satellite clinic, represent quite different organizational and financial structures. Enrollment levels required for each HMO model to attain financial viability for specified premium rates are calculated. In addition, the effects of varying key health-care utilization rates on an HMO's financial position are assessed. This information should be of interest to extension agents and others who are working with groups contemplating a variety of health initiatives.

The authors wish to express their appreciation to Mr. Clinton Conant, formerly of Franklin Area Health Plan, Farmington, Maine, and Mr. Richard White, formerly of Penobscot Bay Medical Center's Prepaid Health Plan in Rockland, Maine, for the provision of data and for their valuable comments on the operational framework of rural HMOs. Also, the thorough review and helpful comments made by Mr. Conrad Griffin, Community Development Specialist, Cooperative Extension Service, at the University of Maine at Orono, were very much appreciated.

This study was supported in part with Hatch Funds administered by the Maine Agricultural Experiment Station, University of Maine at Orono.

## TABLE OF CONTENTS

	Page
INTRODUCTION	1
Statement of Problems and Objectives	1
Description of Basic Health Maintenance Organization Structures	3
MODELS AND METHODOLOGY	5
Breakeven Analysis	5
HMO Model Selection Considerations	7
<i>Population density and access to care</i>	7
<i>Location and disposition of physician population and provider-patient relationships</i>	7
<i>Cost structure</i>	9
<i>Subsidization versus non-subsidization</i>	10
<i>Hospital-based versus non-hospital based</i>	11
<i>Creation of a competitive environment</i>	12
General Assumptions of the Individual Practice Association and Satellite Models	13
<i>Market structure and penetration</i>	13
<i>Benefit package: certification versus non-certification</i>	14
<i>Revenue structure</i>	15
Specific Assumptions of the Two Models	16
<i>Individual practice association model</i>	16
<i>Satellite model</i>	17
PRESENTATION OF DATA	18
IPA Model	18
<i>Cost and service utilization data</i>	18
<i>Revenue data</i>	22
Satellite Model	22
<i>Cost and service utilization data</i>	22
<i>Revenue data</i>	26

TABLE OF CONTENTS (continued)

	<u>Page</u>
ANALYSIS	26
Individual Practice Association Model	26
<i>Benchmark model</i>	26
Sensitivity Analysis	27
<i>Effects of changing the inpatient hospital service utilization rate</i>	27
<i>Effects of changing the utilization rate of in-plan outpatient physician visits</i>	29
<i>Effects of changing the utilization of outpatient referral visits</i>	32
Satellite Model	34
<i>Benchmark model</i>	34
Sensitivity Analysis	34
<i>Effects of changing the inpatient hospital services utilization rate</i>	34
<i>Effects of changing the utilization of outpatient referral visits</i>	36
COMPARISON OF THE TWO HMO MODELS	36
SUMMARY AND CONCLUSION	41
REFERENCES CITED	44
APPENDICES	45

## LIST OF TABLES

Table	Page
1 IPA Model: Monthly Projected Cost Per Enrollee for 1979	20
2 IPA Model: Monthly Cost Data for 1979	21
3 Satellite Model: Monthly Projected Cost Per Enrollee for 1979	23
4 Satellite Model: Monthly Cost Data for 1979	25
5 IPA Benchmark Model: Net Returns Per Month at Selected Enrollment Levels, 1979	28
6 IPA Model: Effect of an Increase in the Utilization Rate of Inpatient Hospital Services on Monthly Net Returns, 1979	30
7 IPA Model: Effect on Monthly Net Returns of an Increase in the Utilization Rate of In-Plan Outpatient Physician Visits, 1979	31
8 IPA Model: Effect of an Increase in the Utilization Rate of Outpatient Referral Visits on Monthly Net Returns, 1979	33
9 Satellite Benchmark Model: Net Returns Per Month at Selected Enrollment Levels, 1979	35
10 Satellite Model: Effect of an Increase in the Utilization Rate of Inpatient Hospital Services on Monthly Net Returns, 1979	37
11 Satellite Model: Effect of an Increase in the Utilization Rate of Outpatient Referral Visits on Monthly Net Returns, 1979	38

## LIST OF FIGURES

Figure	Page
1 Contractually Defined HMO Organizational Structure.....	3
2 HMO Breakeven Chart.....	6
3 A Comparison of the IPA and Satellite Model's Cost Structures .....	40

# A BREAKEVEN ANALYSIS OF TWO RURAL HEALTH MAINTENANCE ORGANIZATION MODELS

*Steven P. Skinner, Brenda S. Bridges,  
Stephen D. Reiling and  
Dennis A. Watkins<sup>1</sup>*

## INTRODUCTION

### Statement of Problems and Objectives

Rural areas often suffer from an inadequate supply of health resources and a lower health status of their population than do metropolitan areas. In 1975, for instance, the physician-to-population ratio in totally rural areas was less than one-half the ratio for urban areas. More hospital beds per person are also available in urban areas. A 1975 survey [1] determined that rural farm residents had the least access to health care when measured by the following three factors: travel time to care, ability to obtain a walk-in visit, and office waiting time. This inadequate supply of health resources has contributed to the lower health status of rural residents. For the 1969 to 1973 period, less urbanized counties not adjacent to a metropolitan area had an infant mortality rate of 21.6 per 1,000 live births compared to a low of 16.2 in fringe counties of greater metro areas [1]. A composite health status index based on mortality rates for the same period indicated that metropolitan areas were relatively better off than their rural counterparts [1].

One alternative rural health care delivery system which has received considerable attention in recent years is the health maintenance organization (HMO). Federal legislation which initiated HMO development, the 1973 HMO Act (P.L. 93-222), provided grants, loans, and loan guarantees for feasibility, planning, and initial development. The HMO Act describes an HMO as an "organized, fiscally sound, legal entity, which provides and/or arranges for a comprehensive range of inpatient and outpatient services to a voluntarily enrolled group of subscribers who made (or in whose

---

<sup>1</sup>Assistant Professor of Agricultural and Resource Economics, Assistant to the Dean of the Graduate School, Assistant Professor of Agricultural and Resource Economics, and Associate Professor of Community Development, respectively.



behalf is made) prepaid, fixed and uniform payments to the HMO on a periodic basis."

HMOs offer the possibility of operating more efficiently than the traditional fee-for-service sector. Cost-effectiveness within an HMO is achieved by providing preventive health care, which lessens the probability of future, more costly hospitalization. Less expensive ambulatory care at the earlier stages of medical care is substituted for in-patient care. In addition, less expensive allied health personnel are substituted for physicians. HMOs are also organized to provide incentives for physicians not to overutilize services.

Urban HMO development has increased in recent years. In contrast, rural HMOs have been much less successful, with their development in many cases being largely reliant on federal subsidization. Subsidization options are limited, however, and show signs of becoming even more restricted. Moreover, it is becoming apparent that what is required for delivery of prepaid health services in rural areas is innovative strategy leading to HMOs that are both flexible enough to serve the special needs of rural areas, while at the same time, capable of maintaining financial solvency without dependence on federal subsidization.

It is the purpose of this study to analyze the financial feasibility of two HMO models which have received considerable support from healthcare professionals as potentially viable options in rural areas. The two HMO models to be analyzed are the Individual Practice Association and a rural satellite clinic which is an expansion of an existing, urban-centered HMO. The analytical technique that will be utilized is breakeven analysis.

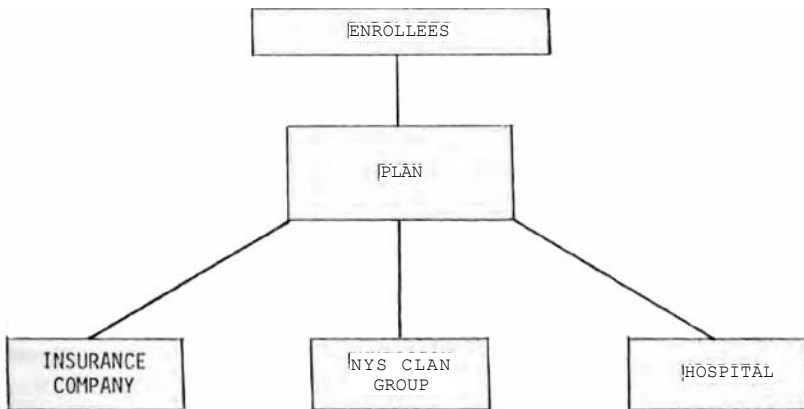
The specific objectives of this study are:

1. Determine enrollment levels required for each HMO model to attain financial viability for specified premium rates.
2. Determine the effect on each HMO model's financial viability of changing key health care utilization rates, *ceteris paribus*.

Description of Basic Health Maintenance Organization Structures

In many ways, each HMO is a unique organizational configuration developed to meet the needs of a particular setting. In legal terms, however, each HMO has five basic elements. These are the enrollees, the plan (administrative unit), arrangements for ambulatory and inpatient physician services, arrangements for hospitalization, and a risk (or incentive) sharing agreement. Figure 1 depicts the basic components and contractual relationships of an HMO. The plan contracts with various groups or individuals to provide an agreed upon group of medical services at a specified prepaid amount. The plan itself carries the major portion of the financial risk involved in guaranteeing delivery of services on a fixed payment basis. Risk is the probability that the actual costs of providing required services will exceed the amount of prepayment. This risk may be shared with provider-physicians, participating hospitals, and an insurance company.

Figure 1. Contractually Defined HMO Organizational Structure\*



\*U.S. Department of Health, Education and Welfare. Bureau of Community Services. HMO Feasibility Study Guide, P. 19.

The plan contracts with physicians to provide inpatient and outpatient physician services. The physicians usually assume the risk for outpatient services, or ambulatory care. They agree to deliver these services on a capitation, or average cost per enrollee basis. Their level of service delivery must be kept below the budget limits established by the overall capitation amount for physician services, or they must bear the financial burden of overutilization of ambulatory services. Conversely, if hospitalization is held below a certain level, physicians may receive a bonus, which serves as an incentive to keep utilization down.

The plan also contracts with an insurance company, which assumes the risk when the costs of providing health care to an individual enrollee exceed a specific dollar amount. This arrangement is called "reinsurance". The hospital may also contractually agree to share the risk of overutilization of inpatient and emergency treatment on a capitation basis. Alternatively, it may elect not to share in the risk and simply provide services at its usual billing rates. In this case, the plan would assume the financial risk of cost overruns.

A peer review committee is also part of each HMO. Its primary purpose is to ensure cost-effective, quality care on the part of each participating physician. This is especially critical when the budget has been exceeded and the financial burden must be borne, to the extent contractually prescribed, by the physicians.

There are basically two types of HMOs to which the overall conceptual framework of the HMO is applied. These are the prepaid group practice plans, and the Individual Practice Association (IPA) plans. The prepaid group practice is the most common, constituting 63 percent of all prepaid plans in 1979. Physicians in prepaid group practice plans practice in one or a few centralized ambulatory clinics. Usually they practice as part of a multi-specialty group and are compensated on a basis other than fee-for-service. The satellite model analyzed in this study represents this type of HMO.

This study also examines the other major type of HMO, the IPA, which contracts with an association of physicians or individual physicians who

remain in their individual practice site, whether it be a solo or group arrangement. Existing doctor-patient relationships are maintained with the physician not only providing care to the HMO prepaid enrollee, but also to other non-HMO patients.

IPAs require minimal change in the established mode of physician practice. However, they can potentially provide the same level of comprehensive services as the group practice HMO. The important factors in achieving cost effectiveness, namely prepayment by enrollees, shared financial risk-taking by the physicians, and peer review, are common to both organizations.

## MODELS AND METHODOLOGY

### Breakeven Analysis

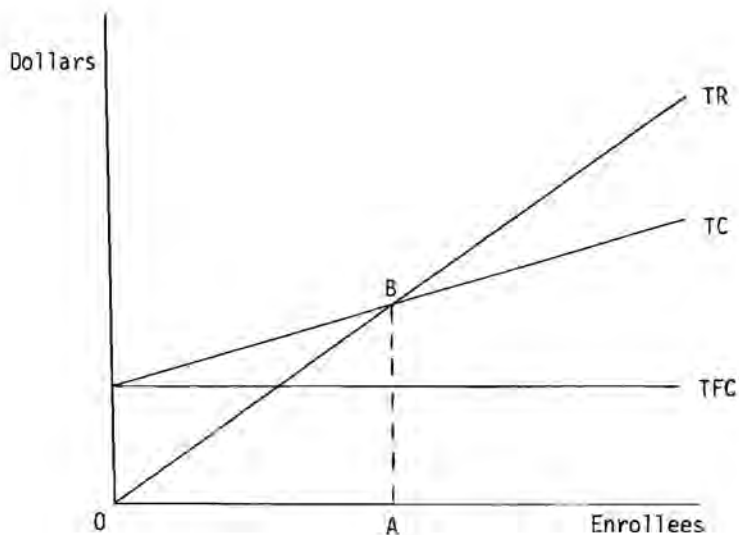
Breakeven analysis is used in this study to assess the financial feasibility of the satellite and IPA models. It is a technique for determining the level of enrollment at which the total cost of providing a previously agreed upon benefit package to an enrollee population equals the total revenue acquired from the sale of policies. It also illustrates what happens to profits (losses) at various enrollment levels greater or less than the breakeven quantity. The effect of changing individual health service utilization rates on total costs and profits (losses) will also be assessed using this methodology.

The results of breakeven analysis will be presented in both tabular and graphical form. Figure 2 provides a general graphical illustration of breakeven analysis. The number of enrollees is measured on the horizontal axis while total revenue (TR) and total cost (TC) are depicted on the vertical axis. In this figure, the breakeven point is depicted by the intersection of the TR and TC lines at point B, at an enrollee level of OA.

During the period of analysis, policy price is assumed to remain constant at all levels of enrollment. Thus TR is graphed as a straight line emanating from the origin. Different enrollment levels result in a

movement along a TR line. In contrast, different premium rates would each be represented by a different TR line.

Figure 2. HMO Breakeven Chart



Total fixed cost (TFC) does not vary with changes in the amount of services provided, within a given enrollment range. Thus TFC is depicted as a horizontal line, as shown in Figure 2. In contrast, total variable cost is assumed to change linearly with changes in the number of enrollees. Marginal cost is therefore constant and equal to average variable cost (AVC). This constant value of AVC is also called the capitation rate, or cost per enrollee.

Only linear relationships will be used in this study. Careful examination of the cost and revenue structure underlying each HMO indicated

that this assumption closely approximated actual conditions for the enrollment ranges analyzed.

#### HMO Model Selection Considerations

The principal considerations examined in the selection and development of the Individual Practice Association (IPA) and satellite clinic models were: 1) population density and access to care; 2) location and disposition of physician population and provider-patient relationships; 3) cost structure; 4) subsidization versus non-subsidization; 5) hospital-based versus non-hospital based; 6) creation of competitive environment. Each of these considerations is discussed below in reference to each of the models.

Population density and access to care. The lack of population concentrations in rural areas creates a particular set of problems for HMO development since health care must be available within a reasonable and acceptable distance of the prospective subscriber population. If this is not the case, plan marketability can be seriously jeopardized. In a documented case study of two rural HMOs, enrollment as a percentage of population declined dramatically outside a geographic radius of approximately 20 miles of the clinic facilities [2].

Access to health care is not only important in terms of plan marketability, but in terms of overall health policy. In addition to financial protection against ill health and increasing the availability of quality care, equitable access to medical care is a primary goal of improved health policy. With the above considerations in mind, the IPA would appear to have greater flexibility in providing care across a broad geographic area, and the satellite unit in serving pockets of population. Also, the continuation of existing physician-patient relationships through the IPA system is a reinforcement for plan enrollment.

Location and disposition of physician population and provider-patient relationships. A discussion of the types of HMOs that are most feasible in a rural setting not only involves the location, disposition, and composition of the physician population, but existing provider-patient relationships as well.

There is a predisposition for solo-practice ambulatory care as a mode of practice in rural areas, both among the providers and the patients. Loyalty to existing physician relationships is also an important consideration as well.

Physician specialization is also a critical factor in rural HMO development. It is generally accepted that provision of specialized physician services is often not viable in rural areas. In most cases there are insufficient resources and too limited a service population to support the level of specialization that exists in urban areas. This can create a financial burden for an HMO providing specialized services.

Physician shortages may exist not only for specialists but for primary care physicians within a given geographical area. Thus the problem may not be availability of doctors but their geographic distribution. Any shortage situation could create a fertile environment for development of an HMO clinic, which in turn might serve to attract new physicians to an area.

Acceptance of new physicians in an area where distribution rather than absolute shortage is at issue is a critical factor. There is evidence that oftentimes a shortage of physician services is not an adequate criterion for the location of sponsored medical services because consumers will, in many cases, continue to travel significant distances to maintain physician-patient relationships once such a pattern has been established during a period of local physician shortage.

Loyalty to existing physician relationships, a shortage or maldistribution of physician services, and a penchant for solo practice in rural areas, all favor development of either an IPA or satellite HMO. The IPA encourages physician participation over a wide geographic area and is based in most cases on solo practice delivery of ambulatory care and maintenance of existing provider-patient relationships. Furthermore, the IPA allows a prepaid plan to take advantage of existing resources, gain needed support within the local medical society, and utilize existing patterns of physician care through the local hospital. The satellite unit, because it is limited in size, can complement existing provider

relationships, alleviate a situation of shortage, and often create a competitive environment within the local health care system.

*Cost structure.* Effective cost control is especially necessary for the survival of a small rural HMO. In particular, the minimization of fixed or overhead costs is crucial. Fixed costs are those which do not vary with changes in output, or in the case of an HMO, with the volume of services provided within a given enrollment range. Variable costs in contrast, are those that vary directly with enrollment size.

One very important component of total fixed cost is often that cost associated with a capital investment. Such an investment in land, buildings, and equipment usually involves a large sum of money that can affect the operation of a business for a number of years.

Although it is not uncommon for a large urban HMO to own its own hospital, whether constructed or purchased, it is usually not financially feasible for a rural HMO. In a 1972 study, Burke [2] determined that a prepayment plan operating its own hospital and clinic facilities could not breakeven with fewer than approximately 20,000 subscribers. This enrollment size is more than twice the potential subscriber market for most rural areas. In addition, the costs of such projects have increased markedly since 1972. Therefore, for the purpose of this study, the satellite HMO will be assumed to occupy a leased clinic facility.

Several cost advantages accrue to both the satellite and its urban-based, parent HMO through the realization of economies of size. For instance, the satellite unit benefits by having the parent perform most administrative and managerial functions. Lower average costs also result from bulk purchasing of supplies and the more efficient use of capital and marketing personnel. If the urban HMO is a prepaid group practice with full-time specialists, the practice and utilization of these physicians is extended by the development of a satellite unit. Additional gains for the satellite unit are financial credibility, the parent HMO's ability to handle legal issues, and in a community relations program, seasoned personnel knowing the subtleties of garnering broad-based community support. The cost of starting the satellite unit is also



greatly reduced by using the expertise of the parent HMO, particularly **in** complying with government regulations.

Both the IPA and satellite unit rely on only limited physical facilities. The IPA does not require a clinic, only administrative space. A satellite unit, **in** contrast, is housed in a small clinic and is staffed by a physician(s) and assistant(s). For both HMOs cost minimization is an essential ingredient to their success.

**Subsidization versus non-subsidization.** Much of rural HMO subsidization has been through U.S. Public Health Service programs. The Health Revenue Sharing and Health Services Act of 1975 (P.L. 94-63) created the Community Health Center (CHC) Program and in so doing, combined three previous programs, Neighborhood Health Center (NHC), Family Health Center (FHC), and Community Health Networks (CHN), under one administrative unit.

Grants through the CHC program are provided to health organizations in areas designated as Medically Underserved Areas (MUAs). A weighted index is used to determine MUAs. This is based on the number of primary care physicians per 1,000 people, infant mortality rate, percentage of people in poverty, and percentage of population 65 years and older. HMOs in MUAs that apply for funding receive priority under the law.

Of the CHC programs, the FHC is the most conspicuously represented **in** the literature. The intent of the FHC program was to provide health care resources through HMOs to medically underserved areas. Under this program, eligible low-income families, those above Medicaid levels but below a designated spendable income, have been able to enroll by paying a premium on a graduated fee-scale based on family size and income. In addition to premium payments, co-payments are required for certain services; the Department of Health and Human Services also subsidizes the plans by payment of a monthly capitation amount per enrollee.

About 80 percent of the monies now available to the CHC program are targeted for earlier established NHC, FHC, and CHN programs. Without describing the details of each of these programs, it is sufficient to note that some have become HMOs and others have not. The CHC funds are

disproportionately allocated to urban areas. For instance, in 1978 \$7.50 in CHC funds were spent per urban medically underserved resident whereas only \$1.00 was spent per rural medically underserved resident. The NHC programs are the most comprehensive of the earlier programs. However, although the rural population living in MUAs constituted 55 percent of the overall MUA population, only about one-fifth of the comprehensive projects' users lived in rural areas in 1978.

The existence of CHC funds and designation of MUA status would seem to encourage rural HMO development. Some CHC funded programs which originally provided only comprehensive care to a subsidized population were the cornerstones of rural HMO development, providing a base for extension of the HMO concept to a non-subsidized population. In these cases, the subsidized population guarantees at least a certain level of income to the HMO.

However, the era of rural health policy which focused on subsidization of rural health care has been vastly undermined by the new emphasis on cost-effectiveness through a return to market mechanisms. Conversion to an HMO is by no means inevitable for all rural CHC programs.

Conversations with Public Health Service staff indicate that conversion of Community Health Center programs is at best experimental. Reliance on a guaranteed income through CHC subsidization might offer a financial hedge for HMO development in some situations, but the overall feasibility of developing an HMO in a particular area should be the primary consideration. Furthermore, Public Health Service staff indicate that few MUAs remain to be designated in rural areas. In view of this, it would seem unlikely that HMOs would develop through inception of a CHC program.

This study will not assume the presence of a subsidized, prepaid population. The existence of such funding cannot be depended upon; therefore inclusion of such a guaranteed income population will not be considered.

Hospital-based versus non-hospital based. Hospital-based HMOs are often located in a medical arts building adjacent to a hospital; also,

they frequently serve a subsidized enrollment population. In order to organize and successfully operate a hospital-based HMO, strong support from the public and medical community is essential. Advantages of a hospital-based HMO often cited are an improved cash flow and reduced collection problem through prepayment, thus increasing the accuracy of budgeting and planning processes. Also, funding for expansion of an existing hospital in order to provide specialized ambulatory services is usually more feasible an undertaking than for an autonomous IPA. Availability of such services, in turn, could contribute to reducing the cost of outside referrals.

The presence of a subsidized enrollee population through FHC funding has in the past created incentives for development of a prepayment option in small rural hospitals. The FHC prepayment program has served those people that, until FHC inception, accounted for the bulk of the system's bad debts. Since the FHC option is now limited to existing programs, its absence could affect the receptivity of rural hospitals to becoming involved in providing and marketing comprehensive care. It is also unlikely that the income group eligible for FHC monies could bear the financial burden of monthly premium payment without the assistance of FHC funds.

Although hospital sponsorship is one option for rural IPA development, this will not be assumed in this study since it is difficult in practice to bring together all the necessary cooperating factors to make it a reality. It should be noted, however, that some hospital-based HMOs are IPAs and physicians continue to practice from their own offices. It is the intent of this study only to examine a satellite model which requires minimal clinic space and an IPA model which does not require a clinic.

*Creation of a competitive environment.* Although IPAs offer potential answers to problems inherent in a rural setting, the need for competing systems of medical care also must be taken into consideration. Recent rulings by the Federal Trade Commission point to IPAs as a new form of health care delivery that may be anti-competitive. In a recent article, Malcolm and Ellwood [3] state an FTC finding that "IPAs that involve more than 60% of the physicians in any given community can be seen as major

obstacles to the formation of competing plans." However, conversations with health care professionals indicate that in the interest of harmony, exclusion of certain members of the medical community is not advisable.

The question of whether IPAs hinder or allow sufficient competition in a rural setting is debatable. Since physicians in an IPA are collectively held to a fixed budget, they share the risk of exceeding this allocation. Risk-sharing by physicians is designed to discourage ordering excessive services and to encourage incorporation of formal utilization and cost controls, including peer review. However, financial incentives must also be found to control specialist and hospital referrals to ensure that competitive prices are maintained.

#### General Assumptions of the Individual Practice Association and Satellite Models

*Market structure and penetration.* In order for a prepaid medical care plan to be successful there must first be a sufficient enrollee market to support it. Major determining factors are the size and concentration of the service area population, the income level or purchasing power of that population, demand for comprehensive services, and the prices of existing health services.

Through feasibility analysis a primary market for HMO enrollment is isolated from the total population of a geographically defined service area. This primary market then becomes the focus of the HMO's marketing efforts.

The primary market typically consists of large employer groups, unions, employees, Medicaid eligibles, Medicare beneficiaries, and small group aggregates. Small group aggregates may consist of small business employees or a group such as a local Chamber of Commerce. There are considerable differences among health care professionals regarding minimum group size requirements. Minimum small group membership requirements are typically in the 10-15 person range while others may vary to as low as four members. A limit on the size of small groups is placed to avoid such high risk enrollment as small family businesses which may have a history of serious illness within the immediate family. However, the limit must

not be so large as to exclude large segments of the rural populations. In the case of the satellite HMO, some of the additional risk of less stringent requirements can be carried by the larger parent plan.

The primary market is defined as follows:

The primary market consists of those individuals whose existing level of third-party financing for health insurance premiums, access to dual choice arrangements, and residential locations relative to potential HMO service sites are such that the HMO will either provide care in excess of that being experienced or be no more expensive in terms of over-all, out-of-pocket expense than existing health care financing and delivery arrangements [6].

It is evident that an important factor in isolating a primary market is determination of those groups to which the HMO can offer a premium that is competitive with their existing insurance. An HMO usually offers a more comprehensive benefit package than conventional insurers. The HMO premium rate can be compared with that of conventional insurers by calculating out-of-pocket medical expenses required by coverage through such an insurer that are not incurred through the HMO plan. Dual choice obligates employers within the service area of a federally certified HMO to offer employees a choice between existing insurers and the HMO plan. Overall, the focus of primary market analysis is determination of those groups which are most likely to select a HMO comprehensive care option.

In order to assess the financial feasibility of each HMO model, assumptions regarding the determination of enrollment sizes must be adopted. Based on conversations with health care professionals, the primary market will be assumed to consist of 40 percent of the relevant total geographic population. HMO enrollment levels will be based on primary market penetration rates ranging from 7.5 to 25 percent. Comparable rates for urban HMOs are typically lower, varying between 5 to 10 percent. It is commonly accepted, however, that market penetration must be substantially higher for successful rural HMO operation. This study will analyze the effect of several different penetration rates.

Benefit package: certification versus non-certification. All HMOs have the option of becoming federally certified. However, the service

requirements of the federally certified HMO are greater than for the non-certified HMO. This is a disadvantage since additional services are usually more expensive to provide and their required provision leaves the rural HMO with little flexibility to adjust its cost structure. Another disadvantage of certification is the requirement that the plan have open enrollment for 30 days each year. This may substantially increase the risk of the plan by creating a financial burden which may be difficult to offset, especially for a small-scale operation. Certification also requires that a plan provide benefits to an employee who is no longer able to work; administrative reporting and compliance requirements are also more costly to maintain.

One potential benefit of being federally certified is that employers are required to offer the HMO plan to employees as an option to existing company insurance. This "dual-choice" obligation may serve to stimulate employer group participation in HMOs. In particular, large industries may view federally certified HMOs as offering better quality care than their uncertified counterparts.

The HMO models analyzed herein are not assumed to comply with federal certification standards. This means only that fewer services are offered, not that quality of care is lessened. Non-certification permits greater financial flexibility which may be needed to deal effectively with limitations imposed by a rural setting. Once an HMO has demonstrated that quality services and fiscal solvency can be maintained, incrementally it may broaden its services until certification is achievable.

Specific services of the basic benefit plan are presented in Appendix A.

*Revenue structure.* There are generally four sources of revenue for an HMO. These are premium payments, co-payments, fee-for-service income, and government grants and loans. Premium payments are the only revenue source considered in this study. It is assumed that the two HMO models analyzed are no longer utilizing initial development loans and grants or relying on fee-for-service income. Thus an assessment of each HMO's independent financial feasibility can be made. Also, since few services require a co-payment, income from that source will not be considered.

Specific Assumptions of the Two Models

*Individual practice association model.* The IPA to be analyzed in this study is assumed to be a non-profit, non-federally certified HMO in which the plan, the physicians, and an insurance company share the risk of overutilization of services. Subscribers pay a monthly premium in order to receive a previously agreed upon benefit package of health services. The plan is legally obligated and financially at risk to cover these services. It is a risk not only for all inpatient and outpatient services offered locally, but also for out-of-area hospital and medical services.

The physicians in an IPA are usually paid through a fund set aside for reimbursement purposes. This fund is the total of the per capita cost of each service the physician delivers multiplied by the average number of services expected to be required by each enrollee within a twelve month period. Physicians usually do not receive a given capitation amount per enrollee, as is the case in group practice HMO, but draw from this fund on a fee-for-service basis as they render care. Services are usually delivered according to a modified fee scale. If services exceed the amount of fund, the physicians incur the loss. In this manner, the IPA physicians share in the risk of overutilization of ambulatory services.

The hospital and other services are acquired at usual billing rates. An insurance carrier underwrites the plan itself and is at risk for medical expenses over a \$7,500.00 limit for each individual, and up to \$25,000.00 annually.

Since the IPA does not operate its own clinic, fixed cost expenses are limited to reinsurance, administration, contingency loading, and coordination of benefits.

The IPA model is structured to serve the following population:

Geographical population of service area	100,000
Primary market population (40% of service area)	40,000
Range of enrollment population (7.5-25% of primary market)	3,000 - 10,000

The plan offers services on a community-rating, rather than an experience rating basis. Under the community-rating system all subscribers are subject to the same rate structure, whereas the experience rating system has different rate structures according to health status. It is commonly felt that the rural market is too small to divide the enrollee population in this manner and that experience rating may discourage enrollment.

The IPA physician population is for the most part primary care. Although there are some participating specialists, out-of-area referrals to specialists for office visits, testing, and some inpatient care are required. In some instances contractual arrangements on a modified fee scale are possible. For the most part referral service costs reflect usual billing rates.

A summary of the specific assumptions of the IPA Model is presented in Appendix B.

*Satellite model.* The sponsor of the satellite model is a financially stable, urban-based HMO. The satellite unit is a non-federally certified, non-profit HMO. Development of the satellite offers the parent, urban-based HMO an opportunity to expand its enrollment base in an area of physician shortage and to potentially lower its unit cost of providing service.

The rural area in which the satellite is developed is defined as a "non-urban area that probably could not support the development of a free-standing HMO and is contiguous to an urban area" [4]. The community in which the satellite is based is centrally located within the targeted service area, or at least has significant consumer traffic from the entire service area for commercial, professional, or educational purposes. The parent HMO is assumed to service 20,000 enrollees.

The satellite unit is structured to serve the following population:

Geographic population of service area	14,000
Primary market population (40% of service area)	5,600
Range of satellite enrollment (9-19% of primary market)	500 - 1,050



The satellite unit itself is only capable of providing ambulatory clinic care. The professional team staffing the clinic consists of one primary care physician and a physician's assistant. Beyond the 750 enrollment level another physician's assistant is required. Parent HMO specialists are rotated to the satellite clinic according to the needs of the patient population. However, enrollees must travel to the urban center to obtain certain specialized services. Both the local community hospital and the urban hospital affiliated with the parent HMO are utilized for inpatient care.

Due to arrangements with its parent, many of the satellite's costs are reduced significantly. Fixed cost items such as reinsurance, administration and coordination of benefits are lessened. Also, such functions as plan marketing, billing, and data processing are carried out entirely by the parent HMO's staff. However, salaries of the clinic staff, building lease, and utility costs are borne by the satellite.

The satellite serves a markedly smaller population than the IPA. It also accepts individuals as members, in contrast to the IPA. A community-rating system is utilized to determine premium rates.

A summary of the specific assumptions of this model is presented in Appendix C.

#### PRESENTATION OF DATA

##### IPA Model

*Cost and service utilization data.* Cost and utilization data for 1979 were obtained from the National HMO census and conversations with health-care professionals.<sup>2</sup> Based on these data the projected monthly

---

<sup>2</sup>During the fall of 1980 data were acquired through visits to the Franklin Area Health Plan in Farmington, Maine, and the Penobscot Bay Medical Center, a Prepaid Health Care Program in Rockland, Maine, and from conversations with Clinton Conant of Franklin Area Health Plan and Richard White of the Penobscot Bay Medical Center program. Additional telephone conversations with Alan Sorbo of Towers, Perrin, Forster and Crosby of Minneapolis, Minnesota, a health care consulting firm, provided further clarification of the cost and revenue structure of HMOs. The 1979 National HMO Census of Prepaid Plans (DHEW, Publ. No. (PHS) 80-50127, 1979) provided data on family premium rates and annualized hospital and physician encounters by size, age, type, and federal certification status of plan.

cost per enrollee, or average total cost, was calculated to be \$25.10 at an enrollment of 3,000. This calculation is detailed in Table 1. Parts A through D of Table 1 comprise average variable cost, which totals \$22.10 or approximately 88 percent of average total cost. The two largest items in this category are inpatient hospital services (\$10.42) and primary care outpatient visits (\$4.00). The annual utilization rate for inpatient hospital services is .500, or 500 days per 1,000 enrollees, which is then multiplied by a unit cost of \$250 to obtain the annual service cost. This amount is then divided by twelve to determine the monthly rate of \$10.42. The same procedure is followed to calculate most projected monthly costs. Several items such as inpatient care, however, were estimated directly.

Based on cost and utilization information contained in Table 1, monthly total and average cost data are calculated and presented in Table 2 for a range of 3,000 to 10,000 enrollees. Total variable cost is \$66,300 for 3,000 enrollees and increases linearly at a rate of \$22.10 per enrollee, or by \$11,050 for each additional increment of 500 persons covered. Thus it equals \$77,350 at 3,500 members. In contrast, total fixed cost remains constant at \$9,000 from 3,000 to 6,499 enrollees. It is then incrementally increased to a constant \$13,000 over the range of 6,500 to 10,000 members to reflect added management and administrative costs. Total cost is the summation of variable and fixed costs and ranges from a low of \$75,300 to a high of \$234,000 for enrollments of 3,000 and 10,000, respectively.

Average fixed cost is computed by dividing total fixed cost by the corresponding enrollment size. As indicated in Table 2, average fixed cost declines from \$3.00 to \$1.50 over the range of 3,000 to 6,000 enrollees. It increases to \$2.00 at an enrollment of 6,500 since total fixed cost was incrementally increased to \$13,000 at that level to reflect added administrative costs. However, it decreases from this level to a low of \$1.30 per person covered at 10,000 enrollees. Thus substantial cost savings per enrollee can be realized at higher enrollment levels. In contrast to declining average fixed cost, average variable cost equals \$22.10 and is assumed to remain constant at all enrollment levels. Since

Table 1

IPA Model: Monthly Projected Cost Per Enrollee for 1979

	Utiliza- tion Rate (Per en- rollee)	Average Cost (per service)	Monthly cost (per enrollee)
Variable Costs:			
A. Inpatient Hospital Services	.50	\$250.00	\$10.42
B. Ambulance	.02	75.00	.12
C. MD/Outpatient Services			
1. In Plan			
a. Outpatient Visits	3.00	16.00	\$ 4.00
b. Laboratory	1.65	8.00	1.10
c. X-Ray	.35	38.00	1.11
2. Outpatient Referrals			
a. Outpatient Visits	.10	40.00	.33
b. Laboratory	.04	35.00	.12
c. X-Ray	.05	50.00	.21
3. Inpatient Care			
a. In-Area			2.90
b. Out-of-Area			.35
4. Emergency Room			
a. In-Area	.24	25.00	.50
b. Out-of-Area			.14
5. Mental Health			.35
SUBTOTAL MD/Outpatient Services			\$11.11 \$11.11
D. Major Medical			.45
AVERAGE VARIABLE COST*			\$22.10
Fixed Costs:			
Reinsurance (Net)			.45
Administration			2.00
Contingency Loading			.45
Coordination of Benefits			.10
AVERAGE FIXED COST**		\$ 3.00	3.00
AVERAGE TOTAL COST			\$25.10

\*Average variable cost and marginal cost are both assumed to remain constant and equal to \$22.10 at all enrollment levels; total cost will thus vary linearly.

\*\*Total fixed cost is \$9,000 and \$13,000 monthly, respectively, for enrollment ranges of 3,000 to 6,499 and 6,500 to 10,000 members. Thus average fixed cost equals \$3.00 only at an enrollment level of 3,000.

average total cost is the summation of the fixed and variable components, it thus varies by the same absolute amount as average fixed cost. Average total cost is \$25.10 at 3,000 enrollees and declines to a low of \$23.40 at 10,000 members.

Table 2  
IPA Model: Monthly Cost Data for 1979

Number Enrollees	Total Variable Cost	Total Fixed Cost	Total Cost	Average Fixed Cost	Average Variable Cost	Average Total Cost
3,000	\$ 66,300	\$ 9,000	\$ 75,300	\$3.00	\$22.10	\$25.10
3,500	77,350	9,000	86,350	2.57	22.10	24.67
4,000	88,400	9,000	97,400	2.25	22.10	24.35
4,500	99,450	9,000	108,450	2.00	22.10	24.10
5,000	110,500	9,000	119,500	1.80	22.10	23.90
5,500	121,550	9,000	130,550	1.64	22.10	23.74
6,000	132,600	9,000	141,600	1.50	22.10	23.60
6,500	143,650	13,000	156,650	2.00	22.10	24.10
7,000	154,700	13,000	167,700	1.85	22.10	23.95
7,500	165,750	13,000	178,750	1.73	22.10	23.83
8,000	176,800	13,000	189,800	1.63	22.10	23.73
8,500	187,850	13,000	200,850	1.53	22.10	23.63
9,000	198,900	13,000	211,900	1.44	22.10	23.54
9,500	209,950	13,000	222,950	1.37	22.10	23.47
10,000	221,000	13,000	234,000	1.30	22.10	23.40

Revenue data. Only premium payments are considered a revenue source in the HMO models studied herein. The 1979 national average monthly family premium rate for IPAs was approximately \$120, with a minimum of \$84 and a maximum of \$168, indicating a wide dispersion in rates. The minimum rate of \$84 was selected as most appropriate for the purpose of assessing IPA feasibility, since rural income levels are historically low and may serve to limit enrollment. Rates for single and two-person contracts were assumed to be \$33 and \$73, respectively.<sup>3</sup>

In order to calculate average revenue (income received on a per enrollee basis), which is used in breakeven analysis, the assumptions and procedures outlined below were followed for each HMO model.

1. Contracts were assumed to be written and distributed among three rate categories as follows: single person, 40 percent; two-person, 20 percent; family (4.2 people), 40 percent. Based on this distribution the average number of individuals covered per contract was calculated to be 2.5.

$$.4 \times 1 + .2 \times 2 + .4 \times 4.2 = 2.5$$

2. The average premium per contract was calculated by weighting the specific premium for each rate category by its respective enrollee percentage distribution and then summing all components. For example, applying this procedure to the monthly IPA premium rates stated above yields an average premium per contract of \$61.40.

$$.4 \times \$33 + .2 \times \$73 + .4 \times \$84 = \$61.40$$

3. The average revenue, or income received per enrollee, is determined by dividing the average premium per contract by the average enrollment per contract. For the IPA model, average revenue is \$24.56 per month ( $\$61.40 \div 2.5$ ). This amount is used directly in breakeven analysis.

### Satellite Model

Cost and service utilization data. Monthly cost and utilization data for 1979 are presented in Table 3, which follows the same format

---

<sup>3</sup>All premium rates were based on information contained in the National HMO Census of Prepaid Plans (DHEW, Pub. No. (PHS) 80-50127, 1979) and from conversations with health care professionals and appear reasonable and representative for the rural HMO models analyzed herein.

Table 3  
Satellite Model: Monthly Projected Cost Per Enrollee for 1979

	Utiliza- tion Rate (per en- rollee)	Average Cost (per service)	Monthly Cost (per enrollee)
Variable Costs:			
A. Inpatient Hospital Services	.41	\$250.00	\$ 8.58
B. Ambulance	.01	75.00	.06
C. MD/Outpatient Services			
1. Primary Care			
a. Laboratory	1.50	8.00	\$ 1.00
b. X-Ray	.15	38.00	.48
2. Outpatient Referrals			
a. Outpatient Visits	.20	25.00	.42
b. Laboratory	.03	30.00	.08
c. X-Ray	.03	40.00	.10
3. Inpatient Care			
a. In-Area			.30
b. Out-of-Area			2.55
4. Emergency Room			
a. In-Area	.20	25.00	.42
b. Out-of-Area			.13
5. Mental Health			.25
SUBTOTAL MD/Outpatient Services			\$ 5.73    5.73
D. Major Medical			.33
AVERAGE VARIABLE COST*			\$14.70
Fixed Costs:			
Shared with Parent HMO			1.00
Related to Clinic Operation			11.60
AVERAGE FIXED COST**			\$12.60    12.60
AVERAGE TOTAL COST			\$27.30

\*Average variable cost and marginal cost are both assumed to remain constant and equal to \$14.70 at all enrollment levels; total cost will thus vary linearly.

\*\*Total fixed cost is \$6,300 and \$7,967 monthly, respectively, for enrollment ranges of 500 to 799 and 800 to 1,050 members. Thus average fixed cost equals \$12.60 only at an enrollment level of 500.

used for the IPA model.<sup>4</sup> The satellite's projected monthly variable cost per enrollee is \$14.70, the sum of items in parts A through D in Table 3; it is calculated in the same manner as the IPA's variable cost. However, in-plan outpatient visits are excluded from the satellite's variable cost as its physician and assistant(s) are salaried, in contrast to the IPA.

These salaries are incorporated into the satellite's fixed cost, which is composed of two parts. First, monthly costs related directly to clinic operation (salaries, lease, utilities, equipment, etc.) were estimated to be \$11.60 per enrollee. Second, it was assumed that the satellite incurred a proportionate share of its parent HMO's fixed cost. Since the satellite's maximum enrollment (1,050) was approximately one-twentieth of the parent's (20,000) this relation was used as a basis to allocate shared fixed cost. The parent's fixed cost was not explicitly budgeted in this study, thus representative monthly average fixed costs ranging from \$16 to \$24 were selected for analysis. Using this range's midpoint of \$20 for the purpose of initial analysis, the satellite's portion of shared fixed cost was calculated to be \$1. Summing this expense with the cost of clinic operation yielded a monthly average fixed cost of \$12.60, or a total fixed cost of \$6,300 for 500 enrollees. As indicated in Table 4, total fixed cost is assumed to remain at this amount through a membership level of 799. Due to the addition of a second physician's assistant required to serve a larger enrollment, total fixed cost is increased to \$7,967 monthly for a membership of 800 to 1,050.

---

<sup>4</sup>Data was acquired through visits to the Franklin Area Health Plan and the Penobscot Bay Medical Center, a Prepaid Health Care Program, and from conversations with Clinton Conant and Richard White, associated with each, respectively. In addition, further information was acquired from John Baackès of the Capital Area Community Health Plan in Latham, New York; this health plan has developed three rural satellite clinics. Notes from the Claverack Conference on satellite development held during the fall of 1978 provided further descriptive information (Paley, 1978). Finally, the 1979 National HMO Census of Prepaid Plans (DHEW, Pub. No. 80-50127, 1979) provided data on premium rates and annualized hospital and physician encounters by size, age, type, and federal certification status of plan.

Table 4  
Satellite Model: Monthly Cost Data for 1979

Number Enrollees	Total Variable Cost	Total Fixed Cost	Total Cost	Average Variable Cost	Average Fixed Cost	Average Total Cost
500	\$ 7,350	\$6,300	\$13,650	\$14.70	\$12.60	\$27.30
550	8,085	6,300	14,385	14.70	11.45	26.15
600	8,820	6,300	15,120	14.70	10.50	25.20
650	9,555	6,300	15,855	14.70	9.69	24.39
700	10,290	6,300	16,590	14.70	9.00	23.70
750	11,025	6,300	17,325	14.70	8.40	23.10
800	11,760	7,967	19,727	14.70	9.96	24.66
850	12,495	7,967	20,462	14.70	9.37	24.07
900	13,230	7,967	21,197	14.70	8.85	23.55
950	13,965	7,967	21,932	14.70	8.39	23.09
1,000	14,700	7,967	22,667	14.70	7.97	22.67
1,050	15,435	7,967	23,402	14.70	7.59	22.29

Total variable cost is calculated by multiplying the number of enrollees by the per capita variable cost of \$14.70. It thus varies linearly from a low of \$7,350 at 500 members to a high of \$15,435 at 1,050 enrollees. Summing fixed and variable costs yields total cost, which reaches a maximum of \$23,402 at an enrollment of 1,050.

Average variable cost, or cost per enrollee, is assumed to remain constant at \$14.70 at all membership levels. In contrast, average fixed cost declines from a high of \$12.60 to a low of \$7.59 at enrollments of 500 and 1,050, respectively. Average total cost, which is used directly in breakeven analysis, is the summation of average fixed and variable



expenses. It varies by approximately \$5.00 between the highest and lowest enrollment levels, equalling \$27.30 and \$22.29 at 500 and 1,050 members, respectively.

Revenue data. Representative premium rates for the satellite model were based on the same data sources and were calculated by following the identical procedure and assumptions used for the IPA model. A wide distribution of family premium rates also characterizes satellite HMOs. The highest 1979 rate was approximately \$170, with an average of \$108 and a low of \$73. The monthly premium rates selected for analysis were: family, \$90.50; two-person, \$79; single person, \$36. Applying the same three-step procedure used for the IPA model to these rates yielded an average revenue of \$26.56, which is used directly in breakeven analysis.

### ANALYSIS

The purpose of the following analysis is to assess the financial viability of each HMO model. Initially a benchmark model depicting the financial position of each HMO at a particular enrollment level is established. This benchmark model serves as a reference point for further analysis. In particular, sensitivity analysis is used to determine the effect of changing the utilization rate of a key health care service on an HMO's financial position. This procedure changes the value of one cost item while maintaining all others at a predetermined level, thus permitting an assessment of its relative importance to the HMO's financial viability. Sensitivity analysis is applied to selected health care services for each HMO model. In the IPA they are: inpatient hospital services, in-plan outpatient physician visits and outpatient referral visits. Inpatient hospital services and outpatient referral visits are then examined in the satellite model.

#### Individual Practice Association Model

Benchmark model. Breakeven analysis is typically presented using total revenue and total cost data to calculate profit (loss) at various output levels. However, average revenue and average cost data are used to determine breakeven enrollment levels in the HMO models analyzed

herein. The advantage of this approach is that the effects of revenue, cost, and utilization rate changes can more readily and meaningfully be assessed on a per enrollee basis. Once this information is ascertained, only one additional calculation is required to determine the effect on total net returns.

Breakeven analysis, as shown in Table 5, will be conducted by subtracting average total cost from average revenue to determine net returns on a per enrollee basis. This figure is then multiplied by the corresponding number of enrollees to calculate total net returns. The benchmark model breakeven enrollment level, as indicated in Table 5, occurs at 3,657 enrollees. Thus, based on the IPA's particular cost and revenue structure it must enroll at least this many individuals to remain financially viable. Below 3,657 enrollees the IPA incurs monthly losses of \$385 and \$1,610 at memberships of 3,500 and 3,000, respectively. Conversely, beyond the breakeven point the IPA becomes progressively more profitable, earning \$11,600 monthly with 10,000 enrollees.

#### Sensitivity Analysis

##### Effects of changing the inpatient hospital service utilization rate.

Inpatient hospital services is the largest single expense for the IPA equalling \$10.42 in the benchmark model and constituting 47 percent of average variable cost. Therefore an unanticipated increase in the utilization rate of this service may substantially affect the IPA's ability to cover all its costs. The 1979 national IPA average utilization rate of .500 was used in the IPA benchmark model. However, this rate ranged nationally from a low of 62 per 1,000 enrollees to a maximum of 1,310 per 1,000, indicating its potentially large variability. In order to assess the effect of an unanticipated change in this expense, its utilization rate is conservatively increased in a two-step incremental process from .500 to .538 and then to .575.

When the utilization rate is increased from .500 to .538, holding all other variables constant, the cost of inpatient hospital services rises from \$10.42 to \$11.21, or an increase in average total cost of \$.79. This seemingly small change substantially alters the IPA's profit position as

Table 5  
 IPA Benchmark Model: Net Returns Per Month  
 at Selected Enrollment Levels, 1979

Number Enrollees	Average Revenue	Average Total Cost	Average Net Returns	Total Net Returns
3,000	\$24.56	\$25.10	- \$.54	- \$ 1,620
3,500	24.56	24.67	- .11	- 385
3,657*	24.56	24.56	--	--
4,000	24.56	24.35	+ .21	+ 840
4,500	24.56	24.10	+ .46	+ 2,070
5,000	24.56	23.90	+ .66	+ 3,300
5,500	24.56	23.74	+ .82	+ 4,510
6,000	24.56	23.60	+ .96	+ 5,760
6,500	24.56	24.10	+ .46	+ 2,990
7,000	24.56	23.95	+ .61	+ 4,270
7,500	24.56	23.83	+ .73	+ 5,475
8,000	24.56	23.73	+ .83	+ 6,640
8,500	24.56	23.63	+ .93	+ 7,905
9,000	24.56	23.54	+ 1.02	+ 9,180
9,500	24.56	23.47	+ 1.09	+ 10,355
10,000	24.56	23.40	+ 1.16	+ 11,600

\*Represents the breakeven enrollment level.

illustrated in Table 6. The breakeven enrollment level has increased markedly from 3,657 to 5,399 members. In addition, although the IPA makes a modest profit of \$1,020 with 6,000 enrollees, it now must serve 9,000 to 10,000 members to attain a stronger financial position. If the IPA is to serve an enrollment of 6,500 to 10,000 it incurs increased fixed costs. Within this enrollment range, as depicted in Table 6, its net returns vary from negative to positive with a new breakeven point at 7,792 members.

A second incremental rate increase from .538 to .575 would place the IPA in an even more precarious financial situation. Its monthly hospital service cost would now be \$11.98, a \$1.56 increase over the .500 benchmark utilization rate. The IPA would incur a loss at every enrollment level, as shown in Table 6, with a minimum loss of \$3,600 at an enrollment of 6,000. These examples illustrate how critical this particular expense is to the overall financial success of the IPA model. Should the IPA's projected utilization rate be even modestly exceeded, the IPA may incur a loss.

Effects of changing the utilization rate of in-plan outpatient physician visits. In the IPA benchmark model, monthly in-plan outpatient physician visits are projected to cost \$4.00 per enrollee, approximately 18 percent of average variable cost. This expense is based on an annual utilization rate of three visits per enrollee and an average cost per visit of \$16.00. Since the substitution of ambulatory services for in-patient hospital services is considered to be a major source of savings for HMOs, this particular cost must be carefully monitored.

Outpatient physician visits in 1979 ranged nationally from a low of 0.6 to a high of 7.4, with the average being 3.4. Incremental increases in this utilization rate are examined in a two-step process, moving from 3.0 to 3.4 and then to 3.8. The monthly cost of outpatient physician visits rises from \$4.00 to \$4.53 when the utilization rate is increased from 3.0 to 3.4. On an annual basis this means that physician encounters have increased from 3,000 to 3,400 per 1,000 enrollees, a 13 percent rise. When compared to the benchmark model Table 7 indicates that net returns are reduced at all enrollment levels. As a result, the breakeven enrollment level is increased by approximately 1,000 members, from the

Table 6

IPA Model: Effect of an Increase in the Utilization Rate of Inpatient Hospital Services on Monthly Net Returns, 1979\*

Number Enrollees	Average Revenue	Utilization Rate = .538			Utilization Rate = .575		
		Average Total Cost	Average Net Returns	Total Net Returns	Average Total Cost	Average Net Returns	Total Net Returns
3,000	\$24.56	\$25.89	-\$1.33	-\$3,990	\$26.66	-\$2.10	-\$6,300
3,500	24.56	25.46	-.90	- 3,150	26.23	- 1.67	- 5,845
4,000	24.56	25.14	-.58	- 2,320	25.91	- 1.35	- 5,400
4,500	24.56	24.89	-.33	- 1,485	25.66	- 1.10	- 4,950
5,000	24.56	24.69	-.13	- 650	25.46	-.90	- 4,500
5,399**	24.56	24.56	--	--			
5,500	24.56	24.53	+.03	+ 165	25.30	-.74	- 4,070
6,000	24.56	24.39	+.17	+ 1,020	25.16	-.60	- 3,600
6,500	24.56	24.89	-.33	- 2,145	25.66	- 1.10	- 7,150
7,000	24.56	24.74	-.18	- 1,260	25.51	-.95	- 6,650
7,500	24.56	24.62	-.06	- 450	25.39	-.83	- 6,225
7,792**	24.56	24.56	--	--			
8,000	24.56	24.52	+.04	+ 320	25.29	-.73	- 5,840
8,500	24.56	24.42	+.14	+ 1,190	25.19	-.63	- 5,355
9,000	24.56	24.33	+.23	+ 2,070	25.10	-.54	- 4,860
9,500	24.56	24.26	+.30	+ 2,850	25.03	-.47	- 4,465
10,000	24.56	24.19	+.37	+ 3,700	24.96	-.40	- 4,000

\*All revenue and costs are benchmark model data except the inpatient hospital services expense, which is calculated by varying the benchmark utilization rate of .500 to the rates indicated in this table.

\*\*These enrollment levels represent breakeven points for inpatient hospital services utilization rates of .538 and .575.

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 789

Table 7

IPA Model: Effect on Monthly Net Returns of an Increase in the Utilization Rate of In-Plan Outpatient Physician Visits, 1979\*

Number Enrollees	Average Revenue	Utilization Rate = 3.4			Utilization Rate - 3.8		
		Average Total Cost	Average Net Returns	Total Net Returns	Average Total Cost	Average Net Returns	Total Net Returns
3,000	\$24.56	\$25.63	- \$1.07	- \$3,210	\$26.17	- \$1.61	- \$4,830
3,500	24.56	25.20	- 0.64	- 2,240	25.74	- 1.18	- 4,130
4,000	24.56	24.88	- 0.32	- 1,280	25.42	- 0.86	- 3,440
4,500	24.56	24.63	- 0.07	- 315	25.17	- 0.61	- 2,745
4,663**	24.56	24.56	--	--			
5,000	24.56	24.43	+ 0.13	+ 650	24.97	- 0.41	- 2,050
5,500	24.56	24.27	+ 0.29	+ 1,595	24.81	- 0.25	- 1,375
6,000	24.56	24.13	+ 0.43	+ 2,580	24.67	- 0.11	- 660
6,500	24.56	24.63	- 0.07	- 455	25.17	- 0.61	- 3,965
7,000	24.56	24.48	+ 0.08	+ 560	25.02	- 0.46	- 3,220
7,500	24.56	24.36	+ 0.20	+ 1,500	24.90	- 0.34	- 2,550
8,000	24.56	24.26	+ 0.30	+ 2,400	24.80	- 0.24	- 1,920
8,500	24.56	24.16	+ 0.40	+ 3,400	24.70	- 0.14	- 1,190
9,000	24.56	24.07	+ 0.49	+ 4,410	24.61	- 0.05	- 450
9,352**					24.56		
9,500	24.56	24.00	+ 0.56	+ 5,320	24.54	+ 0.02	+ 190
10,000	24.56	23.93	+ 0.63	+ 6,300	24.47	+ 0.09	+ 900

\*All revenue and costs are benchmark model data except the in-plan outpatient physician visit expense, which is calculated by varying the benchmark utilization rate of 3.0 to the rates indicated in this table.

\*\*The enrollment levels 4,663 and 9,352 represent breakeven points for in-plan outpatient physician visit utilization rates of 3.4 and 3.8, respectively.

benchmark level of 3,657 to 4,663. Alternatively viewed, if the IPA's revenue previously had been exactly covering all costs with 3,657 enrollees, this utilization increase would cause a monthly loss of \$1,938 at that enrollment.

When the utilization rate is increased from 3.4 to 3.8 the monthly cost of outpatient physician visits becomes \$5.07, a 27 percent rise over the benchmark cost of \$4.00. As shown in Table 7, the IPA now incurs a loss at all enrollment levels below 9,352, its breakeven point. The largest loss of \$4,830 monthly, or \$57,960 annually, occurs with only 3,000 members. The magnitude of the loss steadily declines as the number of individuals covered expands, except at the 6,500 level where fixed costs were incrementally increased. Assuming the average premium rate and all other costs remain at their benchmark level, the IPA must enroll close to its maximum capacity to avoid a loss and remain financially viable.

*Effects of changing the utilization of outpatient referral visits.*

Outpatient referral visits constitute only 1.5 percent of average variable cost, however this expense is not subject to the same degree of control by the IPA as services and costs of its own physicians. A utilization rate of 0.10 was assumed in the IPA benchmark model. However, this rate may vary significantly depending upon the number of specialists who belong to the IPA. This detail was not incorporated into the present model but should be considered in a case-study approach. The relative importance of this expense is examined by incrementally increasing its utilization rate from 0.10 to 0.20 and then to 0.30. Based on discussions with health-care professionals these rates seem representative for a rural IPA.

When the utilization rate is increased from 0.10 to 0.20, the monthly expense rises from \$.33 to \$.67; average total cost is thus increased by \$.34 at each enrollment level. As a result, net receipts are decreased at each enrollment. Also, the breakeven point rises from the benchmark level of 3,657 to 4,245 members, as indicated in Table 8. For instance, at a membership of 7,000, profits decline from the benchmark level of \$4,270 to \$1,890.

Table 8

IPA Model: Effect of an Increase in the Utilization Rate of  
Outpatient Referral Visits on Monthly Net Returns, 1979\*

Number Enrollees	Average Revenue	Utilization Rate = .20			Utilization Rate = .30		
		Average Total Cost	Average Net Returns	Total Net Returns	Average Total Cost	Average Net Returns	Total Net Returns
3,000	\$24.56	\$25.44	- \$0.88	- \$2,640	\$25.77	- \$1.21	- \$3,630
3,500	24.56	25.01	- 0.45	- 1,575	25.34	- 0.78	- 2,730
4,000	24.56	24.69	- 0.13	- 520	25.02	- 0.46	- 1,840
4,245**	24.56	24.56	--	--			
4,500	24.56	24.44	+ 0.12	+ 540	24.77	- 0.21	- 945
5,000	24.56	24.24	+ 0.32	+ 1,600	24.57	- 0.01	- 50
5,029***					24.56	--	--
5,500	24.56	24.08	+ 0.48	+ 2,640	24.41	+ 0.15	+ 825
6,000	24.56	23.94	+ 0.62	+ 3,720	24.27	+ 0.29	+ 1,740
6,500	24.56	24.44	+ 0.12	+ 780	24.77	- 0.21	- 1,365
7,000	24.56	24.29	+ 0.27	+ 1,890	24.62	- 0.06	- 420
7,241***					24.56	--	--
7,500	24.56	24.17	+ 0.39	+ 2,925	24.50	+ 0.06	+ 450
8,000	24.56	24.07	+ 0.49	+ 3,920	24.40	+ 0.16	+ 1,280
8,500	24.56	23.97	+ 0.59	+ 5,015	24.30	+ 0.26	+ 2,210
9,000	24.56	23.88	+ 0.68	+ 6,120	24.21	+ 0.35	+ 3,150
9,500	24.56	23.81	+ 0.75	+ 7,125	24.14	+ 0.42	+ 3,990
10,000	24.56	23.74	+ 0.82	+ 8,200	24.07	+ 0.49	+ 4,900

\*All revenue and costs are benchmark model data except the outpatient referral visit expense, which is calculated by varying the benchmark utilization rate of .10 to the rates indicated in this table.

\*\*Represents the breakeven enrollment level for a utilization rate of .20.

\*\*\*These enrollment levels represent breakeven points for an outpatient referral visit utilization rate of .30.



An additional increase in the use of outpatient referrals to an annual rate of 300 visits per 1,000 enrollees would raise the average monthly expense to \$1.00 and the breakeven point to 5,029 members. Net receipts, as shown in Table 8, would be reduced further compared to the benchmark model. Note that in this example a second breakeven point exists at an enrollment of 7,241. This occurs because fixed costs were incrementally increased at a level of 6,500 members. Although this expense is only a small portion of total cost, shifts in its utilization rate may nevertheless contribute to a noticeable reduction in the IPA's net receipts. A similar experience might also be expected to occur for utilization rate changes of other proportionately small expense items.

#### Satellite Model

*Benchmark model.* Results of breakeven analysis for the satellite benchmark model are presented in Table 9. The calculation of the average revenue and average total cost figures used in this table is described in the preceding presentation of data section. The satellite exactly covers all its costs at the low end of its enrollment range, breaking even at 531 members. As enrollment increases the HMO becomes progressively more profitable, with its net returns equaling a maximum of \$4,484 per month at 1,050 enrollees.

#### Sensitivity Analysis

*Effects of changing the inpatient hospital services utilization rate.* Inpatient hospital services equals \$8.58 in the satellite benchmark model, representing 58 percent of average variable cost. The national annual average utilization rate of 412 hospital days per 1,000 enrollees was used in this calculation. However, there is a wide variation in rates nationally, ranging from a minimum of 92 to a maximum of 737 in 1979. Since this is the largest variable expense in the satellite model and may reasonably be expected to vary from its projected value within any given year, it is important to assess the financial impact of such variation.

The effect of an unanticipated increase in this cost is investigated by incrementally raising the utilization rate in a two-step process from

Table 9  
 Satellite Benchmark Model: Net Returns Per Month at  
 Selected Enrollment Levels, 1979

Number Enrollees	Average Revenue	Average Total Cost	Average Profit (Loss)	Total Profit (Loss)
500	\$26.56	\$27.30	- \$ .74	- \$ 370
531*	26.56	26.56	--	--
550	26.56	26.15	+ .41	+ 226
600	26.56	25.20	+ 1.36	+ 816
650	26.56	24.39	+ 2.17	+ 1,410
700	26.56	23.70	+ 2.86	+ 2,002
750	26.56	23.10	+ 3.46	+ 2,595
800	26.56	24.66	+ 1.90	+ 1,520
850	26.56	24.07	+ 2.49	+ 2,116
900	26.56	23.55	+ 3.01	+ 2,709
950	26.56	23.09	+ 3.47	+ 3,296
1,000	26.56	22.67	+ 3.89	+ 3,890
1,050	26.56	22.29	+ 4.27	+ 4,484

\*Represents the breakeven enrollment level.

.412 to .456 and then to .500. When the utilization rate is set equal to .456 the monthly per enrollee cost of inpatient hospital services increases to \$9.50, a \$.92 rise over the benchmark model cost. As a result the breakeven enrollment level increases from 531 to 576, as shown in Table 10. Thus the HMO must now enroll 45 more members if it is to cover all costs without increasing its premiums. Alternatively, if the satellite's

enrollment were to remain at 531, it would incur a monthly loss of \$489 instead of breaking even.

A second utilization rate increase from .456 to .500 would further reduce the satellite's net returns and increase the breakeven point to 629 members, as shown in Table 10. Compared to the benchmark model this utilization rate results in a \$1.84 increase in average total cost at all enrollment levels, substantially reducing net returns. More specifically, net returns decrease by approximately \$2,000 per month compared to the benchmark model at the 1,050 membership level. Thus an unexpected increase in the use of inpatient hospital services may seriously impair the satellite's ability to remain financially viable.

Effects of changing the utilization of outpatient referral visits.

The satellite makes outpatient referrals largely to specialists on the parent HMO staff. Utilization of the satellite's own physician and assistant(s) does not affect the variable cost structure since its staff is salaried. The benchmark utilization rate of the satellite (.200) is higher than the IPA (.100) because all services other than primary care must be referred outside the satellite clinic to specialists.

A large variation in utilization rates characterizes outpatient referrals. For each additional 100 referrals per 1,000 enrollees annually, average total cost increases by \$.21. Thus at a utilization rate of .300 this expense rises from \$.42 to \$.63 and the breakeven enrollment level increases by 10 members, from 531 to 541. If the utilization rate were to double to .400 from the benchmark level of .200 monthly outpatient referral cost would be \$.84 per enrollee. As shown in Table 11 the breakeven point would increase to 551 members. In addition, the positive net return of \$226 monthly at 550 enrollees in the benchmark model would now be reduced to zero.

#### COMPARISON OF THE TWO HMO MODELS

The IPA and satellite models can be compared on the basis of their financial and physical accessibility to the potential enrollee population. The health care coverage provided by each HMO model can reasonably be

Table 10  
 Satellite Model: Effect of an Increase in the Utilization Rate  
 of Inpatient Hospital Services on  
 Monthly Net Returns, 1979\*

Number Enrollees	Average Revenue	Utilization Rate = .456			Utilization Rate = .500		
		Average Total Cost	Average Net Returns	Total Net Returns	Average Total Cost	Average Net Returns	Total Net Returns
500	\$26.56	\$28.22	-\$1.66	-\$ 830	\$29.14	-\$2.58	-\$1,290
550	26.56	27.07	- 0.51	- 280	27.99	- 1.43	- 786
576**	26.56	26.56	--	--			
600	26.56	26.12	+ 0.44	+ 264	27.04	- 0.48	- 288
629**					26.56	--	--
650	26.56	25.31	+ 1.25	+ 812	26.23	+ 0.33	+ 214
700	26.56	24.62	+ 1.94	+ 1,358	25.54	+ 1.02	+ 714
750	26.56	24.02	+ 2.54	+ 1,905	24.94	+ 1.62	+ 1,215
800	26.56	25.58	+ 0.98	+ 784	26.50	+ 0.06	+ 48
850	26.56	24.99	+ 1.57	+ 1,334	25.91	+ 0.65	+ 552
900	26.56	24.47	+ 2.09	+ 1,881	25.39	+ 1.17	+ 1,053
950	26.56	24.01	+ 2.55	+ 2,422	24.93	+ 1.63	+ 1,548
1,000	26.56	23.59	+ 2.97	+ 2,970	24.51	+ 2.05	+ 2,050
1,050	26.56	23.21	+ 3.35	+ 3,518	24.13	+ 2.43	+ 2,552

\*All revenue and costs are benchmark model data except the inpatient hospital services expense, which is calculated by varying the benchmark utilization rate of .412 to the rates indicated in this table.

\*\*The enrollment levels 576 and 629 represent breakeven points for inpatient hospital services utilization rates of .456 and .500 respectively.

assumed to represent an improvement over typical existing patterns of rural health care, which are often fragmented and less than comprehensive.

Table 11  
 Satellite Model: Effect of an Increase in the Utilization  
 Rate of Outpatient Referral Visits on  
 Monthly Net Returns, 1979\*

Number Enrollees	Average Revenue	Average Total Cost	Average Net Returns	Total Net Returns
500	\$26.56	\$27.72	- \$1.16	- \$ 580
550	26.56	26.57	- 0.01	- 5
551**	26.56	26.56	--	--
600	26.56	25.62	+ 0.94	+ 564
650	26.56	24.81	+ 1.75	+ 1,138
700	26.56	24.12	+ 2.44	+ 1,708
750	26.56	23.52	+ 3.04	+ 2,280
800	26.56	25.08	+ 1.48	+ 1,184
850	26.56	24.49	+ 2.07	+ 1,760
900	26.56	23.97	+ 2.59	+ 2,331
950	26.56	23.51	+ 3.05	+ 2,898
1,000	26.56	23.09	+ 3.47	+ 3,470
1,050	26.56	22.71	+ 3.85	+ 4,042

\*All revenue and costs are benchmark model data except the outpatient referral visit expense, which is based on a utilization rate of .400.

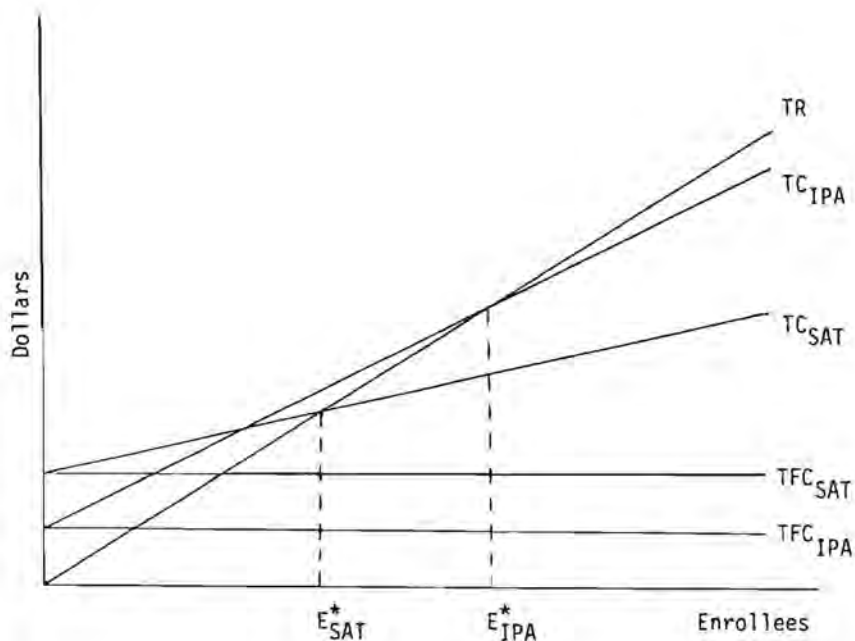
\*\*Represents the breakeven enrollment level.

A comparison of per capita costs of providing care in each benchmark model (see Tables 2, 4) reveals that neither HMO has a significant overall advantage. For instance, although the IPA's monthly average total cost of \$25.10 is lower than the satellite's cost of \$27.30 at their respective minimum enrollment levels, this situation reverses itself as enrollments increase. At the highest enrollment levels considered in each model the satellite is projected to incur a monthly per capita cost of \$22.29, which is lower than the IPA's cost of \$23.40. Thus no significant cost advantage can be attributed to either model.

Although no significant advantage accrues to either model on the basis of comparing per capital costs, a marked difference in the composition of each HMO's cost structure is evident (see Tables 2, 4). For instance, at each HMO's minimum enrollment level average variable cost comprises 88 and 54 percent of average total cost in the IPA and satellite models, respectively. This makes the IPA's cost of providing service potentially more variable and its financial position less stable than the satellite's.

Figure 3 illustrates this basic difference between the two HMO's cost structures. Although the satellite's fixed cost is greater than the IPA's, the satellite's lower average variable cost (which equals marginal cost since average variable cost is constant) is reflected in the slope of its total cost curve, which is noticeably less steep than that of the IPA. In addition, Figure 3 also depicts a total revenue line and the resulting breakeven points for each HMO. Should an unanticipated increase of equal magnitude occur in the same variable cost item for each HMO, the IPA's enrollment level would have to be increased proportionately more than the satellite's in order to breakeven. This conclusion is supported by previous analyses of the effects of unexpected utilization rate changes. Graphically such an increase in variable cost would be represented by an upward rotation of each HMO's total cost curve. It is evident from Figure 3 that the IPA's breakeven enrollment level would be increased proportionately more than the satellite's. Thus the lower variable cost of the satellite makes it less financially vulnerable to the risks of service overutilization or unit cost increases than the IPA.

Figure 3. A Comparison of the IPA and Satellite Models' Cost Structures



In addition to financial considerations, the organizational structure and physical accessibility of each HMO model are important and must be considered. It is apparent that the major requirement for satellite development, namely, an urban sponsor, may not necessarily be readily available. The satellite service area must be within one and a half hours of a major urban area that can support a large HMO. There may be very few urban areas in the country that are both contiguous to medically underserved rural areas and sufficiently populated for expansion purposes. Also, the urban HMO must have reached a point in its development whereby expansion is beneficial. Also, the satellite must be accessible to a primary market of sufficient size to support itself.

Local physician disposition and the general environment for satellite development also must be assessed. Satellites refer a significant proportion of enrollees requiring hospitalization to their urban HMO affiliated hospital(s). This may contradict expectations of the local hospital administration, depending upon the level of expertise at that hospital. Arrangements that are not counterproductive to proper care for enrollees must be organized, and the local provider community, both hospital and physician, must not be disenfranchised.

In contrast to the satellite, the service sites of the IPA are geographically dispersed, giving the IPA greater marketing opportunities than the satellite. The lower administrative and overhead requirements of the IPA are advantageous to expansion, as well. However, market feasibility and ease of expansion must be reinforced by development of support and cooperation of physicians from different geographic locations. Thus the quality of medical care when services are delivered over large areas must be carefully monitored and maintained.

#### SUMMARY AND CONCLUSIONS

This study used breakeven analysis to assess the financial feasibility of two HMO models which have received considerable support from health-care professionals as potentially viable organizations in rural areas. The two models analyzed, the IPA and satellite clinic, represent quite different organizational and financial structures. The rural satellite clinic is an expansion of an existing, urban-centered HMO. It is designed to serve a limited number of enrollees (500-1,050) who reside in a small, rural geographic area within a one and one-half hour drive from an urban-based, parent HMO. In contrast, the IPA is organized to serve 3,000 to 10,000 enrollees who reside in a much wider geographic region. The IPA does not require a clinic since participating physicians utilize their existing practice sites.

The financial viability of each HMO model was assessed by utilizing average national per unit cost and utilization rate data in conjunction with lower than average national premium rate data. Since rural income levels are historically low and may act to limit enrollment this



conservative approach was employed. Nevertheless, the comprehensive health care coverage of both HMO models still can reasonably be assumed to represent an improvement over typical coverage available in most rural communities.

Analysis revealed that the IPA benchmark model requires 3,657 enrollees to breakeven. However, if key projected utilization rates are even modestly exceeded, this situation may change markedly. For instance, if the utilization rate of inpatient hospital services were to increase from .500 to .538 the IPA would have to enroll 5,399 persons to exactly cover its costs. This represents an increase of 1,742 individuals, or a 48 percent change. Thus a relatively modest, unexpected utilization rate increase in a key expense may create a financial burden for the IPA. In contrast, if the satellite were to experience a similar unplanned increase, it would not be as adversely affected. For example, a comparable increase in its inpatient hospital utilization rate would raise the breakeven enrollment from 531 to 576, an 8 percent change. Thus the satellite is not as adversely affected as the IPA as the result of an unexpected utilization rate increase.

The satellite's greater financial stability can be attributed to the fact that only 50 percent of its average total cost is variable whereas the IPA's variable cost comprises 90 percent of its total. Thus the IPA's cost of providing service is potentially more volatile and its financial position less stable than the satellite's. Although the composition of each HMO's cost structure differs significantly, the average total costs of providing care in each model are nearly the same.

Accurate estimation of utilization rates and unit costs thus are prime determinants of future HMO financial feasibility. Unexpected increases in either item can only be counteracted by two measures. Either enrollment levels, premium rates, or some combination of both must be increased in order for the HMO to cover its costs. The prospect of an enrollment increase in the short-run is unlikely given rural market limitations. Also, most HMO plans normally contract with subscribers to provide services at a previously agreed upon premium rate. Therefore,

particularly in the short-run, accurate projections of unit costs and utilization rates are prerequisites to HMO financial viability.

Although the satellite exhibits greater financial stability than the IPA, its organizational requirements pose certain unique problems. It must have a primary market of sufficient size to support itself and be located within one and one-half hours of its urban-based, parent HMO. Few urban areas exist that are both contiguous to medically underserved rural areas and are sufficiently populated themselves to undertake expansion. Since the satellite refers a significant proportion of its enrollees requiring hospitalization to its parent HMO, care must be taken not to disenfranchise the local medical community. In contrast, the IPA's service sites are dispersed over a wider geographic area, giving it greater marketing opportunities than the satellite. Also, its lower administrative and overhead costs are advantages for expansion purposes.

It can be concluded that each model is potentially viable in a particular rural setting. Their success will depend in part on the extent to which they provide high quality, cost effective basic coverage to a significant proportion of the population.

REFERENCES CITED

1. A'Hearn C. 1979. Health care in rural America; Economic Development Division; Economics, Statistics, and Cooperatives Service; U.S. Department of Agriculture; Agriculture Information Bulletin No. 428; Washington, D.C.
2. Burke, Richard F. 1972. A review of the experience of two small HMOs; Interstudy; Minneapolis, Minnesota.
3. Malcolm, Jan and Paul W. Ellwood, Jr. 1979. Competitive approach may ease problems in delivery system; Hospitals, Journal of the American Hospital Association. 53(16):66-69.
4. Paley, Warren and Thomas Bickman. 1978. Report on conference on extending HMO prepayment to rural areas; Claverack, New York, Sept. 29, 30, and Oct. 1, 1978. The Caldwell B. Esselstyn Foundation, Claverack, New York.
5. U.S. Department of Health, Education, and Welfare. 1974. Bureau of Community Services; HMO Feasibility Study Guide; (Prepared by Arthur Young & Co.); Rockville, Maryland; DHEW Pub. No. (HSA) 74-13020.
6. U.S. Department of Health, Education, and Welfare. 1979. Office of Health Maintenance Organizations; National HMO Census of prepaid plans; Rockville, Maryland; Pub. No. (PHS) 80-50127.

Appendix A

BASIC BENEFIT PLAN

AMBULATORY SERVICES

- Physician office visits
- Consultations with and treatment by specialists
- 24 hour emergency services in and outside the area
- Immunizations and inoculations
- Chronic ambulatory maintenance and follow-up
- Pre and post natal care
- Periodic screening and physical exams
- Diagnostic services, such as laboratory and x-ray
- Rehabilitation
- Physio-therapy
- Enrollee education
- Mental health services (usually limited to crisis care and diagnosis, and cases with physical symptoms)
- Ambulance services, if authorized

HOSPITAL SERVICES

- Semi-private accommodations
- Use of operating, delivery, or treatment rooms
- Anesthesia, medication, and oxygen
- Use of special care units
- Laboratory and x-ray examinations
- Radiation and physical therapy
- Psychiatric inpatient care, including alcoholism and drug abuse, not to exceed 31 days - cumulative in a year

REINSURANCE

- Covers medical expenses over \$7,500, and up to \$25,000 per individual for a calendar year

MAJOR MEDICAL

- Includes prescription drugs, prosthetics, oral surgery as the result of accidents, durable equipment

Appendix B

SPECIFIC ASSUMPTIONS OF THE IPA MODEL

ORGANIZATION

- Non-profit, non-federally certified HMO of the IPA type

SPONSORSHIP

- Community-based

RISK-SHARERS

- IPA physicians
- Plan
- Insurance company

REIMBURSEMENT SYSTEMS

Physicians

- General capitation determined fund; payment on fee-for-service basis

Hospital and Other Services

- Usual billing rates unless modified by contractual arrangements

Fixed Cost Expenses

- Reinsurance
- Administration
- Contingency loading
- Coordination of benefits

ADMINISTRATIVE COST EXPENSES

Personnel

- Medical director (1 day per week)
- Administrative assistant
- Accounting
- Two clerical staff (1 part-time; 1 full-time)

Appendix B (continued)

SPECIFIC ASSUMPTIONS OF THE IPA MODEL

ADMINISTRATIVE COST EXPENSES (continued)

Other

- Space lease
- Utilities
- Office supplies
- Janitorial
- Travel
- Financial consulting
- Data processing
- Legal auditing

MARKET STRUCTURE

- |                                            |                |
|--------------------------------------------|----------------|
| - Geographical population of service area: | 100,000        |
| - Primary market population:               | 40,000         |
| - Range of enrollment population:          | 3,000 - 10,000 |

COMPOSITION OF PHYSICIAN POPULATION

- Primary care; some specialists

PHYSICIAN PRACTICE LOCATION

- Individual physician's offices

Appendix C

SPECIFIC ASSUMPTIONS OF THE SATELLITE MODEL

ORGANIZATION

- Non-profit, non-federally certified satellite clinic of the staff type

SPONSORSHIP

- Urban HMO (enrollment population: 20,000)

RISK-SUARERS

- Legal entitles associated with parent HMO

REIMBURSEMENT SYSTEM

Physician

- Salaried

Hospital and Other Services

- Contractual through parent HMO; actual billing rates through local hospital

Fixed Costs Shared with Parent HMO

- Reinsurance
- Administration
- Contingency loading
- Coordination of benefits
- Supplies

Direct Fixed Costs of Clinic Operation

- Personnel: physician, physician's assistant, receptionist (part-time)
- Clinic: lease, utilities

MARKET STRUCTURE

- Geographical population of service area: 14,000
- Primary market population: 5,600
- Range of enrollment population: 500 - 1,050

Appendix C (continued)

SPECIFIC ASSUMPTIONS OF THE SATELLITE MODEL

PHYSICIAN PRACTICE LOCATION

- Satellite clinic
- Parent HMO, satellite clinic

COMPOSITION OF PHYSICIAN POPULATION

- One primary care staff physician at satellite clinic
- Physicians participating in parent HMO, mainly specialists